ICOM®

SERVICE MANUAL

VHF MARINE TRANSCEIVER

IC-M422

S-14131MZ-C1-①
Jul. 2006

Icom Inc.

INTRODUCTION

This service manual describes the latest service information for the **IC-M422** VHF MARINE TRANSCEIVER at the time of publication.

MODEL	COLORS	SYMBOL
IC-M422	BLACK	[BLK]
	SUPER WHITE	[SW]

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

DANGER

NEVER connect the transceiver to an AC outlet or to a DC power supply that uses more than 16 V. Such a connection could cause a fire or electric hazard.

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 order numbers
2. Component part number and name
3. Equipment model name and unit name
4. Quantity required

<SAMPLE ORDER>

5030002790 LCD	A0286	IC-M422	Main unit 5 pieces
8810009510 Screw	BO 2x4 NIxZU (BT)	IC-M422	Chassis 10 pieces

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

REPAIR NOTES

1. Make sure the problem is internal before dis-assembling 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 turning 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 signal generator or a sweep generator.
7. **ALWAYS** connect a 30 dB to 40 dB attenuator between the transceiver and a deviation meter or spectrum analyzer when using such test equipment.
8. **READ** the instructions of test equipment thoroughly before connecting equipment to the transceiver.

TABLE OF CONTENTS

SECTION 1 SPECIFICATIONS

■ GENERAL

• Frequency coverage	: TX 156.025–157.425 MHz RX 156.050–163.275 MHz
• Type of emission	: 16K0G3E, 16K0G2B (DSC)
• Antenna impedance	: 50 Ω (Nominal)
• Operating temperature range	: –4˚F to +140˚F
• Power supply requirement	: 13.8 V DC ±15% (negative ground)
• Current drain (At 13.8 V DC ; approx.)	: Receiving 1.5 A (at max. audio) Transmitting 5.5 A (at 25 W)
• Dimensions (Projections not included)	: 6 15/32 (W)×3 1/16 (H)×5 15/32 (D) in.
• Weight (Approx.)	: 2 lb 5 3/4 oz.

■ TRANSMITTER

• Output power (At 13.8 V DC)	: 25 W (High)/1 W (Low)
• Modulation	: Variable reactance frequency modulation
• Maximum frequency deviation	: ±5.0 kHz
• Frequency error	: Less than ±10 ppm
• Spurious emissions	: Less than 70 dBc
• 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 dB to –3 dB of 6 dB oct. from 300 Hz to 2500 Hz
• Microphone impedance	: 2 kΩ

■ RECEIVER

• Receive system	: Double conversion superheterodyne system
• Intermediate frequencies	: 1st IF: 21.7 MHz, 2nd IF: 450 kHz
• Sensitivity	: –13 dBμ typical at 12 dB SINAD
• Squelch sensitivity (At threshold)	: Less than –13 dBμ
• Adjacent channel selectivity	: More than 70 dB
• Spurious response	: More than 70 dB
• Intermodulation rejection ratio	: More than 70 dB
• Hum and Noise	: More than 40 dB
• Audio frequency response	: +1 dB to –3 dB of 6 dB oct. from 300 Hz to 3000 Hz
• Audio output power	: 4.5 W typical at 10% distortion with a 4 Ω load
• Output impedance (Audio)	: 4 Ω

Specifications are measured in accordance with TIA/EIA 603

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

• Channel list

• 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*1	156.750	156.750	25	157.250	161.850	65	156.275	160.875	75*3	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*3	156.825	156.825	86	157.325	161.925
07	156.350	160.950	17*1	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*2	157.850	157.850	69	156.475	156.475	79	156.975	161.575	P4*2	161.425	161.425
10	156.500	156.500	20	157.000	161.600	60	156.025	160.625	70†	156.525	156.525	80	157.025	161.625			

† DSC operation only.

*1 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.

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

*3 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†	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			

† DSC operation only.

*1 Low power only.

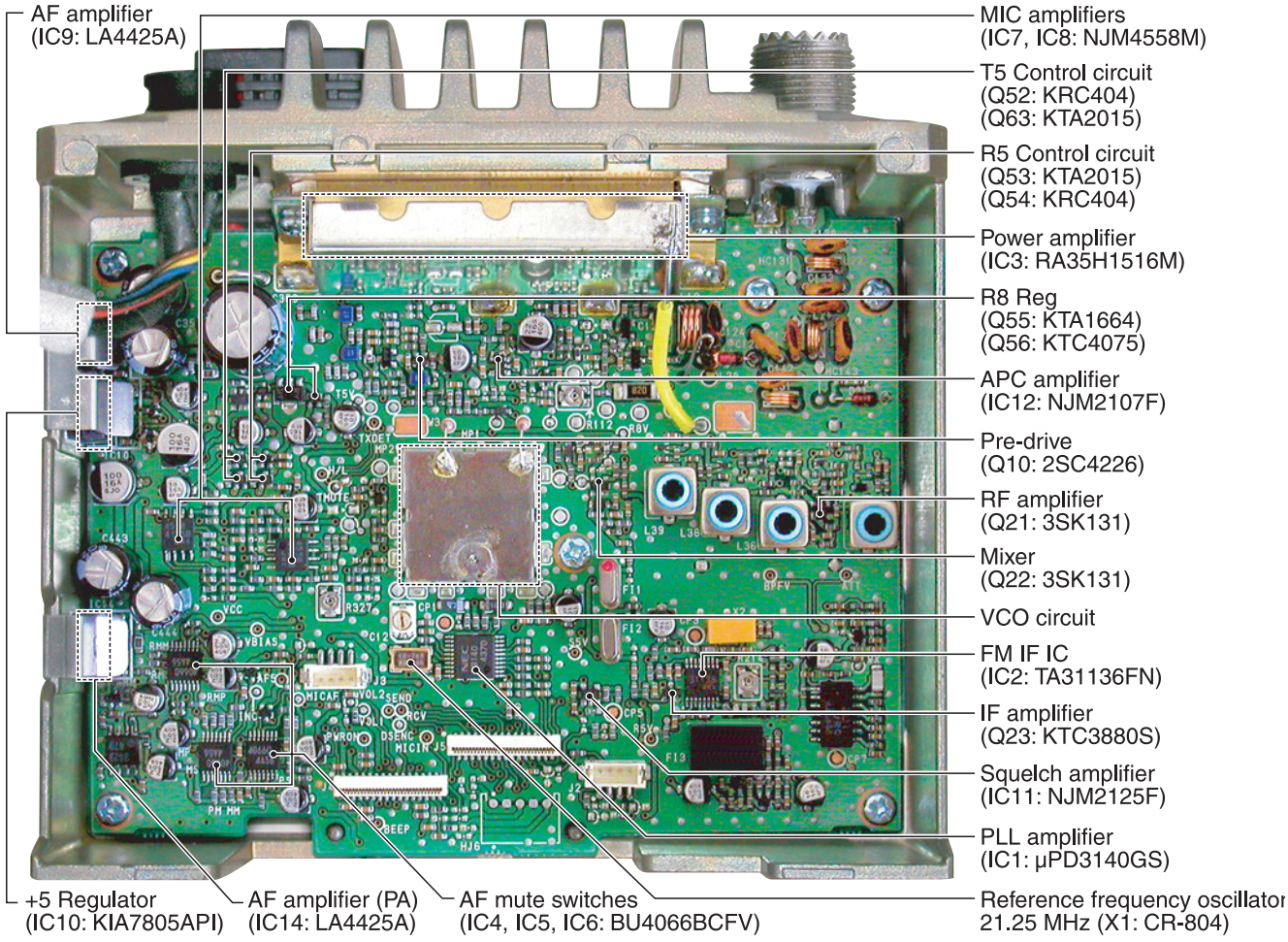
*2 Momentary high power

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

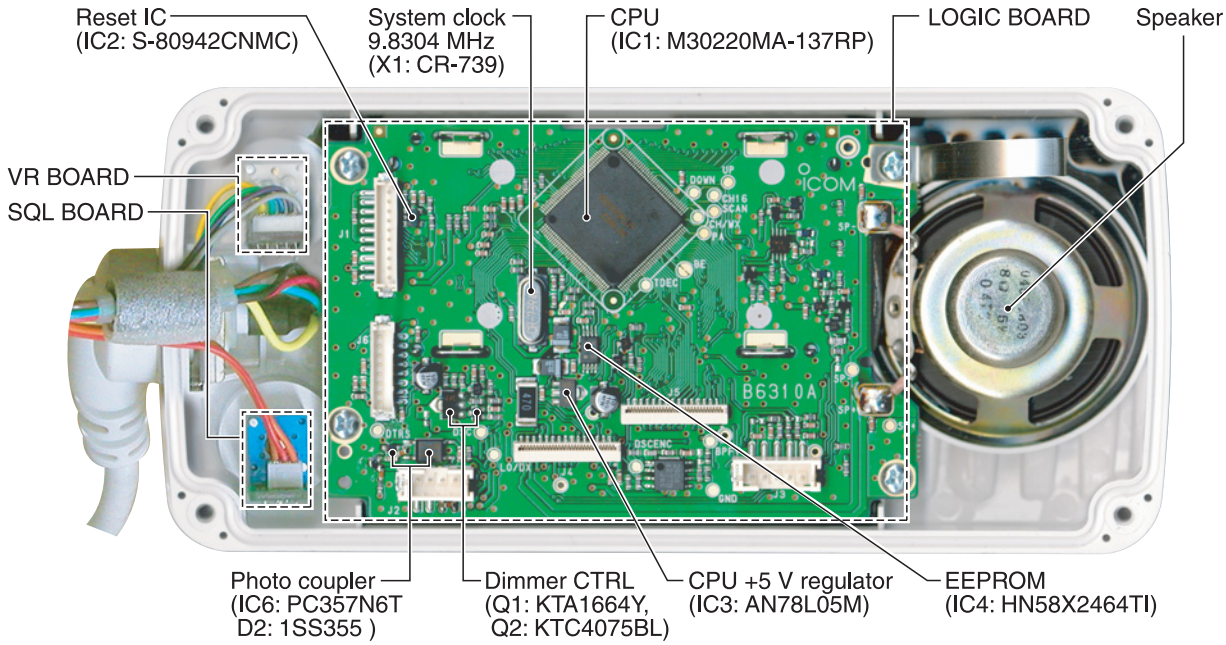
NOTE: Simplex channels, 3, 21, 23, 61, 64, 81, 82 and 83 **CANNOT** be lawfully used by the general public in U.S.A. waters.

SECTION 2 INSIDE VIEWS

• MAIN UNIT



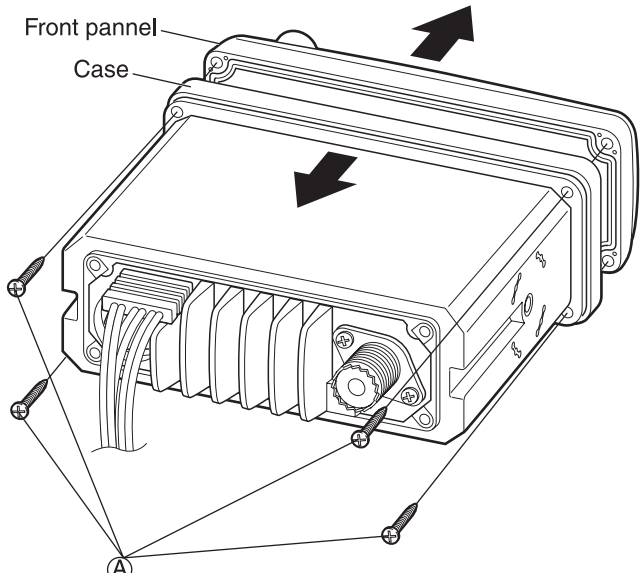
• FRONT UNIT



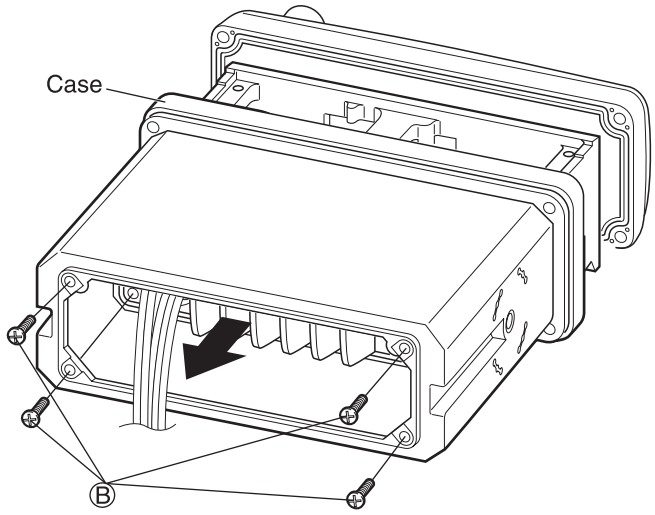
SECTION 3 DISASSEMBLY INSTRUCTIONS

● REMOVING THE CASE

① Unscrew 4 screws, Ⓐ.
Note: When replacing the screws, 0.6–0.8 (N.m) of torque MUST be applied to ensure water resistance.
② Slide the case in the direction of the arrow to separate the front pannel.

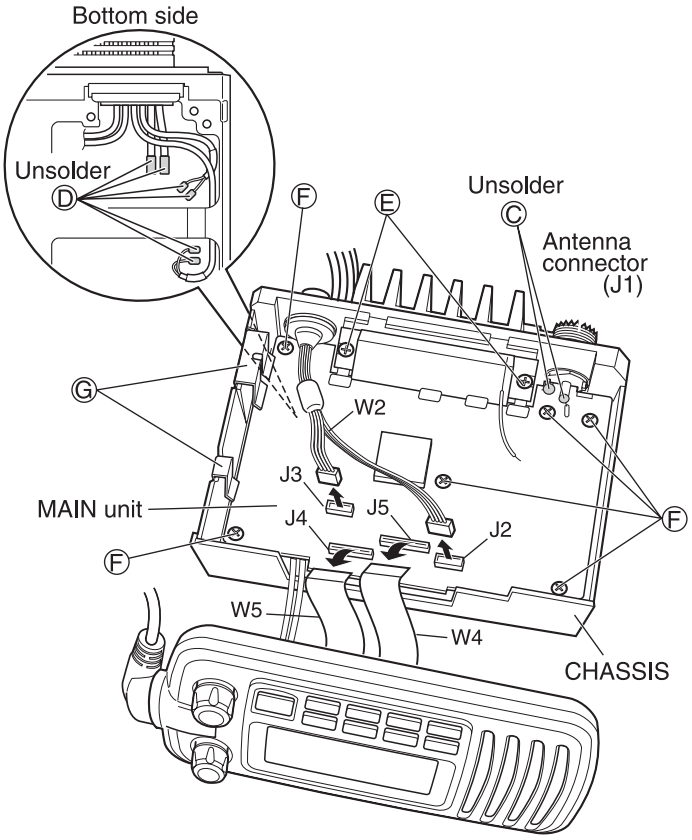


③ Unscrew 4 screws, Ⓑ.
Note: When replacing the screws, 0.6–0.8 (N.m) of torque MUST be applied to ensure water resistance.
④ Slide the case in the direction of the arrow to remove the case.



● REMOVING THE MAIN UNIT

① Disconnect W2 from the J2 and J3.
② Disconnect W4 and W5 from the J4 and J5.
③ Unsolder the antenna connector, Ⓒ (2 points).
④ Unsolder bottom side Ⓓ (6 points), as shown below.
⑤ Unscrew 2 screws, Ⓔ, and 6 screws, Ⓕ, and 2 clips Ⓖ to remove the MAIN unit from the chassis.



SECTION 4 CIRCUIT DESCRIPTION

4-1 RECEIVER CIRCUITS

4-1-1 ANTENNA SWITCHING CIRCUIT

The antenna switching circuit toggles the receive line and the transmit line. This circuit does not allow transmit signals to enter the receiver circuits.

The received signals from the antenna connector (CHASSIS UNIT; J1) are passed through a two-stage low-pass filter (LPF; L21, L22, C127–C130, C132) and then applied to the $\lambda/4$ type antenna switching circuit (D14, D21).

While receiving, no voltage is applied to D14 and D21. Thus, the receive line and the ground are disconnected and L31 and C142 function as an LPF which leads received signals to the RF circuits. The received signals are applied to the RF circuits via the attenuator (D22).

4-1-2 RF CIRCUITS

The RF circuits amplify received signals within the range of frequency coverage and filters out-of-band signals.

The received signals from the antenna switch are passed through a tunable bandpass filter (BPF; D25, L35, C149, C151, C152, C154) to suppress unwanted signals. The filtered signals are amplified at the RF amplifier (Q21). The amplified signals are passed through another three-stage tunable BPF (D26–D28, L36, L38, L39, C161, C162, C164, C173–C178) to suppress unwanted signals again.

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

4-1-3 1st IF CIRCUITS

The 1st IF circuits contain the 1st mixer, IF amplifier and the 1st IF filter circuits, and the 1st IF mixer converts the received signals into a fixed frequency of the 1st intermediate frequency (IF) signal. The converted 1st IF signal is filtered at the 1st IF filters, then amplified at the 1st IF amplifier.

The signals from the three-stage tunable BPF are converted into the 21.7 MHz 1st IF signal at the 1st mixer (Q22) by being mixed with the 1st LO signal generated at the VCO (Q4, Q5, D3, D4).

The converted 1st IF signal from the 1st mixer is passed through the monolithic filters (FI1, FI2) to suppress unwanted signals, and then amplified at the 1st IF amplifier (Q23).

The amplified 1st IF signal is applied to the FM IF IC (IC2, pin 16).

4-1-4 2nd IF AND DEMODULATOR CIRCUITS

The 1st IF signal is converted into the 2nd IF signal and demodulated at the detector section in the FM IF IC. The FM IF IC contains 2nd mixer, limiter amplifier, quadrature detector, etc. in its package.

The 1st IF signal from the 1st IF amplifier (Q23) is applied to the mixer section in the FM IF IC (IC2, pin 16). The applied 1st IF signal is mixed with the 21.25 MHz 2nd LO signal from the PLL IC (IC1, pin 17) to be converted into the 450 kHz 2nd IF signal.

The 2nd IF signal from the mixer section is output from pin 3 and passed through the ceramic filter (FI3) to suppress the heterodyne noise. The filtered signal is applied to the FM IF IC (IC2, pin 5) again, and amplified at the limiter amplifier section and demodulated by the quadrature detector.

The demodulated AF signals are output from pin 9, and applied to the AF cricuits.

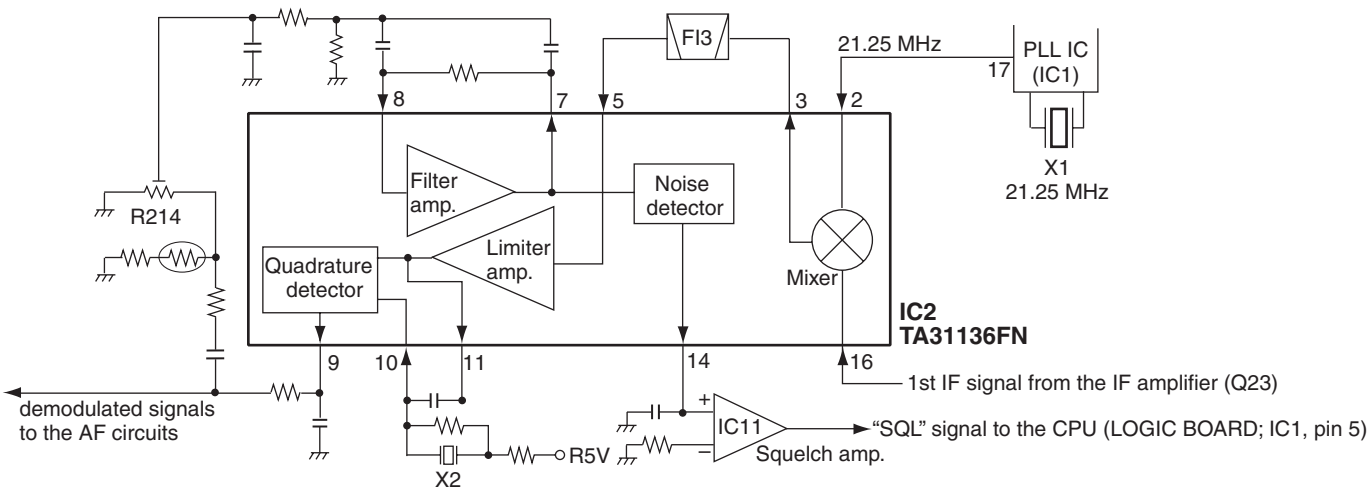
4-1-5 AF CIRCUITS

The demodulated AF signals from the FM IF IC are amplified and filtered in AF circuits.

The AF signals from FM IF IC (IC3, pin 9) are passed through the BPF (Q31, Q32) and AF mute switch (IC4, pins 8, 9), and then applied to the volume control pot (VR BOARD; R1) to be adjusted its level. The level adjusted AF signals are applied to the AF power amplifier (IC9, pin1) to obtain 4.5 W (typ.) of AF output power.

The power amplified AF signals are output from pin 4, and applied to the internal speaker (FRONT UNIT; SP1) via J4 or connected external speaker/hailer.

• 2ND IF AND DEMODULATOR CIRCUITS



4-1-6 SQUELCH CIRCUITS

Noise squelch circuit mutes AF output signals when no RF signals are received. By detecting noise components in the demodulated AF signals, the squelch circuit switches the AF mute switch ON and OFF.

A portion of the demodulated AF signals from the FM IF IC (IC2, pin 9) are passed through the squelch adjustment pot (R214) to be adjusted its level. The level adjusted AF signals are passed through the active filter (IC2, pins 7, 8; R211–R213, C211, C212, C217). The filtered signals are then applied to the noise amplifier section in the IC2 to amplify the noise components only.

The amplified noise components are converted into the pulse-type signal at the noise detector section, and output from pin 14 as the "SQL" signal. The "SQL" signal is applied to the squelch amplifier (IC11, pin 1) to be amplified its level, then output from pin 4. The amplified "SQL" signal is applied to the CPU (LOGIC BOARD; IC1, pin 5). Then the CPU outputs "RMUTEM" signal from pin 64 according to the "SQL" signal level to toggle the AF mute circuit (IC4) ON/OFF.

4-2 TRANSMITTER CIRCUITS

4-2-1 MICROPHONE AMPLIFIER CIRCUIT

The microphone amplifier circuit amplifies the audio signals from microphone (MIC signals) within +6 dB/oct pre-emphasis characteristic.

The MIC signals from the microphone (HM-150B/SW; MC1) are passed through the microphone mute switch (IC5, pins 10, 11) and amplified at the microphone amplifier (IC7, pin 6) to obtain +6 dB/oct pre-emphasis characteristics. The amplified MIC signals are limited its level at the IDC amplifier (IC7, pin 5), and filtered out 3 kHz and higher audio signals at the LPF (IC8, pins 5, 7).

The filtered MIC signals are passed through the deviation adjustment pot (R327) to be adjusted its level. Then the level adjusted MIC signals are applied to the modulation circuit.

4-2-2 MODULATION CIRCUIT

The modulation circuit modulates the VCO oscillating signal with the audio signals from the microphone.

The level adjusted MIC signals are applied to the modulation circuit (D2) to modulate the VCO oscillating signal by changing the reactance of D2 at the VCO (Q4, Q5, D3, D4).

The modulated VCO output signals are amplified at the buffer amplifiers (Q6, Q7), then applied to the transmit amplifiers via the TX/RX switch (D7).

4-2-3 TRANSMIT AMPLIFIERS

The VCO output signals are amplified to transmit output power level by the transmit amplifiers .

The buffer-amplified VCO output signals from the TX/RX switch (D7) are applied to the pre-drive (Q10), YGR (Q12), and power (IC3) amplifiers to be amplified to the transmit output power level. The power amplified transmit signal is passed through the power detector (D12, D13), antenna switch (D14) and a two-stage LPF (L21, L22, C127–C130, C132), and then applied to the antenna connector (CHASSIS UNIT; J1).

4-2-4 APC CIRCUIT

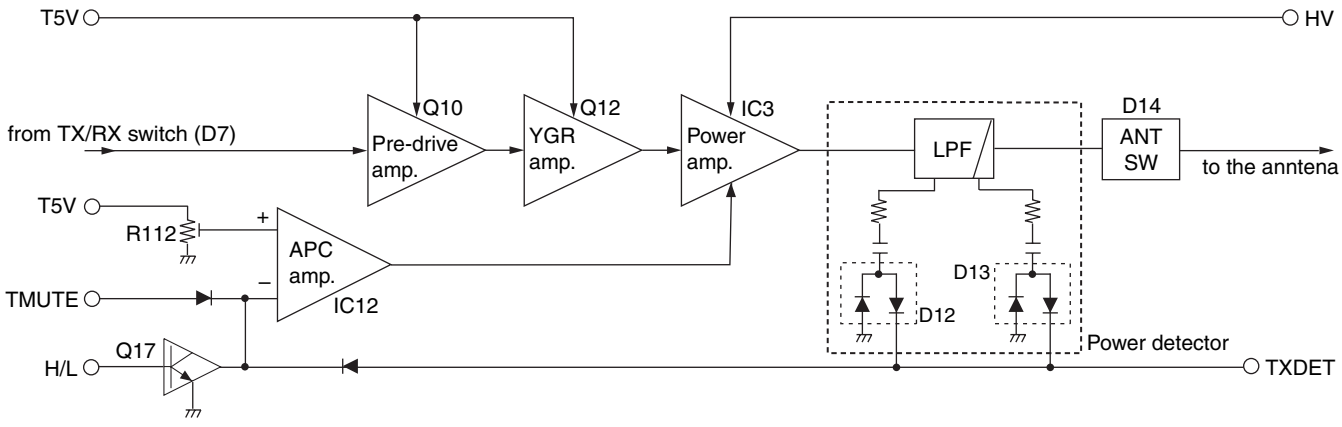
The APC (Automatic Power Control) circuit stabilizes transmit output power and controls transmit output power High (25 W) or Low (1 W).

The power detector circuits (D12, D13) detect the transmit output signal level and converts it into DC voltage. The detected voltage is applied to the APC amplifier (IC12, pin 3). The voltage of the "T5V" line is applied to another input (pin 1) via the transmit output power adjustment pot (R112) as the reference voltage.

The output voltage from the APC amplifier controls the bias of the power amplifier (IC3) to control the output power by comparing the detected voltage and the reference voltage.

Thus the APC circuit maintains a constant transmit output power.

• APC CIRCUIT



4-3 PLL CIRCUITS

4-3-1 VCO CIRCUIT

The VCO circuit (Q4, Q5, D3, D4) directly generates both of the 1st LO frequency for receiving (134.35–141.575 MHz) and the transmit frequency (156.025–157.425 MHz).

While receiving, the VCO output signal (1st LO signal) is amplified at the buffer amplifiers (Q6, Q7) and passed through the TX/RX switch (D8), then applied to the 1st mixer (Q22).

While transmitting, the VCO output signal (transmit signal) is amplified at the buffer amplifiers (Q6, Q7) and passed through the TX/RX switch (D7), then applied to the pre-driver (Q10).

A portion of the VCO output signal from the buffer amplifier (Q6) is fed back to the PLL IC (IC1, pin 2) as the comparison signal via the buffer amplifier (Q3) and the LPF (L2, C34, C35).

4-3-2 PLL CIRCUIT

The PLL circuit provides stable oscillation of the transmit frequency and receive 1st LO frequency. The PLL circuit compares the phase of the divided VCO frequency with the reference frequency. The PLL output frequency is controlled by the divided ratio of the programmable divider.

The buffer amplified signals are applied to the PLL IC (IC1, pin 2) via the LPF (L2, C34, C35). The applied signals are divided at the prescaler and programmable counter section according to the “PDATA” from the CPU (LOGIC BOARD; IC1 pin 8). The divided signal is phase-compared with the reference frequency at the phase detector.

The phase difference is output from pin 8 as a pulse type signal after being passed through the charge pump section. The output signal is passed through the loop filter (R7–R9, R41, C4, C5, C43, C44) to be converted into the DC voltage, and is then applied to the VCO circuits as the lock voltage.

If the oscillated signal drifts, its phase changes from that of the reference frequency, causing a lock voltage change to compensate for the drift in the oscillated frequency.

4-4 DSC CIRCUITS

• DECODING

A portion of the demodulated AF signals from the FM IF IC (IC2, pin 9) are passed through the LPF (Q38) to filter DSC signal. The filtered DSC signal is applied to the DSC decoder (IC15, pin 2). The decoded DSC signal is output from pin7, and then applied to the CPU (LOGIC BOARD; IC1, pin 14). Then the CPU controls the transceiver according to the DSC content.

• ENCODING

The DSC signals (FSK) are generated by the CPU (LOGIC BOARD; IC1) and output from pins 141. The DSC signals are applied to the buffer amplifier (LOGIC BOARD; IC5, pin 3). The buffer amplified DSC signals are output from pin 1, and passed through the LPF (IC8, pins 5, 7), and applied to the modulation circuit (D2) via the deviation adjustment pot (R327) to modulate the VCO oscillating signal.

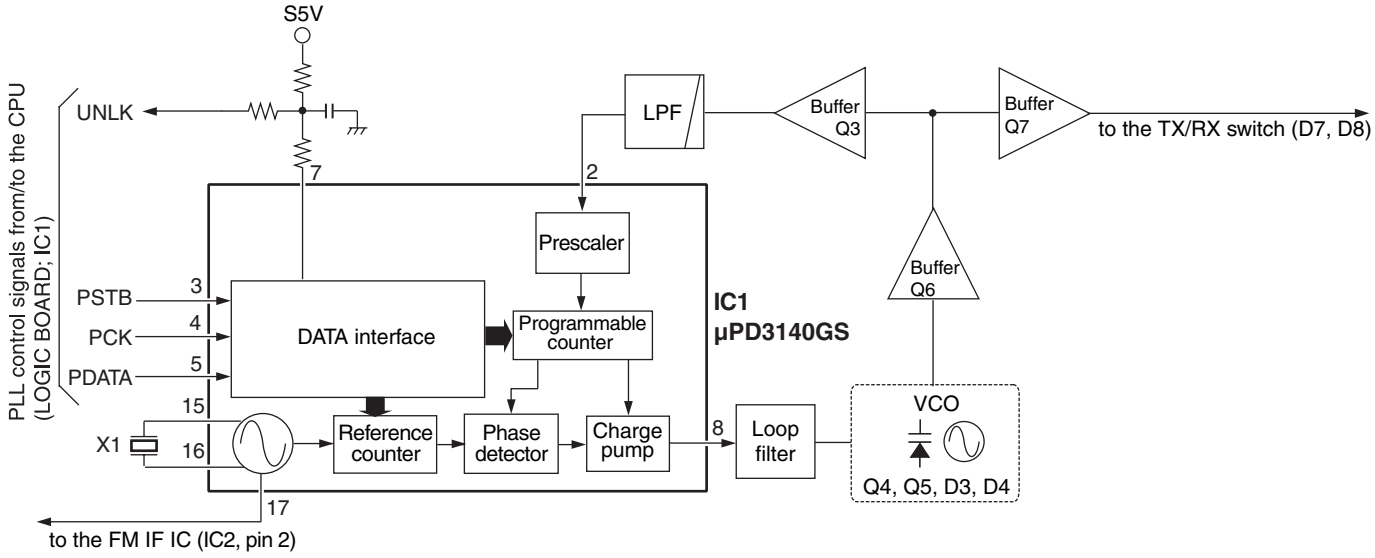
4-5 PUBLIC ADDRESS (PA) CIRCUIT

The Public Address (PA) circuit power amplifies the audio signals from the microphone. The power amplified MIC signals are output to the connected external speaker or hailer.

The MIC signals from the microphone (HM-150B/SW or optional HM-157) are passed through the AF mute circuit (IC5, pins 10, 11), and applied to the microphone amplifier (IC8, pin 2). The amplified MIC signals are output from pin 1, and applied to the electric volume controller (IC13, pin 1) via the AF mute circuit (IC5, pins 8, 9). The volume controlled MIC signals are then passed through the AF mute circuit (Q65), and applied to the AF power amplifier (IC14, pin 1) to be amplified to obtain 5 W (min.) of AF output power.

The power amplified AF signals are output from pin 4, and applied to the connected external speaker or hailer.

• PLL CIRCUITS



4-6 POWER SUPPLY CIRCUITS

Line	Description
HV	The voltage from the connected DC power supply.
L5V	Common 5V converted from the HV line at the L5V regulator (LOGIC BOARD; IC3). The converted voltage is applied to the CPU (LOGIC BOARD; IC1)
VCC	Same voltage as the HV line whitch is passed through the power control circuit (Q61, Q62).
S5V	Common 5V converted from the VCC line at the +5 regulator circuit (IC10).
T5	Transmit 5V controlled by the T5 control circuit (Q52, Q57) using the "SEND" signal from CPU (LOGIC BOARD; IC1, pin 52).
R8	Receive 8 V converted from the VCC line at the R8 regulator (Q55, Q56). The converted voltage is applied to the receiver circuits.
R5	Receive 5V controlled by the R5 control circuit (Q53, Q54) using the "RCV" signal from CPU (LOGIC BOARD; IC1, pin 53). The controlled voltage is applied to the receiver circuits.

4-7 CPU PORT ALLOCATIONS

Pin NO.	Port name	Description
2	KEYM	Input port for keys on HM-150B/SW. Approx. 2.02 V: [▲] key is pushed. Approx. 3.00 V: [▼] key is pushed. Approx. 3.84 V: [H/L] key is pushed.
3	TXDET	Input port for transmit detected voltage.
4	LBAT	Input port for low battery detecting.
5	SQL	Input port for "NOISE" signal from the squelch amplifier (IC11, pin 4).
6	SQLV	Input port for squelch adjustment pot (SQL BOARD; R1).
7	WXDEC	Input port for weather alert signal from the LPF (Q38).
8	PDATA	Outputs data signal to the PLL IC (IC1, pin 5).
9	PCK	Outputs clock signal to the PLL IC (IC1, pin 4).
10	PSTB	Outputs strobe signal to the PLL IC (IC1, pin3).
12	EVDATA	Outputs volume control signal to the volume ccontroller (IC13, pin 5) for PA circuit.
13	EVCK	Outputs clock signal to the volume ccontroller (IC13, pin 4) for PA circuit.
14	DSDEC	Input port for the DSC decode signal from the DSC decoder (IC15, pin 7).
28, 29	CONT1, CONT0	Output LCD contrast adjust signal to the CPU (IC1, pin 134).
32	COMTXD	Outputs serial data signal to the connected HM-157 (Optional product).
33	COMRXD	Input port for the serial data signal from the connected HM-157 (Optional product).
34	ECK	Outputs clock signal to the EEPROM (LOGIC BOARD; IC4, pin 6).
35	EDATA	I/O port for the EEPROM (LOGIC BOARD; IC4, pin 5) control data.
37	NMTXD	Outputs NMEA command signal.
38	NMRXD	Input port for the NMEA signal.
48	PWR	Input port for power switch (VR BOARD; R1). Low: When [VOL] is pushed.
49	PAMUTE	Outputs control signal to the AF (Public Address) mute circuit (Q65). High: During mute.
50	PWRON	Outputs power control signal to the power control circuit (Q61, Q62). High: While the transceiver is switched ON.
51	TMUTE	Outputs transmit mute signal to the APC circuit (IC12, pin 3). High: During mute.
53	RCV	Outputs control signal to the R5 control circuit (Q53, Q54). High: While receiving.
54	H/L	Outputs TX power control signal to the TX power control circuit (Q17, D11). High: 25 W Low: 1 W
55	ATT	Outputs attenuator control signal to the attenuator (D22). High: Attenuator ON.
57	PTT	Input port for the [PTT] switch (HM-150B/SW; S1). Low: [PTT] key is pushed.
60	UNLK	Input port for the "UNLK" signal from the PLL IC (IC1, pin7). High: PLL circuit is unlocked.
61	DTRS	Input port for the [DISTRESS] key (LOGIC BOARD; S9). Low: [DISTRESS] key is pushed.
62	RMUTEP	Outputs AF (Public Address) mute signal to the AF mute circuit (IC4, pin12). Low: During mute.
63	RMUTES	Outputs AF mute signal to the AF mute circuit (IC4, pin 5) for the connected HM-157 (Optional product). Low: During mute.
64	RMUTEM	Outputs AF (internal speaker) mute signal to the AF mute circuit (IC4, pin 6). Low: During mute.
65	MMUTEP	Outputs microphone (Public Address) mute signal to the AF mute circuit (IC5, pin 6). Low: During mute.
66	MMUTES	Outputs microphone mute signal to the AF mute circuit (IC5, pin 5) for the connected HM-157 (Optional product). Low: During mute.
67	MMUTEM	Outputs microphone (HM-150B/SW) mute signal to the AF mute circuit (IC5, pin 13). Low: During mute.
68	PTTS	Outputs AF/MIC control signal to the AF mute circuit (IC6, pin 5). High: PTT switch (HM-157) is pushed
69	PTTM	Outputs AF/MIC control signal to the AF mute circuit (IC5, pin 12).
70	LO/DX	Input port for the [LO/DX] key (LOGIC BOARD; S8). Low: [LO/DX] key is pushed.

4-7 PORT ALLOCATIONS (continued)

Pin NO.	Port name	Description
71	DSC	Input port for the [DSC] key (LOGIC BOARD; S7). Low: [DSC] key is pushed.
72	PA	Input port for the [PA] key (LOGIC BOARD; S6). Low: [PA] key is pushed.
73	CH/WX	Input port for the [CH/WX] key (LOGIC BOARD; S5). Low: [CH/WX] key is pushed.
74	SCAN	Input port for the [SCAN] key (LOGIC BOARD; S4). Low: [SCAN] key is pushed.
75	CH16	Input port for the [16] key (LOGIC BOARD; S3). Low: [16] key is pushed.
76	DOWN	Input port for the [▼] key (LOGIC BOARD; S2). Low: [▼] key is pushed.
77	UP	Input port for the [▲] key (LOGIC BOARD; S1). Low: [▲] key is pushed.
138	DIM	Outputs dimmer control signal to the LCD control circuit (LOGIC BOARD; Q2, Q3).
139	BEEP	Outputs beep signal to the AF amplifier (IC9, pin 1).
141	DS/BPF	• While transmitting: Outputs DSC encode signal as "DSENC" to the LPF (IC8, pin 5) via the buffer amplifier (LOGIC BOARD; IC5, pins 1, 3). • While receiving: Outputs tuning signal as "BPFV" to the tunable BPFs (D25–D28) via buffer amplifier (LOGIC BOARD; IC5, pins 5, 7).

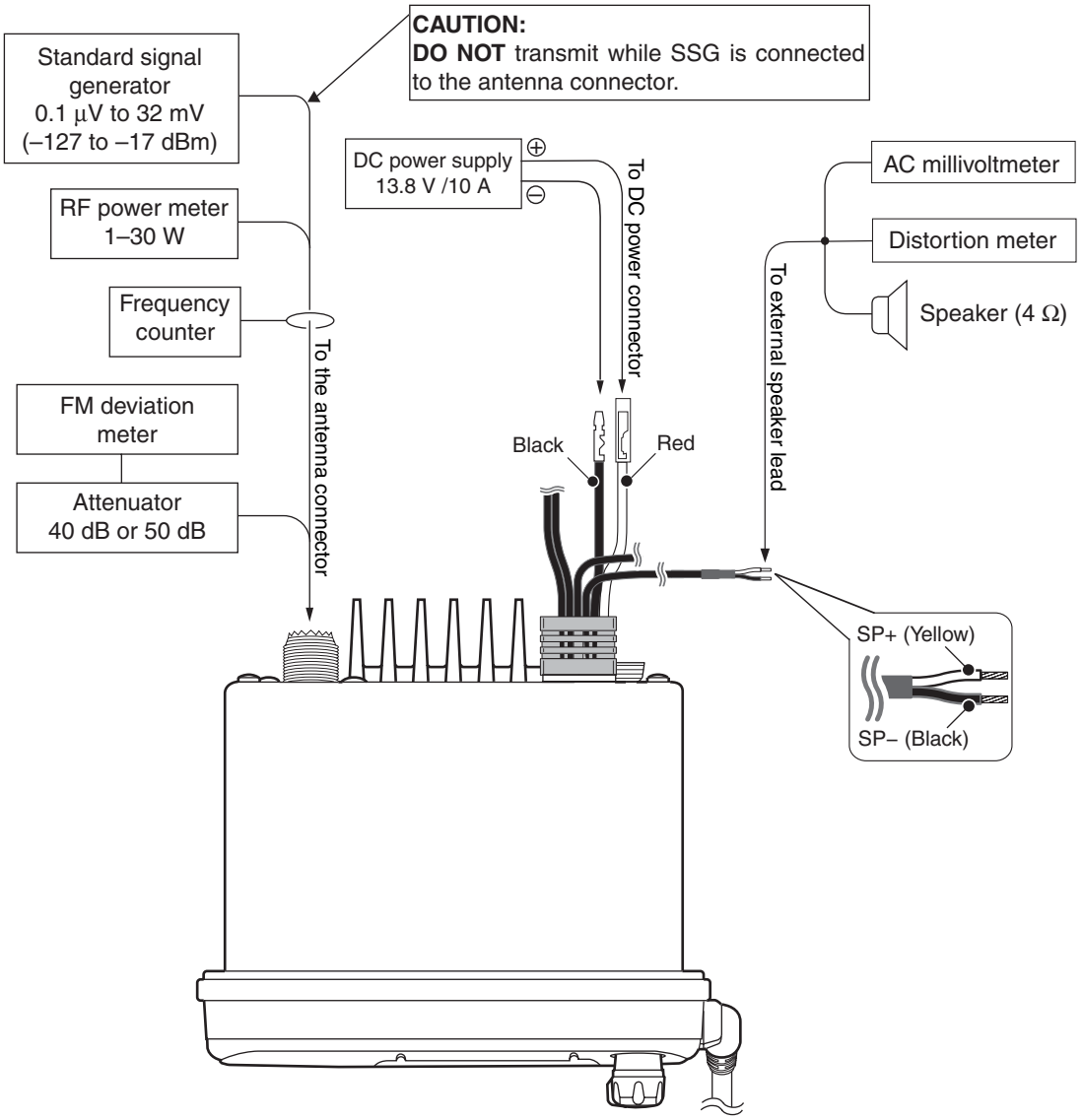
SECTION 5 ADJUSTMENT PROCEDURES

5-1 PREPARATION

■ REQUIRED TEST EQUIPMENTS

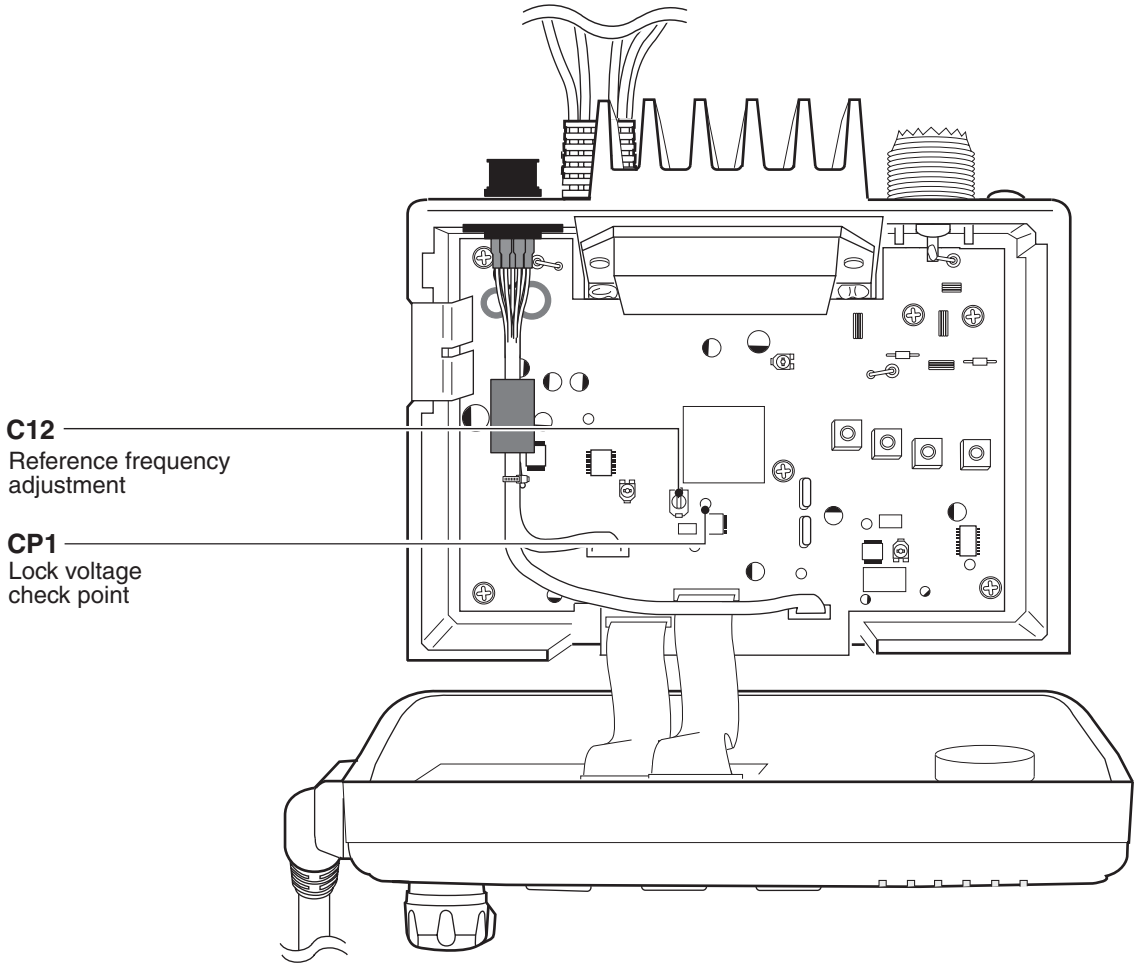
EQUIPMENT	GRADE AND RANGE	EQUIPMENT	GRADE AND RANGE
DC power supply	Output voltage : 13.8 V DC Current capacity : More than 10 A	Audio generator	Frequency range : 300–3000 Hz Measuring range : 1–500 mV
RF power meter (terminated type)	Measuring range : 1–30 W Frequency range : 100–300 MHz Impedance : 50 Ω SWR : Less than 1.2 : 1	Standard signal generator (SSG)	Frequency range : 0.1–300 MHz Output level : 0.1 μV to 32 mV (–127 to –17 dBm)
Frequency counter	Frequency range : 0.1–300 MHz Frequency accuracy: ±1 ppm or better Sensitivity : 100 mV or better	Oscilloscope	Frequency range : DC to 20 MHz Measuring range : 0.01–20 V
FM deviation meter	Frequency range : 30–300 MHz Measuring range : 0 to ±10 kHz	AC millivoltmeter	Measuring range : 10 mV to 10 V
DC volt meter	Input impedance : 50 kΩ /V DC or more	External speaker	Input impedance : 4 Ω Capacity : More than 5 W
		Attenuator	Power attenuation : 40 or 50 dB Capacity : More than 30 W

■ CONNECTION



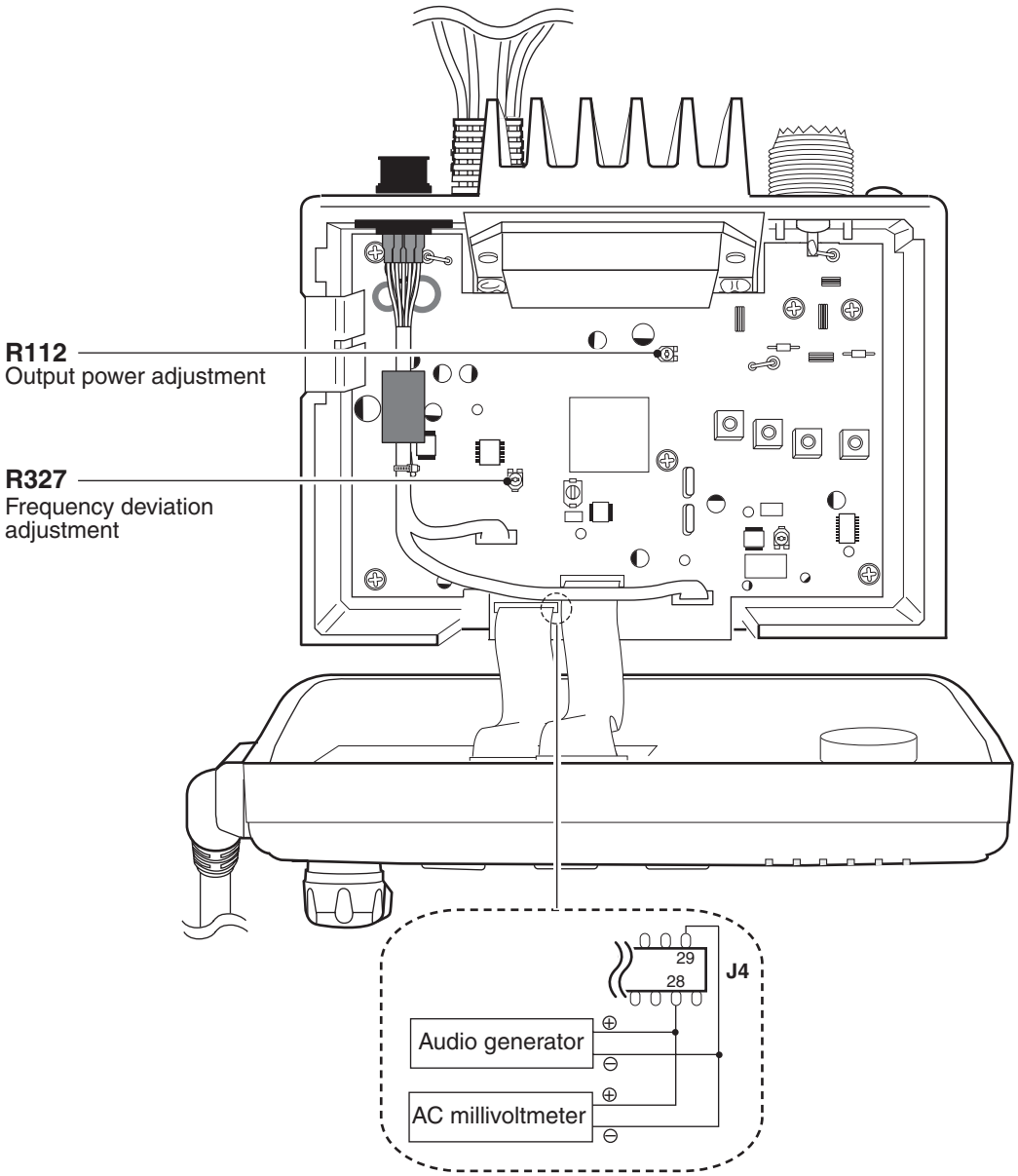
5-2 FREQUENCY ADJUSTMENT

ADJUSTMENT		ADJUSTMENT CONDITION	MEASUREMENT		VALUE	ADJUSTMENT POINT	
			UNIT	OPERATION		UNIT	ADJUST
LOCK VOLTAGE	1	• Channel : CH16 (156.800 MHz) • Receiving	MAIN	Connect a digital multimeter or oscilloscope to the check point "CP1".	1.1–2.1 V	MAIN	Verify
	2	• Channel : CH16 (156.800 MHz) • Output power : Low • Transmitting			0.9–1.9 V		Verify
REFERENCE FREQUENCY	1	• Channel : CH16 (156.800 MHz) • Output power : Low • Connect a power meter to the antenna connector. • Transmitting	Rear Panel	Loosely couple a frequency counter to the antenna connector.	156.800 MHz ±500 Hz	MAIN	C12



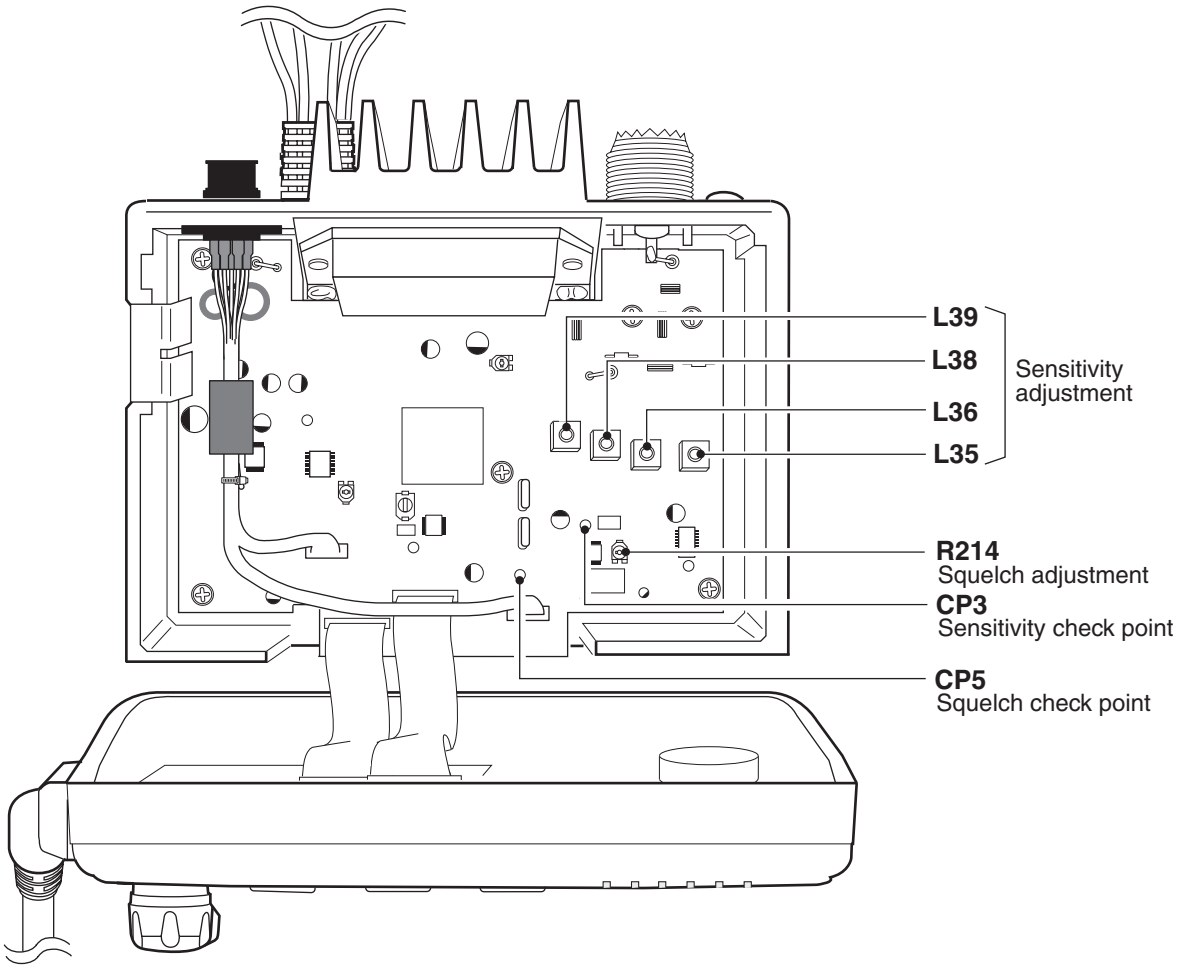
5-3 TRANSMIT ADJUSTMENT

ADJUSTMENT		ADJUSTMENT CONDITION	MEASUREMENT		VALUE	ADJUSTMENT POINT	
			UNIT	OPERATION		UNIT	ADJUST
OUTPUT POWER	1	• Channel : CH16 (156.800 MHz) • Output power : High • Transmitting	Rear Panel	Connect an RF power meter to the antenna connector.	23–23.5 W	MAIN	R112
FREQUENCY DEVIATION	1	• Channel : CH16 (156.800 MHz) • Output power : Low • Connect an audio generator to the pin 28 of J4 (MAIN UNIT) and set as; Frequency : 1 kHz Level : 30 mV • Set the FM deviation meter as; HPF : OFF LPF : 20 kHz De-emphasis: OFF Detector : (P–P)/2 • Transmitting	Rear Panel	Connect an FM deviation meter to the antenna con-nector through an attenuator.	±4.25–4.35 kHz	MAIN	R327



5-4 RECEIVE ADJUSTMENT

ADJUSTMENT		ADJUSTMENT CONDITION	MEASUREMENT		VALUE	ADJUSTMENT POINT	
			UNIT	OPERATION		UNIT	ADJUST
SENSITIVITY	1	• Channel : CH16 (156.800 MHz) • **[SQL]** : Max. counterclockwise • Connect a distortion meter with a 4 Ω load to the external speaker lead. • Push **[PA•RX◀))]** for 1 sec. to turn the RX speaker mode ON. • Connect an SSG to the antenna connector and set as ; Frequency : 156.800 MHz Level : +10 dBμ Modulation :1 kHz Deviation : ±3 kHz • Receiving	MAIN	Connect a DC volt meter or oscilloscope to the check point "CP3".	Maximum voltage	MAIN	L35, L36, L38, L39 (Repeate two times or more.)
SQUELCH	1	• Channel : CH16 (156.800 MHz) • **[SQL]** : Max. counterclockwise • Set the SSG as; Level : –12 dBμ • Receiving	MAIN	Connect a volt meter or oscilloscopeto the check point "CP5".	1.0 V	MAIN	R214



SECTION 6 PARTS LIST

6-1 IC-M422

[REPLACEMENT UNITS]

ORDER NO.	UNIT NAME	
0328520101	U M422 #01 FRONT (FRONT+LOGIC+VR+SQL)	[BLK]
0328520201	U M422 #02 FRONT (FRONT+LOGIC+VR+SQL)	[SW]
0328520102	U M422 #01 MAIN (MAIN+CHASSIS)	

[LOGIC BOARD]

REF NO.	ORDER NO.	DESCRIPTION		M.	H/V LOCATION
IC1	1140012751	S.IC	M30220MA-137RP (FX-2852A-1)	B	48.1/48.5
IC2	1110005771	S.IC	S-80942CNMC-G9CT2G	B	79.7/48.8
IC3	1180000421	S.IC	TA78L05F (TE12R F)	B	55.3/20.7
IC4	1140008650	S.IC	HN58X2464TI	B	51.9/27.7
IC5	1110006380	S.IC	LM2904PWR	B	39.3/8.6
IC6	1170000352	S.IC	PC357N6J000F	B	77.2/11.6
IC7	1130013100	S.IC	KIC7W14FK RTK/P	B	22/44.5
Q1	1520000840	S.TR	KTA1664Y-RTF/P	B	74/18.8
Q2	1530002851	S.TR	2SC4116-BL (TE85R F)	B	69.7/17.5
Q3	1530002851	S.TR	2SC4116-BL (TE85R F)	B	69.7/21.3
Q4	1590003590	S.TR	KRC414 RTK/P	B	46.3/28.6
Q5	1530002851	S.TR	2SC4116-BL (TE85R F)	B	11.8/34.8
Q6	1590003580	S.TR	KRC404 RTK/P	B	15.6/34.6
Q7	1530002691	S.TR	2SC4116-GR (TE85R F)	B	22.7/49.7
Q8	1510000771	S.TR	2SA1586-GR (TE85R F)	B	19.6/51
Q9	1560000810	S.FET	2SK1069-4-TL	B	26.7/39.6
D1	1750001180	S.DIO	KDS122 RTK/P	B	47.5/25.8
D2	1750001320	S.DIO	KDS4148U RTK/P	B	83.7/11.4
D3	1750001180	S.DIO	KDS122 RTK/P	B	13.4/31.7
D4	1750001330	S.ZEN	KDZ6.2V-Y RTK/P	B	12.7/29.2
X1	6050011500	S.XTL	CR-739 (9.8304 MHz	B	60.8/34
R1	7030003640	S.RES	ERJ3GEYJ 473 V (47 k)	B	54.2/37.2
R2	7030003640	S.RES	ERJ3GEYJ 473 V (47 k)	B	54.9/35.9
R3	7030003800	S.RES	ERJ3GEYJ 105 V (1 M)	B	56.2/38.3
R4	7030003320	S.RES	ERJ3GEYJ 101 V (100)	B	57.3/40.3
R5	7030003640	S.RES	ERJ3GEYJ 473 V (47 k)	B	63.2/40.4
R6	7030003560	S.RES	ERJ3GEYJ 103 V (10 k)	B	63.2/41.7
R11	7030010020	S.RES	ERJ2RKF 154 X (150 k)	B	67.4/47.6
R12	7030004820	S.RES	ERJ3GEYF 473 V (47 k)	B	67.4/48.9
R13	7030003560	S.RES	ERJ3GEYJ 103 V (10 k)	B	64.2/33.4
R14	7030003460	S.RES	ERJ3GEYJ 152 V (1.5 k)	B	74/48.1
R15	7030003570	S.RES	ERJ3GEYJ 123 V (12 k)	B	71.4/48.1
R16	7030003530	S.RES	ERJ3GEYJ 562 V (5.6 k)	B	72.7/48.1
R17	7030003560	S.RES	ERJ3GEYJ 103 V (10 k)	B	59.4/54.7
R18	7030003560	S.RES	ERJ3GEYJ 103 V (10 k)	B	62/53.9
R19	7030003560	S.RES	ERJ3GEYJ 103 V (10 k)	B	60.7/53.3
R21	7030003560	S.RES	ERJ3GEYJ 103 V (10 k)	B	80.9/51.9
R22	7030003640	S.RES	ERJ3GEYJ 473 V (47 k)	B	76.7/48.1
R23	7030003640	S.RES	ERJ3GEYJ 473 V (47 k)	B	77/50.9
R25	7030003280	S.RES	ERJ3GEYJ 470 V (47)	B	57.8/14.7
R31	7030003640	S.RES	ERJ3GEYJ 473 V (47 k)	B	51.9/33.6
R32	7030003560	S.RES	ERJ3GEYJ 103 V (10 k)	B	51.9/34.9
R35	7030003580	S.RES	ERJ3GEYJ 153 V (15 k)	B	45.3/25.9
R36	7030003440	S.RES	ERJ3GEYJ 102 V (1 k)	B	44/25.3
R37	7030003440	S.RES	ERJ3GEYJ 102 V (1 k)	B	44.5/31.3
R41	7030003500	S.RES	ERJ3GEYJ 332 V (3.3 k)	B	44.9/11.2
R42	7030003680	S.RES	ERJ3GEYJ 104 V (100 k)	B	44.2/6.4
R43	7030003800	S.RES	ERJ3GEYJ 105 V (1 M)	B	45.8/6.4
R45	7030005250	S.RES	ERJ3GEYF 103 V (10 k)	B	33.2/7.8
R46	7030005620	S.RES	ERJ3GEYF 682 V (6.8 k)	B	34.5/7.9
R51	7030003250	S.RES	ERJ3GEYJ 270 V (27)	B	71.9/22.7
R52	7030003250	S.RES	ERJ3GEYJ 270 V (27)	B	73.2/22.7
R53	7030003250	S.RES	ERJ3GEYJ 270 V (27)	B	74.5/22.7
R60	7030003630	S.RES	ERJ3GEYJ 393 V (39 k)	B	66.8/19.5
R61	7030003640	S.RES	ERJ3GEYJ 473 V (47 k)	B	66.8/16.9
R62	7030003440	S.RES	ERJ3GEYJ 102 V (1 k)	B	68.8/24
R63	7030003560	S.RES	ERJ3GEYJ 103 V (10 k)	B	69.7/19.4
R64	7030003460	S.RES	ERJ3GEYJ 152 V (1.5 k)	B	67.5/21.6
R71	7030000370	S.RES	MCR10EZHJ 821 (820)	B	84.9/6.2
R72	7030000370	S.RES	MCR10EZHJ 821 (820)	B	12.4/11.6
R73	7030000370	S.RES	MCR10EZHJ 821 (820)	B	11.5/8.5
R74	7030000320	S.RES	MCR10EZHJ 331 (330)	B	12.4/50.4
R75	7030000320	S.RES	MCR10EZHJ 331 (330)	B	12.4/39
R75	7030000330	S.RES	MCR10EZHJ 391 (390)	B	12.4/39
R76	7030000320	S.RES	MCR10EZHJ 331 (330)	B	12.4/43.9

[LOGIC BOARD]

REF NO.	ORDER NO.	DESCRIPTION		M.	H/V LOCATION
R81	7030003430	S.RES	ERJ3GEYJ 821 V (820)	B	87.3/10
R82	7030003520	S.RES	ERJ3GEYJ 472 V (4.7 k)	B	21.4/39.5
R83	7030003440	S.RES	ERJ3GEYJ 102 V (1 k)	B	70.9/12
R85	7030003680	S.RES	ERJ3GEYJ 104 V (100 k)	B	12.7/27.5
R86	7030003210	S.RES	ERJ3GEYJ 120 V (12)	B	11.2/31.7
R87	7030003520	S.RES	ERJ3GEYJ 472 V (4.7 k)	B	13.7/34.8
R88	7030003680	S.RES	ERJ3GEYJ 104 V (100 k)	B	14.4/36.8
R91	7030003520	S.RES	ERJ3GEYJ 472 V (4.7 k)	B	19.6/49.1
R92	7030003280	S.RES	ERJ3GEYJ 470 V (47)	B	24.8/48.8
R95	7030003440	S.RES	ERJ3GEYJ 102 V (1 k)	B	26.1/36.8
R96	7030003640	S.RES	ERJ3GEYJ 473 V (47 k)	B	24.8/36.8
R97	7030003440	S.RES	ERJ3GEYJ 102 V (1 k)	B	23.1/39.9
R101	7030003320	S.RES	ERJ3GEYJ 101 V (100)	B	18.4/14.6
R106	7030003640	S.RES	ERJ3GEYJ 473 V (47 k)	B	17/16.9
C1	4550007080	S.TAN	TEESVA 1C 106M8R	B	56.3/30.5
C2	4030016790	S.CER	ECJ0EB1C103K	B	55.6/33.7
C3	4030017410	S.CER	ECJ0EC1H240J	B	57.5/35.5
C4	4030017410	S.CER	ECJ0EC1H240J	B	57.5/38.3
C5	4030017460	S.CER	ECJ0EB1E102K	B	88.9/39.3
C6	4030017730	S.CER	ECJ0EB1E471K	B	88.9/42.2
C7	4030016930	S.CER	ECJ0EB1A104K	B	37.3/55.1
C8	4030017460	S.CER	ECJ0EB1E102K	B	36.6/34.4
C11	4030016950	S.CER	ECJ0EB1A473K	B	68.7/43.1
C12	4030016950	S.CER	ECJ0EB1A473K	B	68.4/44.4
C13	4030016950	S.CER	ECJ0EB1A473K	B	67.7/46.1
C14	4030016950	S.CER	ECJ0EB1A473K	B	67.4/50.2
C15	4030016950	S.CER	ECJ0EB1A473K	B	64.1/50.8
C16	4030016950	S.CER	ECJ0EB1A473K	B	65.4/50.8
C17	4030016930	S.CER	ECJ0EB1A104K	B	62.8/51.2
C18	4030016790	S.CER	ECJ0EB1C103K	B	70.6/50.2
C21	4030017480	S.CER	C1608 JB 1A 474K-T	B	78.3/51.9
C22	4030017030	S.CER	ECJ0EB1A273K	B	79.6/51.9
C25	4510007310	S.ELE	16 CE 10 BS	B	49.6/19.7
C26	4030006900	S.CER	C1608 JB 1H 103K-T	B	59.4/20.7
C27	4510007310	S.ELE	16 CE 10 BS	B	57.5/25.6
C28	4030016790	S.CER	ECJ0EB1C103K	B	54.6/24
C31	4030016930	S.CER	ECJ0EB1A104K	B	52.8/32.3
C41	4030011600	S.CER	C1608 JB 1E 104K-T	B	36.5/11.2
C42	4030017440	S.CER	ECJ0EC1H221J	B	42.1/11.2
C43	4030017620	S.CER	ECJ0EC1H100C	B	40.2/11.2
C51	4510007310	S.ELE	16 CE 10 BS	B	77.6/23.5
C52	4030017460	S.CER	ECJ0EB1E102K	B	70.1/24
C54	4030016930	S.CER	ECJ0EB1A104K	B	66.8/18.2
C81	4030017920	S.CER	ECJ0EB1A683K	B	85.3/11.1
C82	4030016790	S.CER	ECJ0EB1C103K	B	72.3/12
C83	4030016930	S.CER	ECJ0EB1A104K	B	23/36.5
C86	4030016930	S.CER	ECJ0EB1A104K	B	17.8/33.8
C87	4030017460	S.CER	ECJ0EB1E102K	B	11.6/36.9
C88	4030017460	S.CER	ECJ0EB1E102K	B	83.3/7.8
C89	4030017460	S.CER	ECJ0EB1E102K	B	82.1/10.9
C90	4030017460	S.CER	ECJ0EB1E102K	B	71.5/9.9
C91	4030016930	S.CER	ECJ0EB1A104K	B	22.7/51.6
C95	4030016930	S.CER	ECJ0EB1A104K	B	19.5/43.9
C101	4030017460	S.CER	ECJ0EB1E102K	B	17/15.6
C102	4030017460	S.CER	ECJ0EB1E102K	B	17/13.9
C103	4030017730	S.CER	ECJ0EB1E471K	B	23.3/14.6
C104	4030017460	S.CER	ECJ0EB1E102K	B	25.4/13.9
C111	4030017460	S.CER	ECJ0EB1E102K	B	7.4/15.7
C112	4030017460	S.CER	ECJ0EB1E102K	B	9/53
C113	4030017460	S.CER	ECJ0EB1E102K	B	48.6/7.2
C114	4030017730	S.CER	ECJ0EB1E471K	B	47.2/7.2
C121	4030016790	S.CER	ECJ0EB1C103K	B	81.5/17.2
C122	4030017420	S.CER	ECJ0EC1H470J	B	88.2/20.2
C123	4030017460	S.CER	ECJ0EB1E102K	B	87.5/22.1
C124	4030017420	S.CER	ECJ0EC1H470J	B	88.8/22.2
C125	4030017460	S.CER	ECJ0EB1E102K	B	87.5/25
C126	4030017420	S.CER	ECJ0EC1H470J	B	78.9/30.1
J2	6510018971	S.CNR	B4B-PH-SM4-TB (LF) (SN)	B	76.2/6.5
J3	6510022311	S.CNR	B5B-PH-SM4-TB (LF) (SN)	B	22.3/8
J4	6510021720	S.CNR	30FLT-SM1-TB	B	55.4/11.8
J5	6510021720	S.CNR	30FLT-SM1-TB	B	38.5/17.8
J6	6510019421	S.CNR	B8B-ZR-SM4-TF (LF) (SN)	B	84.5/24.6
DS1	5030002850	LCD	IS08328E00V1		
DS2	5040002310	S.LED	SML-311YTT86	T	69.9/11.8
DS3	5040002310	S.LED	SML-311YTT86	T	82.7/4.2
DS4	5040002310	S.LED	SML-311YTT86	T	54.6/11.8
DS5	5040002310	S.LED	SML-311YTT86	T	24/11.8
DS6	5040002310	S.LED	SML-311YTT86	T	39.3/11.8
DS7	5040002310	S.LED	SML-311YTT86	T	10.2/11.8

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

[LOGIC BOARD]

REF NO.	ORDER NO.	DESCRIPTION	M.	H/V LOCATION
DS8	5040003230	S.LED RY-SP110UHY24-5M <VKH>	T	85.7/50.9
DS9	5040003230	S.LED RY-SP110UHY24-5M <VKH>	T	10.5/50.9
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	85.7/42.2
DS13	5040003230	S.LED RY-SP110UHY24-5M <VKH>	T	10.5/42.2
EP2	8930066470	LCT SRCN-2852-SP-N-W		
EP81	6910012350	S.BEA MMZ1608Y 102BT	B	85.3/8.5
EP101	6910012350	S.BEA MMZ1608Y 102BT	B	22/14.6

[MAIN UNIT]

REF NO.	ORDER NO.	DESCRIPTION	M.	H/V LOCATION
IC1	1130007610	S.IC µPD3140GS-E1 (DS8)	T	58.6/30
IC2	1110003201	S.IC TA31136FNG (EL)	T	92.7/25.9
IC3	1150002081	IC RA35H1516M-21		
IC4	1130011770	S.IC CD4066BPWR	T	14.9/28.7
IC5	1130011770	S.IC CD4066BPWR	T	19.6/15
IC6	1130011770	S.IC CD4066BPWR	T	26.7/15.2
IC7	1110000960	S.IC NJM4558M-TE1	T	14/48.5
IC8	1110000960	S.IC NJM4558M-TE1	T	31.3/45.4
IC9	1110003091	IC LA4425A-E		
IC10	1180002780	REG KIA7805API U/P		
IC11	1120002830	S.IC NJM2125F-TE1	T	75.9/24.2
IC12	1110002400	S.IC NJM2107F-TE1	T	62.5/73.6
IC13	1110004490	S.IC M62429FP 700C	T	5.5/16
IC14	1110003091	IC LA4425A-E		
IC15	1110003650	S.IC NJM2211M-TE1	T	112.9/21.1
Q1	1530003900	S.TR KTC4075 BL-RTK/P	T	59.3/46.1
Q2	1590003580	S.TR KRC404 RTK/P	T	44.2/53.8
Q3	1530002601	S.TR 2SC4215-O (TE85R F)	T	64.3/45
Q4	1530002920	S.TR 2SC4226-T1 R25	T	54.9/45.4
Q5	1530002920	S.TR 2SC4226-T1 R25	T	50.7/47.1
Q6	1530002601	S.TR 2SC4215-O (TE85R F)	T	59.1/49.9
Q7	1530002601	S.TR 2SC4215-O (TE85R F)	T	64.9/57
Q10	1530002920	S.TR 2SC4226-T1 R25	T	50.6/74.4
Q12	1530002241	S.TR 2SC3775-3-TB-E	T	45.5/74.9
Q17	1590003580	S.TR KRC404 RTK/P	T	69.5/71.8
Q21	1580000540	S.FET 3SK131-T2-LA	T	110.6/51.7
Q22	1580000540	S.FET 3SK131-T2-LA	T	77.4/55.5
Q23	1530003890	S.TR KTC3880S Y-RTK/P	T	88/24.5
Q31	1530003900	S.TR KTC4075 BL-RTK/P	T	101.9/8
Q32	1530003900	S.TR KTC4075 BL-RTK/P	T	97.7/10.9
Q36	1560000810	S.FET 2SK1069-4-TL	T	25.1/27.6
Q37	1590000720	S.TR DTA144EUA T106	T	27.1/21.6
Q38	1530003900	S.TR KTC4075 BL-RTK/P	T	116.1/32.8
Q52	1590003580	S.TR KRC404 RTK/P	T	23.4/56.7
Q53	1510001090	S.TR KTA2015Y-RTK/P	T	27.2/59.8
Q54	1590003580	S.TR KRC404 RTK/P	T	27.2/56.7
Q55	1520000840	S.TR KTA1664Y-RTF/P	T	30.8/69.5
Q56	1530003900	S.TR KTC4075 BL-RTK/P	T	34.6/68.9
Q57	1510001090	S.TR KTA2015Y-RTK/P	T	23.4/59.8
Q61	1590003560	S.FET TPC6104 (TE85L F)	T	23.4/68.8
Q62	1590003580	S.TR KRC404 RTK/P	T	26.8/70.1
Q65	1530003091	S.TR 2SC4213-B (TE85R F)	T	4.3/23.8
D1	1790000620	S.DIO MA77 (TX)	T	50.1/58.1
D2	1790000620	S.DIO MA77 (TX)	T	53.4/57.6
D3	1750000711	S.VCP HVC350BTRF-E	T	51.9/53
D4	1750000711	S.VCP HVC350BTRF-E	T	51.9/51.7
D7	1790000620	S.DIO MA77 (TX)	T	62.7/66.8
D8	1790000620	S.DIO MA77 (TX)	T	72.8/60.7
D10	1750001340	S.DIO KDS160E RTK/P	T	65.4/71.4
D11	1750001340	S.DIO KDS160E RTK/P	T	75.6/77.1
D12	1790000691	S.DIO HSM88ASRTR-E	T	81.4/79.1
D13	1790000691	S.DIO HSM88ASRTR-E	T	82.9/74.4
D14	1710001080	DIO XB15A308		
D21	1710001080	DIO XB15A308		
D22	1750000581	S.DIO 1SV307 (TPH3 F)	T	116.8/55.1
D25	1750001190	S.VCP KDV214E RTK/P	T	110.7/58.7
D26	1750001190	S.VCP KDV214E RTK/P	T	101.8/58.5
D27	1750001190	S.VCP KDV214E RTK/P	T	96.1/58.5
D28	1750001190	S.VCP KDV214E RTK/P	T	86.9/61.2
D42	1790000700	DIO DSA3A1		
FI1	2030000350	MLH 21R15AB (FL-368)		
FI2	2030000481	MLH 21R15AB (FL-399A)		
FI3	2020002250	CER LT450EW <JJE>		
X1	6050012121	S.XTL CR-804A (21.250 MHz)	T	49/29.6
X2	6070000290	DCR JTB450C24 <JJE>		

[MAIN UNIT]

REF NO.	ORDER NO.	DESCRIPTION	M.	H/V LOCATION
L1	6200009560	S.COL MLG1608B R10J-T	T	66.2/45
L2	6200010840	S.COL MLG1608B 56NJ-T	T	61.4/42.8
L3	6200003091	S.COL NLV32T-2R7J	T	57.3/56.2
L4	6200008190	S.COL 0.25-1.9-8TL 80N	T	55.1/52.6
L6	6200009560	S.COL MLG1608B R10J-T	T	61.4/52.1
L7	6200009560	S.COL MLG1608B R10J-T	T	63/56.8
L11	6200011600	S.COL MLG1608B 82NJ-T	T	75.1/62.3
L12	6200009560	S.COL MLG1608B R10J-T	T	78.5/61.5
L14	6200005741	S.COL ELJRE 47NGFA	T	53.7/68.9
L15	6200002431	S.COL NLV25T-082J	T	50.4/71.6
L16	6200009620	S.COL MLG1608B 68NJ-T	T	43/75.4
L17	6200002601	S.COL NLV25T-047J	T	40.1/75.5
L18	6200002601	S.COL NLV25T-047J	T	39.5/81.4
L19	6110001670	COL LA-253		
L20	6170000230	COL LW-25		
L21	6110001600	COL LA-243		
L22	6110001600	COL LA-243		
L23	6200002861	S.COL NLV25T-4R7J	T	116.1/57.6
L31	6110001600	COL LA-243		
L35	6150003821	COL LS-440-LF		
L36	6150003821	COL LS-440-LF		
L38	6150003821	COL LS-440-LF		
L39	6150003821	COL LS-440-LF		
L42	6200010090	S.COL ELJND R82JF	T	77.4/52.8
R1	7030003440	S.RES ERJ3GEYJ 102 V (1 k)	T	65.8/27
R2	7030003440	S.RES ERJ3GEYJ 102 V (1 k)	T	65.8/28.3
R3	7030003440	S.RES ERJ3GEYJ 102 V (1 k)	T	65.8/29.6
R4	7030003440	S.RES ERJ3GEYJ 102 V (1 k)	T	65.8/24.4
R5	7030003680	S.RES ERJ3GEYJ 104 V (100 k)	T	65.8/25.7
R6	7030003380	S.RES ERJ3GEYJ 331 V (330)	T	65.8/32.2
R7	7030003440	S.RES ERJ3GEYJ 102 V (1 k)	T	61.9/35.2
R8	7030003200	S.RES ERJ3GEYJ 100 V (10)	T	60.1/35.2
R9	7030003480	S.RES ERJ3GEYJ 222 V (2.2 k)	T	58.8/35.2
R11	7030003380	S.RES ERJ3GEYJ 331 V (330)	T	51.3/32.5
R21	7030003440	S.RES ERJ3GEYJ 102 V (1 k)	T	58.4/44
R22	7030003440	S.RES ERJ3GEYJ 102 V (1 k)	T	44.3/47.6
R23	7030003640	S.RES ERJ3GEYJ 473 V (47 k)	T	44.3/50.4
R24	7030003440	S.RES ERJ3GEYJ 102 V (1 k)	T	53.9/59.2
R25	7030003320	S.RES ERJ3GEYJ 101 V (100)	T	41.2/55.2
R26	7030003600	S.RES ERJ3GEYJ 223 V (22 k)	T	40.4/41.7
R26	7030003620	S.RES ERJ3GEYJ 333 V (33 k)	T	40.4/41.7
R27	7030003600	S.RES ERJ3GEYJ 223 V (22 k)	T	44.2/43.1
R28	7030003680	S.RES ERJ3GEYJ 104 V (100 k)	T	41.4/43.1
R31	7030003400	S.RES ERJ3GEYJ 471 V (470)	T	66.2/47.9
R32	7030003660	S.RES ERJ3GEYJ 683 V (68 k)	T	64.9/47.9
R33	7030003360	S.RES ERJ3GEYJ 221 V (220)	T	68.3/37.3
R34	7030003240	S.RES ERJ3GEYJ 220 V (22)	T	68.9/35.3
R35	7030003360	S.RES ERJ3GEYJ 221 V (220)	T	67/37.3
R41	7030003410	S.RES ERJ3GEYJ 561 V (560)	T	56.7/58.9
R42	7030003550	S.RES ERJ3GEYJ 822 V (8.2 k)	T	54.8/47.3
R43	7030003550	S.RES ERJ3GEYJ 822 V (8.2 k)	T	50.8/49
R44	7030003320	S.RES ERJ3GEYJ 101 V (100)	T	59.2/48
R45	7030003390	S.RES ERJ3GEYJ 391 V (390)	T	56.2/48.6
R46	7030003350	S.RES ERJ3GEYJ 181 V (180)	T	52.8/47
R51	7030003420	S.RES ERJ3GEYJ 681 V (680)	T	61.4/53.4
R52	7030003660	S.RES ERJ3GEYJ 683 V (68 k)	T	58.6/52.1
R55	7030003320	S.RES ERJ3GEYJ 101 V (100)	T	63.4/52.7
R56	7030003610	S.RES ERJ3GEYJ 273 V (27 k)	T	64.3/54.8
R74	7030003480	S.RES ERJ3GEYJ 222 V (2.2 k)	T	73.2/57.4
R81	7030003440	S.RES ERJ3GEYJ 102 V (1 k)	T	71.2/60.4
R82	7030003270	S.RES ERJ3GEYJ 390 V (39)	T	59.6/66.8
R83	7030003480	S.RES ERJ3GEYJ 222 V (2.2 k)	T	57.6/67.6
R84	7030003390	S.RES ERJ3GEYJ 391 V (390)	T	56.3/68.9
R85	7030003200	S.RES ERJ3GEYJ 100 V (10)	T	50/68.2
R86	7030003560	S.RES ERJ3GEYJ 103 V (10 k)	T	52/68.9
R87	7030003560	S.RES ERJ3GEYJ 103 V (10 k)	T	51/77.3
R88	7030003320	S.RES ERJ3GEYJ 101 V (100)	T	49/76.6
R91	7030003480	S.RES ERJ3GEYJ 222 V (2.2 k)	T	45.9/69.8
R93	7030003240	S.RES ERJ3GEYJ 220 V (22)	T	42.6/70.5
R94	7030003240	S.RES ERJ3GEYJ 220 V (22)	T	43.9/70.5
R95	7030003440	S.RES ERJ3GEYJ 102 V (1 k)	T	46.7/72.5
R96	7030003270	S.RES ERJ3GEYJ 390 V (39)	T	45.9/81.3
R101	7030003320	S.RES ERJ3GEYJ 101 V (100)	T	60.8/77.7
R102	7030003600	S.RES ERJ3GEYJ 223 V (22 k)	T	63.6/76.4
R103	7030003460	S.RES ERJ3GEYJ 152 V (1.5 k)	T	67/72.7
R104	7030003600	S.RES ERJ3GEYJ 223 V (22 k)	T	71.6/78.3
R105	7030003320	S.RES ERJ3GEYJ 101 V (100)	T	61.6/69.5
R106	7510001651	S.TMR NTCG16 4BH 222JT	T	72.3/75
R107	7030003500	S.RES ERJ3GEYJ 332 V (3.3 k)	T	72.3/76.3
R108	7030003860	S.RES ERJ3GE JPW V	T	62.8/78.5
R111	7030003800	S.RES ERJ3GEYJ 105 V (1 M)	T	69.4/69.4
R112	7310005020	S.TRI RH03ADC14X (10 k)	T	73.8/69
R113	7030003540	S.RES ERJ3GEYJ 682 V (6.8 k)	T	78/69.5
R114	7030003450	S.RES ERJ3GEYJ 122 V (1.2 k)	T	77.6/78
R116	7030003390	S.RES ERJ3GEYJ 391 V (390)	T	74.3/75.5
R121	7030005420	S.RES ERJ3GEYJ 202 V (2 k)	T	84.4/82.1
R122	7030005420	S.RES ERJ3GEYJ 202 V (2 k)	T	83.1/82.1
R123	7030005420	S.RES ERJ3GEYJ 202 V (2 k)	T	88.5/74.4
R124	7030005420	S.RES ERJ3GEYJ 202 V (2 k)	T	86.5/75.2

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
R125	7030007990	S.RES	ERJ12YJ820U (82)	T	83.4/69.4
R126	7030003670	S.RES	ERJ3GEYJ 823 V (82 k)	T	105.4/93.6
R127	7030003720	S.RES	ERJ3GEYJ 224 V (220 k)	T	78.3/75.9
R128	7030003690	S.RES	ERJ3GEYJ 124 V (120 k)	T	78.3/73.1
R146	7030003680	S.RES	ERJ3GEYJ 104 V (100 k)	T	110.5/57.1
R147	7030003320	S.RES	ERJ3GEYJ 101 V (100)	T	106.4/57.4
R149	7030003680	S.RES	ERJ3GEYJ 104 V (100 k)	T	112.2/49.2
R150	7030003630	S.RES	ERJ3GEYJ 393 V (39 k)	T	111.2/55
R151	7030003640	S.RES	ERJ3GEYJ 473 V (47 k)	T	113.3/54.4
R152	7030003260	S.RES	ERJ3GEYJ 330 V (33)	T	111.6/46.6
R153	7030004050	S.RES	ERJ3GEYJ 1R0 V (1)	T	107.3/54.4
R154	7030003410	S.RES	ERJ3GEYJ 561 V (560)	T	107.3/55.9
R155	7030003680	S.RES	ERJ3GEYJ 104 V (100 k)	T	100/59.5
R171	7030003680	S.RES	ERJ3GEYJ 104 V (100 k)	T	94/61.6
R172	7030003680	S.RES	ERJ3GEYJ 104 V (100 k)	T	90.5/62.2
R173	7030003560	S.RES	ERJ3GEYJ 103 V (10 k)	T	98.7/59.5
R176	7030003820	S.RES	ERJ3GEYJ 155 V (1.5 M)	T	81.2/57.7
R177	7030003600	S.RES	ERJ3GEYJ 223 V (22 k)	T	79.9/61.9
R178	7030003560	S.RES	ERJ3GEYJ 103 V (10 k)	T	76.6/59.4
R179	7030003480	S.RES	ERJ3GEYJ 222 V (2.2 k)	T	115.7/61.2
R180	7030003250	S.RES	ERJ3GEYJ 270 V (27)	T	118.1/57.5
R181	7030003640	S.RES	ERJ3GEYJ 473 V (47 k)	T	79.9/57.7
R182	7030003200	S.RES	ERJ3GEYJ 100 V (10)	T	81/49.9
R183	7030003440	S.RES	ERJ3GEYJ 102 V (1 k)	T	79.5/48.6
R185	7030003460	S.RES	ERJ3GEYJ 152 V (1.5 k)	T	81.9/44.9
R201	7030003460	S.RES	ERJ3GEYJ 152 V (1.5 k)	T	84.9/27.6
R202	7030003400	S.RES	ERJ3GEYJ 471 V (470)	T	86.3/27.6
R203	7030003680	S.RES	ERJ3GEYJ 104 V (100 k)	T	84.2/25
R204	7030003460	S.RES	ERJ3GEYJ 152 V (1.5 k)	T	82.5/25
R205	7030003450	S.RES	ERJ3GEYJ 122 V (1.2 k)	T	96.7/30.9
R206	7030003390	S.RES	ERJ3GEYJ 391 V (390)	T	85.6/30.4
R208	7030003500	S.RES	ERJ3GEYJ 332 V (3.3 k)	T	87.3/18.4
R209	7030003460	S.RES	ERJ3GEYJ 152 V (1.5 k)	T	90.6/21
R211	7030003760	S.RES	ERJ3GEYJ 474 V (470 k)	T	96.3/21.8
R212	7030003430	S.RES	ERJ3GEYJ 821 V (820)	T	100.5/21.8
R213	7030003620	S.RES	ERJ3GEYJ 333 V (33 k)	T	101.9/21.8
R214	7310005040	S.TRI	RH03ADCJ4X (22 k)	T	99.6/26.1
R215	7510001671	S.TMR	NTCG16 4BH 103JT	T	103.3/24.6
R216	7030003480	S.RES	ERJ3GEYJ 222 V (2.2 k)	T	104.7/21.8
R217	7030003710	S.RES	ERJ3GEYJ 184 V (180 k)	T	104.7/24.6
R218	7030003580	S.RES	ERJ3GEYJ 153 V (15 k)	T	103.3/27.4
R219	7030003400	S.RES	ERJ3GEYJ 471 V (470)	T	103.3/30.2
R222	7030003540	S.RES	ERJ3GEYJ 682 V (6.8 k)	T	76.4/21.7
R223	7030003490	S.RES	ERJ3GEYJ 272 V (2.7 k)	T	78.3/24.3
R224	7030003560	S.RES	ERJ3GEYJ 103 V (10 k)	T	80.1/24.3
R225	7030003660	S.RES	ERJ3GEYJ 683 V (68 k)	T	79.3/18.7
R226	7030003570	S.RES	ERJ3GEYJ 123 V (12 k)	T	76.6/18.7
R231	7030003600	S.RES	ERJ3GEYJ 223 V (22 k)	T	104/13.7
R232	7030003580	S.RES	ERJ3GEYJ 153 V (15 k)	T	104/8.1
R233	7030003440	S.RES	ERJ3GEYJ 102 V (1 k)	T	102.6/13.7
R234	7030003760	S.RES	ERJ3GEYJ 474 V (470 k)	T	102.6/10.9
R235	7030003720	S.RES	ERJ3GEYJ 224 V (220 k)	T	105.4/10.9
R236	7030003380	S.RES	ERJ3GEYJ 331 V (330)	T	101.2/10.9
R237	7030003490	S.RES	ERJ3GEYJ 272 V (2.7 k)	T	99.8/10.9
R238	7030003620	S.RES	ERJ3GEYJ 333 V (33 k)	T	99.8/7.9
R239	7030003620	S.RES	ERJ3GEYJ 333 V (33 k)	T	97/7.9
R240	7030003480	S.RES	ERJ3GEYJ 222 V (2.2 k)	T	95.6/7.9
R241	7030003680	S.RES	ERJ3GEYJ 104 V (100 k)	T	13.8/23
R242	7030003680	S.RES	ERJ3GEYJ 104 V (100 k)	T	10.3/30.4
R244	7030003680	S.RES	ERJ3GEYJ 104 V (100 k)	T	16.6/23
R245	7030003680	S.RES	ERJ3GEYJ 104 V (100 k)	T	16.1/35.1
R246	7030003680	S.RES	ERJ3GEYJ 104 V (100 k)	T	10.3/29.1
R248	7030003800	S.RES	ERJ3GEYJ 105 V (1 M)	T	20.5/20.5
R249	7030003440	S.RES	ERJ3GEYJ 102 V (1 k)	T	28.9/29
R250	7030003800	S.RES	ERJ3GEYJ 105 V (1 M)	T	21.8/20.5
R251	7030003800	S.RES	ERJ3GEYJ 105 V (1 M)	T	22.7/22.5
R252	7030003680	S.RES	ERJ3GEYJ 104 V (100 k)	T	19.2/20.5
R253	7030003680	S.RES	ERJ3GEYJ 104 V (100 k)	T	17.9/20.5
R254	7030003800	S.RES	ERJ3GEYJ 105 V (1 M)	T	16.7/9.1
R256	7030003800	S.RES	ERJ3GEYJ 105 V (1 M)	T	19.3/9.1
R257	7030003490	S.RES	ERJ3GEYJ 272 V (2.7 k)	T	23.2/12
R258	7030003680	S.RES	ERJ3GEYJ 104 V (100 k)	T	20.6/9.1
R259	7030003680	S.RES	ERJ3GEYJ 104 V (100 k)	T	21.9/9.1
R262	7030003680	S.RES	ERJ3GEYJ 104 V (100 k)	T	27.7/10.4
R263	7030003800	S.RES	ERJ3GEYJ 105 V (1 M)	T	26.4/8.3
R264	7030003450	S.RES	ERJ3GEYJ 122 V (1.2 k)	T	32.8/11.8
R265	7030003520	S.RES	ERJ3GEYJ 472 V (4.7 k)	T	30.6/13.5
R266	7030003800	S.RES	ERJ3GEYJ 105 V (1 M)	T	30.3/20
R267	7030003800	S.RES	ERJ3GEYJ 105 V (1 M)	T	30.2/22.1
R268	7030003800	S.RES	ERJ3GEYJ 105 V (1 M)	T	31.6/20
R269	7030003680	S.RES	ERJ3GEYJ 104 V (100 k)	T	32.8/13.1
R271	7030003590	S.RES	ERJ3GEYJ 183 V (18 k)	T	113.4/36
R272	7030003620	S.RES	ERJ3GEYJ 333 V (33 k)	T	119/37.3
R273	7030003560	S.RES	ERJ3GEYJ 103 V (10 k)	T	116.2/37.3
R274	7030003560	S.RES	ERJ3GEYJ 103 V (10 k)	T	116.2/36
R275	7030003560	S.RES	ERJ3GEYJ 103 V (10 k)	T	116.2/30.8
R276	7030003440	S.RES	ERJ3GEYJ 102 V (1 k)	T	119/34.7
R277	7030003560	S.RES	ERJ3GEYJ 103 V (10 k)	T	119/33.4
R282	7030003760	S.RES	ERJ3GEYJ 474 V (470 k)	T	114.3/27.1
R283	7030003280	S.RES	ERJ3GEYJ 470 V (47)	T	107.9/24.3
R284	7030003680	S.RES	ERJ3GEYJ 104 V (100 k)	T	118.9/16.4

[MAIN UNIT]

REF NO.	ORDER NO.	DESCRIPTION		M.	H/V LOCATION
R285	7030003630	S.RES	ERJ3GEYJ 393 V (39 k)	T	118.9/20.3
R286	7030003580	S.RES	ERJ3GEYJ 153 V (15 k)	T	118.9/21.6
R287	7030003470	S.RES	ERJ3GEYJ 182 V (1.8 k)	T	118.9/22.9
R292	7030003790	S.RES	ERJ3GEYJ 824 V (820 k)	T	18.9/53.3
R293	7030005250	S.RES	ERJ3GEYF 103 V (10 k)	T	18.9/54.7
R294	7030003200	S.RES	ERJ3GEYJ 100 V (10)	T	34.1/49.3
R295	7030004760	S.RES	ERJ3GEYF 822 V (8.2 k)	T	17.7/56.8
R301	7030003680	S.RES	ERJ3GEYJ 104 V (100 k)	T	22.9/49.1
R302	7030003560	S.RES	ERJ3GEYJ 103 V (10 k)	T	22.9/50.5
R303	7030003480	S.RES	ERJ3GEYJ 222 V (2.2 k)	T	21.4/46.3
R304	7030003650	S.RES	ERJ3GEYJ 563 V (56 k)	T	18.5/47
R305	7030003680	S.RES	ERJ3GEYJ 104 V (100 k)	T	18.9/51.9
R306	7030003560	S.RES	ERJ3GEYJ 103 V (10 k)	T	18.5/45.6
R307	7030003540	S.RES	ERJ3GEYJ 682 V (6.8 k)	T	21.4/43.1
R308	7030003770	S.RES	ERJ3GEYJ 564 V (560 k)	T	18.5/43.1
R309	7030003680	S.RES	ERJ3GEYJ 104 V (100 k)	T	18.9/50.5
R311	7030003520	S.RES	ERJ3GEYJ 472 V (4.7 k)	T	18.5/40.3
R312	7030003610	S.RES	ERJ3GEYJ 273 V (27 k)	T	21.4/41.7
R313	7030003680	S.RES	ERJ3GEYJ 104 V (100 k)	T	25.7/41.7
R314	7030003590	S.RES	ERJ3GEYJ 183 V (18 k)	T	23.2/40.4
R315	7030003670	S.RES	ERJ3GEYJ 823 V (82 k)	T	28.5/40.3
R316	7030003670	S.RES	ERJ3GEYJ 823 V (82 k)	T	31.3/40.3
R317	7030003670	S.RES	ERJ3GEYJ 823 V (82 k)	T	34.1/41.7
R318	7030003680	S.RES	ERJ3GEYJ 104 V (100 k)	T	25.7/44.9
R319	7030003610	S.RES	ERJ3GEYJ 273 V (27 k)	T	27.2/51.9
R320	7030003800	S.RES	ERJ3GEYJ 105 V (1 M)	T	28.5/49.1
R321	7030003470	S.RES	ERJ3GEYJ 182 V (1.8 k)	T	25.7/49.1
R323	7030003560	S.RES	ERJ3GEYJ 103 V (10 k)	T	36.8/45.2
R324	7510001671	S.TMR	NTCG16 4BH 103JT	T	39.1/47.2
R325	7030003560	S.RES	ERJ3GEYJ 103 V (10 k)	T	36.5/47.2
R326	7030003580	S.RES	ERJ3GEYJ 153 V (15 k)	T	37.8/47.2
R327	7310005030	S.TRI	RH03ADCS4X (47 k)	T	36.9/38.4
R328	7030003550	S.RES	ERJ3GEYJ 822 V (8.2 k)	T	43.2/40.3
R353	7030003770	S.RES	ERJ3GEYJ 564 V (560 k)	T	9.1/70.6
R354	7030003580	S.RES	ERJ3GEYJ 153 V (15 k)	T	11.9/71.3
R355	7030003620	S.RES	ERJ3GEYJ 333 V (33 k)	T	7.4/70.6
R356	7030000100	S.RES	MCR10EZHJ 4.7 (4R7)	T	18.6/72.7
R382	7030003560	S.RES	ERJ3GEYJ 103 V (10 k)	T	21.5/59.5
R383	7030003440	S.RES	ERJ3GEYJ 102 V (1 k)	T	21.5/56.7
R384	7030003560	S.RES	ERJ3GEYJ 103 V (10 k)	T	25.3/59.5
R385	7030003440	S.RES	ERJ3GEYJ 102 V (1 k)	T	25.3/56.7
R386	7030003510	S.RES	ERJ3GEYJ 392 V (3.9 k)	T	36.5/68.3
R387	7030003510	S.RES	ERJ3GEYJ 392 V (3.9 k)	T	36.5/65.5
R413	7030003280	S.RES	ERJ3GEYJ 470 V (47)	T	33/30.1
R415	7030003280	S.RES	ERJ3GEYJ 470 V (47)	T	75.3/8.3
R416	7030003280	S.RES	ERJ3GEYJ 470 V (47)	T	74/15.4
R417	7030003280	S.RES	ERJ3GEYJ 470 V (47)	T	80.1/7.5
R423	7030003560	S.RES	ERJ3GEYJ 103 V (10 k)	T	8.5/27.8
R424	7030003680	S.RES	ERJ3GEYJ 104 V (100 k)	T	4.1/26
R431	7030003620	S.RES	ERJ3GEYJ 333 V (33 k)	T	6.2/24.3
R432	7030003560	S.RES	ERJ3GEYJ 103 V (10 k)	T	2.4/23.8
R433	7030000100	S.RES	MCR10EZHJ 4.7 (4R7)	T	7.8/31.9
R441	7030003640	S.RES	ERJ3GEYJ 473 V (47 k)	T	21/69.4
R442	7030003680	S.RES	ERJ3GEYJ 104 V (100 k)	T	22.9/71.3
R444	7030003860	S.RES	ERJ3GE JPW V	T	42.2/21.6
C1	4030016970	S.CER	ECJ0EB1C223K	T	65.8/30.9
C2	4030016790	S.CER	ECJ0EB1C103K	T	63/25.7
C3	4030016930	S.CER	ECJ0EB1A104K	T	63/24.4
C4	4550000510	S.TAN	TEESVA 1V 473M8R	T	61.8/37.7
C5	4550002980	S.TAN	TEESVA 1C 225M8R	T	55.4/37.7
C7	4030017460	S.CER	ECJ0EB1E102K	T	53.1/27.7
C11	4030017630	S.CER	ECJ0EC1H120J	T	51.1/35.1
C12	4610001590	S.TRI	TZC3R100A110R00	T	47.8/35.3
C13	4030017390	S.CER	ECJ0EC1H180J	T	51.3/33.8
C20	4030017460	S.CER	ECJ0EB1E102K	T	41.2/53.9
C21	4510007310	S.ELE	16 CE 10 BS	T	72.7/37.2
C22	4030016790	S.CER	ECJ0EB1C103K	T	56.2/43.2
C23	4030017460	S.CER	ECJ0EB1E102K	T	44.3/49
C24	4030017730	S.CER	ECJ0EB1E471K	T	44.2/56.4
C26	4030016790	S.CER	ECJ0EB1C103K	T	44.2/44.5
C27	4030017490	S.CER	C1608 JB 1A 105K-T	T	40.4/40.3
C29	4030017460	S.CER	ECJ0EB1E102K	T	49.8/55
C31	4030017730	S.CER	ECJ0EB1E471K	T	63.6/47.9
C32	4030017380	S.CER	ECJ0EC1H050B	T	62.3/49.6
C33	4030017400	S.CER	ECJ0EC1H220J	T	64.2/42.8
C34	4030017650	S.CER	ECJ0EC1H270J	T	62.4/45
C35	4030017650	S.CER	ECJ0EC1H270J	T	69.6/37.3
C36	4030017460	S.CER	ECJ0EB1E102K	T	66.1/35.3
C41	4030017420	S.CER	ECJ0EC1H470J	T	51.9/55.7
C42	4030017670	S.CER	ECJ0EC1H390J	T	51.9/54.3
C43	4550000550	S.TAN	TEESVA 1V 224M8R	T	59.9/56.9
C44	4030017460	S.CER	ECJ0EB1E102K	T	61.6/58.4
C45	4030009540	S.CER	C1608 CH 1H 1R5B-T	T	53.5/50.4
C46	4030009540	S.CER	C1608 CH 1H 1R5B-T	T	50.8/50.4
C47	4030017460	S.CER	ECJ0EB1E102K	T	53.5/49
C48	4030017730	S.CER	ECJ0EB1E471K	T	50.6/45.2
C49	4030017730	S.CER	ECJ0EB1E471K	T	57.2/46.6
C51	4030017540	S.CER	ECJ0EC1HR75B	T	56.2/50.4
C52	4030017730	S.CER	ECJ0EB1E471K	T	58.6/53.4

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
C55	4030006860	S.CER C1608 JB 1H 102K-T	T	65.4/52.2
C56	4030011770	S.CER C1608 CH 1H 060B-T	T	64.3/50.6
C57	4030006850	S.CER C1608 JB 1H 471K-T	T	65.4/53.5
C58	4030017400	S.CER ECJ0EC1H220J	T	65.4/59.2
C75	4030017460	S.CER ECJ0EB1E102K	T	74.6/58.9
C77	4030017380	S.CER ECJ0EC1H050B	T	77.1/61.5
C80	4030017460	S.CER ECJ0EB1E102K	T	43.4/77.4
C81	4030017460	S.CER ECJ0EB1E102K	T	58.3/69.6
C82	4030017460	S.CER ECJ0EB1E102K	T	56.3/71
C83	4030017420	S.CER ECJ0EC1H470J	T	55.6/66.8
C84	4030017390	S.CER ECJ0EC1H180J	T	55/68.9
C85	4030017390	S.CER ECJ0EC1H180J	T	52.5/74.5
C86	4030017460	S.CER ECJ0EB1E102K	T	48.7/74.4
C87	4030017420	S.CER ECJ0EC1H470J	T	49.2/77.8
C88	4030017460	S.CER ECJ0EB1E102K	T	49.2/78.9
C91	4030017390	S.CER ECJ0EC1H180J	T	50/69.6
C92	4030017460	S.CER ECJ0EB1E102K	T	39.1/56.7
C93	4030017460	S.CER ECJ0EB1E102K	T	43.4/78.7
C94	4030017360	S.CER ECJ0EC1H030B	T	45.9/71.1
C95	4030017460	S.CER ECJ0EB1E102K	T	46.2/77.4
C96	4030017420	S.CER ECJ0EC1H470J	T	46.2/78.7
C97	4030017730	S.CER ECJ0EB1E471K	T	46.2/80
C101	4030017400	S.CER ECJ0EC1H220J	T	43.1/72.5
C102	4030017390	S.CER ECJ0EC1H180J	T	41.4/78.2
C103	4030017670	S.CER ECJ0EC1H390J	T	40.1/78.2
C104	4030017390	S.CER ECJ0EC1H180J	T	41.4/81.8
C105	4030017460	S.CER ECJ0EB1E102K	T	60/75.7
C106	4030016930	S.CER ECJ0EB1A104K	T	64.4/78.5
C107	4030017460	S.CER ECJ0EB1E102K	T	65/74
C108	4030017460	S.CER ECJ0EB1E102K	T	60/72.9
C109	4510007310	S.ELE 16 CE 10 BS	T	56.2/74.7
C111	4030017420	S.CER ECJ0EC1H470J	T	69/82.6
C112	4030017730	S.CER ECJ0EB1E471K	T	71/82.1
C113	4030017460	S.CER ECJ0EB1E102K	T	72.3/82.1
C114	4030011600	S.CER C1608 JB 1E 104K-T	T	73.6/82.1
C115	4030011600	S.CER C1608 JB 1E 104K-T	T	59.1/79.7
C116	4030017620	S.CER ECJ0EC1H100C	T	57.8/79.7
C117	4030017440	S.CER ECJ0EC1H221J	T	61.1/80.5
C118	4510008110	S.ELE 16 CE 22 BS	T	68/78.3
C119	4030017460	S.CER ECJ0EB1E102K	T	66/69.3
C120	4030017460	S.CER ECJ0EB1E102K	T	69.4/68.1
C121	4010005500	CER HM60SJ CH 150J 500V		
C122	4030006860	S.CER C1608 JB 1H 102K-T	T	81.3/82.1
C123	4030006860	S.CER C1608 JB 1H 102K-T	T	85.2/75.2
C124	4010005500	CER HM60SJ CH 150J 500V		
C125	4030006860	S.CER C1608 JB 1H 102K-T	T	85.9/71.9
C126	4010005790	CER RT-HM60SK YB 102K 500V		
C127	4010008050	CER HM60SJ CH 180J 500V		
C128	4010005440	CER HM60SJ CH 060D 500V		
C129	4010008070	CER HM60SJ CH 220J 500V		
C130	4010005430	CER HM60SJ CH 050C 500V		
C132	4010005430	CER HM60SJ CH 050C 500V		
C133	4030017460	S.CER ECJ0EB1E102K	T	73/78.3
C134	4030016790	S.CER ECJ0EB1C103K	T	68.5/74
C136	4030017460	S.CER ECJ0EB1E102K	T	71.4/72.5
C138	4030006860	S.CER C1608 JB 1H 102K-T	T	83.2/76.8
C139	4030006860	S.CER C1608 JB 1H 102K-T	T	80.6/74.1
C140	4030017460	S.CER ECJ0EB1E102K	T	76.5/74.8
C142	4010007630	CER HM60SJ CH 270J 500V		
C148	4030017460	S.CER ECJ0EB1E102K	T	112.9/61.6
C149	4030017530	S.CER ECJ0EC1H0R5B	T	113.2/58.3
C150	4030006860	S.CER C1608 JB 1H 102K-T	T	120.7/58.2
C151	4030007010	S.CER C1608 CH 1H 100D-T	T	119.3/55.2
C152	4030007010	S.CER C1608 CH 1H 100D-T	T	120.6/55.2
C153	4030017380	S.CER ECJ0EC1H050B	T	113/51.5
C154	4030011770	S.CER C1608 CH 1H 060B-T	T	113.1/57.1
C155	4030017460	S.CER ECJ0EB1E102K	T	110.8/60.3
C156	4030016930	S.CER ECJ0EB1A104K	T	107.4/59.5
C157	4030017460	S.CER ECJ0EB1E102K	T	109.5/47.9
C158	4030006900	S.CER C1608 JB 1H 103K-T	T	113.3/55.8
C159	4030017460	S.CER ECJ0EB1E102K	T	111.6/47.9
C160	4030016930	S.CER ECJ0EB1A104K	T	109.8/55
C161	4030017370	S.CER ECJ0EC1H3R5B	T	102.6/55.7
C162	4030011770	S.CER C1608 CH 1H 060B-T	T	103.4/57.8
C163	4030017460	S.CER ECJ0EB1E102K	T	102.1/60.5
C164	4030017360	S.CER ECJ0EC1H030B	T	102.2/54.4
C165	4030017460	S.CER ECJ0EB1E102K	T	95.5/60.3
C173	4030011770	S.CER C1608 CH 1H 060B-T	T	93.9/57.5
C174	4030017570	S.CER ECJ0EC1H040B	T	96/56.8
C175	4030017530	S.CER ECJ0EC1H0R5B	T	92.6/57.5
C176	4030017540	S.CER ECJ0EC1HR75B	T	91.5/59.5
C177	4030017360	S.CER ECJ0EC1H030B	T	87/59.5
C178	4030011770	S.CER C1608 CH 1H 060B-T	T	89.1/60.3
C179	4030016930	S.CER ECJ0EB1A104K	T	88.4/63
C180	4030006860	S.CER C1608 JB 1H 102K-T	T	115.7/59.9
C181	4030006860	S.CER C1608 JB 1H 102K-T	T	119.4/58.2
C182	4030017460	S.CER ECJ0EB1E102K	T	81.7/52.1
C183	4030017380	S.CER ECJ0EC1H050B	T	81.2/54.9
C184	4030016790	S.CER ECJ0EB1C103K	T	81.2/61.9
C185	4030017380	S.CER ECJ0EC1H050B	T	76.9/51.2
C186	4030017500	S.CER ECJ0EC1H560J	T	78.2/49.9

[MAIN UNIT]

REF NO.	ORDER NO.	DESCRIPTION	M.	H/V LOCATION
C187	4030016930	S.CER ECJ0EB1A104K	T	79.8/53.2
C188	4030017460	S.CER ECJ0EB1E102K	T	79.7/51.2
C189	4030017460	S.CER ECJ0EB1E102K	T	81/46.9
C193	4030011770	S.CER C1608 CH 1H 060B-T	T	82.4/37.4
C195	4030017460	S.CER ECJ0EB1E102K	T	82.5/27.6
C202	4030016970	S.CER ECJ0EB1C223K	T	89.1/27.6
C203	4030017460	S.CER ECJ0EB1E102K	T	85.6/25.1
C204	4030016790	S.CER ECJ0EB1C103K	T	87.7/27.6
C205	4030017430	S.CER ECJ0EC1H101J	T	93.9/30.7
C207	4030017460	S.CER ECJ0EB1E102K	T	88.6/19.9
C208	4510007310	S.ELE 16 CE 10 BS	T	86.7/34.9
C209	4030016790	S.CER ECJ0EB1C103K	T	88.3/30.9
C210	4030017460	S.CER ECJ0EB1E102K	T	101.5/33.8
C211	4030017450	S.CER ECJ0EB1E271K	T	97.7/22.2
C212	4030017450	S.CER ECJ0EB1E271K	T	99.1/21.9
C213	4030017460	S.CER ECJ0EB1E102K	T	99.5/30.9
C214	4030016930	S.CER ECJ0EB1A104K	T	102.8/33.8
C215	4030017490	S.CER C1608 JB 1A 105K-T	T	93.3/21
C216	4030016930	S.CER ECJ0EB1A104K	T	96.3/24.6
C217	4030017400	S.CER ECJ0EC1H220J	T	103.3/21.8
C218	4030016930	S.CER ECJ0EB1A104K	T	104.7/27.4
C219	4030017460	S.CER ECJ0EB1E102K	T	104.7/30.2
C220	4030017460	S.CER ECJ0EB1E102K	T	96.3/28.5
C221	4030018890	S.CER ECJ0EB0J224K	T	91.1/30.9
C222	4030018890	S.CER ECJ0EB0J224K	T	73.4/22.2
C223	4030016930	S.CER ECJ0EB1A104K	T	73.4/25
C231	4030018890	S.CER ECJ0EB0J224K	T	104/16.5
C232	4030016930	S.CER ECJ0EB1A104K	T	105.4/13.7
C233	4030016970	S.CER ECJ0EB1C223K	T	104/10.9
C234	4030016970	S.CER ECJ0EB1C223K	T	105.4/8.1
C235	4510007310	S.ELE 16 CE 10 BS	T	108.6/9.5
C236	4030017760	S.CER ECJ0EB1H222K	T	98.4/7.9
C237	4030018820	S.CER ECJ0EB1H561K	T	95.6/10.9
C238	4510007280	S.ELE 50 CE 2R2 BS	T	91.8/9.9
C241	4510007280	S.ELE 50 CE 2R2 BS	T	20.8/26.9
C247	4030016790	S.CER ECJ0EB1C103K	T	102.6/16.5
C248	4030017490	S.CER C1608 JB 1A 105K-T	T	29.3/30.4
C249	4030018890	S.CER ECJ0EB0J224K	T	23.9/24.8
C250	4030017490	S.CER C1608 JB 1A 105K-T	T	24.5/9.8
C251	4030016790	S.CER ECJ0EB1C103K	T	23.2/9.1
C262	4030017460	S.CER ECJ0EB1E102K	T	23.2/16.1
C263	4510007280	S.ELE 50 CE 2R2 BS	T	31.6/8.7
C264	4030018890	S.CER ECJ0EB0J224K	T	30.3/16.7
C265	4510007280	S.ELE 50 CE 2R2 BS	T	34/16.2
C271	4030016930	S.CER ECJ0EB1A104K	T	113.4/37.3
C272	4030017790	S.CER ECJ0EB1E682K	T	119/36
C273	4030016790	S.CER ECJ0EB1C103K	T	113.5/34.7
C274	4030016970	S.CER ECJ0EB1C223K	T	116.2/34.7
C275	4030017760	S.CER ECJ0EB1H222K	T	119/30.8
C276	4030017790	S.CER ECJ0EB1E682K	T	119/32.1
C281	4030016930	S.CER ECJ0EB1A104K	T	116.2/29.5
C282	4030018890	S.CER ECJ0EB0J224K	T	111.5/27.1
C284	4030016930	S.CER ECJ0EB1A104K	T	108.7/27.1
C285	4510007310	S.ELE 16 CE 10 BS	T	110.3/30.3
C286	4340000310	S.MLR ECHU 1C 333JX5	T	119/26.1
C287	4030017760	S.CER ECJ0EB1H222K	T	118.9/15.1
C288	4030016930	S.CER ECJ0EB1A104K	T	118.9/19
C289	4030016790	S.CER ECJ0EB1C103K	T	118.9/17.7
C291	4510007310	S.ELE 16 CE 10 BS	T	13.9/55.1
C292	4030016790	S.CER ECJ0EB1C103K	T	29.9/55.5
C293	4030017460	S.CER ECJ0EB1E102K	T	29.7/54
C301	4030016930	S.CER ECJ0EB1A104K	T	22.9/51.9
C302	4030016790	S.CER ECJ0EB1C103K	T	22.9/47.7
C303	4030017450	S.CER ECJ0EB1E271K	T	18.5/48.4
C304	4030016790	S.CER ECJ0EB1C103K	T	10.2/50.5
C305	4030016930	S.CER ECJ0EB1A104K	T	21.4/44.9
C306	4030017630	S.CER ECJ0EC1H120J	T	18.5/41.7
C311	4030018900	S.CER ECJ0EB0J474K	T	22.8/39.3
C312	4030017740	S.CER ECJ0EB1E821K	T	28.8/41.7
C313	4030017780	S.CER ECJ0EB1E472K	T	31.3/41.7
C314	4030017500	S.CER ECJ0EC1H560J	T	36.9/41.9
C315	4030016790	S.CER ECJ0EB1C103K	T	31.5/49.1
C316	4510007310	S.ELE 16 CE 10 BS	T	32.9/52.4
C317	4030011810	S.CER C1608 JB 1A 224K-T	T	25.7/50.5
C318	4030017420	S.CER ECJ0EC1H470J	T	28.5/50.5
C322	4030017490	S.CER C1608 JB 1A 105K-T	T	25/43.5
C323	4030017790	S.CER ECJ0EB1E682K	T	36.8/43.3
C331	4030016790	S.CER ECJ0EB1C103K	T	51.5/4.4
C332	4030017460	S.CER ECJ0EB1E102K	T	42.1/7.1
C333	4030006900	S.CER C1608 JB 1H 103K-T	T	42.1/5.8
C334	4030017400	S.CER ECJ0EC1H220J	T	63.7/21.7
C335	4030017460	S.CER ECJ0EB1E102K	T	65/21.7
C336	4030017460	S.CER ECJ0EB1E102K	T	67.5/12.7
C337	4030017400	S.CER ECJ0EC1H220J	T	53.2/4.7
C338	4030017460	S.CER ECJ0EB1E102K	T	68.7/24.4
C339	4030017420	S.CER ECJ0EC1H470J	T	68.7/25.7
C340	4030017420	S.CER ECJ0EC1H470J	T	68.7/28.3
C341	4030017420	S.CER ECJ0EC1H470J	T	68.7/29.6
C342	4030017460	S.CER ECJ0EB1E102K	T	38/13.5
C343	4030017460	S.CER ECJ0EB1E102K	T	40.2/7.1
C344	4030017730	S.CER ECJ0EB1E471K	T	17.3/75.4

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
C345	4030017730	S.CER ECJ0EB1E471K	T	16/73.9
C346	4030017460	S.CER ECJ0EB1E102K	T	50.4/7.5
C347	4030017680	S.CER ECJ0EC1H820J	T	50.4/6.2
C348	4030017680	S.CER ECJ0EC1H820J	T	42.2/15.2
C349	4030017460	S.CER ECJ0EB1E102K	T	42.2/13.9
C351	4030016790	S.CER ECJ0EB1C103K	T	10.3/70
C353	4030017490	S.CER C1608 JB 1A 105K-T	T	5/72.8
C354	4030017460	S.CER ECJ0EB1E102K	T	4.1/74.3
C355	4510009450	ELE 16 WA 470M (8X9)		
C356	4510004591	ELE 16 ME 470 HC+TS		
C357	4030011600	S.CER C1608 JB 1E 104K-T	T	18.6/74.9
C358	4030017420	S.CER ECJ0EC1H470J	T	4.1/77.7
C359	4030017420	S.CER ECJ0EC1H470J	T	5.4/77.7
C360	4030017460	S.CER ECJ0EB1E102K	T	9.2/61.9
C361	4030017460	S.CER ECJ0EB1E102K	T	10.6/61.9
C367	4030017460	S.CER ECJ0EB1E102K	T	35.6/78.5
C368	4030017420	S.CER ECJ0EC1H470J	T	32.4/81.9
C369	4510006021	ELE 16 ME 2200 HC		
C370	4030011600	S.CER C1608 JB 1E 104K-T	T	19.3/66.8
C373	4030017400	S.CER ECJ0EC1H220J	T	54.6/82.6
C374	4030017400	S.CER ECJ0EC1H220J	T	39.3/72.9
C375	4030017430	S.CER ECJ0EC1H101J	T	38/72.9
C376	4030017730	S.CER ECJ0EB1E471K	T	36.7/72.9
C377	4030017420	S.CER ECJ0EC1H470J	T	5.4/80.5
C378	4030017460	S.CER ECJ0EB1E102K	T	4.1/80.5
C379	4030017430	S.CER ECJ0EC1H101J	T	34.3/78.5
C380	4030017730	S.CER ECJ0EB1E471K	T	34.6/81.9
C381	4510008120	S.ELE 16 CE 100 BS	T	4.5/56.3
C382	4030006900	S.CER C1608 JB 1H 103K-T	T	6.3/62.5
C383	4030011600	S.CER C1608 JB 1E 104K-T	T	5.7/65
C384	4030016930	S.CER ECJ0EB1A104K	T	7/67.8
C385	4030016790	S.CER ECJ0EB1C103K	T	5.7/67.8
C386	4510008120	S.ELE 16 CE 100 BS	T	14.8/61.8
C387	4030016930	S.CER ECJ0EB1A104K	T	30/58.9
C388	4030017460	S.CER ECJ0EB1E102K	T	22/61.6
C389	4510007310	S.ELE 16 CE 10 BS	T	24.9/63.8
C390	4030016930	S.CER ECJ0EB1A104K	T	32/56.4
C391	4030017460	S.CER ECJ0EB1E102K	T	30/60.2
C392	4510007310	S.ELE 16 CE 10 BS	T	32.8/63.8
C393	4510007310	S.ELE 16 CE 10 BS	T	39.6/65.6
C411	4030006900	S.CER C1608 JB 1H 103K-T	T	39.9/24.3
C412	4030017420	S.CER ECJ0EC1H470J	T	37.5/24.1
C421	4510007280	S.ELE 50 CE 2R2 BS	T	11.5/13.6
C422	4510007280	S.ELE 50 CE 2R2 BS	T	10/23.8
C423	4030016930	S.CER ECJ0EB1A104K	T	8.4/10.7
C424	4030017420	S.CER ECJ0EC1H470J	T	2.4/20.5
C425	4030017420	S.CER ECJ0EC1H470J	T	2/12.8
C431	4030018900	S.CER ECJ0EB0J474K	T	4/21.5
C432	4030017490	S.CER C1608 JB 1A 105K-T	T	5/27.8
C433	4030017460	S.CER ECJ0EB1E102K	T	4.1/29.3
C441	4030017460	S.CER ECJ0EB1E102K	T	26.8/67.9
C443	4510004591	ELE 16 ME 470 HC+TS		
C444	4510004591	ELE 16 ME 470 HC+TS		
C445	4030011600	S.CER C1608 JB 1E 104K-T	T	5.4/32.6
C446	4030017420	S.CER ECJ0EC1H470J	T	4.1/32.6
J2	6510015541	S.CNR B4B-ZR-SM4-TF (LF) (SN)	T	79.5/12.5
J3	6510015541	S.CNR B4B-ZR-SM4-TF (LF) (SN)	T	37.7/27.2
J4	6510021720	S.CNR 30FLT-SM1-TB	T	46/10.5
J5	6510021720	S.CNR 30FLT-SM1-TB	T	62.9/16.5
W1	7120000470	JMP ERDS2T0		
W2	9091201210	WIR 74/98/050/X99/X99		
W3	7120000470	JMP ERDS2T0		
W4	8900014020	CBL OPC-1439 <TJM>		
W5	8900014020	CBL OPC-1439 <TJM>		
W6	7120000470	JMP ERDS2T0		
EP2	9033003901	TUB IRRAX 1.0 (d) L=2 mm		
EP3	6910017290	TUB IRRAX 1.5 (d) L=30 mm		
EP341	6910014690	S.BEA MPZ1608S221A-T	T	9.9/63.9
EP342	6910014690	S.BEA MPZ1608S221A-T	T	9.8/66.1
EP441	6910014690	S.BEA MPZ1608S221A-T	T	9.4/34.1
EP442	6910014690	S.BEA MPZ1608S221A-T	T	7.4/35.7

[FRONT UNIT]

REF NO.	ORDER NO.	DESCRIPTION	M.	H/V LOCATION
MC1	0800007890	MIC HM-150B ACC <FG> [BLACK]		
	0800007900	MIC HM-150SW ACC <FG> [SW]		
W1	7120000470	JMP ERDS2T0		
W2	7120000470	JMP ERDS2T0		

[VR BOARD]

REF NO.	ORDER NO.	DESCRIPTION	M.	H/V LOCATION
R1	7210003220	VAR TP96N97A-15.7SK-10KB-2852		
W1	8900014010	CBL OPC-1442		

[SQL BOARD]

REF NO.	ORDER NO.	DESCRIPTION	M.	H/V LOCATION
R1	7210003150	VAR TP96N97-15SK-10KB-2685		

6-2 HM-150B/SW

[MAIN UNIT]

REF NO.	ORDER NO.	DESCRIPTION	M.	H/V LOCATION
R1	7010007590	RES 12K R20		
R2	7010007600	RES 6.8K R20		
R3	7010007610	RES 15K R20		
R4	7010007620	RES 33K R20		
C1	4030018660	S.CER 0.022 C1608 16V B	B	40.9/43.6
MC1	7700002640	MIC KUC3523-040245		
S1	2260002780	SW SKHHLPA010		
S2	2260002790	SW KHHAMA010		
S3	2260002790	SW KHHAMA010		
S4	2260002790	SW KHHAMA010		
W1	9027150010	W 71/98/010/X98/X98		
W2	9027150010	W 71/98/010/X98/X98		
W3	9027150020	W 24/00/020/W01/W01		
W4	9027150030	W 24/04/020/W01/W01		

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

SECTION 7 MECHANICAL PARTS AND DISASSEMBLY

7-1 IC-M422

[CHASSIS PARTS]

REF. NO.	ORDER NO.	DESCRIPTION		QTY.
J1	6510004880	Connector MR-DSE-01		1
W1	8900014000	Cable OPC-1405		1
W2	8900014090	Cable OPC-1489		1
MP1	8510016590	Case 2807 CASE	[black]	1
	8510016620	Case 2807 CASE (A)	[white]	1
MP2	8830001730	Screw ultra sert UD-45058 NI		2
MP4	8930055070	2438 sheet		1
MP5	8930064040	2807 R-packing seal		1
MP11	8010020100	2852 chassis		1
MP12	8930034300	1542 ANT seal		1
MP13	8810002950	Screw M3×6 SUS		2
MP14	8930064350	2807 R-bush plate		1
MP16	8930064390	2807 module plate		1
MP17	8510016700	2807 module cover		1
MP19	8810008660	Screw PH B0 3×8 NI-ZC3 (BT)		2
MP20	8950000180	Cable tie-80		1
MP21	8930066630	2852 IC clip		1
MP22	8930067170	2852 B-IC clip		1
MP23	8810008660	Screw PH BB0 3×8 NI-ZC3 (BT)		6
MP40	8810004540	Screw M3×8 SUS		4
MP41	8930064030	2807 F-packing seal		1
MP42	8810004700	Screw PH A0 3×16 SUS		4
MP47	8930049040	Isolating sheet (FQ)		1
MP48	8930055040	2438 cap		1

[FRONT UNIT]

REF. NO.	ORDER NO.	DESCRIPTION		QTY.
MC1	0800007890	Mocrophone HM-150B ACC	[black]	1
	0800007900	Mocrophone HM-150SW ACC	[white]	1
SP1	2510001240	Speaker 045P0803		1
MP1	8210021840	2807 front panel (B)	[black]	1
	8210021850	2807 front panel (C)	[white]	1
MP3	8930014280	SP net (FX-706)		1
MP4	8310063950	2807 window plate (B)		1
MP6	8110008230	2685 D-cover (A)		1
MP7	8930052010	2345 shaft		1
MP8	8930060470	2685 shaft angle		1
MP9	8930060481	2685 spring-1		1
MP10	8930066030	2807 keyboard (A)		1
MP21	8930052280	O-ring (AC)		2
MP22	8930060490	2685 F-bush plate		1
MP23	8930055840	2490 grounding spring		1
MP25	8810008660	Screw PH B0 3×8 NI-ZC3 (BT)		4
MP31	8610011370	Knob N-312	[black]	2
	8610012140	Knob N-312 (C)	[white]	2

[VR BOARD]

REF. NO.	ORDER NO.	DESCRIPTION	QTY.
W1	8900014010	Cable OPC-1442A	1

[LOGIC BOARD]

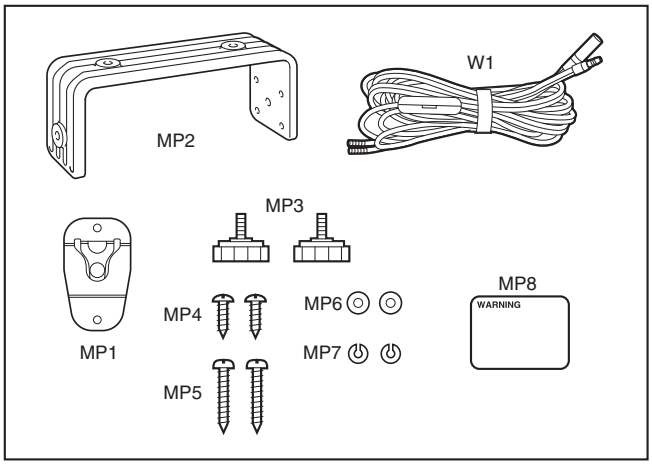
REF. NO.	ORDER NO.	DESCRIPTION	QTY.
DS1	5030002850	LCD IS08328E	1
EP2	8930066470	LCD contact SRCN-2852-SP-N-W	1
MP1	8930066230	2852 LCD holder	1
MP2	8210020990	2807 reflector	1
MP3	8930066400	2852 LCD filter	1
MP4	8930066390	2852 LCD sheet	1
MP5	8930064860	2807 sponge	1

[MAIN UNIT]

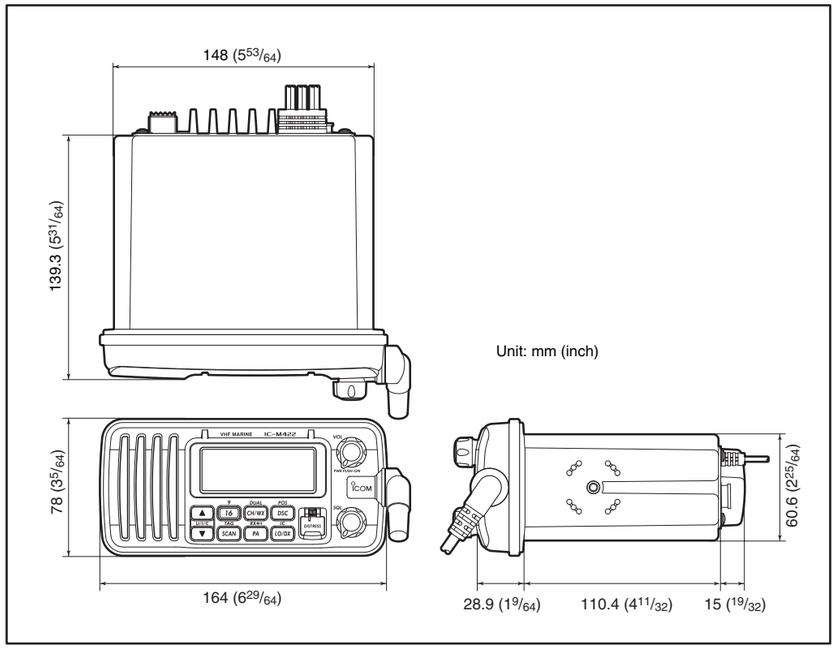
REF. NO.	ORDER NO.	DESCRIPTION	QTY.
W4	8900014020	Cable OPC-1439	1
W5	8900014020	Cable OPC-1439	1
MP1	8510014940	2601 VCO case	1
MP2	8510014950	2601 VCO cover	1
MP3	8930005320	Filter spacer	2

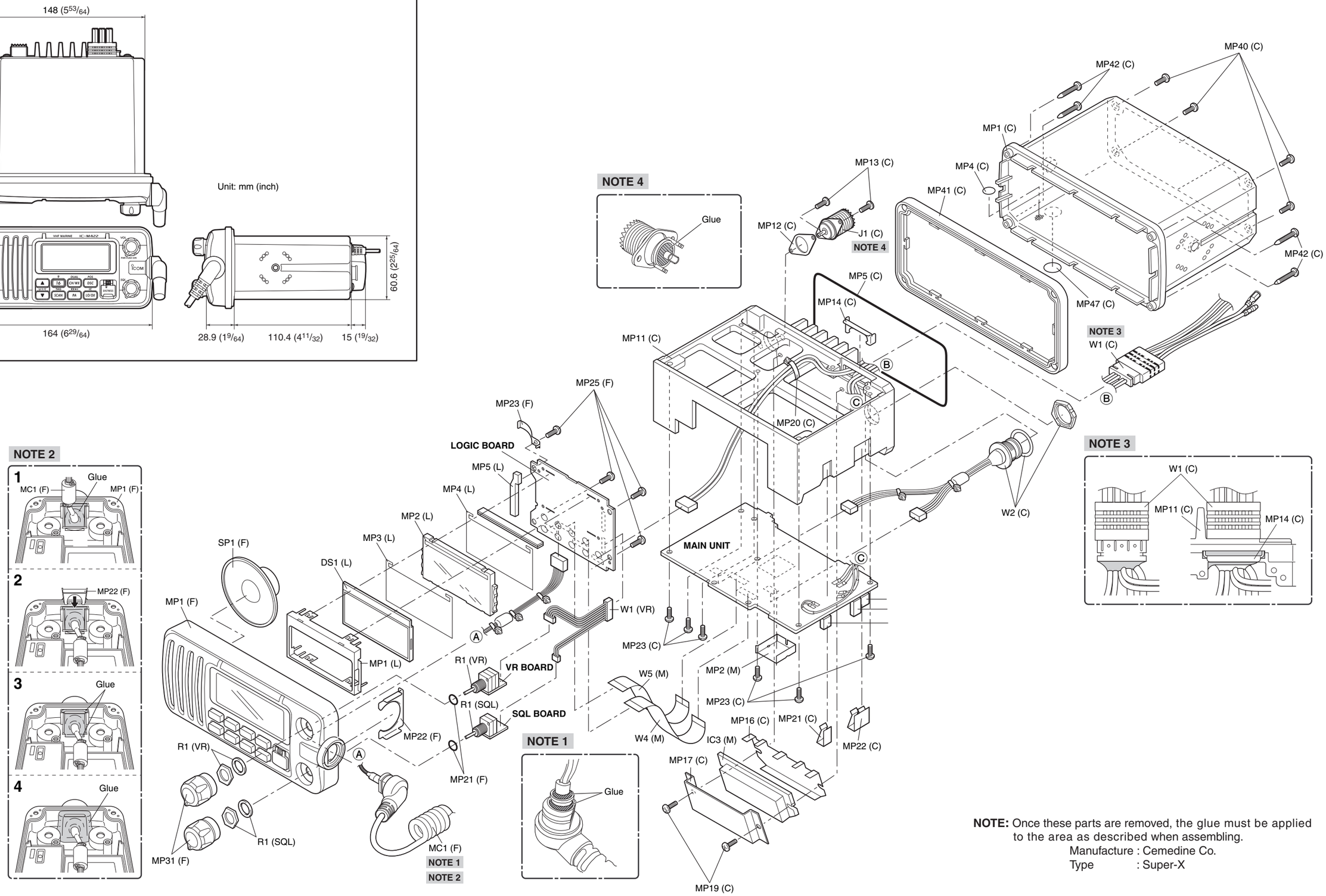
[ACCESSORIES]

REF. NO.	ORDER NO.	DESCRIPTION		QTY.
W1	Optional product	Cable OPC-891A		1
MP1	8950005110	2289 mic hanger		1
MP2	8010019790	2807 mobile bracket	[black]	1
	8010019810	2807 mobile bracket (A)	[white]	1
MP3	8610010561	2040 screw knob bolt-1	[black]	2
	8610011260	2040 screw knob bolt (B)-1	[white]	2
MP4	8810004700	Screw PH A0 3×16 SUS		2
MP5	8810001490	Screw PH A0 5×20 SUS		2
MP6	8850000180	Flat washer M5 SUS		2
MP7	8850000500	S-washer M5 SUS		2
MP8	8310050900	2438 caution seal		1



Screw abbreviations A0, B0, BT: Self-tapping
PH: Pan head
NI: Nickel
SUS: Stainless
NI-ZU: Nickel-Zinc



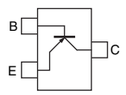
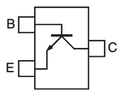
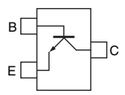
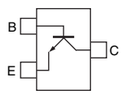
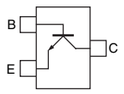
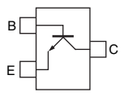
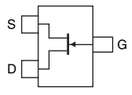
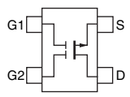
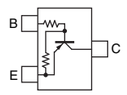
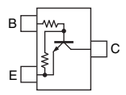
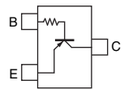
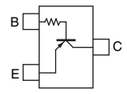
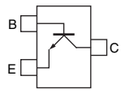
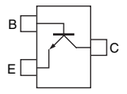
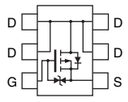


NOTE: Once these parts are removed, the glue must be applied to the area as described when assembling.
Manufacture : Cemedine Co.
Type : Super-X

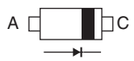
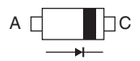
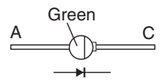
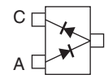
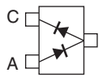
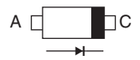
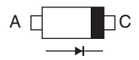
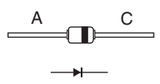
UNIT abbreviations (C): CHASSIS PARTS, (L): LOGIC BOARD, (M): MAIN UNIT, (F): FRONT UNIT
(VR): VR BOARD, (SQL): SQL BOARD

SECTION 8 SEMICONDUCTOR INFORMATION

• TRANSISTOR AND FET'S

2SA1576A (Symbol: FA) 	**2SC3775-3** (Symbol: OY3) 	**2SC4081-S** (Symbol: BS) 	**2SC4213-B** (Symbol: AB) 	**2SC4215-O** (Symbol: QO) 
2SC4226-R25 (Symbol: R25) 	**2SK1069-4-TL** (Symbol: FJ) 	**3SK131-T2-LA** (Symbol: V12) 	**DTA144 EUA** (Symbol: 16) 	**KRC404 RTK/P** (Symbol: ND) 
KTA1664V-RTF/P (Symbol: R) 	**KTA2015Y-RTK/P** (Symbol: Z) 	**KTC3880S Y-RTK/P** (Symbol: AQ) 	**KTC4075 BL-RTK/P** (Symbol: L) 	**TPC6104 (TE85L, F)** (Symbol: VS-6) 

• DIODES

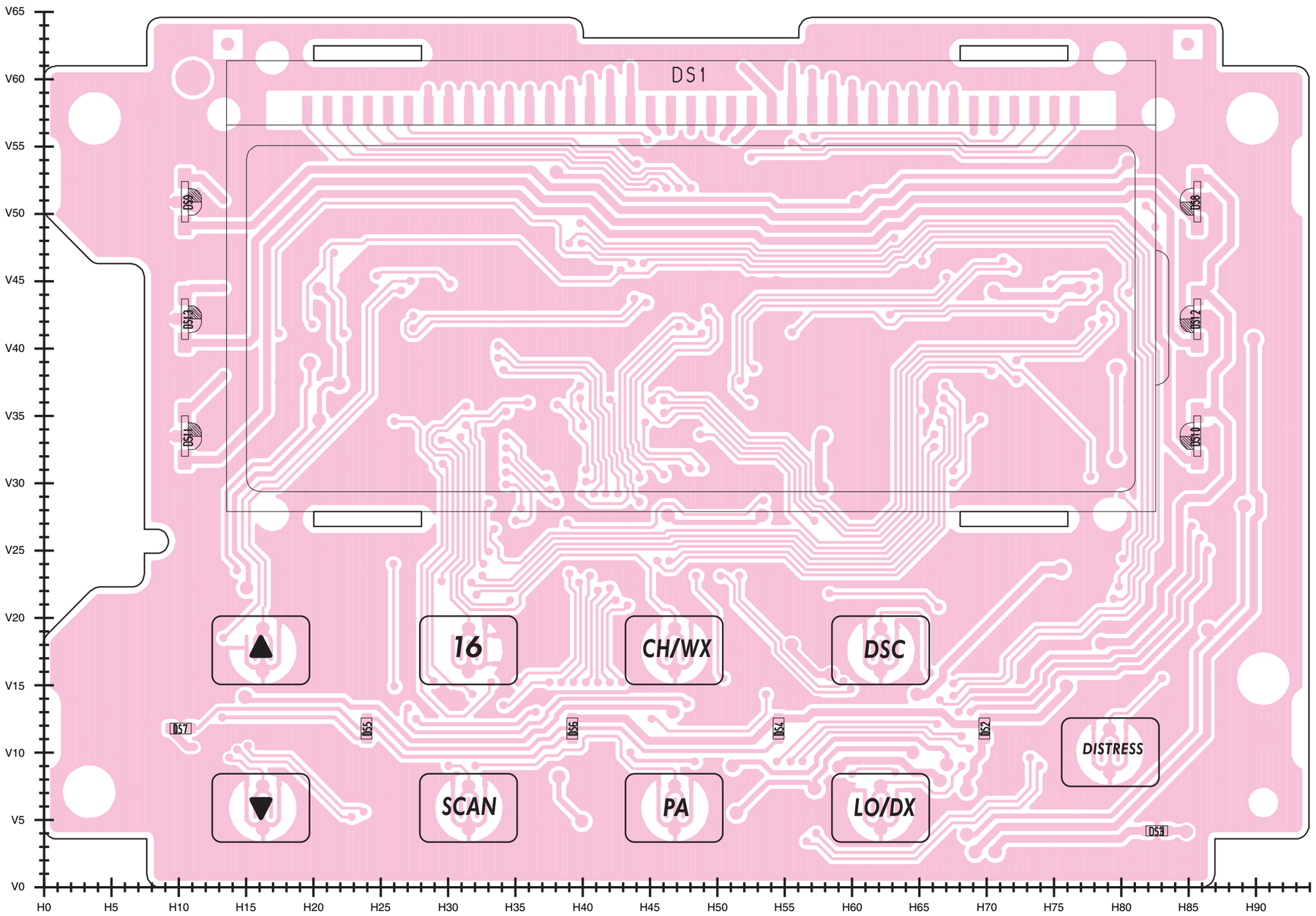
1SS355 (Symbol: A) 	**1SV307** (Symbol: TX) 	**DSA3A1** (Symbol: Green) 	**HSM88ASR** (Symbol: C3) 	**HVC350BTRF** (Symbol: B0) 
KDS122 RTK/P (Symbol: C3) 	**KDV214E RTK/P** (Symbol: UO) 	**MA2S111** (Symbol: A) 	**MA77** (Symbol: 4B) 	**MA8062-M** (Symbol: 6-2) 
L308CCB (Symbol: T8) 				

SECTION 9 BOARD LAYOUTS

The combination of this page and the next page shows the unit layout in the same configuration as the actual P.C. Board.

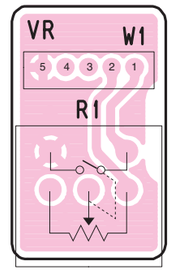
9-1 LOGIC BOARD

• TOP VIEW



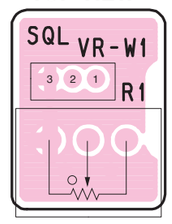
9-2 VR BOARD

• TOP VIEW



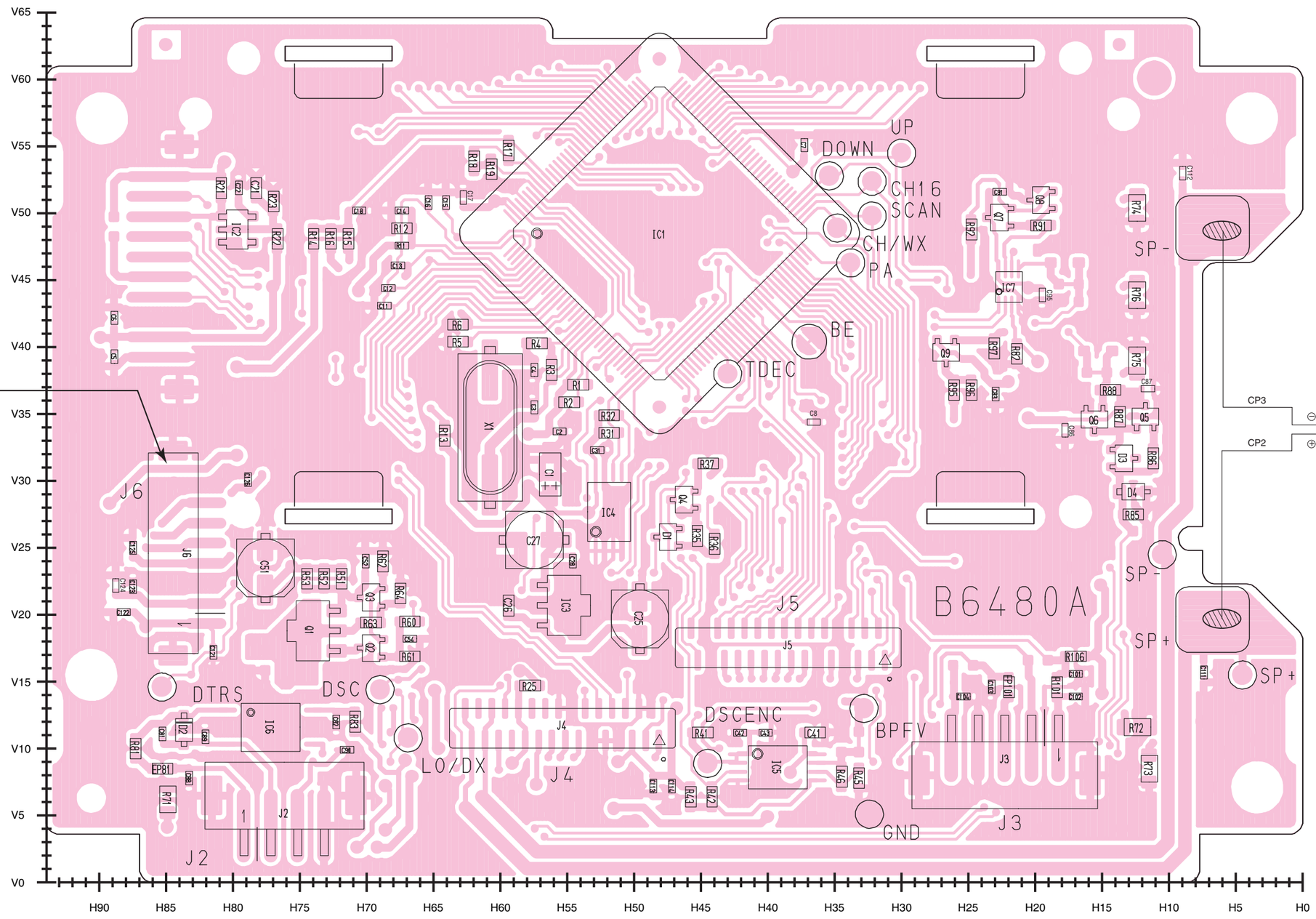
9-3 SQL BOARD

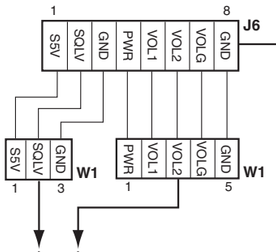
• TOP VIEW



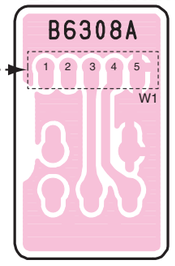
The combination of this page and the previous page shows the unit layout in the same configuration as the actual P.C. Board.

LOGIC BOARD
• BOTTOM VIEW

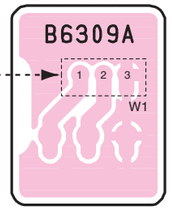


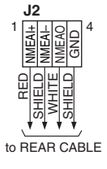


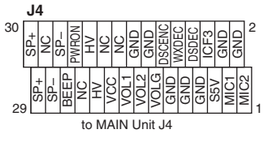
VR BOARD
• BOTTOM VIEW

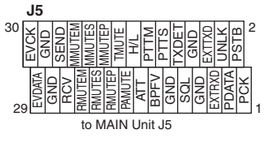


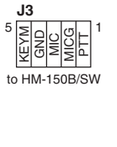
SQL BOARD
• BOTTOM VIEW

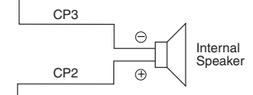






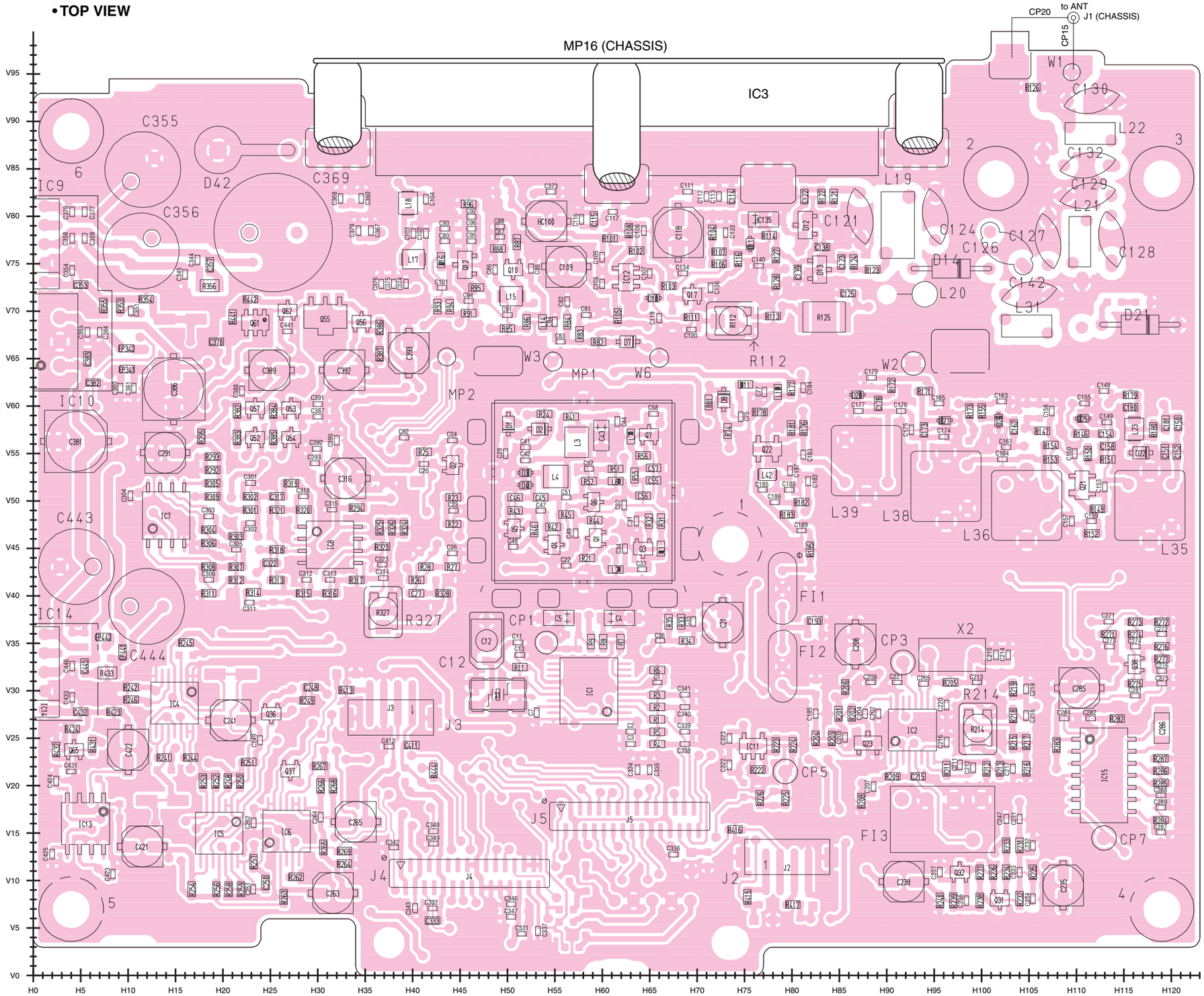




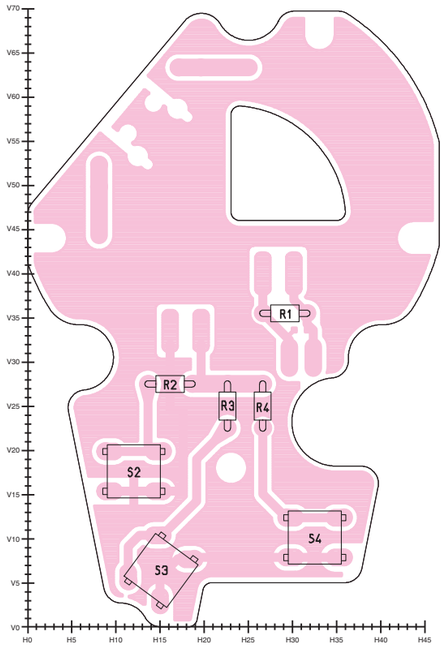


The combination of this page and the next page shows the unit layout in the same configuration as the actual P.C. Board.

9-4 MAIN BOARD
• TOP VIEW



9-5 HM-150B/SW
• TOP VIEW



J3

1			4
VCC	AF/MIC	MICG	PTTC

to W2 (CHASSIS)

J4

1														29
SP+	NC	SP-	PWRON	HV	NC	NC	GND	GND	DSCENC	WXDEC	DSDEC	ICF3	GND	GND
2														30
SP+	SP-	BEEP	NC	HV	VCC	VOL1	VOL2	VOLG	GND	GND	GND	SSV	MIC1	MIC2

to LOGIC Board J4

J5

1														29
EVCK	GND	SEND	MMUTEM	MMUTES	MMUTEP	TMUTE	H/L	PTTM	PTTS	TXDET	GND	EXTXD	UNLK	PSTB
2														30
EVDATA	GND	RCV	BEEP	RMUTEM	RMUTES	RMUTEP	PAMUTE	ATT	BPFV	SQL	GND	EXTRXD	PDATA	PCK

to LOGIC Board J5

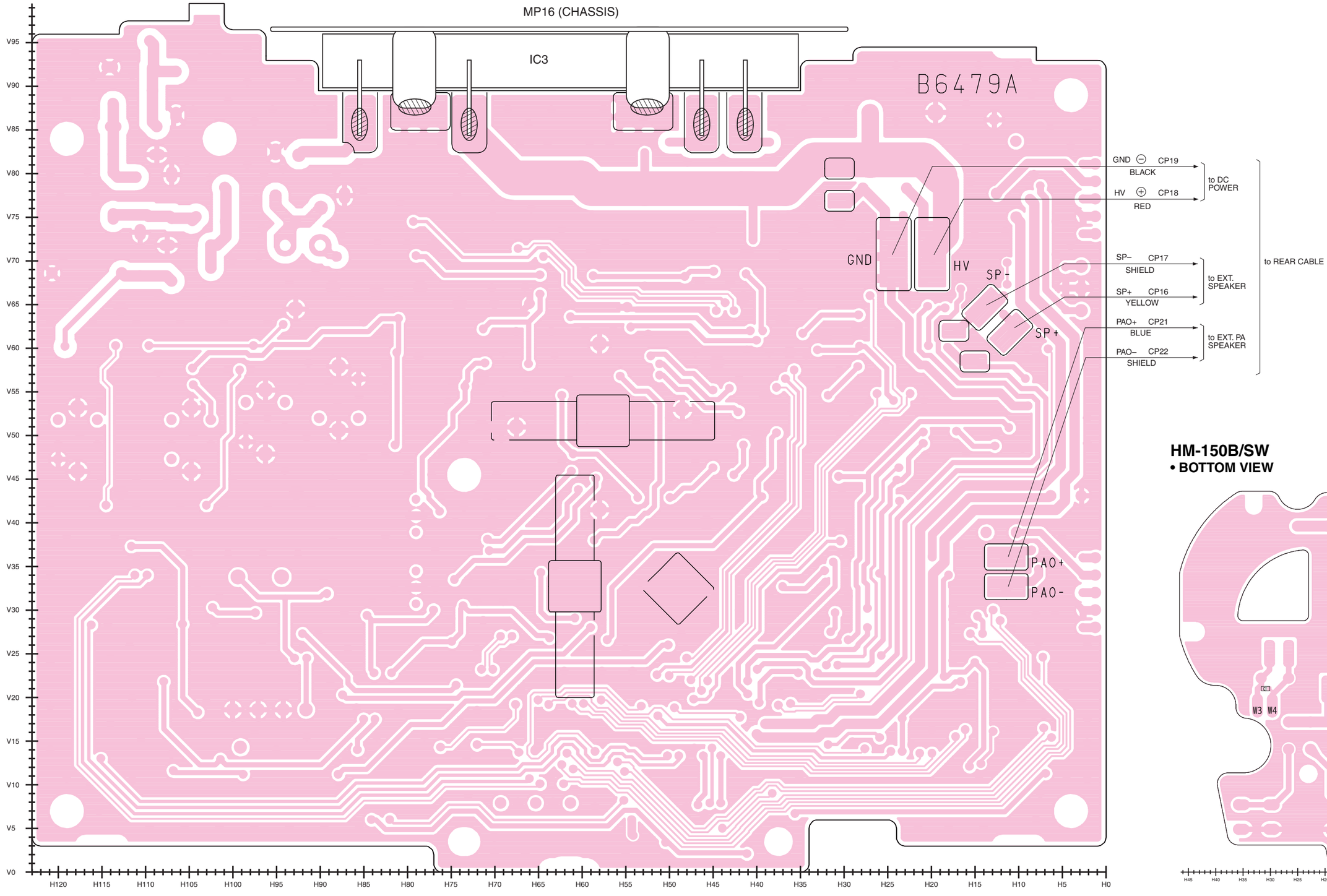
J2

1			4
EXTTXD	EXTRXD	ICF3	GND

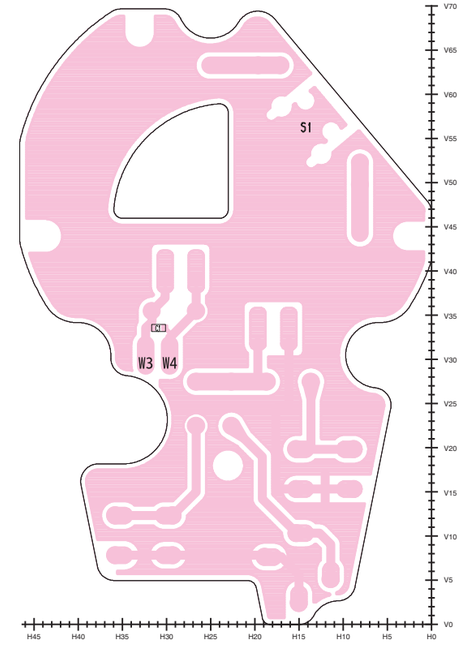
to W2 (CHASSIS)

MAIN BOARD
• BOTTOM VIEW

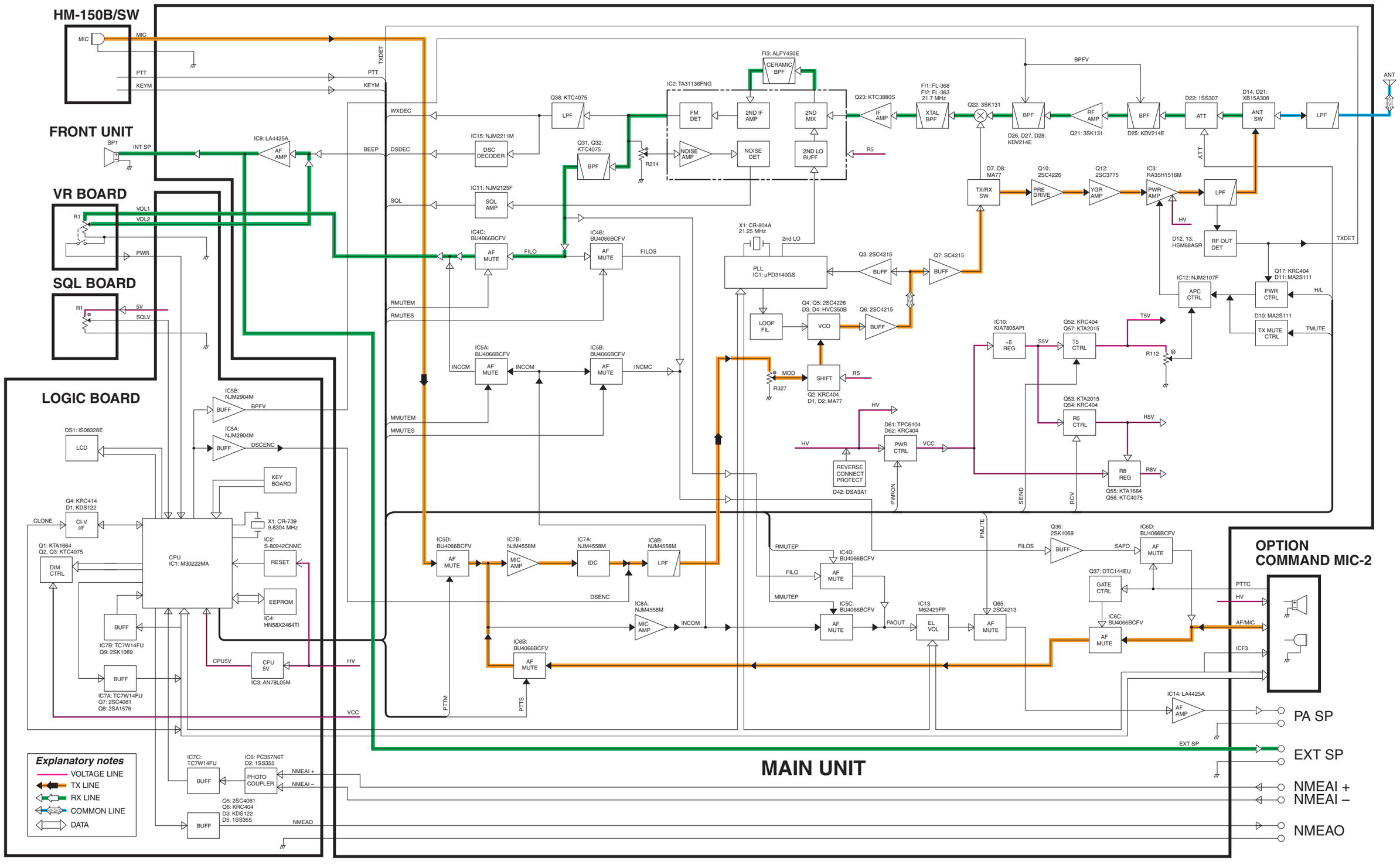
The combination of this page and the previous page shows the unit layout in the same configuration as the actual P.C. Board.



HM-150B/SW
• BOTTOM VIEW

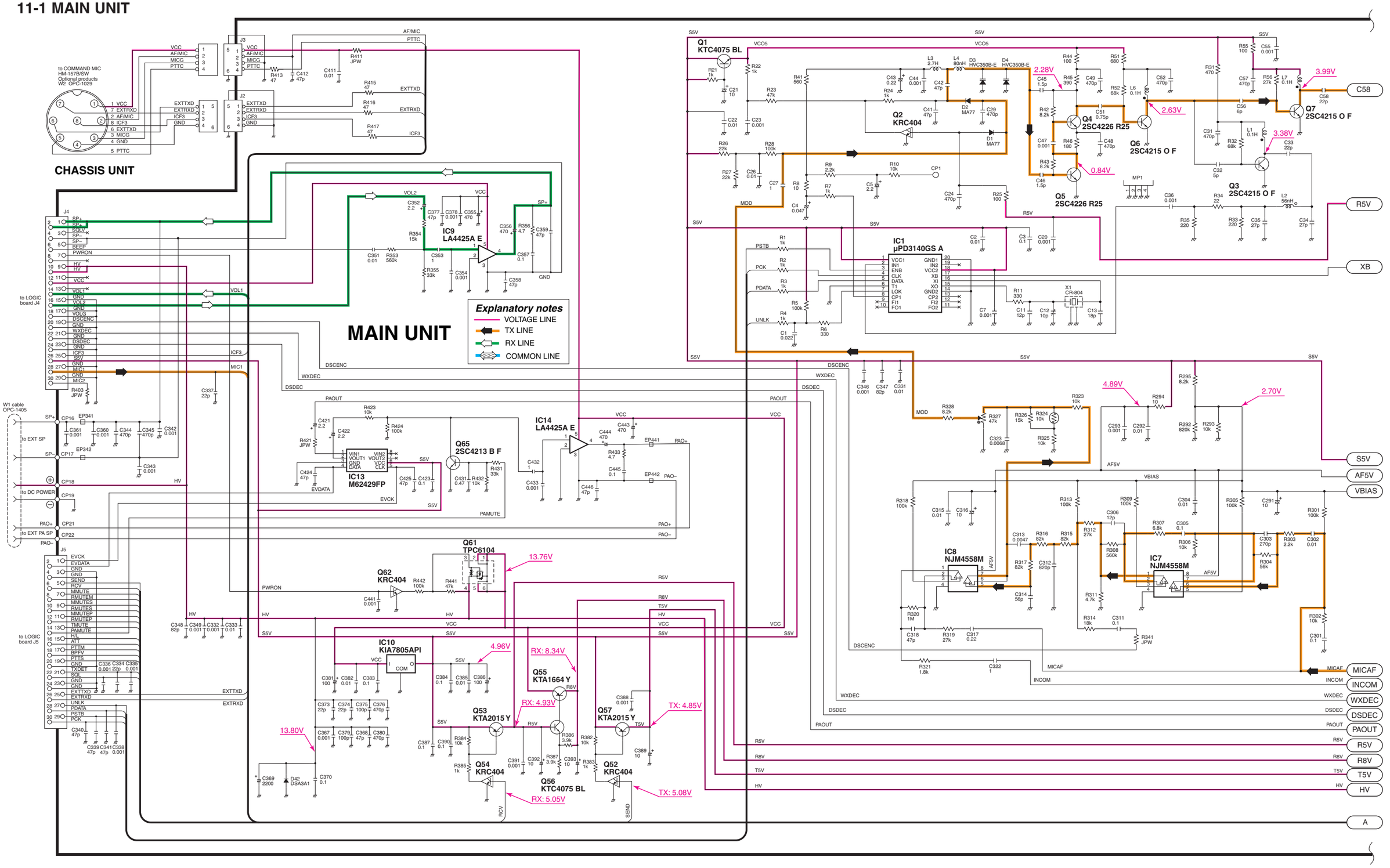


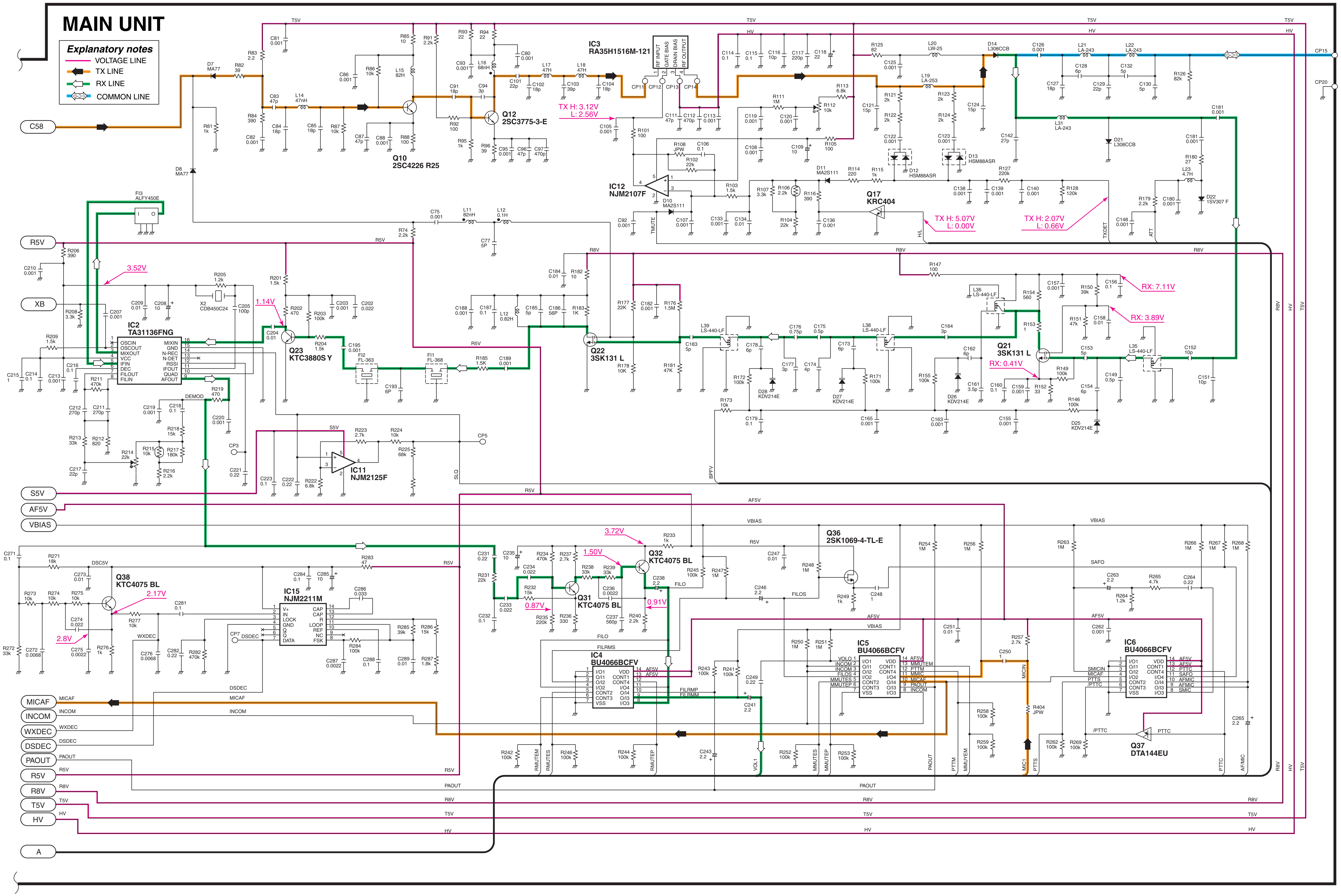
SECTION 10 BLOCK DIAGRAM



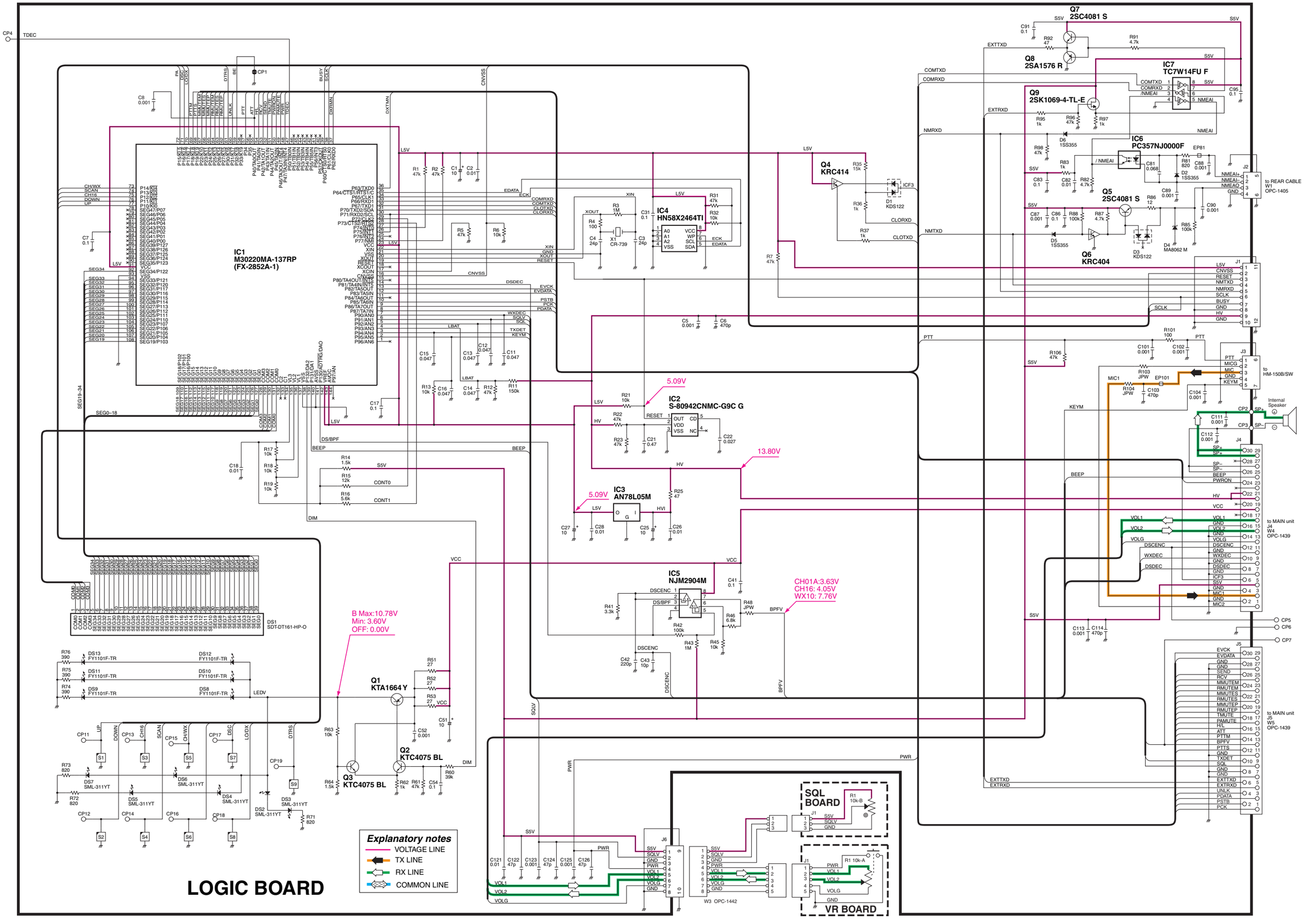
SECTION 11 VOLTAGE DIAGRAM

11-1 MAIN UNIT




MAIN UNIT
Explanatory notes
VOLTAGE LINE
TX LINE
RX LINE
COMMON LINE
IC3 RA35H1516M-121
Q10 2SC4226 R25
Q12 2SC3775-3-E
IC12 NJM2107F
Q17 KRC404
IC2 TA31136FNG
Q23 KTC3880S Y
Q22 3SK131 L
Q21 3SK131 L
IC11 NJM2125F
Q38 KTC4075 BL
IC15 NJM2211M
Q31 KTC4075 BL
Q32 KTC4075 BL
Q36 2SK1069-4-TL-E
IC4 BU4066BCFV
IC5 BU4066BCFV
IC6 BU4066BCFV
Q37 DTA144EU
TX H: 3.12V L: 2.56V
TX H: 5.07V L: 0.00V
TX H: 2.07V L: 0.66V
RX: 7.11V
RX: 3.89V
RX: 0.41V
3.52V
1.14V
3.72V
1.50V
0.87V
0.91V
2.17V
2.8V
C58
R5V
XB
S5V
AF5V
VBIAS
MICAF
INCOM
WXDEC
DSDEC
PAOUT
R8V
T5V
HV
A
CP15
CP20
to ANT

11-2 LOGIC BOARD



SECTION 12 HM-150B/SW

12-1 MECHANICAL PARTS AND DISASSEMBLY

[CHASSIS PARTS]

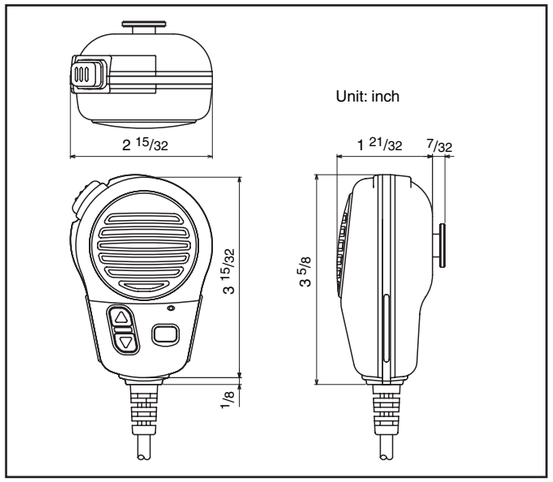
REF. NO.	ORDER NO.	DESCRIPTION		QTY.
W1	8900012212	Cable OPC-1249B	[HM-150B]	1
	8900013570	Cable OPC-1406	[HM-150SW]	1
MP1	8210020111	2715 front panel -1	[HM-150B]	1
	8210021061	2715 front panel (C)-1	[HM-150SW]	1
MP2	8210020120	2715 rear panel	[HM-150B]	1
	8210021240	2715 rear panel (C)	[HM-150SW]	1
MP3	8930060910	2715 key		1
MP4	8930060920	2715 PTT rubber		1
MP5	8930061970	2715 A-PTT holder		1
MP7	8930060930	2715 main seal		1
MP8	8930011600	2715 hanger knob		1
MP9	8610060951	2715 bush plate-1		1
MP10	8310060990	2715 MIC plate		1
MP11	8310061000	2715 MIC tape		1
MP12	8820061010	2715 A-MIC sheet		1
MP13	8850060960	O-ring (AY)		5
MP14	8930060970	O-ring (AZ)		1
MP15	8820001260	2715 screw 2.6 ×18 SUS		5
MP16	8810010230	Screw BiH M4 × 8 ZK		1
MP17	8850002000	Spring washer M4 SUS		1
MP19	8810010240	Screw PH B0 2 × 6 NI (BT)		3
MP20	8930061700	2715 PTT plate		1

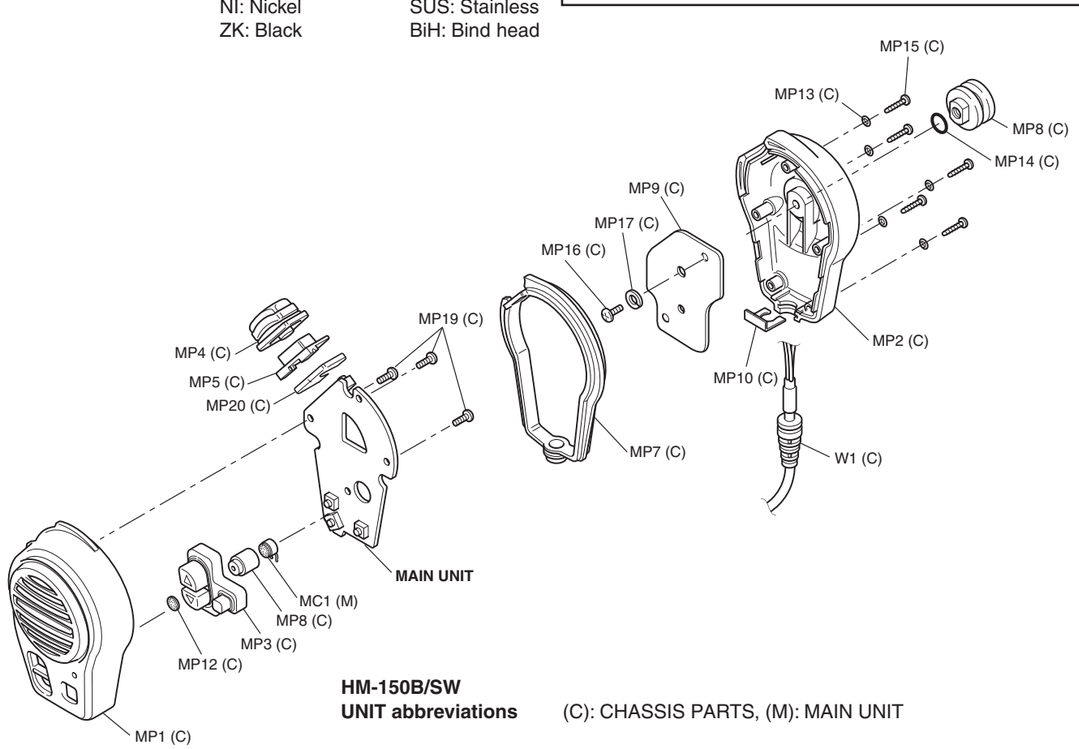
Screw and washer abbreviations

B0, BT: Self-Tapping PH: Pan head
NI: Nickel SUS: Stainless
ZK: Black BiH: Bind head

[MAIN PARTS]

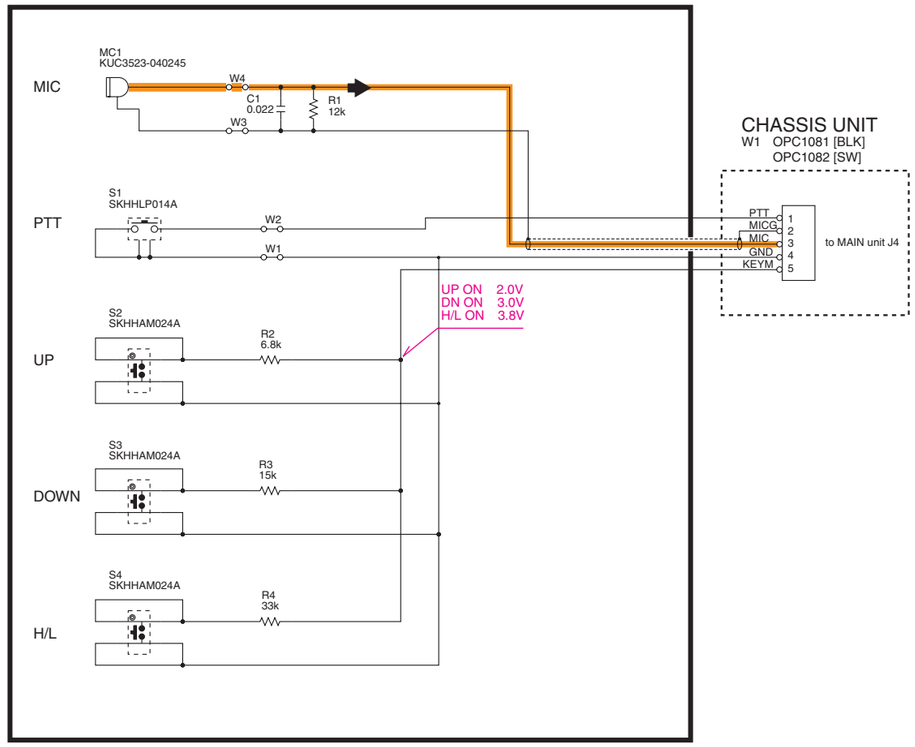
REF. NO.	ORDER NO.	DESCRIPTION	QTY.
MC1	7700002640	MIC KUC3523-040245	1





HM-150B/SW
UNIT abbreviations (C): CHASSIS PARTS, (M): MAIN UNIT

12-2 VOLTAGE DIAGRAM



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