ICOM

SERVICE MANUAL

VHF MARINE TRANSCEVER

IC–M411

S-14414XZ-C1
Nov. 2007

Icom Inc.

INTRODUCTION

This service manual describes the latest service information for the **IC-M411** VHF MARINE TRANSCEVER at the time of publication.

MODEL	VERSION	CHANNEL GROUPE
IC-M411	UK	Inter National, U.S.A.
	EUR	International
	HOL	International, ATIS
	FRG	International, DSC, ATIS
	EUR-1	International

UNIT ABBREVIATIONS:
FR= FRONT UNIT, LG= LOGIC UNIT, MA= MAIN UNIT

CAUTION

NEVER connect the transceiver to an AC outlet or to a DC power supply that uses more than specifed. 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.

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

ORDERING PARTS

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

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

<ORDER EXAMPLE>

1110003491	S.IC	TA31136FNG	IC-M411	MAIN UNIT	5 pieces
8820001210	Screw	2438 screw	IC-M411	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 40 dB to 50 dB attenuator between the transceiver and a Deviation Meter or Spectrum Analyzer when using such test equipment.
8. **READ** the instructions of test equipment throughly before connecting a test equipment to the transceiver.

CONTENTS

SECTION 1 SPECIFICATIONS

■ General

- Frequency coverage : Tx 156.000–161.450 MHz
  Rx 156.000–163.425 MHz
- Mode : FM (16K0G3E),
  DSC (16K0G2B)
- Channel spacing : 25 kHz
- Current drain (at 13.8 V) : TX high 5.5 A max.
  Max. audio 1.5 A max.
- Power supply requirement : 13.8 V DC (10.8 to 15.6 V)
  (negative ground)
- Frequency stability : Less than ±1.5 kHz
- Operating temp. range : –20°C to +60°C
- Antenna impedance : 50 Ω nominal
- Input impedance (MIC) : 2 kΩ
- Output impedance (audio) : 4 Ω
- Dimensions : 164(W) × 78(H) × 139.5(D) mm
  (Projections not included)
- Weight : Approx. 1080 g

■ Transmitter

- RF output power : 25 W/1 W
- Modulation system : Variable reactance frequency modulation
- Max. frequency deviation : ±5.0 kHz
- Spurious emissions : Less than 0.25 µW
- Adjacent channel power : More than 70 dB
- Audio harmonic distortion : Less than 10%
  (at 60% deviation)
- Residual modulation : More than 40 dB
- Audio frequency response : +1 to –3 dB of 6 dB/octave range from 300 to 3000 Hz

■ Receiver

- Receive system : Double conversion superheterodyne
- Sensitivity (20 dB SINAD) : –5 dBµ emf (typical)
- Squelch sensitivity : Less than –2 dBµ emf
- Intermodulation rejection ratio : More than 68 dB
- Spurious response rejection ratio : More than 70 dB
- Adjacent channel selectivity : More than 70 dB
- Audio output power : More than 2.0 W at 10% distortion with a 4 Ω load

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

• International channels

CH	Frequency (MHz)		CH	Frequency (MHz)		CH	Frequency (MHz)		CH	Frequency (MHz)		CH	Frequency (MHz)		CH	Frequency (MHz)	
	Transmit	Receive		Transmit	Receive		Transmit	Receive		Transmit	Receive		Transmit	Receive		Transmit	Receive
01	156.050	160.650	11	156.550	156.550	21	157.050	161.650	61	156.075	160.675	71	156.575	156.575	81	157.075	161.675
02	156.100	160.700	12	156.600	156.600	22	157.100	161.700	62	156.125	160.725	72	156.625	156.625	82	157.125	161.725
03	156.150	160.750	13	156.650	156.650	23	157.150	161.750	63	156.175	160.775	73	156.675	156.675	83	157.175	161.775
04	156.200	160.800	14	156.700	156.700	24	157.200	161.800	64	156.225	160.825	74	156.725	156.725	84	157.225	161.825
05	156.250	160.850	15*2	156.750	156.750	25	157.250	161.850	65	156.275	160.875	75*4	156.775	156.775	85	157.275	161.875
06	156.300	156.300	16	156.800	156.800	26	157.300	161.900	66	156.325	160.925	76*4	156.825	156.825	86	157.325	161.925
07	156.350	160.950	17*2	156.850	156.850	27	157.350	161.950	67	156.375	156.375	77	156.875	156.875	87	157.375	157.375
08	156.400	156.400	18	156.900	161.500	28	157.400	162.000	68	156.425	156.425	78	156.925	161.525	88	157.425	157.425
09	156.450	156.450	19	156.950	161.550	37A*3	157.850	157.850	69	156.475	156.475	79	156.975	161.575	P4*3	161.425	161.425
10	156.500	156.500	20	157.000	161.600	60	156.025	160.625	70*1	156.525	156.525	80	157.025	161.625			

*1 DSC operation only.

*2 Channels 15 and 17 may also be used for on-board communications provided the effective radiated power does not exceed 1 W, and subject to the national regulations of the administration concerned when these channels are used in its territorial waters.

*3 UK Marina Channels: M1=37A (157.850 MHz), M2=P4 (161.425 MHz) for U.K. version only

*4 The use of these channels should be restricted to navigation-related communications only and all precautions should be taken to avoid harmful interference to channel 16, e.g. by limiting the output power to 1 W or by means geographical separation.

• USA channels (for U.K. version only)

CH	Frequency (MHz)		CH	Frequency (MHz)		CH	Frequency (MHz)		CH	Frequency (MHz)		CH	Frequency (MHz)		CH	Frequency (MHz)	
	Transmit	Receive		Transmit	Receive		Transmit	Receive		Transmit	Receive		Transmit	Receive		Transmit	Receive
01A	156.050	156.050	12	156.600	156.600	22A	157.100	157.100	64A	156.225	156.225	75*1	156.775	156.775	85	157.275	161.875
- -	- - -	- - -	13*2	156.650	156.650	23A	157.150	157.150	65A	156.275	156.275	76*1	156.825	156.825	85A	157.275	157.275
03A	156.150	156.150	14	156.700	156.700	24	157.200	161.800	66A	156.325	156.325	77*1	156.875	156.875	86	157.325	161.925
- -	- - -	- - -	15*2	156.750	156.750	25	157.250	161.850	67*2	156.375	156.375	78A	156.925	156.925	86A	157.325	157.325
05A	156.250	156.250	16	156.800	156.800	26	157.300	161.900	68	156.425	156.425	79A	156.975	156.975	87	157.375	161.975
06	156.300	156.300	17*1	156.850	156.850	27	157.350	161.950	69	156.475	156.475	80A	157.025	157.025	87A	157.375	157.375
07A	156.350	156.350	18A	156.900	156.900	28	157.400	162.000	70*3	156.525	156.525	81A	157.075	157.075	88	157.425	162.025
08	156.400	156.400	19A	156.950	156.950	37A*4	157.850	157.850	71	156.575	156.575	82A	157.125	157.125	88A	157.425	157.425
09	156.450	156.450	20	157.000	161.600	61A	156.075	156.075	72	156.625	156.625	83A	157.175	157.175	P4*4	161.425	161.425
10	156.500	156.500	20A	157.000	157.000	- -	- - -	- - -	73	156.675	156.675	84	157.225	161.825			
11	156.550	156.550	21A	157.050	157.050	63A	156.175	156.175	74	156.725	156.725	84A	157.225	157.225			

*1 Low power only.

*2 Momentary high power.

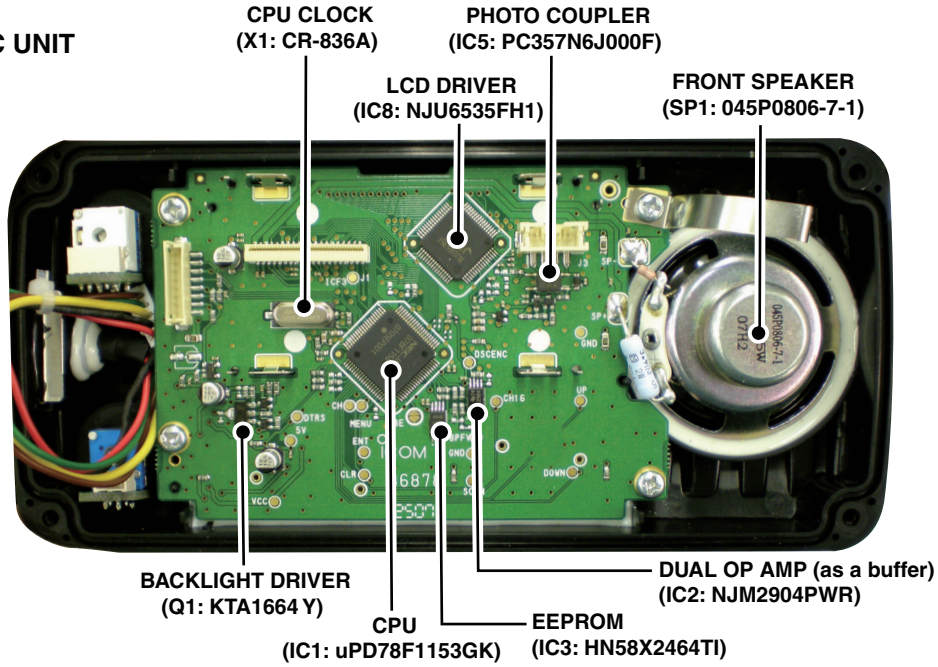
*3 DSC operation only.

*4 UK Marina Channels: M1=37A (157.850 MHz), M2=P4 (161.425 MHz) for U.K. version only

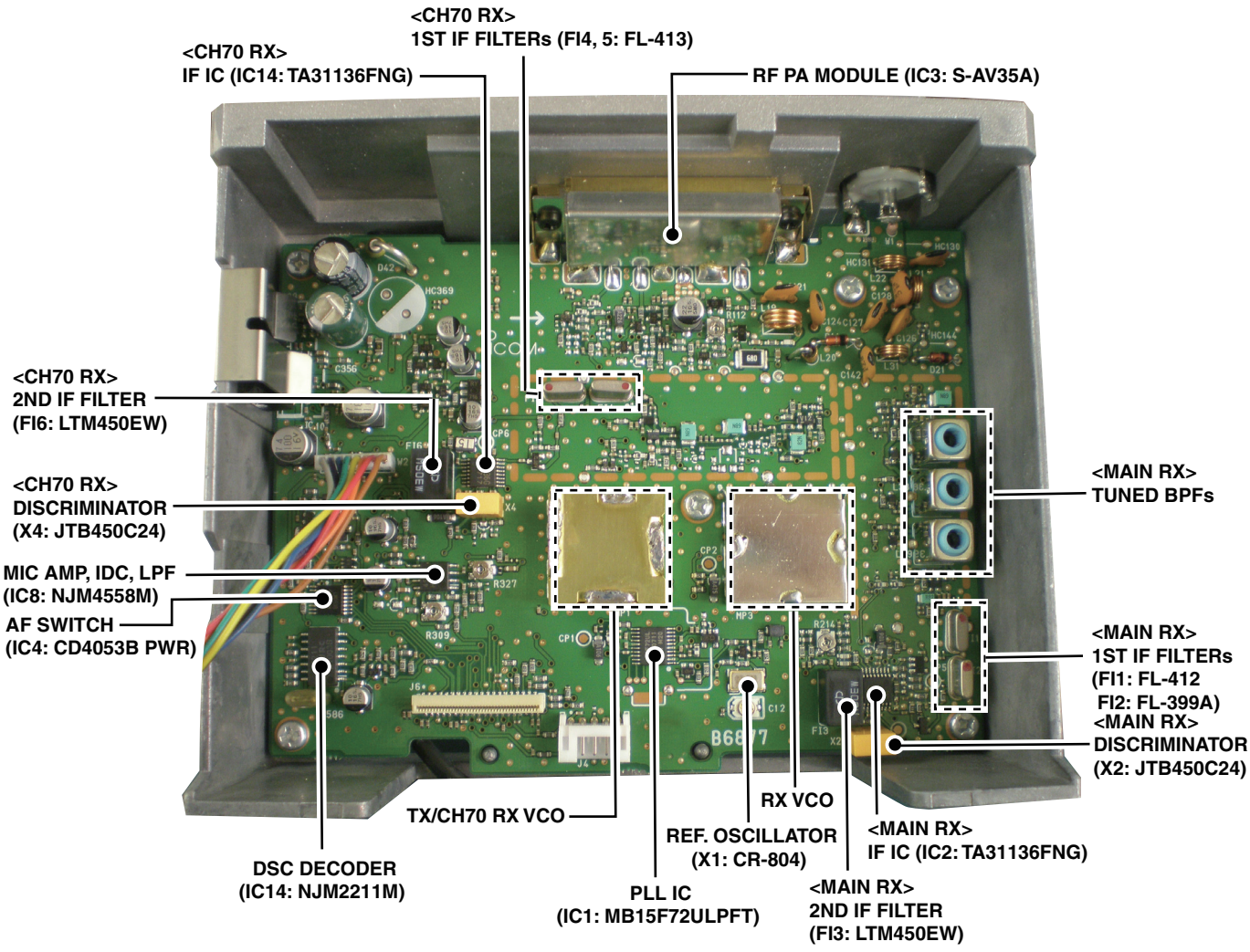
NOTE: Simplex channels, 3, 21, 23, 61, 64, 81, 82 and 83 **CANNOT** be lawfully used by the general public in U.S.A. waters.

SECTION 2 INSIDE VIEWS

• LOGIC UNIT



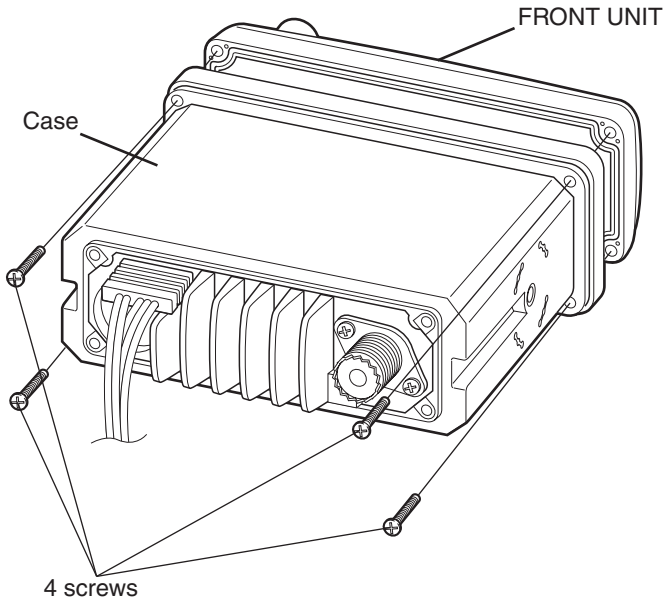
• MAIN UNIT



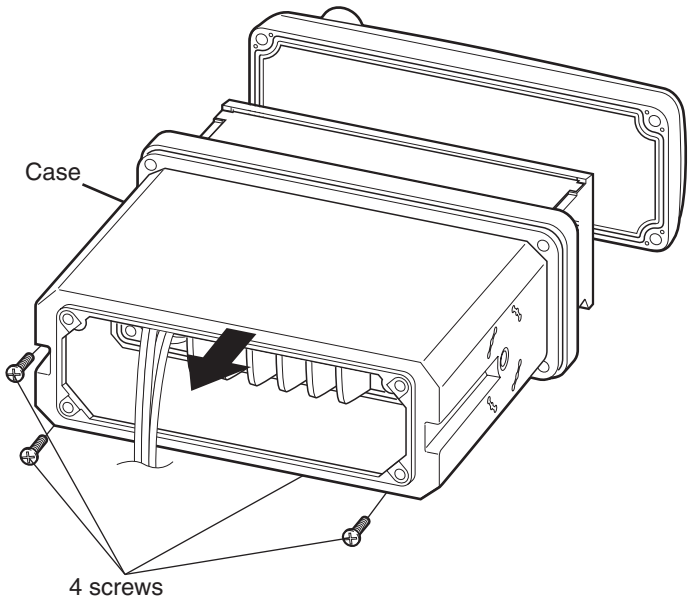
SECTION 3 DISASSEMBLY INSTRUCTION

● REMOVING THE CASE

① Unscrew 4 screws from the bottom of FRONT UNIT.
Note: When replacing the screws, 10–12 kg of torque MUST be applied to ensure waterproof.

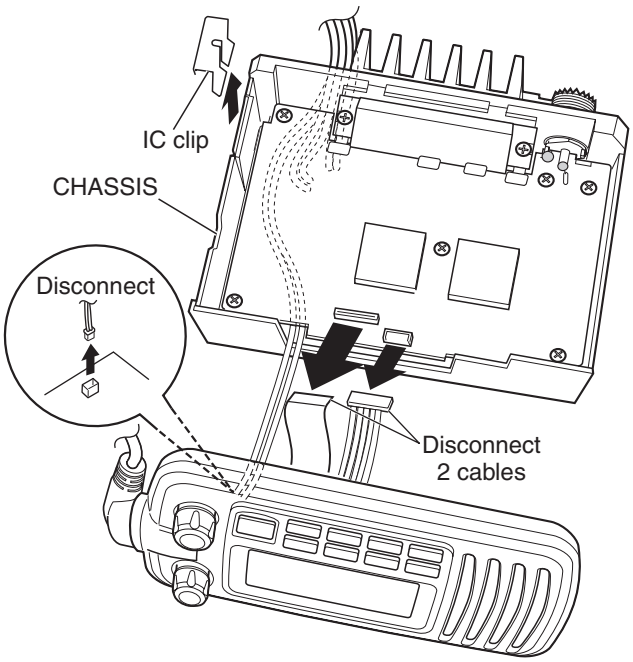


② Unscrew 4 screws from the rear.
Note: When replacing the screws, 10–12 kg of torque MUST be applied to ensure waterproof.
③ Slide the case free of the chassis in the direction of the arrow.

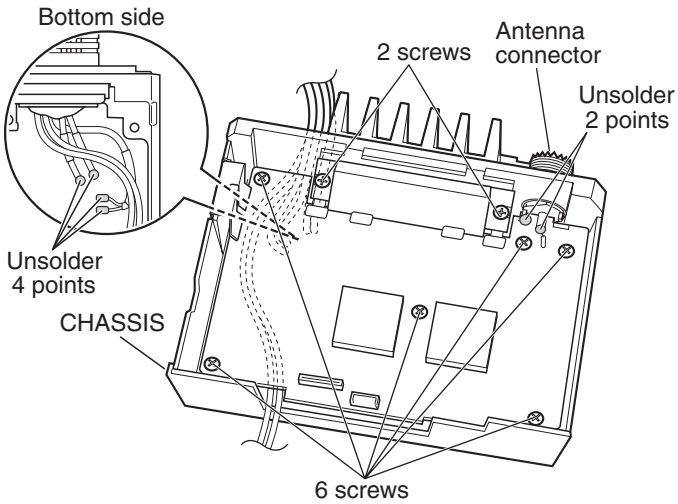


● REMOVING THE MAIN UNIT

① Remove the IC clip from the CHASSIS.
② Disconnect 2 cables from the MAIN UNIT.
③ Disconnect the cable from the FRONT UNIT, and remove it.



④ Unsolder 4 points at the bottom side of the MAIN UNIT.
⑤ Unsolder 2 points at the bottom of ANT connector.
⑥ Unscrew 2 screws from the PA module, and 6 screws from the MAIN UNIT, then remove the MAIN UNIT from the CHASSIS.



SECTION 4 CIRCUIT DESCRIPTION

4-1 RECEIVER CIRCUITS

ANTENNA SWITCH (MAIN-RX/CH70-RX)

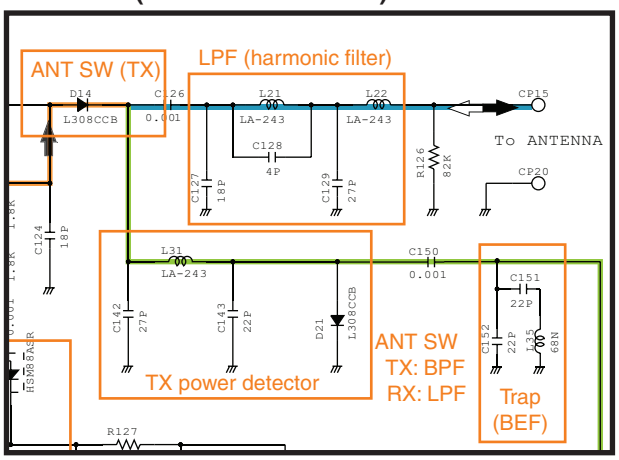
The received signals (RX signals) from the antenna are passed through the LPF (harmonic filter) and ANT SW (as an LPF in RX).

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

While transmitting, serial-connected PIN diodes (D14, 21) are forward biased and the TX line and the antenna is connected by D14. Simultaneously, the RX line is connected to the GND by D21 to prevent transmit signal entering.

The RX signals from the ANT SW (=LPF) are applied to the RF circuits via the trap (BEF; Band Eliminate Filter).

• ANT SW (MAIN-RX/CH70-RX)



RF CIRCUITS (MAIN-RX)

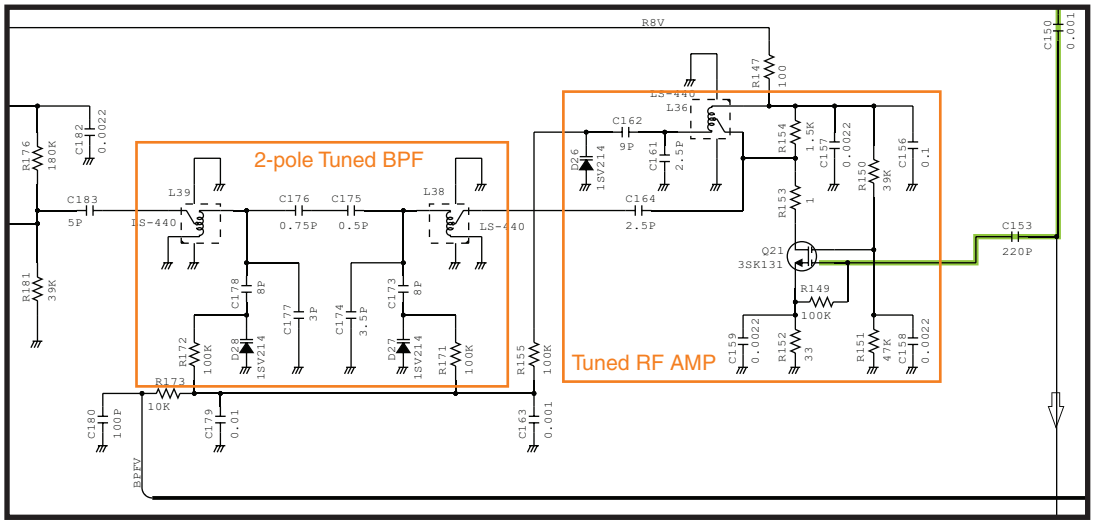
RF circuits consist of RF filters and RF amplifier (RF AMP) that filter and amplify the signals of frequency which desired to receive.

The filtered RX signals from the trap (BEF; Band Eliminate Filter) are applied to the tuned RF AMP. The amplified RX signals are passed through the tuned 2-pole BPF.

The tuned RF AMP and 2-pole BPF are adjusted so that it responds to receiving frequency and rejects all others, by the variable capacitor whose capacitance is varied by applied tuning voltage "BPFV."

The filtered RX signals are then applied to the 1st IF circuits.

• RF CIRCUITS (MAIN-RX)



UNIT ABBREVIATIONS:
FR= FRONT UNIT, LG= LOGIC UNIT, MA= MAIN UNIT

1ST IF CIRCUITS (MAIN-RX)

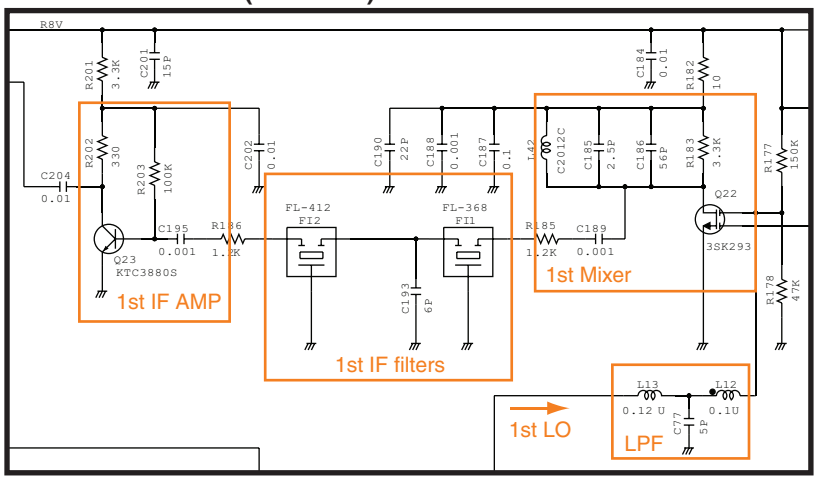
The 1st IF circuits consist of 1st mixer, 1st IF filter and 1st IF amplifier. And it down-converts the RX signals into the 1st IF signal then filters and amplifies.

The filtered RX signals from the 2-pole tuned BPF are applied to the 1st mixer to be converted into the 1st IF signal, by being mixed with the 1st Local Oscillator (LO) signals from the RX VCO (Q72, D51–53) via buffers (Q74, 76) and LPF (L12, 13, C77).

The converted 1st IF signal is passed through two 1st IF filters to remove unwanted signals. The filtered 1st IF signal is amplified by the 1st IF AMP.

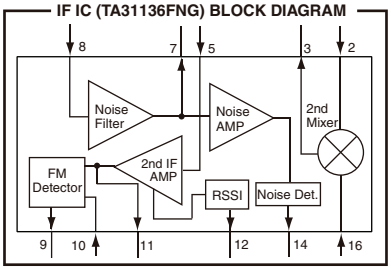
The amplified 1st IF signal is then applied to the 2nd IF circuits.

• 1ST IF CIRCUITS (MAIN-RX)



2ND IF AND DEMODULATOR CIRCUITS (MAIN-RX)

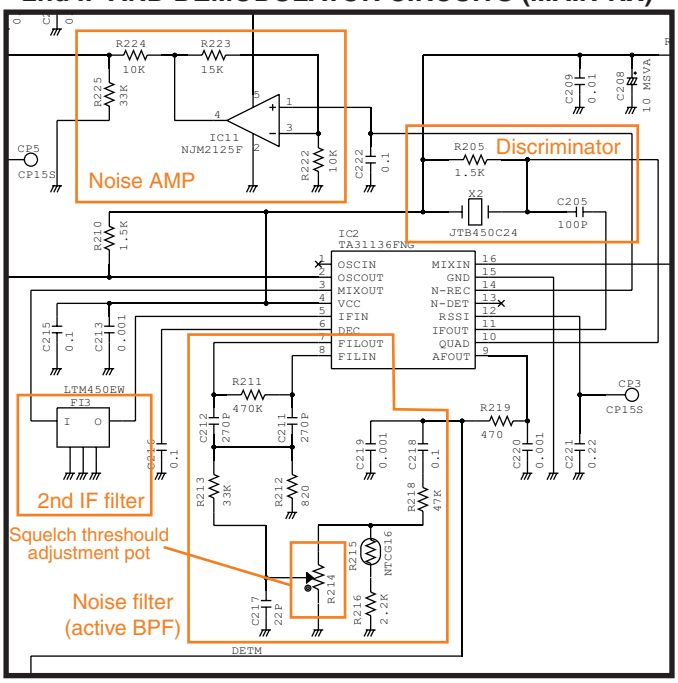
The 2nd IF circuits consist of 2nd mixer, 2nd IF filter and 2nd IF amplifier. It down-converts the 1st IF signal into the 2nd IF signal, then filters to filter 2nd IF signal only and amplifies it. The demodulator circuit converts the 2nd IF signal into AF signals. The IF IC "TA31136FNG" contains major sections of 2nd IF and FM demodulator circuits in its package.



The amplified 1st IF signal from the 1st IF AMP (Q23) is applied to the IF IC (IC2, pin 16), and converted into the 450 kHz 2nd IF signal at the internal 2nd mixer, by being mixed with the 2nd LO signal from the reference frequency oscillator (Q85, X1). The converted 2nd IF signal is output from pin 3 and filtered by the external 2nd IF filter (FI3). The filtered 2nd IF signal is backed to the IF IC (pin 5), and saturation-amplified by the internal 2nd IF AMP. The amplified 2nd IF signal is FM-demodulated by the quadrature detector with a discriminator (X2).

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

• 2nd IF AND DEMODULATOR CIRCUITS (MAIN-RX)



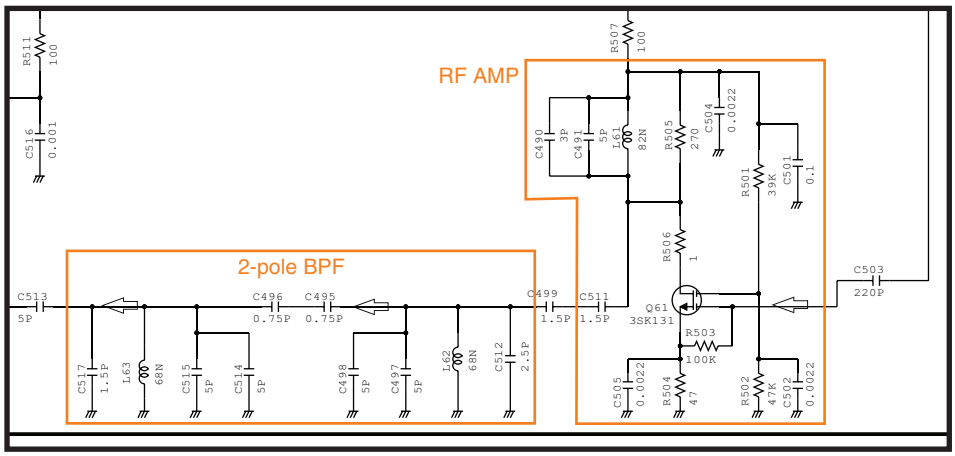
RF CIRCUITS (CH70-RX)

RF circuits for CH70-RX consist of RF filters and RF amplifier (RF AMP), and filter and amplify the signal of CH70 (156.525 MHz) only. The circuits are fixed to receive 156.525 MHz signal only, and are activated even when the transceiver is receiving other channels (MAIN-RX).

The filtered RX signal from the trap (BEF; Band Elminate Filter) are applied to the RF AMP. The amplified RX signal is passed through the 2-pole BPF.

The filtered RX signal is then applied to the 1st IF circuits.

• RF CIRCUITS (CH70-RX)



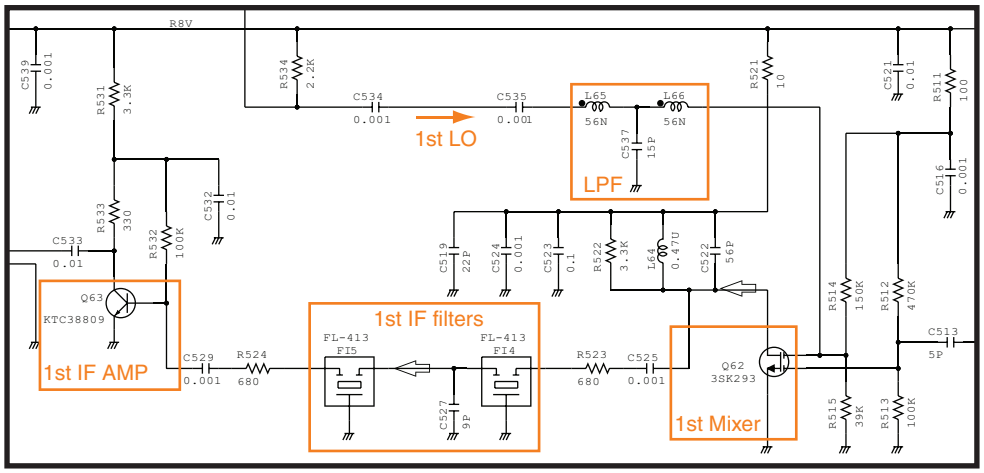
1ST IF CIRCUITS (CH70-RX)

The 1st IF circuits consist of 1st mixer, 1st IF filter and 1st IF amplifier. And it down-convert the RX signals into the 1st IF signal, then filter and amplify.

The filtered RX signal from the 2-pole BPF are applied to the 1st mixer to be converted into the 1st IF signal, by being mixed with the 1st Local Oscillator (LO) signals from the TX/CH70-RX VCO (Q4, 5, D1–3) via buffer (Q7), LO SW (D8) and LPF (L65, 66, C537).

The converted 1st IF signal is passed through two 1st IF filters to remove unwanted signals. The filtered 1st IF signal is amplified by the 1st IF AMP. The amplified 1st IF signal is then applied to the 2nd IF circuits.

• 1ST IF CIRCUITS (CH70-RX)



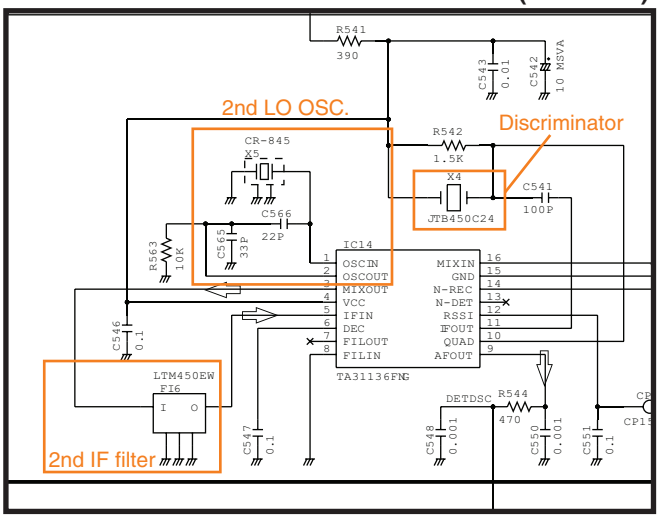
2ND IF AND DEMODULATOR CIRCUITS (CH70-RX)

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

The amplified 1st IF signal is applied to the IF IC (IC14, pin 16), and converted into the 450 kHz 2nd IF signal at the internal 2nd mixer, by being mixed with the 2nd LO signal generated by the internal reference frequency oscillator (X5). The converted 2nd IF signal is output from pin 3, and filtered by the external 2nd IF filter (FI6). The filtered 2nd IF signal is backed to the IF IC (pin 5), and saturation-amplified by the internal 2nd IF AMP. The amplified 2nd IF signal is FM-demodulated by the quadrature detector with a discriminator (X4).

The demodulated DSC signals are applied to the DSC decoding circuits.

• **2nd IF AND DEMODULATOR CIRCUITS (CH70-RX)**



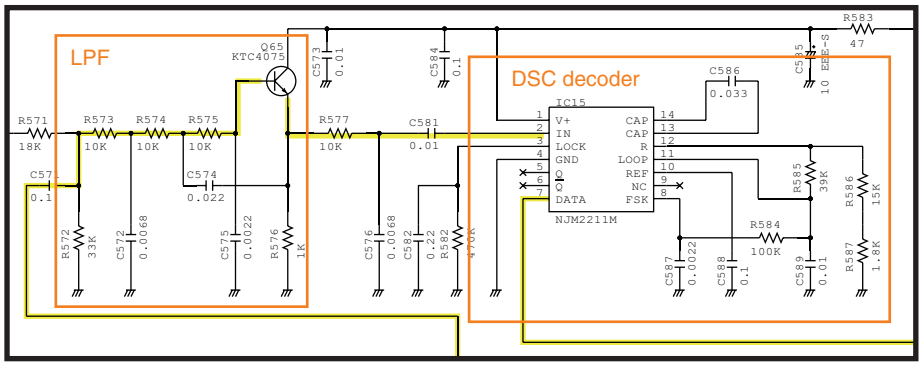
DSC DECODING CIRCUITS (CH70-RX only)

The demodulated DSC siganls from the IF IC (IC14) are filtered by LPF to remove audible signals. The filtered sub audible tone signals are applied to the DSC decoder.

The IC15 is the DSC decode IC which converts the sub audible tone signals into the serial data (logic "H/L" status).

The decoder detects it then outputs serial data to the CPU (LG; IC1, pin 41) to control the transceiver (emergency alarm, DSC indication, etc.).

DSC DECODING CIRCUITS



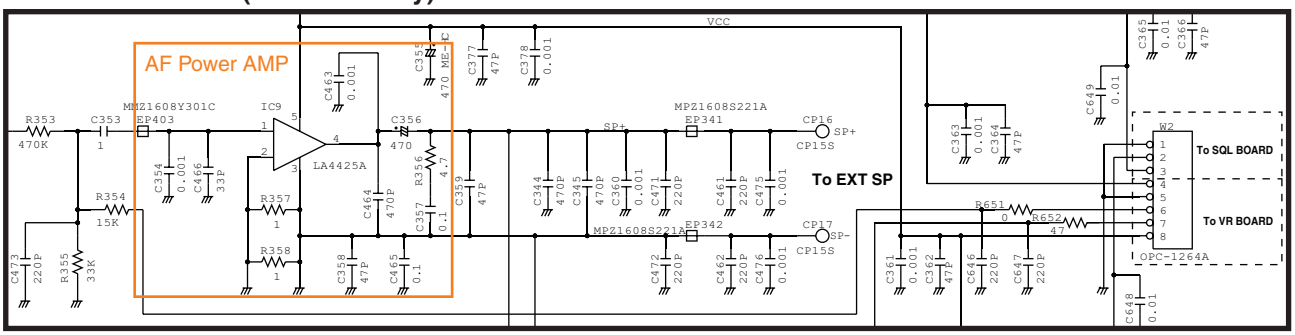
RX AF CIRCUITS (MAIN-RX only)

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

The demodulated AF signals from the IF IC (IC2) are passed through the AF line SW (IC4, pins 13, 14) which toggles the AF lines between MAIN-RX and CH70-RX, and passed through the de-emphasis circuit (R231, C232) to obtain –6 dB/oct of frequency response.

The de-emphasized AF signals are passed through the BPF (Q31, 32) and the AF mute SW (IC4, pins 15, 1) then applied to the VR UNIT. The AF signals are adjusted its level by the variable resister (VR: R1), and backed to the MAIN UNIT and applied to the AF power AMP (IC9). The AF signals are power-amplified to obtain more than 2 W of audio output power. The power-amplified AF signals are applied to the internal/external speaker.

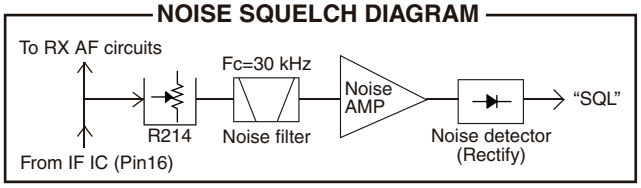
• RX AF CIRCUITS (MAIN-RX only)



SQUELCH CIRCUIT (MAIN-RX only)

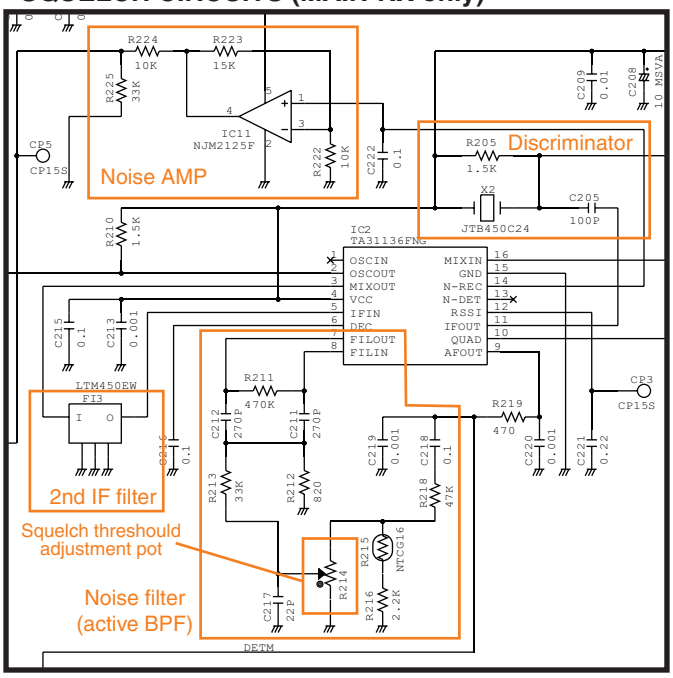
The squelch circuit cuts the AF output signals off when no RF signals are received. Filtering noise components in the demodulated AF signals, the AF mute SW (IC4) disconnects the AF line from the AF AMP.

A portion of FM-demodulated AF signal from the IF IC (IC2) is passed through the noise filter to filter the noise components (approx. 30 kHz signals) only. The filtered noise components are rectified to be converted into the pulse-type signal by noise detector to produce DC voltage corresponding to the noise level ("SQL" signal).



The "SQL" signal is amplified by noise AMP (IC11), then applied to the CPU (LG: IC1, pin 62). If the CPU interprets that the applied noise level is higher than preset one, the CPU sends the "RMUTE" signal to the AF mute SW (IC4) to cut the RX AF line off.

• SQUELCH CIRCUITS (MAIN-RX only)



4-2 TRANSMITTER CIRCUITS

TX AF CIRCUITS

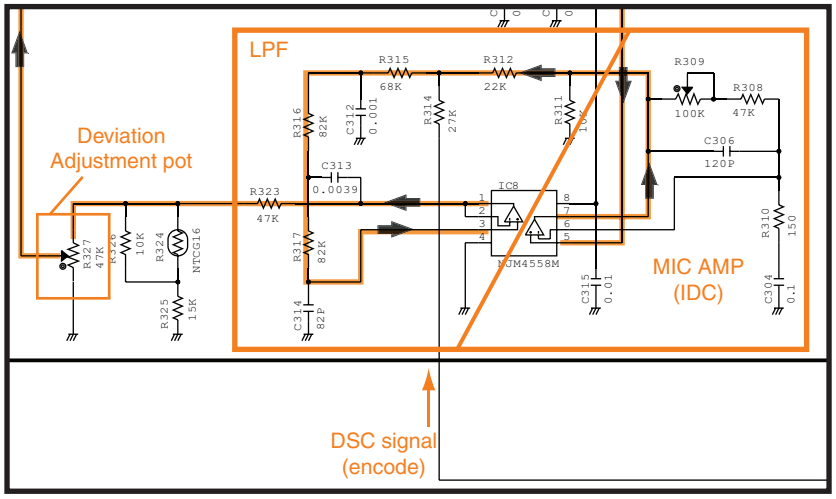
The TX AF circuits consist of microphone amplifier (MIC AMP), MIC mute SW, IDC circuit and AF filters. The IDC (Instant Deviation Control) circuit is an amplifier which adjusts its gain automatically to prevent over deviation.

The audio signals from the microphone (MIC signals) are passed through the MIC mute SW (IC5, pins 1, 2) which cuts off the MIC line in receiving, and applied to the MIC AMP (IC8). The applied MIC signals are amplified within +6 dB/oct of frequency response.

The MIC AMP is included to an IDC circuit which reduces its gain automatically when the high amplitude (=loud voice) signals are applied to the microphone, to prevent over deviation.

The amplitude-limited MIC signals are passed through the splatter filter (LPF) which removes 3 kHz and higher signals, then passed through the deviation adjustment pot (R327). The level-adjusted MIC signals are applied to the modulation circuit of the TX/CH70-RX VCO (Q4, 5, D1–3) as the modulation signals.

• TX AF CIRCUITS



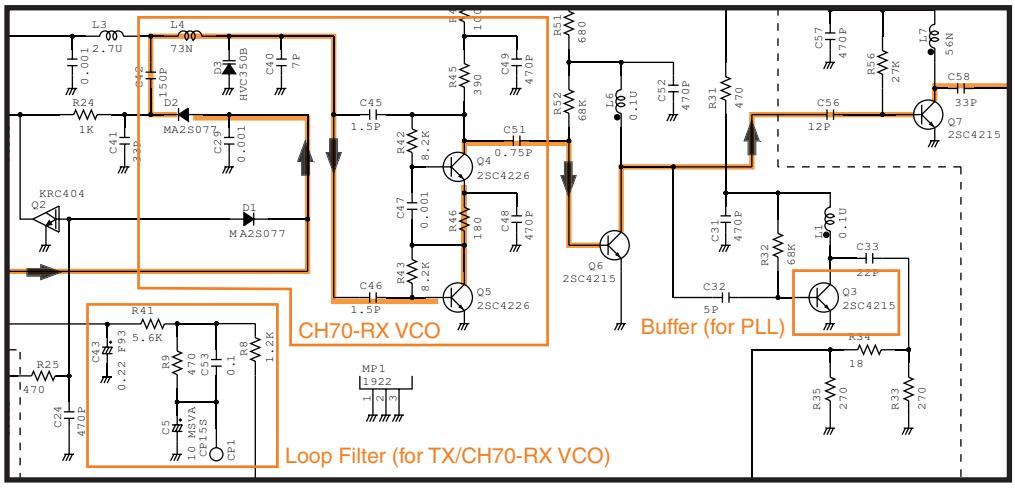
MODULATION CIRCUIT

The modulation circuit FM-modulates the VCO oscillating signal with the MIC signals (=modulation signals) and DSC encoding signals. The amplitude of applied modulation signals vary the capacitance of variable capacitor. Thus the oscillating frequency is shifted by the modulation signals in proportionally to obtain the frequency modulation.

The modulation signals from the deviation adjustment pot (R327) are applied to the variable capacitors (D1, 2) of TX/CH70-RX VCO (Q4, 5, D1–3) for FM modulation.

The modulated VCO output is passed through the buffers (Q6, 7) and LO SW (D7), then applied to the TX AMP.

• MODULATION CIRCUIT



TX AMPs

The TX amplifiers consist the YGR and power amplifiers, and amplify the TX/CH70-RX VCO output to the transmit output power level.

The buffer-amplified VCO output from the TX/CH70-RX VCO is applied to the YGR amplifier (Q10) as the TX signal via LO SW (D7), and amplified to the level need to drive the RF power module (IC3). The amplified TX signal is applied to the RF power module which provides the 25 W of RF output with 10 mW input.

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

APC CIRCUIT

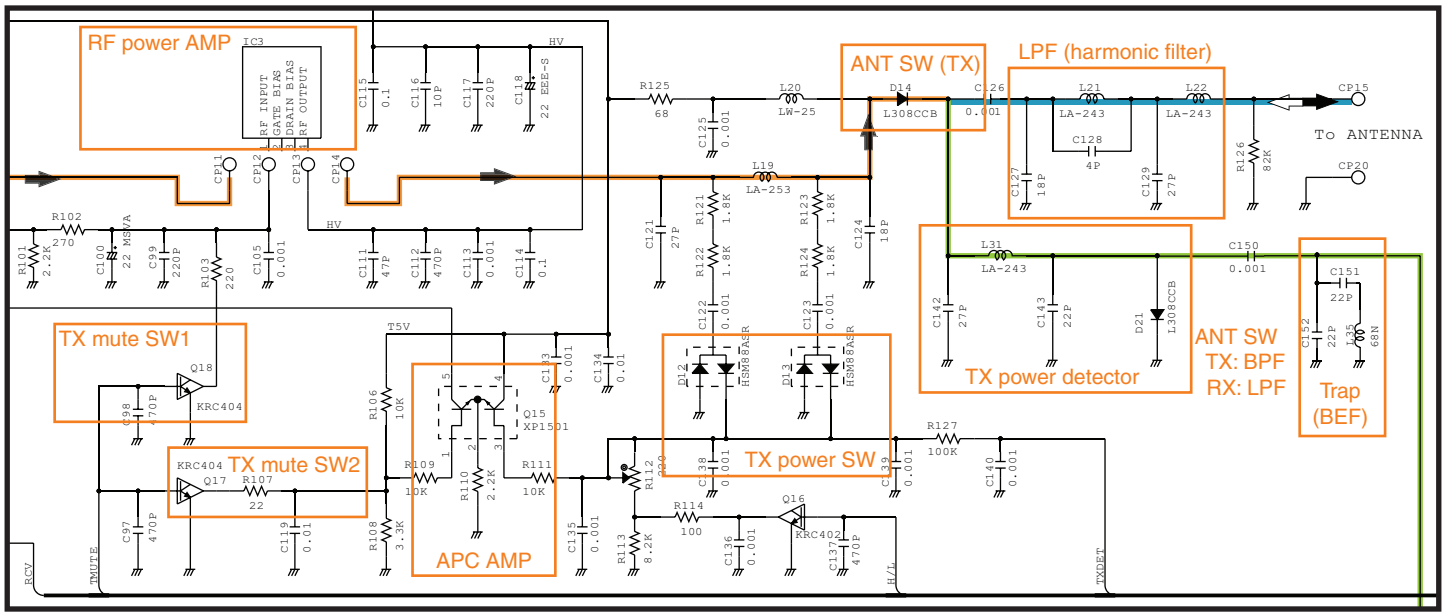
The APC (Automatic Power Control) circuit stabilizes transmit output power to prevent the transition of transmit output power level, which is caused by load mismatching or heat effect, etc. The APC circuit also protects the TX amplifier from the reflected waves caused by load mismatching.

The power detector rectifies a portion of the TX signal and converts it into DC voltage which is in proportion to the transmit output power. The rectified voltage is applied to the base terminal (pin 3) of dual transistor (Q15; as a differencial AMP). The TX power setting voltage (divided voltage of T5V) is applied to another base terminal (pin 3) as the reference.

The differencial AMP compares the rectified voltage and reference voltage, and the difference of these voltages is appeared on the corrector terminal (pin 5) to drives APC driver (Q14). The APC driver controls the gate bias of RF power module to reduce/increase the gain for stable TX output power.

The TX muting is carried out by applying voltage (“TMUTE”) to the TX mute SWs (Q17, 18). When the PLL unlock, etc. is occurred, "TMUTE" becomes to "High" and TX mute SWs are ON to stop supplying voltage to the RF power AMP.

• TX AMPs AND APC CIRCUIT

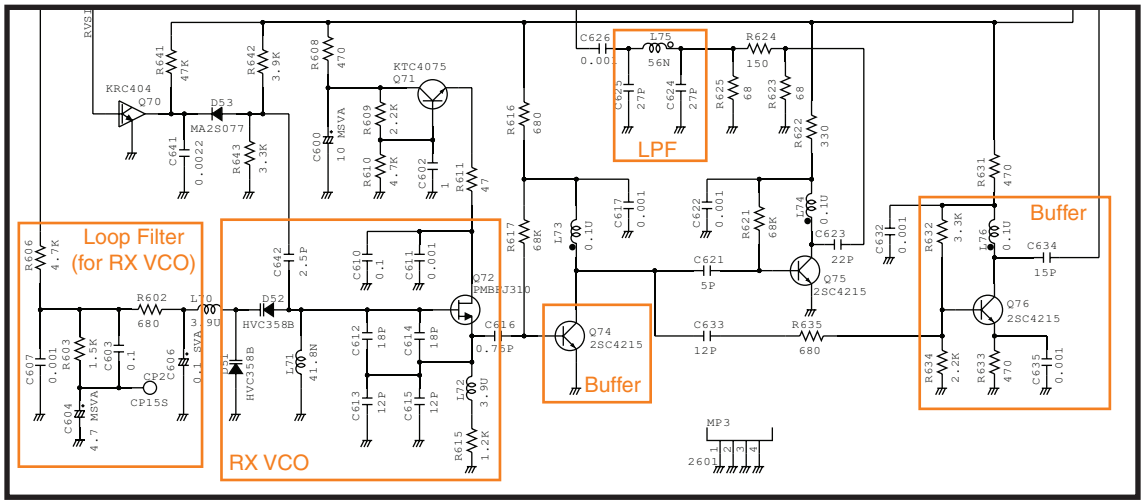


4-3 FREQUENCY SYNTHESIZER CIRCUITS

VCOs

A VCO is an oscillator whose oscillating frequency is controlled by the applied voltage. This transceiver has two VCOs; RX VCO and TX/CH70-RX VCO. The RX VCO generates the 1st LO signals for MAIN-RX, TX/CH70-RX VCO generates TX signal in transmitting and 1st LO signals for CH70-RX in receiving.

• RX VCO



• RX VCO (Q72, D51–53)

The RX VCO oscillates 134.300 to 141.725 MHz LO signals for MAIN-RX. The generated 1st LO signals are applied to the 1st mixer (Q22) via the buffer AMPs (Q74, 76), LPF (harmonic filter; L12, 13, C77).

A portion of the VCO output is applied to the PLL IC (IC1) via the buffer (Q74, 75) and LPF (L75, C624, 625).

• TX/CH70-RX VCO (Q4, 5, D1–3)

<While transmitting>

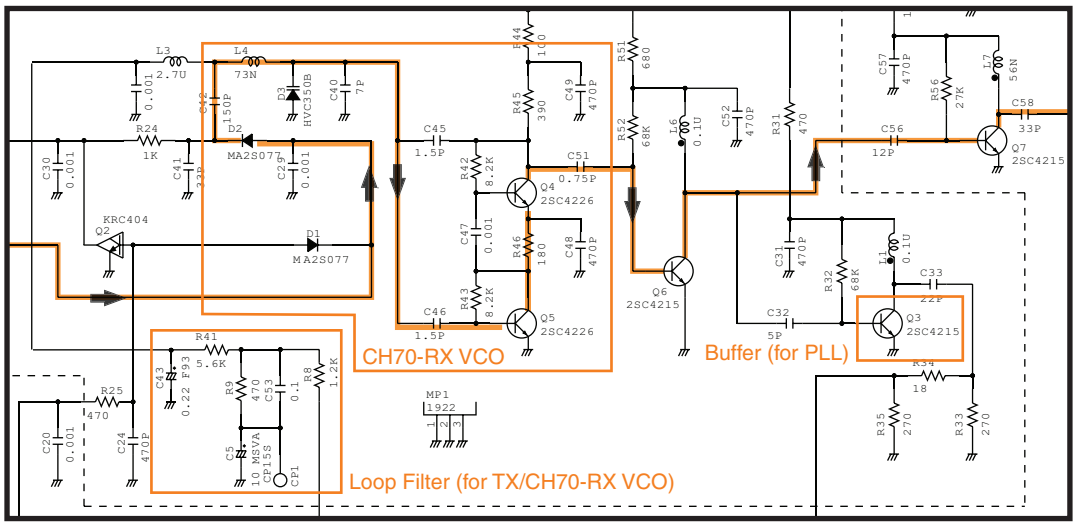
The TX/CH70-RX VCO oscillates 156.000 to 161.450 MHz transmit signals. The generated TX signal is applied to the YGR amplifier (Q10) via the buffer AMPs (Q6, 7) and LO SW (D7).

<While receiving>

The TX/CH70-RX VCO oscillates 125.650 MHz 1st LO signal for CH70-RX (156.525 MHz). The VCO output is applied to the 1st mixer (Q62) via the buffer AMPs (Q6, 7) and LO SW (D8).

A portion of the VCO output is applied to the PLL IC (IC1) via the buffer (Q6, 3) and LPF (L2, C34, 35).

• TX/CH70RX VCO



PLL (Phase Locked Loop) CIRCUIT

The PLL circuit provides stable oscillation for both of the TX and 1st LO frequencies. By comparing fed back VCO output and reference frequency signals, the PLL corrects the difference of the these frequencies.

• RX VCO LOOP

A portion of RX VCO output is applied to the PLL IC (IC1, pin 3) via buffers (Q74, 75) and LPF (L75, C624, 625).

• TX/CH70-RX VCO LOOP

A portion of TX/CH70-RX VCO output is applied to the PLL IC (IC1, pin 17) via buffers (Q6, 3) and LPF (L2, C34, 35).

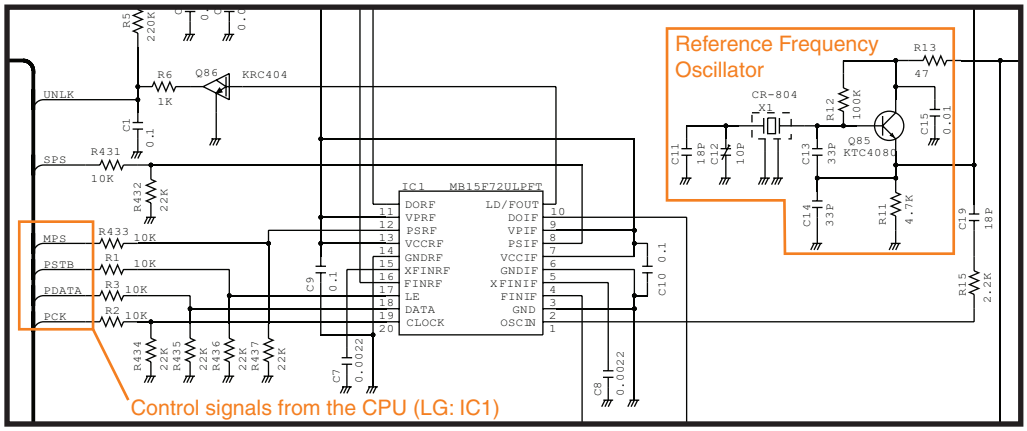
The applied VCO output signal is divided according to the divide ratio which is included in the serial data from the CPU (LG: IC1), at the prescaler and programmable divider. In the same way, the reference frequency signal from the reference frequency oscillator is applied to the PLL IC and divided so that these two applied signals are the same frequency.

The frequency-matched signals (VCO output and the reference frequency signals) are applied to the phase comparator and phase-compared. The resulted phase difference is detected as a pulse-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).

The capasitance of variable capacitors of each VCOs changes corresponding to the applied lock voltage. This causes the change of the VCO oscilating frequency to keep the VCO frequency constant.

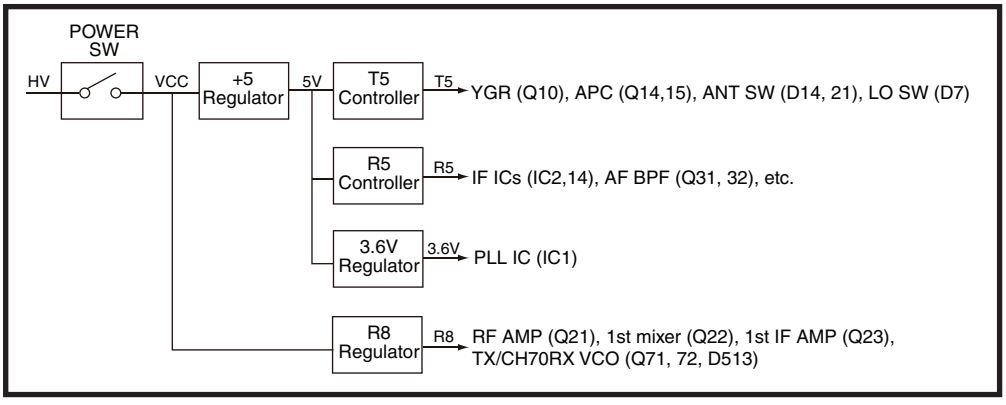
When the oscillation frequency drifts, its phase changes from that of the reference frequency, causing a lock voltage change to compensate for the drift in the VCO oscillating frequency.

• PLL



4-4 VOLTAGE LINES

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



4-5 CPU (LG; IC1) PORT ALLOCATION

Pin No.	LINE	DESCRIPTION	I/O
3	PSTB	Strobe signal to the PLL IC (M: IC1).	O
4	PCK	Clock signal to the PLL IC (M: IC1).	O
5	PDATA	Serial data to the PLL IC (M: IC1).	O
6	PSPS	Power control signal to the PLL IC (M: IC1) for RX VCO loop. (GND level)	O
7	PMPS	Power control signal to the PLL IC (M: IC1) for TX/CH70-RX VCO loop. (GND level)	O
12	PTT	[PTT] key input. (pulled up)	I
21–23	DIM1–3	Brightness (Dimmer) control signals to the LED driver (LG: Q1–3).	O
30	DOWN	[DWN] key input. (pulled up)	I
31	UP	[UP] key input. (pulled up)	I
32	CH16	[CH16] key input. (pulled up)	I
33	SCAN	[SCAN] key input. (pulled up)	I
34	CH	[CH] key input. (pulled up)	I
35	CLR	[CLR] key input. (pulled up)	I
36	MENU	[MENU] key input. (pulled up)	I
37	ENT	[ENT] key input. (pulled up)	I
38	LCDCLK	Clock signal (25 kHz) to the LCD driver (LG: IC8).	O
39	H/L	TX power control signal to the TX power SW (M: Q16). "H"= When the TX power is 'high.'	O
41	DSDEC	Decoded DSC signal from the DSC decoder (M: IC15).	I
42	UNLK	PLL unlock signal from the PLL IC (M: IC1). "L"= When the PLL is unlocked.	I
53	NMRXD	NMEA data (4800 bps) from photo-coupler (LG: IC5).	I
54	ECK	Clock signal to the EEPROM (LG: IC3).	O
55	EDATA	Data I/O port for EEPROM (LG: IC3).	I/O
57	DS/BPFV	• RX (MAIN-RX) Tuning voltage to the tuned BPF (M: D26–28) via buffer (LG: IC2). • TX DSC encode signal to the LPF (M: IC8).	O
58	BEEP	Beep sounds (500, 750, 1k, 1.3k and 2.2 kHz square waves).	O
61	SQLV	[SQL] dial input. (divided voltage of 5V line)	I
62	SQL	Noise level from the IF IC (M: IC2) via noise AMP (M: IC11).	I
63	LBAT	Power supply voltage detect (voltage of VCC line divided by R36 and R37(LG)).	I
64	TXDET	TX power detect (rectified voltage from TX power detector (M: D12, 13)).	I
65	KEYM	Key detect signal (devided voltage) from the HM-164.	I
70	TMUTE	TX mute signal to the TX mute controller (M: Q17, 18). "H"=TX mute.	O
71	MICM	MIC mute (MIC line disconnect) signal to the MIC mute SW (M: IC5). "L"=MIC mute (=in RX).	O
72	SEND	Power line control signal to the T5 line controller (M: Q57, 58). "H"=T5 line is active (=in TX).	O
73	RMUTE	RX AF mute control signal to the AF mute SW (M: IC4). "L"=AF mute (squelch close).	O
74	RCV	Power line control signal to the R5 line controller (M: Q53, 54). "H"=R5 line is active (=in RX).	O
78	LCE	Strobe signal to the LCD driver (LG: IC8).	O
79	LSCL	Clock signal to the LCD driver (LG: IC8).	O
80	LSI	Serial data to the LCD driver (LG: IC8).	O

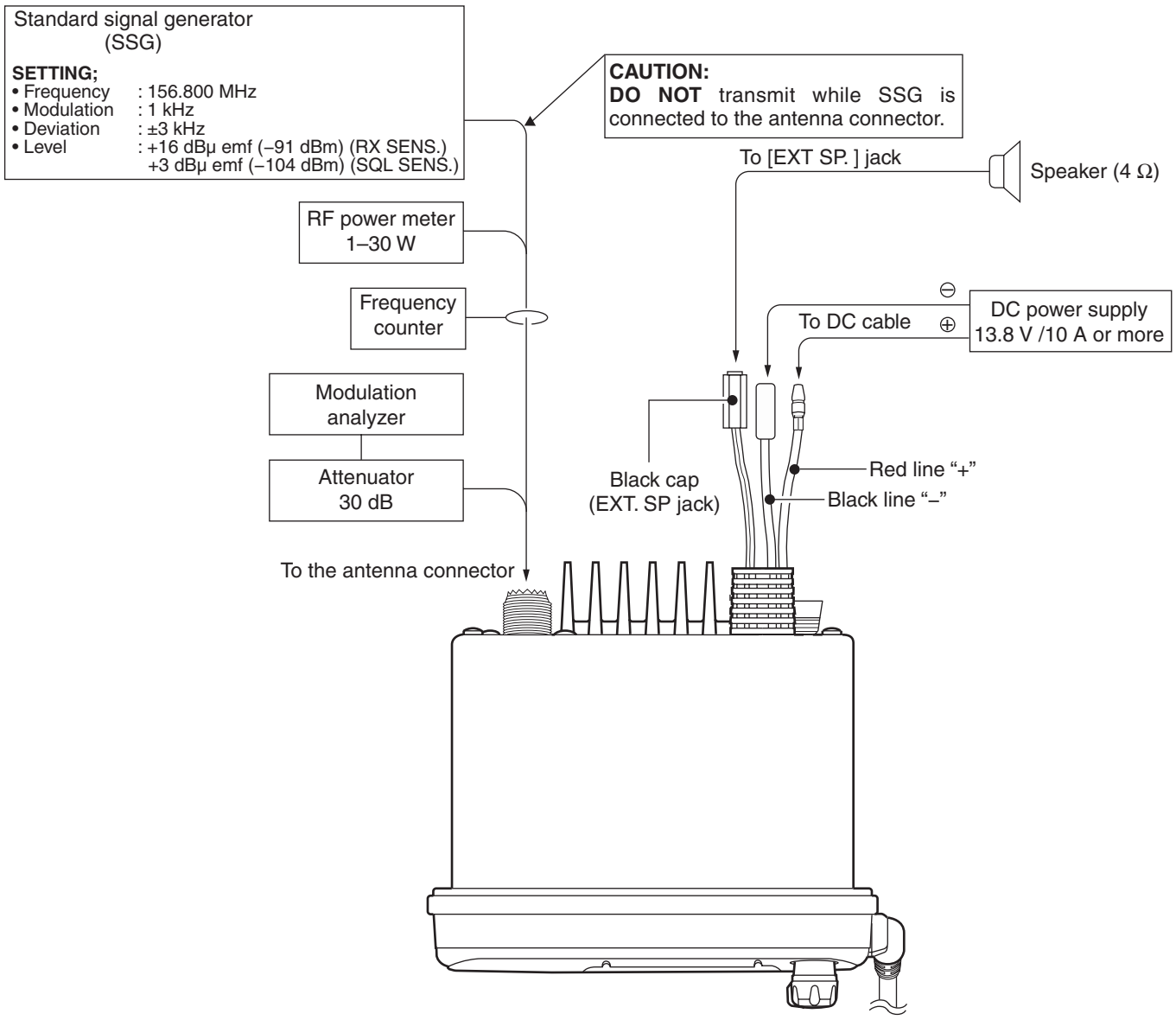
SECTION 5 ADJUSTMENT PROCEDURE

5-1 PREPARATION

■ REQUIRED INSTRUMENTS

INSTRUMENT	SPECIFICATION	INSTRUMENT	SPECIFICATION
Power Supply	Output voltage : 13.8 V DC Current capacity : More than 10 A	Digital Voltmeter	Input impedance : More than 50 kΩ Measuring range : 0.1–10V
RF Power Meter (terminated type)	Measuring range : 0.1–30 W Frequency range : 100–300 MHz Impedance : 50 Ω SWR : Less than 1.2 : 1	Standard Signal Generator (SSG)	Frequency range : 0.1–300 MHz Output level : 0.1 mV to 32 mV (–127 to –17 dBm)
Frequency Counter	Frequency range : 0.1–300 MHz Frequency accuracy : ±1 ppm or better Input level : Less than 1 mW	AC Millivoltmeter	Measuring range : 10 mV to 10 V
Modulation Analyzer	Frequency range : 30–300 MHz Measuring range : 0 to ±10 kHz	External Speaker	Input impedance : 4 Ω Capacity : More than 3 W
Audio Generator	Frequency range : 300–3000 Hz Output level : 1–500 mV	Attenuator	Power attenuation : 30 dB Capacity : More than 30 W

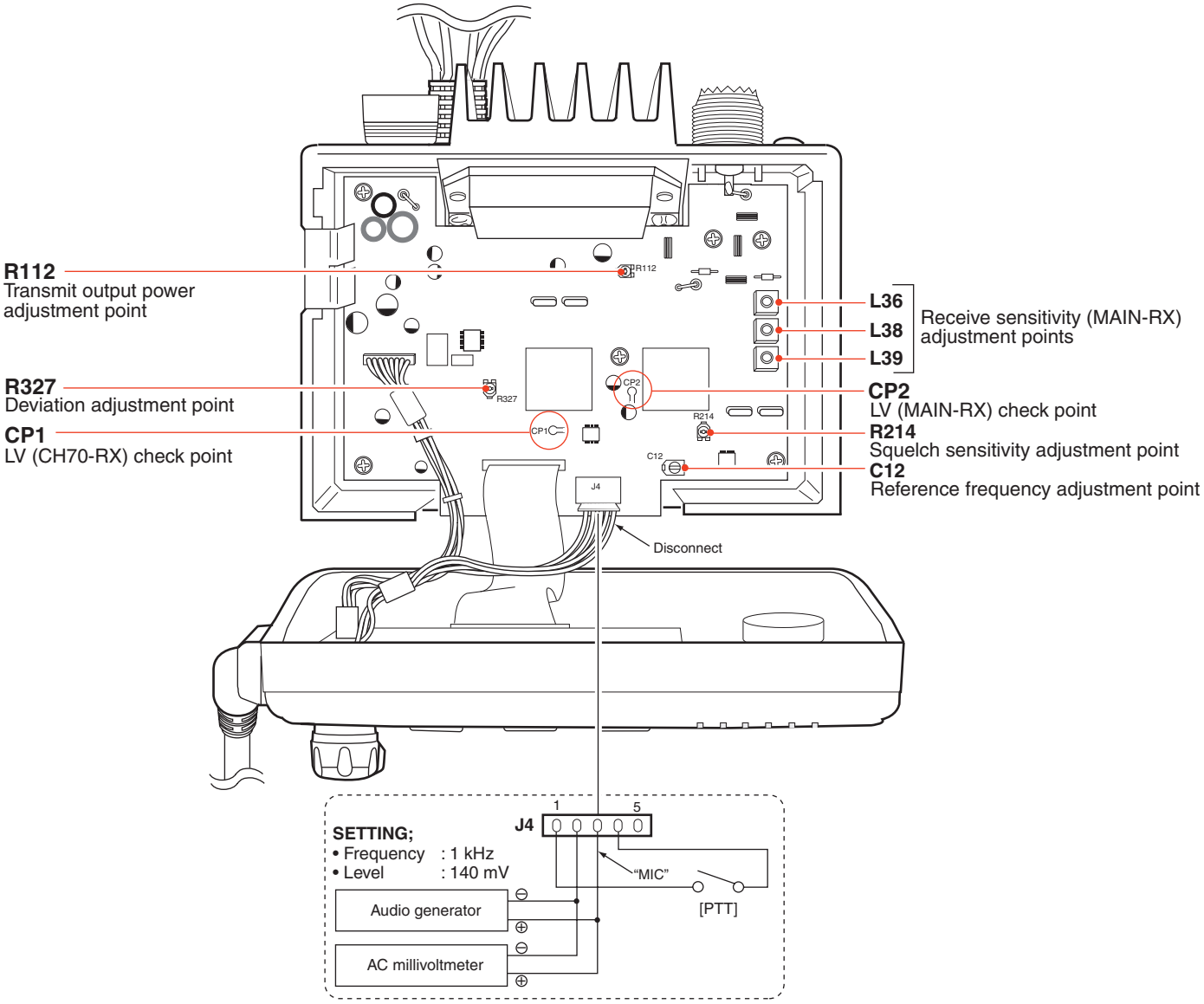
■ CONNECTION



5-2 ADJUSTMENT (See the next page for the location of check /adjust points.)

ADJUSTMENT		ADJUSTMENT CONDITION	OPERATION	ADJUSTMENT POINT	VALUE
LOCK VOLTAGE VERIFICATION (RX)	1	• Channel : 16 • Receiving	Connect a Digital voltmeter to the **CP2** (MAIN UNIT).	–	1.1–2.1 V (Verify)
	2	• Channel : 16 • Receiving	Connect a Digital voltmeter to the **CP1** (MAIN UNIT).	–	1.0–2.0 V (Verify)
(TX)	3	• Channel : 16 • Output power: Low • Transmitting	1) Connect an RF Power Meter to the antenna connector. 2) Connect a Digital voltmeter to the **CP1** (MAIN UNIT).	–	1.0–2.0 V (Verify)
REFERENCE FREQUENCY	1	• Channel : 16 • Transmitting	Loose-couple a Frequency Counter to the antenna connector.	C12 (MAIN UNIT)	156.800 MHz
TRANSMIT OUTPUT POWER	1	• Channel : 16 • Output power: High • Transmitting	Connect an RF Power Meter to the antenna connector.	R112 (MAIN UNIT)	23–23.5 W
DEVIATION (PRESET)	1	• Channel : 16 • Output power: Low • Transmitting	Set the **R309** (MAIN UNIT) to center position.	R309 (MAIN UNIT)	Center position
(ADJUST)	2		1) Disconnect the cable from J4 (MAIN UNIT). 2) Connect an Audio Generator and AC millivoltmeter to the "MIC" line, and set as; • Frequency : 1 kHz • Level : 140 mV 3) Connect a Modulation Analyzer to the antenna connector through an attenuator.	R327 (MAIN UNIT)	±4.25–4.35 kHz
RECEIVE SENSITIVITY (MAIN-RX)	1	• Channel : 16 • Receiving	1) Connect a Standard Signal Generator to the antenna, and set as; • Frequency : 156.800 MHz • Modulation : 1 kHz • Deviation : ±3 kHz • Level : +16 dBμ emf (–91 dBm) 2) Connect a 4 Ω speaker to the [EXT. SP] jack. 3) Connect a Digital voltmeter to the **CP3** (MAIN UNIT).	L38→L36→L39 (in sequence, repeatedly)	Maximum voltage
SQUELCH (MAIN-RX) -Preparation-	1	• Channel : 16 • [SQL] : Max. CW • Receiving	1) Connect a Standard Signal Generator to the antenna, and set as; • Frequency : 156.800 MHz • Modulation : 1 kHz • Deviation : ±3 kHz • Level : +3 dBμ emf (–104 dBm) 2) Connect a 4 Ω speaker to the [EXT. SP] jack.	–	–
-Adjust-	2		1) Turn the **R214** (MAIN UNIT) clockwise to close the squelch. (If the squelch does not close, turn the SSG's output OFF, then turn it ON again.) 2) Set the **R214** to the point where the squelch just opens.	R214 (MAIN UNIT)	Squelch open

• ADJUST&CHECK POINTS



SECTION 6 PARTS LIST

[LOGIC UNIT]

REF NO.	ORDER NO.	DESCRIPTION		M.	H/V LOCATION
IC1	1140014500	S.IC	uPD78F1153GK-GAK-AX	B	50.6/30.7
IC2	1110006380	S.IC	LM2904PWR	B	35.3/22.4
IC3	1140008650	S.IC	HN58X2464TI	B	42.2/18.2
IC4	1110005771	S.IC	S-80942CNMC-G9CT2G	B	83.5/27.8
IC5	1170000352	S.IC	PC357N6J000F	B	22.3/43.6
IC8	1130014050	S.IC	NJU6535FH1	B	38.6/50.6
Q1	1520000840	S.TR	KTA1664Y-RTF/P	B	78/19.9
Q2	1530003900	S.TR	KTC4075 BL-RTK/P	B	73.7/18
Q3	1530003900	S.TR	KTC4075 BL-RTK/P	B	73.7/21.8
Q4	1590000660	S.TR	DTC144TU T106	B	22.1/40
Q5	1590003670	S.TR	KRA304-RTK/P	B	30.9/37.4
D1	1750001320	S.DIO	KDS4148U RTK/P	B	24.3/39.8
D2	1750001320	S.DIO	KDS4148U RTK/P	B	17/43.6
X1	6050012471	S.XTL	CR-836A (SMD-49/9.8304 MHz)	B	66.8/37.8
R22	7030003680	S.RES	ERJ3GEYJ 104 V (100 k)	B	37.8/23.5
R23	7030003800	S.RES	ERJ3GEYJ 105 V (1 M)	B	39.1/23.5
R24	7030003500	S.RES	ERJ3GEYJ 332 V (3.3 k)	B	35/26.9
R25	7030005250	S.RES	ERJ3GEYF 103 V (10 k)	B	39.1/20.6
R26	7030003540	S.RES	ERJ3GEYJ 682 V (6.8 k)	B	37.8/20.6
R31	7030003560	S.RES	ERJ3GEYJ 103 V (10 k)	B	41.2/24.1
R32	7030003560	S.RES	ERJ3GEYJ 103 V (10 k)	B	41.2/22.8
R35	7030003560	S.RES	ERJ3GEYJ 103 V (10 k)	B	34.7/32.9
R36	7030004820	S.RES	ERJ3GEYF 473 V (47 k)	B	40.1/38.3
R37	7030010020	S.RES	ERJ2RKF 154 X (150 k)	B	38.8/36.8
R41	7030003680	S.RES	ERJ3GEYJ 104 V (100 k)	B	63.2/30.9
R42	7030003600	S.RES	ERJ3GEYJ 223 V (22 k)	B	83/37.6
R43	7030003480	S.RES	ERJ3GEYJ 222 V (2.2 k)	B	83/41.4
R44	7030003640	S.RES	ERJ3GEYJ 473 V (47 k)	B	88.8/25.8
R45	7030003640	S.RES	ERJ3GEYJ 473 V (47 k)	B	86.1/26.7
R46	7030003320	S.RES	ERJ3GEYJ 101 V (100)	B	58.2/37.1
R47	7030003280	S.RES	ERJ3GEYJ 470 V (47)	B	60.8/26.9
R48	7030003280	S.RES	ERJ3GEYJ 470 V (47)	B	60.8/25.6
R49	7030003280	S.RES	ERJ3GEYJ 470 V (47)	B	60.8/24.3
R50	7030003200	S.RES	ERJ3GEYJ 100 V (10)	B	63.9/32.8
R51	7030003230	S.RES	ERJ3GEYJ 180 V (18)	B	75.9/23.8
R52	7030003230	S.RES	ERJ3GEYJ 180 V (18)	B	77.2/23.8
R54	7030003530	S.RES	ERJ3GEYJ 562 V (5.6 k)	B	64/27.3
R55	7030003500	S.RES	ERJ3GEYJ 332 V (3.3 k)	B	64/26
R60	7030003560	S.RES	ERJ3GEYJ 103 V (10 k)	B	64/24.7
R61	7030003510	S.RES	ERJ3GEYJ 392 V (3.9 k)	B	71.4/18.1
R62	7030003440	S.RES	ERJ3GEYJ 102 V (1 k)	B	72.8/24.5
R63	7030003550	S.RES	ERJ3GEYJ 822 V (8.2 k)	B	73.6/19.9
R64	7030003460	S.RES	ERJ3GEYJ 152 V (1.5 k)	B	71.5/24.5
R71	7030003430	S.RES	ERJ3GEYJ 821 V (820)	B	85.3/8.1
R72	7030003430	S.RES	ERJ3GEYJ 821 V (820)	B	39.3/8.2
R73	7030003430	S.RES	ERJ3GEYJ 821 V (820)	B	11.4/8.7
R74	7030000320	S.RES	MCR10EZHJ 330 (331)	B	86.6/33.7
R75	7030000320	S.RES	MCR10EZHJ 330 (331)	B	11.8/32.8
R76	7030000320	S.RES	MCR10EZHJ 330 (331)	B	12.2/50.2
R81	7030003680	S.RES	ERJ3GEYJ 104 V (100 k)	B	75.6/14.4
R82	7030003520	S.RES	ERJ3GEYJ 472 V (4.7 k)	B	26.3/37.4
R83	7030003520	S.RES	ERJ3GEYJ 472 V (4.7 k)	B	23.5/37.4
R84	7030003410	S.RES	ERJ3GEYJ 561 V (560)	B	21.4/36.9
R85	7030003400	S.RES	ERJ3GEYJ 471 V (470)	B	19.5/40.8
R86	7030003520	S.RES	ERJ3GEYJ 472 V (4.7 k)	B	27.9/45.4
R87	7030003560	S.RES	ERJ3GEYJ 103 V (10 k)	B	81.7/41.4
R88	7030003560	S.RES	ERJ3GEYJ 103 V (10 k)	B	81.7/44.2
R92	7030003680	S.RES	ERJ3GEYJ 104 V (100 k)	B	46.3/42.1
R98	7030003340	S.RES	ERJ3GEYJ 151 V (150)	B	34.8/37.8
C1	4510008540	S.ELE	EEE1CA100SR	B	79.4/48.2
C2	4030016930	S.CER	ECJ0EB1A104K	B	77.8/51.3
C3	4030016790	S.CER	ECJ0EB1C103K	B	77.8/52.3
C4	4030016930	S.CER	ECJ0EB1A104K	B	30.4/39.6
C21	4030016930	S.CER	ECJ0EB1A104K	B	37.5/26.2
C31	4030016790	S.CER	ECJ0EB1C103K	B	44/21.9
C32	4030016930	S.CER	ECJ0EB1A104K	B	44.9/21.9
C33	4030016930	S.CER	ECJ0EB1A104K	B	80.5/41.7
C34	4030016930	S.CER	ECJ0EB1A104K	B	40.3/36.5
C41	4030016930	S.CER	ECJ0EB1A104K	B	63.6/29.8
C42	4030016790	S.CER	ECJ0EB1C103K	B	87.4/25.8
C44	4030017030	S.CER	ECJ0EB1A273K	B	82.7/30
C45	4030017650	S.CER	ECJ0EC1H270J	B	59.4/37.7
C46	4030017410	S.CER	ECJ0EC1H240J	B	60.3/36
C47	4030017490	S.CER	C1608 JB 1A 105K-T	B	62.7/33.7
C48	4030017460	S.CER	ECJ0EB1E102K	B	61.6/32.9
C49	4030017490	S.CER	C1608 JB 1A 105K-T	B	60.6/34.5
C51	4510008540	S.ELE	EEE1CA100SR	B	83/23.6
C52	4030017460	S.CER	ECJ0EB1E102K	B	74.1/24.5
C81	4030016930	S.CER	ECJ0EB1A104K	B	69.1/12.2
C82	4030017780	S.CER	ECJ0EB1E472K	B	15.4/43.6
C83	4030016790	S.CER	ECJ0EB1C103K	B	26.3/41
C84	4030016930	S.CER	ECJ0EB1A104K	B	26.3/40
C90	4030017420	S.CER	ECJ0EC1H470J	B	28.6/48.8
C91	4030017420	S.CER	ECJ0EC1H470J	B	28.9/47.6
C92	4030017420	S.CER	ECJ0EC1H470J	B	28.9/46.6
C93	4030017400	S.CER	ECJ0EC1H220J	B	30.8/46.6
C94	4030016930	S.CER	ECJ0EB1A104K	B	35.5/40.4
C95	4030016930	S.CER	ECJ0EB1A104K	B	32.7/40.5

[LOGIC UNIT]

REF NO.	ORDER NO.	DESCRIPTION		M.	H/V LOCATION
C96	4030016930	S.CER	ECJ0EB1A104K	B	32.4/44.2
C97	4030016790	S.CER	ECJ0EB1C103K	B	35.2/39
C98	4030017490	S.CER	C1608 JB 1A 105K-T	B	34.8/36.5
C99	4030017490	S.CER	C1608 JB 1A 105K-T	B	34.8/35.2
C101	4030016930	S.CER	ECJ0EB1A104K	B	77.5/15.1
C102	4510008540	S.ELE	EEE1CA100SR	B	72.5/11.6
C104	4030017460	S.CER	ECJ0EB1E102K	B	10.9/43.5
C105	4030017460	S.CER	ECJ0EB1E102K	B	7.7/52.7
C106	4030016790	S.CER	ECJ0EB1C103K	B	68.1/46.1
C107	4030016790	S.CER	ECJ0EB1C103K	B	68.1/45.1
C108	4030017460	S.CER	ECJ0EB1E102K	B	73.7/45.2
C109	4030017460	S.CER	ECJ0EB1E102K	B	74.7/45.2
C110	4030017460	S.CER	ECJ0EB1E102K	B	63.8/45.2
C122	4030016930	S.CER	ECJ0EB1A104K	B	40.2/27.9
C123	4030017460	S.CER	ECJ0EB1E102K	B	39.2/27.9
J1	6510022471	S.CNR	40FLT-SM2-TB (LF) (SN)	B	65.4/49
J3	6510018971	S.CNR	B4B-PH-SM4-TB (LF) (SN)	B	21.9/51.2
DS1	5030002940	LCD	SDT-DT161-HP-O <VKH>		
DS2	5040003310	S.LED	L-C191KYCT <SHO>	T	69.9/11.8
DS3	5040003310	S.LED	L-C191KYCT <SHO>	T	82.7/4.2
DS4	5040003310	S.LED	L-C191KYCT <SHO>	T	54.6/11.8
DS5	5040003310	S.LED	L-C191KYCT <SHO>	T	39.3/11.8
DS6	5040003310	S.LED	L-C191KYCT <SHO>	T	24/11.8
DS7	5040003310	S.LED	L-C191KYCT <SHO>	T	10.2/11.8
DS8	5040003230	S.LED	RY-SP110UHY24-5M <VKH>	T	85.7/50.9
DS9	5040003230	S.LED	RY-SP110UHY24-5M <VKH>	T	85.7/42.2
DS10	5040003230	S.LED	RY-SP110UHY24-5M <VKH>	T	85.7/33.5
DS11	5040003230	S.LED	RY-SP110UHY24-5M <VKH>	T	10.5/33.5
DS12	5040003230	S.LED	RY-SP110UHY24-5M <VKH>	T	10.5/42.2
DS13	5040003230	S.LED	RY-SP110UHY24-5M <VKH>	T	10.5/50.9
EP2	8930066470	LCT	SRCN-2852-SP-N-W		

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	1130013980	S.IC	MB15F72ULPFT	T	65.5/21.5
IC2	1110003201	S.IC	TA31136FNG (EL)	T	103.9/13.6
IC3	1150002172	IC	S-AV35A (I,Q)		
IC4	1140013200	S.IC	CD4053BPWR	T	10.3/29.8
IC5	1130007021	S.IC	TC7S66FU (TE85L,F)	T	13.4/36
IC8	1110000960	S.IC	NJM4558M-TE1	T	28.3/33.6
IC9	1110003091	IC	LA4425A-E		
IC10	1180002781	REG	KIA7805API-U/PF		
IC11	1120002830	S.IC	NJM2125F-TE1	T	111.5/17.6
IC14	1110003201	S.IC	TA31136FNG (EL)	T	36.3/51.5
IC15	1110003650	S.IC	NJM2211M-TE1	T	9.3/20.1
IC16	1180002690	S.REG	S-812C36AMC-C2Q-T2G	T	75.2/22.7
Q1	1530003900	S.TR	KTC4075 BL-RTK/P	T	64.9/34.6
Q2	1590003580	S.TR	KRC404 RTK/P	T	51.4/31.2
Q3	1530002601	S.TR	2SC4215-O (TE85R,F)	T	59.8/40.2
Q4	1530002920	S.TR	2SC4226-T1 R25	T	51.6/44.6
Q5	1530002920	S.TR	2SC4226-T1 R25	T	51.3/40.2
Q6	1530002601	S.TR	2SC4215-O (TE85R,F)	T	60.1/44.7
Q7	1530002601	S.TR	2SC4215-O (TE85R,F)	T	62.8/42.9
Q10	1530002920	S.TR	2SC4226-T1 R25	T	50.9/78.9
Q14	1510001090	S.TR	KTA2015Y-RTK/P	T	66.2/78.8
Q15	1590001170	S.TR	XP1501-(TX) .AB	T	67.9/74.8
Q16	1590003680	S.TR	KRC402 RTK/P	T	75/72
Q17	1590003580	S.TR	KRC404 RTK/P	T	60.9/73.6
Q18	1590003580	S.TR	KRC404 RTK/P	T	63.4/77.2
Q21	1580000540	S.FET	3SK131-T2-LA	T	109.9/61.3
Q22	1580000731	S.FET	3SK293 (TE85L,F)	T	114.9/31.6
Q23	1530003890	S.TR	KTC3880S Y-RTK/P	T	111.9/7.2
Q31	1530003900	S.TR	KTC4075 BL-RTK/P	T	9.4/46.9
Q32	1530003900	S.TR	KTC4075 BL-RTK/P	T	6.6/43.8
Q53	1510001090	S.TR	KTA2015Y-RTK/P	T	26.3/66.6
Q54	1590003580	S.TR	KRC404 RTK/P	T	26.3/63.5
Q55	1520000840	S.TR	KTA1664Y-RTF/P	T	34.8/65.7
Q56	1530003900	S.TR	KTC4075 BL-RTK/P	T	29.3/65.8
Q57	1510001090	S.TR	KTA2015Y-RTK/P	T	26.3/73.5
Q58	1590003580	S.TR	KRC404 RTK/P	T	25.3/70.4
Q59	1590003580	S.TR	KRC404 RTK/P	T	28.1/70.7
Q61	1580000540	S.FET	3SK131-T2-LA	T	92.7/60.5
Q62	1580000731	S.FET	3SK293 (TE85L,F)	T	65.9/57.8
Q63	1530003890	S.TR	KTC3880S Y-RTK/P	T	45.4/53.5
Q65	1530003900	S.TR	KTC4075 BL-RTK/P	T	18/17.5
Q70	1590003580	S.TR	KRC404 RTK/P	T	81.1/37.2
Q71	1530003900	S.TR	KTC4075 BL-RTK/P	T	84.2/36.9
Q72	1560000990	S.FET	PMBFJ310	T	92.2/45
Q74	1530002601	S.TR	2SC4215-O (TE85R,F)	T	92.9/40.1
Q75	1530002601	S.TR	2SC4215-O (TE85R,F)	T	88.1/31.5
Q76	1530002601	S.TR	2SC4215-O (TE85R,F)	T	92.2/33.7
Q85	1530003950	S.TR	KTC4080 Y-RTK/P	T	80.8/20.3
Q86	1590003580	S.TR	KRC404 RTK/P	T	71.3/17.2
D1	1790001260	S.DIO	MA2S077-(TX)	T	49.5/34.7
D2	1790001260	S.DIO	MA2S077-(TX)	T	50.1/36.7
D3	1750000711	S.VCP	HVC350BTRF-E	T	53.4/41.2
D7	1790001260	S.DIO	MA2S077-(TX)	T	57.4/52.8
D8	1790001260	S.DIO	MA2S077-(TX)	T	58.8/52.8
D12	1790000691	S.DIO	HSM88ASRTR-E	T	77.1/81.3
D13	1790000691	S.DIO	HSM88ASRTR-E	T	81.7/76.1
D14	1710001081	DIO	L308CCB		
D21	1710001081	DIO	L308CCB		
D26	1720000261	S.VCP	1SV214 (TPH2,F)	T	108.3/54.3
D27	1720000261	S.VCP	1SV214 (TPH2,F)	T	107.6/46.4
D28	1720000261	S.VCP	1SV214 (TPH2,F)	T	107.6/39.3
D42	1790000700	DIO	DSA3A1		
D51	1720000811	S.VCP	HVC358BTRF-E	T	86.1/45
D52	1720000811	S.VCP	HVC358BTRF-E	T	86.1/46.3
D53	1790001260	S.DIO	MA2S077-(TX)	T	82.5/40.7
FI1	2030000350	MLH	21R15AB (FL-368)		
FI2	2030000481	MLH	FL-399A (21.7 MHz)		
FI3	2020002490	CER	LTM450EW		
FI4	2030000640	MLH	FL-413 (MCF UM-5-3P) 30.875 MHz		
FI5	2030000640	MLH	FL-413 (MCF UM-5-3P) 30.875 MHz		
FI6	2020002490	CER	LTM450EW		
X1	6050012121	S.XTL	CR-804A (21.250 MHz)	T	81.4/15.5
X2	6070000290	DCR	JTB450C24		
X4	6070000290	DCR	JTB450C24		
X5	6050012570	S.XTL	CR-845 (30.425 MHz)	T	33.3/56.5
L1	6200009560	S.COL	MLG1608B R10J-T	T	60/38.1
L2	6200010840	S.COL	MLG1608B 56NJ-T	T	57.9/23.1
L3	6200003091	S.COL	NLV32T-2R7J	T	53.5/34.3
L4	6200012450	S.COL	0.25-1.9-8TL 73N	T	55.3/38.4
L5	6200009141	S.COL	NLV25T-6R8J	T	86.5/23.9
L6	6200009560	S.COL	MLG1608B R10J-T	T	58.7/42.8
L7	6200010840	S.COL	MLG1608B 56NJ-T	T	65/42.8
L12	6200009560	S.COL	MLG1608B R10J-T	T	108.2/31.6
L13	6200013340	S.COL	MLG1608S R12J-T	T	105.3/31.6
L15	6200009560	S.COL	MLG1608B R10J-T	T	53.6/79.9
L17	6200009680	S.COL	MLG1608B 47NJ-T	T	55.7/81.5
L19	6110001670	COL	LA-253		
L20	6170000230	COL	LW-25		
L21	6110001600	COL	LA-243		
L22	6110001600	COL	LA-243		
L31	6110001600	COL	LA-243		
L35	6200010730	S.COL	C2520C-68NG-A	T	117.2/64.2
L36	6150003821	COL	LS-440-LF		
L38	6150003821	COL	LS-440-LF		

[MAIN UNIT]

REF NO.	ORDER NO.	DESCRIPTION		M.	H/V LOCATION
L39	6150003821	COL	LS-440-LF		
L42	6200011200	S.COL	C2012C-R82J-A	T	113.2/29.1
L61	6200011410	S.COL	C2520C-82NG-A	T	91.1/56.5
L62	6200010730	S.COL	C2520C-68NG-A	T	80.1/59.4
L63	6200010730	S.COL	C2520C-68NG-A	T	72/58.3
L64	6200007360	S.COL	ELJND R47J	T	65.1/60.5
L65	6200010840	S.COL	MLG1608B 56NJ-T	T	63.6/54.4
L66	6200010840	S.COL	MLG1608B 56NJ-T	T	65.6/53.8
L70	6200003101	S.COL	NLV32T-3R9J	T	82.6/45.6
L71	6200013420	S.COL	0.30-1.6-7TR 41.8N	T	86.6/42.7
L72	6200003101	S.COL	NLV32T-3R9J	T	95.5/43.4
L73	6200009560	S.COL	MLG1608B R10J-T	T	91/39
L74	6200009560	S.COL	MLG1608B R10J-T	T	86/31.5
L75	6200010840	S.COL	MLG1608B 56NJ-T	T	72.9/20.7
L76	6200009560	S.COL	MLG1608B R10J-T	T	94.4/32.3
R1	7030003560	S.RES	ERJ3GEYJ 103 V (10 k)	T	46.1/14.9
R2	7030003560	S.RES	ERJ3GEYJ 103 V (10 k)	T	48.7/12.9
R3	7030003560	S.RES	ERJ3GEYJ 103 V (10 k)	T	48.7/11.6
R5	7030003720	S.RES	ERJ3GEYJ 224 V (220 k)	T	74.5/17.4
R6	7030003440	S.RES	ERJ3GEYJ 102 V (1 k)	T	73.2/16.1
R8	7030003450	S.RES	ERJ3GEYJ 122 V (1.2 k)	T	60.4/25.2
R9	7030005000	S.RES	ERJ2GEJ 471 X (470)	T	56.6/24.5
R11	7030003520	S.RES	ERJ3GEYJ 472 V (4.7 k)	T	84.9/19.5
R12	7030003680	S.RES	ERJ3GEYJ 104 V (100 k)	T	80.7/18.3
R13	7030003280	S.RES	ERJ3GEYJ 470 V (47)	T	78/18.6
R14	7030003510	S.RES	ERJ3GEYJ 392 V (3.9 k)	T	84/22.9
R15	7030003480	S.RES	ERJ3GEYJ 222 V (2.2 k)	T	78.9/22
R21	7030005120	S.RES	ERJ2GEJ 102 X (1 k)	T	63.8/36.3
R22	7030005120	S.RES	ERJ2GEJ 102 X (1 k)	T	65.5/32.2
R23	7030003640	S.RES	ERJ3GEYJ 473 V (47 k)	T	54/31.3
R24	7030005120	S.RES	ERJ2GEJ 102 X (1 k)	T	50.8/35.2
R25	7030003400	S.RES	ERJ3GEYJ 471 V (470)	T	49.5/32
R26	7030005060	S.RES	ERJ2GEJ 333 X (33 k)	T	37.6/37
R27	7030003590	S.RES	ERJ3GEYJ 183 V (18 k)	T	39.2/37.2
R28	7030005060	S.RES	ERJ2GEJ 333 X (33 k)	T	41.7/36.3
R31	7030003400	S.RES	ERJ3GEYJ 471 V (470)	T	63/39
R32	7030005070	S.RES	ERJ2GEJ 683 X (68 k)	T	61.9/40.1
R33	7030008280	S.RES	ERJ2GEJ 271 X (270)	T	59.7/36.9
R34	7030010090	S.RES	ERJ2GEJ 180 X (18)	T	61.1/36.5
R35	7030008280	S.RES	ERJ2GEJ 271 X (270)	T	59.7/36
R36	7030003280	S.RES	ERJ3GEYJ 470 V (47)	T	59.2/21.3
R41	7030009290	S.RES	ERJ2GEJ 562 X (5.6 k)	T	55.8/32.1
R42	7030005210	S.RES	ERJ2GEJ 822 X (8.2 k)	T	51.5/46.3
R43	7030005210	S.RES	ERJ2GEJ 822 X (8.2 k)	T	49.3/39.8
R44	7030003320	S.RES	ERJ3GEYJ 101 V (100)	T	57.2/46.2
R45	7030003390	S.RES	ERJ3GEYJ 391 V (390)	T	54.1/46.2
R46	7030009160	S.RES	ERJ2GEJ 181 X (180)	T	49.7/44.1
R51	7030003420	S.RES	ERJ3GEYJ 681 V (680)	T	55.8/44.1
R52	7030005070	S.RES	ERJ2GEJ 683 X (68 k)	T	57/44.3
R55	7030003320	S.RES	ERJ3GEYJ 101 V (100)	T	65/39.9
R56	7030003610	S.RES	ERJ3GEYJ 273 V (27 k)	T	62.9/45.8
R80	7030003860	S.RES	ERJ3GE JPW V	T	57.5/78.1
R81	7030003440	S.RES	ERJ3GEYJ 102 V (1 k)	T	55.3/52.3
R83	7030003480	S.RES	ERJ3GEYJ 222 V (2.2 k)	T	55.1/73.4
R88	7030003200	S.RES	ERJ3GEYJ 100 V (10)	T	56.5/79.9
R89	7030003560	S.RES	ERJ3GEYJ 103 V (10 k)	T	53.6/78.6
R90	7030003580	S.RES	ERJ3GEYJ 153 V (15 k)	T	49.8/75
R91	7030003370	S.RES	ERJ3GEYJ 271 V (270)	T	53.6/77.3
R100	7030003680	S.RES	ERJ3GEYJ 104 V (100 k)	T	66.7/76.9
R101	7030003480	S.RES	ERJ3GEYJ 222 V (2.2 k)	T	68.4/79.9
R102	7030003370	S.RES	ERJ3GEYJ 271 V (270)	T	66.1/80.7
R103	7030003360	S.RES	ERJ3GEYJ 221 V (220)	T	64/79.9
R106	7030003560	S.RES	ERJ3GEYJ 103 V (10 k)	T	66/74.8
R107	7030003240	S.RES	ERJ3GEYJ 220 V (22)	T	63.1/73.7
R108	7030003500	S.RES	ERJ3GEYJ 332 V (3.3 k)	T	65.5/70.7
R109	7030003560	S.RES	ERJ3GEYJ 103 V (10 k)	T	67.3/71.9
R110	7030003480	S.RES	ERJ3GEYJ 222 V (2.2 k)	T	70.6/74.7
R111	7030003560	S.RES	ERJ3GEYJ 103 V (10 k)	T	70.6/73.4
R112	7310005460	S.TRI	EVM-3VSX50 BE2 (221)	T	77.1/76.8
R113	7030003550	S.RES	ERJ3GEYJ 822 V (8.2 k)	T	77.7/72.3
R114	7030003320	S.RES	ERJ3GEYJ 101 V (100)	T	77.7/73.6
R121	7030003470	S.RES	ERJ3GEYJ 182 V (1.8 k)	T	84/81.7
R122	7030003470	S.RES	ERJ3GEYJ 182 V (1.8 k)	T	81.9/80.8
R123	7030003470	S.RES	ERJ3GEYJ 182 V (1.8 k)	T	90/74.5
R124	7030003470	S.RES	ERJ3GEYJ 182 V (1.8 k)	T	87.1/74.5
R125	7030007240	S.RES	ERJ12YJ680U (68)	T	83.4/71.5
R126	7030003670	S.RES	ERJ3GEYJ 823 V (82 k)	T	105.4/93.6
R127	7030003680	S.RES	ERJ3GEYJ 104 V (100 k)	T	72.7/73.4
R147	7030003320	S.RES	ERJ3GEYJ 101 V (100)	T	106.1/58.9
R149	7030003680	S.RES	ERJ3GEYJ 104 V (100 k)	T	112.3/61.3
R150	7030003630	S.RES	ERJ3GEYJ 393 V (39 k)	T	106.8/62.2
R151	7030003640	S.RES	ERJ3GEYJ 473 V (47 k)	T	106.6/63.5
R152	7030003260	S.RES	ERJ3GEYJ 330 V (33)	T	115.6/61.1
R153	7030004050	S.RES	ERJ3GEYJ 1R0 V (1)	T	108.3/58.1
R154	7030003460	S.RES	ERJ3GEYJ 152 V (1.5 k)	T	109.6/58.1
R155	7030003680	S.RES	ERJ3GEYJ 104 V (100 k)	T	107.3/50
R171	7030003680	S.RES	ERJ3GEYJ 104 V (100 k)	T	106/46.2
R172	7030003680	S.RES	ERJ3GEYJ 104 V (100 k)	T	106.2/41.6
R173	7030003560	S.RES	ERJ3GEYJ 103 V (10 k)	T	104.4/39.8
R176	7030003710	S.RES	ERJ3GEYJ 184 V (180 k)	T	113.9/33.8
R177	7030003700	S.RES	ERJ3GEYJ 154 V (150 k)	T	111.6/33
R178	7030003640	S.RES	ERJ3GEYJ 473 V (47 k)	T	112.9/31.7
R181	7030003630	S.RES	ERJ3GEYJ 393 V (39 k)	T	117.5/32.7
R182	7030003200	S.RES	ERJ3GEYJ 100 V (10)	T	114.8/26.8
R183	7030003500	S.RES	ERJ3GEYJ 332 V (3.3 k)	T	113.6/26.8
R185	7030003450	S.RES	ERJ3GEYJ 122 V (1.2 k)	T	117.4/28.1
R186	7030003450	S.RES	ERJ3GEYJ 122 V (1.2 k)	T	115.7/12.1
R201	7030003500	S.RES	ERJ3GEYJ 332 V (3.3 k)	T	111.9/12.3
R202	7030003380	S.RES	ERJ3GEYJ 331 V (330)	T	110.1/10.3
R203	7030003680	S.RES	ERJ3GEYJ 104 V (100 k)	T	111.4/10.3
R205	7030003460	S.RES	ERJ3GEYJ 152 V (1.5 k)	T	102.1/8.1
R206	7030003390	S.RES	ERJ3GEYJ 391 V (390)	T	107.8/20.9

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
R210	7030003460	S.RES ERJ3GEYJ 152 V (1.5 k)	T	106.4/20.1
R211	7030003760	S.RES ERJ3GEYJ 474 V (470 k)	T	100.5/19
R212	7030003430	S.RES ERJ3GEYJ 821 V (820)	T	98.4/20.7
R213	7030003620	S.RES ERJ3GEYJ 333 V (33 k)	T	98.4/22
R214	7310005400	S.TRI EVM-3VSX50 BE4 (223)	T	95.2/21.7
R215	7510001571	S.TMR NTCG16 4LH 104JT	T	91.9/22.3
R216	7030003480	S.RES ERJ3GEYJ 222 V (2.2 k)	T	91.1/20.3
R218	7030003640	S.RES ERJ3GEYJ 473 V (47 k)	T	92.7/20.3
R219	7030003400	S.RES ERJ3GEYJ 471 V (470)	T	94.2/18.4
R222	7030003560	S.RES ERJ3GEYJ 103 V (10 k)	T	108.1/17.1
R223	7030003580	S.RES ERJ3GEYJ 153 V (15 k)	T	110.9/15.2
R224	7030003560	S.RES ERJ3GEYJ 103 V (10 k)	T	110.9/13.9
R225	7030003620	S.RES ERJ3GEYJ 333 V (33 k)	T	107.4/13.8
R231	7030003590	S.RES ERJ3GEYJ 183 V (18 k)	T	14.9/40.3
R232	7030003580	S.RES ERJ3GEYJ 153 V (15 k)	T	12.4/47.6
R233	7030003360	S.RES ERJ3GEYJ 221 V (220)	T	7.2/39.8
R234	7030003760	S.RES ERJ3GEYJ 474 V (470 k)	T	9.5/45
R235	7030003710	S.RES ERJ3GEYJ 184 V (180 k)	T	12.4/45
R236	7030003390	S.RES ERJ3GEYJ 391 V (390)	T	11.5/48.8
R237	7030003480	S.RES ERJ3GEYJ 222 V (2.2 k)	T	7.2/46.5
R238	7030003620	S.RES ERJ3GEYJ 333 V (33 k)	T	6.5/48.5
R239	7030003620	S.RES ERJ3GEYJ 333 V (33 k)	T	5.2/45.8
R240	7030003480	S.RES ERJ3GEYJ 222 V (2.2 k)	T	5.2/41.9
R244	7030003800	S.RES ERJ3GEYJ 105 V (1 M)	T	4.6/39.8
R245	7030003760	S.RES ERJ3GEYJ 474 V (470 k)	T	6.4/37.8
R246	7030003680	S.RES ERJ3GEYJ 104 V (100 k)	T	12.9/26.3
R249	7030003680	S.RES ERJ3GEYJ 104 V (100 k)	T	13.5/34
R250	7030003800	S.RES ERJ3GEYJ 105 V (1 M)	T	9.5/34.4
R251	7030003760	S.RES ERJ3GEYJ 474 V (470 k)	T	7.7/34
R252	7030003800	S.RES ERJ3GEYJ 105 V (1 M)	T	4.7/33.7
R257	7030003490	S.RES ERJ3GEYJ 272 V (2.7 k)	T	11.4/38.8
R292	7030003580	S.RES ERJ3GEYJ 153 V (15 k)	T	23.1/39.7
R293	7030003680	S.RES ERJ3GEYJ 104 V (100 k)	T	24.4/39.7
R294	7030003200	S.RES ERJ3GEYJ 100 V (10)	T	20/46.3
R295	7030003560	S.RES ERJ3GEYJ 103 V (10 k)	T	23.1/42.7
R307	7030003660	S.RES ERJ3GEYJ 683 V (68 k)	T	21.3/36.1
R308	7030003640	S.RES ERJ3GEYJ 473 V (47 k)	T	27.9/30.2
R309	7310005420	S.TRI EVM-3VSX50 B15 (104)	T	28.1/27.7
R310	7030003340	S.RES ERJ3GEYJ 151 V (150)	T	22/33.8
R311	7030003560	S.RES ERJ3GEYJ 103 V (10 k)	T	24.2/27.9
R312	7030010310	S.RES ERJ3GEYF 223 V (22 k)	T	29.5/25.1
R314	7030010290	S.RES ERJ3GEYF 273 V (27 k)	T	31.9/25.3
R315	7030003660	S.RES ERJ3GEYJ 683 V (68 k)	T	31.9/28.1
R316	7030003670	S.RES ERJ3GEYJ 823 V (82 k)	T	33.3/29.6
R317	7030003670	S.RES ERJ3GEYJ 823 V (82 k)	T	31.1/30.2
R323	7030003640	S.RES ERJ3GEYJ 473 V (47 k)	T	35/32.2
R324	7510001511	S.TMR NTCG16 4LH 223JT	T	34.6/30.1
R325	7030003580	S.RES ERJ3GEYJ 153 V (15 k)	T	35.3/28
R326	7030003560	S.RES ERJ3GEYJ 103 V (10 k)	T	35.9/30.1
R327	7310005410	S.TRI EVM-3VSX50 BQ4 (473)	T	36.1/34.7
R328	7030005210	S.RES ERJ2GEJ 822 X (8.2 k)	T	39.3/34.6
R351	7030003580	S.RES ERJ3GEYJ 153 V (15 k)	T	5.7/28.5
R353	7030003760	S.RES ERJ3GEYJ 474 V (470 k)	T	9.1/61.5
R354	7030003580	S.RES ERJ3GEYJ 153 V (15 k)	T	11.9/71.5
R355	7030003620	S.RES ERJ3GEYJ 333 V (33 k)	T	7.9/71.5
R356	7030000100	S.RES MCR10EZHJ 4.7 (4R7)	T	18/74
R359	7030003640	S.RES ERJ3GEYJ 473 V (47 k)	T	3.9/30.8
R361	7030003680	S.RES ERJ3GEYJ 104 V (100 k)	T	5.1/35.8
R362	7030003680	S.RES ERJ3GEYJ 104 V (100 k)	T	6.4/35.8
R363	7030003800	S.RES ERJ3GEYJ 105 V (1 M)	T	10.2/58.2
R382	7030003560	S.RES ERJ3GEYJ 103 V (10 k)	T	24.4/73.4
R383	7030003440	S.RES ERJ3GEYJ 102 V (1 k)	T	23.4/70.5
R384	7030003560	S.RES ERJ3GEYJ 103 V (10 k)	T	24.4/66.5
R385	7030003440	S.RES ERJ3GEYJ 102 V (1 k)	T	24.4/63.7
R386	7030003500	S.RES ERJ3GEYJ 332 V (3.3 k)	T	31.4/64.6
R387	7030003500	S.RES ERJ3GEYJ 332 V (3.3 k)	T	29.3/63.8
R388	7030003400	S.RES ERJ3GEYJ 471 V (470)	T	27.9/68.7
R401	7030003320	S.RES ERJ3GEYJ 101 V (100)	T	47.7/6.7
R431	7030003560	S.RES ERJ3GEYJ 103 V (10 k)	T	43.5/17.8
R432	7030003600	S.RES ERJ3GEYJ 223 V (22 k)	T	44.8/18.3
R433	7030003560	S.RES ERJ3GEYJ 103 V (10 k)	T	42.2/15.9
R434	7030003600	S.RES ERJ3GEYJ 223 V (22 k)	T	50.5/14.6
R435	7030003600	S.RES ERJ3GEYJ 223 V (22 k)	T	51.7/12.4
R436	7030003600	S.RES ERJ3GEYJ 223 V (22 k)	T	46.1/16.2
R437	7030003600	S.RES ERJ3GEYJ 223 V (22 k)	T	40.9/18.9
R501	7030003630	S.RES ERJ3GEYJ 393 V (39 k)	T	89.6/61.1
R502	7030003640	S.RES ERJ3GEYJ 473 V (47 k)	T	90.5/63
R503	7030003680	S.RES ERJ3GEYJ 104 V (100 k)	T	95.1/60.2
R504	7030003280	S.RES ERJ3GEYJ 470 V (47)	T	95.5/57.6
R505	7030003370	S.RES ERJ3GEYJ 271 V (270)	T	86.9/57.1
R506	7030004050	S.RES ERJ3GEYJ 1R0 V (1)	T	89.6/59.4
R507	7030003320	S.RES ERJ3GEYJ 101 V (100)	T	89.2/53.8
R511	7030003320	S.RES ERJ3GEYJ 101 V (100)	T	70.3/54.5
R512	7030003760	S.RES ERJ3GEYJ 474 V (470 k)	T	68.6/56.6
R513	7030003680	S.RES ERJ3GEYJ 104 V (100 k)	T	68.5/58.9
R514	7030003700	S.RES ERJ3GEYJ 154 V (150 k)	T	67.5/55.3
R515	7030003630	S.RES ERJ3GEYJ 393 V (39 k)	T	68.1/53.2
R521	7030003200	S.RES ERJ3GEYJ 100 V (10)	T	60.3/60.5
R522	7030003500	S.RES ERJ3GEYJ 332 V (3.3 k)	T	64.4/62.6
R523	7030003420	S.RES ERJ3GEYJ 681 V (680)	T	63.8/64.7
R524	7030003420	S.RES ERJ3GEYJ 681 V (680)	T	49.8/60.8
R531	7030003500	S.RES ERJ3GEYJ 332 V (3.3 k)	T	46.2/60.5
R532	7030003680	S.RES ERJ3GEYJ 104 V (100 k)	T	48.3/55.9
R533	7030003380	S.RES ERJ3GEYJ 331 V (330)	T	45.5/55.9
R534	7030003480	S.RES ERJ3GEYJ 222 V (2.2 k)	T	58.9/56.4
R541	7030003390	S.RES ERJ3GEYJ 391 V (390)	T	34.8/42.1
R542	7030003460	S.RES ERJ3GEYJ 152 V (1.5 k)	T	38.6/42.9
R544	7030003400	S.RES ERJ3GEYJ 471 V (470)	T	30.7/41.3
R563	7030003560	S.RES ERJ3GEYJ 103 V (10 k)	T	30.7/56.9
R571	7030003590	S.RES ERJ3GEYJ 183 V (18 k)	T	24.2/18.2
R572	7030003620	S.RES ERJ3GEYJ 333 V (33 k)	T	21.1/20.5
R573	7030003560	S.RES ERJ3GEYJ 103 V (10 k)	T	23.2/20.7
R574	7030003560	S.RES ERJ3GEYJ 103 V (10 k)	T	22.8/18.6
R575	7030003560	S.RES ERJ3GEYJ 103 V (10 k)	T	21.1/17.6

[MAIN UNIT]

REF NO.	ORDER NO.	DESCRIPTION	M.	H/V LOCATION
R576	7030003440	S.RES ERJ3GEYJ 102 V (1 k)	T	18.6/20.5
R577	7030003560	S.RES ERJ3GEYJ 103 V (10 k)	T	16/17.7
R582	7030003760	S.RES ERJ3GEYJ 474 V (470 k)	T	16/20.5
R583	7030003280	S.RES ERJ3GEYJ 470 V (47)	T	27.5/19.2
R584	7030003680	S.RES ERJ3GEYJ 104 V (100 k)	T	3.7/20.8
R585	7030003630	S.RES ERJ3GEYJ 393 V (39 k)	T	3.7/18.2
R586	7030003580	S.RES ERJ3GEYJ 153 V (15 k)	T	3.7/16.9
R587	7030003470	S.RES ERJ3GEYJ 182 V (1.8 k)	T	3.7/15.6
R602	7030003420	S.RES ERJ3GEYJ 681 V (680)	T	73.4/31.1
R603	7030003460	S.RES ERJ3GEYJ 152 V (1.5 k)	T	73.4/33.5
R606	7030003520	S.RES ERJ3GEYJ 472 V (4.7 k)	T	80.2/40.8
R608	7030003400	S.RES ERJ3GEYJ 471 V (470)	T	80.2/32.3
R609	7030003480	S.RES ERJ3GEYJ 222 V (2.2 k)	T	86.7/38
R610	7030003520	S.RES ERJ3GEYJ 472 V (4.7 k)	T	86.1/36.1
R611	7030003280	S.RES ERJ3GEYJ 470 V (47)	T	90/42
R615	7030003450	S.RES ERJ3GEYJ 122 V (1.2 k)	T	95.3/46.2
R616	7030003420	S.RES ERJ3GEYJ 681 V (680)	T	95.8/37.9
R617	7030005070	S.RES ERJ2GEJ 683 X (68 k)	T	94.7/40.3
R621	7030005070	S.RES ERJ2GEJ 683 X (68 k)	T	88.3/34.4
R622	7030003380	S.RES ERJ3GEYJ 331 V (330)	T	86.1/33.5
R623	7030005590	S.RES ERJ2GEJ 680 X (68)	T	83.7/32.1
R624	7030003340	S.RES ERJ3GEYJ 151 V (150)	T	82.9/30.7
R625	7030005590	S.RES ERJ2GEJ 680 X (68)	T	82.7/32.1
R631	7030003400	S.RES ERJ3GEYJ 471 V (470)	T	94.9/35.6
R632	7030003500	S.RES ERJ3GEYJ 332 V (3.3 k)	T	92.1/35.6
R633	7030003400	S.RES ERJ3GEYJ 471 V (470)	T	91.2/30.8
R634	7030003480	S.RES ERJ3GEYJ 222 V (2.2 k)	T	92.2/36.9
R635	7030005010	S.RES ERJ2GEJ 681 X (680)	T	94.5/37.9
R641	7030005240	S.RES ERJ2GEJ 473 X (47 k)	T	81.4/39.3
R642	7030008410	S.RES ERJ2GEJ 392 X (3.9 k)	T	81.4/40.9
R643	7030007300	S.RES ERJ2GEJ 332 X (3.3 k)	T	83.9/40.5
R651	7030003860	S.RES ERJ3GE JPW V	T	14.3/54.9
R652	7030003860	S.RES ERJ3GE JPW V	T	10.2/50.7
C1	4030016930	S.CER ECJ0EB1A104K	T	69.5/16.8
C2	4030016930	S.CER ECJ0EB1A104K	T	73/24.2
C3	4030017760	S.CER ECJ0EB1H222K	T	72.1/24.2
C5	4550006250	S.TAN TEESVA 1A 106M8R	T	56.1/20.9
C7	4030017760	S.CER ECJ0EB1H222K	T	60.8/21.7
C8	4030017760	S.CER ECJ0EB1H222K	T	70.2/21
C9	4030016930	S.CER ECJ0EB1A104K	T	60.8/23.3
C10	4030016930	S.CER ECJ0EB1A104K	T	70.2/22.7
C11	4030017390	S.CER ECJ0EC1H180J	T	77.2/10.1
C12	4610001590	S.TRI TZC3R100A110R00	T	81.2/10.8
C13	4030017660	S.CER ECJ0EC1H330J	T	82.8/20
C14	4030017660	S.CER ECJ0EC1H330J	T	83.7/20
C15	4030016790	S.CER ECJ0EB1C103K	T	78.8/20.2
C16	4030017460	S.CER ECJ0EB1E102K	T	82.8/21.7
C17	4030017350	S.CER ECJ0EC1H020B	T	85.5/21.7
C18	4030017350	S.CER ECJ0EC1H020B	T	87.5/21.7
C19	4030017390	S.CER ECJ0EC1H180J	T	81.3/22.1
C20	4030017460	S.CER ECJ0EB1E102K	T	45.9/27.8
C21	4550006250	S.TAN TEESVA 1A 106M8R	T	62.6/32.7
C22	4030016790	S.CER ECJ0EB1C103K	T	64.6/37.9
C23	4030017460	S.CER ECJ0EB1E102K	T	65/30.9
C24	4030017730	S.CER ECJ0EB1E471K	T	51/34
C26	4030016790	S.CER ECJ0EB1C103K	T	40.4/36.7
C27	4030017490	S.CER C1608 JB 1A 105K-T	T	41.2/34.9
C29	4030017460	S.CER ECJ0EB1E102K	T	51.6/38.4
C30	4030017460	S.CER ECJ0EB1E102K	T	51/33.1
C31	4030017730	S.CER ECJ0EB1E471K	T	58/40.8
C32	4030017380	S.CER ECJ0EC1H050B	T	60.8/42.6
C33	4030017400	S.CER ECJ0EC1H220J	T	62/37.5
C34	4030017650	S.CER ECJ0EC1H270J	T	59.4/24.1
C35	4030017650	S.CER ECJ0EC1H270J	T	59.4/23.1
C37	4030017460	S.CER ECJ0EB1E102K	T	60.7/20.5
C40	4030017590	S.CER ECJ0EC1H070C	T	51.1/42.4
C41	4030017660	S.CER ECJ0EC1H330J	T	51.9/37.2
C42	4030017700	S.CER ECJ0EC1H151J	T	52.9/37.2
C43	4550007620	S.TAN F931V224MAABMA	T	58.4/32.7
C44	4030017460	S.CER ECJ0EB1E102K	T	56.8/32.1
C45	4030017550	S.CER ECJ0EC1H1R5B	T	53/43.3
C46	4030017550	S.CER ECJ0EC1H1R5B	T	52.1/42.4
C47	4030017460	S.CER ECJ0EB1E102K	T	49.6/45.8
C48	4030017730	S.CER ECJ0EB1E471K	T	49.9/42.4
C49	4030017730	S.CER ECJ0EB1E471K	T	54.6/44.8
C51	4030017540	S.CER ECJ0EC1HR75B	T	54.3/43.6
C52	4030017730	S.CER ECJ0EB1E471K	T	58/44.3
C53	4030016930	S.CER ECJ0EB1A104K	T	55.6/24.5
C55	4030017460	S.CER ECJ0EB1E102K	T	63.5/40.1
C56	4030017630	S.CER ECJ0EC1H120J	T	62.5/44.7
C57	4030017730	S.CER ECJ0EB1E471K	T	63.5/41.1
C58	4030017660	S.CER ECJ0EC1H330J	T	64.7/44.7
C77	4030017380	S.CER ECJ0EC1H050B	T	107/33.3
C81	4030017460	S.CER ECJ0EB1E102K	T	57.6/72.9
C82	4030017460	S.CER ECJ0EB1E102K	T	53.7/73.1
C83	4030017600	S.CER ECJ0EC1H080C	T	50.6/76.8
C86	4030017460	S.CER ECJ0EB1E102K	T	55.4/78.2
C87	4030017420	S.CER ECJ0EC1H470J	T	54.1/75.1
C88	4030017460	S.CER ECJ0EB1E102K	T	54.1/76.1
C91	4030017620	S.CER ECJ0EC1H100C	T	52.6/81.5
C92	4030017620	S.CER ECJ0EC1H100C	T	53.9/81.9
C93	4030017380	S.CER ECJ0EC1H050B	T	56/82.8
C97	4030017730	S.CER ECJ0EB1E471K	T	58.9/72.9
C98	4030017730	S.CER ECJ0EB1E471K	T	62.1/79
C99	4030017440	S.CER ECJ0EC1H221J	T	62.8/80.4
C100	4550007090	S.TAN TEESVA 1A 226M8R	T	60.1/78.8
C105	4030017460	S.CER ECJ0EB1E102K	T	61.8/80.4
C111	4030017420	S.CER ECJ0EC1H470J	T	75/83
C112	4030017730	S.CER ECJ0EB1E471K	T	66.2/82.3
C113	4030017460	S.CER ECJ0EB1E102K	T	67.1/82.3
C114	4030011600	S.CER C1608 JB 1E 104K-T	T	68.2/82.7
C115	4030011600	S.CER C1608 JB 1E 104K-T	T	51/83.9

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
C116	4030017620	S.CER ECJ0EC1H100C	T	61.1/82.1
C117	4030017440	S.CER ECJ0EC1H221J	T	62.1/82.1
C118	4510008570	S.ELE EEE1CA220SR	T	72/79.1
C119	4030016790	S.CER ECJ0EB1C103K	T	67.1/70
C121	4010007630	CER HM60SJ CH 270J 500V		
C122	4030006860	S.CER C1608 JB 1H 102K-T	T	79.5/81.6
C123	4030006860	S.CER C1608 JB 1H 102K-T	T	84.2/74.5
C124	4010008050	CER HM60SJ CH 180J 500V		
C125	4030006860	S.CER C1608 JB 1H 102K-T	T	88.1/72.3
C126	4010005790	CER HM60SJ YB 102K 500V		
C127	4010008050	CER HM60SJ CH 180J 500V		
C128	4010005420	CER HM60SJ CH 040C 500V		
C129	4010007630	CER HM60SJ CH 270J 500V		
C133	4030017460	S.CER ECJ0EB1E102K	T	68.6/77.1
C134	4030016790	S.CER ECJ0EB1C103K	T	80.8/73.9
C135	4030017460	S.CER ECJ0EB1E102K	T	73.9/74.3
C136	4030017460	S.CER ECJ0EB1E102K	T	75.2/73.9
C137	4030017730	S.CER ECJ0EB1E471K	T	75.6/70
C138	4030017460	S.CER ECJ0EB1E102K	T	79.8/78.4
C139	4030017460	S.CER ECJ0EB1E102K	T	79.5/76.6
C140	4030017460	S.CER ECJ0EB1E102K	T	71.2/70.6
C142	4010007630	CER HM60SJ CH 270J 500V		
C143	4030017400	S.CER ECJ0EC1H220J	T	113.3/73.2
C150	4030006860	S.CER C1608 JB 1H 102K-T	T	112.3/65.8
C151	4030017400	S.CER ECJ0EC1H220J	T	113.9/64.2
C152	4030017400	S.CER ECJ0EC1H220J	T	113.9/65.1
C153	4030017440	S.CER ECJ0EC1H221J	T	112.1/63.7
C156	4030016930	S.CER ECJ0EB1A104K	T	107.1/60.1
C157	4030017760	S.CER ECJ0EB1H222K	T	114.5/60.4
C158	4030017760	S.CER ECJ0EB1H222K	T	108.6/63.8
C159	4030017760	S.CER ECJ0EB1H222K	T	113.5/60.8
C161	4030017560	S.CER ECJ0EC1H2R5B	T	109.8/54.3
C162	4030017610	S.CER ECJ0EC1H090C	T	110/53.1
C163	4030017460	S.CER ECJ0EB1E102K	T	105.2/50
C164	4030017560	S.CER ECJ0EC1H2R5B	T	106.9/53.2
C173	4030017600	S.CER ECJ0EC1H080C	T	108.5/44.3
C174	4030017370	S.CER ECJ0EC1H3R5B	T	109/45.6
C175	4030017530	S.CER ECJ0EC1H0R5B	T	109.9/43.8
C176	4030017540	S.CER ECJ0EC1HR75B	T	109.9/42
C177	4030017360	S.CER ECJ0EC1H030B	T	109/40.3
C178	4030017600	S.CER ECJ0EC1H080C	T	108.5/41.6
C179	4030016790	S.CER ECJ0EB1C103K	T	104/42.5
C180	4030017430	S.CER ECJ0EC1H101J	T	103.1/30.4
C182	4030017760	S.CER ECJ0EB1H222K	T	110.4/34
C183	4030017380	S.CER ECJ0EC1H050B	T	116.3/33.9
C184	4030016790	S.CER ECJ0EB1C103K	T	109.4/34.1
C185	4030017560	S.CER ECJ0EC1H2R5B	T	112.2/26.6
C186	4030017500	S.CER ECJ0EC1H560J	T	112.2/27.5
C187	4030016930	S.CER ECJ0EB1A104K	T	117.2/29.5
C188	4030017460	S.CER ECJ0EB1E102K	T	116.3/29.5
C189	4030017460	S.CER ECJ0EB1E102K	T	115.9/26.8
C190	4030017400	S.CER ECJ0EC1H220J	T	115.4/29.4
C193	4030017580	S.CER ECJ0EC1H060C	T	115.6/18.8
C195	4030017460	S.CER ECJ0EB1E102K	T	114.9/9.9
C201	4030017640	S.CER ECJ0EC1H150J	T	108.9/12
C202	4030016790	S.CER ECJ0EB1C103K	T	112.6/10.6
C204	4030016790	S.CER ECJ0EB1C103K	T	108.7/9.5
C205	4030017430	S.CER ECJ0EC1H101J	T	102.5/9.2
C208	4550006250	S.TAN TEESVA 1A 106M8R	T	104.7/22.2
C209	4030016790	S.CER ECJ0EB1C103K	T	109/20.9
C211	4030011280	S.CER C1608 CH 1H 271J-T	T	98.4/18.1
C212	4030011280	S.CER C1608 CH 1H 271J-T	T	98.4/19.4
C213	4030017460	S.CER ECJ0EB1E102K	T	104.2/18.1
C215	4030016930	S.CER ECJ0EB1A104K	T	104.5/19.1
C216	4030016930	S.CER ECJ0EB1A104K	T	102.3/18.6
C217	4030017400	S.CER ECJ0EC1H220J	T	97.6/24.8
C218	4030016930	S.CER ECJ0EB1A104K	T	92.3/18
C219	4030017460	S.CER ECJ0EB1E102K	T	91.3/18
C220	4030017460	S.CER ECJ0EB1E102K	T	96.1/18.4
C221	4030018890	S.CER ECJ0EB0J224K	T	104.3/9.2
C222	4030016930	S.CER ECJ0EB1A104K	T	108.6/18.6
C223	4030016930	S.CER ECJ0EB1A104K	T	112.2/19.8
C232	4030016930	S.CER ECJ0EB1A104K	T	14.4/43.7
C233	4030016970	S.CER ECJ0EB1C223K	T	14.3/45.1
C234	4030016970	S.CER ECJ0EB1C223K	T	12.4/46.3
C235	4510008540	S.ELE EEE1CA100SR	T	10.9/41.9
C236	4030017760	S.CER ECJ0EB1H222K	T	4.4/43.8
C237	4030018820	S.CER ECJ0EB1H561K	T	5.2/47.1
C238	4030017490	S.CER C1608 JB 1A 105K-T	T	5.9/39.8
C241	4030016790	S.CER ECJ0EB1C103K	T	11.4/33.1
C249	4030017490	S.CER C1608 JB 1A 105K-T	T	4.7/32.4
C252	4030016970	S.CER ECJ0EB1C223K	T	9.5/36.7
C291	4510008540	S.ELE EEE1CA100SR	T	18.5/33.2
C292	4030016790	S.CER ECJ0EB1C103K	T	22.6/45.5
C293	4030017460	S.CER ECJ0EB1E102K	T	21.3/45.5
C304	4030011600	S.CER C1608 JB 1E 104K-T	T	22.7/31.4
C306	4030017690	S.CER ECJ0EC1H121J	T	23.5/33
C312	4030017460	S.CER ECJ0EB1E102K	T	33.4/27.3
C313	4030018920	S.CER ECJ0EB1H392K	T	33.1/31.9
C314	4030017680	S.CER ECJ0EC1H820J	T	33.1/34.7
C315	4030016790	S.CER ECJ0EB1C103K	T	24.7/29.4
C316	4510008540	S.ELE EEE1CA100SR	T	19.5/41.7
C321	4030017440	S.CER ECJ0EC1H221J	T	23.1/10.3
C322	4030017440	S.CER ECJ0EC1H221J	T	27.1/8.8
C331	4030016790	S.CER ECJ0EB1C103K	T	33.2/9
C332	4030017460	S.CER ECJ0EB1E102K	T	32/8.6
C333	4030016790	S.CER ECJ0EB1C103K	T	31/8.6
C334	4030017400	S.CER ECJ0EC1H220J	T	38.9/15.8
C335	4030017460	S.CER ECJ0EB1E102K	T	38.9/16.8
C336	4030017460	S.CER ECJ0EB1E102K	T	39.9/8
C337	4030017400	S.CER ECJ0EC1H220J	T	42.2/8.9
C338	4030017420	S.CER ECJ0EC1H470J	T	44.3/15.2
C339	4030017420	S.CER ECJ0EC1H470J	T	48.3/14.1
C340	4030017420	S.CER ECJ0EC1H470J	T	45.8/8.8

[MAIN UNIT]

REF NO.	ORDER NO.	DESCRIPTION	M.	H/V LOCATION
C341	4030017420	S.CER ECJ0EC1H470J	T	44.8/8.8
C342	4030017460	S.CER ECJ0EB1E102K	T	24/10.3
C343	4030017460	S.CER ECJ0EB1E102K	T	26.1/8.8
C344	4030017730	S.CER ECJ0EB1E471K	T	16.2/71.7
C345	4030017730	S.CER ECJ0EB1E471K	T	17.6/71.4
C347	4030017680	S.CER ECJ0EC1H820J	T	21.6/48
C348	4030017680	S.CER ECJ0EC1H820J	T	9.5/54.8
C349	4030017460	S.CER ECJ0EB1E102K	T	29.6/62.2
C350	4030016930	S.CER ECJ0EB1A104K	T	14.4/38
C351	4030016930	S.CER ECJ0EB1A104K	T	9.1/59.2
C352	4030016930	S.CER ECJ0EB1A104K	T	5.7/31
C353	4030017490	S.CER C1608 JB 1A 105K-T	T	7.9/72.8
C354	4030017460	S.CER ECJ0EB1E102K	T	4.3/74.2
C355	4510004591	ELE 16 ME 470 HC		
C356	4510007480	ELE 16 ME 470 CA		
C357	4030011600	S.CER C1608 JB 1E 104K-T	T	16.4/75
C358	4030017420	S.CER ECJ0EC1H470J	T	3.5/77
C359	4030017420	S.CER ECJ0EC1H470J	T	7.2/76.4
C360	4030017460	S.CER ECJ0EB1E102K	T	8.9/65
C361	4030017460	S.CER ECJ0EB1E102K	T	5.8/61.2
C362	4030017420	S.CER ECJ0EC1H470J	T	10.9/55.8
C363	4030017460	S.CER ECJ0EB1E102K	T	14.8/50.5
C364	4030017420	S.CER ECJ0EC1H470J	T	15.8/50.5
C365	4030016790	S.CER ECJ0EB1C103K	T	76.3/16.7
C366	4030017420	S.CER ECJ0EC1H470J	T	68.6/31.2
C367	4030017460	S.CER ECJ0EB1E102K	T	38.6/86
C368	4030017420	S.CER ECJ0EC1H470J	T	28/80.9
C370	4030011600	S.CER C1608 JB 1E 104K-T	T	21.4/75.7
C371	4030017440	S.CER ECJ0EC1H221J	T	20.9/74.5
C373	4030017400	S.CER ECJ0EC1H220J	T	51.5/82.7
C374	4030017400	S.CER ECJ0EC1H220J	T	38.6/80.8
C375	4030017430	S.CER ECJ0EC1H101J	T	37.6/80.8
C376	4030017730	S.CER ECJ0EB1E471K	T	36.6/80.8
C377	4030017420	S.CER ECJ0EC1H470J	T	5.4/81.1
C378	4030017460	S.CER ECJ0EB1E102K	T	4.1/81.1
C379	4030017430	S.CER ECJ0EC1H101J	T	37.6/86
C380	4030017730	S.CER ECJ0EB1E471K	T	28/81.9
C381	4510008120	S.ELE 16 CE 100 BS	T	4.2/56.1
C382	4030016790	S.CER ECJ0EB1C103K	T	5.5/62.7
C383	4030011600	S.CER C1608 JB 1E 104K-T	T	5.7/65
C384	4030016930	S.CER ECJ0EB1A104K	T	7/68.1
C385	4030016790	S.CER ECJ0EB1C103K	T	5.7/68.1
C386	4510008120	S.ELE 16 CE 100 BS	T	15.9/62.8
C387	4030017460	S.CER ECJ0EB1E102K	T	24.3/75.6
C388	4030017460	S.CER ECJ0EB1E102K	T	25.7/75.6
C389	4510008540	S.ELE EEE1CA100SR	T	30.9/75.5
C390	4030011600	S.CER C1608 JB 1E 104K-T	T	30.8/61.9
C391	4030017460	S.CER ECJ0EB1E102K	T	29.8/67.6
C392	4510008540	S.ELE EEE1CA100SR	T	32.7/70.7
C393	4510008540	S.ELE EEE1CA100SR	T	34.7/60.8
C401	4030017460	S.CER ECJ0EB1E102K	T	45.8/7.1
C402	4030017460	S.CER ECJ0EB1E102K	T	44.9/3.8
C403	4030017460	S.CER ECJ0EB1E102K	T	51.8/10.3
C407	4030017460	S.CER ECJ0EB1E102K	T	59.3/10.6
C461	4030017440	S.CER ECJ0EC1H221J	T	11.8/62.5
C462	4030017440	S.CER ECJ0EC1H221J	T	10.5/65.9
C463	4030017460	S.CER ECJ0EB1E102K	T	4.2/79.7
C464	4030017730	S.CER ECJ0EB1E471K	T	4.2/78.7
C465	4030016930	S.CER ECJ0EB1A104K	T	15/73
C466	4030017660	S.CER ECJ0EC1H330J	T	3.4/74.2
C471	4030017440	S.CER ECJ0EC1H221J	T	7.2/65
C472	4030017440	S.CER ECJ0EC1H221J	T	7/66.8
C473	4030017440	S.CER ECJ0EC1H221J	T	8.2/70.4
C475	4030017460	S.CER ECJ0EB1E102K	T	10.9/62.5
C476	4030017460	S.CER ECJ0EB1E102K	T	11.1/65
C490	4030017360	S.CER ECJ0EC1H030B	T	89/57.7
C491	4030017380	S.CER ECJ0EC1H050B	T	93.2/56.3
C495	4030017540	S.CER ECJ0EC1HR75B	T	79.1/57
C496	4030017540	S.CER ECJ0EC1HR75B	T	77.5/57
C497	4030017380	S.CER ECJ0EC1H050B	T	83.7/59.2
C498	4030017380	S.CER ECJ0EC1H050B	T	82.7/59.2
C499	4030017550	S.CER ECJ0EC1H1R5B	T	85/58.8
C501	4030016930	S.CER ECJ0EB1A104K	T	89/62.3
C502	4030017760	S.CER ECJ0EB1H222K	T	91.7/63
C503	4030017440	S.CER ECJ0EC1H221J	T	95.3/61.9
C504	4030017760	S.CER ECJ0EB1H222K	T	93.5/55.1
C505	4030017760	S.CER ECJ0EB1H222K	T	93.4/58
C511	4030017550	S.CER ECJ0EC1H1R5B	T	86.7/59.2
C512	4030017560	S.CER ECJ0EC1H2R5B	T	84.7/60
C513	4030017380	S.CER ECJ0EC1H050B	T	69.4/57.8
C514	4030017380	S.CER ECJ0EC1H050B	T	76.1/57.3
C515	4030017380	S.CER ECJ0EC1H050B	T	75.1/57.3
C516	4030017460	S.CER ECJ0EB1E102K	T	69.2/55.1
C517	4030017550	S.CER ECJ0EC1H1R5B	T	74.1/57.3
C519	4030017400	S.CER ECJ0EC1H220J	T	64/58.8
C521	4030016790	S.CER ECJ0EB1C103K	T	58.2/59.8
C522	4030017500	S.CER ECJ0EC1H560J	T	65.8/62.8
C523	4030016930	S.CER ECJ0EB1A104K	T	62/59.8
C524	4030017460	S.CER ECJ0EB1E102K	T	63/59.8
C525	4030017460	S.CER ECJ0EB1E102K	T	65.5/64
C527	4030017610	S.CER ECJ0EC1H090C	T	54.4/62.9
C529	4030017460	S.CER ECJ0EB1E102K	T	49.1/58
C532	4030016790	S.CER ECJ0EB1C103K	T	45.8/58.5
C533	4030016790	S.CER ECJ0EB1C103K	T	43/53.6
C534	4030017460	S.CER ECJ0EB1E102K	T	58.8/54.6
C535	4030017460	S.CER ECJ0EB1E102K	T	61.4/54.3
C537	4030017640	S.CER ECJ0EC1H150J	T	64.3/52.9
C539	4030017460	S.CER ECJ0EB1E102K	T	57.7/56.6
C541	4030017430	S.CER ECJ0EC1H101J	T	38/48.2
C542	4550006250	S.TAN TEESVA 1A 106M8R	T	29.2/43.8
C543	4030016790	S.CER ECJ0EB1C103K	T	38.2/40.7
C546	4030016930	S.CER ECJ0EB1A104K	T	35.7/48.2
C547	4030016930	S.CER ECJ0EB1A104K	T	33.7/48.2
C548	4030017460	S.CER ECJ0EB1E102K	T	32.2/40.4

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
C550	4030017460	S.CER	ECJ0EB1E102K	T	31.9/41.8
C551	4030016930	S.CER	ECJ0EB1A104K	T	36.9/54.8
C552	4030016930	S.CER	ECJ0EB1A104K	T	38.2/55.2
C565	4030017660	S.CER	ECJ0EC1H330J	T	29.5/56.6
C566	4030017400	S.CER	ECJ0EC1H220J	T	31.9/53.6
C571	4030016930	S.CER	ECJ0EB1A104K	T	25/20.4
C572	4030017790	S.CER	ECJ0EB1E682K	T	22.7/21.8
C573	4030016790	S.CER	ECJ0EB1C103K	T	19.9/16.1
C574	4030016970	S.CER	ECJ0EB1C223K	T	19.8/18.2
C575	4030017760	S.CER	ECJ0EB1H222K	T	19.9/20
C576	4030017790	S.CER	ECJ0EB1E682K	T	17.3/20
C581	4030016790	S.CER	ECJ0EB1C103K	T	14.7/17.7
C582	4030018890	S.CER	ECJ0EB0J224K	T	14.7/20
C584	4030016930	S.CER	ECJ0EB1A104K	T	12.6/13.9
C585	4510008540	S.ELE	EEE1CA100SR	T	15.5/13.3
C586	4310000420	MLR	50 F2D 333J		
C587	4030017760	S.CER	ECJ0EB1H222K	T	3.7/23.4
C588	4030016930	S.CER	ECJ0EB1A104K	T	3.7/22.1
C589	4030016790	S.CER	ECJ0EB1C103K	T	3.9/19.5
C600	4550006250	S.TAN	TEESVA 1A 106M8R	T	82.3/34.5
C602	4030017490	S.CER	C1608 JB 1A 105K-T	T	87.3/36.1
C603	4030016930	S.CER	ECJ0EB1A104K	T	73.7/32.3
C604	4550005980	S.TAN	TEESVA 1A 475M8R	T	76/31.4
C606	4550000530	S.TAN	TEESVA 1V 104M8R	T	82/43
C607	4030017460	S.CER	ECJ0EB1E102K	T	80.1/44.8
C610	4030016930	S.CER	ECJ0EB1A104K	T	92.8/42.6
C611	4030017460	S.CER	ECJ0EB1E102K	T	91.9/42.6
C612	4030017390	S.CER	ECJ0EC1H180J	T	89/45.9
C613	4030017630	S.CER	ECJ0EC1H120J	T	89/44.2
C614	4030017390	S.CER	ECJ0EC1H180J	T	90/45.9
C615	4030017630	S.CER	ECJ0EC1H120J	T	90/44.2
C616	4030017540	S.CER	ECJ0EC1HR75B	T	95.9/40.8
C617	4030017460	S.CER	ECJ0EB1E102K	T	91.1/41.2
C621	4030017380	S.CER	ECJ0EC1H050B	T	89.4/35.5
C622	4030017460	S.CER	ECJ0EB1E102K	T	88.3/33.5
C623	4030017400	S.CER	ECJ0EC1H220J	T	84.7/30.9
C624	4030017650	S.CER	ECJ0EC1H270J	T	71.5/21.4
C625	4030017650	S.CER	ECJ0EC1H270J	T	71.7/20.2
C626	4030017460	S.CER	ECJ0EB1E102K	T	70.4/19.8
C632	4030017460	S.CER	ECJ0EB1E102K	T	92.9/31.9
C633	4030017630	S.CER	ECJ0EC1H120J	T	92.9/38.1
C634	4030017640	S.CER	ECJ0EC1H150J	T	94.4/34.4
C635	4030017460	S.CER	ECJ0EB1E102K	T	91.1/31.9
C641	4030017760	S.CER	ECJ0EB1H222K	T	83.9/39.6
C642	4030017560	S.CER	ECJ0EC1H2R5B	T	83.9/41.4
C646	4030017440	S.CER	ECJ0EC1H221J	T	17.9/68.2
C647	4030017440	S.CER	ECJ0EC1H221J	T	7.3/51
C648	4030016790	S.CER	ECJ0EB1C103K	T	20.3/50.5
C649	4030016790	S.CER	ECJ0EB1C103K	T	16.8/50.5
J4	6510024601	CNR	S5B-PH-K-S (LF) (SN)		
J6	6510022471	S.CNR	40FLT-SM2-TB (LF) (SN)	T	36/12
W1	7120000470	JMP	ERDS2T0		
W2	8900012401	CBL	OPC-1264A		
W3	8900016880	CBL	OPC-1768 (P0.5,N40,L65)		
EP341	6910014690	S.BEA	MPZ1608S221A-T	T	9.9/63.9
EP342	6910014690	S.BEA	MPZ1608S221A-T	T	10/67
EP401	6910018270	S.BEA	MMZ1608Y301CT	T	46.8/3.4
EP402	6910018270	S.BEA	MMZ1608Y301CT	T	21.3/37.4
EP403	6910018270	S.BEA	MMZ1608Y301CT	T	5/72.8
EP404	6910018270	S.BEA	MMZ1608Y301CT	T	53.3/11.1
EP405	6910018270	S.BEA	MMZ1608Y301CT	T	57.3/11.1

[VR UNIT]

REF NO.	ORDER NO.	DESCRIPTION		M.	H/V LOCATION
R1	7210003140	VAR	TP96N97N-15SK-10KA-2685		
J1	6510009381	CNR	B5B-ZR (LF) (SN)		

[SQL UNIT]

REF NO.	ORDER NO.	DESCRIPTION		M.	H/V LOCATION
R1	7210003150	VAR	TP96N97-15SK-10KB-2685		
J1	6510009471	CNR	S3B-ZR (LF) (SN)		

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

SECTION 7 MECHANICAL PARTS

[FRONT UNIT]

REF NO.	ORDER NO.	DESCRIPTION	QTY.
R1*	7070001220	3.9 ERX2SJ	1
MC1	0800009280	HM-164B (#01)	1
SP1	2510001350	045P0806-7-1	1
W1*	7120000470	ERDS2T0	1
MP1	8210024510	3054 FRONT PANEL (Incl. MC1, MP2–4, MP6–9)	1
MP2	8310070050	3054 WINDOW PLATE	1
MP3	8930073320	3054 SP NET	1
MP4	8930064020	2807 KEYBOARD	1
MP5	8610011370	KNOB N-312	2
MP6	8110009290	3054 D-COVER	1
MP7	8930073330	3054 SHAFT	1
MP8	8930073300	3054 SHAFT ANGLE	1
MP9	8930073340	3054 SPRING	1
MP10	8930073310	3054 F-BUSH PLATE	1
MP11	8930055841	2490 EARTH SPRING-1	1
MP12	8930052280	O-ring (AC)	2
MP13	8810008661	Screw BT B0 3X8 NI-ZC3 (BT)	4

[CHASSIS PARTS]

REF NO.	ORDER NO.	DESCRIPTION	QTY.
J1	6510004880	MR-DSE-01	1
W1	8900016870	OPC-1765	1
MP1	8510018680	3054 CASE (Incl. MP2, 4)	1
MP2	8830003160	Ultrasert UD-45058-CD NI	2
MP3	8930049040	Insulation sheet (FQ)	1
MP4	8930073350	3054 SHEET	1
MP5	8930064040	2807 R-PACKING	1
MP6	8930064030	2807 F-PACKING	1
MP7	8930073290	3054 R-BUSH PLATE	1
MP8	8930052440	2345 B-IC CLIP	1
MP9	8510018620	3054 MODULE PLATE	1
MP10	8510018630	3054 MODULE COVER	1
MP11	8010020970	3054 CHASSIS (Incl. J1, W1, MP7, 12, 13, 18)	1
MP12	8930073360	3054 ANT SEAL	1
MP13	8810010730	Screw BiH M3X6 SUS	2
MP14	8810009071	Screw PH M2.6X8 ZK3	2
MP15	8810008661	Screw BT B0 3X8 NI-ZC3 (BT)	6
MP16	8810004540	Screw BiH M3X8 SUS	4
MP17	8810004700	Screw BT A0 3X16 SUS	4
MP18	8950000180	Cable tie -80	1

[LOGIC UNIT]

REF NO.	ORDER NO.	DESCRIPTION	QTY.
DS1	5030002940	SDT-DT161-HP-O	1
EP2	8930066470	SRCN-2852-SP-N-W	1
MP1	8930066230	2852 LCD HOLDER	1
MP2	8210020990	2807 REFLECTOR	1
MP3	8930066400	2852 LCD FILTER	1
MP4	8930066390	2852 LCD SHEET	1

*: Refer to SECTION 8 “BOARD LAYOUTS.”

[MAIN UNIT]

REF NO.	ORDER NO.	DESCRIPTION	QTY.
J4*	6510024601	S5B-PH-K-S (LF) (SN)	1
J6*	6510022471	40FLT-SM2-TB (LF) (SN)	1
W1*	7120000470	ERDS2T0	1
W2	8900012401	OPC-1264A	1
W3	8900016880	OPC-1768	1
MP1*	8510011111	1922 VCO CASE-1	1
MP2	8510011101	1922 VCO COVER-1	1
MP3*	8510014940	2601 VCO CASE	1
MP4	8510014950	2601 VCO COVER	1
MP5*	8930005320	Filter spacer	2
MP6*	8930005320	Filter spacer	2

[SQL UNIT]

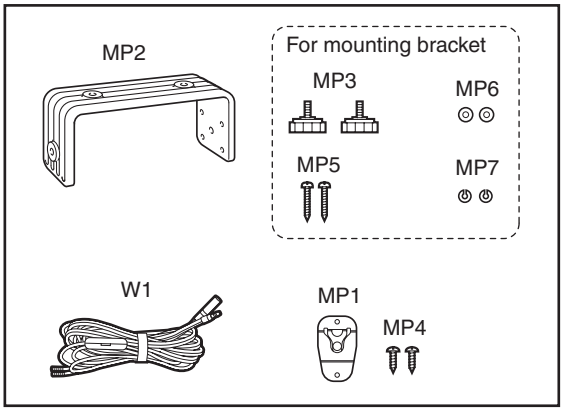
REF NO.	ORDER NO.	DESCRIPTION	QTY.
R1	7210003150	TP96N97-15SK-10KB-2685	1
J1*	6510009471	S3B-ZR (LF) (SN)	1

[VR UNIT]

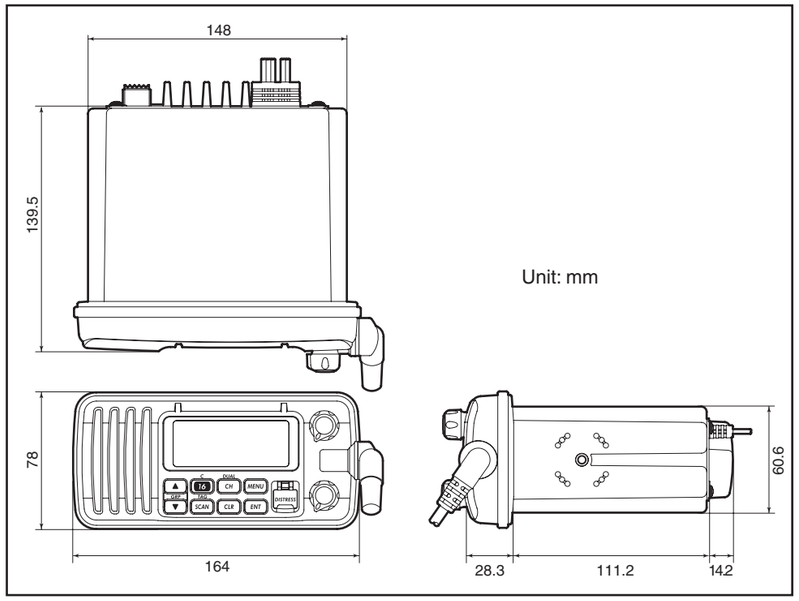
REF NO.	ORDER NO.	DESCRIPTION	QTY.
R1	7210003140	TP96N97N-15SK-10KA-2685	1
J1*	6510009381	B5B-ZR (LF) (SN)	1

[ACCESSORIES]

REF NO.	ORDER NO.	DESCRIPTION	QTY.
W1	8900009041	OPC-891A	1
MP1	8950007250	3054 MIC HANGER	1
MP2	8010020950	3054 MOBILE BRACKET	1
MP3	8820001460	3054 KNOB BOLT	2
MP4	8810010710	Screw BT A0 3X16 SUS	2
MP5	8810010720	Screw BT A0 5X20 SUS	2
MP6	8850002850	PLAIN WASHER M5 SUS	2
MP7	8850002860	SPRING WASHER M5 SUS	2



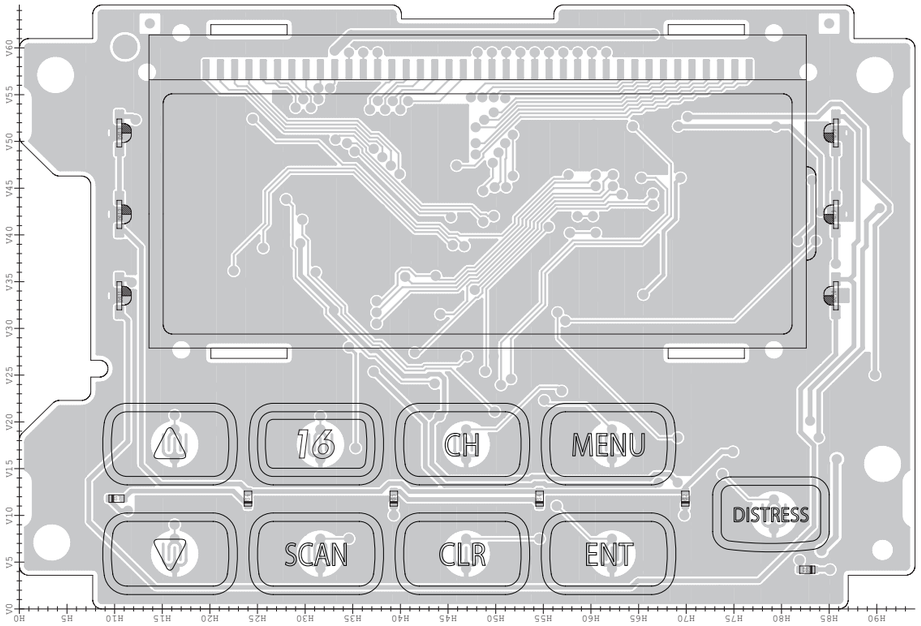
Screw abbreviations A, B0, BT: Self-tapping PH: Pan head ZK: Black NI-ZU: Nickel-Zinc SUS: Stainless



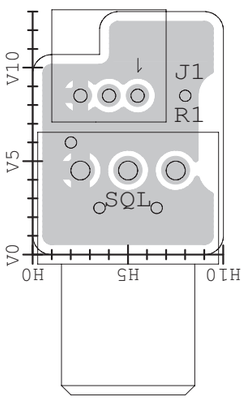
UNIT abbreviations (C): CHASSIS PARTS, (LG): LOGIC BOARD, (MA): MAIN UNIT (FR): FRONT UNIT
(VR): VR BOARD, (SQL): SQL BOARD

SECTION 8 BOARD LAYOUTS

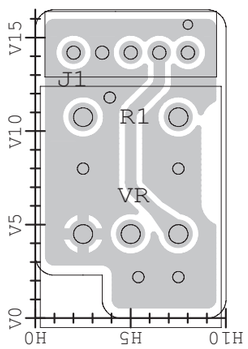
• LOGIC UNIT (TOP VIEW)



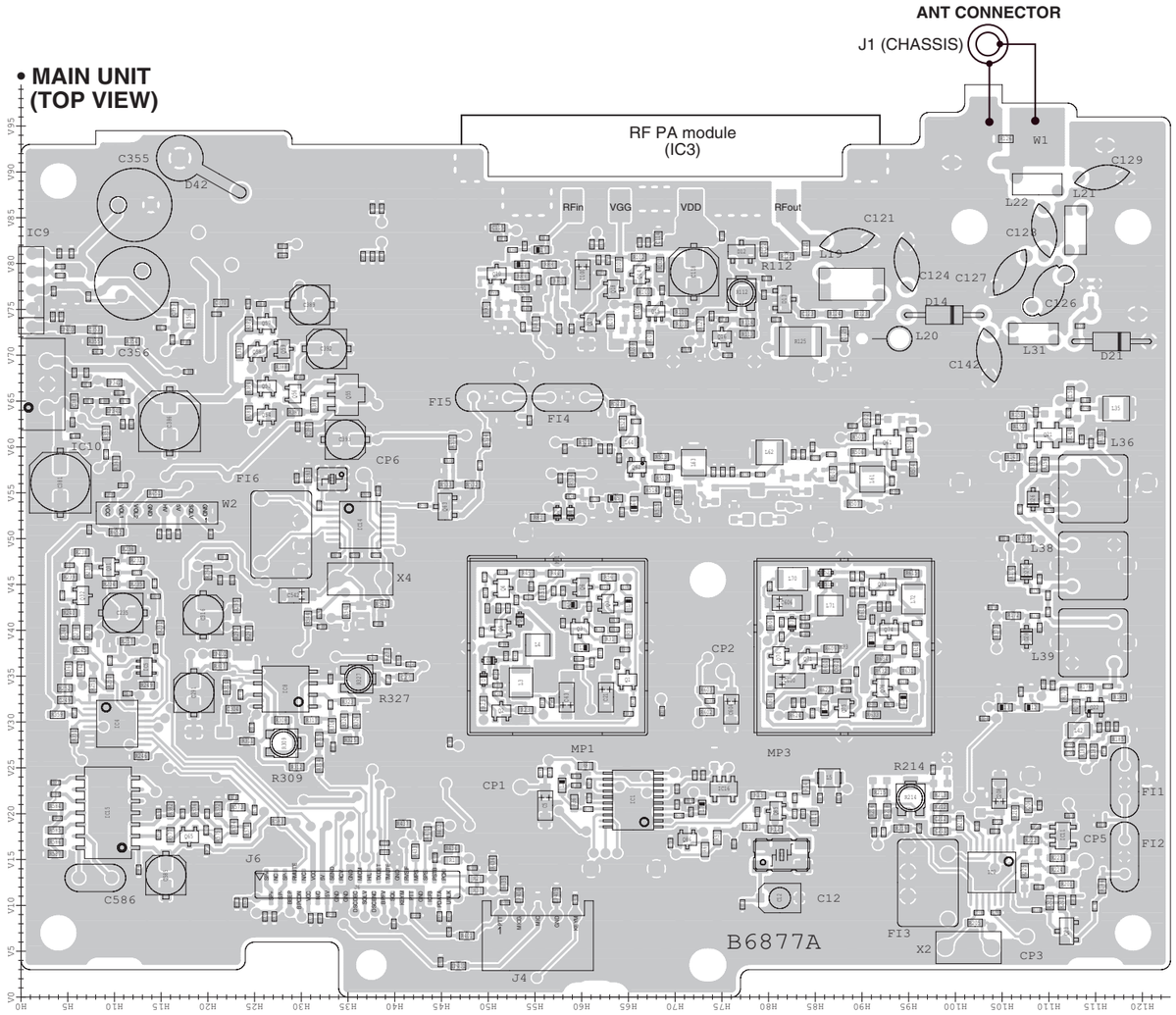
• SQL UNIT (TOP VIEW)



• VR UNIT (TOP VIEW)

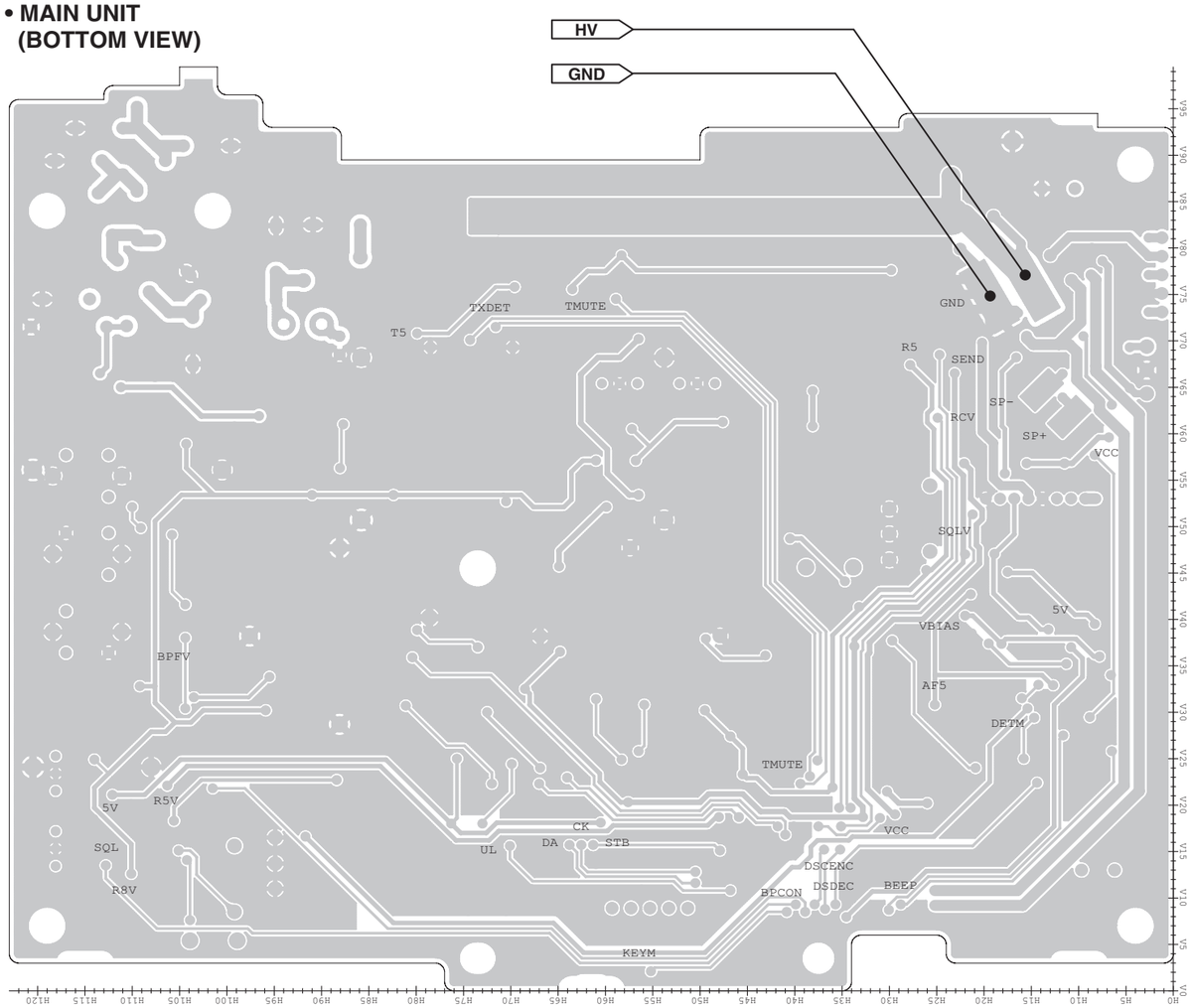


• MAIN UNIT (TOP VIEW)

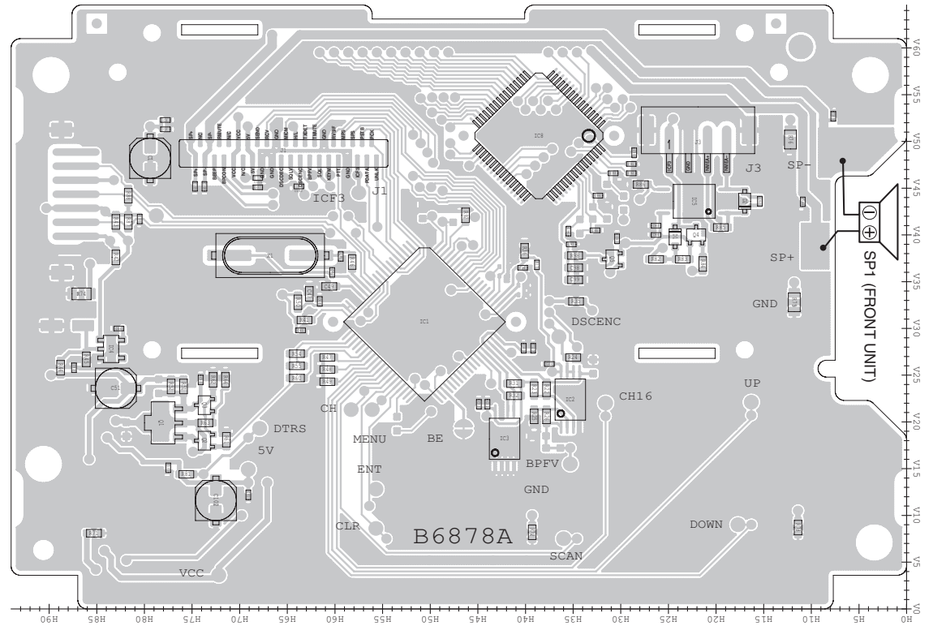


The combination of this side and the bottom side shows the board layout in the same configuration as the actual P.C.Board.

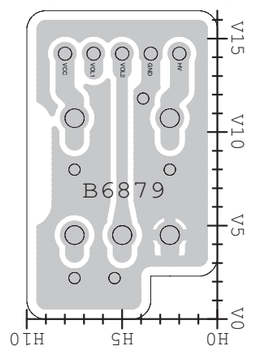
• MAIN UNIT (BOTTOM VIEW)



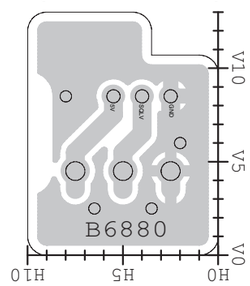
• LOGIC UNIT (BOTTOM VIEW)



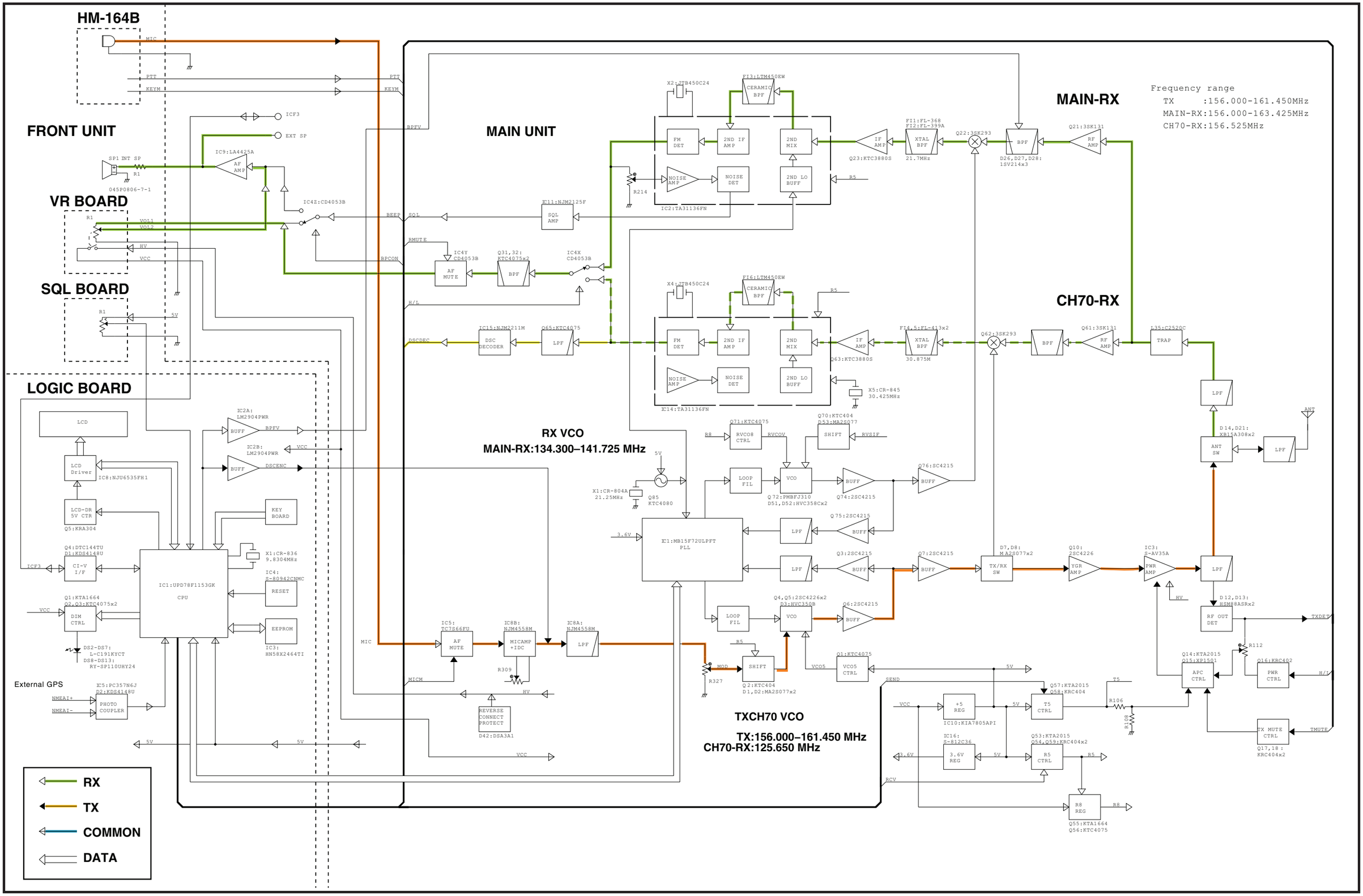
• VR UNIT (BOTTOM VIEW)



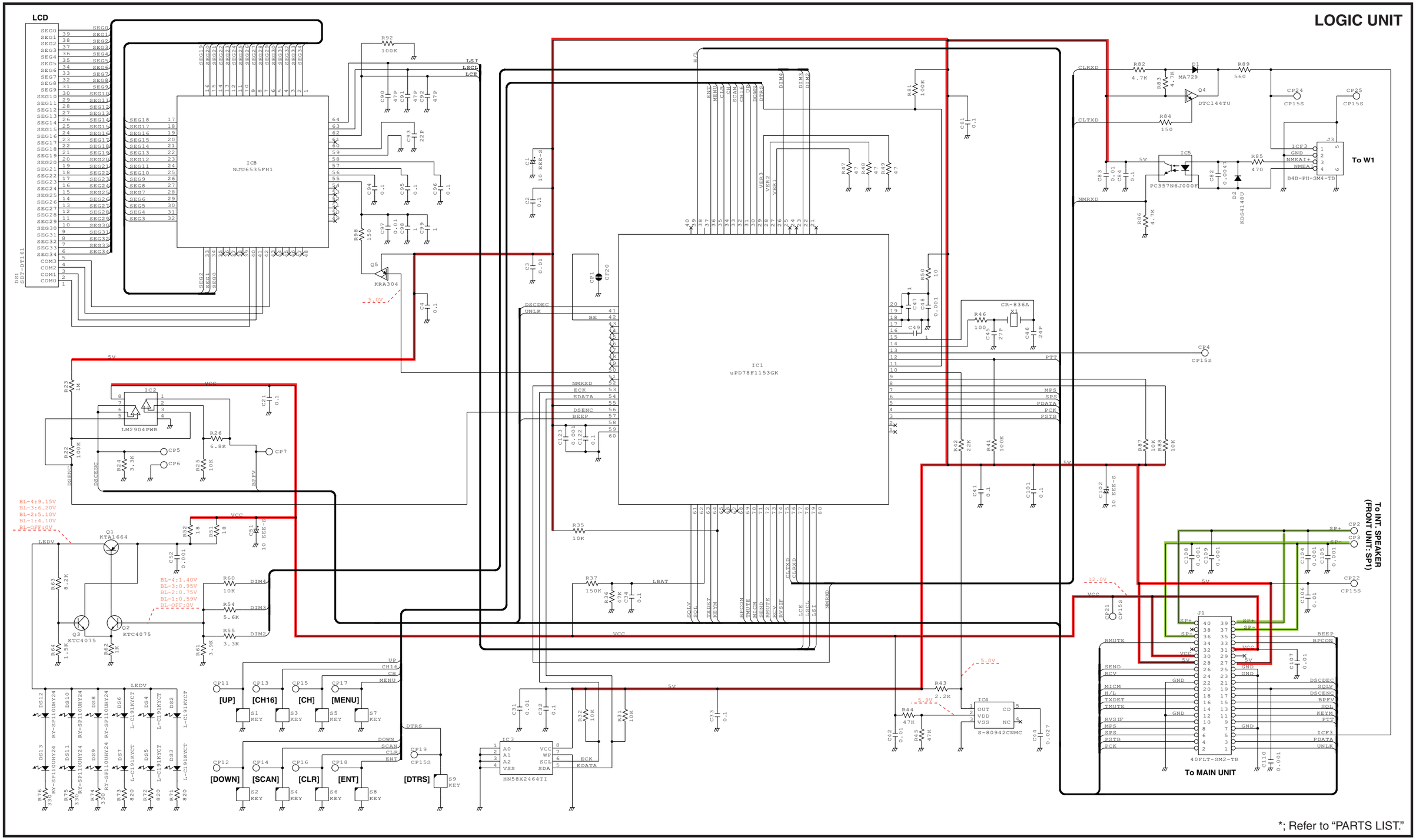
• SQL UNIT (BOTTOM VIEW)



SECTION 9 BLOCK DIAGRAM

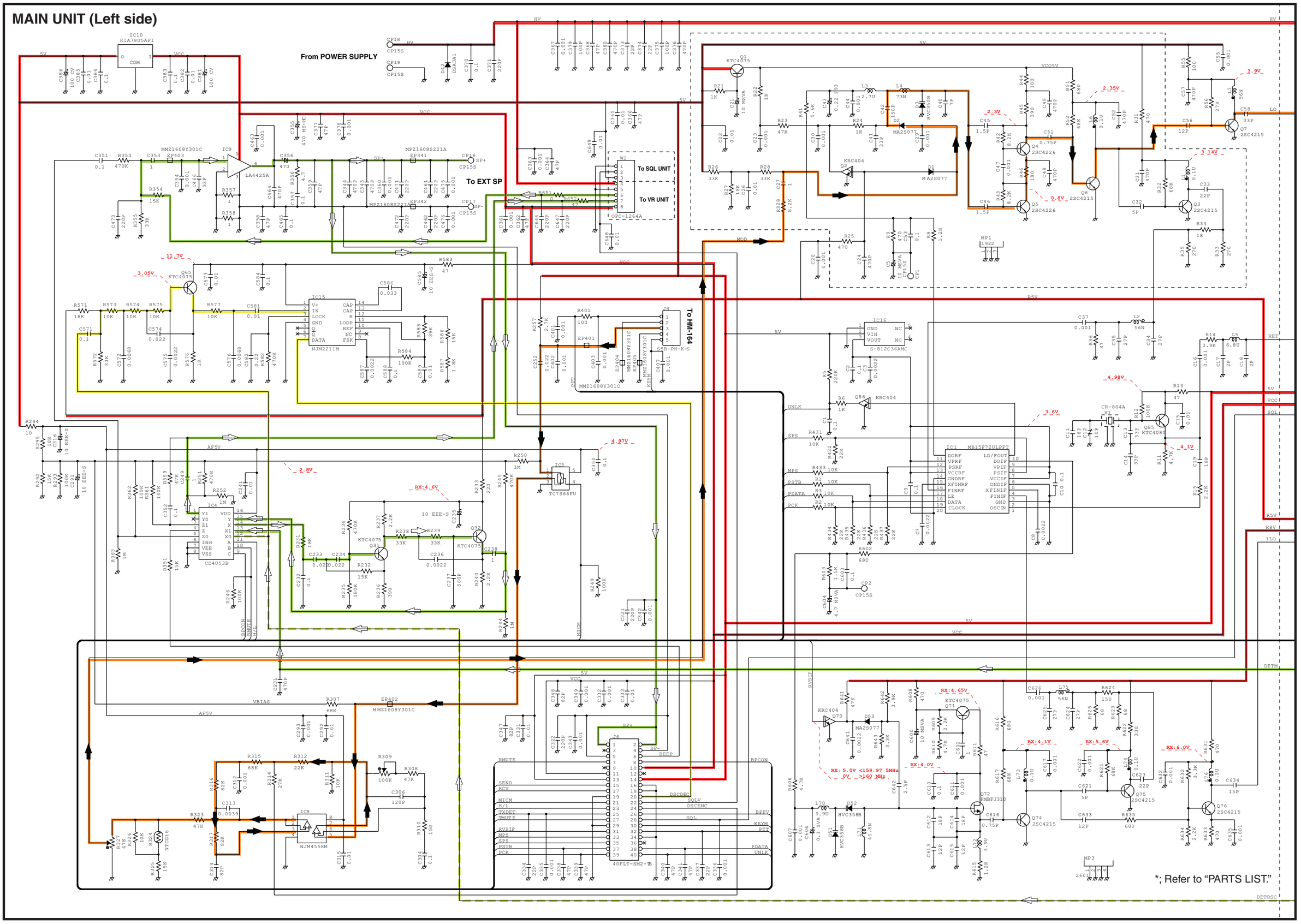


SECTION 10 VOLTAGE DIAGRAM

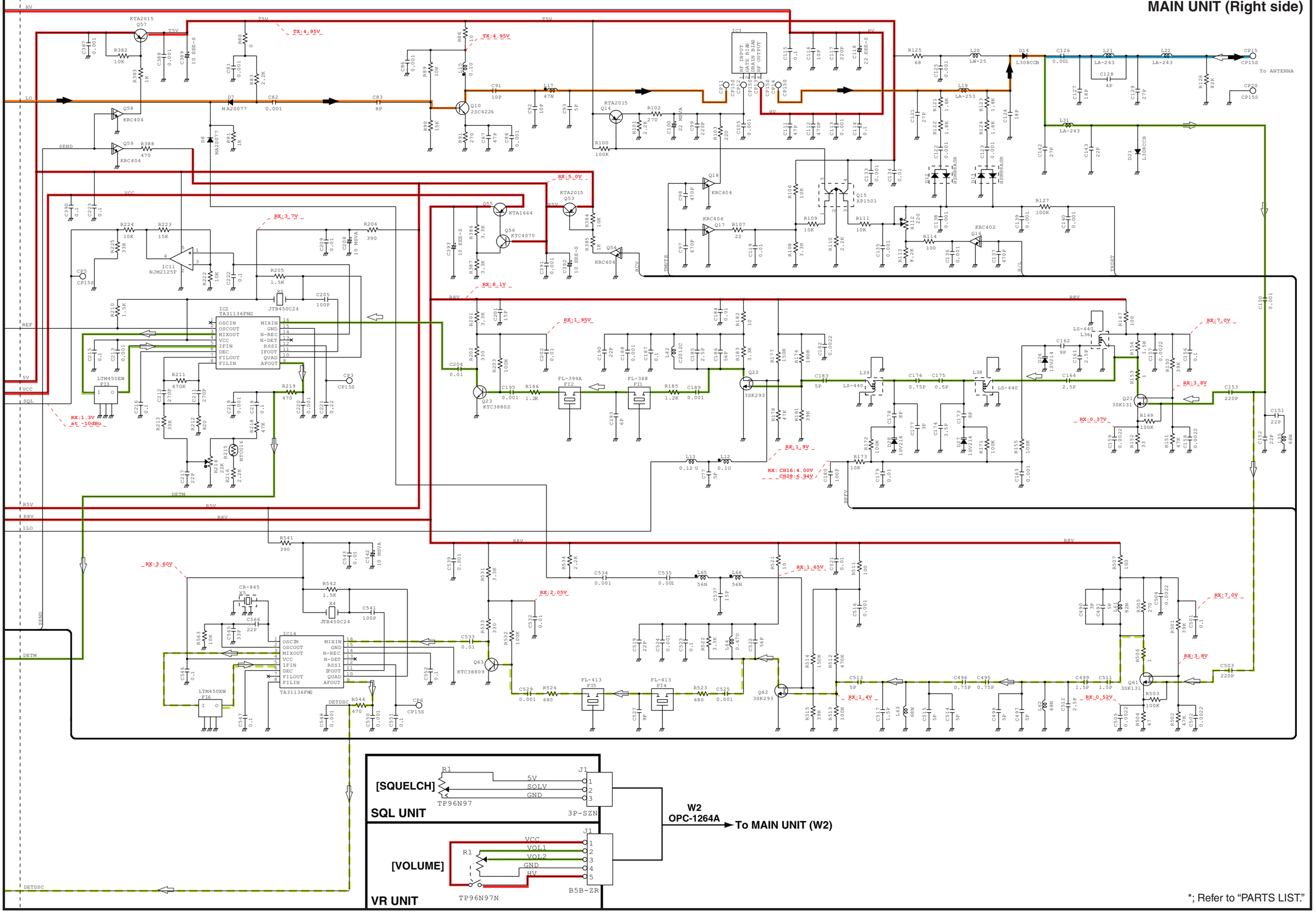


*; Refer to “PARTS LIST.”

MAIN UNIT (Left side)



MAIN UNIT (Right side)



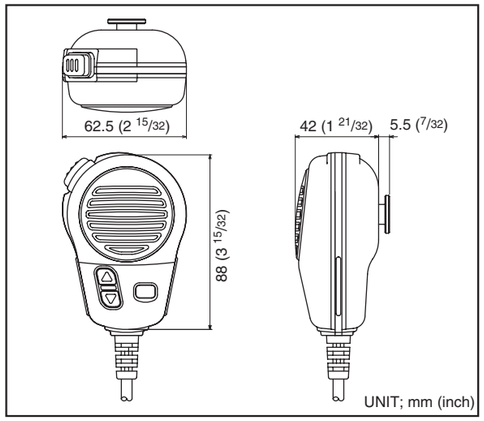
SECTION 11 HM-164B

• CHASSIS PARTS LIST

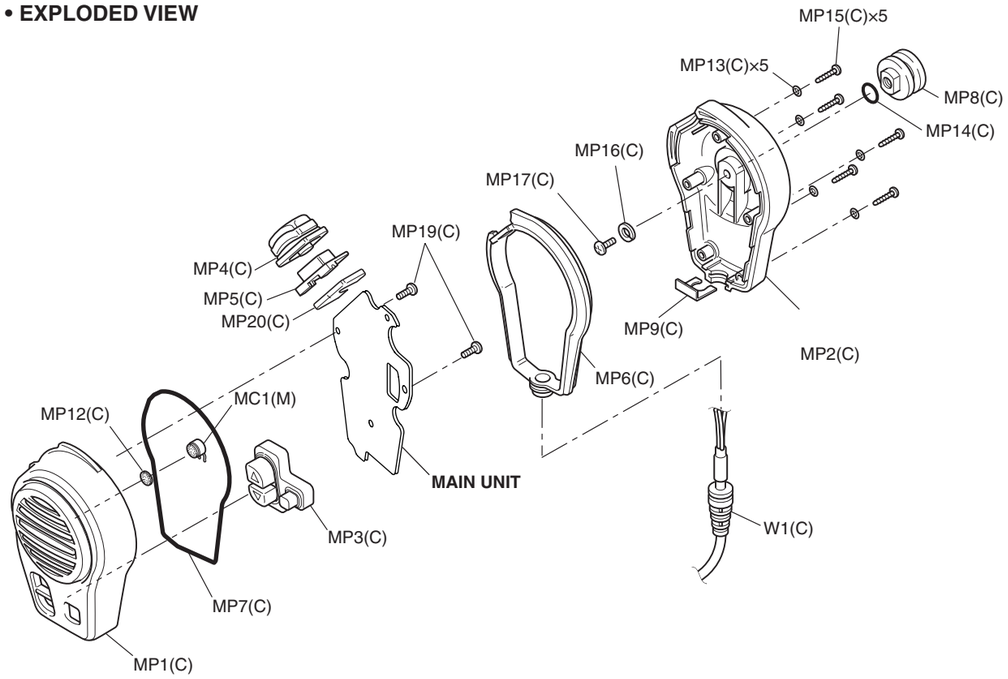
REF NO.	ORDER NO.	DESCRIPTION	QTY.
W1	8900016570	OPC-1747	1
MP1	8210023240	2995 FRONT PANEL	1
MP2	8210020120	2715 REAR PANEL	1
MP3	8930060910	2715 KEY	1
MP4	8930060920	2715 PTT RUBBER	1
MP5	8930061970	2715 A-PTT HOLDER	1
MP6	8930060940	2715 RUBBER	1
MP7	8930060930	2715 MAIN SEAL	1
MP8	8610011600	2715 HANGER KNOB	1
MP9	8930060951	2715 BUSH PLATE-1	1
MP10	8930060990	2715 MIC SHEET	1
MP11	8930061000	2715 MIC TAPE	1
MP12	8930070800	2715 VENT SHEET	1
MP13	8930060960	O-RING (AY)	5
MP14	8930060970	O-RING (AZ)	1
MP15	8820001260	2715 SCREW 2.6X18 SUS	5
MP16	8810010230	Screw BiH M4X8 ZK	1
MP17	8850002000	SPRING WASHER M4 SUS	1
MP19	8810010240	Screw BT B0 2X6NI	2
MP20	8930061700	2715 PTT PLATE	1

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

• DIMENTIONS



• EXPLODED VIEW

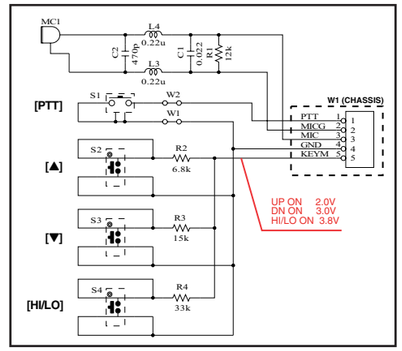


• MAIN UNIT PARTS LIST

REF NO.	ORDER NO.	DESCRIPTION	M.	H/V LOCATION
L3	6180003720	COL SP0203-R22K-PF 0.22U		
L4	6180003720	COL SP0203-R22K-PF 0.22U		
R1	7010007590	RES RD1/4S 123JTA		
R2	7010007600	RES RD1/4 682JTA		
R3	7010007610	RES RD1/4 153JTA		
R4	7010007620	RES RD1/4 333JTA		
C1	4030018660	S.CER C1608 JB 1H 223K-T	B	36.85/70.8
C2	4030018670	S.CER C1608 CH 1H 471J		
MC1	7700002640	MIC KUC3523-040245		
S1	2260002780	SW SKHHLPA010		
S2	2260002790	SW SKHHAMA010		
S3	2260002790	SW SKHHAMA010		
S4	2260002790	SW SKHHAMA010		
W1	9027150010	WIR 71/98/010/X98/X98		
W2	9027150010	WIR 71/98/010/X98/X98		

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

• VOLTAGE DIAGRAM



Icom Inc.

1-1-32, Kamiminami, Hirano-ku, Osaka 547-0003, Japan
Phone : +81 (06) 6793 5302
Fax : +81 (06) 6793 0013
URL : http://www.icom.co.jp/world/index.html

Icom America Inc.

<Corporate Headquarters>
2380 116th Avenue N.E., Bellevue, WA 98004, U.S.A.
Phone : +1 (425) 454-8155 Fax : +1 (425) 454-1509
URL : http://www.icomamerica.com
E-mail : sales@icomamerica.com
<Customer Service>
Phone : +1 (425) 454-7619

Icom Canada

Glenwood Centre #150-6165
Highway 17 Delta, B.C., V4K 5B8, Canada
Phone : +1 (604) 952-4266 Fax : +1 (604) 952-0090
URL : http://www.icomcanada.com
E-mail : info@icomcanada.com

Icom (Australia) Pty. Ltd.

Unit 1 / 103 Garden Road, Clayton VIC 3168 Australia
Phone : +61 (03) 9549-7500 Fax : +61 (03) 9549-7505
URL : http://www.icom.net.au
E-mail : sales@icom.net.au

Icom New Zealand

146A Harris Road, East Tamaki,
Auckland, New Zealand
Phone : +64 (09) 274 4062 Fax : +64 (09) 274 4708
URL : http://www.icom.co.nz
E-mail : inquiries@icom.co.nz

Icom Polska

Sopot, 3 Maja 54 Poland
Phone : +48 (58) 550 7135 Fax : +48 (58) 551 0484
E-mail : icompolska@icompolska.com.pl

Icom (Europe) GmbH

Communication Equipment
Himmelgeister Str. 100, D-40225 Düsseldorf, Germany
Phone : +49 (0211) 346047 Fax : +49 (0211) 333639
URL : http://www.icomeurope.com
E-mail : info@icomeurope.com

Icom Spain S.L

Ctra. Rubi, 88, 08190, Sant Cugat del Valles, Barcelona, SPAIN
Phone : +34 (93) 590 26 70 Fax : +34 (93) 589 04 46
URL : http://www.icomspain.com
E-mail : icom@icomspain.com

Icom (UK) Ltd.

Unit 9, Sea St., Herne Bay, Kent, CT6 8LD, U.K.
Phone : +44 (01227) 741741 Fax : +44 (01227) 741742
URL : http://www.icomuk.co.uk
E-mail : info@icomuk.co.uk

Icom France s.a.s.

Zac de la Plaine
1 Rue Brindejonc des Moulinais BP 5804
31505 Toulouse Cedex, France
Phone : +33 (5) 61 36 03 03 Fax : +33 (5) 61 36 03 00
URL : http://www.icom-france.com
E-mail : icom@icom-france.com

Asia Icom Inc.

6F No.68, Sec. 1 Cheng-Teh Road, Taipei, Taiwan, R.O.C.
Phone : +886 (02) 2559 1899 Fax : +886 (02) 2559 1874
URL : http://www.asia-icom.com
E-mail : sales@asia-icom.com

Count on us!

Icom Inc.
1-1-32, Kamiminami, Hirano-ku, Osaka 547-0003, Japan

S-14414XZ-C1