



SERVICE MANUAL

VHF MARINE TRANSCEIVER

IC-M90
IC-M90E

INTRODUCTION

This service manual describes the latest service information for the **IC-M90** VHF MARINE TRANSCEIVER at the time of publication.

MODEL	VERSION	TX HI-POWER	FM I/S
IC-M90	USA	5 W	NO
	USA-1	5 W	YES
IC-M90E	EUR	5 W	NO
	UK	5 W	NO
	FRG	1 W (MARINE)	NO
5 W (PMR)			

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 7.5 V. Such a connection could cause a fire or electric hazard.

DO NOT expose the transceiver to rain, snow or any liquids.

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

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

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-M90 Main unit 5 pieces
8810009510 Screw BO 2x4 NlxZU (BT) IC-M90E Chassis 10 pieces

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

REPAIR NOTES

1. Make sure a 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 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.



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SECTION 1

SPECIFICATIONS

		IC-M90		IC-M90E			
		[USA], [USA-1]		[EUR], [UK]	[FRG]		
GENERAL	• Frequency coverage	TX	156.025–157.425 MHz [MARINE]	156.000–161.450 MHz [MARINE]			
		RX	156.050–163.275 MHz [MARINE]	156.000–163.425 MHz [MARINE]			
		TX/RX	146.000–174.000 MHz [LMR]	146.000–174.000 MHz [PMR]			
	• Number of programable channels	100 channels					
	• Type of emission	Wide	16K0G3E [MARINE] 16K0F3E [LMR]		16K0G3E [MARINE] (For ATIS) 16K0F3E [PMR]		
			8K50F3E [LMR]		8K50F3E [PMR]		
	• Antenna impedance	Narrow	50 Ω (nominal)				
			–4°F to +140°F [MARINE] –22°F to +140°F [LMR]		–15°C to +55°C [MARINE] –25°C to +55°C [PMR]		
	• Operating temperature range	7.5 V DC nominal (negative ground)		7.2 V DC nominal (negative ground)			
	• Power supply requirement	50 Ω (nominal)					
	• Current drain (approx.)	RX	0.2 A (at max. audio)				
			–				
		TX	5 W	1.6 A			
			3 W	1.2 A			
1 W			0.7 A				
0.5 W	–			0.6 A			
• Dimensions (projections not included)	65(W) × 145(H) × 44(D) mm; 2 9/16(W) × 5 23/32(H) × 1 3/4(D) in.						
• Weight (approx.)	410 g; 14.46 oz. (Including BP-225)						
TRANSMITTER	• Output power	High	5 W	5 W	1 W [MARINE] 5 W [PMR]		
		Middle	3 W	3 W	3 W [PMR]		
		Low	1 W	1 W	0.5 W [MARINE] 1 W [PMR]		
	• Modulation	Variable reactance frequency modulation					
	• Max. frequency deviation	Marine	±5.0 kHz	±5.0 kHz			
		Wide	±5.0 kHz [LMR]	±5.0 kHz [PMR]	±4.0 kHz [PMR]		
		Narrow	±2.5 kHz [LMR]	±2.5 kHz [PMR]			
	• Frequency error	±5.0 ppm		±1.5 kHz			
	• Spurious emissions (typical)	–70 dBc		0.25 μW (≤2 GHz), 1.00 μW (>2 GHz)			
	• Adjacent channel power	Marine	70 dB	70 dB			
		Wide	70 dB [LMR]	70 dB [PMR]			
		Narrow	60 dB [LMR]	60 dB [PMR]			
	• Audio harmonic distortion	10% (at 60% deviation)					
	• FM hum and noise	Marine	40 dB	–			
		Wide	40 dB [LMR]	–			
		Narrow	34 dB [LMR]	–			
	• Residual modulation	Marine	–	40 dB			
		Wide	–	40 dB [PMR]			
Narrow		–	34 dB [PMR]				
• Audio frequency response	+1 dB to –3 dB of 6 dB oct. from 300 Hz to 3000 Hz [MARINE]						
• Limiting charact. of modulation	60–100% of max. deviation						
• Microphone impedance	2 kΩ						

		IC-M90		IC-M90E		
		[USA], [USA-1]		[EUR], [UK]	[FRG]	
RECEIVER	• Receive system	Double conversion superheterodyne system				
	• Intermediate frequencies	1st : 31.05 MHz, 2nd : 450 kHz				
	• Sensitivity	0.25 μ V typ. at 12 dB SINAD		-2 dB μ emf typ. at 20 dB SINAD [MARINE] -4 dB μ emf typ. at 20 dB SINAD [PMR]		
	• Squelch sensitivity	0.35 μ V typ. (at threshold)		+0 dB μ emf typ.		
	• Adjacent channel selectivity	Marine	70 dB typ.		70 dB	
		Wide	70 dB typ. [LMR]		70 dB [PMR]	
		Narrow	60 dB typ. [LMR]		60 dB [PMR]	
	• Spurious response	70 dB typ.		70 dB		
	• Intermodulation rejection ratio	70 dB typ.		68 dB [MARINE] 65 dB [PMR]		
	• Hum and Noise	Marine	40 dB		40 dB	
		Wide	40 dB [LMR]		40 dB [PMR]	
		Narrow	34 dB [LMR]		34 dB [PMR]	
	• Audio frequency response	+1 dB to -3 dB of -6 dB oct. from 300 Hz to 3000 Hz [MARINE]				
	• Audio output power (at 10% distortion with an 8 Ω load)	0.35 W typ.		0.2 W typ. [MARINE] 0.35 W typ. [PMR]		
• Output impedance (audio)	8 Ω					

Specifications are measured in accordance with TIA/EIA-603 (IC-M90) and EN301-178-2 or EN300 086 (IC-M90E).
All stated specifications are subject to change without notice or obligation.

• CHANNEL LISTS

• 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			

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

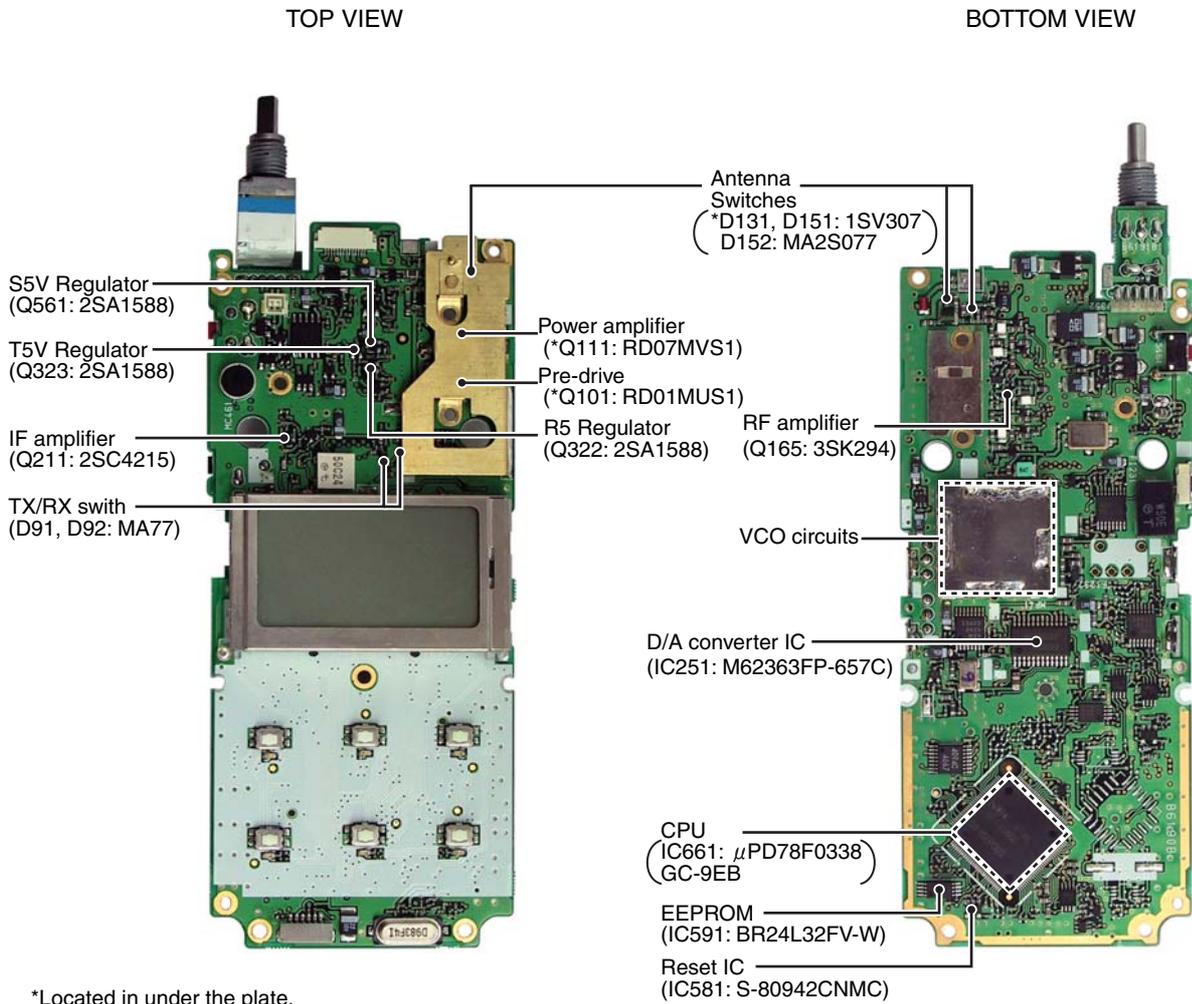
[†] Low power only

[‡] Receive only

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

SECTION 2 INSIDE VIEWS

● MAIN UNIT

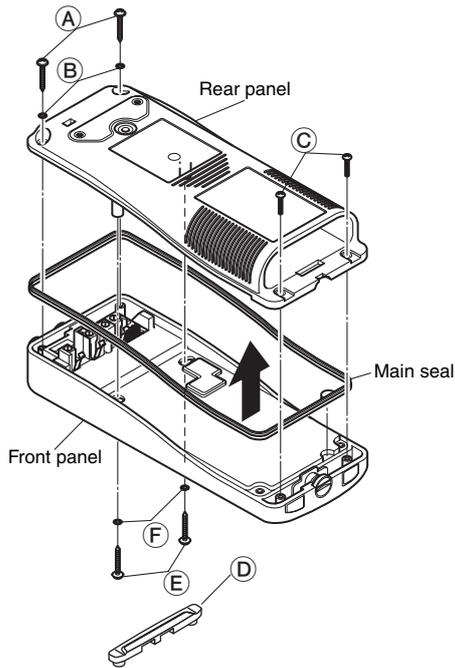


SECTION 3 DISASSEMBLY INSTRUCTIONS

● REMOVING THE REAR PANEL

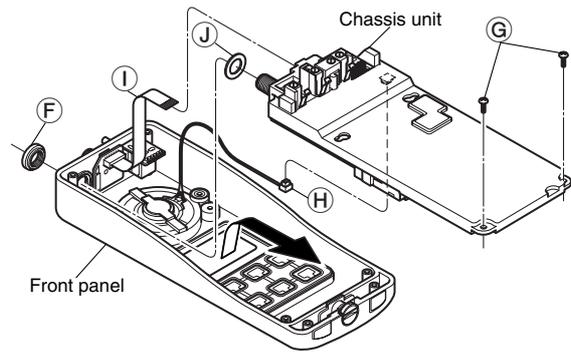
- ① Unscrew 2 screws (A), and remove 2 washers (B).
- ② Unscrew 2 screws (C).
- ③ Remove the speaker panel (D).
- ④ Unscrew 2 screws (E), and remove 2 washers (F).
- ⑤ Remove the rear panel and the main seal from the front panel.

Note: When replacing the screws, 10–12 kg of torque MUST be applied to ensure water resistance.



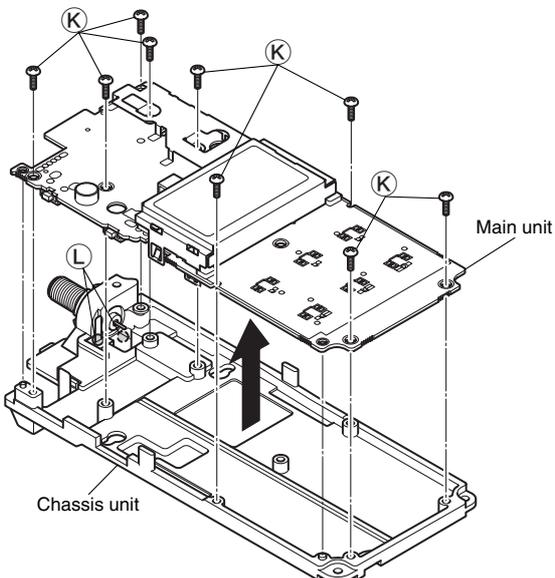
● REMOVING THE CHASSIS UNIT

- ① Unscrew 1 nut (F).
- ② Unscrew 2 screws (G).
- ③ Take off the chassis unit in the direction of the arrow.
- ④ Unplug the connector (H) and the cable (I) from the chassis unit.
- ⑤ Remove 1 washer (J).



● REMOVING THE MAIN UNIT

- ① Unscrew 9 screws (K).
- ② Unsolder 2 points (L), and take off the main unit in the direction of the arrow.



SECTION 4 CIRCUIT DESCRIPTION

4-1 RECEIVER CIRCUITS

4-1-1 ANTENNA SWITCHING CIRCUIT

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

Received signals from the antenna are passed through the low-pass filter (LPF: L131, L132, C131–C136) and applied to the antenna switching circuit (D151, D152).

While receiving, no voltage is applied to D151 and D152. Thus, the receive line and the ground are disconnected and L151, L152, C151, C152 and C153 function as an LPF which leads received signals to the RF circuits.

4-1-2 RF CIRCUITS

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

The signals from the antenna switching circuit are passed through the two-stage tunable bandpass filter (BPF: D154, D155, L154–L156, C156, C157, C159–C161, C163, C164, C168), then applied to the RF amplifier (Q165).

The amplified signals are passed through another two-stage BPF (D181, D182, L166, L181 C181, C182, C184–C186, C188) to suppress unwanted signals. The filtered signals are then applied to the 1st mixer circuit.

4-1-3 1st MIXER AND 1st IF AMPLIFIER CIRCUITS

The 1st mixer circuit converts received signals into the 1st intermediate frequency (IF) signal by mixing with local oscillator (LO) signal. The converted 1st IF signal is filtered at the 1st IF filter, then amplified at the 1st IF amplifier.

The signals from the two-stage BPF are converted into the 31.05 MHz 1st IF signal at the 1st mixer (Q191) by being mixed with the 1st LO signals generated at RX VCO (Q41, D31–D34).

The 1st IF signal from the 1st mixer is passed through the crystal filter (FI211) to suppress unwanted signals, and amplified at the 1st IF amplifier (Q211).

The amplified 1st IF signal is applied to the FM IF IC (IC231).

4-1-4 2nd IF AND DEMODULATOR CIRCUITS

The 1st IF signal is converted into the 2nd IF signal and de-modulated by 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 is applied to pin 16 of IC231, and mixed with the 30.6 MHz 2nd LO signal coming from the doubler (Q221), to convert into the 450 kHz 2nd IF signal and output from pin 3. The 2nd IF signal is filtered by the ceramic filters (FI231, FI232) to suppress the heterodyne noise, then applied to IC231 (pin 5) again and amplified at the limiter amplifier section and demodulated by the quadrature detector.

The quadrature detector is a detection method which uses a ceramic discriminator (X231). The demodulated AF signals are output from pin 9.

4-1-5 AF CIRCUITS

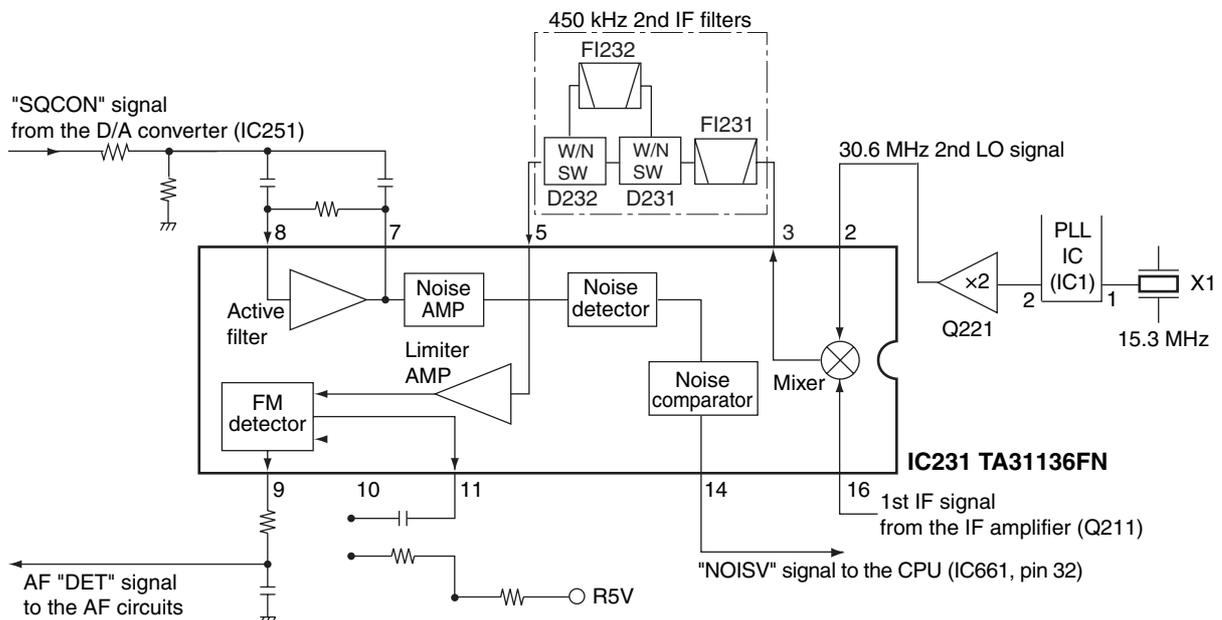
Demodulated signals are filtered and amplified at the AF circuits.

AF signals from IC231 (pin 9) are passed through the AF mute switch (IC281 A; pins 1, 2), analog switch (IC282; pins 1, 7), LPF (IC261 C; pins 8–10) and R801 (VR BOARD) to control the AF output level.

The level controlled AF signals are passed through the AF mute switch (Q411) and the de-emphasis circuit (R411, C413) to obtain the frequency characteristic of -6 dB/oct.

The de-emphasized signals are applied to the AF power amplifier (IC421, pin 4). The AF power amplifier provides more than 0.3 W of audio power.

• 2nd IF AND DEMODULATOR CIRCUITS



4-1-6 SQUELCH CIRCUIT

Squelch circuit mutes AF output signal when no signals are received.

A portion of the AF signals from the FM IF IC (IC231, pin 9) are applied to the IC251 to control the level, and the active filter (R239–R241, C237, C238). The filtered signals are applied to the noise amplifier section in the FM IF IC (IC231, pin 8) to amplify the noise components only.

The amplified noise components are detected at the noise detector section, and output from pin 14 as the "NOISV" signal to the CPU (IC661, pin 32). Then the CPU outputs "AFMS" signal from pin 84 according to the "NOISV" signal level to control the AF mute switch (Q411).

4-2 TRANSMITTER CIRCUITS

4-2-1 MIC AMPLIFIER, SPLATTER FILTER CIRCUITS

The MIC amplifier circuit amplifies audio signals from the microphone within +6 dB/oct pre-emphasis characteristics and amplifies to the level needed for modulation.

The AF signals from the microphone are passed through the microphone switch (Q461) and the microphone mute switches (IC682 A, pins 1, 2; IC682 B, pins 5, 6). The AF signals are then passed through the pre-emphasis circuit (R463, C463) to obtain frequency characteristics of +6 dB/oct.

The pre-emphasized AF signals are amplified at the microphone amplifier (IC261 B), and adjusted its level at the microphone gain control circuit (Q653, Q654, R474, R705, R707, R708). The level adjusted signals are applied to the limiter amplifier (IC491 A; pins 1, 2) to limit its level via the AF mute switch (IC481 A; pins 1, 2).

The AF signals are then passed through the splatter filter (IC491 B; pins 6, 7) to suppress unwanted 3 kHz and higher audio signals, then applied to the modulation circuit via the D/A converter (IC251; pins 3, 4).

4-2-2 MODULATOR CIRCUIT

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

AF signals from the D/A converter (IC251, pin 3) are applied to the modulation circuit (D39) to modulate the oscillated signal by changing the reactance of D39 at the TX VCO (Q51, D35–38).

4-2-3 TRANSMIT AMPLIFIERS

Transmit amplifiers amplify the TX VCO output to transmit power level.

The TX VCO output signal is buffer-amplified by the buffer amplifiers (Q61, Q62) and passes through the TX/RX switch (D91). The signals from the TX/RX switch are applied to the another buffer amplifier (Q91), pre-drive (Q101) and power amplifier (Q111) and amplified to the transmit level.

The power amplifier output is applied to the antenna connector (J41: CHASSIS UNIT) via the antenna switching circuit and the LPFs.

4-2-4 APC CIRCUIT

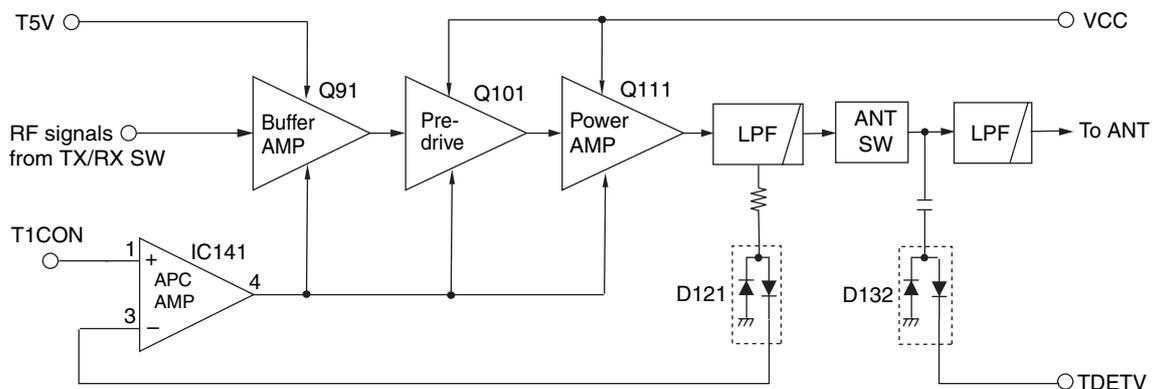
The APC (Automatic Power Control) circuit stabilizes transmit output power and controls transmit output power High, Middle and Low.

The RF output signal from the power amplifier (Q111) is detected at the power detector (D121). The detector converts the RF signals into DC voltage, and the detected voltage is applied to the APC amplifier (IC141, pin 3).

The transmit output power setting voltage is applied to another input terminal of the APC amplifier (IC141, pin 1) as the reference voltage. The APC amplifier controls the bias of the buffer, pre-drive and power amplifiers by comparing the detected voltage and reference voltage. Thus the APC circuit maintains a constant output power.

Another power detector (D132) detects the RF output level and outputs "TDETV" signal to the CPU (IC661, pin 31). The CPU outputs "TLED" signal to the LED driver (Q655) to light TX LED (DS655).

• APC CIRCUIT



4-3 PLL CIRCUITS

4-3-1 GENERAL

PLL circuits control TX and RX VCO circuits. IC1 is a PLL IC and contains prescaler, programmable counter, programmable divider, phase detector, charge pump in its package.

The VCOs directly generate the transmit frequency and the 1st LO frequency for receiving. The PLL sets the divided ratio based on the serial data from the CPU (IC661), and compares the phase of the VCO output with the reference oscillator's frequency (15.3 MHz) oscillated by X1.

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

4-3-2 TRANSMIT LOOP

A portion of the generated signal at the TX VCO (Q51, D35–D39) is applied to the PLL IC (IC1, pin 8) via buffer-amplifier (Q71). The applied signal is divided at the prescaler section and programmable divider section and is then applied to the phase detector section.

The phase detector compares the input signal with the reference frequency, and then outputs the control signal (pulse-type) from pin 5 via the charge pump section. The pulse-type signal is converted into DC voltage at the loop filter (R17–R19, C16, C17), and then applied to the TX VCO (Q51, D35–D39) as the lock voltage.

4-3-3 RECEIVE LOOP

The generated signal at the RX VCO (Q41, D31–D34) is applied to the PLL IC (IC1, pin 8) via buffer-amplifier (Q71) and is divided at the prescaler section and programmable divider section and is then applied to the phase detector section.

The phase detector compares the input signal with a reference frequency, and then outputs the control signal (pulse-type) from pin 5. The pulse-type signal is converted into DC voltage at the loop filter (R17–R19, C16, C17), and then applied to the RX VCO (Q41, D31–D34) as the lock voltage.

4-4 OTHER CIRCUITS

4-4-1 CTCSS/DTCS CIRCUIT (DECODING)

The CTCSS/DTCS signal from FM IF IC (IC231, pin 9) is filtered at the LPF (Q291, R291–R293, R297, R298, C292–C294, C301, C302). The filtered signal is then applied to the CPU (IC661, pin 36) to control the AF mute switch according to the received CTCSS/DTCS signal.

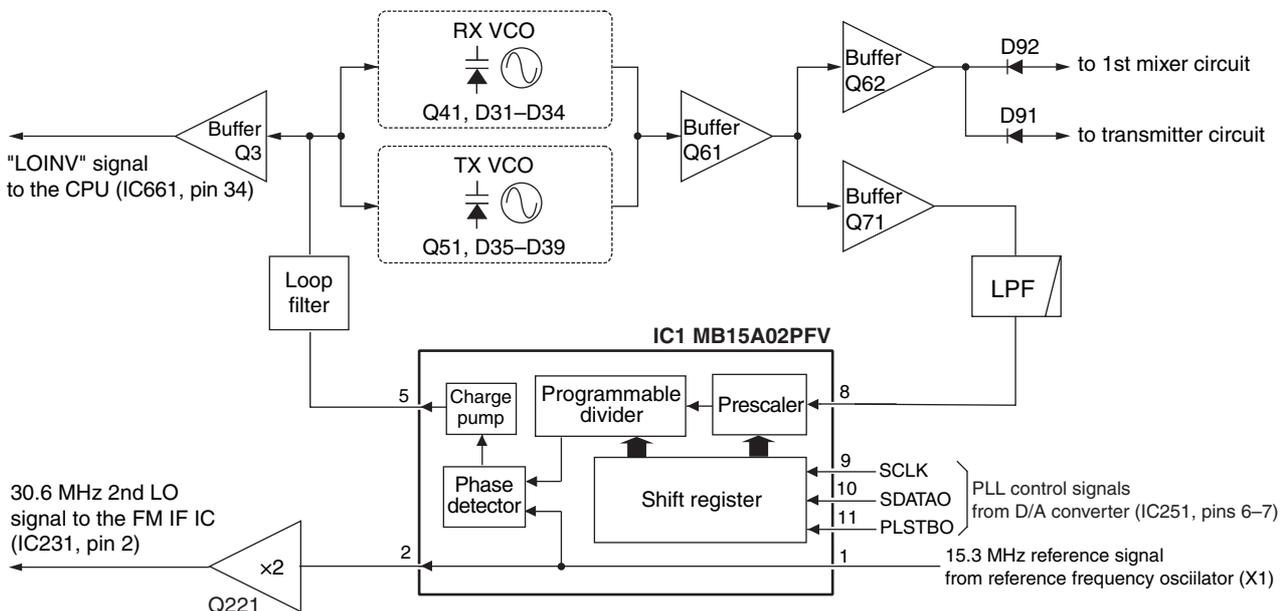
4-4-2 CTCSS/DTCS CIRCUIT (ENCODING)

The CTCSS/DTCS signal is generated by the CPU (IC661, pins 98–100) and converted into analog signal at the D/A converter (R532–R534). The converted signal is then applied to the limiter amplifier (IC491 A) via the LPF (Q532).

4-4-3 VOX CIRCUIT

When the VOX function is activated, the AF signals from the microphone are applied to the VOX amplifier (IC261 A; pins 2, 3) via the AF mute circuit (IC682 A; pins 1, 2). The amplified AF signals are applied to the VOX control circuit (IC683), then VOXT signal is output to the CPU (IC661, pin 29) to perform transmitting.

• PLL CIRCUITS



4-5 POWER SUPPLY CIRCUITS

4-5-1 VOLTAGE LINES

LINE	DESCRIPTION
VCC	The voltage from the connected DC power supply passed through the [VOL] switch (R1: VR BOARD).
CPU5V	5V for the CPU (IC661) converted from the VCC line at the CPU5V regulator circuit (IC551).
M5V	Common 5V line converted from the VCC line at the M5V regulator circuit (Q551–Q553).
T5V	5V for the transmit circuits controlled by the T5V control circuit (Q323) using the T5VS signal from the CPU (IC661, pin 90).
S5V	5V for the AF circuits controlled by the S5V control circuit (Q561) using the S5VS signal from the CPU (IC661, pin 87).
R5V	5V for the receive circuits controlled by the R5V control circuit (Q322) using the R5VS signal from CPU (IC661, pin 89).

4-6 PORT ALLOCATIONS

4-6-1 CPU (IC661)

PIN NUMBER	PORT NAME	DESCRIPTION
1	BEEP	Output port for BEEP signal.
2	VSSTB	Output port for scrambler strobe signal.
3	EXSTB	Output port for external expander strobe signal.
4	DASTB	Output port for external D/A strobe signal.
5	PLSTB	Output port for PLL strobe.
6	ERXDI	Input port for cloning.
7	ETXDO	Output port for cloning.
10	SDATA	Output port for serial data.
11	SCK	Output port for serial clock.
12	ESCK	Input port for EEPROM clock.
13	ESDA	I/O port for EEPROM data.
14	TLED	Output port for TX LED driver.
15	RLED	Output port for RX LED driver.
17	CSIFT	Output port for clock shift signal.
25	RESET	Input port for reset signal.
27	WDECV	Input port for WX tone signal.
28	EXDET	Input port for the [MIC/SP] detect signal.
29	VOXT	Input port for VOX signal.
30	BATTV	Input port for battery voltage detection signal.
31	TDETV	Input port for TX power level.
32	NOISV	Input port for noise level.
33	RSSIV	Input port for RSSI level.
34	LOINV	Input port for PLL lock voltage level.
35	TEMPV	Input port for temperature level.
36	CDECV	Input port for CTCSS/DTCS tone signal.
38	ATIS	Output port for ATIS/CTCSS signal.
75, 76	CONT1, CONT2	Output ports for LCD contrast control signal.

PIN NUMBER	PORT NAME	DESCRIPTION
77, 78	LEDS1, LEDS2	Output port for dimmer control signal.
79	STXMS	Output port for scrambler mute signal.
80	MICMS	Output port for microphone mute signal. "HIGH": Microphone mute
81	ISPMS	Output port for internal speaker mute signal. "HIGH": Speaker mute
82	LDTFS	Output port for CTCSS/DTCS filter switching signal.
83	WNS	Output port for IF passband width switching signal.
84	AFMS	Output port for AF mute signal.
85	AFVS	Output port for AF amplifier power supply control signal.
98–100	CENC1–CENC3	Output ports for DTCS signal.
102	PTTIN	Input port for [PTT] switch.
103	EXPTT	Input port for external PTT switch.
104	BTYPE	Input port for battery type detection.
105	PTTM	Output port for microphone mute signal.
106–108	MIC1–MIC3	Output ports for microphone sensitivity detection signal.
109	SQL	Input port for [SQL] key.
110	UP	Input port for [UP] key.
111	DOWN	Input port for [DOWN] key.
112	CH/WX	Input port for [CH/WX] key.
113	16/9	Input port for [16] key.
114	SCAN	Input port for [SCAN] key.
115	H/L	Input port for [Hi/Lo] key.
117	VOXM	Output port for mute signal in VOX mode.
119	UNLK	Input port for PLL unlock signal.

4-6-2 EXPANDER (IC341)

PIN NUMBER	PORT NAME	DESCRIPTION
4	CTFIS	Output port for CTCSS/DTCS tone filter control signal.
5	SRXMS	Output port for scrambler output mute signal.
6	DETMS	Output port for DET mute signal.
7	CKSIS	Output port for scrambler unit reference frequency control signal.
11	ATTS	Output port for RF attenuator control signal.
12	TXMS	Output port for TX mute signal.
13	VCOS	TX/RX VCO switching signal.
14	SQLT	Output port for squelch control signal.

SECTION 5 ADJUSTMENT PROCEDURES

5-1 PREPARATION

■ REQUIRED TEST EQUIPMENTS

When adjusting IC-M90/E, the optional CS-M90 ADJ ADJUSTMENT SOFTWARE (Rev. 1.0 or later), OPC-478 (RS-232 type) or OPC-478U (USB type) CLONING CABLE, OPC-1028 and JIG cable (see page 5-2) are required.

EQUIPMENT	GRADE AND RANGE	EQUIPMENT	GRADE AND RANGE
RF power meter (terminated type)	Measuring range : 0.1–10 W Frequency range : 100–300 MHz Impedance : 50 Ω SWR : Less than 1.2 : 1	Standard signal generator (SSG)	Frequency range : 0.1–300 MHz Output level : 0.1 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–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
Audio generator	Frequency range : 300–3000 Hz Output level : 1–500 mV	External speaker	Input impedance : 8 Ω Capacity : More than 5 W
		Attenuator	Power attenuation : 20 or 30 dB Capacity : More than 5 W

■ SYSTEM REQUIREMENTS

- Microsoft® Windows® 98/SE/ME/2000/XP
- RS232C/USB port

■ BEFORE STARTING SOFTWARE ADJUSTMENT

Clone adjustment configurations into the empty programmable channels using the CS-M90 CLONING SOFTWARE before starting SOFTWARE ADJUSTMENTS. Otherwise, the transceiver can not be adjusted.

CH.	CH. GROUP	FREQUENCY	BAND WIDTH	DTCS
A1	MARINE	160.0000 MHz	Wide	–
A2	MARINE	160.0000 MHz	Narrow	–
A3	MARINE	160.0000 MHz	Wide	007
A4	MARINE	160.0000 MHz	Narrow	007
A5	LAND	160.0000 MHz	Wide	–
A6	LAND	160.0000 MHz	Narrow	–

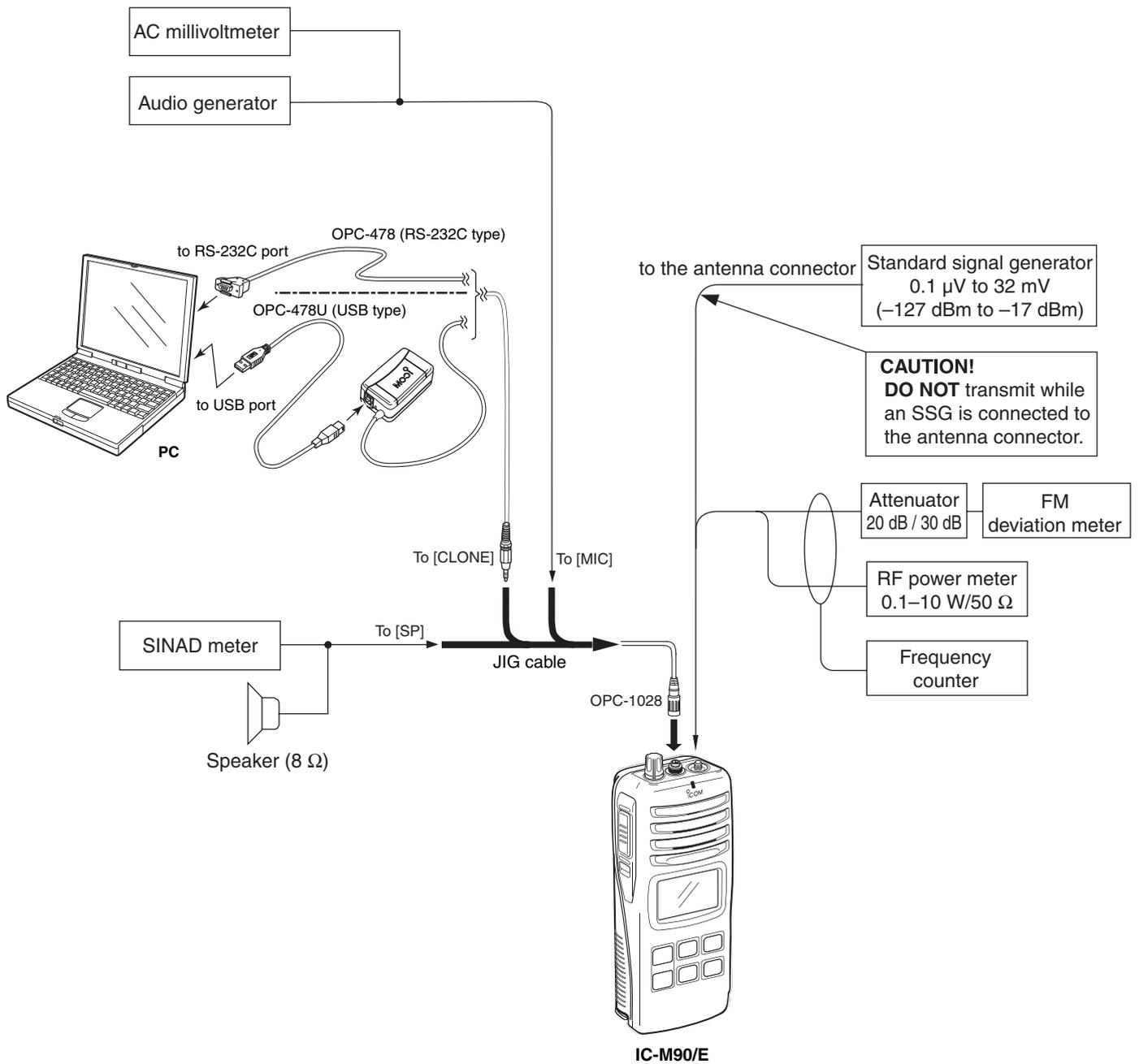
CAUTION!: BACK UP the originally programmed memory data in the transceiver before programming the adjustment frequencies. When program the adjustment frequencies into the transceiver, the transceiver's memory data will be overwritten and lose original memory data at the same time.

■ STARTING SOFTWARE ADJUSTMENT

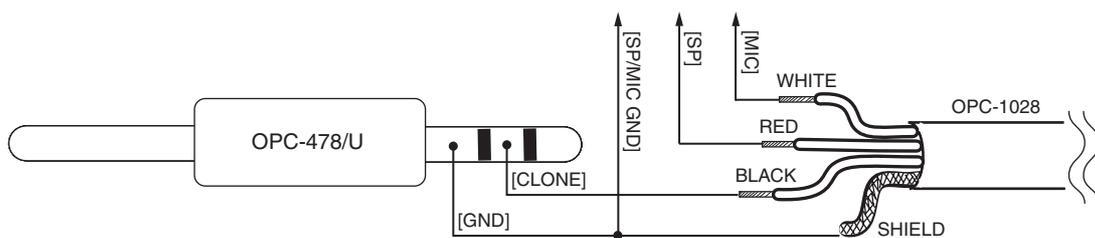
- (1) Connect IC-M90/E and a PC with OPC-478/U, OPC-1028 and JIG CABLE.
- (2) Turn the transceiver ON.
- (3) Boot up Windows®, and click the program group 'CS-M90 ADJ' in the 'Programs' folder of the [Start] menu, then CS-M90 ADJ's window appears.
- (4) Click 'Adjust' on the CS-M90's window, then IC-M90/E's up-to-date condition appears.
- (5) Set or modify adjustment data as desired.

Microsoft and Windows are registered trademarks of Microsoft Corporation in the U.S.A. and other countries.

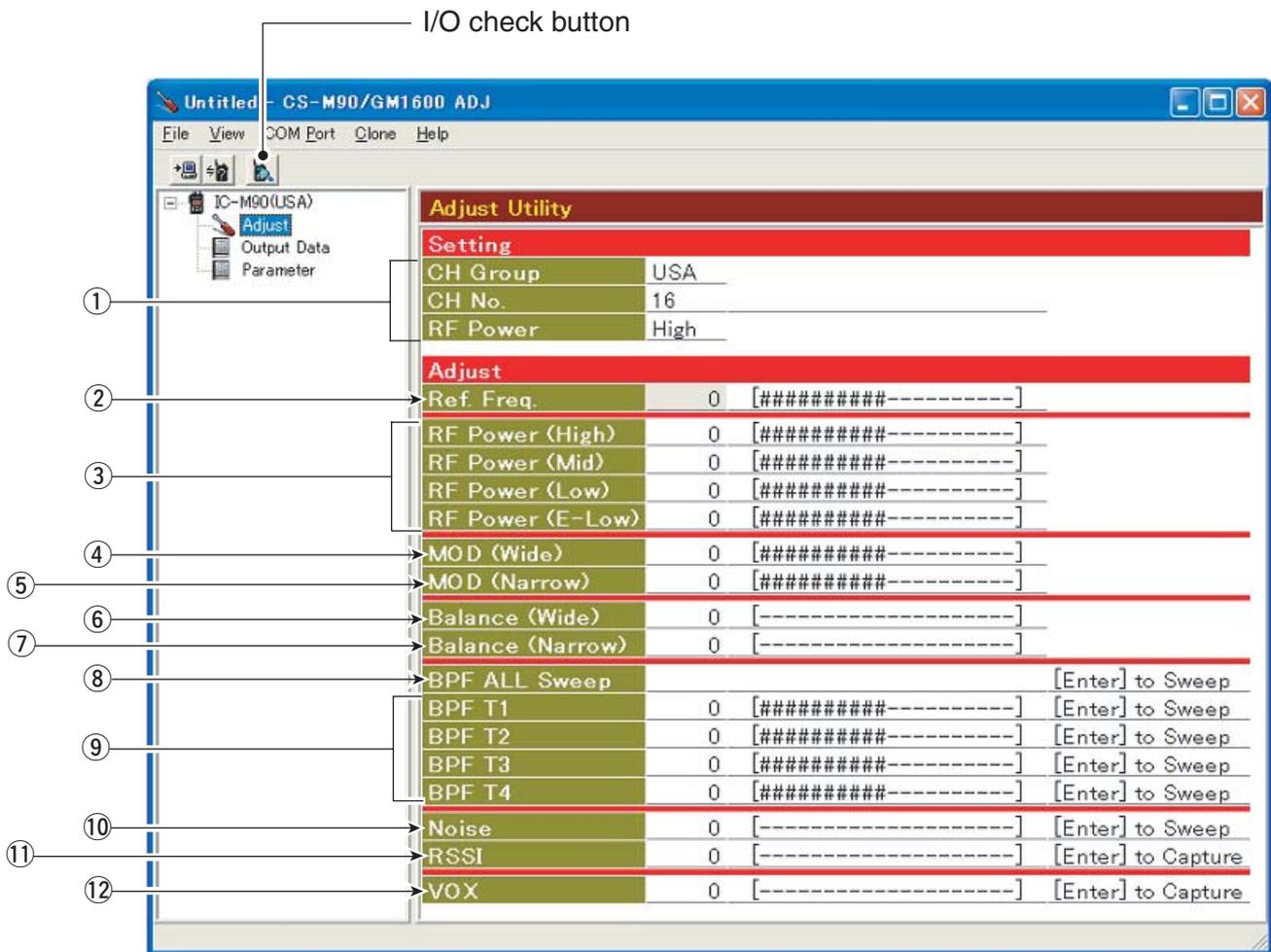
• CONNECTION



• JIG CABLE



• PC SCREEN EXAMPLE



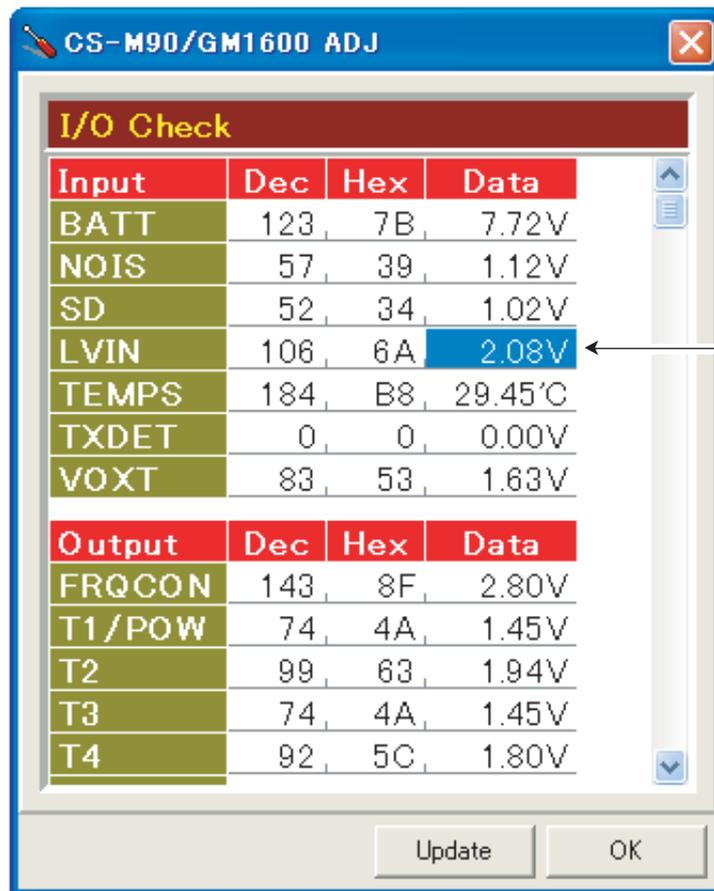
NOTE: The above screen is an example.
Each transceiver has its own specific values for each setting.

- | | |
|--------------------------------|------------------------------------|
| ①: Adjustment condition | ⑦: FM deviation balance (Narrow) |
| ②: Reference frequency | ⑧: Receive sensitivity (Automatic) |
| ③: RF output power | ⑨: Receive sensitivity (Manual) |
| ④: FM deviation (Wide) | ⑩: Squelch level |
| ⑤: FM deviation (Narrow) | ⑪: S-meter |
| ⑥: FM deviation balance (Wide) | ⑫: VOX |

5-2 SOFTWARE ADJUSTMENT (FREQUENCY)

Select the adjustment item with [↑] / [↓] keys, then set the value with [←] / [→] keys on the connected PC.

ADJUSTMENT	ADJUSTMENT CONDITION	MEASUREMENT		VALUE
		UNIT	OPERATION	
PLL LOCK VOLTAGE	1 • Operating CH. : A1 • Receiving	PC screen	Click the "I/O check button" on the CS-M90 ADJ's screen (see page 5-3) to open the I/O check window as below.	1.5–3.0 V (Verify)
	2 • Operating CH. : A1 • RF power : Low • Transmitting			1.8–3.3 V (Verify)
REFERENCE FREQUENCY [Ref Freq]	1 • Operating CH. : A1 • Connect the RF power meter or a 50 Ω dummy load to the antenna connector. • RF power : Low • Transmitting	Top Panel	Loosely couple the frequency counter to the antenna conector.	160.0000 MHz ±500 Hz

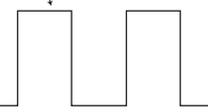


PLL LOCK VOLTAGE

NOTE: The above screen is an example.
Each transceiver has its own specific values.

5-2 SOFTWARE ADJUSTMENT (TRANSMITTING)

Select the adjustment item with [↑] / [↓] keys, then set the value with [←] / [→] keys on the connected PC.

ADJUSTMENT	ADJUSTMENT CONDITION	MEASUREMENT		VALUE
		UNIT	OPERATION	
OUTPUT POWER Expect [FRG] (Marine)				
[RF Power (High)]	1 <ul style="list-style-type: none"> • Operating CH. : A1 • RF power : High • Transmitting 	Top panel	Connect the RF power meter to the antenna connector.	5.0 W
[RF Power (Mid)]	2 <ul style="list-style-type: none"> • Operating CH. : A1 • RF power : Mid • Transmitting 			3.0 W
[RF Power (Low)]	3 <ul style="list-style-type: none"> • Operating CH. : A1 • RF power : Low • Transmitting 			0.75 W
OUTPUT POWER [FRG] (Marine) only				
[RF Power (High)]	1 <ul style="list-style-type: none"> • Operating CH. : A5 • RF power : High • Transmitting 	Top panel	Connect the RF power meter to the antenna connector.	0.75 W
[RF Power (E-Low)]	2 <ul style="list-style-type: none"> • Operating CH. : A5 • RF power : E-Low • Transmitting 			0.45 W
FM DEVIATION [MOD (Wide)]	1 <ul style="list-style-type: none"> • Operating CH. : A1 • Set the FM deviation meter as; <ul style="list-style-type: none"> HPF : OFF LPF : 20 kHz De-emphasis : OFF Detector : (P-P)/2 • Connect the audio generator to the [MIC/SP] jack through OPC-973 and set as; <ul style="list-style-type: none"> Frequency : 1 kHz Level : 25 mV rms • Transmitting 	Top panel	Connect the FM deviation meter to the antenna connector through the attenuator.	±4.15–4.25 kHz
[MOD (Narrow)]	2 <ul style="list-style-type: none"> • Operating CH. : A2 • Transmitting 			±2.00–2.10 kHz
MODURATION BALANCE [Balance (Wide)]	1 <ul style="list-style-type: none"> • Operating CH. : A3 • No audio applied to the [MIC/SP] jack. • Set the FM deviation meter as; <ul style="list-style-type: none"> HPF : OFF LPF : 20 kHz De-emphasis : OFF Detector : (P-P)/2 • Transmitting 	Top panel	Connect the FM deviation meter with the oscilloscope to the antenna connector through the attenuator.	Set to square wave form 
[Balance (Narrow)]	2 <ul style="list-style-type: none"> • Operating CH. : A4 • Transmitting 			
VOX [VOX]	1 <ul style="list-style-type: none"> • Operating CH. : A1 • Set to VOX mode. (Push [SQL•MONI] + [Hi/Lo•].) • No audio applied to the [MIC/SP] jack. 	PC screen	Push the [ENTER] key on the keyboard of the connected PC.	Automatic adjustment

5-2 SOFTWARE ADJUSTMENT (RECEIVING)

Select the adjustment item with [↑] / [↓] keys, then set the value with [←] / [→] keys on the connected PC.

ADJUSTMENT	ADJUSTMENT CONDITION	MEASUREMENT		VALUE
		UNIT	OPERATION	
RECEIVE SENSITIVITY [BPF T1] [BPF T2] [BPF T3] [BPF T4] (Wide)	1 <ul style="list-style-type: none"> Operating CH. : A1 (IC-M90) A5 (IC-M90E) Connect the standard signal generator to the antenna connector and set as; <ul style="list-style-type: none"> Frequency : 160.0000 MHz Level : +20 dBμ* Modulation : 1 kHz Deviation : \pm3.0 kHz <p style="text-align: right;">Except [FRG] \pm2.4 kHz [FRG] only</p> <ul style="list-style-type: none"> Receiving 	Top panel	Connect the distortion meter with an 8 Ω load to the [MIC/SP] jack through the JIG cable.	Minimum distortion level
(Narrow)	2 <ul style="list-style-type: none"> Operating CH. : A2 (IC-M90) A6 (IC-M90E) Set the standard signal generator as; <ul style="list-style-type: none"> Deviation : \pm1.5 kHz Receiving 			
<p>CONVENIENT: RECEIVE SENSITIVITY can be adjusted automatically.</p> <ol style="list-style-type: none"> Put the cursor on the [BPF ALL Sweep] on the CS-M90 ADJ's screen and push the [ENTER] key. The connected PC tunes BPF T1–T4 to peak level automatically. <p style="text-align: center;">or</p> <ol style="list-style-type: none"> Put the cursor on the one of BPF T1–T4 as desired. Push the [ENTER] key to start tuning. Repeat 1 and 2 to perform additional BPF tuning. 				
SQUELCH LEVEL [NOISE]	1 <ul style="list-style-type: none"> Operating CH. : A1 (IC-M90) A5 (IC-M90E) Connect the standard signal generator to the antenna connector and set as; <ul style="list-style-type: none"> Frequency : 160.0000 MHz Level : -5 dBμ* (IC-M90) -6 dBμ* (IC-M90E) Modulation : 1 kHz Deviation : \pm3.0 kHz <p style="text-align: right;">Except [FRG] \pm2.4 kHz [FRG] only</p> <ul style="list-style-type: none"> Receiving 	Top panel	Push the [ENTER] key on the keyboard of the connected PC.	Automatic adjustment
S-METER [RSSI]	1 <ul style="list-style-type: none"> Operating CH. : A1 (IC-M90) A5 (IC-M90E) Connect the standard signal generator to the antenna connector and set as; <ul style="list-style-type: none"> Frequency : 160.0000 MHz Level : -5 dBμ* (IC-M90) -4 dBμ* (IC-M90E) Modulation : 1 kHz Deviation : \pm3.0 kHz <p style="text-align: right;">Except [FRG] \pm2.4 kHz [FRG] only</p> <ul style="list-style-type: none"> Receiving 	Top panel	Push the [ENTER] key on the keyboard of the connected PC.	Automatic adjustment

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

SECTION 6

PARTS LIST

[MAIN UNIT]

REF NO.	ORDER NO.	DESCRIPTION	M.	H/V LOCATION
IC1	1140005990	S.IC MB15A02PFV1-G-BND-ER	B	55.7/12.1
IC141	1110002750	S.IC TA75S01F (TE85R)	T	107.2/24.2
IC231	1110003200	S.IC TA31136FN (EL)	B	76.4/36.5
IC251	1190000350	S.IC M62363FP-650C	B	53.5/24.2
IC261	1110005340	S.IC NJM12902V-TE1	B	56.1/41.6
IC281	1130007300	S.IC TC4W66FU (TE12L)	T	59/38.1
IC282	1130006220	S.IC TC4W53FU (TE12L)	T	61.1/42.4
IC341	1130007570	S.IC BU4094BCFV-E2	B	33/8.6
IC381	1130009900	S.IC FX214L2/TR	B	23.5/37.8
IC382	1110003800	S.IC NJM2904V-TE1	B	33.1/34
IC383	1130007990	S.IC TC3W03FU (TE12L)	B	9.5/38.5
IC421	1110001810	S.IC TA7368F (ER)	T	102.1/34.9
IC481	1130007300	S.IC TC4W66FU (TE12L)	B	46/37.6
IC491	1110003800	S.IC NJM2904V-TE1	B	41/32.8
IC551	1110005350	S.IC NJM2870F05-TE1	T	94.5/35.1
IC581	1110005770	S.IC S-80942CNMC-G9C-T2	B	6.8/12.4
IC591	1130011570	S.IC BR24L32FV-WE2	B	10.3/6.6
IC661	1140012420	S.IC μ PD78F0338GC-9EB	B	20/18.6
IC681	1130007300	S.IC TC4W66FU (TE12L)	B	8.8/28.7
IC682	1130007300	S.IC TC4W66FU (TE12L)	B	44.6/42.9
IC683	1110002750	S.IC TA75S01F (TE85R)	B	37.1/42.8
Q3	1560000540	S.FET 2SK880-Y (TE85R)	B	47.8/6
Q41	1530002920	S.TR 2SC4226-T1 R25	B	78.1/11.7
Q47	1590001190	S.TR XP6501-(TX) .AB	B	78.2/3.8
Q51	1530002920	S.TR 2SC4226-T1 R25	B	74.5/16.2
Q61	1530002380	S.TR 2SC4215-Y (TE85R)	B	78.1/17.5
Q62	1530002380	S.TR 2SC4215-Y (TE85R)	B	76.8/23.2
Q71	1530002380	S.TR 2SC4215-Y (TE85R)	B	66.3/23.2
Q81	1590001400	S.TR XP1214 (TX)	T	72.2/17.3
Q82	1590003290	S.TR UNR9213J-(TX)	T	72.2/19.9
Q91	1530003420	S.TR 2SC51110-O (TE85R)	T	82.3/8.9
Q101	1560001240	S.FET RD01MUS1	T	93.9/10.4
Q111	1560001230	S.FET RD07MVS1	T	100.1/10
Q141	1590003230	S.TR UNR9113J-(TX)	T	110/23
Q165	1580000750	S.FET 3SK294 (TE85L)	B	96.3/19
Q171	1560000840	S.FET 2SK1829 (TE85R)	B	98.9/17.1
Q191	1580000760	S.FET 3SK299-T1 U73	B	86.5/19.6
Q211	1530002600	S.TR 2SC4215-O (TE85R)	T	84.5/37.9
Q221	1530002690	S.TR 2SC4116-GR (TE85R)	T	65.1/30.3
Q231	1590003230	S.TR UNR9113J-(TX)	T	69.7/38.2
Q232	1530003310	S.TR 2SC5107-O (TE85R)	T	85.4/34
Q291	1590001650	S.TR XP4601 (TX)	T	59.1/32.5
Q321	1510000670	S.TR 2SA1588-GR (TE85R)	T	93.3/23.3
Q322	1510000670	S.TR 2SA1588-GR (TE85R)	T	96.9/24.1
Q323	1510000670	S.TR 2SA1588-GR (TE85R)	T	99.7/26.5
Q324	1590001770	S.TR XP1213 (TX)	B	81.1/29.8
Q381	1590003290	S.TR UNR9213J-(TX)	B	5.7/37.2
Q411	1530003090	S.TR 2SC4213-B (TE85R)	T	96.3/31.1
Q431	1520000450	S.TR 2SB1132 T100 Q	T	111.4/30.5
Q432	1590001190	S.TR XP6501-(TX) .AB	T	107.6/29.6
Q441	1530002850	S.TR 2SC4116-BL (TE85R)	T	101.5/39.2
Q442	1560001330	S.FET RSR025N03	T	103.3/42.4
Q443	1560001330	S.FET RSR025N03	T	97.9/41.4
Q444	1590003290	S.TR UNR9213J-(TX)	T	98.3/38.4
Q461	1590003380	S.TR UNR9111J-(TX)	B	90.3/42.5
Q462	1590003380	S.TR UNR9111J-(TX)	B	90/45.6
Q501	1590003290	S.TR UNR9213J-(TX)	B	34.6/26.1
Q531	1590001770	S.TR XP1213 (TX)	B	37.5/16.8
Q532	1530002850	S.TR 2SC4116-BL (TE85R)	B	36.9/23
Q551	1520000450	S.TR 2SB1132 T100 Q	B	101.1/39.9
Q552	1590001190	S.TR XP6501-(TX) .AB	B	102.2/35.5
Q553	1590003290	S.TR UNR9213J-(TX)	B	98.6/35
Q561	1510000670	S.TR 2SA1588-GR (TE85R)	T	100.5/23.8
Q651	1590001770	S.TR XP1213 (TX)	B	27.3/27.8
Q652	1590000660	S.TR DTC144TU T106	B	6.4/33.7
Q653	1590001770	S.TR XP1213 (TX)	B	52/35.6
Q654	1590003290	S.TR UNR9213J-(TX)	B	53.5/33.1
Q655	1590001540	S.TR UMD6N TR	T	112.4/20.6
Q656	1590003550	S.TR XP4313 (TX)	B	3.6/31.2
D1	1790001250	S.DIO MA2S111-(TX)	B	51.2/14.6
D31	1750000710	S.VCP HVC350BTRF	B	70.7/9.2
D32	1750000710	S.VCP HVC350BTRF	B	72/9.2
D33	1750000710	S.VCP HVC350BTRF	B	68.1/9.2
D34	1750000710	S.VCP HVC350BTRF	B	69.4/9.2
D35	1750000710	S.VCP HVC350BTRF	B	65.7/16
D36	1750000710	S.VCP HVC350BTRF	B	65.7/14.7
D37	1750000710	S.VCP HVC350BTRF	B	63.8/17.5
D38	1750000710	S.VCP HVC350BTRF	B	63.8/18.8
D39	1720000400	S.VCP 1SV245 (TPH3)	T	66.4/20.1
D40	1790001620	S.DIO 1SV308 (TPL3) [EUR], [UK], [FRG]	B	65.4/10
D41	1790000680	S.DIO SB20-03P-TD	B	118.7/29.3

[MAIN UNIT]

REF NO.	ORDER NO.	DESCRIPTION	M.	H/V LOCATION
D91	1790000620	S.DIO MA77 (TX)	T	82.5/18.4
D92	1790000620	S.DIO MA77 (TX)	T	81.3/22
D121	1790001670	S.DIO RB706F-40T106	T	108.3/15.9
D131	1750000580	S.DIO 1SV307 (TPH3)	T	111.9/9.8
D132	1790001210	S.DIO 1SS375-TL	T	114.3/14
D141	1790001240	S.DIO MA2S728-(TX)	T	102.6/25.1
D151	1750000580	S.DIO 1SV307 (TPH3)	B	113.2/8.5
D152	1790001260	S.DIO MA2S077-(TX)	B	111.3/12.7
D153	1790001620	S.DIO 1SV308 (TPL3)	B	112.9/15.1
D154	1750000710	S.VCP HVC350BTRF	B	109.1/20.4
D155	1750000710	S.VCP HVC350BTRF	B	104.1/21.6
D171	1790001250	S.DIO MA2S111-(TX)	B	102/16.9
D181	1750000710	S.VCP HVC350BTRF	B	93.5/21.5
D182	1750000710	S.VCP HVC350BTRF	B	90.5/21.5
D231	1750000520	S.DIO DAN222TL	T	76.1/41.2
D232	1750000520	S.DIO DAN222TL	T	74.1/37.6
D601	1790001260	S.DIO MA2S077-(TX)	T	7.3/12.6
D602	1750000370	S.DIO DA221 TL	B	10/32.6
D603	1790001250	S.DIO MA2S111-(TX)	B	34.6/42.1
FI211	2030000230	S.MLH FL-355 (31.05 MHz)		
	4580000160	S.FIL FL-377 MFT31P 31.050 MHZ [EUR], [UK], [FRG] [USA], [USA-1]	B	89.1/32.7
FI231	2020001270	CER CFWLB450KE2A-B0		
FI232	2020001410	CER CFWLB450KGFA-B0		
X1	6050011940	S.XTL CR-783 (15.3 MHz)	B	47.6/11.9
X231	6070000190	S.DCR CDBC450KCAY24-R0	T	79.2/30.1
X381	6050011560	S.XTL CR-746 (4.000 MHz)	B	13.9/38.5
X601	6050011550	S.XTL CR-747 (9.8304 MHz)	T	2.9/17.6
L31	6200005540	S.COL ELJNC R47K-F	T	66.7/9.9
L32	6200007710	S.COL LQW2BHN27NJ01L [EUR], [UK], [FRG] [USA], [USA-1]	B	67.4/12.2
L33	6200005540	S.COL ELJNC R47K-F	T	63.6/13.8
L34	6200007760	S.COL LQW2BHN82NJ01L	B	63.5/15.2
L35	6200007730	S.COL LQW2BHN39NJ01L [EUR], [UK], [FRG]	B	63.9/12.3
L41	6200007760	S.COL LQW2BHN82NJ01L	B	71.5/12.2
L51	6200007770	S.COL LQW2BHN10J01L	B	68.6/17.2
L61	6200006980	S.COL ELJRE R10G-F	B	76.6/19.9
L62	6200006980	S.COL ELJRE R10G-F	B	74.2/22.3
L71	6200006980	S.COL ELJRE R10G-F	B	68.4/21.3
L72	6200005720	S.COL ELJRE 33NG-F	B	63.8/21.6
L81	6200007170	S.COL MLF1608A 3R3K-T	T	74.9/12.3
L82	6200007170	S.COL MLF1608A 3R3K-T	T	74.8/15.3
L92	6200006980	S.COL ELJRE R10G-F	T	84.7/11.2
L102	6200007690	S.COL LQW2BHN18NJ01L	T	93.9/15.2
L112	6200009240	S.COL 0.20-1.0-7TL 31N	T	104.1/13.9
L121	6200010640	S.COL 0.26-1.0-3TL 8.5N	T	102.9/5.2
L122	6200008510	S.COL 0.30-0.9-4TR 10.5N	T	105.6/4.3
L123	6200008280	S.COL 0.30-1.7-7TL 50N	T	110.1/5.9
L124	6200003710	S.COL NL 252018T-2R7J	T	111.1/13
L131	6200009800	S.COL 0.26-1.1-7TR 30N	B	112.1/4.6
L132	6200008580	S.COL 0.30-1.4-6TL 32N	T	115.4/9.8
L151	6200008280	S.COL 0.30-1.7-7TL 50N	B	110/8.7
L152	6200005740	S.COL ELJRE 47NG-F	B	109.3/12
L153	6200003960	S.COL MLF1608A 1R0K-T	B	112.9/16.5
L154	6200007750	S.COL LQW2BHN56NJ01L	B	107.9/18
L155	6200007750	S.COL LQW2BHN56NJ01L	B	103.7/17.3
L156	6200001770	S.COL ELJNC 47NK-F [EUR], [UK], [FRG] [USA], [USA-1]	B	112.6/18.4
L165	6200003960	S.COL MLF1608A 1R0K-T	B	112.6/18.4
L166	6200007750	S.COL LQW2BHN56NJ01L	B	97.3/24.7
L181	6200007750	S.COL LQW2BHN56NJ01L	B	95.3/22.1
L191	6200010960	S.COL C2520C-R47G-A (0.47U)	B	89.6/17.9
L203	6200009180	S.COL ELJRE R10J-F3	B	83.1/21.7
L221	6200003960	S.COL MLF1608A 1R0K-T	B	84.7/16
L222	6200004480	S.COL MLF1608D R82K-T	B	64.2/28.1
			B	69.6/28.9
R1	7030005100	S.RES ERJ2GEJ 154 X (150 k Ω)	B	54/16.4
R2	7030007250	S.RES ERJ2GEJ 220 X (22 Ω)	B	54.6/17.8
R4	7510001660	S.TMR NTCG16 4LH 473KT	B	41.8/9.1
R5	7030003940	S.RES ERJ3GEYF 104 V (100 k Ω)	B	43.8/8
R6	7030005110	S.RES ERJ2GEJ 224 X (220 k Ω)	B	44.4/16.6
R9	7030005230	S.RES ERJ2GEJ 334 X (330 k Ω)	B	43.9/15.1
R15	7030005050	S.RES ERJ2GEJ 103 X (10 k Ω)	B	50/8.7
R16	7030005580	S.RES ERJ2GEJ 560 X (56 Ω)	B	53.6/15.4
R17	7030004980	S.RES ERJ2GEJ 101 X (100 Ω)	B	53.5/8.8

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
R18	7030005120	S.RES ERJ2GEJ 102 X (1 kΩ)	B	53.5/7.8
R19	7030005000	S.RES ERJ2GEJ 471 X (470 Ω)	B	54.9/8.3
R20	7030005120	S.RES ERJ2GEJ 102 X (1 kΩ)	B	45.3/6.8
R21	7030005050	S.RES ERJ2GEJ 103 X (10 kΩ)	B	49.7/7.2
R22	7030005210	S.RES ERJ2GEJ 822 X (8.2 kΩ)	B	45.8/4.5
R31	7030005530	S.RES ERJ2GEJ 100 X (10 Ω)	T	64.1/9.9
R32	7030005120	S.RES ERJ2GEJ 102 X (1 kΩ)	B	73.2/8.8
R33	7030005120	S.RES ERJ2GEJ 102 X (1 kΩ)	B	68.8/15.1
R34	7030005530	S.RES ERJ2GEJ 100 X (10 Ω)	T	63.6/11.2
R35	7030008300	S.RES ERJ2GEJ 184 X (180 kΩ)	T	69.1/20.4
R36	7030005240	S.RES ERJ2GEJ 473 X (47 kΩ)	T	68.8/21.9
R37	7030005090	S.RES ERJ2GEJ 104 X (100 kΩ)	T	67.8/19.9
R38	7030005240	S.RES ERJ2GEJ 473 X (47 kΩ)	T	63.9/23
R39	7030005090	S.RES ERJ2GEJ 104 X (100 kΩ)	T	66.4/22.9
R40	7030005040	S.RES ERJ2GEJ 472 X (4.7 kΩ) [EUR], [UK], [FRG] only	B	65.2/8.3
R41	7030006461	S.RES ERA3YED 152V	B	77.9/2.0
R42	7030006571	S.RES ERA3YED 392V	B	75.7/9
R43	7030009320	S.RES ERJ2GEJ 4R7 X (4.7 Ω)	B	76.3/11.4
R47	7030007290	S.RES ERJ2GEJ 222 X (2.2 kΩ)	B	80.2/3.2
R51	7030006601	S.RES ERA3YED 272V	B	74.3/14.3
R52	7030005331	S.RES ERA3YED 562V	B	71.3/15.2
R53	7030009320	S.RES ERJ2GEJ 4R7 X (4.7 Ω)	B	72.5/15.6
R61	7030004980	S.RES ERJ2GEJ 101 X (100 Ω)	B	75.3/19.7
R62	7030005070	S.RES ERJ2GEJ 683 X (68 kΩ)	B	76.3/17.6
R63	7030009320	S.RES ERJ2GEJ 4R7 X (4.7 Ω)	B	72/22.9
R64	7030005240	S.RES ERJ2GEJ 473 X (47 kΩ)	B	75/23.8
R65	7030004980	S.RES ERJ2GEJ 101 X (100 Ω)	B	75/21.1
R71	7030005070	S.RES ERJ2GEJ 683 X (68 kΩ)	B	69.1/23.6
R72	7030004990	S.RES ERJ2GEJ 221 X (220 Ω)	B	69.6/21.6
R81	7030007280	S.RES ERJ2GEJ 331 X (330 Ω)	T	72.9/12.9
R82	7030009280	S.RES ERJ2GEJ 391 X (390 Ω)	T	73.5/14.8
R83	7030005040	S.RES ERJ2GEJ 472 X (4.7 kΩ)	T	70/18.4
R84	7030005040	S.RES ERJ2GEJ 472 X (4.7 kΩ)	T	69.1/19.4
R91	7030005120	S.RES ERJ2GEJ 102 X (1 kΩ)	T	80.5/20.2
R92	7030004980	S.RES ERJ2GEJ 101 X (100 Ω)	T	85/16.2
R93	7030005050	S.RES ERJ2GEJ 103 X (10 kΩ)	T	84.3/17.2
R94	7030005030	S.RES ERJ2GEJ 152 X (1.5 kΩ)	T	81.2/10.7
R95	7030005000	S.RES ERJ2GEJ 471 X (470 Ω)	T	83.1/10.7
R96	7030007300	S.RES ERJ2GEJ 332 X (3.3 kΩ)	T	83.1/11.7
R97	7030005530	S.RES ERJ2GEJ 100 X (10 Ω)	T	86.1/11.8
R98	7030004980	S.RES ERJ2GEJ 101 X (100 Ω)	T	80.9/7
R101	7030005040	S.RES ERJ2GEJ 472 X (4.7 kΩ)	T	91.1/5.1
R102	7030005060	S.RES ERJ2GEJ 333 X (33 kΩ)	T	91.6/3.7
R103	7030005590	S.RES ERJ2GEJ 680 X (68 Ω)	T	92/6.6
R111	7030003200	S.RES ERJ3GEYJ 100 V (10 Ω)	T	96.9/5.5
R112	7030005530	S.RES ERJ2GEJ 100 X (10 Ω)	T	96.9/4.3
R113	7030005040	S.RES ERJ2GEJ 472 X (4.7 kΩ)	T	93/4.3
R114	7030005090	S.RES ERJ2GEJ 104 X (100 kΩ)	T	93/3.2
R121	7030003580	S.RES ERJ3GEYJ 153 V (15 kΩ)	T	110.2/16.1
R122	7030000280	S.RES MCR10EZJH 150 Ω (151)	T	112.8/17.3
R131	7030003670	S.RES ERJ3GEYJ 823 V (82 kΩ)	B	116.7/8.9
R132	7030007340	S.RES ERJ2GEJ 153 X (15 kΩ)	T	115.4/17.4
R133	7030005050	S.RES ERJ2GEJ 103 X (10 kΩ)	T	114.4/17.4
R141	7030005100	S.RES ERJ2GEJ 154 X (150 kΩ)	T	104.3/25.4
R142	7030007350	S.RES ERJ2GEJ 393 X (39 kΩ)	T	104.8/24
R143	7030007290	S.RES ERJ2GEJ 222 X (2.2 kΩ)	T	107.7/21.6
R144	7030009140	S.RES ERJ2GEJ 272 X (2.7 kΩ)	T	109.1/21.2
R145	7030008010	S.RES ERJ2GEJ 123 X (12 kΩ)	T	109.2/19.8
R146	7030005050	S.RES ERJ2GEJ 103 X (10 kΩ)	T	107.8/20.3
R147	7030005100	S.RES ERJ2GEJ 154 X (150 kΩ)	T	106.4/20.8
R148	7030004980	S.RES ERJ2GEJ 101 X (100 Ω)	T	104.8/22.1
R149	7030005120	S.RES ERJ2GEJ 102 X (1 kΩ)	T	104.2/20.6
R151	7030004980	S.RES ERJ2GEJ 101 X (100 Ω)	B	111.6/13.9
R152	7030005090	S.RES ERJ2GEJ 104 X (100 kΩ) [EUR], [UK], [FRG]	B	114.8/17.5
	7030005220	S.RES ERJ2GEJ 223 X (22 kΩ) [USA], [USA-1]	B	114.8/17.5
R153	7030005110	S.RES ERJ2GEJ 224 X (220 kΩ)	B	108.9/22.2
R154	7030005050	S.RES ERJ2GEJ 103 X (10 kΩ)	B	107.4/23.2
R155	7030005110	S.RES ERJ2GEJ 224 X (220 kΩ)	B	103.1/23.4
R156	7030005050	S.RES ERJ2GEJ 103 X (10 kΩ)	B	101.7/23.8
R165	7030005090	S.RES ERJ2GEJ 104 X (100 kΩ) [USA], [USA-1]	B	98.1/19.3
	7030008290	S.RES ERJ2GEJ 183 X (18 kΩ) [EUR], [UK], [FRG]	B	98.1/19.3
R166	7030005100	S.RES ERJ2GEJ 154 X (150 kΩ) [EUR], [UK], [FRG]	B	97/16.6
	7030005700	S.RES ERJ2GEJ 274 X (270 kΩ) [USA], [USA-1]	B	97/16.6
R167	7030005000	S.RES ERJ2GEJ 471 X (470 Ω)	B	98.6/21.4
R171	7030005050	S.RES ERJ2GEJ 103 X (10 kΩ)	B	100.2/22.4
R172	7030005170	S.RES ERJ2GEJ 474 X (470 kΩ)	B	101.9/18.6
R173	7030009290	S.RES ERJ2GEJ 562 X (5.6 kΩ)	B	100.8/16.6
R174	7030007060	S.RES ERJ2GEJ 684X (680 kΩ) [EUR], [UK], [FRG] only	B	96/16.6
R175	7030005050	S.RES ERJ2GEJ 103 X (10 kΩ)	B	99.1/19.3
R181	7030009270	S.RES ERJ2GEJ 821 X (820 Ω)	B	92.7/17.4
R182	7030005110	S.RES ERJ2GEJ 224 X (220 kΩ)	B	93.1/23.7
R183	7030005050	S.RES ERJ2GEJ 103 X (10 kΩ)	B	93.7/25.4
R184	7030005110	S.RES ERJ2GEJ 224 X (220 kΩ)	B	90.5/23.7
R185	7030005050	S.RES ERJ2GEJ 103 X (10 kΩ)	B	91.4/25.1
R191	7030005710	S.RES ERJ2GEJ 121 X (120 Ω)	B	87.2/23.4

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

[MAIN UNIT]

REF NO.	ORDER NO.	DESCRIPTION	M.	H/V LOCATION
R192	7030004980	S.RES ERJ2GEJ 101 X (100 Ω)	B	85.2/22
R193	7030007300	S.RES ERJ2GEJ 332 X (3.3 kΩ)	B	82.8/17.8
R194	7030003520	S.RES ERJ3GEYJ 472 V (4.7 kΩ)	B	87.2/16.8
R201	7030005120	S.RES ERJ2GEJ 102 X (1 kΩ)	T	84.8/23.7
R202	7030005050	S.RES ERJ2GEJ 103 X (10 kΩ)	T	83.5/22.8
R203	7030005000	S.RES ERJ2GEJ 471 X (470 Ω)	T	87.2/22
R204	7030010430	S.RES ERJ2GEJ 120 X (12 Ω)	T	85.9/20.8
R205	7030005000	S.RES ERJ2GEJ 471 X (470 Ω)	T	86.4/19.5
R206	7030005040	S.RES ERJ2GEJ 472 X (4.7 kΩ)	B	85.9/16.5
R211	7030005120	S.RES ERJ2GEJ 102 X (1 kΩ)	B	85.9/25.2
R213	7030005030	S.RES ERJ2GEJ 152 X (1.5 kΩ) [EUR], [UK], [FRG]	T	88.3/38.5
	7030005120	S.RES ERJ2GEJ 102 X (1 kΩ) [USA], [USA-1]	T	88.3/38.5
R214	7030005000	S.RES ERJ2GEJ 471 X (470 Ω)	T	85/35.9
R215	7030005310	S.RES ERJ2GEJ 124 X (120 kΩ)	T	86.3/38.5
R216	7030005010	S.RES ERJ2GEJ 681 X (680 Ω)	T	86.6/36.8
R221	7030007060	S.RES ERJ2GEJ 684X (680 kΩ)	B	63.3/29.8
R222	7030007570	S.RES ERJ2GEJ 122 X (1.2 kΩ)	B	62.3/29.8
R223	7030007270	S.RES ERJ2GEJ 151 X (150 Ω)	B	81.3/38.2
R231	7030007300	S.RES ERJ2GEJ 332 X (3.3 kΩ)	T	80.6/35
R232	7030004970	S.RES ERJ2GEJ 470 X (47 Ω)	T	83.1/35.9
R233	7030007340	S.RES ERJ2GEJ 153 X (15 kΩ)	T	76.1/43.4
R234	7030005220	S.RES ERJ2GEJ 223 X (22 kΩ)	T	71.9/39.2
R235	7030005220	S.RES ERJ2GEJ 223 X (22 kΩ)	T	72.5/36
R236	7030009320	S.RES ERJ2GEJ 4R7 X (4.7 Ω)	T	73.9/39.3
R237	7030008010	S.RES ERJ2GEJ 123 X (12 kΩ)	T	71.9/38.2
R238	7030007340	S.RES ERJ2GEJ 153 X (15 kΩ)	T	78.5/37.6
R239	7030005230	S.RES ERJ2GEJ 334 X (330 kΩ)	B	80.7/34.3
R240	7030005600	S.RES ERJ2GEJ 273 X (27 kΩ)	B	78.2/33.2
R241	7030007290	S.RES ERJ2GEJ 222 X (2.2 kΩ)	B	82.9/36
R242	7030009280	S.RES ERJ2GEJ 331 X (330 Ω)	B	73.1/33.2
R243	7030009320	S.RES ERJ2GEJ 4R7 X (4.7 Ω)	T	71.9/37.2
R244	7030007290	S.RES ERJ2GEJ 222 X (2.2 kΩ)	T	82.6/34.6
R245	7030005240	S.RES ERJ2GEJ 473 X (47 kΩ)	T	85.1/32.2
R246	7030005240	S.RES ERJ2GEJ 473 X (47 kΩ)	T	86.8/31.1
R247	7030007570	S.RES ERJ2GEJ 122 X (1.2 kΩ)	B	81.9/32.3
R251	7030005000	S.RES ERJ2GEJ 471 X (470 Ω)	B	57.8/18.3
R261	7030005040	S.RES ERJ2GEJ 472 X (4.7 kΩ)	B	62.8/36.5
R262	7030008010	S.RES ERJ2GEJ 123 X (12 kΩ)	B	61.2/39.2
R263	7030005240	S.RES ERJ2GEJ 473 X (47 kΩ)	B	60.8/37.8
R264	7030005210	S.RES ERJ2GEJ 822 X (8.2 kΩ)	B	60.9/40.2
R265	7030005050	S.RES ERJ2GEJ 103 X (10 kΩ)	B	58.6/37.8
R266	7030009290	S.RES ERJ2GEJ 562 X (5.6 kΩ)	B	59.8/38.3
R267	7030005050	S.RES ERJ2GEJ 103 X (10 kΩ)	B	63.5/41.1
R269	7030005090	S.RES ERJ2GEJ 104 X (100 kΩ)	B	57.6/37.8
R270	7030007340	S.RES ERJ2GEJ 153 X (15 kΩ)	B	60.9/43.3
R271	7030005720	S.RES ERJ2GEJ 563 X (56 kΩ)	B	63.4/43.1
R272	7030005100	S.RES ERJ2GEJ 154 X (150 kΩ)	B	60.7/44.7
R273	7030005120	S.RES ERJ2GEJ 102 X (1 kΩ)	B	59.7/45.3
R274	7030005120	S.RES ERJ2GEJ 102 X (1 kΩ)	B	62.1/44.5
R275	7030008300	S.RES ERJ2GEJ 184 X (180 kΩ)	T	56.6/41.3
R276	7030005050	S.RES ERJ2GEJ 103 X (10 kΩ)	T	56.9/44.9
R277	7030006610	S.RES ERJ2GEJ 394 X (390 kΩ)	T	55.5/43.5
R281	7030005090	S.RES ERJ2GEJ 104 X (100 kΩ)	T	62.2/38.8
R282	7030005090	S.RES ERJ2GEJ 104 X (100 kΩ)	T	57.8/35.7
R283	7030005090	S.RES ERJ2GEJ 104 X (100 kΩ)	T	58.9/44.3
R284	7030005090	S.RES ERJ2GEJ 104 X (100 kΩ)	T	59.7/35.7
R291	7030005070	S.RES ERJ2GEJ 683 X (68 kΩ)	T	61.5/34.1
R292	7030005070	S.RES ERJ2GEJ 683 X (68 kΩ)	T	62/32
R293	7030005070	S.RES ERJ2GEJ 683 X (68 kΩ)	T	61/32
R294	7030005050	S.RES ERJ2GEJ 103 X (10 kΩ)	T	63.4/29.6
R296	7030007340	S.RES ERJ2GEJ 153 X (15 kΩ)	T	60/34.3
R297	7030005050	S.RES ERJ2GEJ 103 X (10 kΩ)	T	56.1/31.7
R298	7030005040	S.RES ERJ2GEJ 472 X (4.7 kΩ)	T	56.6/29.4
R305	7030005090	S.RES ERJ2GEJ 104 X (100 kΩ)	T	60.5/30.5
R306	7030005070	S.RES ERJ2GEJ 683 X (68 kΩ)	T	59.2/30.2
R307	7030007570	S.RES ERJ2GEJ 122 X (1.2 kΩ)	T	57.1/32.2
R321	7030005050	S.RES ERJ2GEJ 103 X (10 kΩ)	T	93.5/21.4
R322	7030005040	S.RES ERJ2GEJ 472 X (4.7 kΩ)	T	91.5/23.2
R323	7030005050	S.RES ERJ2GEJ 103 X (10 kΩ)	T	95.4/22.2
R324	7030005040	S.RES ERJ2GEJ 472 X (4.7 kΩ)	T	95.1/23.7
R325	7030005050	S.RES ERJ2GEJ 103 X (10 kΩ)	T	97.8/26.5
R326	7030005040	S.RES ERJ2GEJ 472 X (4.7 kΩ)	T	96.8/26.5
R381	7030005050	S.RES ERJ2GEJ 103 X (10 kΩ)	B	35.4/30.3
R382	7030005720	S.RES ERJ2GEJ 563 X (56 kΩ)	B	33.2/29.6
R383	7030005090	S.RES ERJ2GEJ 104 X (100 kΩ)	B	35.6/32
R384	7030008290	S.RES ERJ2GEJ 183 X (18 kΩ)	B	30.6/34.1
R385	7030007300	S.RES ERJ2GEJ 332 X (3.3 kΩ)	B	33/38.4
R386	7030005090	S.RES ERJ2GEJ 104 X (100 kΩ)	B	36/35.7
R387	7030005160	S.RES ERJ2GEJ 105 X (1 MΩ)	B	9.8/41.7
R388	7030005120	S.RES ERJ2GEJ 102 X (1 kΩ)	B	7.2/40.2
R389	7030005050	S.RES ERJ2GEJ 103 X (10 kΩ)	B	7.3/36.6
R390	7030010040	S.RES ERJ2GEJ-JPW [USA], [USA-1] only	B	62.9/10.4
R391	7030010040	S.RES ERJ2GEJ-JPW	T	83/14.8
R393	7030010040	S.RES ERJ2GEJ-JPW	T	82.5/6.4
R394	7030010040	S.RES ERJ2GEJ-JPW	T	89.2/4
R398	7030010040	S.RES ERJ2GEJ-JPW	B	60.6/41.5
R399	7030010040	S.RES ERJ2GEJ-JPW	T	58.9/42.5
R411	7030005050	S.RES ERJ2GEJ 103 X (10 kΩ)	T	98.7/31.4
R412	7030005050	S.RES ERJ2GEJ 103 X (10 kΩ)	T	94.3/32
R413	7030005060	S.RES ERJ2GEJ 333 X (33 kΩ)	T	94.3/30.1
R414	7030007310	S.RES ERJ2GEJ 155 X (1.5 MΩ)	T	99.2/29

S.=Surface mount

[MAIN UNIT]

REF NO.	ORDER NO.	DESCRIPTION	M.	H/V LOCATION
R415	7030007310	S.RES ERJ2GEJ 155 X (1.5 MΩ)	T	97.2/29
R421	7030005530	S.RES ERJ2GEJ 100 X (10 Ω)	T	107/33.5
R422	7030005530	S.RES ERJ2GEJ 100 X (10 Ω)	B	104.4/38.7
R431	7030005600	S.RES ERJ2GEJ 273 X (27 kΩ)	T	106.1/27.6
R432	7030005160	S.RES ERJ2GEJ 105 X (1 MΩ)	T	107.6/27.1
R433	7030007290	S.RES ERJ2GEJ 222 X (2.2 kΩ)	T	109.4/33
R434	7030007290	S.RES ERJ2GEJ 222 X (2.2 kΩ)	T	105.8/29.6
R435	7030007300	S.RES ERJ2GEJ 332 X (3.3 kΩ)	T	108.1/32.1
R441	7030005170	S.RES ERJ2GEJ 474 X (470 kΩ)	T	100.7/41
R442	7030005170	S.RES ERJ2GEJ 474 X (470 kΩ)	T	96.7/38.3
R443	7030005090	S.RES ERJ2GEJ 104 X (100 kΩ)	T	99.5/39.9
R461	7030005060	S.RES ERJ2GEJ 333 X (33 kΩ)	B	94.3/48.5
R462	7030005040	S.RES ERJ2GEJ 472 X (4.7 kΩ)	B	47.8/44.6
R463	7030009290	S.RES ERJ2GEJ 562 X (5.6 kΩ)	B	50.3/42.8
R467	7030008280	S.RES ERJ2GEJ 271 X (270 Ω)	B	97.3/40.8
R468	7030005090	S.RES ERJ2GEJ 104 X (100 kΩ)	B	90.5/40.4
R471	7030007060	S.RES ERJ2GEJ 684X (680 kΩ)	B	51.7/43.1
R472	7030008290	S.RES ERJ2GEJ 183 X (18 kΩ)	B	56.2/38.3
R473	7030005040	S.RES ERJ2GEJ 472 X (4.7 kΩ)	B	50.7/44.2
R474	7030009290	S.RES ERJ2GEJ 562 X (5.6 kΩ)	B	50.2/40.3
R475	7030010310	S.RES ERJ3GEYF 223 V (22 kΩ)	B	58/35.5
R476	7030004740	S.RES ERJ3GEYF 392 V (3.9 kΩ)	B	57.2/33.5
R477	7030004730	S.RES ERJ3GEYF 222 V (2.2 kΩ)	B	60.7/35.5
R481	7030005090	S.RES ERJ2GEJ 104 X (100 kΩ)	B	47.3/35.4
R482	7030005090	S.RES ERJ2GEJ 104 X (100 kΩ)	B	42.3/39
R490	7030005720	S.RES ERJ2GEJ 563 X (56 kΩ)	B	39.3/37.5
R491	7030007340	S.RES ERJ2GEJ 153 X (15 kΩ)	B	41.1/37.4
R492	7030005110	S.RES ERJ2GEJ 224 X (220 kΩ)	B	37.4/25.8
R493	7030008310	S.RES ERJ2GEJ 564 X (560 kΩ)	B	39.1/36.2
R494	7030005250	S.RES ERJ3GEYF 103 V (10 kΩ)	B	44.4/33.6
R495	7030005040	S.RES ERJ2GEJ 472 X (4.7 kΩ)	B	38.5/31.3
R496	7030005110	S.RES ERJ2GEJ 224 X (220 kΩ)	B	38/29.3
R497	7030008300	S.RES ERJ2GEJ 184 X (180 kΩ)	B	39.4/24.7
R498	7030005090	S.RES ERJ2GEJ 104 X (100 kΩ)	B	39.4/25.7
R501	7030005090	S.RES ERJ2GEJ 104 X (100 kΩ)	B	43.5/31
R502	7030005060	S.RES ERJ2GEJ 333 X (33 kΩ)	B	40.7/27.3
R503	7030005310	S.RES ERJ2GEJ 124 X (120 kΩ)	B	38/27.2
R504	7030005050	S.RES ERJ2GEJ 103 X (10 kΩ)	B	44.6/29.7
R511	7030005600	S.RES ERJ2GEJ 273 X (27 kΩ)	B	33/23.6
R512	7030005100	S.RES ERJ2GEJ 154 X (150 kΩ)	B	36.6/28
R513	7030008290	S.RES ERJ2GEJ 183 X (18 kΩ)	B	32.6/25.6
R521	7030005010	S.RES ERJ2GEJ 681 X (680 Ω)	B	45.1/31.1
R531	7030005220	S.RES ERJ2GEJ 223 X (22 kΩ)	B	34.6/18.9
R532	7030005220	S.RES ERJ2GEJ 223 X (22 kΩ)	B	33.4/15.5
R533	7030005720	S.RES ERJ2GEJ 563 X (56 kΩ)	B	34.1/16.5
R534	7030008300	S.RES ERJ2GEJ 184 X (180 kΩ)	B	34.1/17.5
R535	7030005050	S.RES ERJ2GEJ 103 X (10 kΩ)	B	35.5/17.3
R536	7030005240	S.RES ERJ2GEJ 473 X (47 kΩ)	B	36.3/18.9
R537	7030005240	S.RES ERJ2GEJ 473 X (47 kΩ)	B	36.3/20.8
R538	7030005120	S.RES ERJ2GEJ 102 X (1 kΩ)	B	35/23.4
R539	7030005240	S.RES ERJ2GEJ 473 X (47 kΩ)	B	39.3/21.3
R540	7030007340	S.RES ERJ2GEJ 153 X (15 kΩ)	B	39.3/22.3
R551	7030005050	S.RES ERJ2GEJ 103 X (10 kΩ)	B	99.9/36.5
R552	7030007290	S.RES ERJ2GEJ 222 X (2.2 kΩ)	B	100.4/35
R553	7030005220	S.RES ERJ2GEJ 223 X (22 kΩ)	B	100.5/33.5
R561	7030005050	S.RES ERJ2GEJ 103 X (10 kΩ)	T	100.3/21.8
R562	7030005040	S.RES ERJ2GEJ 472 X (4.7 kΩ)	T	98.7/23.4
R571	7030005930	S.RES ERJ3GEYF 334 V (330 kΩ)	B	105.2/30
R572	7030008090	S.RES ERJ3EKF 1503 V (150 kΩ)	B	103.1/27.3
R581	7030005050	S.RES ERJ2GEJ 103 X (10 kΩ)	B	9.2/12.3
R583	7030005090	S.RES ERJ2GEJ 104 X (100 kΩ)	T	6.4/34.4
R584	7030005090	S.RES ERJ2GEJ 104 X (100 kΩ)	T	6.9/33
R591	7030005050	S.RES ERJ2GEJ 103 X (10 kΩ)	B	10.7/12.1
R592	7030005050	S.RES ERJ2GEJ 103 X (10 kΩ)	B	8/9.6
R601	7030005530	S.RES ERJ2GEJ 100 X (10 Ω)	T	6.6/17.4
R602	7030005160	S.RES ERJ2GEJ 105 X (1 MΩ)	T	6.1/18.9
R603	7030008010	S.RES ERJ2GEJ 123 X (12 kΩ)	T	7.8/15
R604	7030008010	S.RES ERJ2GEJ 123 X (12 kΩ)	T	6.5/14.4
R605	7030008010	S.RES ERJ2GEJ 123 X (12 kΩ)	T	7.3/10.3
R606	7030005120	S.RES ERJ2GEJ 102 X (1 kΩ)	T	6.8/8.8
R611	7030005050	S.RES ERJ2GEJ 103 X (10 kΩ)	T	54.8/42.5
R612	7030005040	S.RES ERJ2GEJ 472 X (4.7 kΩ)	T	54.3/44.8
R631	7030005050	S.RES ERJ2GEJ 103 X (10 kΩ)	B	25.5/7.6
R632	7030005090	S.RES ERJ2GEJ 104 X (100 kΩ)	B	23.9/5.2
R633	7030005050	S.RES ERJ2GEJ 103 X (10 kΩ)	B	15.9/6.7
R634	7030005050	S.RES ERJ2GEJ 103 X (10 kΩ)	B	23.9/7.1
R635	7030005050	S.RES ERJ2GEJ 103 X (10 kΩ)	B	17.1/5.8
R636	7030005050	S.RES ERJ2GEJ 103 X (10 kΩ)	B	14.7/5.3
R637	7030005050	S.RES ERJ2GEJ 103 X (10 kΩ)	B	14.3/6.6
R638	7030005050	S.RES ERJ2GEJ 103 X (10 kΩ)	B	13.7/9.6
R639	7030005050	S.RES ERJ2GEJ 103 X (10 kΩ)	B	12.7/9.8
R651	7030007280	S.RES ERJ2GEJ 331 X (330 Ω)	T	63.1/4.3
R652	7030004990	S.RES ERJ2GEJ 221 X (220 Ω)	T	62.1/3.8
R653	7030005120	S.RES ERJ2GEJ 102 X (1 kΩ)	T	15.8/38.2
R654	7030005010	S.RES ERJ2GEJ 681 X (680 Ω)	T	14.8/38.2
R656	7030005120	S.RES ERJ2GEJ 102 X (1 kΩ)	T	16.3/11.8
R657	7030005010	S.RES ERJ2GEJ 681 X (680 Ω)	T	15.3/11.8
R658	7030005120	S.RES ERJ2GEJ 102 X (1 kΩ)	T	16.2/22.7
R659	7030005010	S.RES ERJ2GEJ 681 X (680 Ω)	T	15.2/22.7
R662	7030007280	S.RES ERJ2GEJ 331 X (330 Ω)	T	68.9/4.3
R663	7030004990	S.RES ERJ2GEJ 221 X (220 Ω)	T	70.3/3.3
R681	7030009150	S.RES ERJ2GEJ 824 X (820 kΩ)	B	12.7/17.2
R682	7030005700	S.RES ERJ2GEJ 274 X (270 kΩ)	B	6.6/26.5

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

[MAIN UNIT]

REF NO.	ORDER NO.	DESCRIPTION	M.	H/V LOCATION
R683	7030006610	S.RES ERJ2GEJ 394 X (390 kΩ)	B	12/29.3
R684	7030003830	S.RES ERJ3GEYJ 185 V (1.8 MΩ)	B	13.2/29.7
R685	7030007340	S.RES ERJ2GEJ 153 X (15 kΩ)	B	8.4/31.4
R686	7030005120	S.RES ERJ2GEJ 102 X (1 kΩ)	B	8.1/33.2
R687	7030005120	S.RES ERJ2GEJ 102 X (1 kΩ)	B	5.4/31.3
R688	7030005080	S.RES ERJ2GEJ 823 X (82 kΩ)	B	4.3/34.2
R689	7030005240	S.RES ERJ2GEJ 473 X (47 kΩ)	B	3.6/33.2
R690	7030010040	S.RES ERJ2GE-JPW	B	47.7/31.3
R691	7030010040	S.RES ERJ2GE-JPW	B	50.7/30.5
R692	7030010040	S.RES ERJ2GE-JPW	T	5.4/38.7
R693	7030005120	S.RES ERJ2GEJ 102 X (1 kΩ)	T	119.6/20.5
R694	7030005170	S.RES ERJ2GEJ 474 X (470 kΩ)	B	28.2/11.2
R695	7030005090	S.RES ERJ2GEJ 104 X (100 kΩ)	B	88.9/47.7
R696	7030005090	S.RES ERJ2GEJ 104 X (100 kΩ)	B	41.2/40.8
R697	7030005090	S.RES ERJ2GEJ 104 X (100 kΩ)	B	48.2/40.8
R698	7030007340	S.RES ERJ2GEJ 153 X (15 kΩ)	B	40.3/45.6
R699	7030005230	S.RES ERJ2GEJ 334 X (330 kΩ)	B	38.3/45.6
R700	7030007570	S.RES ERJ2GEJ 122 X (1.2 kΩ)	B	38.8/40.6
R701	7030006610	S.RES ERJ2GEJ 394 X (390 kΩ)	B	36.9/40.6
R702	7030005220	S.RES ERJ2GEJ 223 X (22 kΩ)	B	34.8/44.5
R703	7030003830	S.RES ERJ3GEYJ 185 V (1.8 MΩ)	B	33.3/43.3
R704	7030005090	S.RES ERJ2GEJ 104 X (100 kΩ)	B	11/31.1
R705	7030008290	S.RES ERJ2GEJ 183 X (18 kΩ)	B	49.9/37.5
R706	7030008090	S.RES ERJ3EKF 1503 V (150 kΩ)	B	44.4/35
R707	7030005210	S.RES ERJ2GEJ 822 X (8.2 kΩ)	B	49.9/38.5
R708	7030008410	S.RES ERJ2GEJ 392 X (3.9 kΩ)	B	49.8/36
R709	7030005040	S.RES ERJ2GEJ 472 X (4.7 kΩ)	B	50.3/41.8
R710	7030005210	S.RES ERJ2GEJ 822 X (8.2 kΩ)	B	51.7/40.1
R711	7030005090	S.RES ERJ2GEJ 104 X (100 kΩ)	B	56.2/37.1
R712	7030005040	S.RES ERJ2GEJ 472 X (4.7 kΩ)	B	52.6/37.9
R715	7030010040	S.RES ERJ2GE-JPW	B	24.9/35.7
R717	7030010040	S.RES ERJ2GE-JPW	B	28.9/10.1
R718	7030005120	S.RES ERJ2GEJ 102 X (1 kΩ)	B	92.7/42.9
R720	7030010040	S.RES ERJ2GE-JPW	B	45/45.5
C1	4030016930	S.CER ECJ0EB1A104K	B	51/17.8
C2	4030016930	S.CER ECJ0EB1A104K	B	52.6/17.8
C3	4030017460	S.CER ECJ0EB1E102K	B	53.6/17.8
C4	4030017420	S.CER ECJ0EC1H470J	B	55.8/16.4
C5	4030016930	S.CER ECJ0EB1A104K	B	42.6/17.5
C6	4030018560	S.CER C2012 JB 1A 475K-T	B	46.5/20
C10	4030016930	S.CER ECJ0EB1A104K	B	46.3/8.8
C11	4030017460	S.CER ECJ0EB1E102K	B	45.3/8.8
C12	4030007010	S.CER C1608 CH 1H 100D-T	B	48.2/9.1
C13	4030017430	S.CER ECJ0EC1H101J	B	51.2/10.6
C14	4030017460	S.CER ECJ0EB1E102K	B	55.5/15.4
C16	4550006300	S.TAN ECST1AY475R	B	51.6/6.7
C17	4550006160	S.TAN ECST1CY155R	B	58/8.2
C19	4030017460	S.CER ECJ0EB1E102K	B	45.3/5.8
C20	4030017460	S.CER ECJ0EB1E102K	B	50/5.7
C21	4030017460	S.CER ECJ0EB1E102K	B	44.8/4.5
C31	4030007040	S.CER C1608 CH 1H 180J-T	B	69.8/12
C32	4030006990	S.CER C1608 CH 1H 080D-T	B	67.6/14.9
C33	4030007070	S.CER C1608 CH 1H 330J-T	B	65.9/18
C34	4030017460	S.CER ECJ0EB1E102K	T	67.8/21.9
C35	4030017730	S.CER ECJ0EB1E471K	T	65.4/22.9
C36	4030018860	S.CER ECJ0EB0J105K	T	61.9/23
C37	4030009540	S.CER C1608 CH 1H 1R5B-T	T	67.2/17.7
C38	4030018860	S.CER ECJ0EB0J105K		
C39	4030009920	S.CER C1608 CH 1H 050B-T [EUR], [UK], [FRG] only	B	63.2/8.3
C40	4030009350	S.CER C1608 CH 1H 3R5B-T [EUR], [UK], [FRG] only	B	66.7/9.9
C41	4030009550	S.CER C1608 CH 1H 2R5B-T [EUR], [UK], [FRG] only	B	64.1/10
C42	4030007090	S.CER C1608 CH 1H 470J-T	B	74.4/11
C43	4030007020	S.CER C1608 CH 1H 120J-T	B	74.4/12.3
C44	4030017730	S.CER ECJ0EB1E471K	B	78.5/9.3
C45	4030016790	S.CER ECJ0EB1C103K	B	78.5/8.3
C46	4030009560	S.CER C1608 CH 1H R75B-T	B	78.7/14.6
C47	4550006700	S.TAN ECST1AY106R	B	83.3/3
C48	4550006700	S.TAN ECST1AY106R	B	74.1/3.6
C51	4030009560	S.CER C1608 CH 1H R75B-T	B	68.8/18.9
C52	4030009920	S.CER C1608 CH 1H 050B-T	B	70/14.9
C53	4030007050	S.CER C1608 CH 1H 220J-T	B	71.7/17.2
C54	4030007040	S.CER C1608 CH 1H 180J-T	B	71.7/18.5
C55	4030017730	S.CER ECJ0EB1E471K	B	76.9/14.5
C56	4030016790	S.CER ECJ0EB1C103K	B	76.9/15.5
C57	4030009500	S.CER C1608 CH 1H 0R5B-T	B	74.4/18.1
C61	4030017460	S.CER ECJ0EB1E102K	B	78.3/19.5
C62	4030006980	S.CER C1608 CH 1H 070D-T	B	72.7/21
C63	4030017460	S.CER ECJ0EB1E102K	B	73/23.8
C64	4030016930	S.CER ECJ0EB1A104K	B	74/23.8
C65	4030007040	S.CER C1608 CH 1H 180J-T	B	78.7/23
C71	4030009550	S.CER C1608 CH 1H 2R5B-T	B	70.8/22.7
C72	4030017460	S.CER ECJ0EB1E102K	B	68.1/23.6
C73	4030006990	S.CER C1608 CH 1H 080D-T	B	66.5/21.1
C74	4030007100	S.CER C1608 CH 1H 560J-T	B	64.4/23.6
C75	4030007100	S.CER C1608 CH 1H 560J-T	B	63.1/23.6
C81	4030007020	S.CER C1608 CH 1H 120J-T	T	74.9/10.9
C82	4030007020	S.CER C1608 CH 1H 120J-T	T	75.1/17.7
C83	4030017420</			

[MAIN UNIT]

REF NO.	ORDER NO.	DESCRIPTION	M.	H/V LOCATION
C84	4030016930	S.CER ECJ0EB1A104K	T	69.3/17.1
C91	4030007000	S.CER C1608 CH 1H 090D-T	T	78.9/21.2
C92	4030017460	S.CER ECJ0EB1E102K	T	83/16.2
C96	4030017460	S.CER ECJ0EB1E102K	T	86.1/14.2
C97	4030017420	S.CER ECJ0EC1H470J	T	84.3/13
C98	4030017460	S.CER ECJ0EB1E102K	T	84.3/14
C99	4030017460	S.CER ECJ0EB1E102K	T	80.9/6
C100	4030017380	S.CER ECJ0EC1H050B	T	82.6/13
C103	4030007030	S.CER C1608 CH 1H 150J-T	T	90/7
C104	4030016930	S.CER ECJ0EB1A104K	T	93.3/6.1
C105	4030017460	S.CER ECJ0EB1E102K	T	93.3/7.1
C106	4030017460	S.CER ECJ0EB1E102K	T	91.8/14.3
C107	4030007050	S.CER C1608 CH 1H 220J-T	T	96.9/14.8
C111	4030007130	S.CER C1608 CH 1H 101J-T	T	94.9/6.2
C112	4030017460	S.CER ECJ0EB1E102K	T	95.5/3.8
C113	4030016930	S.CER ECJ0EB1A104K	T	94.5/3.8
C114	4030017420	S.CER ECJ0EC1H470J	T	106.1/16.4
C115	4030017460	S.CER ECJ0EB1E102K	T	104.2/16.1
C121	4030007100	S.CER C1608 CH 1H 560J-T	T	103.6/2.7
C122	4030007080	S.CER C1608 CH 1H 390J-T	T	104.3/6.8
C123	4030007070	S.CER C1608 CH 1H 330J-T	T	107.6/4.3
C123	4030009650	S.CER C1608 CH 1H 240J-T	T	107.6/4.3
C124	4030006860	S.CER C1608 JB 1H 102K-T	T	106.9/6.5
C125	4030007030	S.CER C1608 CH 1H 150J-T	T	109.6/3
C126	4030007040	S.CER C1608 CH 1H 180J-T	T	110.9/3
C127	4030006860	S.CER C1608 JB 1H 102K-T	T	110.8/8.7
C128	4030017420	S.CER ECJ0EC1H470J	T	112.5/15.1
C129	4030017460	S.CER ECJ0EB1E102K	T	111.4/17.2
C131	4030006860	S.CER C1608 JB 1H 102K-T	T	112.7/5.8
C132	4030007050	S.CER C1608 CH 1H 220J-T	T	112.8/3
C133	4030011530	S.CER C1608 CH 1H 110J-T	T	114.3/6.8
C134	4030009650	S.CER C1608 CH 1H 240J-T	T	116.8/7.5
C135	4030006980	S.CER C1608 CH 1H 070D-T	B	115.4/8.9
C136	4030007000	S.CER C1608 CH 1H 090D-T	T	117.5/10.1
C137	4030017460	S.CER ECJ0EB1E102K	T	114.9/16.1
C138	4030009500	S.CER C1608 CH 1H 0R5B-T	T	113/11.7
C141	4030016930	S.CER ECJ0EB1A104K	T	103.8/24
C142	4030017460	S.CER ECJ0EB1E102K	T	110.2/19.8
C143	4030016930	S.CER ECJ0EB1A104K	T	105.4/20.3
C144	4030016790	S.CER ECJ0EB1C103K	T	109.5/25.2
C145	4030017460	S.CER ECJ0EB1E102K	T	103.2/20.6
C151	4030007000	S.CER C1608 CH 1H 090D-T	B	109/5.3
C152	4030007010	S.CER C1608 CH 1H 100D-T	B	112.9/10.1
C153	4030009530	S.CER C1608 CH 1H 030B-T	B	111.3/11.4
C154	4030017460	S.CER ECJ0EB1E102K	B	109.7/13.9
C155	4030017460	S.CER ECJ0EB1E102K	B	115.8/16.5
C156	4030011770	S.CER C1608 CH 1H 060B-T	B	109.3/15.7
C157	4030007060	S.CER C1608 CH 1H 270J-T	B	107.8/20.4
C158	4030017460	S.CER ECJ0EB1E102K	B	107/22.2
C159	4030009550	S.CER C1608 CH 1H 2R5B-T	B	107.3/16.2
C160	4030009510	S.CER C1608 CH 1H 010B-T	B	105.7/19.7
C161	4030007100	S.CER C1608 CH 1H 560J-T	B	105.4/21.7
C162	4030017460	S.CER ECJ0EB1E102K	B	104.5/24
C163	4030009910	S.CER C1608 CH 1H 040B-T	B	105.4/16.9
C164	4030006980	S.CER C1608 CH 1H 070D-T	B	102.3/19.8
C165	4030016790	S.CER ECJ0EB1C103K	B	97.2/20.9
C166	4030017420	S.CER ECJ0EC1H470J	B	97.5/22.4
C167	4030016790	S.CER ECJ0EB1C103K	B	98.5/23.3
C168	4030006990	S.CER C1608 CH 1H 080D-T	[EUR], [UK], [FRG]	
	4030011770	S.CER C1608 CH 1H 060B-T	[USA], [USA-1]	110.6/15.7
C171	4030017480	S.CER C1608 JB 1A 474K-T	B	100.4/19.7
C172	4030017460	S.CER ECJ0EB1E102K	B	94.7/16.1
C173	4030017420	S.CER ECJ0EC1H470J	B	94.7/17.1
C181	4030017460	S.CER ECJ0EB1E102K	B	93.9/19.8
C182	4030007120	S.CER C1608 CH 1H 820J-T	B	92.1/21.5
C183	4030017460	S.CER ECJ0EB1E102K	B	92.1/23.7
C184	4030009550	S.CER C1608 CH 1H 2R5B-T	B	92.4/16.2
C185	4030009510	S.CER C1608 CH 1H 010B-T	B	92.6/18.6
C186	4030007070	S.CER C1608 CH 1H 330J-T	B	89.2/21.5
C187	4030017460	S.CER ECJ0EB1E102K	B	89.5/23.7
C188	4030011770	S.CER C1608 CH 1H 060B-T	B	89.6/16.2
C189	4030009920	S.CER C1608 CH 1H 050B-T	B	89.7/19.6
C191	4030017460	S.CER ECJ0EB1E102K	B	87.2/21.4
C192	4030017420	S.CER ECJ0EC1H470J	B	87.2/22.4
C193	4030007100	S.CER C1608 CH 1H 560J-T	B	83.2/19
C194	4030016970	S.CER ECJ0EB1C223K	B	82.3/15.5
C195	4030017460	S.CER ECJ0EB1E102K	B	82.8/16.8
C201	4030017460	S.CER ECJ0EB1E102K	T	82.5/23.8
C202	4030007060	S.CER C1608 CH 1H 270J-T	T	85.3/22.5
C203	4030006990	S.CER C1608 CH 1H 080D-T	T	84.7/19.2
C210	4550006300	S.TAN ECST1AY475R	T	87.2/29.5
C211	4030017460	S.CER ECJ0EB1E102K	B	88.1/27.6
C213	4030007000	S.CER C1608 CH 1H 090D-T	[USA], [USA-1]	92.8/34.6
	4030011770	S.CER C1608 CH 1H 060B-T	[EUR], [UK], [FRG]	92.8/34.6
C215	4030017460	S.CER ECJ0EB1E102K	T	82.7/38.2
C216	4030016790	S.CER ECJ0EB1C103K	T	87.3/38.5
C217	4030007130	S.CER C1608 CH 1H 101J-T	T	80.3/38.5
C221	4030007010	S.CER C1608 CH 1H 100D-T	B	60.1/28.1
C222	4030016790	S.CER ECJ0EB1C103K	B	61.3/29.8

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

[MAIN UNIT]

REF NO.	ORDER NO.	DESCRIPTION	M.	H/V LOCATION
C223	4030007040	S.CER C1608 CH 1H 180J-T	B	67/30.4
C224	4030009520	S.CER C1608 CH 1H 020B-T	B	67/28.1
C225	4030007050	S.CER C1608 CH 1H 220J-T	B	68.3/30.4
C226	4030006980	S.CER C1608 CH 1H 070D-T	B	70.9/28.9
C231	4030017460	S.CER ECJ0EB1E102K	B	82.8/38.2
C232	4030007130	S.CER C1608 CH 1H 101J-T	T	75.7/34.7
C233	4030016930	S.CER ECJ0EB1A104K	T	73.3/35
C234	4030016930	S.CER ECJ0EB1A104K	T	68/38.2
C235	4030016930	S.CER ECJ0EB1A104K	T	74.9/31.8
C236	4030016790	S.CER ECJ0EB1C103K	T	77.5/36.7
C237	4030017720	S.CER ECJ0EB1H331K	B	82.2/34.7
C238	4030017720	S.CER ECJ0EB1H331K	B	82.2/33.7
C239	4550006300	S.TAN ECST1AY475R	B	84.5/36.8
C240	4030017460	S.CER ECJ0EB1E102K	B	81.5/36.7
C241	4030016930	S.CER ECJ0EB1A104K	B	81.5/35.7
C242	4030017460	S.CER ECJ0EB1E102K	B	72.6/31.3
C243	4030017460	S.CER ECJ0EB1E102K	B	74.6/31.3
C244	4030017460	S.CER ECJ0EB1E102K	B	75/33.2
C245	4030017460	S.CER ECJ0EB1E102K	T	80.6/36
C246	4030017730	S.CER ECJ0EB1E471K	T	86.9/32.2
C247	4030017460	S.CER ECJ0EB1E102K	B	71.9/36.7
C251	4030016790	S.CER ECJ0EB1C103K	B	56.8/18.3
C252	4030016790	S.CER ECJ0EB1C103K	B	57.3/29.6
C253	4030016790	S.CER ECJ0EB1C103K	B	58.8/18.5
C261	4030016780	S.CER ECJ0EB1C153K	B	62.8/38.4
C262	4030017040	S.CER ECJ0EB1A333K	B	61.8/37.8
C263	4030016950	S.CER ECJ0EB1A473K	B	62.5/40.5
C265	4030017460	S.CER ECJ0EB1E102K	B	54.2/38.3
C266	4030017700	S.CER ECJ0EC1H151J	B	58.4/44.9
C267	4030017780	S.CER ECJ0EB1E472K	B	62.4/43.1
C268	4030016950	S.CER ECJ0EB1A473K	B	64.9/44.3
C269	4030016790	S.CER ECJ0EB1C103K	T	56.9/43.1
C270	4030017920	S.CER ECJ0EB1A683K	B	66.2/43.4
C272	4030017480	S.CER C1608 JB 1A 474K-T	T	62.7/35.6
C281	4030016790	S.CER ECJ0EB1C103K	T	57.9/44.3
C282	4030017460	S.CER ECJ0EB1E102K	B	112.4/31.3
C291	4030016790	S.CER ECJ0EB1C103K	T	63.4/30.7
C292	4030017790	S.CER ECJ0EB1E682K	T	63/33.3
C293	4030017040	S.CER ECJ0EB1A333K	T	62/30.1
C294	4030018080	S.CER ECJ0EB1H182K	T	63.4/31.8
C301	4030016970	S.CER ECJ0EB1C223K	T	57.1/28
C302	4030017760	S.CER ECJ0EB1H222K	T	56.1/28
C322	4030016790	S.CER ECJ0EB1C103K	T	92.1/20.9
C323	4030016790	S.CER ECJ0EB1C103K	T	94.9/20.9
C324	4030016790	S.CER ECJ0EB1C103K	T	95.4/26.9
C325	4550006710	S.TAN ECST1AX226R	B	102.9/31
C326	4550006300	S.TAN ECST1AY475R	T	112.8/25.1
C341	4030016790	S.CER ECJ0EB1C103K	B	36.3/11.5
C381	4030018860	S.CER ECJ0EB0J105K	B	30.2/40.7
C382	4030018860	S.CER ECJ0EB0J105K	B	27.7/32.2
C383	4030018860	S.CER ECJ0EB0J105K	B	26.6/31.2
C384	4030016930	S.CER ECJ0EB1A104K	B	36.6/33.4
C385	4030016930	S.CER ECJ0EB1A104K	B	29.5/30.5
C386	4030018860	S.CER ECJ0EB0J105K	B	30.6/36
C387	4030018860	S.CER ECJ0EB0J105K	B	35.7/38.7
C388	4030016790	S.CER ECJ0EB1C103K	B	30.6/32
C389	4030016790	S.CER ECJ0EB1C103K	B	36/36.7
C391	4030016930	S.CER ECJ0EB1A104K	B	7.9/41.6
C392	4030017650	S.CER ECJ0EC1H270J	B	17.1/41.9
C393	4030017650	S.CER ECJ0EC1H270J	B	17.1/34.3
C394	4030017690	S.CER ECJ0EC1H121J	B	10.4/34.9
C395	4030016930	S.CER ECJ0EB1A104K	B	7.9/42.6
C396	4030018860	S.CER ECJ0EB0J105K	B	28.7/33.3
C397	4030018860	S.CER ECJ0EB0J105K	B	31.1/39.7
C398	4030017630	S.CER ECJ0EC1H120J	B	7.3/38.4
C411	4030017480	S.CER C1608 JB 1A 474K-T	T	99.1/30.2
C412	4550006430	S.TAN ECST1VY474R	T	92.7/30.8
C413	4030016930	S.CER ECJ0EB1A104K	T	100.6/31.4
C421	4550006210	S.TAN ECST1CX106R	B	106.5/39.7
C422	4030016930	S.CER ECJ0EB1A104K	T	103.8/29.3
C423	4030017460	S.CER ECJ0EB1E102K	T	104.8/29.3
C424	4550006700	S.TAN ECST1AY106R	T	109.1/35
C425	4030017420	S.CER ECJ0EC1H470J	T	104.9/31.4
C426	4030016950	S.CER ECJ0EB1A473K	B	104.4/40.6
C427	4550007050	S.TAN ECST1AD157R	B	108.3/30.8
C431	4030018860	S.CER ECJ0EB0J105K	T	108.6/27.1
C432	4030016930	S.CER ECJ0EB1A104K	T	107.1/32.1
C441	4030017420	S.CER ECJ0EC1H470J	T	104/40.2
C461	4030017460	S.CER ECJ0EB1E102K	B	94.3/47.5
C462	4030016930	S.CER ECJ0EB1A104K	B	48.3/42.8
C463	4030016790	S.CER ECJ0EB1C103K	B	49.2/43.8
C464	4030018860	S.CER ECJ0EB0J105K	B	44/45.5
C465	4030018860	S.CER ECJ0EB0J105K	B	43.2/40.7
C466	4030016930	S.CER ECJ0EB1A104K	B	89.5/40.4
C467	4550006700	S.TAN ECST1AY106R	B	96.8/42.4
C472	4550006700	S.TAN ECST1AY106R	B	59.7/32.2
C473	4030016790	S.CER ECJ0EB1C103K	B	52.6/44.4
C481	4030016790	S.CER ECJ0EB1C103K	B	46.8/39.8
C491	4030016790	S.CER ECJ0EB1C103K	B	39.1/29.3
C492	4030018860	S.CER ECJ0EB0J105K	B	37.4/24.8
C502	4030017700	S.CER ECJ0EC1H151J	B	40.7/28.3
C503	4030017780	S.CER ECJ0EB1E472K	B	39.1/27.1
C504	4030017910	S.CER ECJ0EB1H152K	B	36.6/27

S.=Surface mount

[MAIN UNIT]

REF NO.	ORDER NO.	DESCRIPTION	M.	H/V LOCATION
C511	4030017770	S.CER ECJ0EB1E332K	B	33/24.6
C512	4030016930	S.CER ECJ0EB1A104K	B	33/27
C521	4030016930	S.CER ECJ0EB1A104K	B	47.2/30
C522	4030016970	S.CER ECJ0EB1C223K	B	48.2/30
C531	4030016950	S.CER ECJ0EB1A473K	B	35.2/15.5
C532	4030016940	S.CER ECJ0EB1A393K	B	37.8/18.6
C533	4030016930	S.CER ECJ0EB1A104K	B	37.3/20.9
C534	4030017740	S.CER ECJ0EB1E821K	B	39.4/23.7
C535	4030016790	S.CER ECJ0EB1C103K	B	35/21.5
C536	4030016950	S.CER ECJ0EB1A473K	B	38.6/20
C552	4030017460	S.CER ECJ0EB1E102K	T	109.2/37.1
C553	4550006820	S.TAN ECST1DX106R	B	118.9/22.5
C554	4030016790	S.CER ECJ0EB1C103K	T	92.2/34.5
C555	4030011810	S.CER C1608 JB 1A 224K-T	B	100.5/31.6
C556	4030017460	S.CER ECJ0EB1E102K	T	97.3/33.4
C557	4550006710	S.TAN ECST1AX226R	B	98.1/31
C561	4030016790	S.CER ECJ0EB1C103K	T	98.7/21.2
C571	4030016790	S.CER ECJ0EB1C103K	B	105.1/26.7
C581	4030017030	S.CER ECJ0EB1A273K	B	5.6/15.1
C591	4030016790	S.CER ECJ0EB1C103K	B	7.9/8.1
C601	4030017400	S.CER ECJ0EC1H220J	T	6.1/15.9
C602	4030017590	S.CER ECJ0EC1H070C	T	6.1/20.8
C603	4030017660	S.CER ECJ0EC1H330J	T	7.1/18.9
C604	4030016790	S.CER ECJ0EB1C103K	T	6.1/12.3
C605	4030017420	S.CER ECJ0EC1H470J	T	5.8/10.8
C606	4030016790	S.CER ECJ0EB1C103K	T	5.8/9.8
C611	4030017460	S.CER ECJ0EB1E102K	T	55.5/44.8
C612	4030016970	S.CER ECJ0EB1C223K	T	54.2/41.1
C641	4550006710	S.TAN ECST1AX226R	T	4/27.5
C642	4030016790	S.CER ECJ0EB1C103K	B	34.6/19.9
C643	4030016790	S.CER ECJ0EB1C103K	B	28.2/9.1
C661	4030016950	S.CER ECJ0EB1A473K	B	7.7/14.6
C662	4030017460	S.CER ECJ0EB1E102K	B	113.8/30.3
C664	4030016950	S.CER ECJ0EB1A473K	B	5.8/17.6
C665	4030016950	S.CER ECJ0EB1A473K	B	6.8/19.2
C666	4030017040	S.CER ECJ0EB1A333K	B	5.7/19.2
C667	4030016950	S.CER ECJ0EB1A473K	B	5.2/20.5
C668	4030016950	S.CER ECJ0EB1A473K	B	5.2/21.5
C669	4030016950	S.CER ECJ0EB1A473K	B	5.6/23
C670	4030016950	S.CER ECJ0EB1A473K	B	6.6/23
C671	4030016930	S.CER ECJ0EB1A104K	B	10/23.6
C681	4030016930	S.CER ECJ0EB1A104K	B	7.4/31.3
C682	4030017480	S.CER C1608 JB 1A 474K-T	B	8.3/24.6
C683	4030017480	S.CER C1608 JB 1A 474K-T	B	6.3/25.3
C684	4030017480	S.CER C1608 JB 1A 474K-T	B	14.6/29.7
C685	4030017480	S.CER C1608 JB 1A 474K-T	B	10.6/25.1
C686	4030017420	S.CER ECJ0EC1H470J	B	6.4/31.3
C687	4030017420	S.CER ECJ0EC1H470J	B	9.7/30.9
C688	4030016930	S.CER ECJ0EB1A104K	B	89.9/47.7
C689	4030017460	S.CER ECJ0EB1E102K	B	45.2/40.7
C690	4030016960	S.CER ECJ0EB1C183K	B	40/43
C691	4030016960	S.CER ECJ0EB1C183K	B	39.8/44.3
C692	4030017730	S.CER ECJ0EB1E471K	B	39.3/45.6
C693	4030017460	S.CER ECJ0EB1E102K	B	32.1/42.3
C695	4030018860	S.CER ECJ0EB0J105K	B	48.8/39.5
C696	4030016930	S.CER ECJ0EB1A104K	B	48.5/41.8
C697	4030016930	S.CER ECJ0EB1A104K	B	36/45.5
C698	4030017460	S.CER ECJ0EB1E102K	B	113.8/31.3
C699	4030017460	S.CER ECJ0EB1E102K	B	90.9/48
C700	4030018860	S.CER ECJ0EB0J105K	B	92.9/48
J352	6910016370	CNR IMSA-9230B-1-06Z032-PT1		
J412	6510021900	S.CNR BM02B-ASRS-TF	T	107.3/40.1
J414	6510024530	S.CNR 14FH-SM1-TB	T	118.8/28.5
DS653	5040002310	S.LED SML-311YTT86	T	31.8/40.6
DS654	5040002310	S.LED SML-311YTT86	T	15.3/40.6
DS656	5040002310	S.LED SML-311YTT86	T	32.3/9.4
DS657	5040002310	S.LED SML-311YTT86	T	15.8/9.4
DS658	5040002310	S.LED SML-311YTT86	T	32.3/24.9
DS659	5040002310	S.LED SML-311YTT86	T	15.8/24.9
DS681	5030002790	LCD A0286 LCD39.0*25.0 (19.0) *0.7T		
MC461	7700002480	MIC SKB-2746 LPC		
S100	2260002850	S.SW EVQP2T02M	T	18.3/40.6
S101	2260002850	S.SW EVQP2T02M	T	34.8/40.6
S102	2260002850	S.SW EVQP2T02M	T	35.3/24.9
S103	2260002850	S.SW EVQP2T02M	T	18.8/24.9
S104	2260002850	S.SW EVQP2T02M	T	35.3/9.4
S105	2260002850	S.SW EVQP2T02M	T	18.8/9.4
S461	2260002840	SW SKHLLFA010		
S641	2260002800	S.SW SW-167 (SKQTLAE010)	B	80.4/49
EP1	0910058232	PCB B 6190B		
EP2	6910015370	S.BEA ACZ1005Y-102-T	B	41.2/7.9
EP3	6910015370	S.BEA ACZ1005Y-102-T	B	41.5/10.3
EP4	6910015370	S.BEA ACZ1005Y-102-T	B	43.5/10.3

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

[MAIN UNIT]

REF NO.	ORDER NO.	DESCRIPTION	M.	H/V LOCATION
EP101	6910013370	S.BEA BLM18BB221SN1D	T	91.7/16.5
EP111	6910014690	S.BEA MPZ1608S221A-T	T	107/18
EP681	8930064210	LCT SRCN-2795-SP-N-W		
EP682	6910016340	E.OTH CV1083 FX2795		

[VR UNIT]

REF NO.	ORDER NO.	DESCRIPTION	M.	H/V LOCATION
R801	7210002530	VAR TP96N937N-15F-10KA-1540		
F1	5210000900	S.FUS 0434003.NRP	B	12.2/4.4
EP1	0910058242	PCB B 6191B		

[MIC UNIT]

REF NO.	ORDER NO.	DESCRIPTION	M.	H/V LOCATION
Q655	1590001770	S.TR XP1213 (TX)	B	3.6/2.1
R713	7030005010	S.RES ERJ2GEJ 681 X (680 Ω)	B	6.1/1.8
R714	7030005120	S.RES ERJ2GEJ 102 X (1 kΩ)	B	5.9/2.8
C700	4030017420	S.CER ECJ0EC1H470J	B	11.4/5.1
C702	4030017420	S.CER ECJ0EC1H470J	B	3.8/5
C703	4030017620	S.CER ECJ0EC1H100C	B	4.5/7.8
J415	6510022020	S.CNR 14FLT-SM1-TB	B	6.6/13
J416	6510021940	CNR 246S-550-4P		
DS655	5040003090	S.LED FRDG1211F-TR	B	10/1.8
W470	8900013540	CBL OPC-1410 (N=14,L=50)		
EP1	0910058252	PCB B 6192B		
EP451	6910012350	S.BEA MMZ1608Y 102BT	B	9.6/5.1
EP452	6910012350	S.BEA MMZ1608Y 102BT	B	12.6/10.7
EP454	6910012350	S.BEA MMZ1608Y 102BT	B	3.4/8.9
EP458	6910012350	S.BEA MMZ1608Y 102BT	B	3.7/6.4

[CHASSIS UNIT]

REF NO.	ORDER NO.	DESCRIPTION	M.	H/V LOCATION
J41	6910016650	CNR 2795 ANT CONNECTOR		
SP1	2510001092	SP 036D0801B <FG>		
W3	8900010960	CBL OPC-1129		

S.=Surface mount

SECTION 7 MECHANICAL PARTS AND DISASSEMBLY

7-1 CABINET PARTS

[MAIN UNIT]

REF.	ORDER. NO.	DESCRIPTION	QTY.
DS681	5030002790	LCD A0286	1
EP681	8930064210	LCD contact SRCN-2795-SP-N-W	1
MP681	8930063850	2795 LCD holder	1

[CHASSIS PARTS]

REF.	ORDER. NO.	DESCRIPTION	QTY.
J41	6910014700	2600 ANT connector	1
SP1	2510001092	Speaker 036D0801B	1
W3	8900010960	Cable OPC-1129	1
MP1	8210020840	2795 Front panel	[M90] 1
	8210021170	2795 Front panel (B)	[M90E] 1
MP8	8210020870	2795 SP panel	1
MP10	8930063640	2795 SP rubber	1
MP18	8930063600	2795 MIC cap	1
MP20	8210020850	2795 rear panel	1
MP21	8610011151	2497 BATT lock-1	1
MP22	8930065070	2795 lock plate	1
MP23	8930063630	2795 terminal holder	1
MP24	8930063840	2795 A-terminal	1
MP25	8930063830	2795 B-terminal	1
MP26	8930063820	2795 C-terminal	1
MP31	8830001140	VR nut (J)	1
MP32	8930052280	O ring (AC)	1
MP33	8610012200	Knob N-321 (A)	1
MP35	8830001480	VR nut (O)	1
MP41	8010019740	2795 chassis	1
MP46	8930063660	2795 main seal	1
MP47	8810009510	Screw B0 2X4 NI-ZU (BT)	9
MP51	8830001600	Screw nut (L)	1
MP52	8930065190	O ring (BB)	1
MP66	8930059800	2600 pet sheet	1
MP67	8930030920	1301 sheet	1
MP70	8810010150	Screw B0 2X10 SUS ZK	2
MP71	8820001320	2795 screw	4
MP73	8930063690	O ring (BA)	4
MP74	8810009560	Screw B0 2X6 ZK (BT)	3
MP75	8810009560	Screw B0 2X6 ZK (BT)	1
MP76	8810010150	Screw B0 2X10 SUS ZK	2
MP77	8510016610	2795 shield plate	1

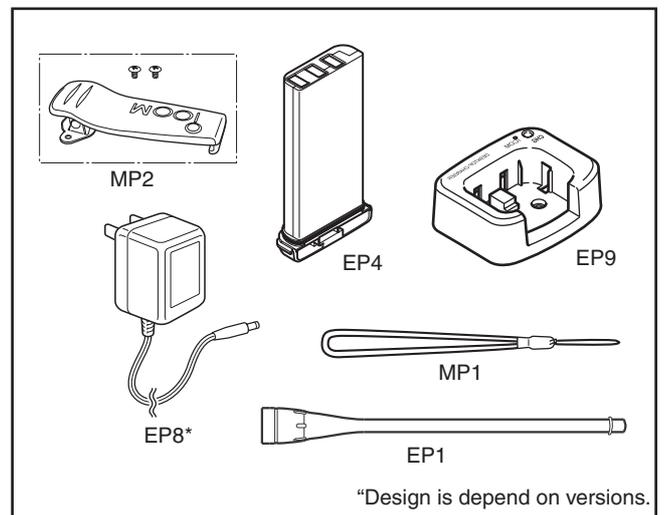
Screw abbreviations B0, BT: Self-tapping
 ZK: Black
 SUS: Stainless
 NI-ZU: Nickel-zinc

[MIC BOARD]

REF.	ORDER. NO.	DESCRIPTION	QTY.
J416	6510021940	246S-550-4P connector	1

[ACCESSORIES]

REF.	ORDER. NO.	DESCRIPTION	QTY.
EP1	3310003020	FA-S59V ACC	1
EP4	0800007800	BP-225 ACC	1
EP8	0800006160	BC-147A	[M90] 1
	0800006170	BC-147E	[M90E] 1
EP9	0880001590	BC-158 ACC	1
MP1	8010018010	HK-008	1
MP2	8010019930	MB-103 ACC	1



• BC-158 CHARGER PARTS LIST

MECHANICAL PARTS

[CHASSIS UNIT]

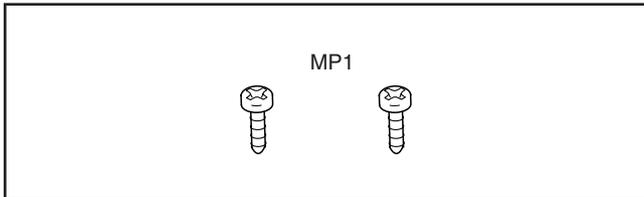
REF.	ORDER. NO.	DESCRIPTION	QTY.
MP1	8510016540	2810 case	1
MP2	8110007680	2523 cover	1
MP3	8810008660	Screw B0 3 x 8 NI-ZU (BT)	2
MP4	8930047830	Leg cushion (C)	2

[CHARGE UNIT]

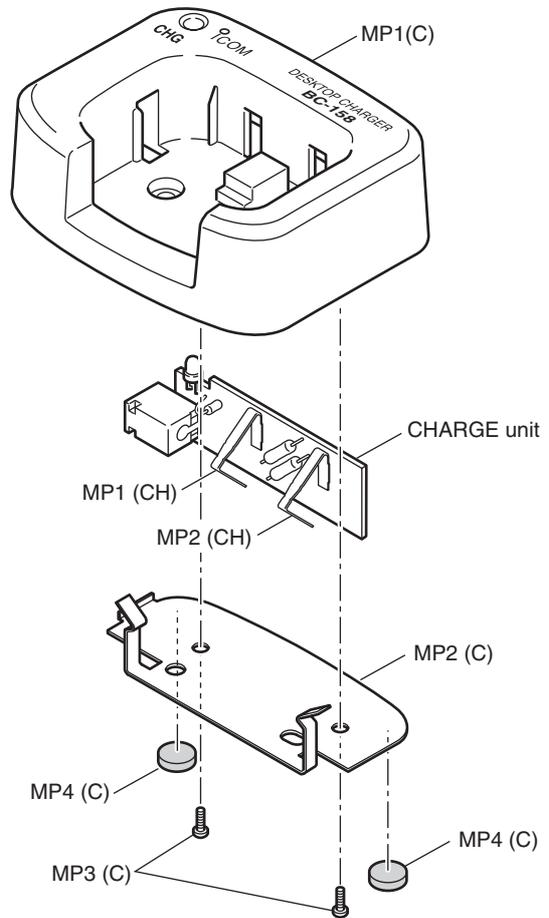
REF.	ORDER. NO.	DESCRIPTION	QTY.
MP1	8930057120	2523 Terminal	1
MP2	8930057120	2523 Terminal	1

[ACCESSORIES]

REF.	ORDER. NO.	DESCRIPTION	QTY.
MP1	8810001460	Screw A0 3.5 x 20 SUS	2

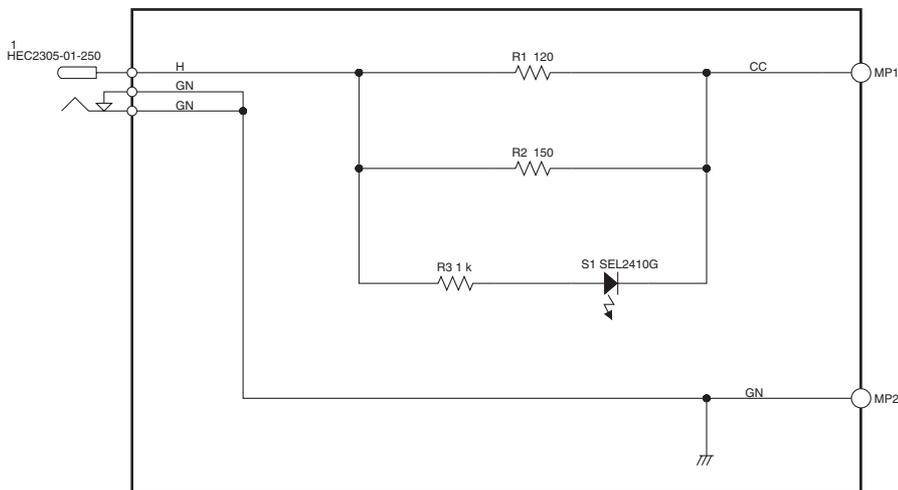


Screw abbreviations A0, B0, BT: Self-tapping
 NI-ZU: Nickel-zinc
 SUS: Stainless



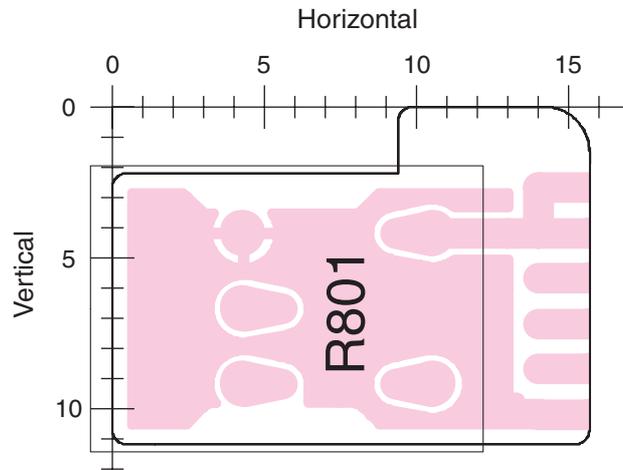
NOTE: (C) : CHASSIS
 (CH) : CHARGE UNIT

• CIRCUIT DIAGRAM



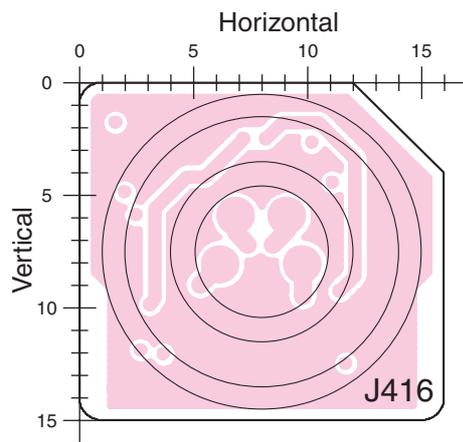
9-2 VR BOARD

- TOP VIEW



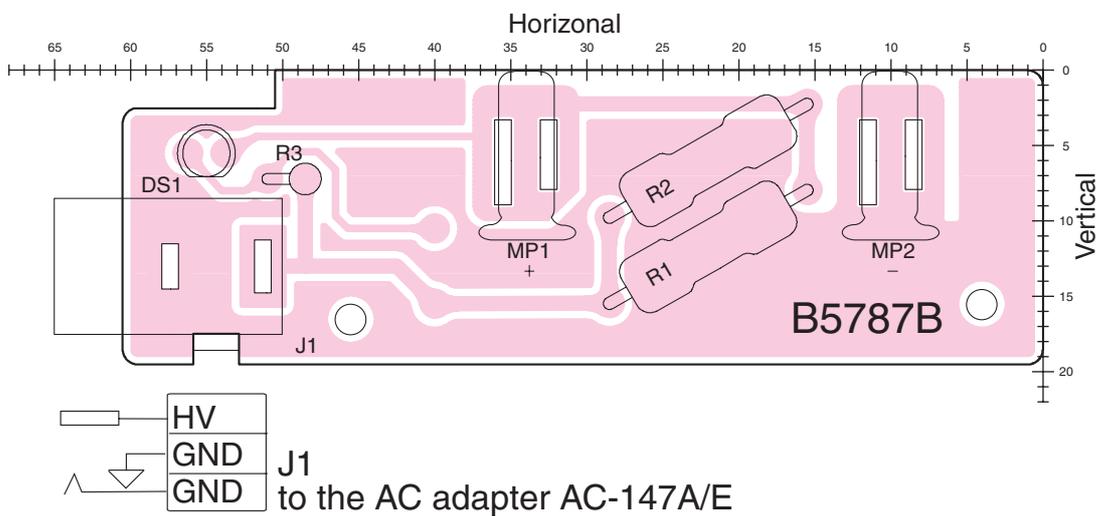
9-3 MIC BOARD

- TOP VIEW

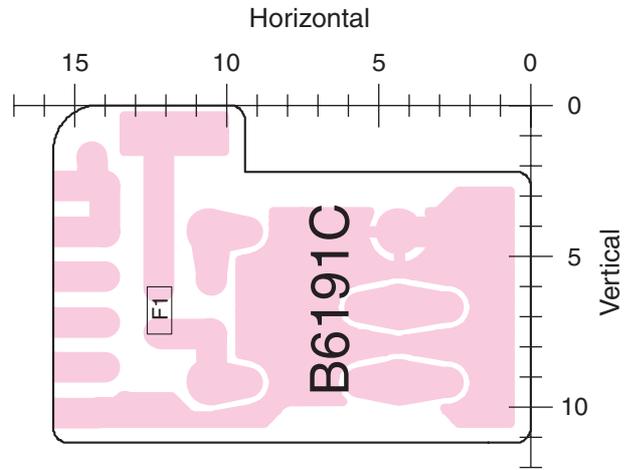


9-4 BC-158

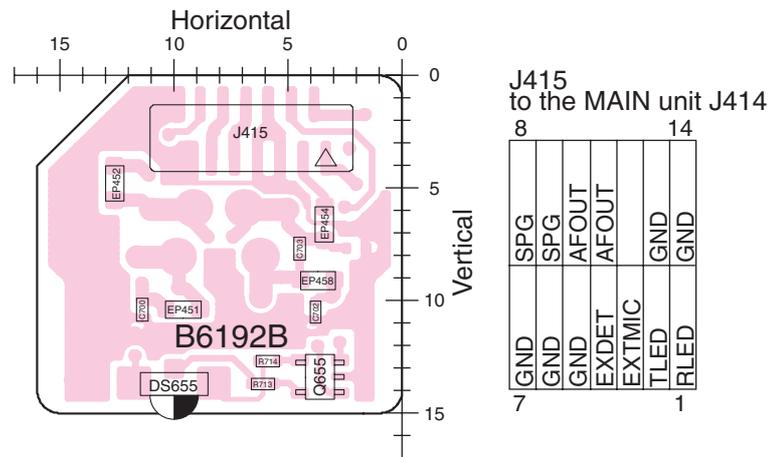
- TOP VIEW



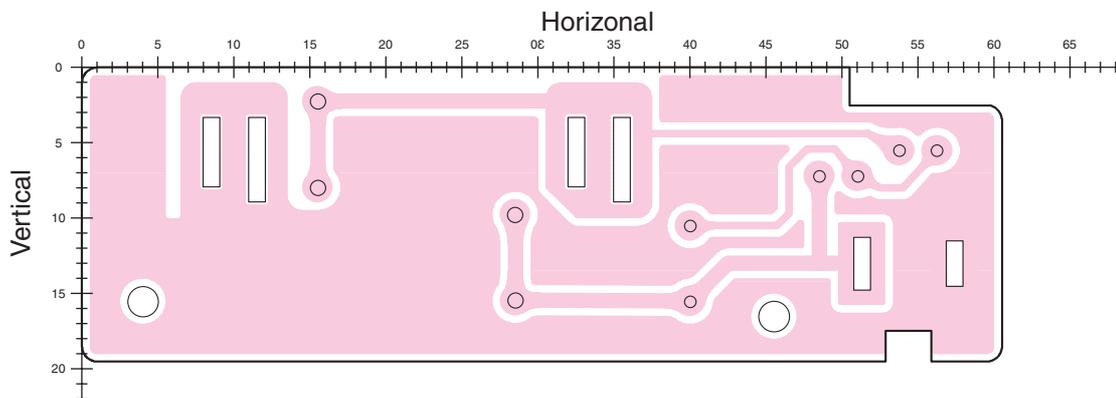
• BOTTOM VIEW



• BOTTOM VIEW



• BOTTOM VIEW



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