



SERVICE MANUAL

VHF TRANSCEIVER

IC-F30GT

IC-F30GS

IC-F31GT

IC-F31GS

INTRODUCTION

This service manual describes the latest service information for the **IC-F30GT/GS** and **IC-F31GT/GS** VHF TRANSCEIVER at the time of publication.

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 10 V. This will ruin the transceiver.

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

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

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

INTRINSICALLY SAFE QUALIFICATION

When servicing intrinsically safe versions of the **IC-F30GT/GS** and **IC-F31GT/GS** the following conditions must be met. Failing to satisfy any of these conditions will invalidate the INTRINSICALLY SAFE certification.

1. Servicing the transceiver should only be undertaken by suitably qualified personnel in a non-hazardous area. Never attempt to remove the case in a hazardous area.
2. **ONLY** the approved battery, ICOM's BP-210FM may be used.
3. **USE ONLY** safety critical components as specified in the parts list (SECTION 6), should replacement of any item be necessary.

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>

1110001810 S.IC TA7368F IC-F30GT MAIN UNIT 1 piece
8930053170 2337 Key board IC-F31GS CHASSIS 5 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 tuning tool **MUST** be used for all adjustments.
5. **DO NOT** keep power ON for a long time when the transceiver is defective.
6. **DO NOT** transmit power into a signal generator or a sweep generator.
7. **ALWAYS** connect a 40 dB or 50 dB attenuator between the transceiver and a deviation meter or spectrum analyser 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	
SECTION 2	INSIDE VIEWS	
SECTION 3	DISASSEMBLY INSTRUCTIONS	
SECTION 4	CIRCUIT DESCRIPTION	
4 - 1	RECEIVER CIRCUITS	4 - 1
4 - 2	TRANSMITTER CIRCUITS	4 - 2
4 - 3	PLL CIRCUITS	4 - 3
4 - 4	FFSK CIRCUITS	4 - 4
4 - 5	POWER SUPPLY CIRCUITS	4 - 5
4 - 6	CPU PORT ALLOCATIONS	4 - 5
SECTION 5	ADJUSTMENT PROCEDURES	
5 - 1	PREPARATION	5 - 1
5 - 2	PLL ADJUSTMENT	5 - 4
5 - 3	SOFTWARE ADJUSTMENT	5 - 5
SECTION 6	PARTS LIST	
SECTION 7	MECHANICAL PARTS AND DISASSEMBLY	
SECTION 8	SEMI-CONDUCTOR INFORMATION	
SECTION 9	BOARD LAYOUTS	
9 - 1	FRONT UNIT	9 - 1
9 - 2	MAIN UNIT	9 - 2
SECTION 10	BLOCK DIAGRAM	

SECTION 1 SPECIFICATIONS

		USA/GEN	EUR
GENERAL	Measurement method	EIA-152-C/204D or TIA-603	ETS 300 086 (GEN)
	Frequency coverage	136.000–174.000 MHz	
	Type of emission	16K0F3E [25 kHz; Wide], 8K50F3E [12.5 kHz; Narrow] 14K0F3E [20 kHz; Moddle], 8K50F3E [12.5 kHz; Narrow]	
	Number of conventional channels	Max. 256 ch (16 channels × 16 banks)	
	Power supply requirement	7.2 V DC (negative ground; supplied battery pack)	
	Current drain (approx.)	TX at High power 2.0 A RX rated audio 300 mA stand-by 95 mA (typical)	
	Frequency error	±2.5 ppm	±1.5 kHz
	Usable temperature range	–30°C to +60°C (–22°F to +140°F)	–25°C to +55°C
	Dimensions (proj. not included)	54(W) × 139(H) × 38(D) mm; 2 ¹ / ₈ (W) × 5 ¹⁵ / ₃₂ (H) × 1 ¹ / ₂ (D) inch	
	Weight (approx.)	420 g; 14.8 oz (with BP-210)	
TRANSMITTER	RF output power	5 W / 2 W / 1 W (High/Low2/Low1)	
	Modulation system	Variable reactance frequency modulation	
	Maximum permissible deviation	±5.0 kHz [Wide], ±2.5 kHz [Narrow]	
	Spurious emissions	73 dBc typical	0.25 μW
	Adjacent channel power	70 dB [Wide], 60 dB [Narrow]	
	Audio frequency response	+2 dB to –8 dB of 6 dB/octarve range from 300 Hz to 3000 Hz [Wide]/2550 Hz [Narrow]	
	Audio harmonic distortion	3% typical at 1 kHz, 40% deviation	
	FM hum and noise (typical)	46 dB [Wide], 40 dB [Narrow]	—
	Residual modulation (typical)	—	45 dB [Wide], 43 dB [Narrow]
	Limiting charact of modulator	60–100% of max. deviation	
	Ext. microphone connector	9-pin multi connector/2.2 kΩ	
	RECEIVER	Receive system	Double-conversion superheterodyne system
Intermediate frequencies		1st: 31.65 MHz, 2nd: 450 kHz	
Sensitivity (typical)		0.25 μV at 12 dB SINAD	–4 dBμV (emf) at 20 dB SINAD
Squelch sencitivity (at threshold) (typical)		0.25 μV	–4 dBμV (emf)
Adjcent channel selectivity (typical)		73 dB [Wide], 63 dB [Narrow]	
Spurious response		70 dB	
Intermoduration (typical)		74 dB	70 dB
FM hum and noise (typical)		46 dB [Wide], 40 dB [Narrow]	—
Hum and noise (with CCITT filter) (typical)		—	45 dB [Wide], 43 dB [Narrow]
Audio output power (at 7.2 V DC)		500 mW typical at 5% distortion with a 8 Ω load 600 mW typical at 5% distortion with a 6 Ω load	
External SP connector		9-pin multi connector/8 Ω	

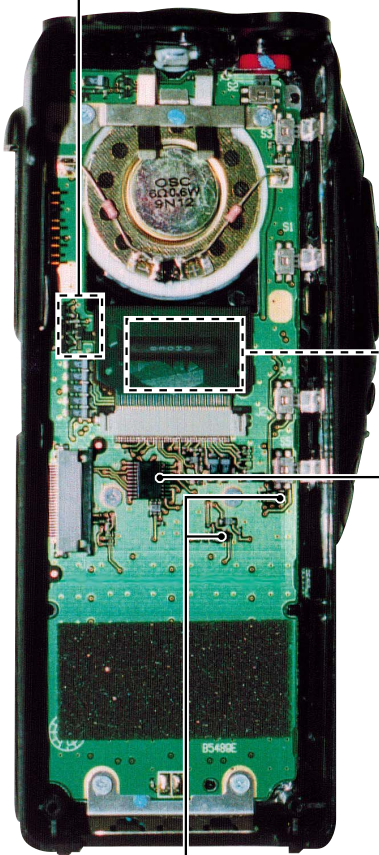
All stated specifications are subject to change without notice or obligation.

SECTION 2 INSIDE VIEWS

• FRONT UNIT

Bottom view

Internal speaker switch circuit
(Q6, Q7: CPH3403, Q8: 2SC4081,
Q9: DTC144EUA)



KEY LED switch
(Q1, Q2: 2SC4116)

LCD module
(DS10: EDMMU1FA0)

Expander IC
(IC1: TC74VHC373FT)

• MAIN UNIT

Top view

Antenna switching
(D1, D25, D24: MA77
D1 is bottom side)

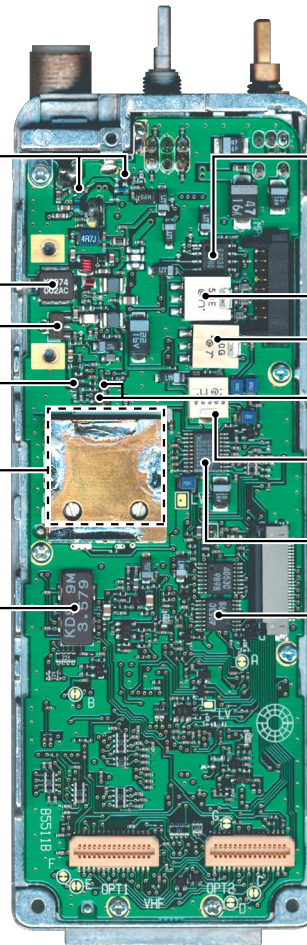
Power amplifier
(Q1: 2SK2974)

Pre-drive amplifier
(Q2: 2SK2973)

YGR amplifier
(Q3: 2SC4226)

TX/RX VCO circuit

3.58 MHz crystal
(X4: CR-563
3.579545 MHz)



D/A converter
(IC27: M62334FP)

2nd IF filter (450 kHz)
(FI2: SFPCA450KE4A)
(FI3: SFPCA450KG1A)

TX/RX switch
(D5, D4: MA77)

Discreminator
(X2: CDBC450KCA24 450 kHz)

PLL IC
(IC1: SA7025DK)

PTT/MD1 switch and
INT/EXT microphone switch
(IC19: BU4053BCF)

• MAIN UNIT

Bottom view

S5 regulator
(Q31: 2SA1362)

+5 regulator
(Q32: 2SB1132)

R5 regulator
(Q30: 2SA1362)

2nd mixer/IF detect
/SQL amplifier
(IC3: TA31136FN)

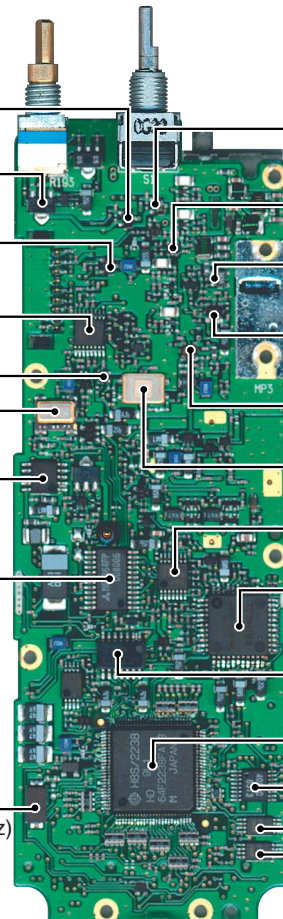
1st IF amplifier
(Q18: 2SC4215)

TCXO
(X1: CR-667
15.600 MHz)

AF amplifier
(IC5: TA7368F)

D/A converter
(IC13: M62364FP)

Crystal oscillator
for CPU clock
(X3: CR-681 12.288 MHz)



T5 regulator
(Q29: 2SA1362)

RF amplifier
(Q20: 3SK293)

Power detector
(D2: MA713)

APC amplifier
(IC4: TC75S51F)

1st mixer
(Q19: 3SK206)

1st IF filter
(FI1: FL-322 31.650 MHz)

Splatter filter
(IC7: NJM2902V)

Microphone amplifier/mute
/compander
(IC9: TC35453F)

DTMF decoder
(IC17: LC73872M)

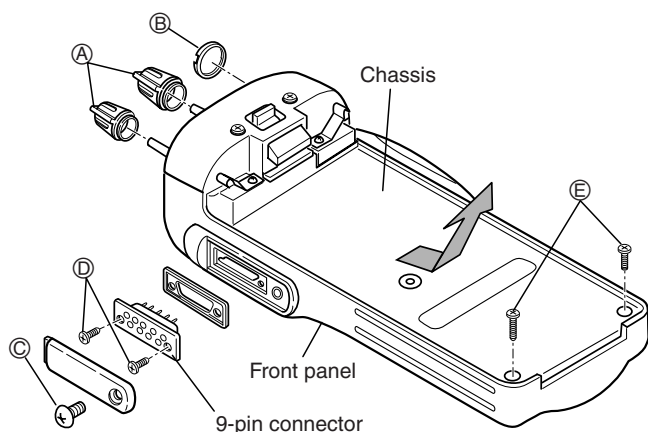
CPU
(IC14: HD64F2238FA13)

Expander IC
(IC23: BU4094BCFV)

EEPROM
(IC16, IC24: HN58X2464T1)

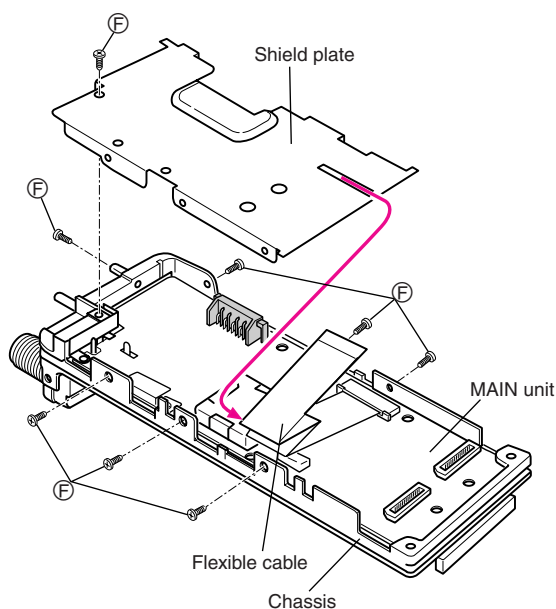
SECTION 3 DISASSEMBLY INSTRUCTIONS

1 Removing the chassis panel



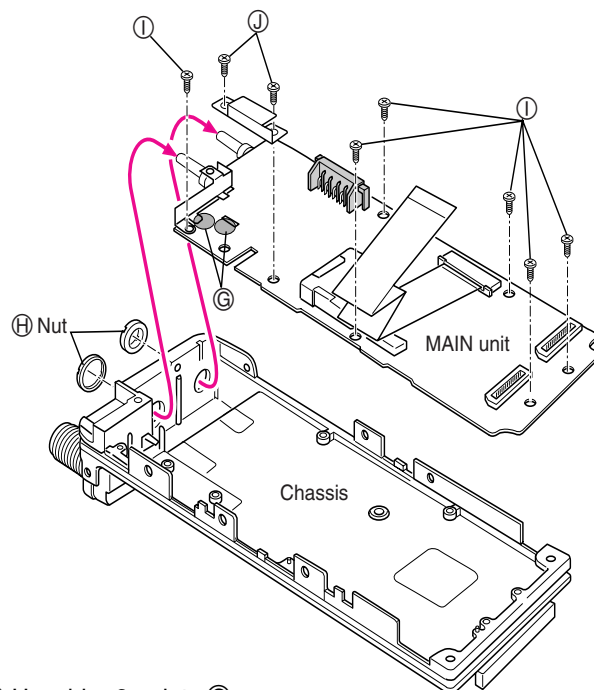
- ① Remove 2 knobs (A), and unscrew 1 nut (B).
- ② Unscrew 1 screw (C) (ICOM screw), and 2 screws (D) (2 × 4 mm, black) from the 9-pin connector.
- ③ Unscrew 2 screws (E) (2 × 8 mm, silver) from the chassis.
- ④ Take off the chassis in the direction of the arrow.

2 Removing the shield plate



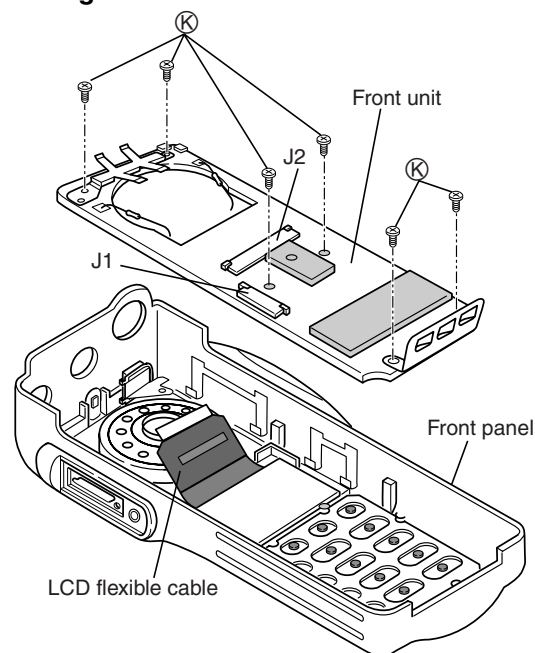
- ① Unplug the flexible cable from J1 on the FRONT unit to separate the chassis.
- ② Take off the flexible cable in the direction of the arrow.
- ③ Unscrew 8 screws (F) (2 × 3 mm, black) to separate the shield plate.

3 Removing the MAIN unit



- ① Unsolder 2 points (G).
- ② Unscrew 2 nuts (H).
- ③ Unscrew 6 screws (I) (2 × 4 mm, silver), and 2 screws (J) (2 × 4 mm, black) from the MAIN unit.
- ④ Take off the MAIN unit in the direction of the arrow.

4 Removing the FRONT unit



- ① Unplug the LCD flexible cable from J2 on the FRONT unit to separate the front panel.
- ② Unscrew 6 screws (K) (2 × 3.5 mm, silver) from the FRONT unit.
- ③ Unsolder the leads of speaker.

SECTION 4 CIRCUIT DESCRIPTION

4-1 RECEIVER CIRCUITS

4-1-1 ANTENNA SWITCHING CIRCUIT

The antenna switching circuit functions as a low-pass filter while receiving and a resonator circuit while transmitting. This circuit does not allow transmit signals to enter the receiver circuits.

Received signals enter the antenna connector (CHASSIS; MP44) and pass through the low-pass filter (L1–L3, C1–C3, C416–C419). The filtered signals are passed through the $\lambda/4$ type antenna switching circuit (D25, L39, D24) and then applied to the RF circuit.

4-1-2 RF CIRCUIT

The RF circuit amplifies signals within the range of frequency coverage and filters out-of-band signals.

The signals from the antenna switching circuit pass through the two-stage tunable bandpass filters (D21, D20, L38, L37). The filtered signals are amplified at the RF amplifier (Q20) and then passed through the another two-stage tunable bandpass filters (D19, D18, L36, L33) to suppress unwanted signals. The filtered signals are applied to the 1st mixer circuit.

D18–D21 employ varactor diodes, that are controlled by the CPU via the D/A converter (IC27), to track the bandpass filter. These varactor diodes tune the center frequency of an RF pass band for wide bandwidth receiving and good image response rejection.

4-1-3 1ST MIXER AND 1ST IF CIRCUITS

The 1st mixer circuit converts the received signal into fixed frequency of the 1st IF signal with the PLL output frequency. By changing the PLL frequency, only the desired frequency passes through a crystal filter at the next stage of the 1st mixer.

The RF signals from the bandpass filter are mixed with the 1st LO signals, where come from the RX VCO circuit via the attenuator (R360–R358), at the 1st mixer circuit (Q19) to produce a 31.65 MHz 1st IF signal. The 1st IF signal is passed through a monolithic filter (F11) in order to obtain selection capability and to pass only the desired signals. The filtered signal is applied to the 2nd IF circuit after being amplified at the 1st IF amplifier (Q18).

4-1-4 2ND IF AND DEMODULATOR CIRCUITS

The 2nd mixer circuit converts the 1st IF signal into a 2nd IF signal. The double-conversion superheterodyne system (which convert receive signals twice) improves the image rejection ratio and obtains stable receiver gain.

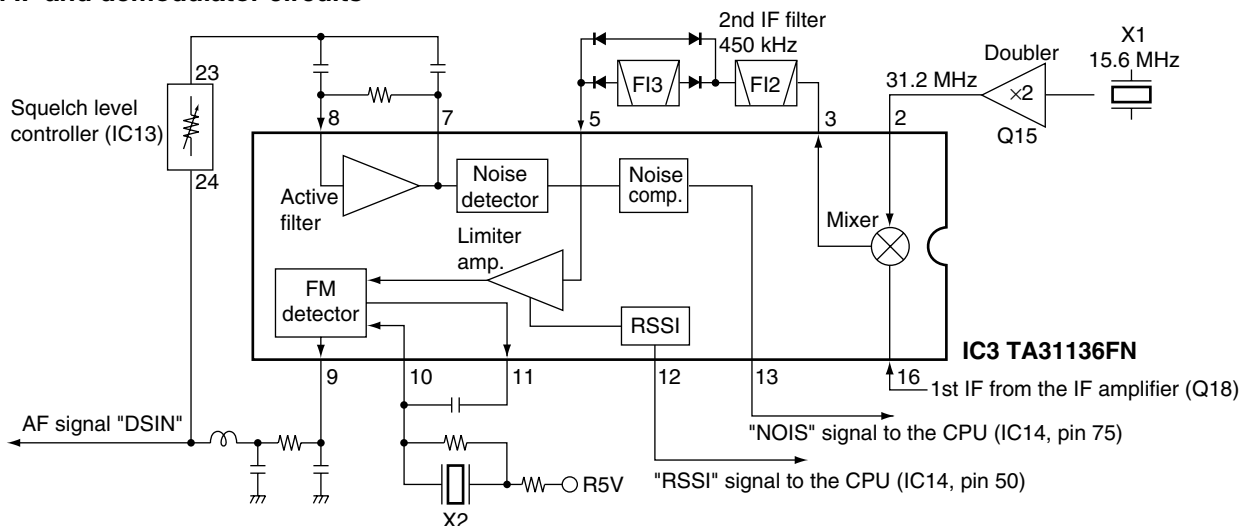
The 1st IF signal from the IF amplifier (Q18) is applied to the 2nd mixer section of the FM IF IC (IC3, pin 16), and is mixed with the 2nd LO signal to be converted into a 450 kHz 2nd IF signal.

The FM IF IC (IC3) contains the 2nd mixer, 2nd local oscillator, limiter amplifier, quadrature detector, active filter and noise amplifier circuits. A 2nd LO signal (31.2 MHz) is produced at the PLL circuit by doubling its reference frequency (15.6 MHz).

The 2nd IF signal from the 2nd mixer (IC3, pin 3) passes through the ceramic filters (F12, F13) during narrow channel spacing selection or F12 only (bypassing F13) during wide channel spacing selection to remove unwanted heterodyned frequencies. It is then amplified at the limiter amplifier section (IC3, pin 5) and applied to the quadrature detector section (IC3, pins 10, 11) to demodulate the 2nd IF signal into AF signals.

The demodulated AF signals are output from pin 9 (IC3) and applied to the AF circuit via the receiver mute circuit.

• 2nd IF and demodulator circuits



4-1-5 AF AMPLIFIER CIRCUIT

The AF amplifier circuit amplifies the demodulated AF signals to drive a speaker.

The AF signals from the FM IF IC (IC3, pin 9) are amplified at the AF amplifier section of the compander IC (IC9, pins 5, 4) and are then applied to the high-pass filter circuit (IC7a).

The high-pass filter characteristics are controlled by the FSW signal from the I/O expander IC (IC23, pin 14). When FSW signal is high, the cut-off frequency is shifted higher to remove CTCSS or DTCS signals.

The filtered AF signals from the high-pass filter (IC7a, pin 1) are applied to the de-emphasis section of compander IC (IC9, pin 3) with frequency characteristics of -6 dB/octave, and are then passed through the low-pass filter, high-pass filter, expander sections of compander IC (IC9). The output signal from IC9 (pin 38) is applied to the electronic volume controller (IC13, pin 1).

The output AF signals from the electronic volume controller (IC13, pin 2) are applied to the AF power amplifier (IC5) to drive the speaker.

4-1-6 RECEIVE MUTE CIRCUITS

• NOISE SQUELCH

A squelch circuit cuts out AF signals when no RF signals are received. By detecting noise components in the AF signals, the squelch circuit switches the AF mute switch.

Some noise components in the AF signals from the FM IF IC (IC3, pin 9) are passed through the level controller (IC13, pins 24, 23). The level controlled signals are applied to the active filter section in the FM IF IC (IC3, pin 8). Noise components about 10 kHz are amplified and output from pin 7.

The filtered signals are converted into the pulse-type signals at the noise detector section and output from pin 13 (NOIS).

The NOIS signal from the FM IF IC is applied to the CPU (IC14, pin 75). Then the CPU analyzes the noise condition and controls the AF mute signal via "AFMT" line (IC23, pin 13) to the AF regulator (Q23, Q24).

• CTCSS AND DTCS

The tone squelch circuit detects AF signals and opens the squelch only when receiving a signal containing a matching subaudible tone (CTCSS or DTCS). When tone squelch is in use, and a signal with a mismatched or no subaudible tone is received, the tone squelch circuit mutes the AF signals even when noise squelch is open.

A portion of the AF signals from the FM IF IC (IC3, pin 9) passes through the low-pass filter (IC20b/a) to remove AF (voice) signals and is applied to the CTCSS or DTCS decoder inside of the CPU (IC14, pin 46) via the "RXDT" line to control the AF mute switch via the I/O expander IC (IC23).

4-2 TRANSMITTER CIRCUITS

4-2-1 MICROPHONE AMPLIFIER CIRCUIT

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

The AF signals (MIC+) from the FRONT unit via J3 (pin 22) are passed through the internal/external microphone switch (IC19, pins 12, 14) and level controller (IC13, pins 9, 10) to the microphone amplifier circuit.

The AF signals from the level controller (IC13) are applied to the microphone amplifier section of compander IC (IC9, pin 12). The amplified signals are passed through the compressor, low-pass filter and high-pass filter sections of IC9.

The filtered AF signals are amplified at the buffer amplifier (Q47) and pre-emphasized with $+6$ dB/octave at the pre-emphasis circuit (C203, R166), and are then applied to the IDC amplifier section of IC9 (pin 8).

The amplified AF signals are passed through the limiter amplifier and low-pass filter sections of IC9 after being passed through the AF mute switch inside of IC9.

The output signals from pin 6 are passed through the splatter filter (IC7c) and level controller (IC13, pins 21, 22), and are then applied to the modulation circuit (D7).

4-2-2 MODULATION CIRCUIT

The modulation circuit modulates the VCO oscillating signal (RF signal) using the microphone audio signals.

The AF signals from the level controller (IC13) change the reactance of varactor diode (D7) to modulate the oscillated signal at the TX VCO circuit (Q12, D8, D43–D45). The modulated VCO signal is amplified at the buffer amplifiers (Q8, Q6) and is then applied to the drive amplifier circuit via the T/R switch (D4).

The CTCSS/DTCS signals from the CPU (IC14, pin 44) are passed through the low-pass filter (IC7d), level controller (IC13, pins 12, 11) and mixer circuit (IC7b), and are then applied to the VCO circuit via the splatter filter (IC7c).

4-2-3 DRIVE/POWER AMPLIFIER CIRCUITS

The drive/power amplifier circuits amplify the VCO oscillating signal to an output power level.

The signal from the VCO circuit passes through the T/R switch (D4), and is amplified at the YGR (Q3), drive (Q2), power (Q1) amplifiers to obtain 5 W of RF power (at 7.2 V DC).

The amplified signal is passed through the APC detector, antenna switching circuit (D1) and low-pass filter, and is then applied to the antenna connector.

The bias current of the drive (Q2) and power (Q1) amplifiers is controlled by the APC circuit.

4-2-4 APC CIRCUIT

The APC circuit (IC4, Q22) protects the drive and power amplifiers from excessive current drive, and selects output power of HIGH, LOW2 or LOW1.

The power detector circuit (D2) detects the transmit power output level and converts it into DC voltage. The output voltage is at a minimum level when the antenna impedance is matched at 50 Ω and is increased when it is mismatched.

The detected voltage is applied to the differential amplifier (IC4, pin 3), and the "T4" signal from the D/A converter (IC27, pin 4), controlled by the CPU (IC14), is applied to the other input for reference. When antenna impedance is mismatched, the detected voltage exceeds the power setting voltage. Then the output voltage of the differential amplifier (IC4, pin 4) controls the input current of the drive amplifier (Q2) and power amplifier (Q1) to reduce the output power.

4-3 PLL CIRCUITS

4-3-1 PLL CIRCUIT

A PLL circuit provides stable oscillation of the transmit frequency and receive 1st LO frequency. The PLL output compares the phase of the divided VCO frequency to the reference frequency. The PLL output frequency is controlled by the divided ratio (N-data) of a programmable divider.

The PLL circuit contains the TX/RX VCO circuit (Q12, Q11). The oscillated signal is amplified at the buffer amplifiers (Q8, Q7) and then applied to the PLL IC (IC1, pin 5).

The PLL IC contains a prescaler, programmable counter, programmable divider and phase detector, etc. The entered signal is divided at the prescaler and programmable counter section by the N-data ratio from the CPU. The divided signal is detected on phase at the phase detector using the reference frequency.

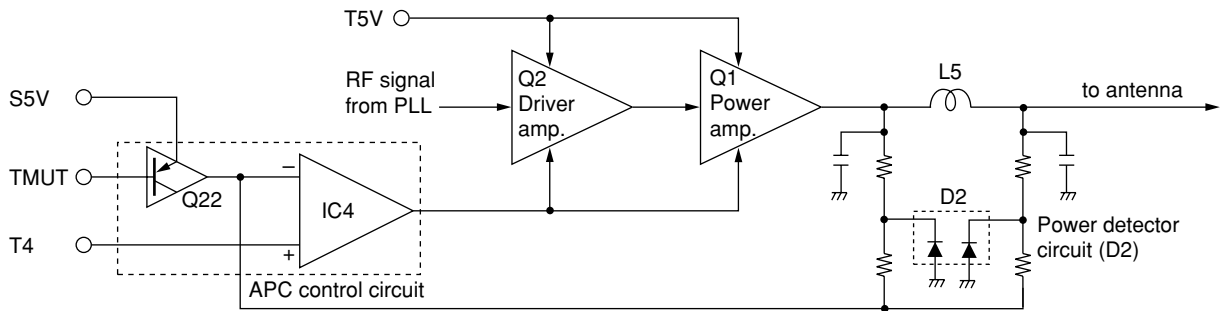
If the oscillated signal drifts, its phase changes from that of the reference frequency, causing a lock voltage change to compensate for the drift in the oscillated frequency.

4-3-2 VCO CIRCUIT

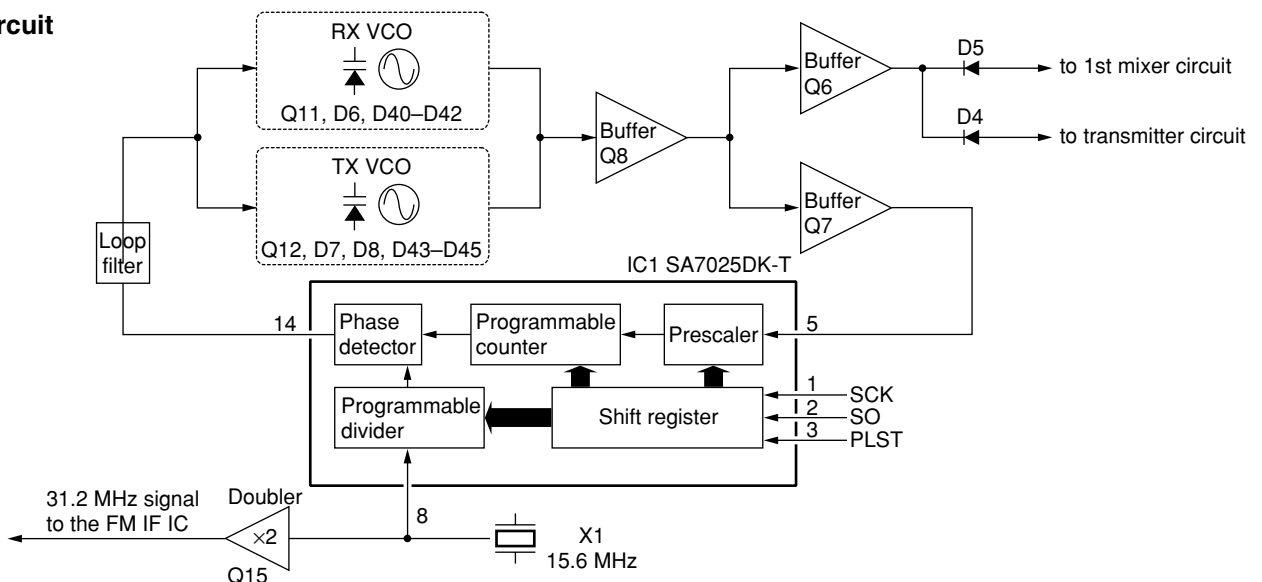
The VCO circuit contains a separate RX VCO (Q11, D6, D40–D42) and TX VCO (Q12, D7, D8, D43–D45). The oscillated signal is amplified at the buffer amplifiers (Q8, Q6) and is then applied to the T/R switch (D5, D4). Then the receive 1st LO (Rx) signal is applied to the 1st mixer (Q19) and the transmit (Tx) signal to the YGR amplifier circuit (Q3).

A portion of the signal from the buffer amplifier (Q8) is fed back to the PLL IC (IC1, pin 5) via the buffer amplifier (Q7) as the comparison signal.

• APC circuit



• PLL circuit



4-4 FFSK CIRCUIT DESCRIPTION

4-4-1 GENERAL

IC9 is the compander IC which is controlled by serial data bus line ("TRD", "MSKE", "DIN", "SCK", "APST", "REGS1", "REGS2", "RTM", "RDT", "FCLR" signals) from the CPU. The IC is composed of FFSK transmitting and receiving circuits, data register circuits, transmitting and receiving data buffer circuits, and so on.

X4 is oscillated 3.58 MHz reference signal to the IC9.

In case of the FFSK signal is used for the PM modulation, the FM/PM switch (IC29) is changed to pin 3.

In case of the FFSK signal is used for the FM modulation, the FM/PM switch (IC29) is changed to pin 5.

The output signal from IC29, pin 4 is applied to the the buffer amplifier (IC7, pins 8, 10), and is applied to the D/A converter IC (IC13, pins 21, 22). The signal is applied to the modulation circuit (Q12, D7, D8, D43–D45).

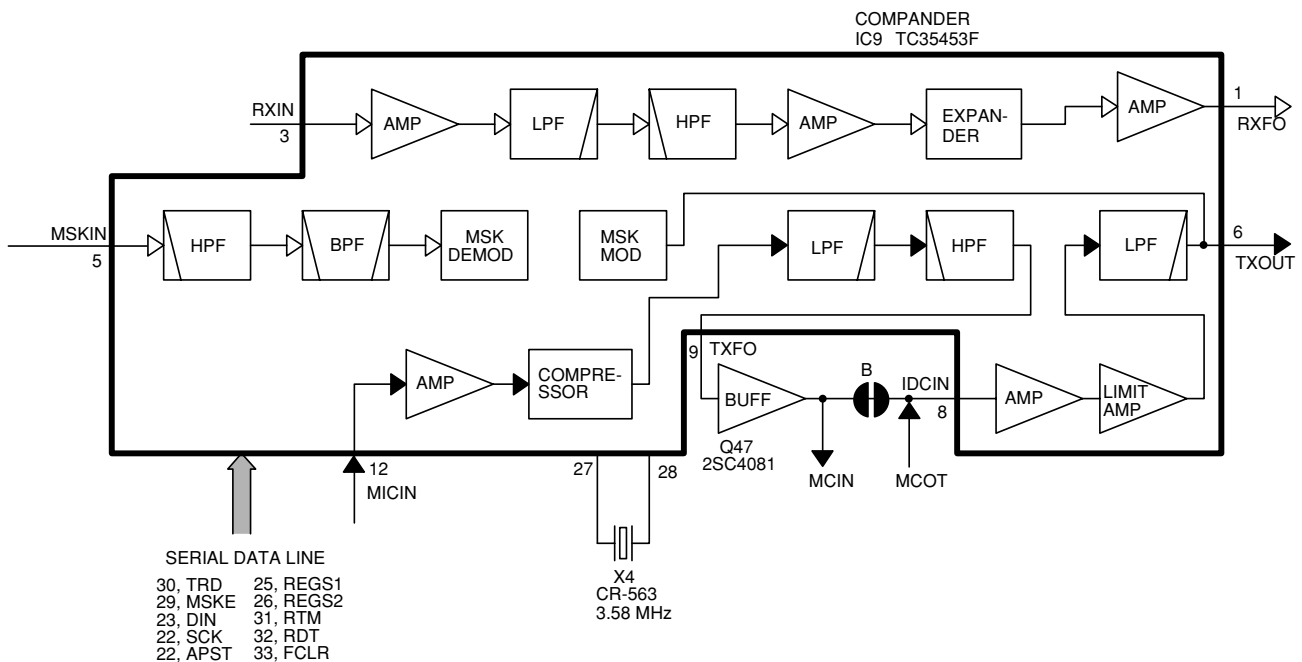
4-4-2 DECODEING CIRCUIT

The input signal from the FM IC (IC3, pin 9) via the "DSIN" signal is applied to the compander IC (IC9, pin 5), and is then detected bit synchronization detection within 16 bit.

4-4-3 ENCODEING CIRCUIT

The FFSK signal is made by serial data bus line signals, and is then output from the compander IC (IC9, pin 6).

• Compounder IC block diagram



4-5 POWER SUPPLY CIRCUIT VOLTAGE LINE

LINE	DESCRIPTION
HV	The voltage from the attached battery pack.
VCC	The same voltage as the HV line (battery voltage) which is controlled by the power switch ([VOL] control).
CPU5V	Common 5 V converted from the VCC line by the reference regulator circuit (IC12). The output voltage is applied to the CPU (IC14), 5 V regulator circuit (Q32, Q33) and reset circuit (IC15), and etc.
+5V	Common 5 V converted from the VCC line by the +5V regulator circuit (Q32, Q33).
S5V	Common 5 V converted from the +5V line by the S5V regulator circuit (Q31).
T5V	5 V for transmitter circuits regulated by the T5V regulator circuit (Q29).
R5V	5 V for receiver circuits regulated by the R5V regulator circuit (Q30).

4-6 PORT ALLOCATIONS

4-6-1 CPU (IC14)

Pin number	Port name	Description
4	RESB	Outputs reset signal for the expander IC (IC23).
5	RMUT	Input port for AF mute signal from the optional units via J1 or J2.
6	MMUT	Input port for MIC mute signal from the optional units via J1 or J2.
7	PTOT	Input port for the [PTT] switch Low : While [PTT] switch is pushed.
13	EXST	Outputs strobe signals to the expander IC (IC23).
15	APST	Outputs strobe signals to the compander IC (IC9).
16	DIN	Outputs serial data signals to the compander IC (IC9).
17, 18, 19	RGS1, RGS2, MSKE	Output control signal for the compander IC (IC9).
21	FCLR	Outputs reset signal for the compander IC (IC9).
22–25	CB10–CB13	Input ports for rotary selector [SEL].
26	VCOS	Outputs TX VCO/RX VCO switching signal for the VCO switch (Q9, Q10). High : While transmitting
28	PLST	Outputs strobe signals to the PLL IC (IC1).
29	ULCK	Input port for the PLL unlock signal. Low : PLL is unlocked.
34	SCK	Outputs clock signal for the PLL IC (IC1), compander IC (IC9), expander IC (IC23), D/A converter (IC13), etc.

Pin number	Port name	Description
35	SO	Outputs data signals for the PLL IC (IC1), compander IC (IC9), expander IC (IC23), D/A converter (IC13), etc.
36	DAST	Outputs strobe signals to the D/A converter (IC13).
39	DTAC	Output clock signal to the DTMF decoder (IC17).
43	SENC	Outputs single tone signal.
44	CTDA	Outputs CTCSS/DTCS tone signal.
45	SDEC	Single tone signal input port for decoding.
46	RXDT	CTCSS/DTCS signals input port for decoding.
47	AFVI	Input port for the volume control [VOL]. High : [VOL] is maximum clockwise.
49	LVIN	Input port for the PLL lock voltage.
50	RSSI	Input port for the RSSI detection.
59	RES	Input port for the reset signal.
68	DTSD	Outputs serial data signals to the DTMF decoder IC (IC17).
70	TMUT	Outputs transmit mute signal. Low : During unlock or while muted
71	R5C	Outputs R5 regulator control signal. Low: While receiving
73	T5C	Outputs T5 regulator control signal. Low: While transmitting
75	NOIS	Input port for noise signals (pulse-type) for noise squelch operation.
81	SDA	I/O port for data signals from/to the D/A converter (IC27).
82	MSO	I/O port for data signals from/to EEPROMs (IC16, IC24).
87	BEEP	Outputs beep audio signals.
94	MSCK	Outputs clock signal to EEPROMs (IC16, IC24).
95	SCL	Outputs clock signal to the D/A converter (IC27).

4-6-2 I/O EXPANDER (IC23)

Pin number	Port name	Description
4	BUSY	Outputs BUSY detection. Low : The channel is busy.
6	DUSE	Outputs low-pass filter cut-off frequency control signal when DTCS is activated.
7	W/N	Outputs IF bandwidth control signal. High : While IF bandwidth is narrow.
11	S5C	Outputs S5 regulator control signal.
12	SPCN	Outputs internal speaker select signal.
13	AFMT	Outputs control signal for the AF amplifier regulator circuit. High: While AF amp. is activated.
14	FSW	Outputs high-pass filter's characteristics select signal.

SECTION 5 ADJUSTMENT PROCEDURES

5-1 PREPARATION

When you adjust the contents on pages 5-5 and 5-6, SOFTWARE ADJUSTMENT, the optional CS-F30G ADJ ADJUSTMENT SOFTWARE (Rev. 1.0 or later), *OPC-966 JIG CABLE (modified OPC-966 CLONING CABLE) are required.

■ REQUIRED TEST EQUIPMENT

EQUIPMENT	GRADE AND RANGE	EQUIPMENT	GRADE AND RANGE
DC power supply	Output voltage : 7.5 V DC Current capacity : 5 A or more	Audio generator	Frequency range : 300–3000 Hz Output level : 1–500 mV
FM deviation meter	Frequency range : DC–300 MHz Measuring range : 0 to ±10 kHz	Attenuator	Power attenuation : 40 or 50 dB Capacity : 10 W or more
Frequency counter	Frequency range : 0.1–300 MHz Frequency accuracy : ±1 ppm or better Sensitivity : 100 mV or better	Standard signal generator (SSG)	Frequency range : 100–300 MHz Output level : 0.1 μV–32 mV (–127 to –17 dBm)
Digital multimeter	Input impedance : 10 MΩ/V DC or better	DC voltmeter	Input impedance : 50 kΩ/V DC or better
RF power meter (terminated type)	Measuring range : 1–10 W Frequency range : 100–300 MHz Impedance : 50 Ω SWR : Less than 1.2 : 1	Oscilloscope	Frequency range : DC–20 MHz Measuring range : 0.01–20 V
		AC millivoltmeter	Measuring range : 10 mV–10 V

■ SYSTEM REQUIREMENTS

- IBM PC compatible computer with an RS -232C serial port (38400 bps or faster).
- Microsoft Windows 95 or Windows 98
- Intel i486DX processor or faster (Pentium 100 MHz or faster recommended)
- At least 16 MB RAM and 10 MB of hard disk space
- 640×480 pixel display (800×600 pixel display recommended)

■ ADJUSTMENT SOFTWARE INSTALLATION

- ① Boot up Windows.
- Quit all applications when Windows is running.
- ② Insert the 'CS-F30G' into the appropriate drive.
- ③ Select 'Run' from the [Start] menu.
- ④ Type the setup program name using the full path name, then push [Enter] key.
(ex. D:\CSF30GADJ\disk1\Setup.exe)
- ⑤ Follow the prompts.
- ⑥ Program group 'CS-F30G ADJ' appears in the 'Programs' folder of the [Start] menu.

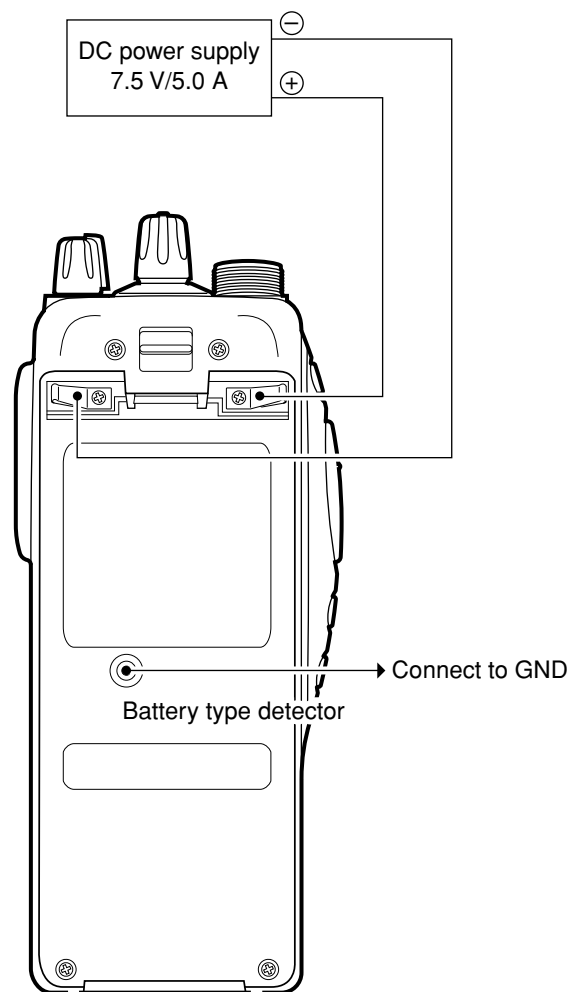
■ STARTING SOFTWARE ADJUSTMENT

- ① Connect IC-F30GT, F30GS, F31GT or F31GS and PC with *OPC-966 JIG CABLE.
- ② Turn the transceiver power ON.
- ③ Boot up Windows, and click the program group 'CS-F30G ADJ' in the 'Programs' folder of the [Start] menu, then CS-F30G ADJ's window appears.
- ④ Click 'Connect' on the CS-F30G's window, then appears IC-F30GT, F30GS, F31GT or F31GS's up-to-date condition.
- ⑤ Set or modify adjustment data as desired.

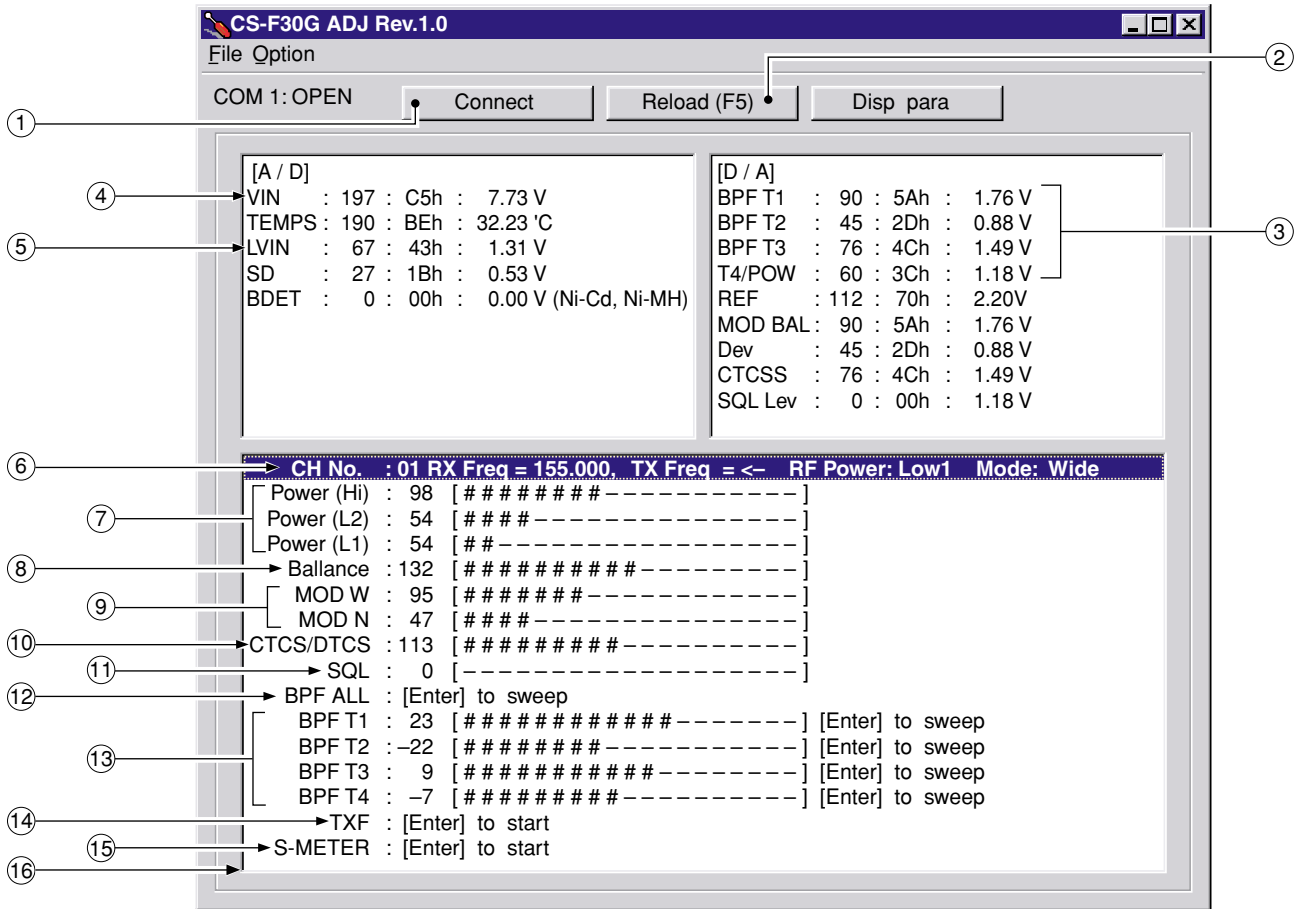
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• High power transmission

When you adjust the output power (high power), the battery type detector must be connected to GND (see illustration at below). Otherwise the transceiver does not transmit high power, the output power will be low.



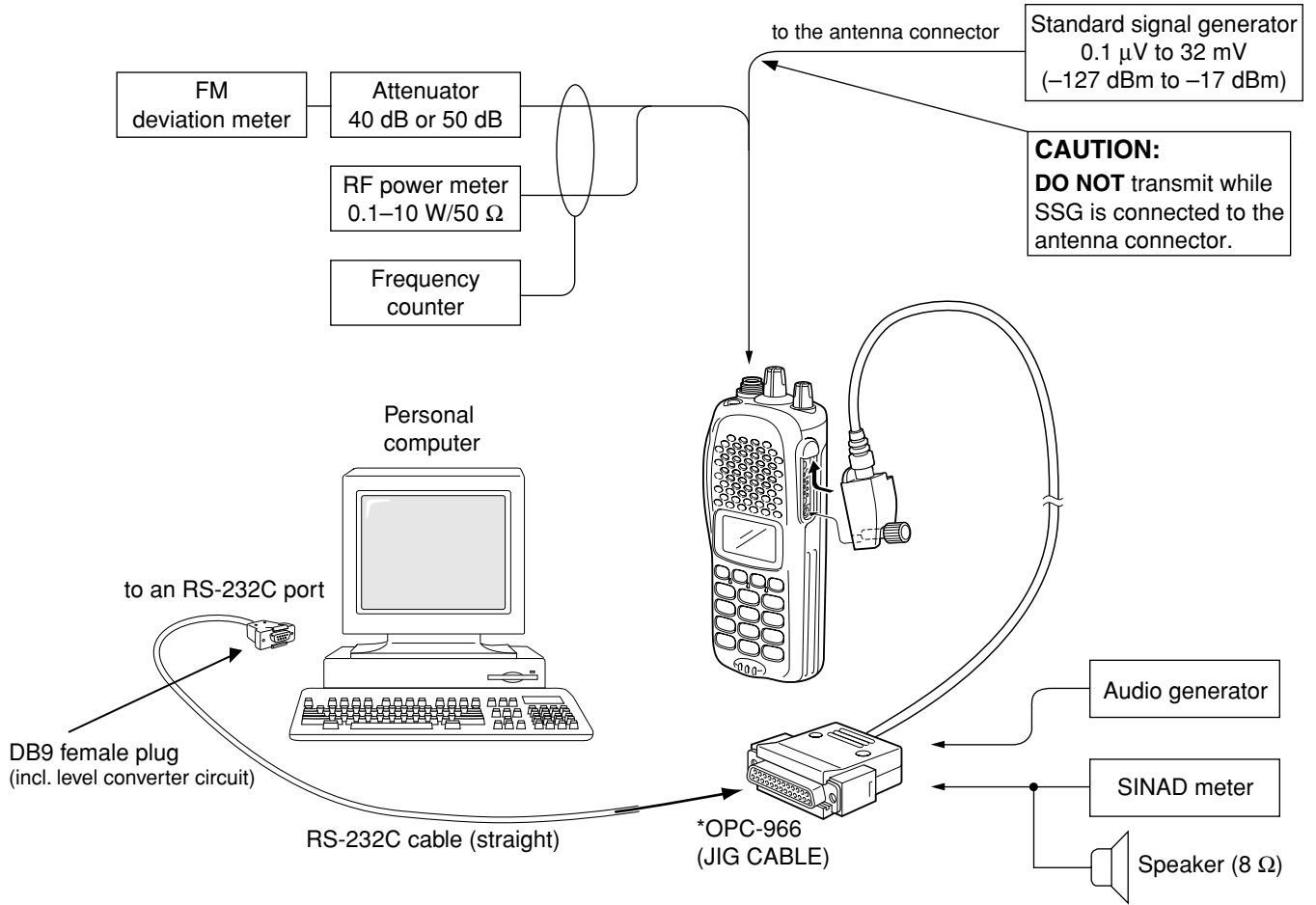
• Screen display example



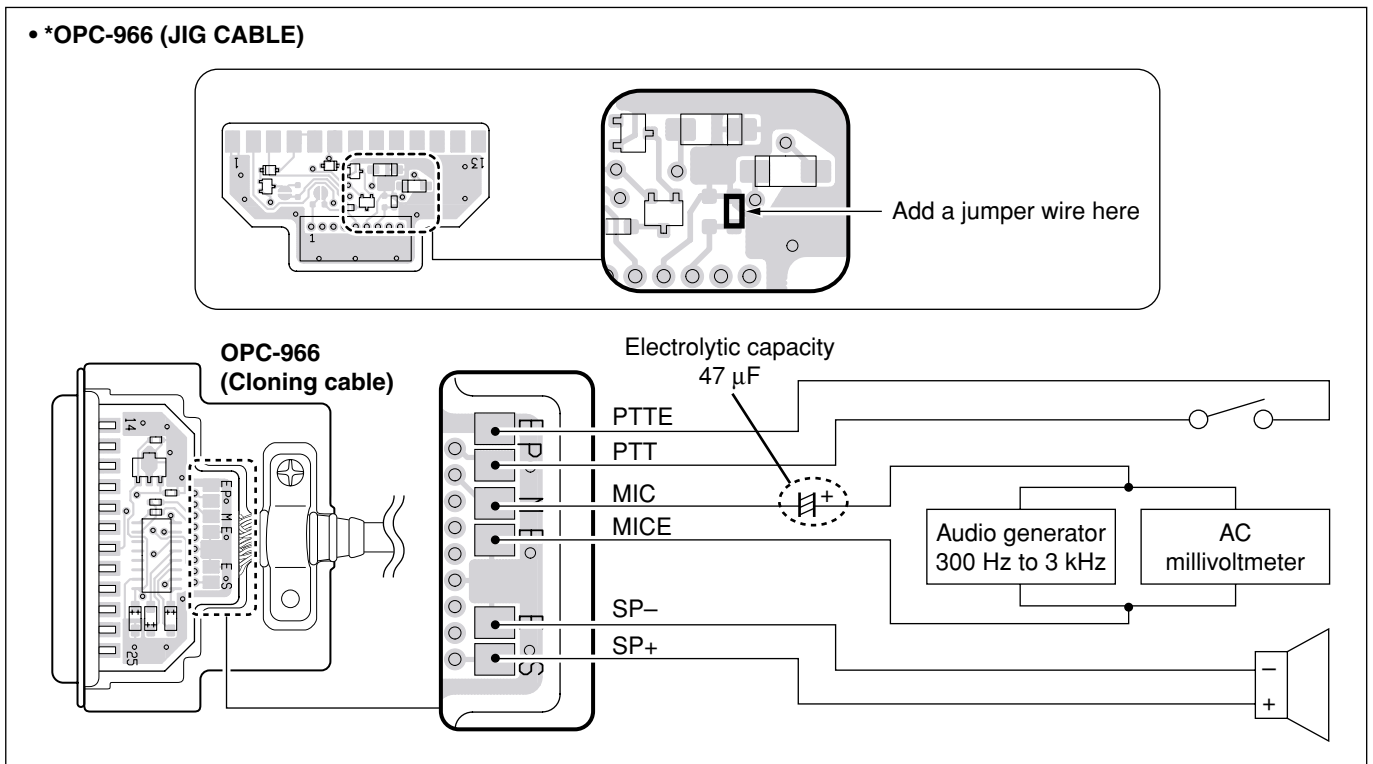
NOTE: The above values for settings are example only.
Each transceiver has its own specific values for each setting.

- | | |
|-------------------------------------|---|
| ① : Transceiver's connection state | ⑨ : FM deviation |
| ② : Reload adjustment data | ⑩ : CTCSS/DTCS deviation |
| ③ : Receive sensitivity measurement | ⑪ : Squelch level |
| ④ : Connected DC voltage | ⑫ : Receive sensitivity (automatically) |
| ⑤ : PLL lock voltage | ⑬ : Receive sensitivity (manually) |
| ⑥ : Operating channel select | ⑭ : Reference frequency |
| ⑦ : RF output power | ⑮ : S-meter |
| ⑧ : Modulation balance | ⑯ : Adjustment items |

• Connection



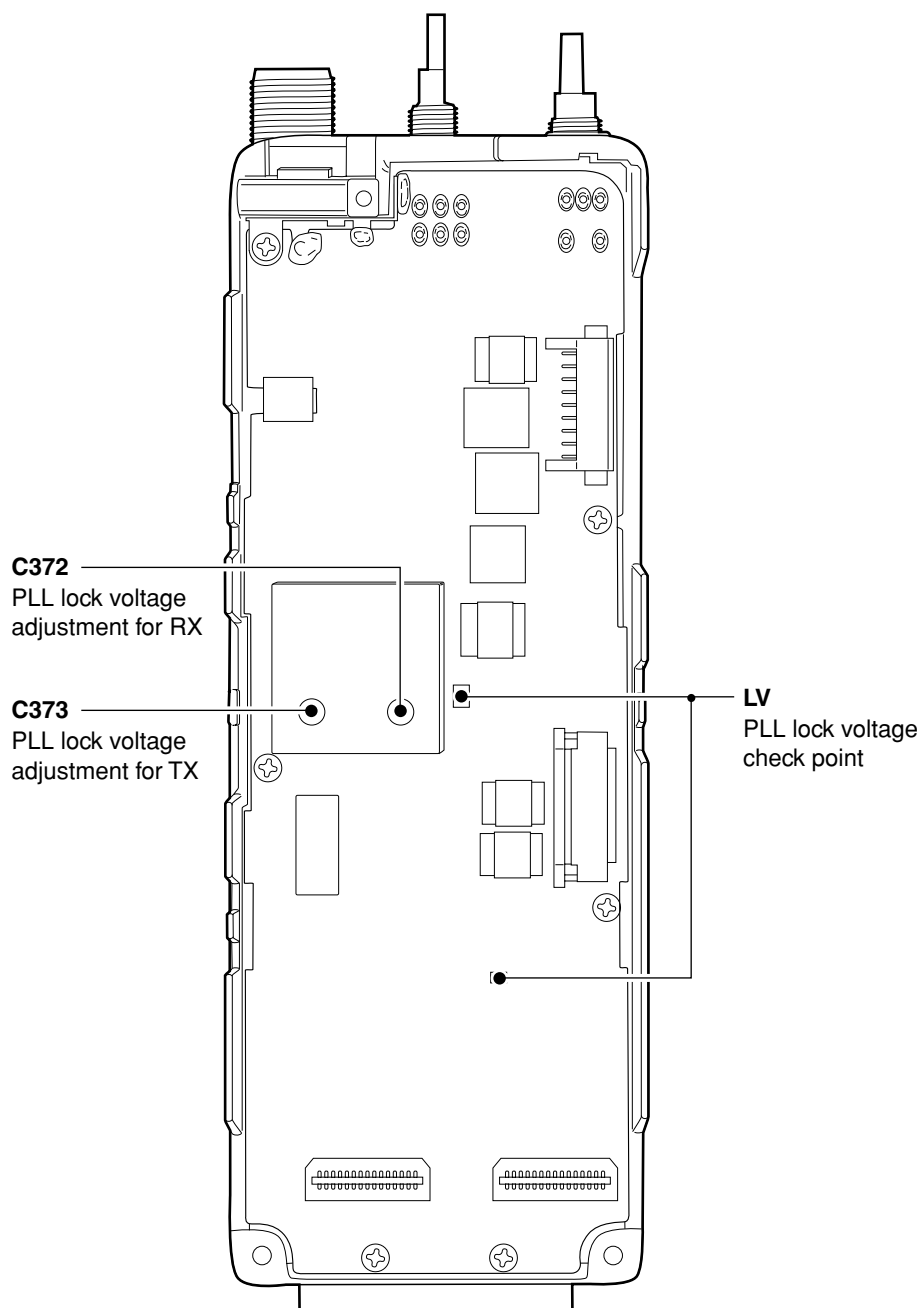
• *OPC-966 (JIG CABLE)



5-2 PLL ADJUSTMENT

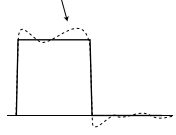
ADJUSTMENT	ADJUSTMENT CONDITIONS	MEASUREMENT		VALUE	ADJUSTMENT		
		UNIT	LOCATION		UNIT	ADJUST	
PLL LOCK VOLTAGE	1 • Operating freq. : 136.000 MHz • Receiving	MAIN	Connect a digital multi-meter or an oscilloscope to the check point, "LV".	1.2 V	MAIN	C372	
	2 • Transmitting					1.0 V	C373
	3 • Operating freq. : 174.000 MHz • Receiving					3.0–4.5 V	Verify
	4 • Transmitting						

• MAIN unit



5-3 SOFTWARE ADJUSTMENT

Select an operation using [↑] / [↓] keys, then set specified value using [←] / [→] keys on the connected computer keyboard.

ADJUSTMENT	ADJUSTMENT CONDITION	MEASUREMENT		VALUE
		UNIT	LOCATION	
REFERENCE FREQUENCY [TXF]	1 <ul style="list-style-type: none"> Operating freq. : 174.000 MHz Output power : Low1 Connect an RF power meter or 50 Ω dummy load to the antenna connector. Transmitting 	Top panel	Loosely couple a frequency counter to the antenna connector.	174.0000 MHz
OUTPUT POWER [Power (Hi)]	1 <ul style="list-style-type: none"> Operating freq. : 136.000 MHz Output power : High Transmitting 	Top panel	Connect an RF power meter to the antenna connector.	5.0 W
[Power (L2)]	2 <ul style="list-style-type: none"> Output power : Low2 Transmitting 			2.0 W
[Power (L1)]	3 <ul style="list-style-type: none"> Output power : Low1 Transmitting 			1.0 W
MODULATION BALLANCE [Ballance]	1 <ul style="list-style-type: none"> Operating freq. : 155.000 MHz Output power : Low1 Set an FM deviation meter as: <ul style="list-style-type: none"> HPF : OFF LPF : 20 kHz De-emphasis : OFF Detector : (P-P)/2 Push [P0] key while transmitting 	Top panel	Connect an FM deviation meter with an oscilloscope to the antenna connector through an attenuator.	Set to flat wave form 
FM DEVIATION [MOD W]	1 <ul style="list-style-type: none"> Operating freq. : 155.000 MHz Output power : Low1 IF bandwidth : Wide 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 multi connector through the JIG cable (*OPC-966) and set as : 1.0 kHz/150 mVrms Transmitting 	Top panel	Connect an FM deviation meter to the antenna connector through the attenuator.	±4.1 kHz ① ±3.1 kHz ②
[MOD N]	2 <ul style="list-style-type: none"> IF bandwidth : Narrow Transmitting 			±2.1 kHz
CTCSS/DTCS DEVIATION [CTCS/DTCS]	1 <ul style="list-style-type: none"> Operating freq. : 155.000 MHz Output power : Low1 IF bandwidth : Wide CTCSS : 88.5 Hz DTCS code : 007 No audio applied to the [MIC] input. Transmitting 	Top panel	Connect an FM deviation meter to the antenna connector through the attenuator.	±0.70 kHz ① ±0.56 kHz ②

①: W/N version, ②: M/N version

SOFTWARE ADJUSTMENT – continued

Select an operation using [↑] / [↓] keys, then set specified value using [←] / [→] keys on the connected computer keyboard.

ADJUSTMENT	ADJUSTMENT CONDITION	MEASUREMENT		VALUE	
		UNIT	LOCATION		
RX SENSITIVITY [BPF T1] – [BPF T4]	1	<ul style="list-style-type: none"> Operating freq. : 136.000 MHz IF bandwidth : Wide Connect a standard signal generator to the antenna connector and set as: <ul style="list-style-type: none"> Frequency : 136.000 MHz Level : 10 μV* (–87 dBm) Modulation : 1 kHz Deviation : \pm3.5 kHz (A) \pm2.8 kHz (B) Receiving 	MAIN	Connect a SINAD meter with an 8 Ω load to the multi connector through the JIG cable (see page 5-3).	Minimum distortion level
	<p>CONVENIENT: The BPF T1–BPF T4 can be adjusted automatically.</p> <p>①-1: Set the cursor to “BPF ALL” on the adjustment program and then push [ENTER] key. ①-2: The connected PC tunes BPF T1–BPF T4 to peak levels. or ②-1: Set the cursor to one of BPF T1, T2, T3, or T4 as desired. ②-2: Push [ENTER] key to start tuning. ②-3: Repeat ②-1 and ②-2 to perform additional BPF tuning.</p>				
S-METER [S-METER]	1	<ul style="list-style-type: none"> Operating freq. : 136.000 MHz IF bandwidth : Wide Connect an SSG to the antenna connector and set as: <ul style="list-style-type: none"> Frequency : 136.000 MHz Level : 14 μV* (–84 dBm) Modulation : 1 kHz Deviation : \pm3.5 kHz (A) \pm2.8 kHz (B) Receiving 	Push [ENTER] key on the connected computer keyboard to set “S3 level”.		
	2	<ul style="list-style-type: none"> Set an SSG as : <ul style="list-style-type: none"> Level : 0.45 μV* (–114 dBm) Modulation : 1 kHz Deviation : \pm3.5 kHz (A) \pm2.8 kHz (B) Receiving 	Push [ENTER] key on the connected computer keyboard to set “S1 level”.		
SQUELCH LEVEL [SQL]	1	<ul style="list-style-type: none"> Operating freq. : 155.000 MHz IF bandwidth : Wide Connect an SSG to the antenna connector and set as: <ul style="list-style-type: none"> Frequency : 155.000 MHz Level : 0.2 μV* (–121 dBm) Modulation : 1 kHz Deviation : \pm3.5 kHz (A) \pm2.8 kHz (B) Receiving 	Front panel	Internal speaker	Set “SQL level” to close squelch. Then set “SQL level” at the point where the audio signals just appears.

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

(A): W/N version, (B): M/N version

SECTION 6 PARTS LIST

[FRONT UNIT]

REF NO.	ORDER NO.	DESCRIPTION		M.
IC1	1130009860	S.IC	TC74VHC373FT (EL)	T
IC2	1110002750	S.IC	TA75S01F (TE85R)	T
Q1	1530002850	S.TRANSISTOR	2SC4116-BL (TE85R)	T
Q2	1530002850	S.TRANSISTOR	2SC4116-BL (TE85R)	T
Q3	1590002150	S.TRANSISTOR	DTC144TE TL	T
Q4	1590002150	S.TRANSISTOR	DTC144TE TL	T
Q5	1590002150	S.TRANSISTOR	DTC144TE TL	T
Q6	1560001130	S.FET	CPH3403-TL	T
Q7	1560001130	S.FET	CPH3403-TL	T
Q8	1530002060	S.TRANSISTOR	2SC4081 T106 R	T
Q9	1590000430	S.TRANSISTOR	DTC144EUA T106	T
D1	1790001280	S.DIODE	MA111 (TX)	T
D2	1790001280	S.DIODE	MA111 (TX)	T
D3	1790001200	S.DIODE	MA6S121 (TX)	T
D4	1790001280	S.DIODE	MA111 (TX)	T
R1	7030007300	S.RESISTOR	ERJ2GEJ 332 X (3.3 kΩ)	T
R2	7030005030	S.RESISTOR	ERJ2GEJ 152 X (1.5 kΩ)	T
R3	7030007250	S.RESISTOR	ERJ2GEJ 220 X (22 Ω)	T
R4	7030009150	S.RESISTOR	ERJ2GEJ 824 X (820 kΩ)	T
R5	7030009150	S.RESISTOR	ERJ2GEJ 824 X (820 kΩ)	T
R6	7030006610	S.RESISTOR	ERJ2GEJ 394 X (390 kΩ)	T
R7	7030008310	S.RESISTOR	ERJ2GEJ 564 X (560 kΩ)	T
R8	7030008370	S.RESISTOR	ERJ2GEJ 561 X (560 Ω)	T
R9	7030004990	S.RESISTOR	ERJ2GEJ 221 X (220 Ω)	T
R10	7030005030	S.RESISTOR	ERJ2GEJ 152 X (1.5 kΩ)	T
R11	7030007300	S.RESISTOR	ERJ2GEJ 332 X (3.3 kΩ)	T
R12	7030005060	S.RESISTOR	ERJ2GEJ 333 X (33 kΩ)	T
R13	7030007280	S.RESISTOR	ERJ2GEJ 331 X (330 Ω)	T
R14	7030005090	S.RESISTOR	ERJ2GEJ 104 X (100 kΩ)	T
R17	7030005090	S.RESISTOR	ERJ2GEJ 104 X (100 kΩ)	T
R18	7410000750	S.ARRAY	EXB-V4V 104JV (100 kΩ)	T
R20	7030005170	S.RESISTOR	ERJ2GEJ 474 X (470 kΩ)	T
R21	7030005090	S.RESISTOR	ERJ2GEJ 104 X (100 kΩ)	T
R22	7030005170	S.RESISTOR	ERJ2GEJ 474 X (470 kΩ)	T
R23	7030005050	S.RESISTOR	ERJ2GEJ 103 X (10 kΩ)	T
R24	7030005240	S.RESISTOR	ERJ2GEJ 473 X (47 kΩ)	T
R25	7030008300	S.RESISTOR	ERJ2GEJ 184 X (180 kΩ)	T
R26	7030007340	S.RESISTOR	ERJ2GEJ 153 X (15 kΩ)	T
R27	7030008010	S.RESISTOR	ERJ2GEJ 123 X (12 kΩ)	T
C1	4030016930	S.CERAMIC	ECJ0EB1A104K	T
C2	4030016930	S.CERAMIC	ECJ0EB1A104K	T
C3	4030016930	S.CERAMIC	ECJ0EB1A104K	T
C4*	4550006150	S.TANTALUM	ECST1CY105R	T
C6*	4550006150	S.TANTALUM	ECST1CY105R	T
C7*	4550006150	S.TANTALUM	ECST1CY105R	T
C8*	4550006150	S.TANTALUM	ECST1CY105R	T
C9*	4550006150	S.TANTALUM	ECST1CY105R	T
C10*	4550006150	S.TANTALUM	ECST1CY105R	T
C11*	4550006150	S.TANTALUM	ECST1CY105R	T
C12	4030014180	S.CERAMIC	ECUE1H470JCQ	T
C13	4030014180	S.CERAMIC	ECUE1H470JCQ	T
C14	4030014180	S.CERAMIC	ECUE1H470JCQ	T
C15	4030014180	S.CERAMIC	ECUE1H470JCQ	T
C16	4030013850	S.CERAMIC	ECUE1E102KBQ	T
C17	4030014180	S.CERAMIC	ECUE1H470JCQ	T
C18	4030014180	S.CERAMIC	ECUE1H470JCQ	T
C19	4030016930	S.CERAMIC	ECJ0EB1A104K	T
C20	4030014180	S.CERAMIC	ECUE1H470JCQ	T
C21*	4550006150	S.TANTALUM	ECST1CY105R	T
C22	4030016930	S.CERAMIC	ECJ0EB1A104K	T
C23*	4550006150	S.TANTALUM	ECST1CY105R	T
C24	4030016790	S.CERAMIC	ECJ0EB1C103K	T
C25	4030014180	S.CERAMIC	ECUE1H470JCQ	T
C26	4030016930	S.CERAMIC	ECJ0EB1A104K	T
C27	4030017230	S.CERAMIC	ECUE1E271KBQ	T
C28	4030016790	S.CERAMIC	ECJ0EB1C103K	T
C29	4030013850	S.CERAMIC	ECUE1E102KBQ	T
C30	4030016930	S.CERAMIC	ECJ0EB1A104K	T
J1	6510022360	S.CONNECTOR	26FLZ-SM1-TB	T
J2	6510022200	S.CONNECTOR	40FLZ-SM1-R-TB	T

[FRONT UNIT]

REF NO.	ORDER NO.	DESCRIPTION		M.
DS1	5010000160	S.LED	LNJ310M6URA	B
DS2	5010000160	S.LED	LNJ310M6URA	B
DS3	5010000160	S.LED	LNJ310M6URA	B
DS4	5010000160	S.LED	LNJ310M6URA	B
DS5	5040002170	S.LED	LNJ210C6ARA	B
DS6	5010000120	S.LED	LN1371G-(TR)	[GT] B
DS7	5010000120	S.LED	LN1371G-(TR)	[GT] B
DS8	5010000120	S.LED	LN1371G-(TR)	[GT] B
DS9	5010000120	S.LED	LN1371G-(TR)	[GT] B
DS10	5030001870	LCD	EDMMUD1FA0	B
DS11	5010000120	S.LED	LN1371G-(TR)	[GT] B
DS12	5010000120	S.LED	LN1371G-(TR)	[GT] B
DS13	5010000160	S.LED	LNJ310M6URA	B
DS14	5010000120	S.LED	LN1371G-(TR)	[GS] B
DS15	5010000120	S.LED	LN1371G-(TR)	[GS] B
MC1	7700002310	MICROPHONE	EM-140	B
S1	2230001060	S.SWITCH	EVQ-PUL 02K	T
S2	2230001060	S.SWITCH	EVQ-PUL 02K	T
S3	2230001060	S.SWITCH	EVQ-PUL 02K	T
S4	2230001060	S.SWITCH	EVQ-PUL 02K	T
S5	2230001060	S.SWITCH	EVQ-PUL 02K	T
SP1*	2510001060	SPEAKER	K036NA500-47	T
W1	7120000470	JUMPER	ERDS2T0	T
W3	7030003860	S.RESISTOR	ERJ3GE JPW V	T
EP1	0910055257	PCB	B 5489G	

[GT]: IC-F30GT/F31GT, [GS]: IC-F30GS/F31GS,
 [F30G]: IC-F30GT/F30GS, [F31G]: IC-F31GT/F31GS
 [IS]: Intrinsically safe version, [BIIS]: BIIS version

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

[MAIN UNIT]

REF NO.	ORDER NO.	DESCRIPTION	M.
IC1	1130009130	S.IC SA7025DK-T	T
IC2	1130008560	S.IC TC75S51F (TE85L)	B
IC3	1110003490	S.IC TA31136FN (D,EL)	B
IC4	1130008560	S.IC TC75S51F (TE85L)	B
IC5	1110001810	S.IC TA7368F (ER)	B
IC7	1110003780	S.IC NJM2902V-TE1	B
IC9	1130009330	S.IC TC35453F (BR,DRY)	B
IC12	1110003390	S.IC AN8005M-(E1)	B
IC13	1190001350	S.IC M62364FP 600D	B
IC14	1140010140	S.IC HD64F2238BFA13	B
IC15	1110005770	S.IC S-80942CNMC-G9C-T2	B
IC16	1140008650	S.IC HN58X2464T1	B
IC17	1130009700	S.IC LC73872M-TRM	B
IC18	1110002750	S.IC TA75S01F (TE85R)	T
IC19	1130008230	S.IC BU4053BCFV-E2	T
IC20	1110003800	S.IC NJM2904V-TE1	B
IC23	1130007570	S.IC BU4094BCFV-E2	B
IC24	1140008650	S.IC HN58X2464T1	B
IC27	1190001340	S.IC M62334FP 600C	T
IC29	1130008230	S.IC BU4053BCFV-E2	T
IC30	1130007020	S.IC TC7S66FU (TE85R)	B
IC31	1130008560	S.IC TC75S51F (TE85L)	T
Q1	1560001050	S.FET 2SK2974	T
Q2	1560001020	S.FET 2SK2973 (MTS101P)	T
Q3	1530002920	S.TRANSISTOR 2SC4226-T1 R25	T
Q6	1530002600	S.TRANSISTOR 2SC4215-O (TE85R)	T
Q7	1530002600	S.TRANSISTOR 2SC4215-O (TE85R)	T
Q8	1530002600	S.TRANSISTOR 2SC4215-O (TE85R)	T
Q9	1590000430	S.TRANSISTOR DTC144EUA T106	B
Q10	1590001400	S.TRANSISTOR XP1214 (TX)	B
Q11	1530002920	S.TRANSISTOR 2SC4226-T1 R25	T
Q12	1530002920	S.TRANSISTOR 2SC4226-T1 R25	T
Q13	1590001190	S.TRANSISTOR XP6501-(TX).AB	B
Q14	1560000540	S.FET 2SK880-Y (TE85R)	B
Q15	1530002690	S.TRANSISTOR 2SC4116-GR (TE85R)	T
Q16	1590000720	S.TRANSISTOR DTA144EUA T106	B
Q17	1530002690	S.TRANSISTOR 2SC4116-GR (TE85R)	B
Q18	1530002600	S.TRANSISTOR 2SC4215-O (TE85R)	B
Q19	1580000430	S.FET 3SK206-T1 U78	B
Q20	1580000730	S.FET 3SK293 (TE85L)	B
Q21	1560000840	S.FET 2SK1829 (TE85R)	B
Q22	1590000720	S.TRANSISTOR DTA144EUA T106	B
Q23	1520000460	S.TRANSISTOR 2SB1132 T100 R	B
Q24	1590001190	S.TRANSISTOR XP6501-(TX).AB	B
Q26	1590000430	S.TRANSISTOR DTC144EUA T106	B
Q27	1530003090	S.TRANSISTOR 2SC4213-B (TE85R)	B
Q29	1510000580	S.TRANSISTOR 2SA1362-GR (TE85R)	B
Q30	1510000580	S.TRANSISTOR 2SA1362-GR (TE85R)	B
Q31	1510000580	S.TRANSISTOR 2SA1362-GR (TE85R)	B
Q32	1520000460	S.TRANSISTOR 2SB1132 T100 R	B
Q33	1590001190	S.TRANSISTOR XP6501-(TX).AB	B
Q39	1530002690	S.TRANSISTOR 2SC4116-GR (TE85R)	T
Q40	1590001400	S.TRANSISTOR XP1214 (TX)	B
Q41	1590000430	S.TRANSISTOR DTC144EUA T106	B
Q43	1530002690	S.TRANSISTOR 2SC4116-GR (TE85R)	T
Q44	1590000430	S.TRANSISTOR DTC144EUA T106	B
Q45	1590002530	S.TRANSISTOR UN911H (TX)	B
Q46	1590000430	S.TRANSISTOR DTC144EUA T106	T
Q47	1530002690	S.TRANSISTOR 2SC4116-GR (TE85R)	T
D1	1790000620	S.DIODE MA77 (TX)	B
D2	1790000650	S.DIODE MA713 (TX)	B
D4	1790000620	S.DIODE MA77 (TX)	T
D5	1790000620	S.DIODE MA77 (TX)	B
D6	1750000710	S.VARICAP HVC350BTRF	B
D7	1720000400	S.VARICAP 1SV245 (TPH3)	B
D8	1750000710	S.VARICAP HVC350BTRF	B
D10	1160000060	S.DIODE DAN202U T106	T
D13	1160000050	S.DIODE DAP202U T106	B
D14	1160000050	S.DIODE DAP202U T106	B
D15	1160000060	S.DIODE DAN202U T106	B
D16	1160000060	S.DIODE DAN202U T106	B
D18	1750000710	S.VARICAP HVC350BTRF	B
D19	1750000710	S.VARICAP HVC350BTRF	B
D20	1750000710	S.VARICAP HVC350BTRF	B
D21	1750000710	S.VARICAP HVC350BTRF	B
D22	1790001250	S.DIODE MA2S111-(TX)	B
D23	1790001250	S.DIODE MA2S111-(TX)	T
D24	1790000620	S.DIODE MA77 (TX)	T
D25	1790000620	S.DIODE MA77 (TX)	T
D26	1790001250	S.DIODE MA2S111-(TX)	B
D27	1790000620	S.DIODE MA77 (TX)	T
D29	1790001250	S.DIODE MA2S111-(TX)	B
D30	1730002360	S.ZENER MA8062-M (TX)	T
D31	1790001250	S.DIODE MA2S111-(TX)	B

[MAIN UNIT]

REF NO.	ORDER NO.	DESCRIPTION	M.
D33	1790001250	S.DIODE MA2S111-(TX)	B
D34	1790000950	S.ZENER MA8056-M (TX)	T
D35	1790000950	S.ZENER MA8056-M (TX)	T
D36	1790000950	S.ZENER MA8056-M (TX)	T
D38	1790001250	S.DIODE MA2S111-(TX)	T
D39	1730002260	S.ZENER MA8030-H (TX)	T
D40	1750000710	S.VARICAP HVC350BTRF	B
D41	1750000710	S.VARICAP HVC350BTRF	B
D42	1750000710	S.VARICAP HVC350BTRF	B
D43	1750000710	S.VARICAP HVC350BTRF	B
D44	1750000710	S.VARICAP HVC350BTRF	B
D45	1750000710	S.VARICAP HVC350BTRF	B
D46	1790000980	S.DIODE MA742 (TX)	B
D47	1730002270	S.ZENER MA8024 (TX)	T
FI1	2010002510	S.XTAL FL-322 (31.650 MHz)	B
FI2	2020001490	S.CERAMIC SFPCA450KE4A-R1	T
FI3	2020001080	S.CERAMIC SFPCA450KG1A-R1	T
FI4	2040001440	S.LC NFE31PT152Z1E9L	T
X1	6050010960	S.XTAL CR-667 (15.600 MHz)	B
X2	6070000190	S.DISCIMINATOR CDBC450KAY24-R0	T
X3	6050011000	S.XTAL CR-681 (12.288 MHz)	B
X4	6050009910	S.XTAL CR-563 (3.579545 MHz)	T
L1	6200008580	S.COIL 0.30-1.4-6TL 32N	B
L2	6200008150	S.COIL 0.35-1.6-7TL 44N	B
L3	6200008280	S.COIL 0.30-1.7-7TL 50N	B
L4	6200002960	S.COIL NL 322522T-4R7J-3	T
L5	6200008280	S.COIL 0.30-1.7-7TL 50N	T
L7	6200008490	S.COIL 0.30-0.9-3TR 7.5N	T
L8	6200008330	S.COIL 0.45-1.4-4TL 15N	T
L9	6200003590	S.COIL EXCCL3225U1	T
L10	6200009450	S.COIL 0.20-1.0-6TL 25N	T
L13	6200007690	S.COIL LQW2BHN18NJ01L	T
L14	6200003590	S.COIL EXCCL3225U1	T
L15	6200005690	S.COIL ELJRE 18NG-F	T
L17	6200006980	S.COIL ELJRE R10G-F	T
L18	6200006980	S.COIL ELJRE R10G-F	T
L19	6200007170	S.COIL MLF1608A 3R3K-T	B
L20	6200008190	S.COIL 0.25-1.9-8TL 80N	T
L21	6200005540	S.COIL ELJNC R47K-F	B
L22	6200004950	S.COIL NL 252018T-1R8J	B
L23	6200008390	S.COIL 0.25-1.9-9TL	T
L24	6200005540	S.COIL ELJNC R47K-F	B
L25	6200004950	S.COIL NL 252018T-1R8J	T
L26	6200004950	S.COIL NL 252018T-1R8J	T
L27	6200004950	S.COIL NL 252018T-1R8J	T
L28	6200004950	S.COIL NL 252018T-1R8J	T
L29	6200005720	S.COIL ELJRE 33NG-F	T
L31	6200002790	S.COIL ELJFC R82M-F	B
L33	6200007750	S.COIL LQW2BHN56NJ01L	B
L35	6200001980	S.COIL NL 252018T-1R0J	B
L36	6200007750	S.COIL LQW2BHN56NJ01L	B
L37	6200007750	S.COIL LQW2BHN56NJ01L	B
L38	6200007750	S.COIL LQW2BHN56NJ01L	B
L39	6200009290	S.COIL LQW18AN47NG00D	T
L40	6200009290	S.COIL LQW18AN47NG00D	T
L41	6200003590	S.COIL EXCCL3225U1	T
L42	6200004950	S.COIL NL 252018T-1R8J	B
L43	6200002860	S.COIL NL 252018T-4R7J	B
L44	6200001980	S.COIL NL 252018T-1R0J	B
L45	6200004660	S.COIL MLF1608A 1R8K-T	T
L46	6200007170	S.COIL MLF1608A 3R3K-T	B
L47	6200001980	S.COIL NL 252018T-1R0J	B
L48	6200009460	S.COIL 0.25-1.9-7TL 67N	T
L49	6200008390	S.COIL 0.25-1.9-9TL	T
L50	6200006980	S.COIL ELJRE R10G-F	T
L51	6200002150	S.COIL ELJNC 56NKF	T
L52	6200006980	S.COIL ELJRE R10G-F	B
L53	6200003960	S.COIL MLF1608A 1R0K-T	T
R1	7030003670	S.RESISTOR ERJ3GEYJ 823 V (82 kΩ)	B
R2	7030000280	S.RESISTOR MCR10EZJH 150 Ω (151)	T
R3	7030003480	S.RESISTOR ERJ3GEYJ 222 V (2.2 kΩ)	B
R4	7030003480	S.RESISTOR ERJ3GEYJ 222 V (2.2 kΩ)	B
R5	7030005040	S.RESISTOR ERJ2GEJ 472 X (4.7 kΩ)	B
R6	7030005040	S.RESISTOR ERJ2GEJ 472 X (4.7 kΩ)	B
R7	7030003240	S.RESISTOR ERJ3GEYJ 220 V (22 Ω)	T
R8	7030008290	S.RESISTOR ERJ2GEJ 183 X (18 kΩ)	T
R10	7030005590	S.RESISTOR ERJ2GEJ 680 X (68 Ω)	T
R12	7030005050	S.RESISTOR ERJ2GEJ 103 X (10 kΩ)	T
R14	7030005530	S.RESISTOR ERJ2GEJ 100 X (10 Ω)	T
R15	7030007570	S.RESISTOR ERJ2GEJ 122X (1.2 kΩ)	T

[GT]: IC-F30GT/F31GT, [GS]: IC-F30GS/F31GS,
 [F30G]: IC-F30GT/F30GS, [F31G]: IC-F31GT/F31GS
 [IS]: Intrinsically safe version, [BIS]: BISS version

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.
R16	7030005590	S.RESISTOR ERJ2GEJ 680 X (68 Ω)	T
R17	7030007570	S.RESISTOR ERJ2GEJ 122X (1.2 kΩ)	T
R18	7030004980	S.RESISTOR ERJ2GEJ 101 X (100 Ω)	B
R19	7030005050	S.RESISTOR ERJ2GEJ 103 X (10 kΩ)	T
R20	7030005120	S.RESISTOR ERJ2GEJ 102 X (1 kΩ)	B
R21	7030004980	S.RESISTOR ERJ2GEJ 101 X (100 Ω)	T
R22	7030005240	S.RESISTOR ERJ2GEJ 473 X (47 kΩ)	T
R23	7030009320	S.RESISTOR ERJ2GEJ 4R7 X (4.7 Ω)	T
R24	7030004990	S.RESISTOR ERJ2GEJ 221 X (220 Ω)	T
R25	7030005070	S.RESISTOR ERJ2GEJ 683 X (68 kΩ)	T
R26	7030004980	S.RESISTOR ERJ2GEJ 101 X (100 Ω)	B
R28	7030005070	S.RESISTOR ERJ2GEJ 683 X (68 kΩ)	T
R29	7030005050	S.RESISTOR ERJ2GEJ 103 X (10 kΩ)	B
R30	7030008340	S.RESISTOR RR0510P-182-D (1.8 kΩ)	T
R31	7030011000	S.RESISTOR RR0510P-392-D	T
R32	7030007250	S.RESISTOR ERJ2GEJ 220 X (22 Ω)	T
R33	7030007280	S.RESISTOR ERJ2GEJ 331 X (330 Ω)	B
R34	7030008340	S.RESISTOR RR0510P-182-D (1.8 kΩ)	T
R35	7030011000	S.RESISTOR RR0510P-392-D	T
R36	7030005530	S.RESISTOR ERJ2GEJ 100 X (10 Ω)	T
R37	7030009280	S.RESISTOR ERJ2GE	B
R38	7030007290	S.RESISTOR ERJ2GEJ 222 X (2.2 kΩ)	B
R39	7030005530	S.RESISTOR ERJ2GEJ 100 X (10 Ω)	B
R40	7030004980	S.RESISTOR ERJ2GEJ 101 X (100 Ω) [F30G]	B
	7030005530	S.RESISTOR ERJ2GEJ 100 X (10 Ω) [F31G]	B
R41	7030005110	S.RESISTOR ERJ2GEJ 224 X (220 kΩ)	B
R42	7030005090	S.RESISTOR ERJ2GEJ 104 X (100 kΩ)	B
R43	7030005030	S.RESISTOR ERJ2GEJ 152 X (1.5 kΩ) [F31G]	B
	7030009270	S.RESISTOR ERJ2GEJ 821 X (820 Ω) [F30G]	B
R44	7030005040	S.RESISTOR ERJ2GEJ 472 X (4.7 kΩ) [F31G]	B
	7030005290	S.RESISTOR ERJ2GEJ 682 X (6.8 kΩ) [F30G]	B
R45	7030005530	S.RESISTOR ERJ2GEJ 100 X (10 Ω)	B
R46	7030005040	S.RESISTOR ERJ2GEJ 472 X (4.7 kΩ) [F30G]	B
	7030008010	S.RESISTOR ERJ2GEJ 123 X (12 kΩ) [F31G]	B
R47	7030005050	S.RESISTOR ERJ2GEJ 103 X (10 kΩ) [F30G]	T
	7030009710	S.RESISTOR ERJ2GEJ 203 X (20 kΩ) [F31G]	T
R48	7030005050	S.RESISTOR ERJ2GEJ 103 X (10 kΩ)	B
R49	7030005290	S.RESISTOR ERJ2GEJ 682 X (6.8 kΩ)	B
R50	7030005120	S.RESISTOR ERJ2GEJ 102 X (1 kΩ)	B
R51	7030005050	S.RESISTOR ERJ2GEJ 103 X (10 kΩ)	B
R52	7030004980	S.RESISTOR ERJ2GEJ 101 X (100 Ω)	B
R53	7030005110	S.RESISTOR ERJ2GEJ 224 X (220 kΩ)	B
R54	7030004980	S.RESISTOR ERJ2GEJ 101 X (100 Ω)	B
R55	7030005220	S.RESISTOR ERJ2GEJ 223 X (22 kΩ)	B
R57	7030009700	S.RESISTOR ERJ2GEJ 202 X (2 kΩ)	B
R58	7410000950	S.ARRAY EXB-V8V 102JV	T
R59	7030009700	S.RESISTOR ERJ2GEJ 202 X (2 kΩ)	B
R60	7030005090	S.RESISTOR ERJ2GEJ 104 X (100 kΩ)	T
R61	7030005110	S.RESISTOR ERJ2GEJ 224 X (220 kΩ)	T
R62	7030007570	S.RESISTOR ERJ2GEJ 122X (1.2 kΩ)	T
R63	7030005580	S.RESISTOR ERJ2GEJ 560 X (56 Ω)	B
R64	7030005240	S.RESISTOR ERJ2GEJ 473 X (47 kΩ)	T
R65	7030005240	S.RESISTOR ERJ2GEJ 473 X (47 kΩ)	T
R66	7030005240	S.RESISTOR ERJ2GEJ 473 X (47 kΩ)	T
R67	7030005090	S.RESISTOR ERJ2GEJ 104 X (100 kΩ)	B
R69	7030005090	S.RESISTOR ERJ2GEJ 104 X (100 kΩ)	B
R73	7030005090	S.RESISTOR ERJ2GEJ 104 X (100 kΩ)	B
R75	7030005090	S.RESISTOR ERJ2GEJ 104 X (100 kΩ)	T
R77	7030007340	S.RESISTOR ERJ2GEJ 153 X (15 kΩ)	B
R78	7030005220	S.RESISTOR ERJ2GEJ 223 X (22 kΩ)	B
R79	7030008010	S.RESISTOR ERJ2GEJ 123 X (12 kΩ)	B
R80	7030005220	S.RESISTOR ERJ2GEJ 223 X (22 kΩ)	B
R81	7030009320	S.RESISTOR ERJ2GEJ 4R7 X (4.7 Ω)	B
R82	7030007340	S.RESISTOR ERJ2GEJ 153 X (15 kΩ)	B
R85	7030007280	S.RESISTOR ERJ2GEJ 331 X (330 Ω)	B
R86	7030005080	S.RESISTOR ERJ2GEJ 823 X (82 kΩ)	B
R87	7030008410	S.RESISTOR ERJ2GEJ 392 X (3.9 kΩ)	B
R88	7030005240	S.RESISTOR ERJ2GEJ 473 X (47 kΩ)	B
R89	7030005030	S.RESISTOR ERJ2GEJ 152 X (1.5 kΩ)	B
R90	7030004970	S.RESISTOR ERJ2GEJ 470 X (47 Ω)	T
R91	7030005050	S.RESISTOR ERJ2GEJ 103 X (10 kΩ)	T
R92	7030005240	S.RESISTOR ERJ2GEJ 473 X (47 kΩ)	T
R93	7030005240	S.RESISTOR ERJ2GEJ 473 X (47 kΩ)	B
R94	7030007300	S.RESISTOR ERJ2GEJ 332 X (3.3 kΩ)	B
R95	7030009320	S.RESISTOR ERJ2GEJ 4R7 X (4.7 Ω)	T
R96	7030008410	S.RESISTOR ERJ2GEJ 392 X (3.9 kΩ)	T
R97	7030005010	S.RESISTOR ERJ2GEJ 681 X (680 Ω)	B
R98	7030005090	S.RESISTOR ERJ2GEJ 104 X (100 kΩ)	T
R99	7030005120	S.RESISTOR ERJ2GEJ 102 X (1 kΩ)	T
R102	7030008280	S.RESISTOR ERJ2GEJ 271 X (270 Ω)	B
R103	7030004990	S.RESISTOR ERJ2GEJ 221 X (220 Ω)	B
R105	7030005040	S.RESISTOR ERJ2GEJ 472 X (4.7 kΩ)	B
R109	7030004980	S.RESISTOR ERJ2GEJ 101 X (100 Ω)	T
R110	7030005040	S.RESISTOR ERJ2GEJ 472 X (4.7 kΩ)	T
R111	7030005100	S.RESISTOR ERJ2GEJ 154 X (150 kΩ)	B
R112	7030005050	S.RESISTOR ERJ2GEJ 103 X (10 kΩ)	B
R113	7030005110	S.RESISTOR ERJ2GEJ 224 X (220 kΩ)	B
R114	7030005050	S.RESISTOR ERJ2GEJ 103 X (10 kΩ)	B

[MAIN UNIT]

REF NO.	ORDER NO.	DESCRIPTION	M.
R115	7030005050	S.RESISTOR ERJ2GEJ 103 X (10 kΩ)	B
R116	7030005090	S.RESISTOR ERJ2GEJ 104 X (100 kΩ)	B
R117	7030008280	S.RESISTOR ERJ2GEJ 271 X (270 Ω)	B
R118	7030005090	S.RESISTOR ERJ2GEJ 104 X (100 kΩ)	B
R119	7030006610	S.RESISTOR ERJ2GEJ 394 X (390 kΩ)	B
R120	7030007340	S.RESISTOR ERJ2GEJ 153 X (15 kΩ)	B
R121	7030009320	S.RESISTOR ERJ2GEJ 4R7 X (4.7 Ω)	B
R122	7030008400	S.RESISTOR ERJ2GEJ 182 X (1.8 kΩ)	B
R123	7030005240	S.RESISTOR ERJ2GEJ 473 X (47 kΩ)	B
R124	7030005170	S.RESISTOR ERJ2GEJ 474 X (470 kΩ)	B
R125	7030005050	S.RESISTOR ERJ2GEJ 103 X (10 kΩ)	B
R126	7030005090	S.RESISTOR ERJ2GEJ 104 X (100 kΩ)	B
R127	7030004980	S.RESISTOR ERJ2GEJ 101 X (100 Ω)	B
R128	7030005090	S.RESISTOR ERJ2GEJ 104 X (100 kΩ)	B
R129	7030008410	S.RESISTOR ERJ2GEJ 392 X (3.9 kΩ)	B
R130	7030005050	S.RESISTOR ERJ2GEJ 103 X (10 kΩ)	B
R131	7030005230	S.RESISTOR ERJ2GEJ 334 X (330 kΩ)	B
R132	7030008300	S.RESISTOR ERJ2GEJ 184 X (180 kΩ)	B
R133	7030007290	S.RESISTOR ERJ2GEJ 222 X (2.2 kΩ)	B
R134	7030003200	S.RESISTOR ERJ3GEYJ 100 V (10 Ω)	B
R135	7030003200	S.RESISTOR ERJ3GEYJ 100 V (10 Ω)	B
R136	7030005290	S.RESISTOR ERJ2GEJ 682 X (6.8 kΩ)	B
R137	7030009140	S.RESISTOR ERJ2GEJ 272 X (2.7 kΩ)	B
R138	7030007300	S.RESISTOR ERJ2GEJ 332 X (3.3 kΩ)	B
R139	7030005120	S.RESISTOR ERJ2GEJ 102 X (1 kΩ)	B
R140	7030005160	S.RESISTOR ERJ2GEJ 105 X (1 MΩ)	B
R141	7030005070	S.RESISTOR ERJ2GEJ 683 X (68 kΩ)	B
R150	7030005110	S.RESISTOR ERJ2GEJ 224 X (220 kΩ)	B
R151	7030005100	S.RESISTOR ERJ2GEJ 154 X (150 kΩ)	B
R152	7030005100	S.RESISTOR ERJ2GEJ 154 X (150 kΩ)	B
R153	7030009320	S.RESISTOR ERJ2GEJ 4R7 X (4.7 Ω)	B
R155	7030007350	S.RESISTOR ERJ2GEJ 393 X (39 kΩ)	B
R157	7030005220	S.RESISTOR ERJ2GEJ 223 X (22 kΩ)	T
R159	7030005090	S.RESISTOR ERJ2GEJ 104 X (100 kΩ)	B
R161	7030005070	S.RESISTOR ERJ2GEJ 683 X (68 kΩ)	B
R162	7030005070	S.RESISTOR ERJ2GEJ 683 X (68 kΩ)	B
R163	7030005060	S.RESISTOR ERJ2GEJ 333 X (33 kΩ)	B
R164	7030005110	S.RESISTOR ERJ2GEJ 224 X (220 kΩ)	B
R165	7030005240	S.RESISTOR ERJ2GEJ 473 X (47 kΩ)	B
R166	7030005050	S.RESISTOR ERJ2GEJ 103 X (10 kΩ)	B
R167	7030005170	S.RESISTOR ERJ2GEJ 474 X (470 kΩ)	B
R168	7030007350	S.RESISTOR ERJ2GEJ 393 X (39 kΩ)	B
R171	7030005070	S.RESISTOR ERJ2GEJ 683 X (68 kΩ)	B
R172	7030005070	S.RESISTOR ERJ2GEJ 683 X (68 kΩ)	B
R173	7030005100	S.RESISTOR ERJ2GEJ 154 X (150 kΩ)	B
R174	7030005600	S.RESISTOR ERJ2GEJ 273 X (27 kΩ)	B
R175	7030009290	S.RESISTOR ERJ2GEJ 562 X (5.6 kΩ)	B
R176	7030005720	S.RESISTOR ERJ2GEJ 563 X (5.6 kΩ)	T
R177	7030008290	S.RESISTOR ERJ2GEJ 183 X (18 kΩ)	B
R178	7030005600	S.RESISTOR ERJ2GEJ 273 X (27 kΩ)	T
R179	7030005600	S.RESISTOR ERJ2GEJ 273 X (27 kΩ)	T
R180	7030007340	S.RESISTOR ERJ2GEJ 153 X (15 kΩ)	T
R181	7030005600	S.RESISTOR ERJ2GEJ 273 X (27 kΩ)	B
R182	7030005600	S.RESISTOR ERJ2GEJ 273 X (27 kΩ)	B
R183	7030005030	S.RESISTOR ERJ2GEJ 152 X (1.5 kΩ)	B
R184	7030008010	S.RESISTOR ERJ2GEJ 123 X (12 kΩ)	B
R185	7030005310	S.RESISTOR ERJ2GEJ 124 X (120 kΩ)	B
R186	7030005070	S.RESISTOR ERJ2GEJ 683 X (68 kΩ)	T
R187	7030005040	S.RESISTOR ERJ2GEJ 472 X (4.7 kΩ)	T
R188	7030005090	S.RESISTOR ERJ2GEJ 104 X (100 kΩ)	B
R189	7030005000	S.RESISTOR ERJ2GEJ 471 X (470 Ω)	T
R190	7030005090	S.RESISTOR ERJ2GEJ 104 X (100 kΩ)	T
R192	7030005090	S.RESISTOR ERJ2GEJ 104 X (100 kΩ)	B
R193	7210003060	VARIABLE TP76N00N-15F-10KA-2251	B
R195	7030005040	S.RESISTOR ERJ2GEJ 472 X (4.7 kΩ)	B
R196	7030005050	S.RESISTOR ERJ2GEJ 103 X (10 kΩ)	B
R197	7030005040	S.RESISTOR ERJ2GEJ 472 X (4.7 kΩ)	B
R198	7030005050	S.RESISTOR ERJ2GEJ 103 X (10 kΩ)	B
R199	7030005040	S.RESISTOR ERJ2GEJ 472 X (4.7 kΩ)	B
R200	7030005050	S.RESISTOR ERJ2GEJ 103 X (10 kΩ)	B
R201	7030007290	S.RESISTOR ERJ2GEJ 222 X (2.2 kΩ)	B
R202	7030005120	S.RESISTOR ERJ2GEJ 102 X (1 kΩ)	T
R203	7030005050	S.RESISTOR ERJ2GEJ 103 X (10 kΩ)	B
R206	7030004980	S.RESISTOR ERJ2GEJ 101 X (100 Ω)	B
R207	7030005220	S.RESISTOR ERJ2GEJ 223 X (22 kΩ)	T
R208	7030007340	S.RESISTOR ERJ2GEJ 153 X (15 kΩ)	T
R209	7030005230	S.RESISTOR ERJ2GEJ 334 X (330 kΩ)	T
R210	7030006610	S.RESISTOR ERJ2GEJ 394 X (390 kΩ)	T
R211	7030007570	S.RESISTOR ERJ2GEJ 122X (1.2 kΩ)	T
R212	7030003830	S.RESISTOR ERJ3GEYJ 185 V (1.8 MΩ)	T
R215	7030005090	S.RESISTOR ERJ2GEJ 104 X (100 kΩ) [GS]	T
	7030005160	S.RESISTOR ERJ2GEJ 105 X (1 MΩ) [GT]	T
R216	7030005090	S.RESISTOR ERJ2GEJ 104 X (100 kΩ) [GT]	B
R217	7030005000	S.RESISTOR ERJ2GEJ 471 X (470 Ω)	B
R218	7030007350	S.RESISTOR ERJ2GEJ 393 X (39 kΩ)	T
R219	7030005050	S.RESISTOR ERJ2GEJ 103 X (10 kΩ)	T
R220	7030005090	S.RESISTOR ERJ2GEJ 104 X (100 kΩ)	B
R221	7030005060	S.RESISTOR ERJ2GEJ 333 X (33 kΩ)	T

[GT]: IC-F30GT/F31GT, [GS]: IC-F30GS/F31GS,
 [F30G]: IC-F30GT/F30GS, [F31G]: IC-F31GT/F31GS
 [IS]: Intrinsically safe version, [BIIS]: BIIS version

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

[MAIN UNIT]

REF NO.	ORDER NO.	DESCRIPTION	M.
R222	7030005090	S.RESISTOR ERJ2GEJ 104 X (100 kΩ)	T
R223	7410000580	S.ARRAY EXB-V4V 224JV (220 kΩ)	T
R224	7030005090	S.RESISTOR ERJ2GEJ 104 X (100 kΩ)	B
R225	7030005090	S.RESISTOR ERJ2GEJ 104 X (100 kΩ)	T
R226	7510001470	S.THERMISTOR NTCG20 4AG 473JT	T
R227	7030005090	S.RESISTOR ERJ2GEJ 104 X (100 kΩ)	T
R228	7030010080	S.RESISTOR ERJ2RHD 104 X (100 kΩ)	T
R229	7030010080	S.RESISTOR ERJ2RHD 104 X (100 kΩ)	T
R230	7030008010	S.RESISTOR ERJ2GEJ 123 X (12 kΩ)	T
R231	7030008010	S.RESISTOR ERJ2GEJ 123 X (12 kΩ)	T
R232	7030008010	S.RESISTOR ERJ2GEJ 123 X (12 kΩ)	T
R233	7030005090	S.RESISTOR ERJ2GEJ 104 X (100 kΩ)	T
R234	7030005050	S.RESISTOR ERJ2GEJ 103 X (10 kΩ)	B
R235	7030005120	S.RESISTOR ERJ2GEJ 102 X (1 kΩ)	T
R236	7410000950	S.ARRAY EXB-V8V 102JV	B
R237	7410000950	S.ARRAY EXB-V8V 102JV	B
R238	7410000950	S.ARRAY EXB-V8V 102JV	B
R239	7410000950	S.ARRAY EXB-V8V 102JV	B
R240	7410000770	S.ARRAY EXB-V4V 102JV (1 kΩ)	B
R242	7410000700	S.ARRAY EXB-V8V 105JV (1 MΩ)	T
R243	7410000900	S.ARRAY EXB-V4V 105JV (1 MΩ)	T
R244	7410000950	S.ARRAY EXB-V8V 102JV	T
R245	7410000770	S.ARRAY EXB-V4V 102JV (1 kΩ)	T
R246	7410000950	S.ARRAY EXB-V8V 102JV	B
R247	7410000950	S.ARRAY EXB-V8V 102JV	T
R248	7030005120	S.RESISTOR ERJ2GEJ 102 X (1 kΩ)	B
R249	7410000950	S.ARRAY EXB-V8V 102JV	B
R250	7410000950	S.ARRAY EXB-V8V 102JV	B
R251	7410000950	S.ARRAY EXB-V8V 102JV	T
R252	7410000950	S.ARRAY EXB-V8V 102JV	B
R253	7410000750	S.ARRAY EXB-V4V 104JV (100 kΩ)	T
R254	7030008300	S.RESISTOR ERJ2GEJ 184 X (180 kΩ)	T
R257	7030005220	S.RESISTOR ERJ2GEJ 223 X (22 kΩ)	B
R258	7030005220	S.RESISTOR ERJ2GEJ 223 X (22 kΩ)	T
R259	7030005240	S.RESISTOR ERJ2GEJ 473 X (47 kΩ)	B
R260	7030005240	S.RESISTOR ERJ2GEJ 473 X (47 kΩ)	B
R261	7030005240	S.RESISTOR ERJ2GEJ 473 X (47 kΩ)	B
R262	7030009290	S.RESISTOR ERJ2GEJ 562 X (5.6 kΩ)	T
R264	7030005000	S.RESISTOR ERJ2GEJ 471 X (470 Ω)	B
R266	7030005240	S.RESISTOR ERJ2GEJ 473 X (47 kΩ)	B
R267	7030005240	S.RESISTOR ERJ2GEJ 473 X (47 kΩ)	B
R268	7030004980	S.RESISTOR ERJ2GEJ 101 X (100 Ω)	B
R269	7030005310	S.RESISTOR ERJ2GEJ 124 X (120 kΩ)	B
R270	7030008290	S.RESISTOR ERJ2GEJ 183 X (18 kΩ)	B
R271	7030005110	S.RESISTOR ERJ2GEJ 224 X (220 kΩ)	B
R272	7030005070	S.RESISTOR ERJ2GEJ 683 X (68 kΩ)	B
R273	7030005220	S.RESISTOR ERJ2GEJ 223 X (22 kΩ)	T
R274	7030005220	S.RESISTOR ERJ2GEJ 223 X (22 kΩ)	T
R275	7030005220	S.RESISTOR ERJ2GEJ 223 X (22 kΩ)	T
R276	7030004970	S.RESISTOR ERJ2GEJ 470 X (47 Ω)	B
R277	7030005120	S.RESISTOR ERJ2GEJ 102 X (1 kΩ)	B
R278	7030005120	S.RESISTOR ERJ2GEJ 102 X (1 kΩ)	B
R279	7030005120	S.RESISTOR ERJ2GEJ 102 X (1 kΩ)	B
R280	7030005120	S.RESISTOR ERJ2GEJ 102 X (1 kΩ)	B
R281	7030005600	S.RESISTOR ERJ2GEJ 273 X (27 kΩ)	T
R284	7030005120	S.RESISTOR ERJ2GEJ 102 X (1 kΩ)	T
R285	7030005050	S.RESISTOR ERJ2GEJ 103 X (10 kΩ)	T
R288	7030005050	S.RESISTOR ERJ2GEJ 103 X (10 kΩ)	B
R289	7030005090	S.RESISTOR ERJ2GEJ 104 X (100 kΩ)	T
R291	7030005090	S.RESISTOR ERJ2GEJ 104 X (100 kΩ)	T
R292	7030009290	S.RESISTOR ERJ2GEJ 562 X (5.6 kΩ)	T
R293	7030005090	S.RESISTOR ERJ2GEJ 104 X (100 kΩ)	T
R294	7030005240	S.RESISTOR ERJ2GEJ 473 X (47 kΩ)	T
R295	7030005240	S.RESISTOR ERJ2GEJ 473 X (47 kΩ)	T
R296	7030005240	S.RESISTOR ERJ2GEJ 473 X (47 kΩ)	B
R297	7410000950	S.ARRAY EXB-V8V 102JV	T
R298	7030005090	S.RESISTOR ERJ2GEJ 104 X (100 kΩ)	T
R299	7030005120	S.RESISTOR ERJ2GEJ 102 X (1 kΩ)	B
R307	7030005090	S.RESISTOR ERJ2GEJ 104 X (100 kΩ)	T
R312	7030005220	S.RESISTOR ERJ2GEJ 223 X (22 kΩ)	T
R313	7030005060	S.RESISTOR ERJ2GEJ 333 X (33 kΩ)	T
R314	7030005060	S.RESISTOR ERJ2GEJ 333 X (33 kΩ)	T
R315	7030005060	S.RESISTOR ERJ2GEJ 333 X (33 kΩ)	T
R316	7030009140	S.RESISTOR ERJ2GEJ 272 X (2.7 kΩ)	T
R317	7030005170	S.RESISTOR ERJ2GEJ 474 X (470 kΩ)	T
R318	7030005060	S.RESISTOR ERJ2GEJ 333 X (33 kΩ)	B
R321	7030007290	S.RESISTOR ERJ2GEJ 222 X (2.2 kΩ)	B
R322	7410000710	S.ARRAY EXB-V8V 224JV (220 kΩ)	T
R323	7030005090	S.RESISTOR ERJ2GEJ 104 X (100 kΩ)	B
R324	7030005000	S.RESISTOR ERJ2GEJ 471 X (470 Ω)	T
R325	7030005050	S.RESISTOR ERJ2GEJ 103 X (10 kΩ)	T
R327	7030004970	S.RESISTOR ERJ2GEJ 470 X (47 Ω)	B
R328	7030005120	S.RESISTOR ERJ2GEJ 102 X (1 kΩ)	B
R329	7030005050	S.RESISTOR ERJ2GEJ 103 X (10 kΩ)	T
R330	7030009320	S.RESISTOR ERJ2GEJ 4R7 X (4.7 Ω)	T
R331	7030005170	S.RESISTOR ERJ2GEJ 474 X (470 kΩ)	T
R332	7030005090	S.RESISTOR ERJ2GEJ 104 X (100 kΩ)	T
R333	7030005120	S.RESISTOR ERJ2GEJ 102 X (1 kΩ)	B

[MAIN UNIT]

REF NO.	ORDER NO.	DESCRIPTION	M.
R334	7030005040	S.RESISTOR ERJ2GEJ 472 X (4.7 kΩ)	B
R336	7030005090	S.RESISTOR ERJ2GEJ 104 X (100 kΩ)	T
R340	7030008300	S.RESISTOR ERJ2GEJ 184 X (180 kΩ)	B
R341	7030005600	S.RESISTOR ERJ2GEJ 273 X (27 kΩ)	B
R342	7030005120	S.RESISTOR ERJ2GEJ 102 X (1 kΩ)	B
R343	7410000770	S.ARRAY EXB-V4V 102JV (1 kΩ)	B
R344	7030005120	S.RESISTOR ERJ2GEJ 102 X (1 kΩ)	B
R345	7030005120	S.RESISTOR ERJ2GEJ 102 X (1 kΩ)	B
R347	7030009320	S.RESISTOR ERJ2GEJ 4R7 X (4.7 Ω)	B
R349	7030005120	S.RESISTOR ERJ2GEJ 102 X (1 kΩ)	T
R352	7030005050	S.RESISTOR ERJ2GEJ 103 X (10 kΩ)	B
R354	7030008410	S.RESISTOR ERJ2GEJ 392 X (3.9 kΩ)	T
R355	7030005240	S.RESISTOR ERJ2GEJ 473 X (47 kΩ)	B
R356	7030008300	S.RESISTOR ERJ2GEJ 184 X (180 kΩ)	T
R358	7030003210	S.RESISTOR ERJ3GEJ 120 V (12 Ω)	B
R359	7030005000	S.RESISTOR ERJ2GEJ 471 X (470 Ω)	B
R360	7030005000	S.RESISTOR ERJ2GEJ 471 X (470 Ω)	B
R361	7030005000	S.RESISTOR ERJ2GEJ 471 X (470 Ω)	B
R362	7030009290	S.RESISTOR ERJ2GEJ 562 X (5.6 kΩ)	T
R363	7030005090	S.RESISTOR ERJ2GEJ 104 X (100 kΩ)	T
R364	7030005090	S.RESISTOR ERJ2GEJ 104 X (100 kΩ)	T
R365	7030007350	S.RESISTOR ERJ2GEJ 393 X (39 kΩ)	T
R366	7030005080	S.RESISTOR ERJ2GEJ 823 X (82 kΩ)	T
R367	7030005030	S.RESISTOR ERJ2GEJ 152 X (1.5 kΩ)	T
R368	7030006610	S.RESISTOR ERJ2GEJ 394 X (390 kΩ)	T
R369	7030008300	S.RESISTOR ERJ2GEJ 184 X (180 kΩ)	T
R370	7030005240	S.RESISTOR ERJ2GEJ 473 X (47 kΩ)	T
R371	7030005220	S.RESISTOR ERJ2GEJ 223 X (22 kΩ)	T
R372	7030005060	S.RESISTOR ERJ2GEJ 333 X (33 kΩ)	T
R373	7030005040	S.RESISTOR ERJ2GEJ 472 X (4.7 kΩ)	T
R374	7030005240	S.RESISTOR ERJ2GEJ 473 X (47 kΩ)	T
R375	7030005040	S.RESISTOR ERJ2GEJ 472 X (4.7 kΩ)	T
R376	7030005120	S.RESISTOR ERJ2GEJ 102 X (1 kΩ)	T
C1	4030007070	S.CERAMIC C1608 CH 1H 330J-T	B
C2	4030007070	S.CERAMIC C1608 CH 1H 330J-T	B
C3	4030007040	S.CERAMIC C1608 CH 1H 180J-T	B
C4	4030006680	S.CERAMIC C1608 JB 1H 102K-T	B
C5	4030013850	S.CERAMIC ECUE1E102KBQ	T
C6	4030013850	S.CERAMIC ECUE1E102KBQ	T
C7	4030014180	S.CERAMIC ECUE1H470JCC	T
C8	4030006680	S.CERAMIC C1608 JB 1H 102K-T	B
C9	4030007050	S.CERAMIC C1608 CH 1H 220J-T	B
C12	4030007050	S.CERAMIC C1608 CH 1H 220J-T	B
C14	4030007100	S.CERAMIC C1608 CH 1H 560J-T	T
C16*	4030008680	S.CERAMIC C2012 JF 1C 105Z-T	T
C17	4030013850	S.CERAMIC ECUE1E102KBQ	T
C18	4030013850	S.CERAMIC ECUE1E102KBQ	T
C19	4030007150	S.CERAMIC C1608 CH 1H 151J-T	T
C20	4030013850	S.CERAMIC ECUE1E102KBQ	T
C21	4030014220	S.CERAMIC ECUE1E471KBQ	T
C22	4030013850	S.CERAMIC ECUE1E102KBQ	T
C23*	4550006660	S.TANTALUM ECST1CC226R	T
C24	4030014220	S.CERAMIC ECUE1E471KBQ	T
C26	4030013850	S.CERAMIC ECUE1E102KBQ	T
C27	4030013850	S.CERAMIC ECUE1E102KBQ	T
C28	4030014180	S.CERAMIC ECUE1H470JCC	T
C29	4030013850	S.CERAMIC ECUE1E102KBQ	T
C30	4030016930	S.CERAMIC ECJ0EB1A104K	T
C31	4030016930	S.CERAMIC ECJ0EB1A104K	T
C34	4030006680	S.CERAMIC C1608 JB 1H 102K-T	T
C35	4030013850	S.CERAMIC ECUE1E102KBQ	B
C36	4030014180	S.CERAMIC ECUE1H470JCC	T
C37	4030013850	S.CERAMIC ECUE1E102KBQ	T
C38	4030013850	S.CERAMIC ECUE1E102KBQ	T
C39	4030014240	S.CERAMIC ECUE1H180JCC	T
C42	4030013850	S.CERAMIC ECUE1E102KBQ	B
C43	4030013850	S.CERAMIC ECUE1E102KBQ	B
C46	4030014240	S.CERAMIC ECUE1H180JCC	B
C47	4030013850	S.CERAMIC ECUE1E102KBQ	T
C48	4030014100	S.CERAMIC ECUE1E070CCQ	T
C49	4030014130	S.CERAMIC ECUE1H120JCC	T
C50	4030014020	S.CERAMIC ECUE1H020BCQ	T
C51	4030013850	S.CERAMIC ECUE1E102KBQ	T
C52	4030013850	S.CERAMIC ECUE1E102KBQ	T
C53	4030014180	S.CERAMIC ECUE1H470JCC	B
C54	4030014220	S.CERAMIC ECUE1E471KBQ	T
C55	4030016790	S.CERAMIC ECJ0EB1C103K	B
C56	4030016820	S.CERAMIC ECUE1HR75BCQ	B
C57	4030014130	S.CERAMIC ECUE1H120JCC	T
C58	4030014130	S.CERAMIC ECUE1H120JCC	T
C59	4030007090	S.CERAMIC C1608 CH 1H 470J-T	T
C61	4030014150	S.CERAMIC ECUE1H220JCC	B
C62	4550006700	S.TANTALUM ECST1AY106R	B
C63	4550006700	S.TANTALUM ECST1AY106R	B
C64	4030013850	S.CERAMIC ECUE1E102KBQ	T
C65	4030014220	S.CERAMIC ECUE1E471KBQ	T

[GT]: IC-F30GT/F31GT, [GS]: IC-F30GS/F31GS,
 [F30G]: IC-F30GT/F30GS, [F31G]: IC-F31GT/F31GS
 [IS]: Intrinsically safe version, [BIS]: BISS version

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

[MAIN UNIT]

REF NO.	ORDER NO.	DESCRIPTION	M.
C66	4030014420	S.CERAMIC ECUE1H0R5BCQ	T
C67	4030014130	S.CERAMIC ECUE1H120JCC	B
C68	4030014240	S.CERAMIC ECUE1H180JCC	T
C69	4030007050	S.CERAMIC C1608 CH 1H 220J-T	T
C70	4030017580	S.CERAMIC ECJ0EC1H060C	B
C71	4030016820	S.CERAMIC ECUE1HR75BCQ	T
C72	4030014440	S.CERAMIC ECUE1H820JCC	B
C73	4030014180	S.CERAMIC ECUE1H470JCC	B
C74	4550006810	S.TANTALUM ECST1Y473R	B
C76	4030007130	S.CERAMIC C1608 CH 1H 101J-T	B
C77	4550006130	S.TANTALUM ECST1Y224R	[F31G] B
	4550006360	S.TANTALUM ECST1Y104R	[F30G] B
C78	4030013850	S.CERAMIC ECUE1E102KBQ	T
C79	4030016930	S.CERAMIC ECJ0EB1A104K	[F30G] T
	4030017460	S.CERAMIC ECJ0EB1E102K	[F31G] T
C80	4030016930	S.CERAMIC ECJ0EB1A104K	T
C81	4030014180	S.CERAMIC ECUE1H470JCC	T
C82	4030014120	S.CERAMIC ECEU1H100CCQ	T
C83	4030016790	S.CERAMIC ECJ0EB1C103K	B
C84	4030014130	S.CERAMIC ECUE1H120JCC	T
C85	4030014030	S.CERAMIC ECEU1H2R5BCQ	T
C86	4030014080	S.CERAMIC ECEU1H050BCQ	T
C87	4030014050	S.CERAMIC ECUE1H030BCQ	T
C88	4030013850	S.CERAMIC ECUE1E102KBQ	B
C89	4030014140	S.CERAMIC ECUE1H150JCC	T
C90	4030014140	S.CERAMIC ECUE1H150JCC	T
C91	4030014180	S.CERAMIC ECUE1H470JCC	T
C95	4030014180	S.CERAMIC ECUE1H470JCC	T
C96	4030014180	S.CERAMIC ECUE1H470JCC	T
C97	4030014180	S.CERAMIC ECUE1H470JCC	T
C98	4030016790	S.CERAMIC ECJ0EB1C103K	T
C99	4030014180	S.CERAMIC ECUE1H470JCC	T
C100	4030013850	S.CERAMIC ECUE1E102KBQ	B
C101	4030013850	S.CERAMIC ECUE1E102KBQ	B
C102	4030016760	S.CERAMIC ECUE1E472KBQ	B
C103	4030014120	S.CERAMIC ECEU1H100CCQ	B
C104	4030016930	S.CERAMIC ECJ0EB1A104K	B
C105	4030013850	S.CERAMIC ECUE1E102KBQ	B
C106	4030016930	S.CERAMIC ECJ0EB1A104K	B
C107	4030014180	S.CERAMIC ECUE1H470JCC	B
C108	4030014180	S.CERAMIC ECUE1H470JCC	B
C109	4030016930	S.CERAMIC ECJ0EB1A104K	B
C110	4030016930	S.CERAMIC ECJ0EB1A104K	B
C111	4030014330	S.CERAMIC ECUE1H221JCC	B
C112	4030014330	S.CERAMIC ECUE1H221JCC	B
C113	4030016790	S.CERAMIC ECJ0EB1C103K	B
C114	4030016930	S.CERAMIC ECJ0EB1A104K	B
C115	4030013850	S.CERAMIC ECUE1E102KBQ	B
C116	4030014220	S.CERAMIC ECUE1E471KBQ	B
C117	4030013850	S.CERAMIC ECUE1E102KBQ	B
C118	4030013850	S.CERAMIC ECUE1E102KBQ	B
C119	4030013850	S.CERAMIC ECUE1E102KBQ	B
C120	4030013850	S.CERAMIC ECUE1E102KBQ	B
C121	4030016930	S.CERAMIC ECJ0EB1A104K	B
C122	4030014180	S.CERAMIC ECUE1H470JCC	B
C123	4030014200	S.CERAMIC ECUE1H101JCC	B
C124*	4550006700	S.TANTALUM ECST1AY106R	T
C125	4030014200	S.CERAMIC ECUE1H101JCC	B
C126	4030014220	S.CERAMIC ECUE1E471KBQ	B
C127*	4550006170	S.TANTALUM ECST1AY225R	B
C128	4030014100	S.CERAMIC ECUE1E070CCQ	B
C130	4030013850	S.CERAMIC ECUE1E102KBQ	B
C131	4030014160	S.CERAMIC ECUE1H270JCC	B
C132	4030016790	S.CERAMIC ECJ0EB1C103K	B
C133	4030013850	S.CERAMIC ECUE1E102KBQ	B
C134	4030013850	S.CERAMIC ECUE1E102KBQ	B
C135	4030014080	S.CERAMIC ECEU1H050BCQ	B
C137	4030014090	S.CERAMIC ECUE1H060CCQ	B
C138	4030013850	S.CERAMIC ECUE1E102KBQ	B
C139	4030013850	S.CERAMIC ECUE1E102KBQ	B
C140	4030014000	S.CERAMIC ECUE1H1R5BCQ	B
C141	4030013850	S.CERAMIC ECUE1E102KBQ	B
C142	4030013850	S.CERAMIC ECUE1E102KBQ	B
C143	4030014100	S.CERAMIC ECUE1E070CCQ	B
C145	4030013850	S.CERAMIC ECUE1E102KBQ	B
C146	4030013850	S.CERAMIC ECUE1E102KBQ	B
C147	4030013850	S.CERAMIC ECUE1E102KBQ	B
C148	4030013850	S.CERAMIC ECUE1E102KBQ	T
C149	4030014220	S.CERAMIC ECUE1E471KBQ	B
C150	4030014180	S.CERAMIC ECUE1H470JCC	B
C151	4030013850	S.CERAMIC ECUE1E102KBQ	B
C154	4030014180	S.CERAMIC ECUE1H470JCC	B
C155	4030013850	S.CERAMIC ECUE1E102KBQ	B
C156	4030014080	S.CERAMIC ECEU1H050BCQ	B
C157	4550006140	S.TANTALUM ECST1EY474R	B
C158	4030014180	S.CERAMIC ECUE1H470JCC	B
C159	4030013850	S.CERAMIC ECUE1E102KBQ	B
C160	4030014100	S.CERAMIC ECUE1E070CCQ	B

[MAIN UNIT]

REF NO.	ORDER NO.	DESCRIPTION	M.
C161	4030013850	S.CERAMIC ECUE1E102KBQ	B
C162	4030013850	S.CERAMIC ECUE1E102KBQ	B
C163	4030013980	S.CERAMIC ECUE1H010BCQ	B
C165	4030014070	S.CERAMIC ECUE1H040BCQ	B
C167	4030014090	S.CERAMIC ECUE1H060CCQ	T
C168	4030014110	S.CERAMIC ECUE1H080CCQ	T
C170	4030007000	S.CERAMIC C1608 CH 1H 090D-T	T
C171	4030016790	S.CERAMIC ECJ0EB1C103K	B
C172*	4550006540	S.TANTALUM ECST1CY475R	B
C173	4030016790	S.CERAMIC ECJ0EB1C103K	B
C174	4030013850	S.CERAMIC ECUE1E102KBQ	B
C175	4030016930	S.CERAMIC ECJ0EB1A104K	B
C176	4030013850	S.CERAMIC ECUE1E102KBQ	B
C177	4030014220	S.CERAMIC ECUE1E471KBQ	B
C178*	4550006670	S.TANTALUM ECST1AD107R	B
C179	4030016950	S.CERAMIC ECJ0EB1A473K	B
C180	4030014180	S.CERAMIC ECUE1H470JCC	B
C181*	4550006700	S.TANTALUM ECST1AY106R	B
C182	4030016960	S.CERAMIC ECJ0EB1C183K	B
C183	4030013850	S.CERAMIC ECUE1E102KBQ	B
C184*	4550006210	S.TANTALUM ECST1CX106R	T
C185	4030016930	S.CERAMIC ECJ0EB1A104K	B
C186	4030016930	S.CERAMIC ECJ0EB1A104K	B
C187	4030014180	S.CERAMIC ECUE1H470JCC	B
C188	4030014180	S.CERAMIC ECUE1H470JCC	T
C189	4030013850	S.CERAMIC ECUE1E102KBQ	B
C192	4030016760	S.CERAMIC ECUE1E472KBQ	T
C193*	4550006620	S.TANTALUM ECST0JY226R	B
C195	4030014220	S.CERAMIC ECUE1E471KBQ	B
C197	4030016790	S.CERAMIC ECJ0EB1C103K	B
C198	4030016760	S.CERAMIC ECUE1E472KBQ	B
C199	4030014500	S.CERAMIC ECUE1H121JCC	B
C200	4030014350	S.CERAMIC ECUE1H560JCC	B
C202	4030017230	S.CERAMIC ECUE1E271KBQ	B
C203	4030016920	S.CERAMIC ECUE1H222KBQ	B
C205	4550006360	S.TANTALUM ECST1Y104R	B
C206	4030016930	S.CERAMIC ECJ0EB1A104K	B
C207	4030016930	S.CERAMIC ECJ0EB1A104K	B
C208*	4550006320	S.TANTALUM ECST0JY475R	B
C213*	4550006320	S.TANTALUM ECST0JY475R	B
C214	4550006360	S.TANTALUM ECST1Y104R	B
C215	4030016930	S.CERAMIC ECJ0EB1A104K	B
C216	4030016950	S.CERAMIC ECJ0EB1A473K	B
C217	4030016930	S.CERAMIC ECJ0EB1A104K	B
C218	4030016760	S.CERAMIC ECUE1E472KBQ	B
C219	4030014500	S.CERAMIC ECUE1H121JCC	B
C224	4030016930	S.CERAMIC ECJ0EB1A104K	B
C225	4030016950	S.CERAMIC ECJ0EB1A473K	B
C226	4030016950	S.CERAMIC ECJ0EB1A473K	B
C227	4030017040	S.CERAMIC ECJ0EB1A333K	B
C228	4030014220	S.CERAMIC ECUE1E471KBQ	B
C229	4030014180	S.CERAMIC ECUE1H470JCC	B
C230*	4550006700	S.TANTALUM ECST1AY106R	T
C231	4030016760	S.CERAMIC ECUE1E472KBQ	B
C232	4030016920	S.CERAMIC ECUE1H222KBQ	B
C233	4030016930	S.CERAMIC ECJ0EB1A104K	T
C234	4030014180	S.CERAMIC ECUE1H470JCC	B
C235*	4550006620	S.TANTALUM ECST0JY226R	T
C236*	4550006620	S.TANTALUM ECST0JY226R	T
C237*	4550006620	S.TANTALUM ECST0JY226R	T
C238*	4550006620	S.TANTALUM ECST0JY226R	T
C239	4030016790	S.CERAMIC ECJ0EB1C103K	B
C240	4030016790	S.CERAMIC ECJ0EB1C103K	B
C241	4030016790	S.CERAMIC ECJ0EB1C103K	B
C242*	4550006320	S.TANTALUM ECST0JY475R	B
C243*	4550006950	S.TANTALUM ECST0JX476R	T
C244	4030013850	S.CERAMIC ECUE1E102KBQ	B
C246	4030013850	S.CERAMIC ECUE1E102KBQ	B
C247*	4550006210	S.TANTALUM ECST1CX106R	T
C248	4030016960	S.CERAMIC ECJ0EB1C183K	T
C249	4030016960	S.CERAMIC ECJ0EB1C183K	T
C250	4030014220	S.CERAMIC ECUE1E471KBQ	B
C251*	4550006170	S.TANTALUM ECST1AY225R	B
C252	4030014220	S.CERAMIC ECUE1E471KBQ	T
C253	4030013850	S.CERAMIC ECUE1E102KBQ	T
C254*	4550006320	S.TANTALUM ECST0JY475R	T
C257	4030016930	S.CERAMIC ECJ0EB1A104K	B
C258	4030016930	S.CERAMIC ECJ0EB1A104K	B
C259	4030016790	S.CERAMIC ECJ0EB1C103K	T
C260	4030013850	S.CERAMIC ECUE1E102KBQ	B
C261	4030016930	S.CERAMIC ECJ0EB1A104K	B
C262	4030014220	S.CERAMIC ECUE1E471KBQ	B
C263	4030016930	S.CERAMIC ECJ0EB1A104K	T
C264*	4550006950	S.TANTALUM ECST0JX476R	B
C265*	4550006950	S.TANTALUM ECST0JX476R	B
C266	4030014220	S.CERAMIC ECUE1E471KBQ	T
C267	4030016790	S.CERAMIC ECJ0EB1C103K	B
C268	4030016930	S.CERAMIC ECJ0EB1A104K	T

[GT]: IC-F30GT/F31GT, [GS]: IC-F30GS/F31GS,
 [F30G]: IC-F30GT/F30GS, [F31G]: IC-F31GT/F31GS
 [IS]: Intrinsically safe version, [BIIS]: BIIS version

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

[MAIN UNIT]

REF NO.	ORDER NO.	DESCRIPTION	M.
C271	4030017030	S.CERAMIC ECJ0EB1A273K	B
C272	4030014180	S.CERAMIC ECUE1H470JCC	T
C273	4030014180	S.CERAMIC ECUE1H470JCC	T
C275	4030014180	S.CERAMIC ECUE1H470JCC	T
C276	4030014150	S.CERAMIC ECUE1H220JCC	B
C277	4030014100	S.CERAMIC ECUE1E070CCQ	B
C278	4030016790	S.CERAMIC ECJ0EB1C103K	T
C279	4030016790	S.CERAMIC ECJ0EB1C103K	T
C280	4030014170	S.CERAMIC ECUE1H330JCC	T
C281	4030016930	S.CERAMIC ECJ0EB1A104K	T
C282	4030014180	S.CERAMIC ECUE1H470JCC	T
C283	4030014180	S.CERAMIC ECUE1H470JCC	B
C284	4030014180	S.CERAMIC ECUE1H470JCC	T
C285	4030014180	S.CERAMIC ECUE1H470JCC	B
C286	4030014180	S.CERAMIC ECUE1H470JCC	T
C287	4030014180	S.CERAMIC ECUE1H470JCC	B
C288	4030014180	S.CERAMIC ECUE1H470JCC	B
C289	4030014180	S.CERAMIC ECUE1H470JCC	T
C291	4030014180	S.CERAMIC ECUE1H470JCC	B
C292	4030014180	S.CERAMIC ECUE1H470JCC	B
C293	4030014180	S.CERAMIC ECUE1H470JCC	B
C294	4030014180	S.CERAMIC ECUE1H470JCC	T
C295	4030014180	S.CERAMIC ECUE1H470JCC	T
C296	4030014180	S.CERAMIC ECUE1H470JCC	B
C297	4030014180	S.CERAMIC ECUE1H470JCC	T
C298	4030014180	S.CERAMIC ECUE1H470JCC	T
C299	4030014180	S.CERAMIC ECUE1H470JCC	B
C300	4030014180	S.CERAMIC ECUE1H470JCC	B
C301	4030014180	S.CERAMIC ECUE1H470JCC	B
C302	4030014180	S.CERAMIC ECUE1H470JCC	B
C303	4030014180	S.CERAMIC ECUE1H470JCC	T
C304	4030014180	S.CERAMIC ECUE1H470JCC	B
C305	4030014180	S.CERAMIC ECUE1H470JCC	B
C306	4030016930	S.CERAMIC ECJ0EB1A104K	B
C307	4030014180	S.CERAMIC ECUE1H470JCC	B
C308	4030014180	S.CERAMIC ECUE1H470JCC	B
C309	4030014180	S.CERAMIC ECUE1H470JCC	T
C310	4030014180	S.CERAMIC ECUE1H470JCC	B
C311	4030014180	S.CERAMIC ECUE1H470JCC	B
C312	4030014180	S.CERAMIC ECUE1H470JCC	B
C313	4030014180	S.CERAMIC ECUE1H470JCC	B
C314	4030014180	S.CERAMIC ECUE1H470JCC	T
C315	4030014180	S.CERAMIC ECUE1H470JCC	T
C316	4030016760	S.CERAMIC ECUE1E472KBQ	T
C317	4030016760	S.CERAMIC ECUE1E472KBQ	T
C318	4030016790	S.CERAMIC ECJ0EB1C103K	T
C319	4030014180	S.CERAMIC ECUE1H470JCC	T
C320	4030014180	S.CERAMIC ECUE1H470JCC	T
C321	4030014180	S.CERAMIC ECUE1H470JCC	T
C322	4030014180	S.CERAMIC ECUE1H470JCC	T
C323	4030014180	S.CERAMIC ECUE1H470JCC	B
C324	4030014180	S.CERAMIC ECUE1H470JCC	T
C325	4030014180	S.CERAMIC ECUE1H470JCC	T
C326	4030014180	S.CERAMIC ECUE1H470JCC	B
C327	4030014180	S.CERAMIC ECUE1H470JCC	B
C328	4030014180	S.CERAMIC ECUE1H470JCC	B
C329	4030014180	S.CERAMIC ECUE1H470JCC	B
C330	4030016930	S.CERAMIC ECJ0EB1A104K	B
C331	4030014180	S.CERAMIC ECUE1H470JCC	B
C332	4030014180	S.CERAMIC ECUE1H470JCC	B
C333	4030014180	S.CERAMIC ECUE1H470JCC	B
C334	4030014180	S.CERAMIC ECUE1H470JCC	T
C335	4030014180	S.CERAMIC ECUE1H470JCC	T
C336	4030014180	S.CERAMIC ECUE1H470JCC	T
C337	4030014180	S.CERAMIC ECUE1H470JCC	T
C338	4030014180	S.CERAMIC ECUE1H470JCC	B
C339	4030014180	S.CERAMIC ECUE1H470JCC	B
C340	4030014180	S.CERAMIC ECUE1H470JCC	B
C341	4030014430	S.CERAMIC C1005JB 1C 153K-T-A	B
C342	4030016930	S.CERAMIC ECJ0EB1A104K	B
C343	4030017250	S.CERAMIC ECUE1E821KBQ	B
C345	4030016790	S.CERAMIC ECJ0EB1C103K	B
C346	4030017040	S.CERAMIC ECJ0EB1A333K	B
C347	4030016930	S.CERAMIC ECJ0EB1A104K	B
C348	4030016930	S.CERAMIC ECJ0EB1A104K	B
C349	4030017240	S.CERAMIC ECUE1C682KBQ	T
C350	4030016790	S.CERAMIC ECJ0EB1C103K	T
C351	4030016930	S.CERAMIC ECJ0EB1A104K	T
C352	4030016940	S.CERAMIC ECJ0EB1A393K	T
C353	4030013850	S.CERAMIC ECUE1E102KBQ	B
C354	4030013850	S.CERAMIC ECUE1E102KBQ	T
C355	4030013850	S.CERAMIC ECUE1E102KBQ	B
C356	4030014180	S.CERAMIC ECUE1H470JCC	T
C357	4550006770	S.TANTALUM TEESVD2 1C 476M-12R except [IS]	T
C358	4030014220	S.CERAMIC ECUE1E471KBQ Other	T
	4030017730	S.CERAMIC ECJ0EB1E471K [BIIS]	T
C359	4030013850	S.CERAMIC ECUE1E102KBQ Other	T
	4030017460	S.CERAMIC ECJ0EB1E102K [BIIS]	T

[MAIN UNIT]

REF NO.	ORDER NO.	DESCRIPTION	M.
C360*	4030012600	S.CERAMIC C2012 JB 1A 105M-T	B
C362	4030017220	S.CERAMIC ECUE1E122KBQ	B
C364	4030014180	S.CERAMIC ECUE1H470JCC	T
C365	4030014180	S.CERAMIC ECUE1H470JCC	T
C366	4030014180	S.CERAMIC ECUE1H470JCC	T
C367	4030014180	S.CERAMIC ECUE1H470JCC	T
C369	4030014110	S.CERAMIC ECUE1H080CCQ	B
C371	4030014180	S.CERAMIC ECUE1H470JCC	B
C372	4610001590	S.TRIMMER TZC3R100A110R00	T
C373	4610001590	S.TRIMMER TZC3R100A110R00	T
C375	4030016930	S.CERAMIC ECJ0EB1A104K	B
C376	4030013850	S.CERAMIC ECUE1E102KBQ	B
C377	4030014180	S.CERAMIC ECUE1H470JCC	T
C378	4030016930	S.CERAMIC ECJ0EB1A104K	B
C379	4030014180	S.CERAMIC ECUE1H470JCC	T
C380	4030014180	S.CERAMIC ECUE1H470JCC	T
C381	4030014180	S.CERAMIC ECUE1H470JCC	T
C382	4030014180	S.CERAMIC ECUE1H470JCC	T
C383	4030016930	S.CERAMIC ECJ0EB1A104K	T
C384	4030013850	S.CERAMIC ECUE1E102KBQ	T
C385	4030016930	S.CERAMIC ECJ0EB1A104K	T
C386	4030014180	S.CERAMIC ECUE1H470JCC	T
C393*	4030012600	S.CERAMIC C2012 JB 1A 105M-T	T
C394	4030016960	S.CERAMIC ECJ0EB1C183K	T
C395	4030014190	S.CERAMIC ECUE1H680JCC	T
C396*	4030012600	S.CERAMIC C2012 JB 1A 105M-T	T
C397	4030016760	S.CERAMIC ECUE1E472KBQ	B
C398	4030016760	S.CERAMIC ECUE1E472KBQ	B
C399	4030016760	S.CERAMIC ECUE1E472KBQ	B
C400	4030013850	S.CERAMIC ECUE1E102KBQ	T
C401	4030014180	S.CERAMIC ECUE1H470JCC	T
C402*	4550006950	S.TANTALUM ECST0JX476R	T
C403	4030006860	S.CERAMIC C1608 JB 1H 102K-T	T
C404	4030014180	S.CERAMIC ECUE1H470JCC	B
C405	4030014180	S.CERAMIC ECUE1H470JCC	B
C406	4030013940	S.CERAMIC C1005 JB 1E 223K-T-N	B
C407	4030016930	S.CERAMIC ECJ0EB1A104K	T
C408	4030016930	S.CERAMIC ECJ0EB1A104K	B
C409	4030016930	S.CERAMIC ECJ0EB1A104K	T
C410	4030016930	S.CERAMIC ECJ0EB1A104K	T
C411*	4550006320	S.TANTALUM ECST0JY475R	B
C412	4030014180	S.CERAMIC ECUE1H470JCC	B
C413	4030016930	S.CERAMIC ECJ0EB1A104K	B
C414	4030016930	S.CERAMIC ECJ0EB1A104K	T
C415*	4550006170	S.TANTALUM ECST1AY225R	B
C416	4030007010	S.CERAMIC C1608 CH 1H 100D-T	B
C417	4030007010	S.CERAMIC C1608 CH 1H 100D-T	T
C418	4030009920	S.CERAMIC C1608 CH 1H 050B-T	B
C419	4030009540	S.CERAMIC C1608 CH 1H 1R5B-T	T
C420	4030013850	S.CERAMIC ECUE1E102KBQ	B
C421	4030016930	S.CERAMIC ECJ0EB1A104K	T
C422	4030016930	S.CERAMIC ECJ0EB1A104K	B
C423	4030016930	S.CERAMIC ECJ0EB1A104K	B
C424	4030014220	S.CERAMIC ECUE1E471KBQ	B
C425	4030013850	S.CERAMIC ECUE1E102KBQ	T
C426	4030011810	S.CERAMIC C1608 JB 1A 224K-T	T
C427*	4550006320	S.TANTALUM ECST0JY475R	B
C428	4030016930	S.CERAMIC ECJ0EB1A104K	T
C429	4030014180	S.CERAMIC ECUE1H470JCC	B
C430	4030013850	S.CERAMIC ECUE1E102KBQ	B
C431	4030013850	S.CERAMIC ECUE1E102KBQ	B
C432	4030016930	S.CERAMIC ECJ0EB1A104K	B
C433	4030014180	S.CERAMIC ECUE1H470JCC	B
C434	4030016930	S.CERAMIC ECJ0EB1A104K	B
C437	4030014090	S.CERAMIC ECUE1H060CCQ	T
C438	4030013850	S.CERAMIC ECUE1E102KBQ	B
C439	4030013850	S.CERAMIC ECUE1E102KBQ	T
C440	4030013850	S.CERAMIC ECUE1E102KBQ	B
C441	4030007090	S.CERAMIC C1608 CH 1H 470J-T	T
C442*	4550006320	S.TANTALUM ECST0JY475R	T
C443	4030013850	S.CERAMIC ECUE1E102KBQ	T
C444	4030014490	S.CERAMIC ECUE1H331KBQ	B
C445	4030016970	S.CERAMIC ECJ0EB1C223K	T
C446	4030017250	S.CERAMIC ECUE1E821KBQ	T
C447	4030017250	S.CERAMIC ECUE1E821KBQ	T
C448	4030016950	S.CERAMIC ECJ0EB1A473K	T
C449	4030016930	S.CERAMIC ECJ0EB1A104K	T
C450	4030016930	S.CERAMIC ECJ0EB1A104K	B
C451	4030014180	S.CERAMIC ECUE1H470JCC	B
C452	4030016930	S.CERAMIC ECJ0EB1A104K	T
C453	4030014140	S.CERAMIC ECUE1H150JCC	T
C454	4030014240	S.CERAMIC ECUE1H180JCC	T
C455	4030016930	S.CERAMIC ECJ0EB1A104K	T
C456	4030016930	S.CERAMIC ECJ0EB1A104K	T
C457	4030014200	S.CERAMIC ECUE1H101JCC	B
C458	4030016930	S.CERAMIC ECJ0EB1A104K	T
J1	6510018430	S.CONNECTOR AXN330C038P	T
J2	6510018430	S.CONNECTOR AXN330C038P	T

[GT]: IC-F30GT/F31GT, [GS]: IC-F30GS/F31GS,
 [F30G]: IC-F30GT/F30GS, [F31G]: IC-F31GT/F31GS
 [IS]: Intrinsically safe version, [BIIS]: BIIS version

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

[MAIN UNIT]

REF NO.	ORDER NO.	DESCRIPTION		M.
J3	6510022360	S.CONNECTOR	26FLZ-SM1-TB	T
F1	5210000710	S.FUSE	KAB 2402 322 NA29 [F31G]	T
	5210000880	S.FUSE	043403.5NRP [F30G]	T
S1	2250000180	ENCODER	EC10SP16-47	B
W2	7030003860	S.RESISTOR	ERJ3GE JPW V	B
W3	7030003860	S.RESISTOR	ERJ3GE JPW V	T
W4	7030003860	S.RESISTOR	ERJ3GE JPW V	B
W5	8900009790	CABLE	OPC-972	
EP1	0910055243	PCB	B 5511C	

[GT]: IC-F30GT/F31GT, M.=Mounted side (T: Mounted on the Top side,
 [GS]: IC-F30GS/F31GS, B: Mounted on the Bottom side)
 [F30G]: IC-F30GT/F30GS, *=safety critical components
 [F31G]: IC-F31GT/F31GS S.=Surface mount
 [IS]: Intrinsically safe version

SECTION 7 MECHANICAL PARTS AND DISASSEMBLY

[CHASSIS PARTS]

REF NO.	ORDER NO.	DESCRIPTION	QTY.
MP1	8210017211	2337 front panel-1 assembly [GT]	1
	8210017350	2337 S-front panel assembly [GS]	1
MP2	8310049450	2337 window plate	1
MP4	8930052850	2337 release button	1
MP5	8930052970	2337 PTT plate	1
MP8	8210017100	2337 rear panel	1
MP9	8210017080	2337 reflector	1
MP10	8930052981	2337 switch plate-1	1
MP12	8010018251	2337 chassis-1	1
MP13	8930052641	2337 key board-1 [GT]	1
	8930059691	2337 key board (A)-1 [GT version BLIS]	1
	8930053170	2337 4-key [GS]	1
MP14	8930053650	2336 main seal	1
MP16	8930052840	2337 T-rubber	1
MP17	8930054540	2336 top key	1
MP18	8930052991	2337 terminal-1	1
MP19	8610010910	Knob N281	1
MP20	8610010920	Knob N282	1
MP21	8510013161	2337 main shield-1	1
MP22	8930053670	2337 side plate	1
MP23	8930053000	2337 window sheet	1
MP25	8510013480	2336 PA shield	1
MP26	8830001480	VR nut (O)	1
MP29	8930053210	2337 microphone sheet	1
MP32	8830001500	2337 nut	1
MP33	8830001511	Nut (I)-1	1
MP34	8810009220	Screw PH B0 M2 × 8 ZK (BT)	2
MP35	8930042080	1922 minus terminal	1
MP37	8950004420	1652 9-pin connector	1
MP40	8810008970	Screw FH BT No.0 M2 × 3.5 NI-ZU	6
MP41	8810009180	Screw FH BT No.0 M2 × 5 NI-ZU	1
MP43	8210017091	2337 terminal holder-1	1
MP44	8950005311	Antenna connector-103-1	1
MP49	8510013220	2337 antenna plate	1
MP50	8930053440	2337 A-PTT plate	1
MP51	8930053431	Sponge (GP)-1	2
MP52	8810000100	Screw PH M2 × 4 ZK	2
MP53	8930053630	Seal O-ring (AH)	1
MP54	8930053680	Spring (AG)	1
MP55	8810004890	Screw PH No.0 M2 × 6 ZK	2
MP56	8810005360	Screw PH No.0 M2 × 3 ZK	8
MP57	8810009560	Screw PH BT M2 × 6 ZK	2
MP58	8810005700	Screw PH No.0 M2 × 4 ZK	3
MP59	8810009510	Screw PH BT M2 × 4 NI-ZU	8
MP60	8930046000	1903 microphone sponge [GS] only	1
MP61	8930053660	2337 side seal	1
MP63	8930053880	2337 key sheet [GT]	1
	8930054010	2337 4-key sheet [GS]	1
MP64	8930051781	Insulation sheet GA-1	1
MP65	8930053890	2337 T-K sheet	1

[GT]: IC-F30GT/F31GT

[GS]: IC-F30GS/F31GS

[FRONT UNIT]

REF NO.	ORDER NO.	DESCRIPTION	QTY.
DS10	5030001870	LCD EDMUD1FA0	1
SP1*	2510001060	Speaker K036NA500-47	
MC1	7700002310	Microphone EM-140	1
MP1	8510013230	2337 LOGIC shield	1
MP2	8930053320	2337 LOGIC spring	1

[MAIN UNIT]

REF NO.	ORDER NO.	DESCRIPTION	QTY.
MP1	8510013000	2336 VCO case	1
MP2	8510011180	1923 VCO cover	1
MP3	8410002370	2337 PA heat sink (using Q1:2SK2974)	1
MP6	8950005330	2337 9-pin base	1
MP7	8950005320	2337 contact	1
W5	8950009790	Cable OPC-972	1

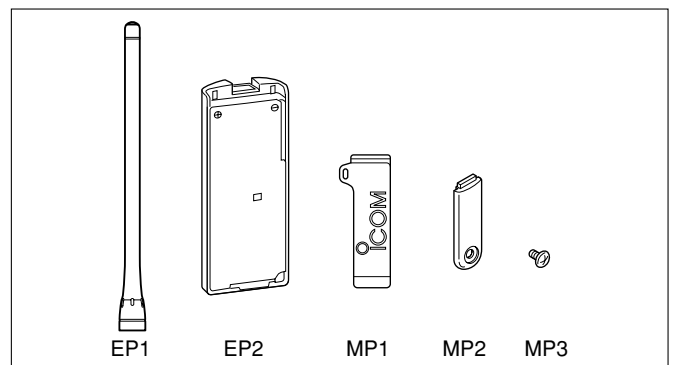
Screw abbreviations

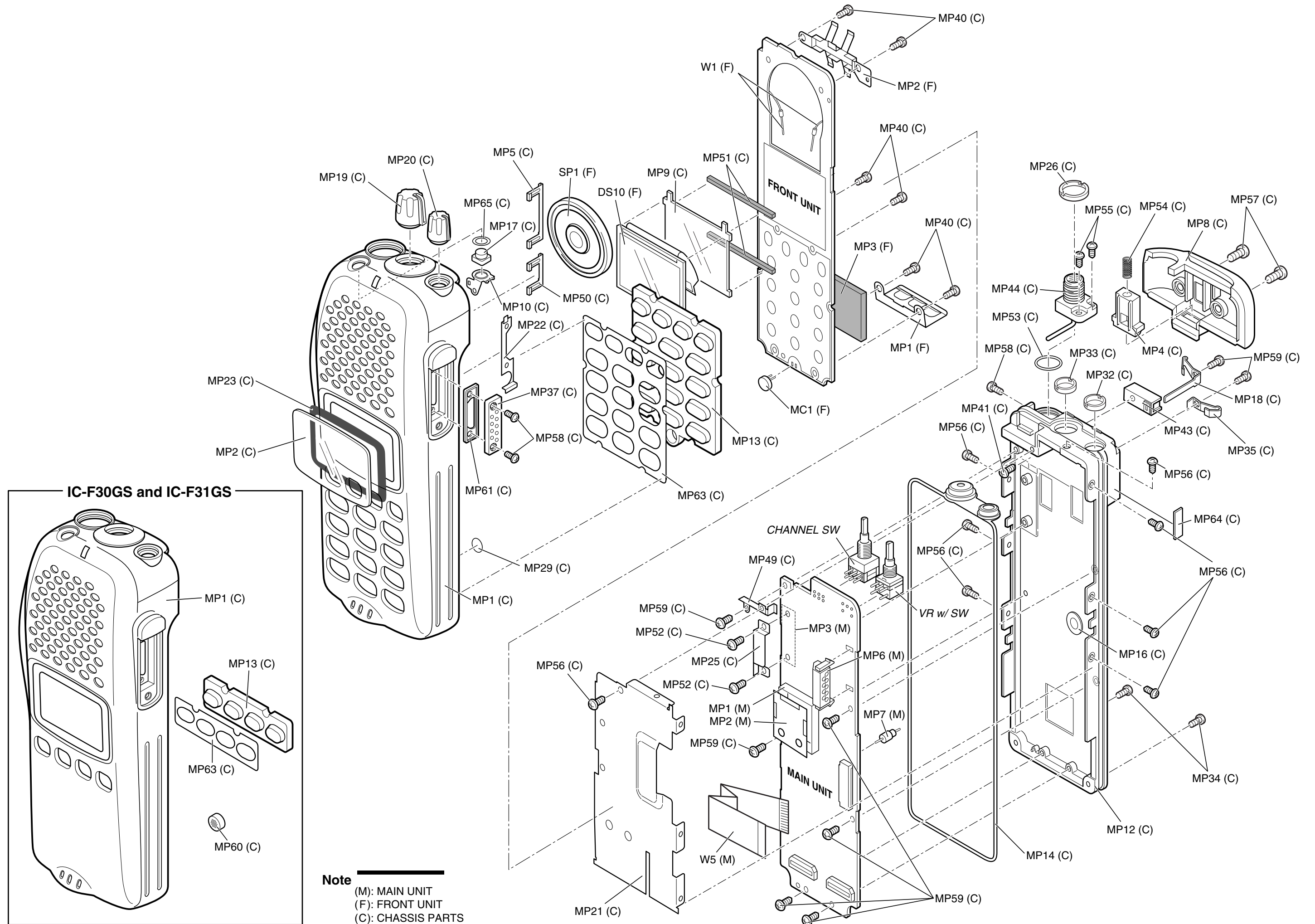
B0, BT: Self-tapping PH: Pan head FH: Flat head
 NI-ZU: Nickel-Zinc ZK: Black

[ACCESSORIES]

REF NO.	ORDER NO.	DESCRIPTION	QTY.
EP1	Optional products	Antenna FA-SC55V-1	1
EP2*	Optional products	Battery BP-210FM	1
		for intrinsically safe version	
		Battery BP-210 for other version	1
MP1	8010019360	MB-74N clip	1
MP2	8210017071	2337 C-panel-1	1
MP3	8810003700	ICOM screw B4	1

* : Safety critical components





SECTION 8 SEMI-CONDUCTOR INFORMATION

8 - 1 TRANSISTORS AND FETS

NAME	SYMBOL	INSIDE VIEW
2SA1362 GR	AEG	
2SB1132 R	BARB	
2SC4081 R 2SC4116 GR 2SC4213 B 2SC4215 O 2SC4226 R25	BR LG AB QO R25	
2SK880-Y	XY	
2SK1829	K1	
2SK2973	K1	
2SK2974	K2974	

NAME	SYMBOL	INSIDE VIEW
3SK206-T1 U78 3SK293	U78 UF	
CPH3403-TL	KC	
DTA144EUA	16	
DTC144EUA	26	
DTC144TE TL	06	
UN911H	6P	
XP1214	9H	

NAME	SYMBOL	INSIDE VIEW
XP6501 AB	5N	

8 - 2 DIODES

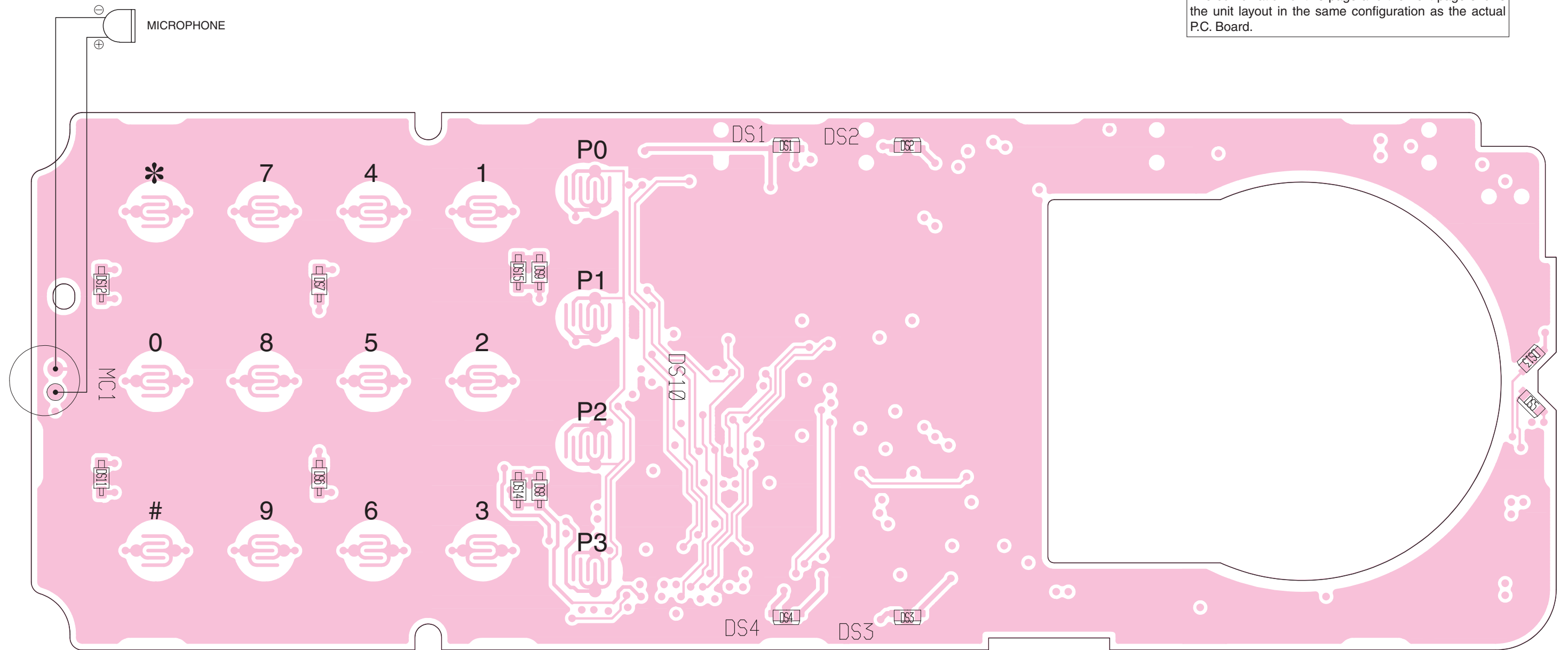
NAME	SYMBOL	INSIDE VIEW
1SV245 HVC350BTRF	T3 BO	
DAN202U	N	
DAP202U	P	
MA111 MA2S111	1B A	
MA77	4B	

NAME	SYMBOL	INSIDE VIEW
MA713	MIN	
MA742	M1U	
MA8024 MA8030-H MA8056-M MA8062-M	2.4 3^0 5-6 6-2	

SECTION 9 BOARD LAYOUTS

9 - 1 FRONT UNIT

• TOP VIEW

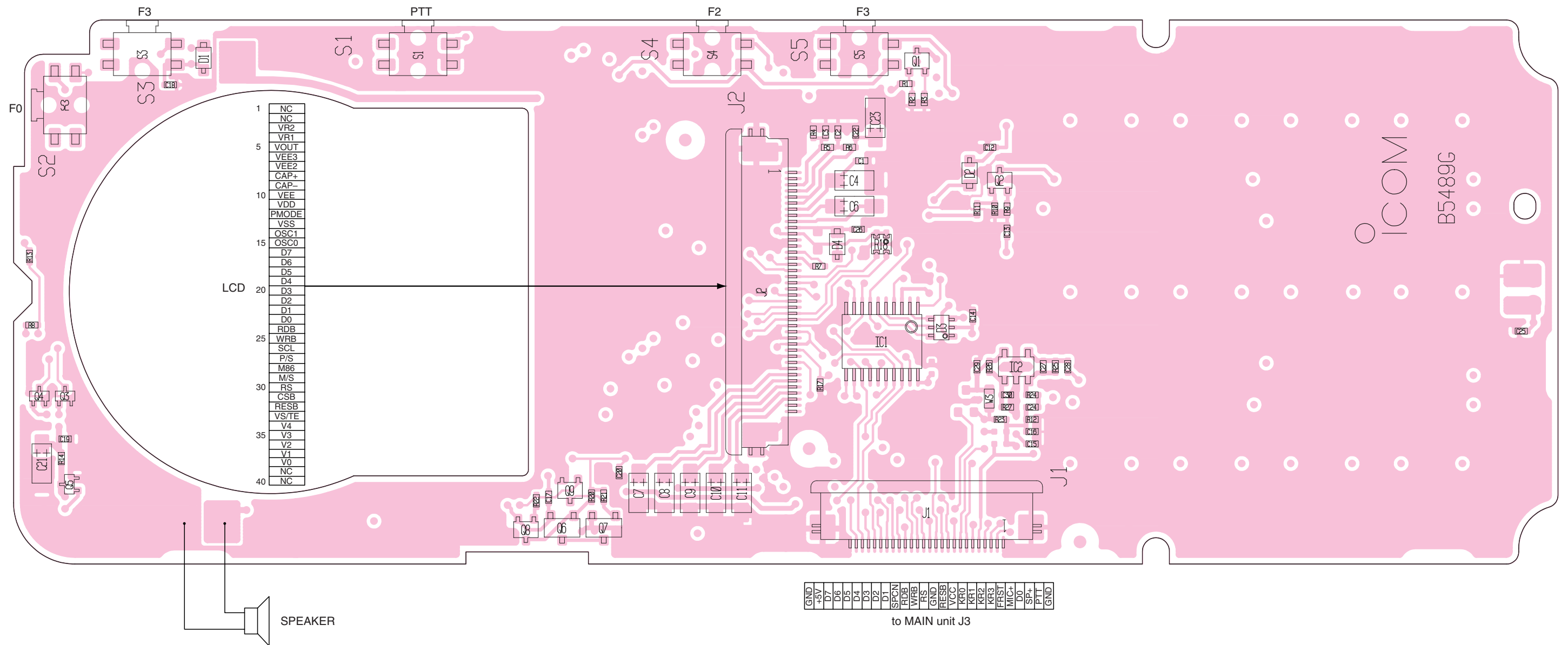


The combination of this page and the next page shows the unit layout in the same configuration as the actual P.C. Board.

FRONT UNIT

• 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.

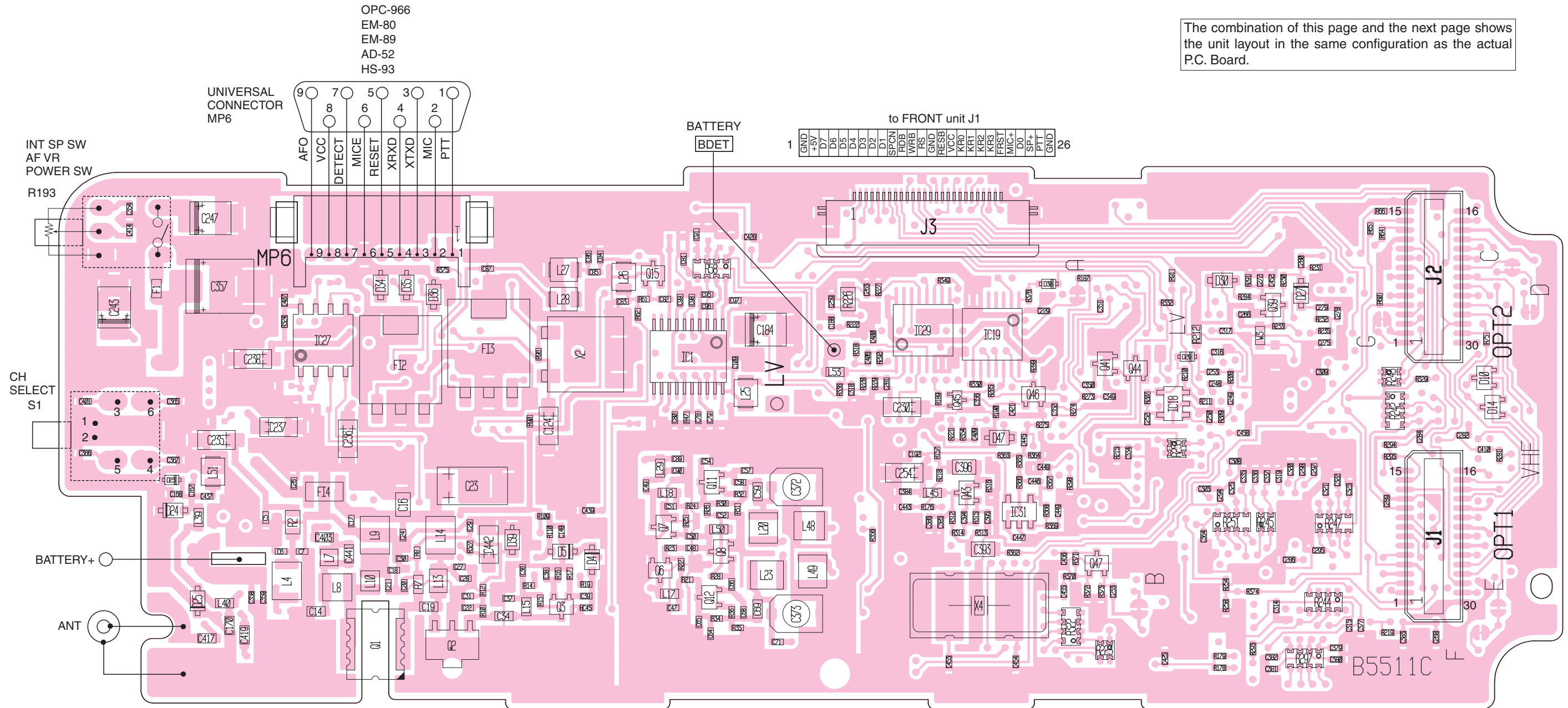


9 - 2 MAIN UNIT

• TOP VIEW

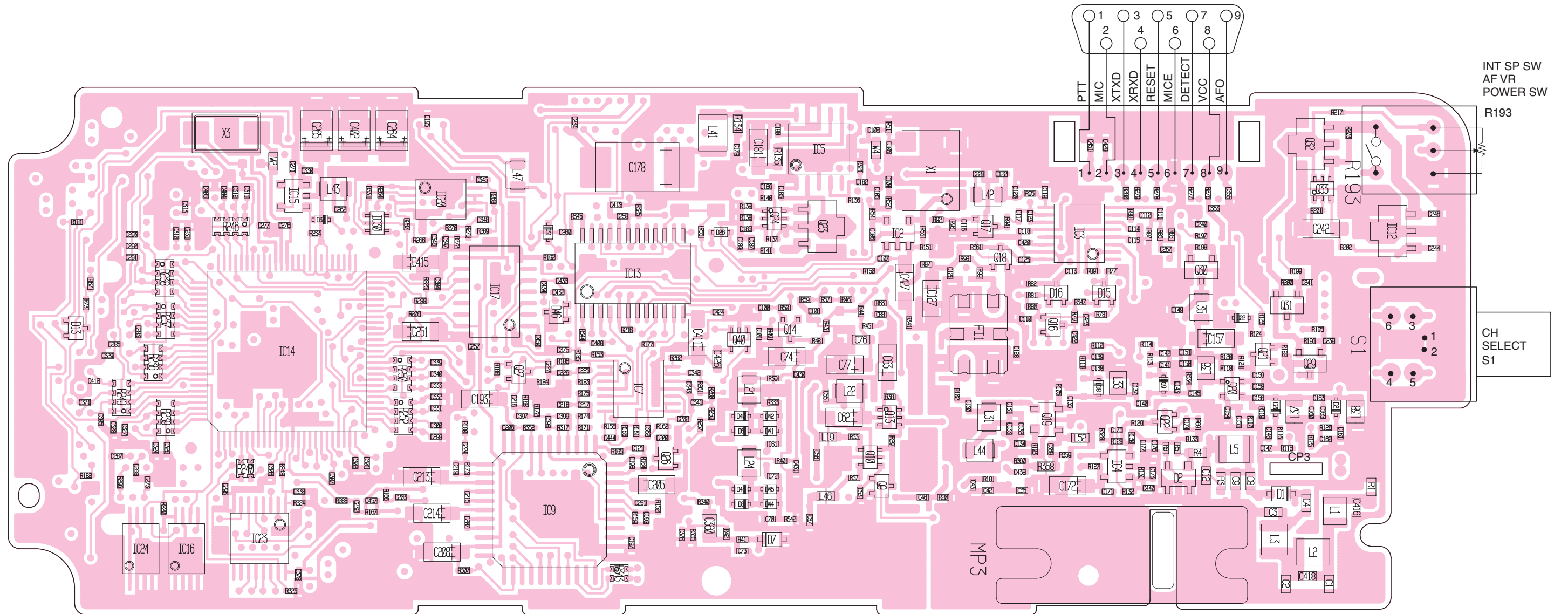
OPC-966
EM-80
EM-89
AD-52
HS-93

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

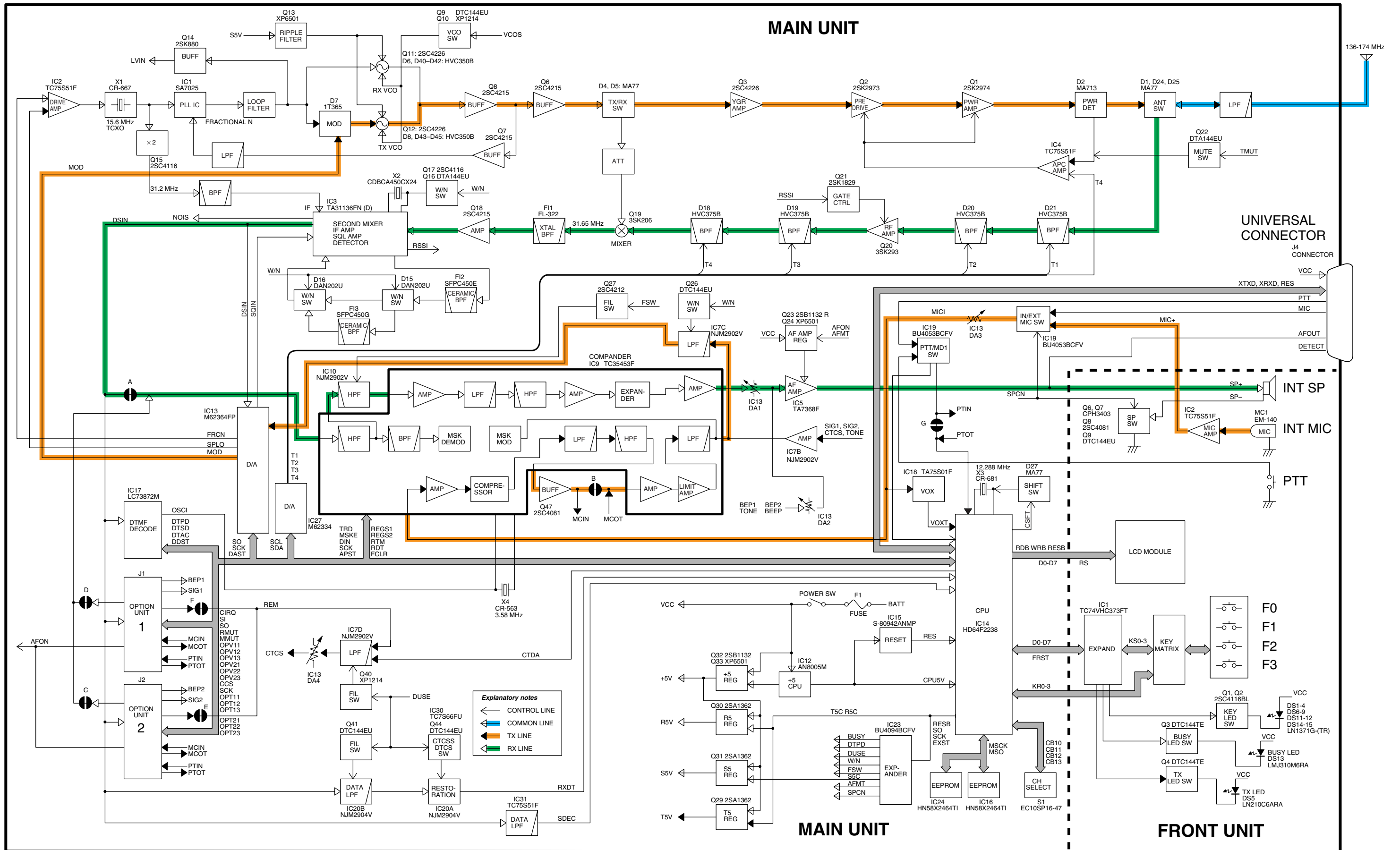


MAIN UNIT
• BOTTOM VIEW

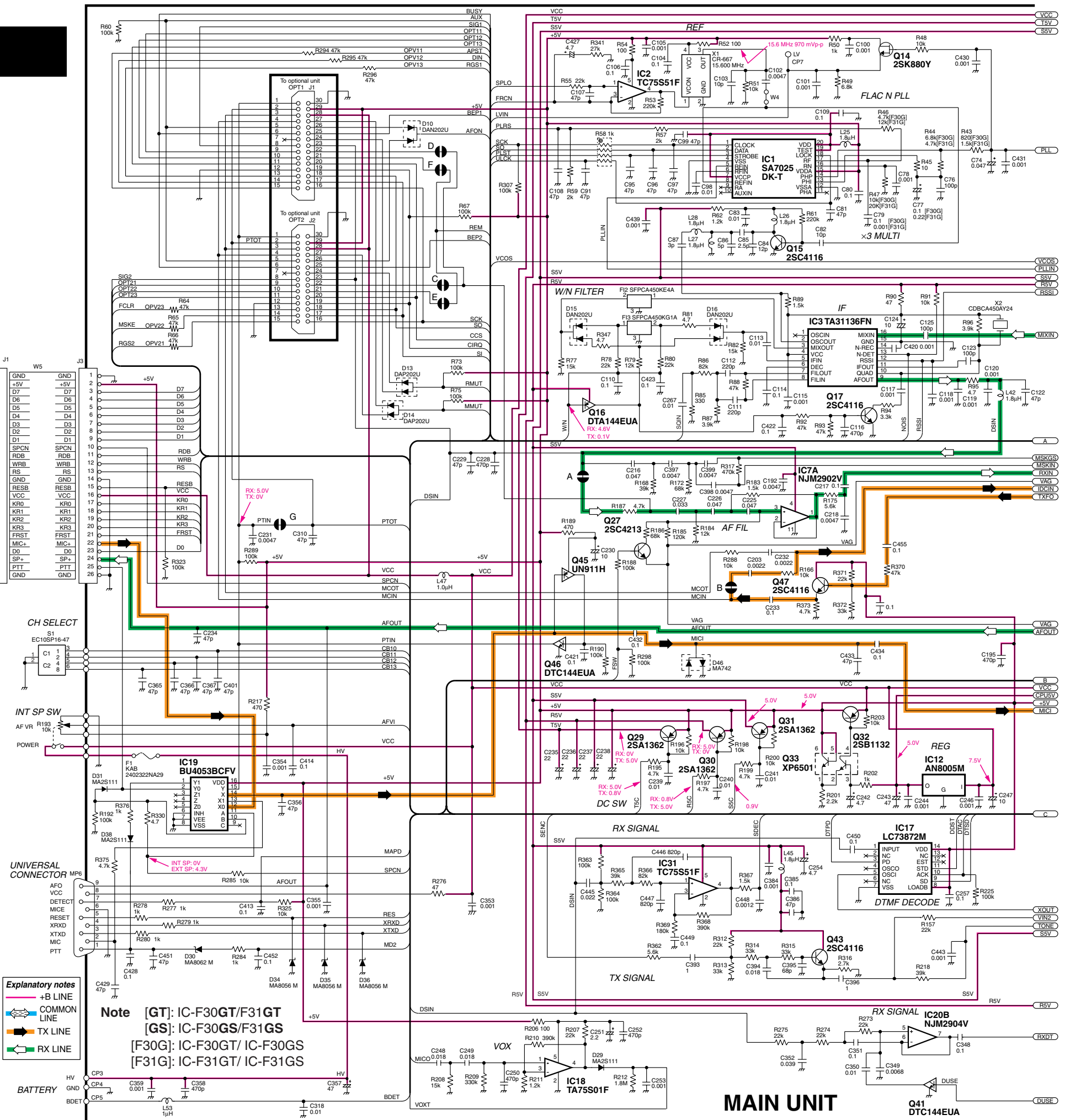
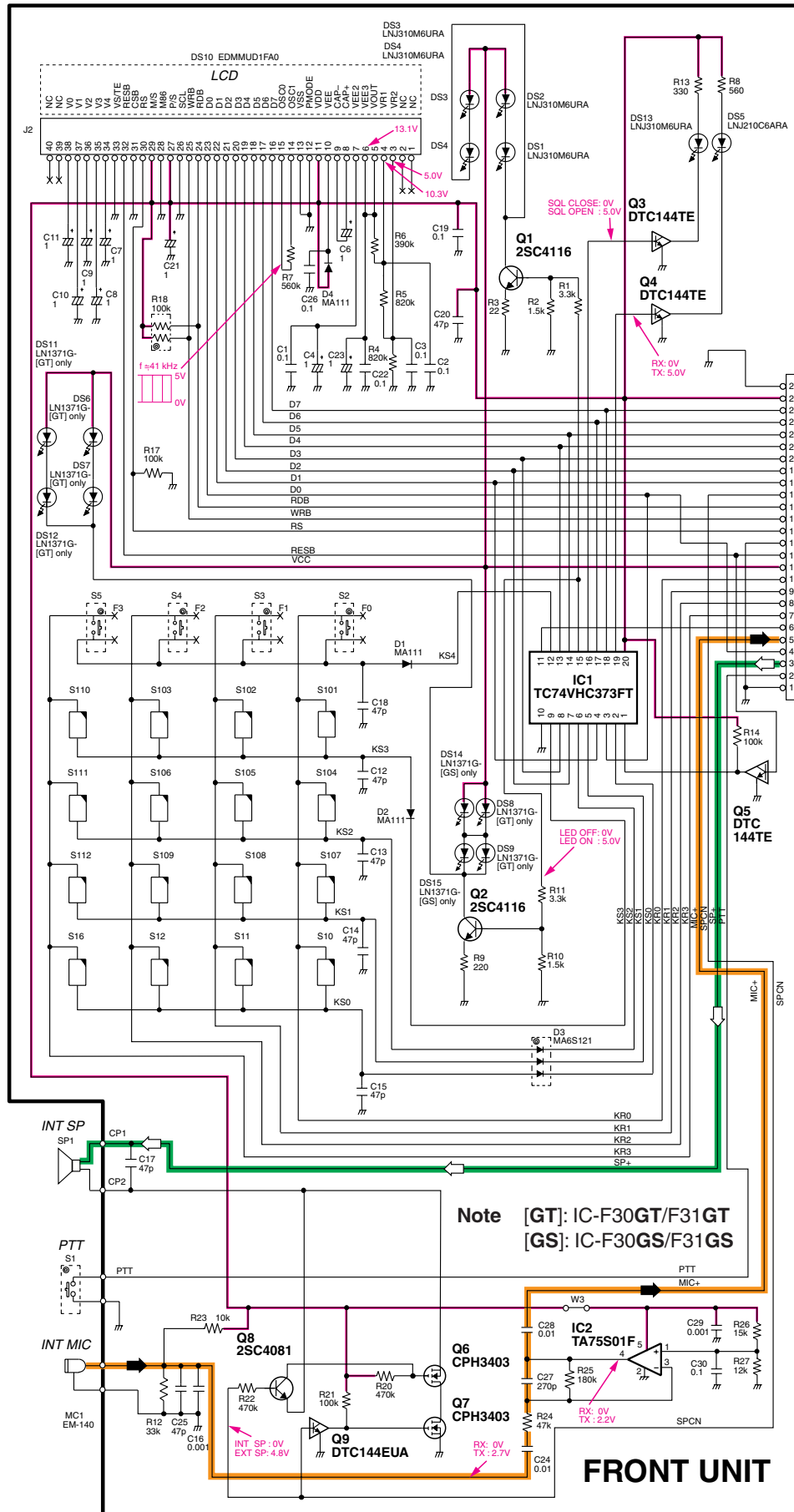
The combination of this page and the previous page shows the unit layout in the same configuration as the actual P.C. Board.

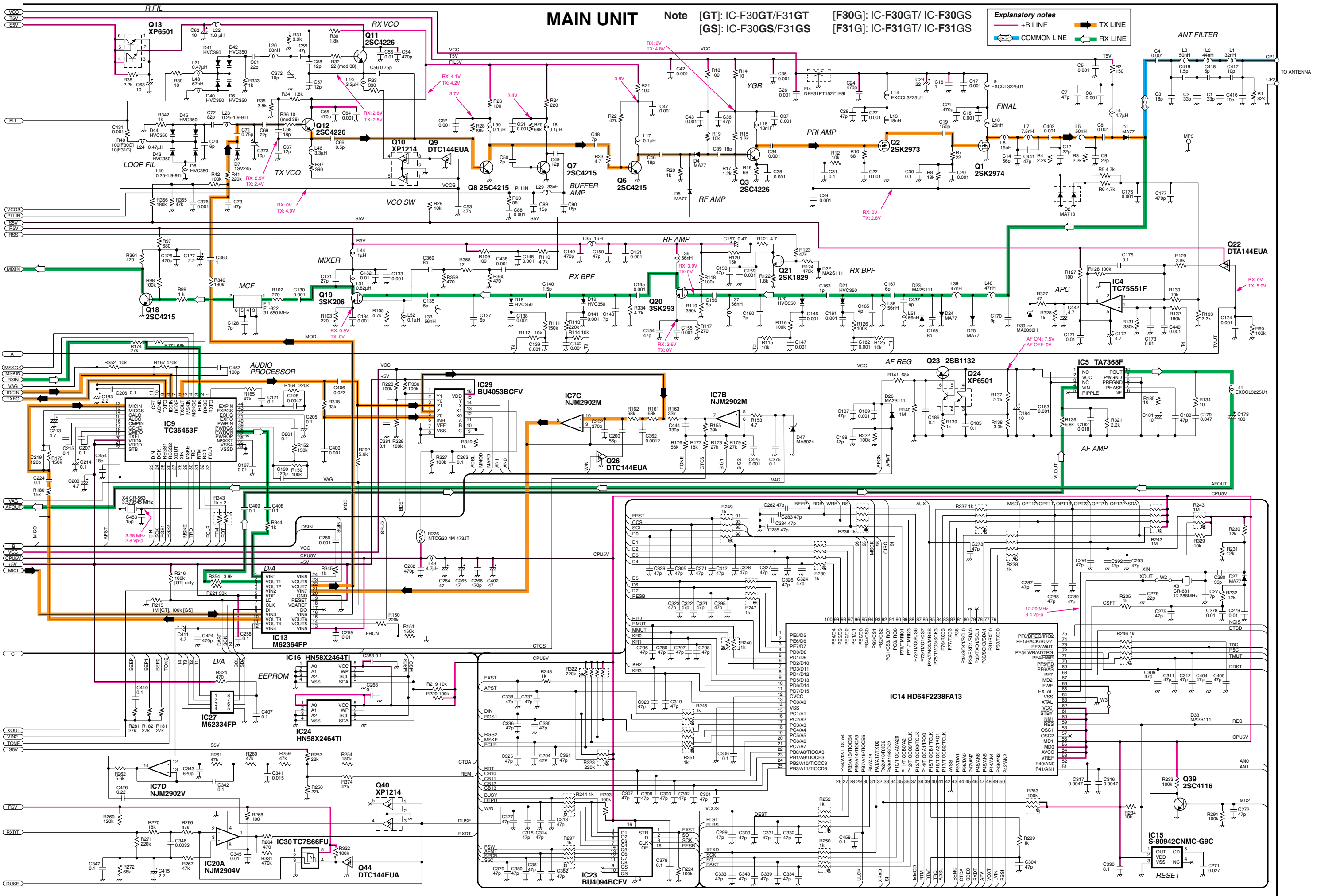


SECTION 10 BLOCK DIAGRAM



SECTION 11 VOLTAGE DIAGRAM





MAIN UNIT

Note [GT]: IC-F30GT/F31GT [F30G]: IC-F30GT/ IC-F30GS [GS]: IC-F30GS/F31GS [F31G]: IC-F31GT/ IC-F31GS

Explanatory notes
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