



# SERVICE MANUAL

VHF TRANSCEIVER  
**IC-F50**  
**IC-F51**

---

---

---

---

---

---

## INTRODUCTION

---

This service manual describes the latest service information for the **IC-F50/IC-F51** VHF TRANSCEIVER at the time of publication.

| MODEL  | VERSION | SYMBOL |
|--------|---------|--------|
| IC-F50 | U.S.A   | USA    |
|        | General | GEN    |
| IC-F51 | Europe  | EUR    |

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 8 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 (100mW) 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>

|                  |               |        |            |           |
|------------------|---------------|--------|------------|-----------|
| 5030002630 LCD   | L3-0048TAY-2  | IC-F50 | Front unit | 5 pieces  |
| 8810010120 Screw | BO 2x8 SUS ZK | IC-F50 | 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.

---

## 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 .....          | 4-2 |
| 4-4 | POWER SUPPLY CIRCUITS ..... | 4-4 |
| 4-5 | OTHER CIRCUITS .....        | 4-5 |
| 4-6 | PORT ALLOCATIONS .....      | 4-5 |

### SECTION 5 ADJUSTMENT PROCEDURES

|     |                            |     |
|-----|----------------------------|-----|
| 5-1 | PREPARATION .....          | 5-1 |
| 5-2 | SOFTWARE ADJUSTMENTS ..... | 5-4 |

### SECTION 6 PARTS LIST

### SECTION 7 MECHANICAL PARTS AND DISASSEMBLY

### SECTION 8 SEMI-CONDUCTOR INFORMATION

### SECTION 9 BOARD LAYOUTS

|     |                       |     |
|-----|-----------------------|-----|
| 9-1 | MAIN UNIT .....       | 9-1 |
| 9-2 | FRONT UNIT .....      | 9-3 |
| 9-3 | VR BOARD .....        | 9-5 |
| 9-4 | CONNECTOR BOARD ..... | 9-6 |

### SECTION 10 BLOCK DIAGRAM

### SECTION 11 VOLTAGE DIAGRAM

|      |                             |      |
|------|-----------------------------|------|
| 11-1 | MAIN UNIT .....             | 11-1 |
| 11-2 | RF UNIT .....               | 11-2 |
| 11-3 | VR / CONNECTOR BOARDS ..... | 11-3 |

Icom, Icom Inc. and ICOM are registered trademarks of Icom Incorporated (Japan) in the United States, the United Kingdom, Germany, France, Spain, Russia and/or other countries.

# SECTION 1 SPECIFICATIONS

## ■ GENERAL

- Frequency coverage : 136.000–174.000 MHz
- Mode : FM
- Type of emission :

| VERSION      | WIDE               | MIDDLE             | NARROW            |
|--------------|--------------------|--------------------|-------------------|
| [USA], [GEN] | 16K0F3E (25.0 kHz) | /                  |                   |
| [EUR]        |                    | 14K0F3E (20.0 kHz) | 8K0F3E (12.5 kHz) |

- Number of conventional channels : 128 ch, 8banks
- Antenna connector : SMA type (50 Ω)
- Operating temperature range : –30 °C to +60°C (–22 °F to +140°F) [USA], [GEN]  
–25 °C to +55°C [EUR]
- Power supply requirement : 7.2 V DC nominal (negative ground)
- Current drain (at 7.2 V DC) :

| RECEIVING |            | TRANSMITTING |           |
|-----------|------------|--------------|-----------|
| Stand-by  | Max. audio | High (5 W)   | Low (1 W) |
| 85 mA     | 300 mA     | 1.8 A        | 0.7 A     |

- Dimensions (projections not included) : 56.0(W)×97.0(H)×36.4(D) mm  
27<sup>32</sup>(W) × 31<sup>3</sup><sub>16</sub>(H) × 17<sup>16</sup>(D) in
- Weight (Including BP-223) : Approximately 280 g (9.88 oz)

## ■ TRANSMITTER

- Output power (at 7.2 V DC) : High: 5 W, Low: 1 W
- Modulation : Variable reactance frequency modulation
- Maximum permissible deviation : ±5.0 kHz (Wide), ±4.0 kHz (Middle), ±2.5 kHz (Narrow)
- Frequency error : ±2.5 ppm
- Spurious emissions : 70 dB (typical) [USA], [GEN]  
0.25 μW (≤ 1 GHz), 1.0 μW (≥ 1 GHz) [EUR]
- Adjacent channel power : 70 dB min. (Wide, Middle), 60 dB min. (Narrow)
- Audio harmonic distortion : 3 % typical (AF 1kHz, 40 % deviation)
- \*Hum and Noise ([USA], [GEN] only) (without CCITT filter) : 40 dB min (46 dB typical) for Wide  
34 dB min (40 dB typical) for Narrow
- \*Residual modulation ([EUR] only) (with CCITT filter) : 45 dB min (55 dB typical) for Wide  
43 dB min (53 dB typical) for Middle  
40 dB min (50 dB typical) for Narrow
- Limiting charact of modulator : 60–100 % of maximum deviation
- Microphone impedance : 2.2 kΩ

## ■ RECEIVER

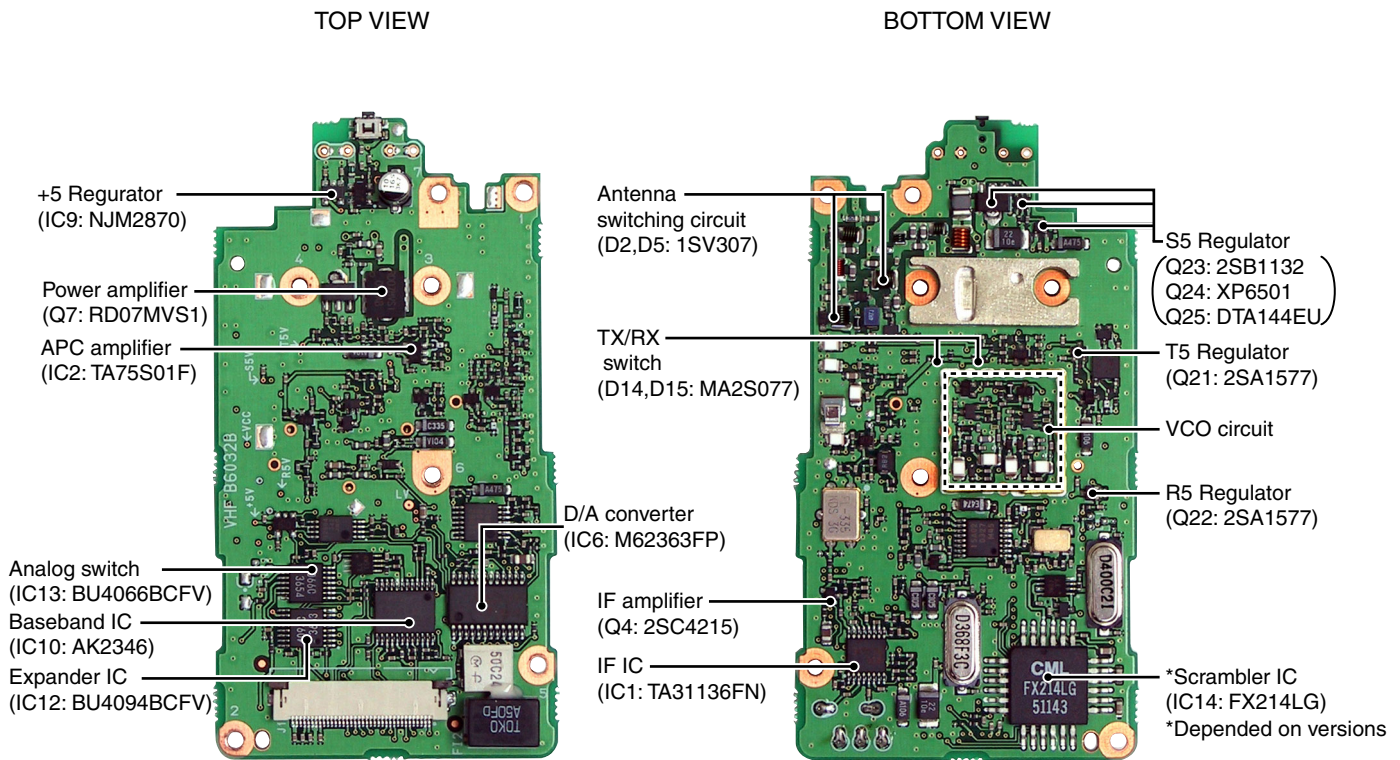
- Receive system : Double conversion superheterodyne system
- Intermediate frequencies : 1st IF: 46.35 MHz, 2nd IF: 450 kHz
- Sensitivity : 0.25 μV (–119 dBm) typical at 12 dB SINAD [USA], [GEN]  
0.63 μV (–111 dBm) emf typical at 20 dB SINAD [EUR]
- Adjacent channel selectivity : 70 dB min (75 dB typical) for Wide and Middle  
60 dB min (65 dB typical) for Narrow
- Spurious response : 70 dB
- Intermodulation rejection ratio : 70 dB min (74 dB typical) [USA], [GEN]  
65 dB min (67 dB typical) [EUR]
- \*Hum and Noise ([USA], [GEN] only) (without CCITT filter) : 40 dB min (45 dB typical) for Wide  
34 dB min (40 dB typical) for Narrow
- \*Hum and Noise ([EUR] only) (with CCITT filter) : 45 dB min (55 dB typical) for Wide  
43 dB min (53 dB typical) for Middle  
40 dB min (50 dB typical) for Narrow
- Audio output power : 0.5 W typical at 5% distortion with an 8 Ω load
- Squelch sensitivity (at threshold) : 0.25 μV typical [USA], [GEN]  
0.63 μV (–111 dBm) emf typical [EUR]
- Output impedance (Audio) : 8 Ω

Specifications are measured in accordance with EIA-152-C/204D, TIA-603 or EN 300 086.

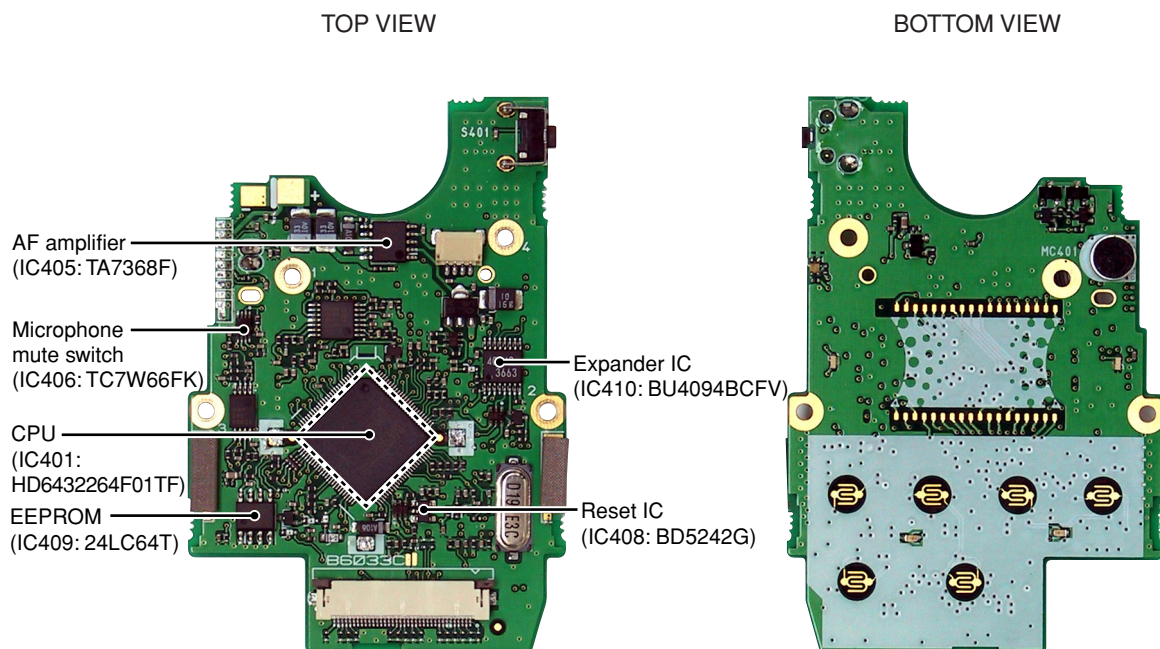
**All stated specifications are subject to change without notice or obligation.**

# SECTION 2 INSIDE VIEWS

## ● MAIN UNIT



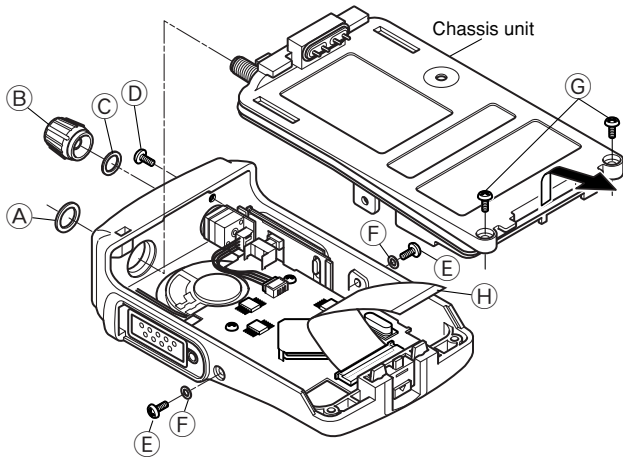
## ● FRONT UNIT



## SECTION 3 DISASSEMBLY INSTRUCTIONS

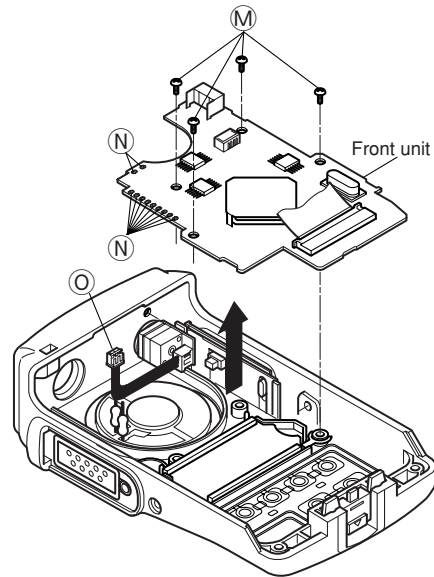
### ● REMOVING THE CHASSIS UNIT

- ① Unscrew 1 nut (A), and remove 1 knob (B).
- ② Remove 1 washer (C), and unscrew 1 screw (D).
- ③ Unscrew 2 screws (E), and remove 2 washers (F).
- ④ Unscrew 2 screws (G).
- ⑤ Take off the chassis unit in the direction of the arrow.
- ⑥ Remove the cable (H) from the chassis unit.



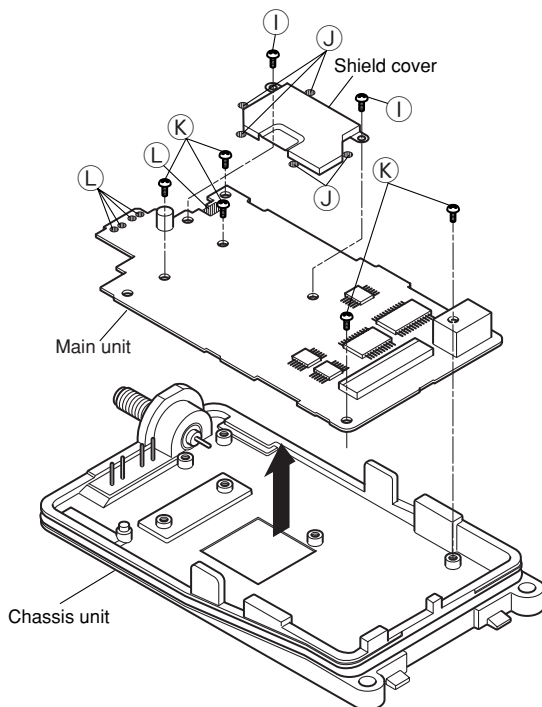
### ● REMOVING THE FRONT UNIT

- ① Unscrew 4 screws (M).
- ② Unsolder 11 points (N).
- ③ Unplug the connector (O) from J402 on the Front unit.
- ④ Take off the front unit in the direction of the arrow.



### ● REMOVING THE MAIN UNIT

- ① Unscrew 2 screws (I).
- ② Unsolder 5 points (J), and remove the shield cover.
- ③ Unscrew 5 screws (K).
- ④ Unsolder 5 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 (MAIN UNIT)

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; J1) and pass through the low-pass filter (L1, L2, C1–C5). The filtered signals are passed through the  $\lambda/4$  type antenna switching circuit (D5, D6, L5, L6) and then applied to the RF circuit.

#### 4-1-2 RF CIRCUIT (MAIN UNIT)

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 (D4, D8, L7, L8). The filtered signals are amplified at the RF amplifier (Q2) and then passed through the another two-stage tunable bandpass filters (D9, D10, L9, L11) to suppress unwanted signals. The filtered signals are applied to the 1st mixer circuit.

D4, D8–D10 employ varactor diodes, that are controlled by the CPU via the D/A converter (IC6), 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 (MAIN UNIT)

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 (R26–R28), at the 1st mixer circuit (Q3) to produce a 46.35 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 (Q4).

#### 4-1-4 2ND IF AND DEMODULATOR CIRCUITS (MAIN UNIT)

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.

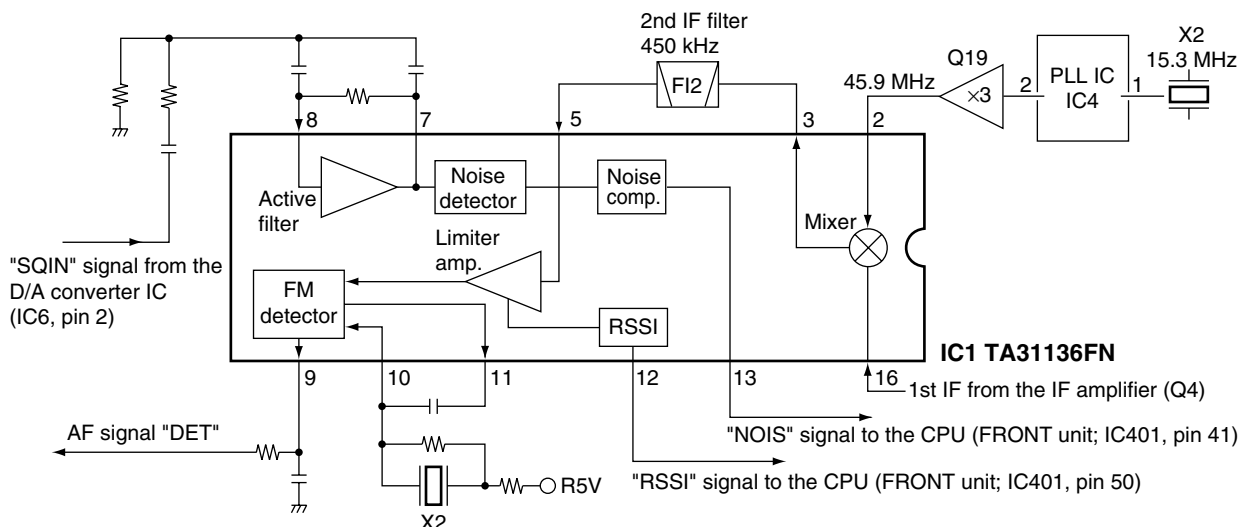
The 1st IF signal from the IF amplifier (Q4) is applied to the 2nd mixer section of the FM IF IC (IC1, pin 16), and is mixed with the 2nd LO signal to be converted into a 450 kHz 2nd IF signal.

The FM IF IC (IC1) contains the 2nd mixer, 2nd local oscillator, limiter amplifier, quadrature detector, active filter and noise amplifier circuits. A 2nd LO signal (45.9 MHz) is produced at the PLL circuit by tripling its reference frequency (15.3 MHz).

The 2nd IF signal from the 2nd mixer (IC1, pin 3) passes through the ceramic filter (F12) to remove unwanted heterodyned frequencies. It is then amplified at the limiter amplifier section (IC1, pin 5) and applied to the quadrature detector section (IC1, pins 10, 11) to demodulate the 2nd IF signal into AF signals.

The demodulated AF signals are output from pin 9 (IC1) and applied to the AF circuit via the receiver mute circuit.

### • 2ND IF AND DEMODULATOR CIRCUITS



#### 4-1-5 AF AMPLIFIER CIRCUIT (MAIN AND FRONT UNITS)

The AF amplifier circuit amplifies the demodulated AF signals to drive a speaker. This transceiver employs the base band IC which is composed of pre-amplifier, expander, scrambler, MSK de-modulator, etc. at the AF amplifier section.

The AF signals from the FM IF IC (IC1, pin 9) are amplified at the AF amplifier section of the base band IC (IC10, pin 5) and are then applied to the low-pass filter section of it.

The filtered signals pass through the high-pass filter to suppress unwanted harmonic components. The signals pass through (or bypass) scrambler and expander sections, and are then applied to (or bypass) the scrambler IC (IC14) via the analog switch (IC13). The signals are amplified at the amplifier section of the base band IC (IC10), and pass through the AF mute switch (IC406) and low-pass filter (IC403). The filtered signals pass through the AF volume, and are then applied to the AF power amplifier (IC405) to drive the speaker.

#### 4-1-6 RECEIVE MUTE CIRCUITS (MAIN AND FRONT UNITS)

##### • 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 (IC1, pin 9) are passed through the D/A converter (IC6, pin 1). The signals are applied to the active filter section in the FM IF IC (IC1, 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 (FRONT unit; IC401, pin 41). Then the CPU analyzes the noise condition and controls the AF mute signal via "AFON" line from expander IC (FRONT unit; IC410, pin 7) to the AF power controller (FRONT unit; Q401, Q402).

##### • 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 "DET" AF signals from the FM IF IC (IC1, pin 9) passes through the low-pass filter (IC5, pin 5) to remove AF (voice) signals, and are then applied to the amplifier (MAIN unit; IC5, pin 10). The amplified signals are applied to the CTCSS or DTCS decoder inside of the CPU (FRONT; IC401, pin 44) via the "CDEC" line. The CPU outputs AF mute control signal, and is then applied to the I/O expander IC (IC410). The IC outputs AF mute circuit (IC406) and AF power supply circuits (Q401, Q402) control signals via the "AFON" line.

### 4-2 TRANSMITTER CIRCUITS

#### 4-2-1 MICROPHONE AMPLIFIER CIRCUIT (FRONT AND MAIN UNITS)

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.

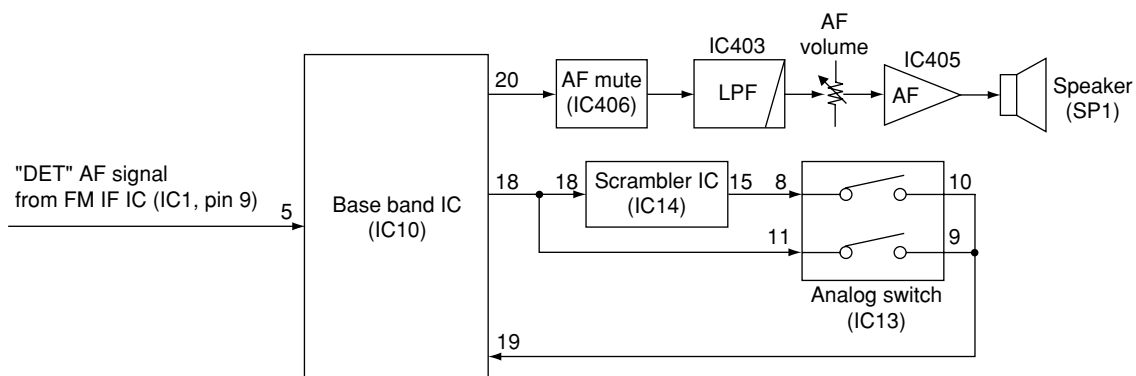
This transceiver employs the base band IC which is composed of microphone amplifier, compressor, scrambler, limiter, splatter filter, MSK modulator, etc. at the microphone amplifier section.

The AF signals (MIC) from the microphone (MC401) are passed through the microphone mute switch (IC406, pins 2, 1), and are then applied to the amplifier (IC407, pins 2, 6). The amplified signals pass through (or bypass) the scrambler IC (IC14) via the analog switch (IC13), and are then applied to the microphone amplifier section of the base band IC (MAIN unit; IC10, pins 3, 4). The amplified signals are passed through or bypass the compressor, scrambler sections of IC10 (MAIN unit), and are then passed through the high-pass, limiter amplifier, splatter filter sections of IC10 (MAIN unit).

The filtered AF signals are applied to the FM/PM switch (MAIN unit; IC11, pin 6), and pass through the low-pass filter (MAIN unit; IC5, pin 1). The amplified signals are applied to the D/A converter (MAIN unit; IC6, pin 4)

The output signals from the D/A converter (MAIN unit; IC6, pin 3) are applied to the modulation circuit (MAIN unit; D18).

##### • AF AMPLIFIER CIRCUIT





#### 4-2-2 MODULATION CIRCUIT (MAIN UNIT)

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

The AF signals from the D/A converter (IC6, pin 3) change the reactance of varactor diode (D18) to modulate the oscillated signal at the TX VCO circuit (Q13, D16, D17). The modulated VCO signal is amplified at the buffer amplifiers (Q10, Q12) and is then applied to the drive amplifier circuit via the T/R switch (D14).

The CTCSS/DTCS signals ("CENC0", "CENC1", "CENC2" from the CPU (FRONT unit; IC401, pins 79–81) pass through the low-pass filter (IC403, pins 1, 3), and are then applied to the D/A converter via the "CDCS" line (IC6, pin 9). The output signal from the D/A converter (IC6, pin 10) passes through the low-pass filter (IC5, pins 1, 2). The CTCSS/DTCS signals are mixed with "MOD" signal at the low-pass filter (IC5), and are then applied to the D/A converter again (IC6, pin 4).

#### 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 (D14), and is amplified at the pre-drive (Q9), drive (Q8), power (Q7) amplifiers to obtain 5 W of RF power (at 7.2 V DC).

The amplified signal is passed through the power detector (D1), antenna switching circuit (D2) and low-pass filter (L1, L2, C1–C5), and is then applied to the antenna connector (CHASSIS unit; J1).

The bias current of the pre-drive (Q9), drive (Q8) and power (Q7) amplifiers are controlled by the APC circuit.

#### 4-2-4 APC CIRCUIT (MAIN UNIT)

The APC circuit (IC2, D1) protects the drive and power amplifiers from excessive current drive, and selects output power of HIGH, LOW2 or LOW1.

The power detector circuit (D1) 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  $\Omega$  and is increased when it is mismatched.

The detected voltage is applied to the differential amplifier (IC2, pin 3), and the "T2" signal from the D/A converter (IC6, pin 14), controlled by the CPU (FRONT unit; IC401), 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 (IC2, pin 4) controls the input current of the pre-drive (Q9), drive (Q8) and power (Q7) amplifiers to reduce the output power.

### 4-3 PLL CIRCUITS

#### 4-3-1 PLL CIRCUIT (MAIN UNIT)

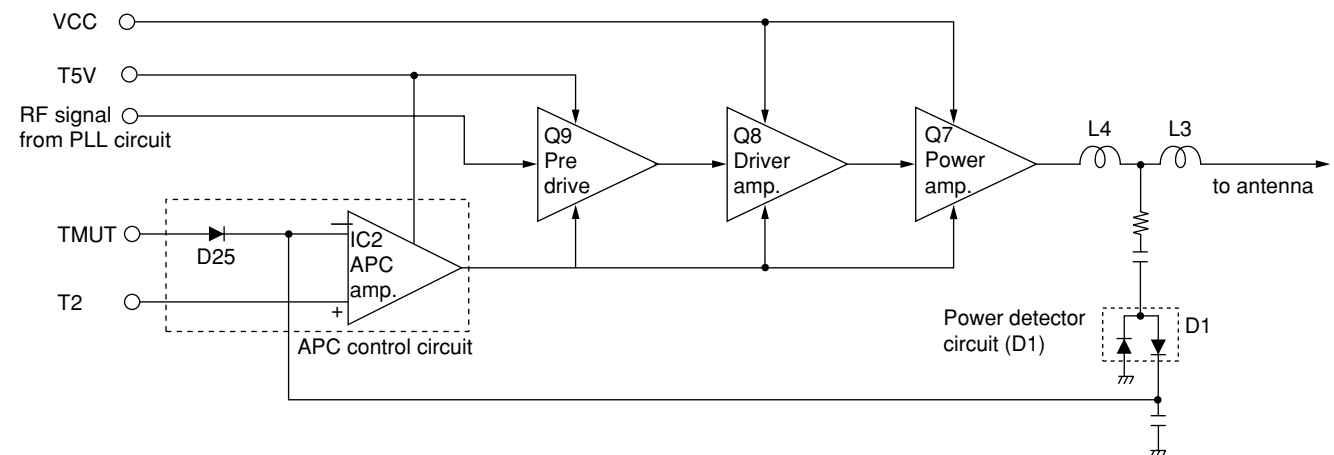
A PLL circuit provides stable oscillation of the transmit frequency and receive 1st LO frequency. The PLL output compares the phase of the divided VCO frequency to the reference frequency. The PLL output frequency is controlled by the divided ratio (N-data) of a programmable divider.

The PLL circuit contains the TX/RX VCO circuits (Q13, Q14, D16, D17, D19, D20). The oscillated signal is amplified at the buffer amplifiers (Q11, Q12) and then applied to the PLL IC (IC4, pin 8) after being passed through the low-pass filter (L32, C206–C208).

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.

#### • APC CIRCUIT



### 4-3-2 VCO CIRCUIT (MAIN UNIT)

The VCO circuit contains a separate RX VCO (Q14, D19, D20) and TX VCO (Q13, D16, D17). The oscillated signal is amplified at the buffer amplifiers (Q10, Q12) and is then applied to the T/R switch (D14, D15). Then the receive 1st LO (Rx) signal is applied to the 1st mixer (Q3) and the transmit (Tx) signal to the pre-drive amplifier circuit (Q9).

A portion of the signal from the buffer amplifier (Q12) is fed back to the PLL IC (IC4, pin 8) via the buffer amplifier (Q11) as the comparison signal.

## 4-4 POWER SUPPLY CIRCUIT

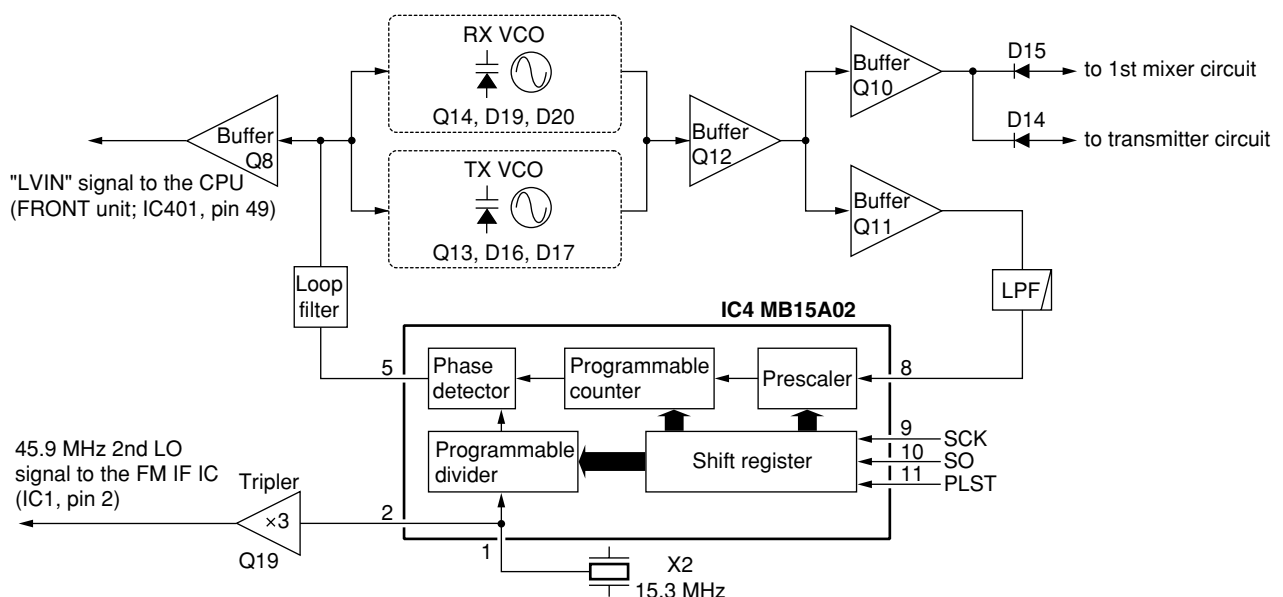
### 4-4-1 MAIN UNIT VOLTAGE LINE

| LINE | DESCRIPTION                                                                                                                                                                                                    |
|------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| VCC  | The voltage from the connected battery pack.                                                                                                                                                                   |
| +5V  | Common 5 V converted from the VCC line at the +5 regulator circuit (IC9). The output voltage is supplied to the fast switch (IC17), buffer amplifiers (IC16, IC18) and so on.                                  |
| S5V  | Common 5 V converted from the VCC line at the S5 regulator circuit (Q23–Q25). The output voltage is supplied to the ripple filter (Q17), PLL IC (IC4), FRONT unit, etc.                                        |
| R5V  | Receive 5 V converted from the S5V line at the R5 regulator circuit (Q22). The output voltage is supplied to the tripler (Q19), FM IF IC (IC1), IF amplifier (Q4), VCO switch (Q15, Q16), 1st mixer (Q3), etc. |
| T5V  | Transmit 5 V converted from the S5V line at the T5 regulator circuit (Q21). The output voltage is supplied to the pre-drive (Q9), APC amplifier (IC2).                                                         |

### 4-4-2 FRONT UNIT VOLTAGE LINE

| LINE | DESCRIPTION                                                                                                                                                                       |
|------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| VCC  | Same voltage as VCC line on the MAIN unit is applied to the FRONT unit via the J401, pins 1, 2 (FRONT unit). The voltage is supplied to the [PWR] switch controller (Q401, Q402). |
| CPU5 | Same voltage as +5V line on the MAIN unit is applied to the FRONT unit via the J401, pin 4 (FRONT unit). The voltage is supplied to the CPU (IC401), reset IC (IC408), etc.       |
| S5V  | Same voltage as S5V line on the MAIN unit is applied to the FRONT unit via the J401, pin 5 (FRONT unit). The voltage is supplied to the mic mute circuit (IC406), etc.            |

### • PLL CIRCUIT



## 4-5 OTHER CIRCUITS

### 4-5-1 COMPOUNDER CIRCUIT (MAIN UNIT)

IC-F50/F51 have compounder circuit which can improve S/N ratio and become wide dynamic range to suppress the transmitting signal and to extend receiving signal. The circuit is composed of the base band IC (MAIN unit; IC10).

#### (1) IN CASE OF TRANSMITTING

The audio signals from the microphone are applied to the base band IC (IC10, pin 3) via microphone mute circuit (FRONT unit; IC406), microphone amplifier (IC407), etc. The signals are amplified at the amplifier section, and are then applied to the compressor circuit to compress the audio signals. The signals pass through (or bypass) scrambler section, and are then amplified at limiter amplifier section after being passed through the high-pass filter. The amplified signals pass through the low-pass filter section, and are then applied to the modulation circuit (Q13, D16–D18) via the FM/PM switch (IC11), low-pass filter (IC5) and D/A converter (IC6).

#### (2) IN CASE OF RECEIVING

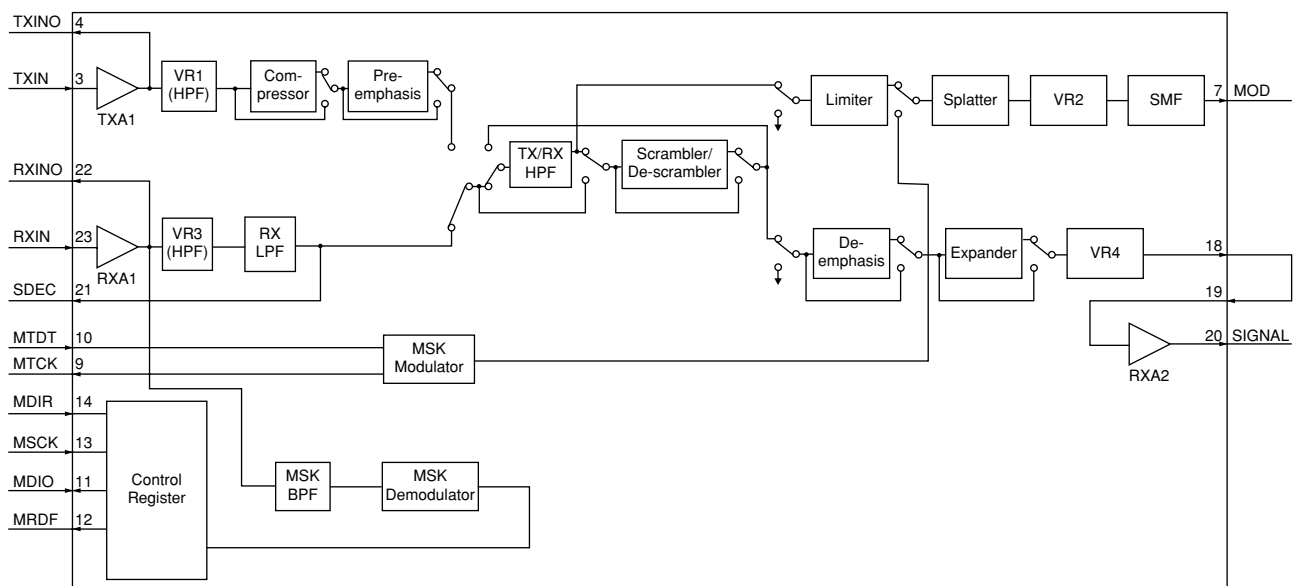
The demodulated AF signals from the IF IC are applied to the amplifier section of base band IC (IC10, pin 23), and then pass through the low-pass and high-pass filter section to suppress unwanted signals. The filtered signals pass through (or bypass) scrambler section, and are then applied to the expander circuit to expand AF signals. The signals pass through (or bypass) scrambler IC (IC14), and are then applied to the analog switch (IC13, pins 8, 11). The signals are applied to the base band IC's amplifier section (IC10, pins 19, 20), and are then applied to the AF amplifier circuit.

## 4-6 PORT ALLOCATIONS

### 4-6-1 EXPANDER IC (FRONT UNIT; IC410)

| Pin number | Port name | Description                                                                                                                                                                                                                                                               |
|------------|-----------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 4          | LEDR      | Outputs RX LED control signal.<br>Low: Lights ON.                                                                                                                                                                                                                         |
| 5          | LEDT      | Outputs TX LED control signal.<br>Low: Lights ON.                                                                                                                                                                                                                         |
| 6          | LIGT      | Outputs back light LED control signal.<br>Low: Back light is ON.                                                                                                                                                                                                          |
| 7          | AFON      | Outputs audio control signal.<br>Low: Outputs audio signals from speaker.                                                                                                                                                                                                 |
| 11         | DUSE      | <ul style="list-style-type: none"> <li>Outputs CTCSS/DTCS switching signal when transmitting.<br/>High: Selected DTCS.</li> <li>Outputs Min. VR switching signal when receiving.<br/>Low: Select Min VR.</li> </ul> <b>NOTE:</b> Audio signals are prior to transmitting. |
| 12         | MCON      | Outputs microphone select signal.<br>High: While the internal microphone is used.                                                                                                                                                                                         |
| 13         | CSFT      | Outputs shift signal for reference oscillator's frequency.                                                                                                                                                                                                                |
| 14         | SPON      | Outputs the internal speaker control signal.<br>High: The internal speaker is selected.                                                                                                                                                                                   |

### • BASE BAND IC BLOCK DIAGRAM



#### 4-6-2 MAIN CPU (FRONT unit; IC401)

| Pin number             | Port name                                    | Description                                                                                                                                                                                                                         |
|------------------------|----------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1–11,<br>13,<br>15–25, | SEG23–<br>SEG13,<br>SEG12,<br>SEG11–<br>SEG1 | Output segment data to the LCD display.                                                                                                                                                                                             |
| 26                     | SO                                           | Outputs serial data to the PLL IC (MAIN unit; IC6, pin 8) and D/A converter (MAIN unit; IC6, pin 8).                                                                                                                                |
| 27                     | SCK                                          | Outputs serial clock signal to the PLL IC (MAIN unit; IC4, pin 9), D/A converter (MAIN unit; IC6, pin 7), etc.                                                                                                                      |
| 28                     | MDIO                                         | I/O port for the serial data signals from/to the base band IC (MAIN unit; IC10, pin 11).                                                                                                                                            |
| 29                     | MSCK                                         | Outputs clock signal to the base band IC (MAIN unit; IC10, pin 13).                                                                                                                                                                 |
| 30                     | SCST                                         | Outputs strobe signals to the scrambler IC (MAIN unit; IC14, pin 11).                                                                                                                                                               |
| 31                     | PLST                                         | Outputs strobe signals to the PLL IC (MAIN unit; IC4, pin 11).                                                                                                                                                                      |
| 32                     | ESDA                                         | I/O port for data signals from/to the EEPROM (IC409, pin 5).                                                                                                                                                                        |
| 33                     | ESCL                                         | Outputs clock signal to the EEPROM (IC409, pin 6).                                                                                                                                                                                  |
| 34                     | SCAT                                         | <ul style="list-style-type: none"> <li>• Outputs power down control signal to the scrambler IC (MAIN unit; IC14, pin 12).</li> <li>• Input port for the detection signal whether the scrambler unit is installed or not.</li> </ul> |
| 35                     | EXSF                                         | Outputs strobe signals to the expander IC (IC410, pin 2).                                                                                                                                                                           |
| 36                     | EXSM                                         | Outputs strobe signals to the expander IC (MAIN unit; IC12, pin 1).                                                                                                                                                                 |
| 37                     | EXOE                                         | Outputs the enable signal to the expander ICs (IC410, pin 15 and MAIN unit; IC12, pin 15).                                                                                                                                          |
| 38                     | BEEP                                         | Outputs beep audio signals.                                                                                                                                                                                                         |
| 39                     | MTDT                                         | Outputs MSK data for transmitting to the base band IC (MAIN unit; IC10, pin 10).                                                                                                                                                    |
| 40                     | MTCK                                         | Input port for the transmitting MSK clock signal from the base band IC (MAIN unit; IC10, pin 9).                                                                                                                                    |
| 41                     | NOIS                                         | Input port for the noise signal from the FM IF IC (MAIN unit; IC1, pin 13).                                                                                                                                                         |
| 43                     | SDEC                                         | Input port for single tone decode signal from the base band IC (MAIN unit; IC10, pin 21).                                                                                                                                           |
| 44                     | CDEC                                         | Input port for CTCSS/DTCS signal from the amplifier (MAIN unit; IC5, pin 8).                                                                                                                                                        |

| Pin number | Port name       | Description                                                                                                                                                                        |
|------------|-----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 45         | PTT             | Input port for the PTT switch detection signal.<br>Low: While the PTT switch is pushed.                                                                                            |
| 46<br>47   | KR1<br>KR0      | Input ports for the key return A/D signals.                                                                                                                                        |
| 48         | BATV            | Input port for the detect signal for connecting battery pack's voltage.                                                                                                            |
| 49         | LVIN            | Input port for the PLL lock voltage.                                                                                                                                               |
| 50         | RSSI            | Input port for the S-meter signal from the FM IF IC (MAIN unit; IC1, pin 12).                                                                                                      |
| 51         | TEMP            | Input port for the transceiver's internal temperature detecting signal.                                                                                                            |
| 52         | OPTV            | Input port for the optional microphone determine signal.                                                                                                                           |
| 55         | ULCK            | Input port for the PLL unlock signal.<br>Low: The PLL circuit is unlocked.                                                                                                         |
| 71         | MDIR            | Outputs serial data control signal to the base band IC (MAIN unit; IC10, pin 14)                                                                                                   |
| 72–75      | SENC3–<br>SENC0 | Output single tone encoder signal.                                                                                                                                                 |
| 76         | CLO             | Outputs the cloning data signal.                                                                                                                                                   |
| 77         | CLI             | Input port for the cloning data signal.                                                                                                                                            |
| 78         | MRDF            | Input port for the receiving MSK detection signal from the base band IC (MAIN unit; IC10, pin 12)                                                                                  |
| 79–81      | CENC2–<br>CENC0 | Output the CTCSS/DTCS signals.                                                                                                                                                     |
| 82         | DAST            | <ul style="list-style-type: none"> <li>• Outputs strobe signals to the D/A converter (IC6, pin 6).</li> <li>• Input port for the connecting battery type detect signal.</li> </ul> |
| 88–91      | COM4–<br>COM1   | Output common signal to the LCD display.                                                                                                                                           |

#### 4-6-3 EXPANDER IC (FRONT UNIT; IC410)

| Pin number | Port name | Description                                                                                                                                                                                                                                                                          |
|------------|-----------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 4          | LEDR      | Outputs RX LED control signal.<br>Low: Lights ON.                                                                                                                                                                                                                                    |
| 5          | LEDT      | Outputs TX LED control signal.<br>Low: Lights ON.                                                                                                                                                                                                                                    |
| 6          | LIGT      | Outputs back light LED control signal.<br>Low: Back light is ON.                                                                                                                                                                                                                     |
| 7          | AFON      | Outputs audio control signal.<br>Low: Outputs audio signals from speaker.                                                                                                                                                                                                            |
| 11         | DUSE      | <ul style="list-style-type: none"> <li>• Outputs CTCSS/DTCS switching signal when transmitting.<br/>High: Selected DTCS.</li> <li>• Outputs Min. VR switching signal when receiving.<br/>Low: Select Min VR.</li> </ul> <p><b>NOTE:</b> Audio signals are prior to transmitting.</p> |
| 12         | MCON      | Outputs microphone select signal.<br>High: While the internal microphone is used.                                                                                                                                                                                                    |
| 13         | CSFT      | Outputs shift signal for reference oscillator's frequency.                                                                                                                                                                                                                           |
| 14         | SPON      | Outputs the internal speaker control signal.<br>High: The internal speaker is selected.                                                                                                                                                                                              |

#### 4-6-4 D/A CONVERTER IC (MAIN UNIT; IC6)

| Pin number | Port name | Description                                                                                                                                                                                                                                                                    |
|------------|-----------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 11         | BAL       | Outputs the modulation balance level control signal. The signal is applied to the buffer amplifier (IC16, pin 2).                                                                                                                                                              |
| 14         | T2        | <ul style="list-style-type: none"> <li>• Outputs the bandpass filter tuning signal. The output signal is applied to the bandpass filters (D9, D10).</li> <li>• Outputs the TX power control signal. The output signal is applied to the APC amplifier (IC2, pin 1).</li> </ul> |
| 15         | T1        | Outputs the bandpass filter tuning signal. The output signal is applied to the bandpass filters (D4, D8).                                                                                                                                                                      |
| 22         | LVA       | Outputs the PLL lock voltage control signal. The output signal is applied to the buffer amplifier (IC16, pin 5).                                                                                                                                                               |
| 23         | REF       | Outputs the reference oscillator correcting voltage. The voltage is applied to the buffer amplifier (IC16, pin 3).                                                                                                                                                             |

#### 4-6-5 EXPANDER IC (MAIN UNIT; IC12)

| Pin number | Port name | Description                                                                                                                                                                                  |
|------------|-----------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 4          | R5C       | Outputs the R5 regulator (Q22) control signal.<br>Low: While receiving.                                                                                                                      |
| 5          | T5C       | Outputs the T5 regulator (Q21) control signal.<br>Low: While transmitting.                                                                                                                   |
| 6          | LIGT      | Outputs the S5 regulator (Q23–Q25) control signal.<br>Low: While the S5 regulator outputs 5 V voltage.                                                                                       |
| 7          | AFON      | Outputs audio control signal.<br>Low: Outputs audio signals from speaker.                                                                                                                    |
| 11         | MUT2      | Outputs the analog switch (IC13, pins 5, 6) control signal to control the scrambler unit.<br>High: While the scrambler function is ON.<br>Low: While the microphone mute or AF mute is ON.   |
| 12         | MUT1      | Outputs the analog switch (IC13, pins 12, 13) control signal to control the scrambler unit.<br>High: While the scrambler function is ON.<br>Low: While the microphone mute or AF mute is ON. |
| 13         | PMFM      | Outputs the FM/PM modulation switching signal to the FM/PM switch (IC11, pin 5).<br>High: PM is selected.                                                                                    |
| 14         | TMUT      | Outputs the transmitting mute switch control signal to the mute switch (D25).<br>High: While muting.                                                                                         |

# SECTION 5 ADJUSTMENT PROCEDURES

## 5-1 PREPARATION

When adjusting IC-F60/F61, the optional CS-F50 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<br>Current capacity : 5 A or more                                              | Audio generator                 | Frequency range : 300–3000 Hz<br>Output level : 1–500 mV                          |
| FM deviation meter                  | Frequency range : DC–600 MHz<br>Measuring range : 0 to ±10 kHz                                           | Attenuator                      | Power attenuation : 40 or 50 dB<br>Capacity : 10 W or more                        |
| Frequency counter                   | Frequency range : 0.1–600 MHz<br>Frequency accuracy : ±1 ppm or better<br>Sensitivity : 100 mV or better | Standard signal generator (SSG) | Frequency range : 300–600 MHz<br>Output level : 0.1 μV–32 mV<br>(–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<br>(terminated type) | Measuring range : 1–10 W<br>Frequency range : 300–600 MHz<br>Impedance : 50 Ω<br>SWR : Less than 1.2 : 1 | Oscilloscope                    | Frequency range : DC–20 MHz<br>Measuring range : 0.01–20 V                        |
|                                     |                                                                                                          | AC millivoltmeter               | Measuring range : 10 mV–10 V                                                      |

### ■ SYSTEM REQUIREMENTS

- Microsoft® Windows® 95 or Windows® 98
- RS-232C serial port

### ■ ADJUSTMENT SOFTWARE INSTALLATION

- ① Boot up Windows.  
- Quit all applications when Windows is running.
- ② Insert the cloning software CD-ROM into the appropriate CD-ROM drive.
- ③ Select 'Run' from the [Start] menu.
- ④ Type the setup program name using the full path name, then push [Enter] key.  
(For example; D:\Setup.exe)
- ⑤ Follow the prompts.
- ⑥ Program group 'CS-F50 ADJ' appears in the 'Programs' folder of the [Start] menu.

### ■ BEFORE STARTING SOFTWARE ADJUSTMENT

Program the adjustment frequencies, listed in page 5-2, into the transceiver using with the CS-F50 before starting the software adjustment. Otherwise, the transceiver can not start software adjustment.

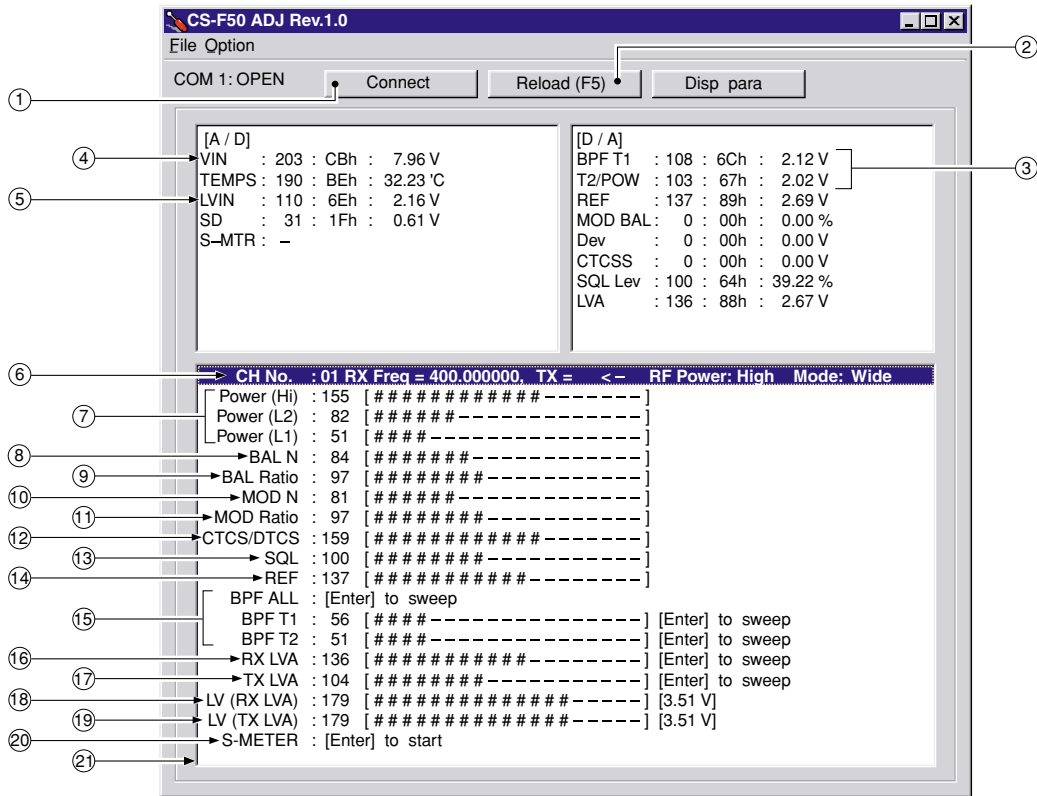
**CAUTION!:** BACK UP the originally programmed memory data in the transceiver before programming the adjustment frequencies. When program the adjustment frequencies into the transceiver, the transceiver's memory data will be overwritten and lose original memory data at the same time.

### ■ STARTING SOFTWARE ADJUSTMENT

- ① Connect IC-F60/F61 and PC with \*OPC-966 JIG CABLE.
- ② Turn the transceiver power ON.
- ③ Boot up Windows, and click the program group 'CS-F50 ADJ' in the 'Programs' folder of the [Start] menu, then CS-F50 ADJ's window appears.
- ④ Click 'Connect' on the CS-F50's window, then appears IC-F60/F61's up-to-date condition.
- 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.

• SCREEN DISPLAY EXAMPLE



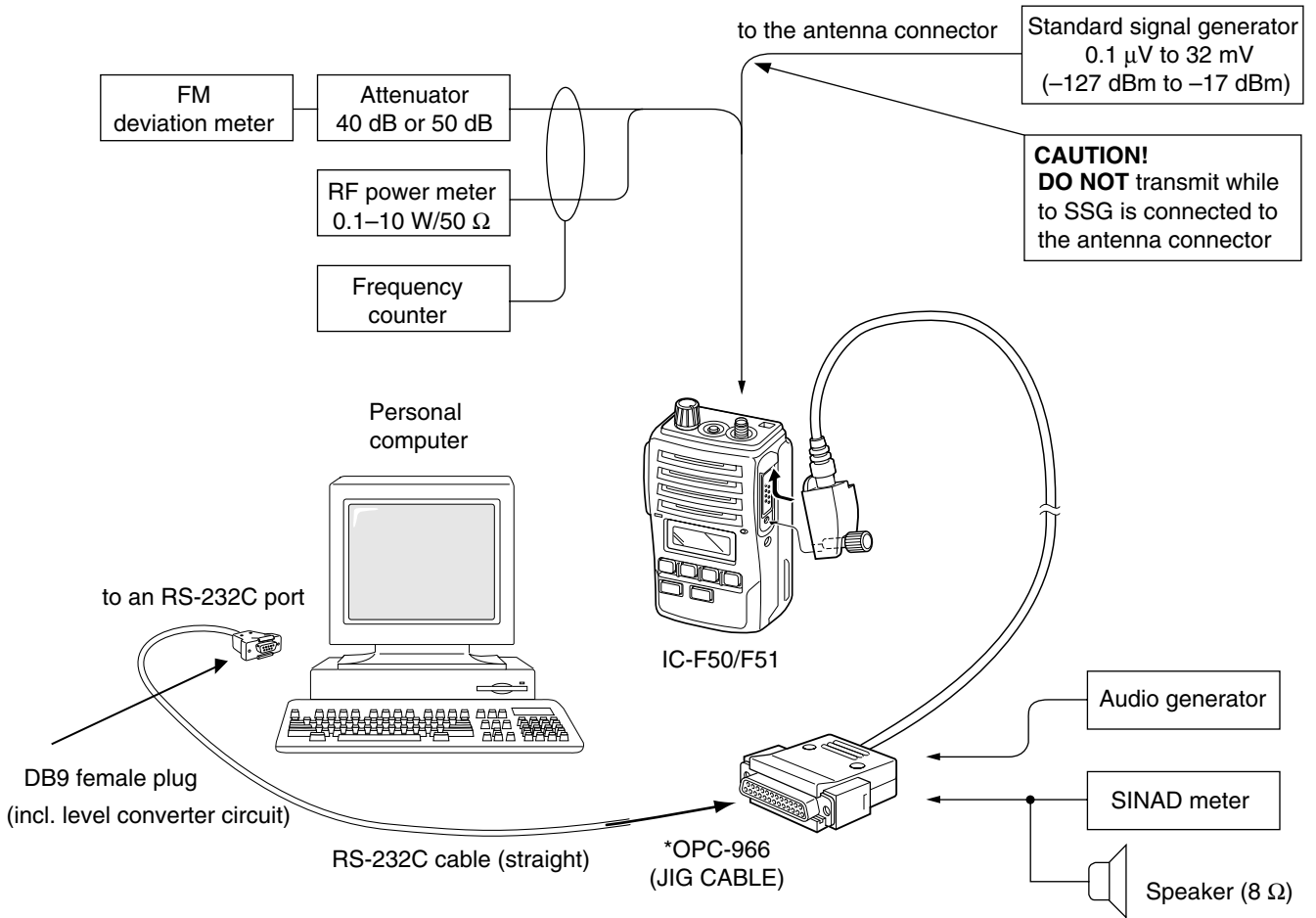
**NOTE:** The above values for settings are example only.  
Each transceiver has its own specific values for each setting.

- ① : Transceiver's connection state
- ② : Reload adjustment data
- ③ : Receive sensitivity measurement
- ④ : Connected DC voltage measurement
- ⑤ : PLL lock voltage measurement
- ⑥ : Operating channel select
- ⑦ : RF output power
- ⑧ : FM deviation balance (Narrow)
- ⑨ : FM deviation balance (Wide)
- ⑩ : FM deviation (Narrow)
- ⑪ : FM deviation (Wide)
- ⑫ : CTCSS/DTCS deviation
- ⑬ : Squelch level
- ⑭ : Reference frequency
- ⑮ : Receive sensitivity (automatically)
- ⑯ : PLL lock voltage for RX (automatically)
- ⑰ : PLL lock voltage for TX (automatically)
- ⑱ : PLL lock voltage for RX (manually)
- ⑲ : PLL lock voltage for TX (manually)
- ⑳ : S-meter
- ㉑ : Adjustment items

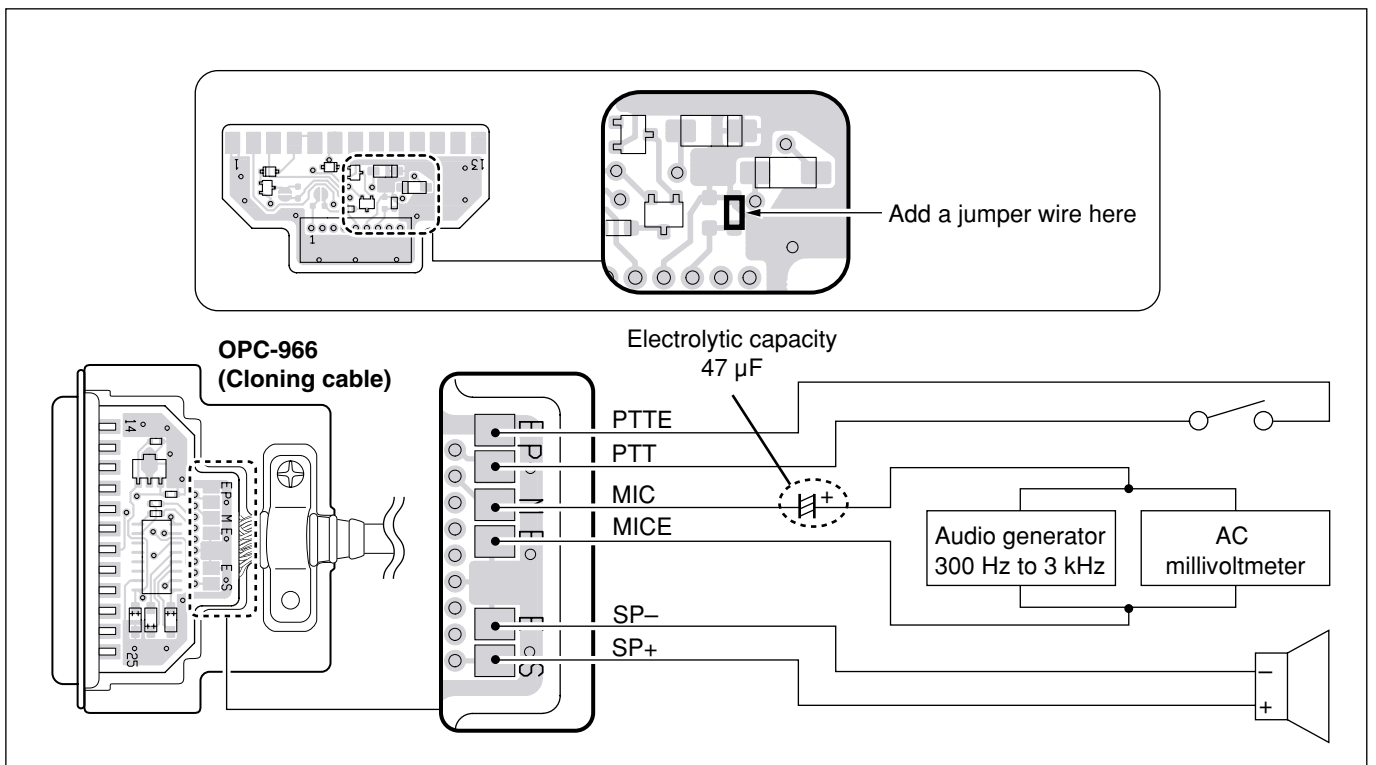
• ADJUSTMENT FREQUENCY LIST

| CH | FREQUENCY   | ADJUSTMENT ITEM     | CH | FREQUENCY   | ADJUSTMENT ITEM     |
|----|-------------|---------------------|----|-------------|---------------------|
| 1  | 174.000 MHz | TX power : Hi       | 7  | 155.000 MHz | TX power : L1       |
| 2  | 174.000 MHz | TX power : L2       |    |             | Band width : Narrow |
| 3  | 174.000 MHz | TX power : L1       | 8  | 155.000 MHz | TX power : L1       |
| 4  | 174.000 MHz | TX power : L1       | 9  | 155.000 MHz | Band width : Middle |
|    |             | DTCS code : 007     |    |             | TX power : L1       |
| 5  | 174.000 MHz | Band width : Narrow | 10 | 155.000 MHz | Band width : Wide   |
|    |             | TX power : L1       |    |             | CTCSS : 151.4 Hz    |
| 6  | 174.000 MHz | DTCS code : 007     | 11 | 136.000 MHz | DTCS code : 007     |
|    |             | Band width : Middle |    |             | Band width : Wide   |
| 6  | 174.000 MHz | TX power : L1       |    |             |                     |
|    |             | DTCS code : 007     |    |             |                     |
|    |             | Band width : Wide   |    |             |                     |

• CONNECTION



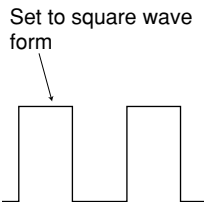
• \*OPC-966 (JIG CABLE)





## 5-2 SOFTWARE ADJUSTMENTS (TRANSMITTING)

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

| ADJUSTMENT                                                                           | ADJUSTMENT CONDITION                                                                                                                                                                                                                                                         | MEASUREMENT |                                                                                                        | VALUE                                                                                 |
|--------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|--------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
|                                                                                      |                                                                                                                                                                                                                                                                              | UNIT        | LOCATION                                                                                               |                                                                                       |
| PLL LOCK VOLTAGE<br>[LV (RX LVA)]<br>[LV (TX LVA)]                                   | 1 • Operating CH : CH3<br>• Receiving                                                                                                                                                                                                                                        | Soft ware   | Check the "LV" item on the CS-F50 ADJ's display.                                                       | 3.5 V                                                                                 |
|                                                                                      | 2 • Operating CH : CH3<br>• Transmitting                                                                                                                                                                                                                                     |             |                                                                                                        | 3.5 V                                                                                 |
|                                                                                      | 3 • Operating CH : CH11<br>• Receiving                                                                                                                                                                                                                                       | Soft ware   | Check the "LV" item on the CS-F50 ADJ's display.<br><br>Connect a digital multimeter to the "LV" line. | 0.9–1.5 V (Verify)                                                                    |
|                                                                                      | 4 • Operating CH : CH11<br>• Transmitting                                                                                                                                                                                                                                    |             |                                                                                                        | 0.9–1.5 V (Verify)                                                                    |
| REFERENCE FREQUENCY [REF]                                                            | 1 • Operating CH : CH3<br>• Connect an RF power meter or 50 Ω dummy load to the antenna connector.<br>• Transmitting                                                                                                                                                         | Top panel   | Loosely couple a frequency counter to the antenna connector.                                           | 174.0000 MHz                                                                          |
| OUTPUT POWER<br>[Power (Hi)]<br>[Power (L2)]<br>[Power (L1)]                         | 1 • Operating CH : CH1<br>• Transmitting                                                                                                                                                                                                                                     | Top panel   | Connect an RF power meter to the antenna connector.                                                    | 5.0 W                                                                                 |
|                                                                                      | 2 • Operating CH : CH2<br>• Transmitting                                                                                                                                                                                                                                     |             |                                                                                                        | 2.0 W                                                                                 |
|                                                                                      | 3 • Operating CH : CH3<br>• Transmitting                                                                                                                                                                                                                                     |             |                                                                                                        | 1.0 W                                                                                 |
| FM DEVIATION<br>[MOD N] (Narrow)<br>[MOD Ratio] (Middle)<br>[MOD Ratio] (Wide)       | 1 • Operating CH : CH7<br>• Set the FM deviation meter as:<br>HPF : OFF<br>LPF : 20 kHz<br>De-emphasis : OFF<br>Detector : (P-P)/2<br>• Connect the audio generator to the multi connector through the JIG cable (*OPC-966) and set as : 1.0 kHz/150 mVrms<br>• Transmitting | Top panel   | Connect an FM deviation meter to the antenna connector through the attenuator.                         | ±2.10 kHz                                                                             |
|                                                                                      | 2 • Operating CH : CH8<br>• Transmitting                                                                                                                                                                                                                                     |             |                                                                                                        | ±3.20 kHz                                                                             |
|                                                                                      | 3 • Operating CH : CH9<br>• Transmitting                                                                                                                                                                                                                                     |             |                                                                                                        | ±4.10 kHz                                                                             |
| MODULATION BALANCE<br>[BAL N] (Narrow)<br>[BAL Ratio] (Middle)<br>[BAL Ratio] (Wide) | 1 • Operating CH : CH4<br>• No audio applied to the [MIC] input.<br>• Set an FM deviation meter as:<br>HPF : OFF<br>LPF : 20 kHz<br>De-emphasis : OFF<br>Detector : (P-P)/2<br>• IF bandwidth : Narrow<br>• Transmitting                                                     |             | Connect an FM deviation meter with an oscilloscope to the antenna connector through an attenuator.     |  |
|                                                                                      | 2 • Operating CH : CH5<br>• Transmitting                                                                                                                                                                                                                                     |             |                                                                                                        |                                                                                       |
|                                                                                      | 3 • Operating CH : CH6<br>• Transmitting                                                                                                                                                                                                                                     |             |                                                                                                        |                                                                                       |
| CTCSS/DTCS DEVIATION [CTCS/DTCS]                                                     | • Operating CH : CH10<br>• No audio applied to the [MIC] input.<br>• Transmitting                                                                                                                                                                                            | Top panel   | Connect an FM deviation meter to the antenna connector through the attenuator.                         | ±0.68 kHz                                                                             |

## SOFTWARE ADJUSTMENTS (RECEIVING)

- Select an operation using [↑] / [↓] keys, then set specified value using [←] / [→] keys on the connected computer keyboard.
- Need to adjust "S-METER ADJUSTMENT" after "RX SENSITIVITY ADJUSTMENT" is adjusted. Otherwise, "S-METER ADJUSTMENT" will not be adjusted properly.

| ADJUSTMENT                              | ADJUSTMENT CONDITION                                                                                                                                                                                                                                                                                                                                                                                  | MEASUREMENT                                                            |                                                                                                        | VALUE                                                                                                            |
|-----------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------|
|                                         |                                                                                                                                                                                                                                                                                                                                                                                                       | UNIT                                                                   | LOCATION                                                                                               |                                                                                                                  |
| RX SENSITIVITY<br>[BPF T1],<br>[BPF T2] | 1 <ul style="list-style-type: none"> <li>• Operating CH : CH11</li> <li>• Connect a standard signal generator to the antenna connector and set as:               <ul style="list-style-type: none"> <li>Frequency : 136.000 MHz</li> <li>Level : 10 <math>\mu</math>V* (-87 dBm)</li> <li>Modulation : 1 kHz</li> <li>Deviation : <math>\pm</math>3.5 kHz</li> </ul> </li> <li>• Receiving</li> </ul> | MAIN                                                                   | Connect a SINAD meter with an 8 $\Omega$ load to the multi connector through the JIG cable (*OPC-966). | Minimum distortion level                                                                                         |
|                                         | <b>CONVENIENT:</b><br>The BPF T1, BPF T2 can be adjusted automatically.<br>①-1: Set the cursor to "BPF ALL" on the adjustment program and then push [ENTER] key.<br>①-2: The connected PC tunes BPF T1, BPF T2 to peak levels.<br>or<br>②-1: Set the cursor to one of BPF T1, T2 as desired.<br>②-2: Push [ENTER] key to start tuning.<br>②-3: Repeat ②-1 and ②-2 to perform additional BPF tuning.   |                                                                        |                                                                                                        |                                                                                                                  |
| S-METER<br>[S-METER]                    | 1 <ul style="list-style-type: none"> <li>• Operating CH : CH11</li> <li>• Connect an SSG to the antenna connector and set as:               <ul style="list-style-type: none"> <li>Frequency : 136.000 MHz</li> <li>Level : 4.5 <math>\mu</math>V* (-94 dBm)</li> <li>Modulation : 1 kHz</li> <li>Deviation : <math>\pm</math>3.5 kHz</li> </ul> </li> <li>• Receiving</li> </ul>                     | Push [ENTER] key on the connected computer keyboard to set "S6 level". |                                                                                                        |                                                                                                                  |
|                                         | 2 <ul style="list-style-type: none"> <li>• Set an SSG as :               <ul style="list-style-type: none"> <li>Level : 0.25 <math>\mu</math>V* (-119 dBm)</li> <li>Modulation : 1 kHz</li> <li>Deviation : <math>\pm</math>3.5 kHz</li> </ul> </li> <li>• Receiving</li> </ul>                                                                                                                       | Push [ENTER] key on the connected computer keyboard to set "S1 level". |                                                                                                        |                                                                                                                  |
| SQUELCH LEVEL<br>[SQL]                  | 1 <ul style="list-style-type: none"> <li>• Operating CH : CH9</li> <li>• Connect an SSG to the antenna connector and set as:               <ul style="list-style-type: none"> <li>Frequency : 155.000 MHz</li> <li>Level : 0.18 <math>\mu</math>V* (-122 dBm)</li> <li>Modulation : 1 kHz</li> <li>Deviation : <math>\pm</math>3.5 kHz</li> </ul> </li> <li>• Receiving</li> </ul>                    | Front panel                                                            | Internal speaker                                                                                       | Set "SQL level" to close squelch.<br><br>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.

# SECTION 6 PARTS LIST

## [VR BOARD]

| REF NO. | ORDER NO.  | DESCRIPTION |                        | M. |
|---------|------------|-------------|------------------------|----|
| R601    | 7210003130 | VARIABLE    | TP76N97N-13F-10KA-2497 | T  |
| W601    | 8900012340 | CABLE       | OPC-1260               | T  |
| EP601   | 0910056532 | PCB         | B 6034B                |    |

## [CONNECTOR BOARD]

| REF NO. | ORDER NO.  | DESCRIPTION |                    | M. |
|---------|------------|-------------|--------------------|----|
| D701    | 1790001810 | S.VARISTOR  | AVR-M1005C080MTABB | B  |
| D702    | 1790001810 | S.VARISTOR  | AVR-M1005C080MTABB | B  |
| D703    | 1790001810 | S.VARISTOR  | AVR-M1005C080MTABB | B  |
| D704    | 1790001810 | S.VARISTOR  | AVR-M1005C080MTABB | B  |
| D705    | 1790001810 | S.VARISTOR  | AVR-M1005C080MTABB | B  |
| R701    | 7410001130 | S.ARRAY     | EXB28V102JX        | T  |
| C701    | 4030017460 | S.CERAMIC   | ECJ0EB1E102K       | B  |
| C702    | 4030017460 | S.CERAMIC   | ECJ0EB1E102K       | B  |
| C703    | 4030017460 | S.CERAMIC   | ECJ0EB1E102K       | B  |
| C704    | 4030017460 | S.CERAMIC   | ECJ0EB1E102K       | B  |
| EP701   | 6910012350 | S.BEAD      | MMZ1608Y 102BT     | B  |
| EP702   | 6910012350 | S.BEAD      | MMZ1608Y 102BT     | B  |
| EP703   | 6910012350 | S.BEAD      | MMZ1608Y 102BT     | B  |
| EP704   | 6910012350 | S.BEAD      | MMZ1608Y 102BT     | B  |
| EP705   | 6910012350 | S.BEAD      | MMZ1608Y 102BT     | B  |
| EP706   | 0910056523 | PCB         | B 6035C            |    |

## [FRONT UNIT]

| REF NO. | ORDER NO.  | DESCRIPTION  |                           | M. |
|---------|------------|--------------|---------------------------|----|
| IC401   | 1140011780 | S.IC         | HD6432264F01TF (FX-2681A) | T  |
| IC403   | 1110005340 | S.IC         | NUM12902V-TE1             | T  |
| IC405   | 1110001810 | S.IC         | TA7368F (ER)              | T  |
| IC406   | 1130011740 | S.IC         | TC7W66FK (TE85L)          | T  |
| IC407   | 1110005330 | S.IC         | NUM12904V-TE1             | T  |
| IC408   | 1110006260 | S.IC         | BD5242G-TR                | T  |
| IC409   | 1130011580 | S.IC         | 24LC64T-I/SN              | T  |
| IC410   | 1130007570 | S.IC         | BU4094BCFV-E2             | T  |
| Q401    | 1520000450 | S.TRANSISTOR | 2SB1132 T100 Q            | T  |
| Q402    | 1590001190 | S.TRANSISTOR | XP6501-(TX) .AB           | T  |
| Q403    | 1530002840 | S.TRANSISTOR | 2SC4116-Y (TE85R)         | B  |
| Q404    | 1560001330 | S.FET        | RSR025N03                 | B  |
| Q405    | 1560001330 | S.FET        | RSR025N03                 | B  |
| Q406    | 1590000430 | S.TRANSISTOR | DTC144EUA T106            | B  |
| Q407    | 1590000720 | S.TRANSISTOR | DTA144EUA T106            | T  |
| Q408    | 1590000430 | S.TRANSISTOR | DTC144EUA T106            | T  |
| Q409    | 1590002370 | S.TRANSISTOR | XP4111 (TX)               | T  |
| Q411    | 1590001660 | S.TRANSISTOR | XP4312 (TX)               | T  |
| Q412    | 1590000720 | S.TRANSISTOR | DTA144EUA T106            | T  |
| Q413    | 1560001330 | S.FET        | RSR025N03                 | B  |
| D401    | 1790001250 | S.DIODE      | MA2S111-(TX)              | T  |
| D402    | 1790001250 | S.DIODE      | MA2S111-(TX)              | T  |
| D403    | 1790001250 | S.DIODE      | MA2S111-(TX)              | T  |
| D404    | 1790001260 | S.DIODE      | MA2S077-(TX)              | T  |
| D405    | 1730002360 | S.ZENER      | MA8062-M (TX)             | T  |
| D406    | 1790001250 | S.DIODE      | MA2S111-(TX)              | T  |

## [FRONT UNIT]

| REF NO. | ORDER NO.  | DESCRIPTION |                        | M. |
|---------|------------|-------------|------------------------|----|
| X401    | 6050011720 | S.XTAL      | CR-764 (19.6608 MHz)   | T  |
| R401    | 7030005220 | S.RESISTOR  | ERJ2GEJ 223 X (22 kΩ)  | T  |
| R402    | 7030005060 | S.RESISTOR  | ERJ2GEJ 333 X (33 kΩ)  | T  |
| R403    | 7030005120 | S.RESISTOR  | ERJ2GEJ 102 X (1 kΩ)   | T  |
| R404    | 7030005120 | S.RESISTOR  | ERJ2GEJ 102 X (1 kΩ)   | T  |
| R405    | 7030007340 | S.RESISTOR  | ERJ2GEJ 153 X (15 kΩ)  | T  |
| R406    | 7030005210 | S.RESISTOR  | ERJ2GEJ 822 X (8.2 kΩ) | T  |
| R407    | 7030005230 | S.RESISTOR  | ERJ2GEJ 334 X (330 kΩ) | T  |
| R408    | 7030005090 | S.RESISTOR  | ERJ2GEJ 104 X (100 kΩ) | T  |
| R409    | 7030005090 | S.RESISTOR  | ERJ2GEJ 104 X (100 kΩ) | T  |
| R410    | 7030005090 | S.RESISTOR  | ERJ2GEJ 104 X (100 kΩ) | T  |
| R411    | 7030005090 | S.RESISTOR  | ERJ2GEJ 104 X (100 kΩ) | T  |
| R412    | 7030005090 | S.RESISTOR  | ERJ2GEJ 104 X (100 kΩ) | T  |
| R413    | 7030005600 | S.RESISTOR  | ERJ2GEJ 273 X (27 kΩ)  | T  |
| R414    | 7030005600 | S.RESISTOR  | ERJ2GEJ 273 X (27 kΩ)  | T  |
| R415    | 7030005100 | S.RESISTOR  | ERJ2GEJ 154 X (150 kΩ) | T  |
| R416    | 7030005100 | S.RESISTOR  | ERJ2GEJ 154 X (150 kΩ) | T  |
| R417    | 7030005170 | S.RESISTOR  | ERJ2GEJ 474 X (470 kΩ) | T  |
| R418    | 7030005170 | S.RESISTOR  | ERJ2GEJ 474 X (470 kΩ) | T  |
| R420    | 7030005600 | S.RESISTOR  | ERJ2GEJ 273 X (27 kΩ)  | T  |
| R421    | 7030005090 | S.RESISTOR  | ERJ2GEJ 104 X (100 kΩ) | T  |
| R422    | 7030005090 | S.RESISTOR  | ERJ2GEJ 104 X (100 kΩ) | T  |
| R423    | 7030005090 | S.RESISTOR  | ERJ2GEJ 104 X (100 kΩ) | T  |
| R426    | 7030005230 | S.RESISTOR  | ERJ2GEJ 334 X (330 kΩ) | T  |
| R427    | 7030005240 | S.RESISTOR  | ERJ2GEJ 473 X (47 kΩ)  | T  |
| R428    | 7030005240 | S.RESISTOR  | ERJ2GEJ 473 X (47 kΩ)  | T  |
| R429    | 7030005040 | S.RESISTOR  | ERJ2GEJ 472 X (4.7 kΩ) | T  |
| R430    | 7030007350 | S.RESISTOR  | ERJ2GEJ 393 X (39 kΩ)  | T  |
| R432    | 7030005720 | S.RESISTOR  | ERJ2GEJ 563 X (56 kΩ)  | T  |
| R433    | 7030005090 | S.RESISTOR  | ERJ2GEJ 104 X (100 kΩ) | T  |
| R434    | 7030005000 | S.RESISTOR  | ERJ2GEJ 471 X (470 Ω)  | B  |
| R435    | 7030007260 | S.RESISTOR  | ERJ2GEJ 330 X (33 Ω)   | T  |
| R436    | 7030005530 | S.RESISTOR  | ERJ2GEJ 100 X (10 Ω)   | T  |
| R437    | 7030005120 | S.RESISTOR  | ERJ2GEJ 102 X (1 kΩ)   | T  |
| R438    | 7030007300 | S.RESISTOR  | ERJ2GEJ 332 X (3.3 kΩ) | T  |
| R439    | 7030009140 | S.RESISTOR  | ERJ2GEJ 272 X (2.7 kΩ) | T  |
| R440    | 7030005090 | S.RESISTOR  | ERJ2GEJ 104 X (100 kΩ) | T  |
| R441    | 7030005070 | S.RESISTOR  | ERJ2GEJ 683 X (68 kΩ)  | T  |
| R442    | 7030005170 | S.RESISTOR  | ERJ2GEJ 474 X (470 kΩ) | B  |
| R443    | 7030005170 | S.RESISTOR  | ERJ2GEJ 474 X (470 kΩ) | B  |
| R444    | 7030005090 | S.RESISTOR  | ERJ2GEJ 104 X (100 kΩ) | B  |
| R445    | 7030004980 | S.RESISTOR  | ERJ2GEJ 101 X (100 Ω)  | B  |
| R446    | 7030005090 | S.RESISTOR  | ERJ2GEJ 104 X (100 kΩ) | B  |
| R455    | 7030005000 | S.RESISTOR  | ERJ2GEJ 471 X (470 Ω)  | T  |
| R456    | 7030004980 | S.RESISTOR  | ERJ2GEJ 101 X (100 Ω)  | T  |
| R457    | 7030005000 | S.RESISTOR  | ERJ2GEJ 471 X (470 Ω)  | B  |
| R458    | 7030005120 | S.RESISTOR  | ERJ2GEJ 102 X (1 kΩ)   | B  |
| R461    | 7030008300 | S.RESISTOR  | ERJ2GEJ 184 X (180 kΩ) | T  |
| R462    | 7030005720 | S.RESISTOR  | ERJ2GEJ 563 X (56 kΩ)  | T  |
| R463    | 7030005220 | S.RESISTOR  | ERJ2GEJ 223 X (22 kΩ)  | T  |
| R464    | 7030005220 | S.RESISTOR  | ERJ2GEJ 223 X (22 kΩ)  | T  |
| R465    | 7030005050 | S.RESISTOR  | ERJ2GEJ 103 X (10 kΩ)  | T  |
| R466    | 7030005240 | S.RESISTOR  | ERJ2GEJ 473 X (47 kΩ)  | T  |
| R467    | 7030005240 | S.RESISTOR  | ERJ2GEJ 473 X (47 kΩ)  | T  |
| R468    | 7030005240 | S.RESISTOR  | ERJ2GEJ 473 X (47 kΩ)  | T  |
| R469    | 7030005040 | S.RESISTOR  | ERJ2GEJ 472 X (4.7 kΩ) | T  |
| R470    | 7030005240 | S.RESISTOR  | ERJ2GEJ 473 X (47 kΩ)  | T  |
| R471    | 7030005110 | S.RESISTOR  | ERJ2GEJ 224 X (220 kΩ) | T  |
| R472    | 7030005090 | S.RESISTOR  | ERJ2GEJ 104 X (100 kΩ) | T  |
| R473    | 7030005240 | S.RESISTOR  | ERJ2GEJ 473 X (47 kΩ)  | T  |
| R474    | 7030005220 | S.RESISTOR  | ERJ2GEJ 223 X (22 kΩ)  | T  |
| R475    | 7030005050 | S.RESISTOR  | ERJ2GEJ 103 X (10 kΩ)  | T  |
| R476    | 7030005070 | S.RESISTOR  | ERJ2GEJ 683 X (68 kΩ)  | T  |
| R477    | 7030005070 | S.RESISTOR  | ERJ2GEJ 683 X (68 kΩ)  | T  |
| R478    | 7030005070 | S.RESISTOR  | ERJ2GEJ 683 X (68 kΩ)  | T  |
| R479    | 7030005070 | S.RESISTOR  | ERJ2GEJ 683 X (68 kΩ)  | T  |
| R480    | 7030005070 | S.RESISTOR  | ERJ2GEJ 683 X (68 kΩ)  | T  |
| R482    | 7030005090 | S.RESISTOR  | ERJ2GEJ 104 X (100 kΩ) | T  |
| R483    | 7030005090 | S.RESISTOR  | ERJ2GEJ 104 X (100 kΩ) | T  |
| R484    | 7030005090 | S.RESISTOR  | ERJ2GEJ 104 X (100 kΩ) | T  |
| R485    | 7030005090 | S.RESISTOR  | ERJ2GEJ 104 X (100 kΩ) | T  |
| R486    | 7410001130 | S.ARRAY     | EXB28V102JX            | T  |
| R487    | 7030005090 | S.RESISTOR  | ERJ2GEJ 104 X (100 kΩ) | T  |
| R488    | 7030005090 | S.RESISTOR  | ERJ2GEJ 104 X (100 kΩ) | T  |
| R489    | 7030005090 | S.RESISTOR  | ERJ2GEJ 104 X (100 kΩ) | T  |
| R490    | 7030005090 | S.RESISTOR  | ERJ2GEJ 104 X (100 kΩ) | T  |
| R491    | 7030005530 | S.RESISTOR  | ERJ2GEJ 100 X (10 Ω)   | T  |
| R492    | 7030005160 | S.RESISTOR  | ERJ2GEJ 105 X (1 MΩ)   | T  |
| R493    | 7030008010 | S.RESISTOR  | ERJ2GEJ 123 X (12 kΩ)  | T  |

Ⓐ: The scrambler IC is installed type. Ⓑ: The scrambler IC is not installed type.

S.=Surface mount

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

[FRONT UNIT]

| REF NO. | ORDER NO.  | DESCRIPTION |                        | M. |
|---------|------------|-------------|------------------------|----|
| R494    | 7030008010 | S.RESISTOR  | ERJ2GEJ 123 X (12 kΩ)  | T  |
| R495    | 7030008010 | S.RESISTOR  | ERJ2GEJ 123 X (12 kΩ)  | T  |
| R496    | 7030005050 | S.RESISTOR  | ERJ2GEJ 103 X (10 kΩ)  | T  |
| R497    | 7030005050 | S.RESISTOR  | ERJ2GEJ 103 X (10 kΩ)  | T  |
| R500    | 7030005090 | S.RESISTOR  | ERJ2GEJ 104 X (100 kΩ) | T  |
| R501    | 7030005090 | S.RESISTOR  | ERJ2GEJ 104 X (100 kΩ) | T  |
| R502    | 7030010080 | S.RESISTOR  | ERJ2RHD 104 X (100 kΩ) | T  |
| R503    | 7030010080 | S.RESISTOR  | ERJ2RHD 104 X (100 kΩ) | T  |
| R506    | 7030007300 | S.RESISTOR  | ERJ2GEJ 332 X (3.3 kΩ) | T  |
| R507    | 7030005600 | S.RESISTOR  | ERJ2GEJ 273 X (27 kΩ)  | T  |
| R508    | 7030007290 | S.RESISTOR  | ERJ2GEJ 222 X (2.2 kΩ) | T  |
| R509    | 7030005090 | S.RESISTOR  | ERJ2GEJ 104 X (100 kΩ) | T  |
| R511    | 7030005700 | S.RESISTOR  | ERJ2GEJ 274 X (270 kΩ) | T  |
| R512    | 7030005090 | S.RESISTOR  | ERJ2GEJ 104 X (100 kΩ) | T  |
| R513    | 7030009290 | S.RESISTOR  | ERJ2GEJ 562 X (5.6 kΩ) | T  |
| R514    | 7030010040 | S.RESISTOR  | ERJ2GE-JPW             | T  |
| C401    | 4030017460 | S.CERAMIC   | ECJ0EB1E102K           | T  |
| C402    | 4030017460 | S.CERAMIC   | ECJ0EB1E102K           | T  |
| C403    | 4030017460 | S.CERAMIC   | ECJ0EB1E102K           | T  |
| C404    | 4030017460 | S.CERAMIC   | ECJ0EB1E102K           | T  |
| C405    | 4030017760 | S.CERAMIC   | ECJ0EB1H222K           | T  |
| C406    | 4030018110 | S.CERAMIC   | ECJ0EB1H272K           | T  |
| C407    | 4030017430 | S.CERAMIC   | ECJ0EC1H101J           | T  |
| C408    | 4030016930 | S.CERAMIC   | ECJ0EB1A104K           | T  |
| C409    | 4030016930 | S.CERAMIC   | ECJ0EB1A104K           | T  |
| C410    | 4030016930 | S.CERAMIC   | ECJ0EB1A104K           | T  |
| C411    | 4030016930 | S.CERAMIC   | ECJ0EB1A104K           | T  |
| C412    | 4030016930 | S.CERAMIC   | ECJ0EB1A104K           | T  |
| C413    | 4030017730 | S.CERAMIC   | ECJ0EB1E471K           | T  |
| C414    | 4030017640 | S.CERAMIC   | ECJ0EC1H150J           | T  |
| C415    | 4030016790 | S.CERAMIC   | ECJ0EB1C103K           | T  |
| C416    | 4030017630 | S.CERAMIC   | ECJ0EC1H120J           | T  |
| C417    | 4030017580 | S.CERAMIC   | ECJ0EC1H060C           | T  |
| C418    | 4030016930 | S.CERAMIC   | ECJ0EB1A104K           | T  |
| C419    | 4550006250 | S.TANTALUM  | TEESVA 1A 106M8L       | T  |
| C420    | 4030016930 | S.CERAMIC   | ECJ0EB1A104K           | T  |
| C421    | 4030016930 | S.CERAMIC   | ECJ0EB1A104K           | T  |
| C423    | 4030016930 | S.CERAMIC   | ECJ0EB1A104K           | T  |
| C424    | 4030017460 | S.CERAMIC   | ECJ0EB1E102K           | T  |
| C425    | 4030017730 | S.CERAMIC   | ECJ0EB1E471K           | T  |
| C426    | 4030017460 | S.CERAMIC   | ECJ0EB1E102K           | B  |
| C427    | 4550006080 | S.TANTALUM  | TEESVB2 1C 106M8L      | T  |
| C428    | 4030016930 | S.CERAMIC   | ECJ0EB1A104K           | T  |
| C429    | 4030017460 | S.CERAMIC   | ECJ0EB1E102K           | T  |
| C430    | 4030017460 | S.CERAMIC   | ECJ0EB1E102K           | T  |
| C431    | 4030016930 | S.CERAMIC   | ECJ0EB1A104K           | T  |
| C432    | 4030017460 | S.CERAMIC   | ECJ0EB1E102K           | T  |
| C433    | 4030017420 | S.CERAMIC   | ECJ0EC1H470J           | B  |
| C434    | 4550006250 | S.TANTALUM  | TEESVA 1A 106M8L       | T  |
| C435    | 4550007060 | S.TANTALUM  | ECSTIAX336R            | T  |
| C436    | 4030016950 | S.CERAMIC   | ECJ0EB1A473K           | T  |
| C437    | 4030017490 | S.CERAMIC   | C1608 JB 1A 105K-T     | B  |
| C441    | 4030016780 | S.CERAMIC   | ECJ0EB1C153K           | T  |
| C442    | 4030016930 | S.CERAMIC   | ECJ0EB1A104K           | T  |
| C443    | 4030017740 | S.CERAMIC   | ECJ0EB1E821K           | T  |
| C444    | 4030016930 | S.CERAMIC   | ECJ0EB1A104K           | T  |
| C445    | 4030017460 | S.CERAMIC   | ECJ0EB1E102K           | T  |
| C446    | 4030017460 | S.CERAMIC   | ECJ0EB1E102K           | T  |
| C447    | 4030017760 | S.CERAMIC   | ECJ0EB1H222K           | T  |
| C448    | 4030017690 | S.CERAMIC   | ECJ0EC1H121J           | T  |
| C449    | 4030017770 | S.CERAMIC   | ECJ0EB1E332K           | T  |
| C450    | 4030017420 | S.CERAMIC   | ECJ0EC1H470J           | T  |
| C461    | 4030017420 | S.CERAMIC   | ECJ0EC1H470J           | T  |
| C462    | 4030017420 | S.CERAMIC   | ECJ0EC1H470J           | T  |
| C463    | 4030017420 | S.CERAMIC   | ECJ0EC1H470J           | T  |
| C464    | 4030017420 | S.CERAMIC   | ECJ0EC1H470J           | T  |
| C465    | 4030017420 | S.CERAMIC   | ECJ0EC1H470J           | T  |
| C466    | 4030017420 | S.CERAMIC   | ECJ0EC1H470J           | T  |
| C467    | 4030017420 | S.CERAMIC   | ECJ0EC1H470J           | T  |
| C468    | 4030017420 | S.CERAMIC   | ECJ0EC1H470J           | T  |
| C473    | 4030016790 | S.CERAMIC   | ECJ0EB1C103K           | T  |
| C474    | 4030017490 | S.CERAMIC   | C1608 JB 1A 105K-T     | T  |
| C475    | 4030017460 | S.CERAMIC   | ECJ0EB1E102K           | T  |
| C476    | 4030017460 | S.CERAMIC   | ECJ0EB1E102K           | T  |
| C477    | 4030017460 | S.CERAMIC   | ECJ0EB1E102K           | T  |
| C478    | 4030017460 | S.CERAMIC   | ECJ0EB1E102K           | T  |
| C479    | 4030017460 | S.CERAMIC   | ECJ0EB1E102K           | T  |
| C481    | 4030017460 | S.CERAMIC   | ECJ0EB1E102K           | T  |
| C482    | 4030017460 | S.CERAMIC   | ECJ0EB1E102K           | T  |
| C483    | 4030017460 | S.CERAMIC   | ECJ0EB1E102K           | T  |
| C484    | 4030017460 | S.CERAMIC   | ECJ0EB1E102K           | B  |
| C485    | 4030017460 | S.CERAMIC   | ECJ0EB1E102K           | B  |
| C486    | 4030017460 | S.CERAMIC   | ECJ0EB1E102K           | T  |
| C487    | 4030017460 | S.CERAMIC   | ECJ0EB1E102K           | T  |
| C488    | 4030017460 | S.CERAMIC   | ECJ0EB1E102K           | T  |
| C489    | 4030017460 | S.CERAMIC   | ECJ0EB1E102K           | T  |

[FRONT UNIT]

| REF NO. | ORDER NO.  | DESCRIPTION |                            | M. |
|---------|------------|-------------|----------------------------|----|
| C490    | 4030017460 | S.CERAMIC   | ECJ0EB1E102K               | T  |
| C491    | 4030017460 | S.CERAMIC   | ECJ0EB1E102K               | T  |
| C492    | 4030017460 | S.CERAMIC   | ECJ0EB1E102K               | T  |
| C493    | 4030016930 | S.CERAMIC   | ECJ0EB1A104K               | T  |
| C494    | 4030017460 | S.CERAMIC   | ECJ0EB1E102K               | T  |
| C495    | 4030017460 | S.CERAMIC   | ECJ0EB1E102K               | T  |
| C496    | 4550007060 | S.TANTALUM  | ECSTIAX336R                | T  |
| C497    | 4030016790 | S.CERAMIC   | ECJ0EB1C103K               | T  |
| C498    | 4030017430 | S.CERAMIC   | ECJ0EC1H101J               | T  |
| C499    | 4030017420 | S.CERAMIC   | ECJ0EC1H470J               | T  |
| C500    | 4030016930 | S.CERAMIC   | ECJ0EB1A104K               | B  |
| J401    | 6510023520 | S.CONNECTOR | 54104-3692                 | T  |
| J402    | 6510023830 | S.CONNECTOR | SM04B-SRSS-TB              | T  |
| DS401   | 5030002630 | LCD         | L3-0048TAY-2               | B  |
| DS402   | 5040002420 | S.LED       | SML-310MT T86              | B  |
| DS403   | 5040002420 | S.LED       | SML-310MT T86              | B  |
| DS404   | 5040002960 | S.LED       | SML-A12MT T86              | B  |
| DS405   | 5040002960 | S.LED       | SML-A12MT T86              | B  |
| DS406   | 5040002670 | S.LED       | CL-165HR/YG                | B  |
| MC401   | 7700002480 | MICROPHONE  | SKB-2746 LPC               | B  |
| S401    | 2260002840 | SWITCH      | SKHLLFA010                 | T  |
| SP401   | 2510001092 | SPEAKER     | 036D0801B <FG>             | T  |
| W401    | 8900011880 | CABLE       | OPC-1210 (P=0.5 N=36 L=70) | T  |
| W402    | 7120000470 | JUMPER      | ERDS2T0                    | T  |
| W403    | 7120000470 | JUMPER      | ERDS2T0                    | T  |
| EP401   | 0910056543 | PCB         | B 6033C                    |    |
| EP402   | 8930061530 | LCD CONTACT | SRCN-2681-SP-N-W           | B  |

[MAIN UNIT]

| REF NO. | ORDER NO.  | DESCRIPTION  |                      | M. |
|---------|------------|--------------|----------------------|----|
| IC1     | 1110003200 | S.IC         | TA31136FN (EL)       | B  |
| IC2     | 1110002750 | S.IC         | TA75S01F (TE85R)     | T  |
| IC4     | 1140005990 | S.IC         | MB15A02PFV1-G-BND-ER | T  |
| IC5     | 1110005340 | S.IC         | NJM12902V-TE1        | B  |
| IC6     | 1190000350 | S.IC         | M62363FP-650C        | T  |
| IC7     | 1190001860 | S.IC         | EW-460-FT            | T  |
| IC9     | 1110005350 | S.IC         | NJM2870F05-TE1       | B  |
| IC10    | 1110006220 | S.IC         | AK2346-E2            | T  |
| IC11    | 1130006220 | S.IC         | TC4W53FU (TE12L)     | T  |
| IC12    | 1130007570 | S.IC         | BU4094BCFV-E2        | T  |
| IC13    | 1130008090 | S.IC         | BU4066BCFV-E1        | T  |
| IC14    | 1110004990 | S.IC         | FX214LG/TR           | B  |
| IC15    | 1130007990 | S.IC         | TC3W03FU (TE12L)     | B  |
| IC16    | 1110005330 | S.IC         | NJM12904V-TE1        | T  |
| IC17    | 1130004200 | S.IC         | TC4S66F (TE85R)      | T  |
| Q1      | 1560000840 | S.FET        | 2SK1829 (TE85R)      | T  |
| Q2      | 1580000730 | S.FET        | 3SK293 (TE85L)       | T  |
| Q3      | 1580000760 | S.FET        | 3SK299-T1 U73        | B  |
| Q4      | 1530002600 | S.TRANSISTOR | 2SC4215-O (TE85R)    | B  |
| Q7      | 1560001230 | S.FET        | RD07MVS1             | T  |
| Q8      | 1560001240 | S.FET        | RD01MUS1             | T  |
| Q9      | 1530003420 | S.TRANSISTOR | 2SC5110-O (TE85R)    | B  |
| Q10     | 1530003310 | S.TRANSISTOR | 2SC5107-O (TE85R)    | B  |
| Q11     | 1530003310 | S.TRANSISTOR | 2SC5107-O (TE85R)    | B  |
| Q12     | 1530003310 | S.TRANSISTOR | 2SC5107-O (TE85R)    | T  |
| Q13     | 1530002920 | S.TRANSISTOR | 2SC4226-T1 R25       | B  |
| Q14     | 1530002920 | S.TRANSISTOR | 2SC4226-T1 R25       | B  |
| Q15     | 1590001400 | S.TRANSISTOR | XP1214 (TX)          | T  |
| Q16     | 1590000430 | S.TRANSISTOR | DTC144EUA T106       | T  |
| Q17     | 1530002850 | S.TRANSISTOR | 2SC4116-BL (TE85R)   | T  |
| Q18     | 1560000540 | S.FET        | 2SK880-Y (TE85R)     | T  |
| Q19     | 1530002850 | S.TRANSISTOR | 2SC4116-BL (TE85R)   | B  |
| Q21     | 1510000920 | S.TRANSISTOR | 2SA1577 T106 Q       | B  |
| Q22     | 1510000920 | S.TRANSISTOR | 2SA1577 T106 Q       | B  |

(A): The scrambler IC is installed type. (B): The scrambler IC is not installed type.

S.=Surface mount

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





**[MAIN UNIT]**

| REF NO. | ORDER NO.  | DESCRIPTION                  | M. |
|---------|------------|------------------------------|----|
| C117    | 4030017730 | S.CERAMIC ECJ0EB1E471K       | B  |
| C118    | 4030017530 | S.CERAMIC ECJ0EC1H0R5B       | B  |
| C119    | 4030017460 | S.CERAMIC ECJ0EB1E102K       | B  |
| C120    | 4030017730 | S.CERAMIC ECJ0EB1E471K       | B  |
| C121    | 4030017390 | S.CERAMIC ECJ0EC1H180J       | B  |
| C122    | 4030017660 | S.CERAMIC ECJ0EC1H330J       | B  |
| C123    | 4030017510 | S.CERAMIC ECJ0EC1H680J       | B  |
| C124    | 4030017440 | S.CERAMIC ECJ0EC1H221J       | B  |
| C126    | 4030017660 | S.CERAMIC ECJ0EC1H330J       | B  |
| C127    | 4030017420 | S.CERAMIC ECJ0EC1H470J       | B  |
| C129    | 4030017340 | S.CERAMIC ECJ0EC1H010B       | B  |
| C132    | 4030016930 | S.CERAMIC ECJ0EB1A104K       | B  |
| C133    | 4030017400 | S.CERAMIC ECJ0EC1H220J       | B  |
| C134    | 4030017660 | S.CERAMIC ECJ0EC1H330J       | B  |
| C135    | 4030017460 | S.CERAMIC ECJ0EB1E102K       | B  |
| C137    | 4030016790 | S.CERAMIC ECJ0EB1C103K       | B  |
| C138    | 4030017420 | S.CERAMIC ECJ0EC1H470J       | T  |
| C139    | 4030016930 | S.CERAMIC ECJ0EB1A104K       | B  |
| C140    | 4030016930 | S.CERAMIC ECJ0EB1A104K       | T  |
| C141    | 4030017460 | S.CERAMIC ECJ0EB1E102K       | T  |
| C143    | 4030017460 | S.CERAMIC ECJ0EB1E102K       | T  |
| C145    | 4030017730 | S.CERAMIC ECJ0EB1E471K       | T  |
| C146    | 4550000530 | S.TANTALUM TEESVA 1V 104M8L  | T  |
| C147    | 4550006390 | S.TANTALUM TEESVA 1C 335M8L  | T  |
| C148    | 4550006250 | S.TANTALUM TEESVA 1A 106M8L  | B  |
| C149    | 4550000270 | S.TANTALUM TEESVA 1E 474M8L  | B  |
| C150    | 4030017490 | S.CERAMIC C1608 JB 1A 105K-T | T  |
| C151    | 4030016930 | S.CERAMIC ECJ0EB1A104K       | B  |
| C152    | 4030017420 | S.CERAMIC ECJ0EC1H470J       | B  |
| C153    | 4030017420 | S.CERAMIC ECJ0EC1H470J       | B  |
| C154    | 4030017420 | S.CERAMIC ECJ0EC1H470J       | B  |
| C155    | 4030017450 | S.CERAMIC ECJ0EB1E271K       | B  |
| C156    | 4030017460 | S.CERAMIC ECJ0EB1E102K       | B  |
| C157    | 4030017620 | S.CERAMIC ECJ0EC1H100C       | B  |
| C158    | 4030016930 | S.CERAMIC ECJ0EB1A104K       | B  |
| C159    | 4030017460 | S.CERAMIC ECJ0EB1E102K       | B  |
| C161    | 4030017620 | S.CERAMIC ECJ0EC1H100C       | B  |
| C162    | 4030017500 | S.CERAMIC ECJ0EC1H560J       | B  |
| C163    | 4030017570 | S.CERAMIC ECJ0EC1H040B       | B  |
| C164    | 4030017590 | S.CERAMIC ECJ0EC1H070C       | B  |
| C165    | 4030016790 | S.CERAMIC ECJ0EB1C103K       | B  |
| C166    | 4030017360 | S.CERAMIC ECJ0EC1H030B       | B  |
| C167    | 4030016930 | S.CERAMIC ECJ0EB1A104K       | B  |
| C168    | 4030016930 | S.CERAMIC ECJ0EB1A104K       | B  |
| C169    | 4030016930 | S.CERAMIC ECJ0EB1A104K       | B  |
| C170    | 4030016930 | S.CERAMIC ECJ0EB1A104K       | T  |
| C171    | 4030018560 | S.CERAMIC C2012 JB 1A 475K-T | T  |
| C172    | 4030017460 | S.CERAMIC ECJ0EB1E102K       | T  |
| C180    | 4030016930 | S.CERAMIC ECJ0EB1A104K       | T  |
| C182    | 4030017460 | S.CERAMIC ECJ0EB1E102K       | T  |
| C183    | 4030017620 | S.CERAMIC ECJ0EC1H100C       | B  |
| C184    | 4030017460 | S.CERAMIC ECJ0EB1E102K       | B  |
| C185    | 4030016930 | S.CERAMIC ECJ0EB1A104K       | T  |
| C186    | 4030016930 | S.CERAMIC ECJ0EB1A104K       | T  |
| C188    | 4030017460 | S.CERAMIC ECJ0EB1E102K       | B  |
| C190    | 4030017380 | S.CERAMIC ECJ0EC1H050B       | B  |
| C191    | 4030017570 | S.CERAMIC ECJ0EC1H040B       | B  |
| C192    | 4030017360 | S.CERAMIC ECJ0EC1H030B       | B  |
| C193    | 4030017360 | S.CERAMIC ECJ0EC1H030B       | B  |
| C194    | 4030017380 | S.CERAMIC ECJ0EC1H050B       | B  |
| C195    | 4030017570 | S.CERAMIC ECJ0EC1H040B       | B  |
| C199    | 4030017460 | S.CERAMIC ECJ0EB1E102K       | B  |
| C200    | 4030017420 | S.CERAMIC ECJ0EC1H470J       | T  |
| C201    | 4030017490 | S.CERAMIC C1608 JB 1A 105K-T | T  |
| C202    | 4030016930 | S.CERAMIC ECJ0EB1A104K       | T  |
| C203    | 4030017460 | S.CERAMIC ECJ0EB1E102K       | T  |
| C205    | 4030017400 | S.CERAMIC ECJ0EC1H220J       | T  |
| C206    | 4030017630 | S.CERAMIC ECJ0EC1H120J       | T  |
| C207    | 4030017620 | S.CERAMIC ECJ0EC1H100C       | T  |
| C208    | 4030017630 | S.CERAMIC ECJ0EC1H120J       | T  |
| C209    | 4030017460 | S.CERAMIC ECJ0EB1E102K       | B  |
| C211    | 4030018560 | S.CERAMIC C2012 JB 1A 475K-T | T  |
| C213    | 4030016930 | S.CERAMIC ECJ0EB1A104K       | T  |
| C220    | 4030016970 | S.CERAMIC ECJ0EB1C223K       | B  |
| C221    | 4030016940 | S.CERAMIC ECJ0EB1A393K       | B  |
| C222    | 4030016790 | S.CERAMIC ECJ0EB1C103K       | T  |
| C223    | 4030016930 | S.CERAMIC ECJ0EB1A104K       | T  |
| C224    | 4550005980 | S.TANTALUM TEESVA 1A 475M8L  | T  |
| C225    | 4030017730 | S.CERAMIC ECJ0EB1E471K       | T  |
| C226    | 4030017460 | S.CERAMIC ECJ0EB1E102K       | B  |
| C227    | 4030016790 | S.CERAMIC ECJ0EB1C103K       | B  |
| C228    | 4030017460 | S.CERAMIC ECJ0EB1E102K       | B  |
| C229    | 4030016930 | S.CERAMIC ECJ0EB1A104K       | T  |
| C230    | 4030017460 | S.CERAMIC ECJ0EB1E102K       | T  |
| C231    | 4030016790 | S.CERAMIC ECJ0EB1C103K       | B  |
| C232    | 4030016790 | S.CERAMIC ECJ0EB1C103K       | B  |
| C233    | 4550006350 | S.TANTALUM TEESVB2 1A 226M8L | B  |
| C234    | 4030017330 | S.CERAMIC ECJ0EF1C104Z       | B  |

**[MAIN UNIT]**

| REF NO. | ORDER NO.     | DESCRIPTION                  | M.            |
|---------|---------------|------------------------------|---------------|
| C235    | 4030016790    | S.CERAMIC ECJ0EB1C103K       | B             |
| C236    | 4510004630    | S.ELECTROLYTIC ECEV1CA100SR  | B             |
| C237    | 4030016790    | S.CERAMIC ECJ0EB1C103K       | T             |
| C238    | 4550005980    | S.TANTALUM TEESVA 1A 475M8L  | B             |
| C239    | 4030017330    | S.CERAMIC ECJ0EF1C104Z       | B             |
| C240    | 4030017460    | S.CERAMIC ECJ0EB1E102K       | B             |
| C241    | 4030017460    | S.CERAMIC ECJ0EB1E102K       | T             |
| C242    | 4030017460    | S.CERAMIC ECJ0EB1E102K       | B             |
| C243    | 4030016930    | S.CERAMIC ECJ0EB1A104K       | T             |
| C245    | 4030017420    | S.CERAMIC ECJ0EC1H470J       | T             |
| C246    | 4030017420    | S.CERAMIC ECJ0EC1H470J       | T             |
| C247    | 4030017420    | S.CERAMIC ECJ0EC1H470J       | T             |
| C248    | 4030017420    | S.CERAMIC ECJ0EC1H470J       | B             |
| C249    | 4030017420    | S.CERAMIC ECJ0EC1H470J       | B             |
| C250    | 4030017420    | S.CERAMIC ECJ0EC1H470J       | B             |
| C251    | 4030017420    | S.CERAMIC ECJ0EC1H470J       | T             |
| C252    | 4030017910    | S.CERAMIC ECJ0EB1H152K       | T             |
| C253    | 4030017710    | S.CERAMIC ECJ0EC1H181J       | T             |
| C254    | 4030017750    | S.CERAMIC ECJ0EB1E122K       | T             |
| C255    | 4030016930    | S.CERAMIC ECJ0EB1A104K       | B             |
| C256    | 4030017760    | S.CERAMIC ECJ0EB1H222K       | T             |
| C257    | 4030016930    | S.CERAMIC ECJ0EB1A104K       | T             |
| C258    | 4030016930    | S.CERAMIC ECJ0EB1A104K       | T             |
| C259    | 4030017400    | S.CERAMIC ECJ0EC1H220J       | B             |
| C260    | 4030017400    | S.CERAMIC ECJ0EC1H220J       | B             |
| C261    | 4550000460    | S.TANTALUM TEESVA 1C 105M8L  | B             |
| C262    | 4550000460    | S.TANTALUM TEESVA 1C 105M8L  | B             |
| C263    | 4030017460    | S.CERAMIC ECJ0EB1E102K       | T             |
| C264    | 4550006350    | S.TANTALUM TEESVB2 1A 226M8L | B             |
| C265    | 4030017460    | S.CERAMIC ECJ0EB1E102K       | T             |
| C266    | 4030017760    | S.CERAMIC ECJ0EB1H222K       | T             |
| C267    | 4030016790    | S.CERAMIC ECJ0EB1C103K       | B             |
| C269    | 4030017460    | S.CERAMIC ECJ0EB1E102K       | B             |
| C271    | 4030016930    | S.CERAMIC ECJ0EB1A104K       | T             |
| C273    | 4030016930    | S.CERAMIC ECJ0EB1A104K       | B             |
| C274    | 4030016930    | S.CERAMIC ECJ0EB1A104K       | (A) only<br>B |
| C275    | 4030017490    | S.CERAMIC C1608 JB 1A 105K-T | (A) only<br>B |
| C276    | 4030017490    | S.CERAMIC C1608 JB 1A 105K-T | (A) only<br>B |
| C277    | 4030017490    | S.CERAMIC C1608 JB 1A 105K-T | (A) only<br>B |
| C279    | 4030017650    | S.CERAMIC ECJ0EC1H270J       | (A) only<br>B |
| C280    | 4030017650    | S.CERAMIC ECJ0EC1H270J       | (A) only<br>B |
| C281    | 4030016930    | S.CERAMIC ECJ0EB1A104K       | T             |
| C287    | 4030016930    | S.CERAMIC ECJ0EB1A104K       | B             |
| C288    | 4030016930    | S.CERAMIC ECJ0EB1A104K       | B             |
| C289    | 4030016930    | S.CERAMIC ECJ0EB1A104K       | (A) only<br>B |
| C290    | 4030016930    | S.CERAMIC ECJ0EB1A104K       | (A) only<br>T |
| C291    | 4030017460    | S.CERAMIC ECJ0EB1E102K       | B             |
| C292    | 4030017460    | S.CERAMIC ECJ0EB1E102K       | B             |
| C293    | 4030017460    | S.CERAMIC ECJ0EB1E102K       | T             |
| C294    | 4030017460    | S.CERAMIC ECJ0EB1E102K       | B             |
| C295    | 4030017460    | S.CERAMIC ECJ0EB1E102K       | B             |
| C296    | 4030017460    | S.CERAMIC ECJ0EB1E102K       | T             |
| C297    | 4030017460    | S.CERAMIC ECJ0EB1E102K       | T             |
| C298    | 4030017460    | S.CERAMIC ECJ0EB1E102K       | T             |
| C299    | 4030017460    | S.CERAMIC ECJ0EB1E102K       | T             |
| C300    | 4030017460    | S.CERAMIC ECJ0EB1E102K       | T             |
| C301    | 4030017460    | S.CERAMIC ECJ0EB1E102K       | T             |
| C302    | 4030007090    | S.CERAMIC C1608 CH 1H 470J-T | B             |
| C303    | 4030016930    | S.CERAMIC ECJ0EB1A104K       | B             |
| C304    | 4030016930    | S.CERAMIC ECJ0EB1A104K       | (A) only<br>T |
| C305    | 4030017420    | S.CERAMIC ECJ0EC1H470J       | B             |
| C306    | 4030017460    | S.CERAMIC ECJ0EB1E102K       | B             |
| C307    | 4030016930    | S.CERAMIC ECJ0EB1A104K       | T             |
| C308    | 4030017530    | S.CERAMIC ECJ0EC1H0R5B       | B             |
| J1      | 6510023520    | S.CONNECTOR 54104-3692       | T             |
| F1      | 5210000830    | S.FUSE ERBFE3R00U            | T             |
| S1      | 2260002750    | S.SWITCH EVQP7M01K           | T             |
| EP1     | 6910015370    | S.BEAD ACZ1005Y-102-T        | T             |
| EP2     | 6910012350    | S.BEAD MMZ1608Y 102BT        | T             |
| EP3     | 6910015370    | S.BEAD ACZ1005Y-102-T        | B             |
| EP4     | 6910015600    | S.BEAD ACZ1005Y-241          | T             |
| EP5     | 6910015600    | S.BEAD ACZ1005Y-241          | T             |
| EP6     | 6910015370    | S.BEAD ACZ1005Y-102-T        | B             |
| EP7     | 0910056553PCB | B 6032C                      | B             |

(A): The scrambler IC is installed type. (B): The scrambler IC is not installed type.

S.=Surface mount

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

# SECTION 7 MECHANICAL PARTS AND DISASSEMBLY

## 7-1 CABINET PARTS

### [MAIN UNIT]

| REF. NO. | ORDER NO.  | DESCRIPTION       | QTY. |
|----------|------------|-------------------|------|
| MP4      | 8510015670 | 2681 shield plate | 1    |

### [CHASSIS PARTS]

| REF. NO. | ORDER NO.  | DESCRIPTION               | QTY. |
|----------|------------|---------------------------|------|
| J1       | 6910014700 | 2600 ant connector        | 1    |
| MP1      | 8010019290 | 2681 chassis              | 1    |
| MP2      | 8950005511 | 2403 contact spring -1    | 1    |
| MP3      | 8930058561 | 2403 A-main seal-1        | 1    |
| MP4      | 8930059800 | 2600 pet sheet            | 1    |
| MP5      | 8930059830 | 2600 sheet                | 1    |
| MP6      | 8930051500 | O ring (AB)               | 1    |
| MP7      | 8930055870 | O ring (AO)               | 1    |
| MP8      | 8930058550 | O ring (AS)               | 1    |
| MP9      | 8830001600 | Screw nut (L)             | 1    |
| MP10     | 8830001470 | VR nut (N)                | 1    |
| MP11     | 8850001880 | Sealing washer (W)        | 2    |
| MP12     | 8810009510 | Screw B0 2 x 4 NI-ZU (BT) | 7    |
| MP13     | 8810007890 | Screw B0 2 x 4 SUS        | 1    |
| MP14     | 8810010120 | Screw B0 2 x 8 SUS ZK     | 2    |
| MP15     | 8810010190 | Screw M2 x 4 SUS ZK       | 3    |

### [FRONT UNIT]

| REF. NO. | ORDER NO.  | DESCRIPTION               | QTY. |
|----------|------------|---------------------------|------|
| DS401    | 5030002630 | L3-0048TAY-2              | 1    |
| EP402    | 8930061530 | SRCN-2681-SP-N-W          | 2    |
| SP401    | 2510001092 | 036D0801B                 | 1    |
| W401     | 8900011880 | OPC-1210                  | 1    |
| MP401    | 8210019860 | 2681 front panel          | 1    |
| MP404    | 8930060540 | 2681 4-2 Key board        | 1    |
| MP405    | 8210019880 | 2681 PTT button           | 1    |
| MP406    | 8930060550 | 2681 PTT Plate            | 1    |
| MP407    | 8930060710 | 2681 PTT rubber           | 1    |
| MP408    | 8310059540 | 2681 LCD plate            | 1    |
| MP410    | 8210019890 | 2681 Reflector            | 1    |
| MP411    | 8310059530 | 2681 window plate         | 1    |
| MP412    | 8930060860 | 2681 window sheet         | 1    |
| MP413    | 8930059360 | 2600 release button       | 1    |
| MP414    | 8930055761 | 2403 release plate        | 1    |
| MP415    | 8930056540 | Spring (AH)               | 2    |
| MP417    | 8930055730 | 2403 connector seal       | 1    |
| MP418    | 8930055890 | 2403 connector sheet      | 1    |
| MP419    | 8930056430 | 2403 9-pin sheet          | 1    |
| MP421    | 8610011380 | Knob N-313                | 1    |
| MP423    | 8930061110 | 2681 mic tape             | 1    |
| MP424    | 8810009510 | Screw B0 2 x 4 NI-ZU (BT) | 4    |
| MP426    | 8930061200 | 2681 mic rubber           | 1    |
| MP429    | 8930061910 | Sponge (HL)               | 1    |

### [VR UNIT]

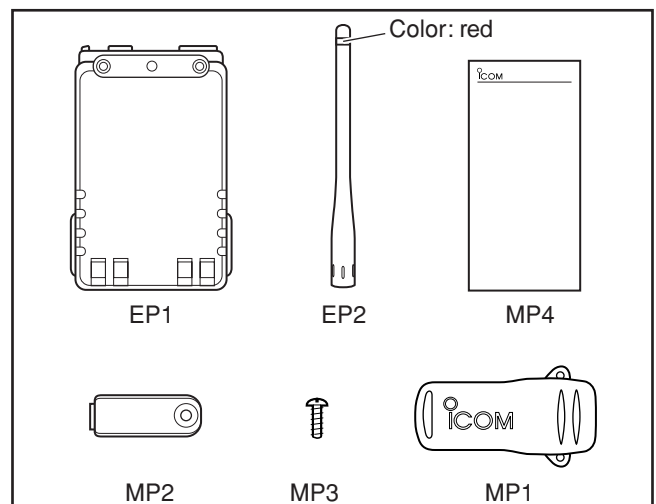
| REF. NO. | ORDER NO.  | DESCRIPTION            | QTY. |
|----------|------------|------------------------|------|
| R601     | 7210003130 | TP76N97N-13F-10KA-2497 | 1    |

### [CONNECTOR UNIT]

| REF. NO. | ORDER NO.  | DESCRIPTION          | QTY. |
|----------|------------|----------------------|------|
| MP701    | 8950005520 | 2403 9-pin connector | 1    |

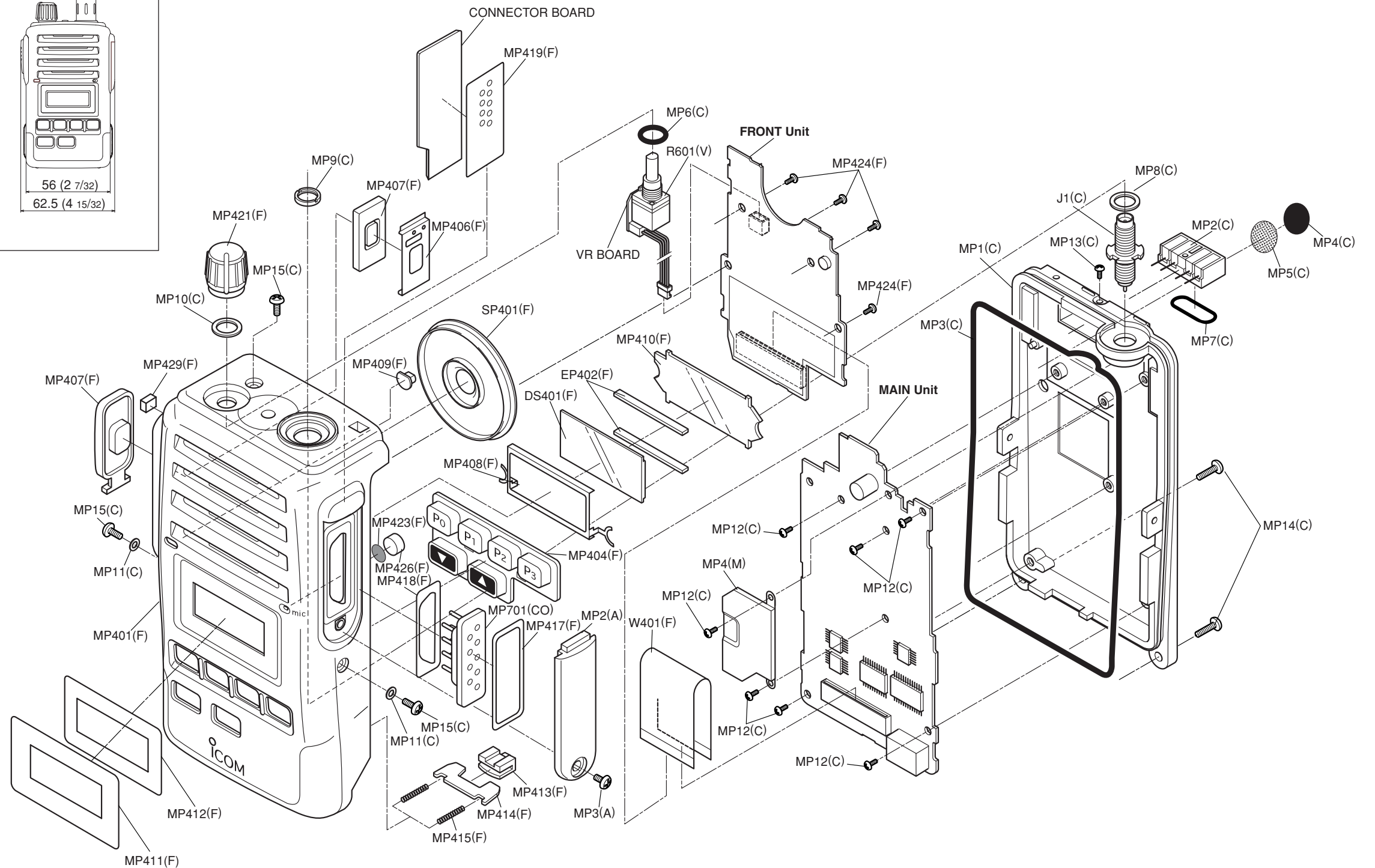
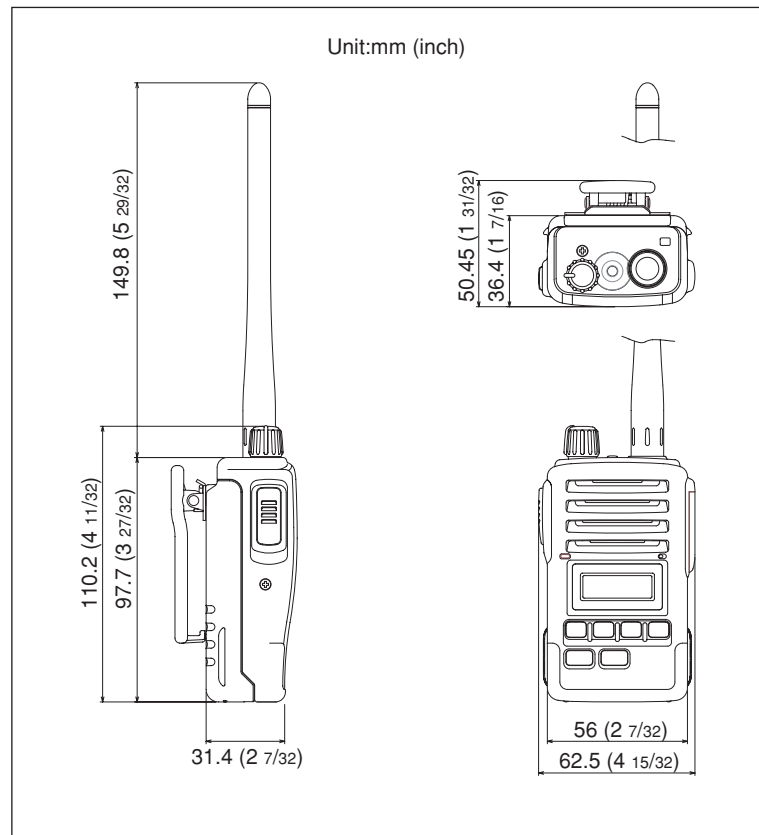
### [ACCESSORIES]

| REF. NO. | ORDER NO.  | DESCRIPTION         | QTY. |
|----------|------------|---------------------|------|
| EP1      | 0800006730 | Battery BP-227      | 1    |
| EP2      | 3310003020 | Antenna FA-S59V ACC | 1    |
| MP1      | 8930061480 | Clip MB-98 ACC      | 1    |
| MP2      | 8210017071 | 2337 C-PANEL-1      | 1    |
| MP3      | 8810009270 | Screw M3 x 4 SUS ZK | 1    |
| MP4      | 8310060530 | 2681 key-sticker    | 1    |



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

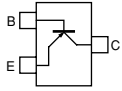
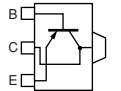
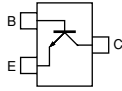
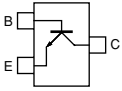
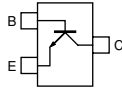
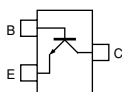
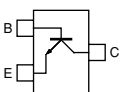
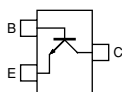
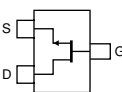
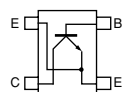
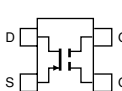
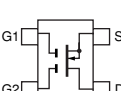
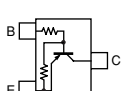
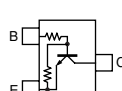
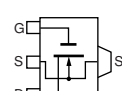
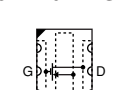
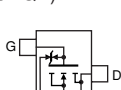
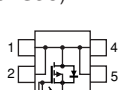
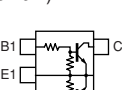
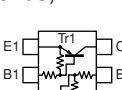
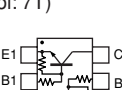
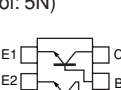




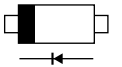

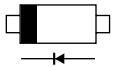
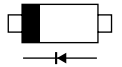




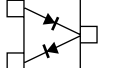
**UNIT abbreviation** (C): CHASSIS PARTS, (M): MAIN UNIT, (CO): CONNECTOR UNIT, (V): VR UNIT, (A): ACCESSORIES, (F): FRONT UNIT

## SECTION 8 SEMI-CONDUCTOR INFORMATION

### • TRANSISTOR AND FET'S

|                                                                                                                              |                                                                                                                           |                                                                                                                          |                                                                                                                         |                                                                                                                         |
|------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------|
| <b>2SA1577 Q</b><br>(Symbol: HP)<br>      | <b>2SB1132 Q</b><br>(Symbol: BAQ)<br>  | <b>2SC4116 BL</b><br>(Symbol: LL)<br> | <b>2SC4116 Y</b><br>(Symbol: LY)<br> | <b>2SC4215 O</b><br>(Symbol: QO)<br> |
| <b>2SC4226 R25</b><br>(Symbol: R25)<br>   | <b>2SC5107 O</b><br>(Symbol: MFO)<br>  | <b>2SC5110 O</b><br>(Symbol: MGO)<br> | <b>2SK880 Y</b><br>(Symbol: XY)<br>  | <b>2SK1829</b><br>(Symbol: K1)<br>   |
| <b>3SK293</b><br>(Symbol: UF)<br>         | <b>3SK299</b><br>(Symbol: U73)<br>     | <b>DTA144 EU</b><br>(Symbol: 16)<br>  | <b>DTC144EU</b><br>(Symbol: 26)<br>  | <b>RD01MUS1</b><br>(Symbol: K2)<br>  |
| <b>RD07MVS1</b><br>(Symbol: RD07MVS1)<br> | <b>RSR025N03</b><br>(Symbol: QY)<br>   | <b>TPC6103</b><br>(Symbol: S3C)<br>   | <b>XP1214</b><br>(Symbol: 9H)<br>    | <b>XP4111</b><br>(Symbol: 9U)<br>    |
| <b>XP4312</b><br>(Symbol: 7T)<br>       | <b>XP6501 AB</b><br>(Symbol: 5N)<br> |                                                                                                                          |                                                                                                                         |                                                                                                                         |

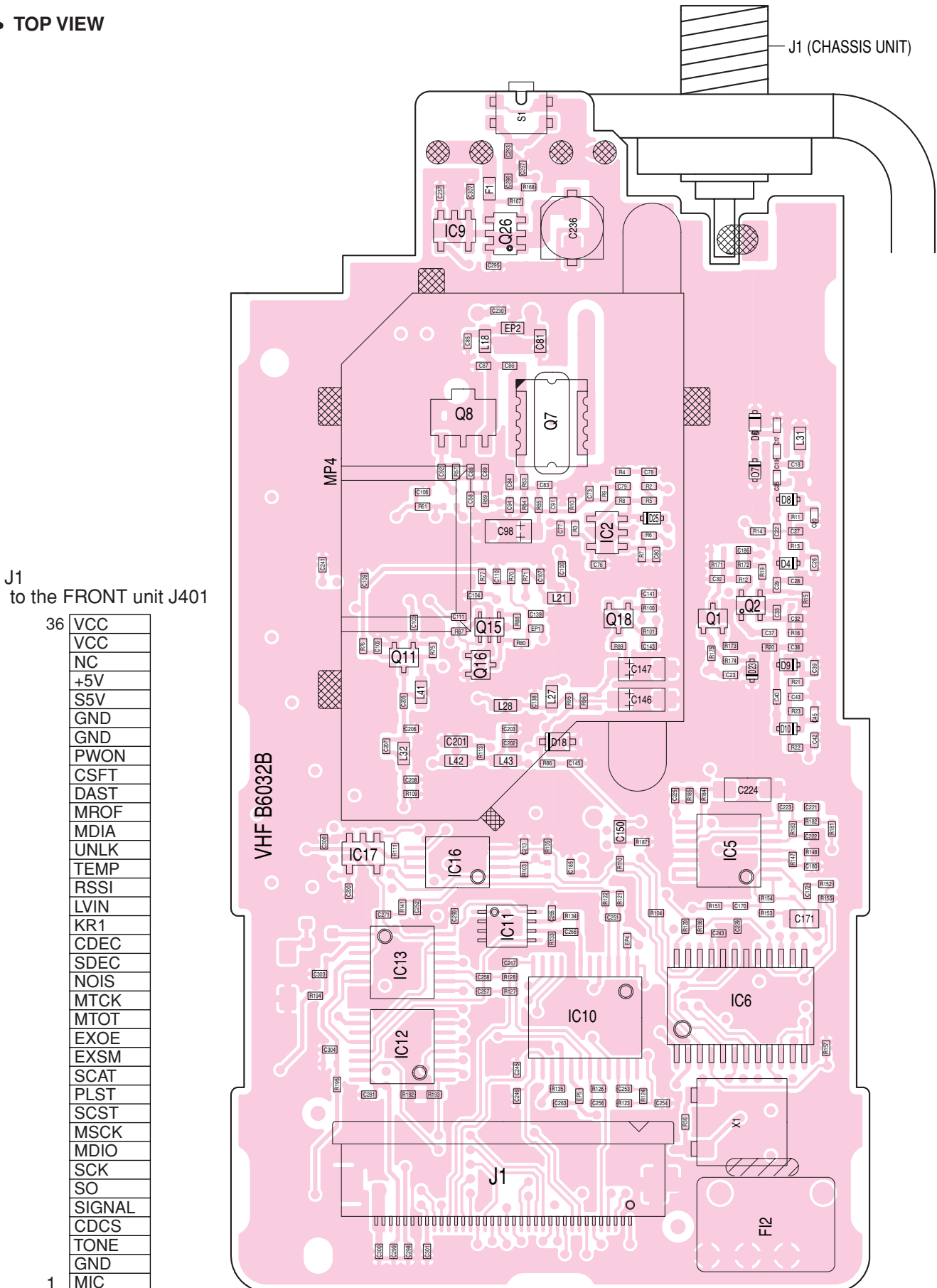
### • DIODES

|                                                                                                                        |                                                                                                                        |                                                                                                                         |                                                                                                                            |                                                                                                                         |
|------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------|
| <b>1SV239</b><br>(Symbol: TC)<br> | <b>1SV307</b><br>(Symbol: TX)<br> | <b>HVC350B</b><br>(Symbol: B0)<br> | <b>HVC375B</b><br>(Symbol: B8)<br>    | <b>HVC376B</b><br>(Symbol: B9)<br> |
| <b>MA2S077</b><br>(Symbol: S)<br> | <b>MA2S111</b><br>(Symbol: A)<br> | <b>MA2S728</b><br>(Symbol: B)<br>  | <b>RB706F- 40</b><br>(Symbol: 3J)<br> |                                                                                                                         |

# SECTION 9 BOARD LAYOUTS

## 9-1 MAIN UNIT

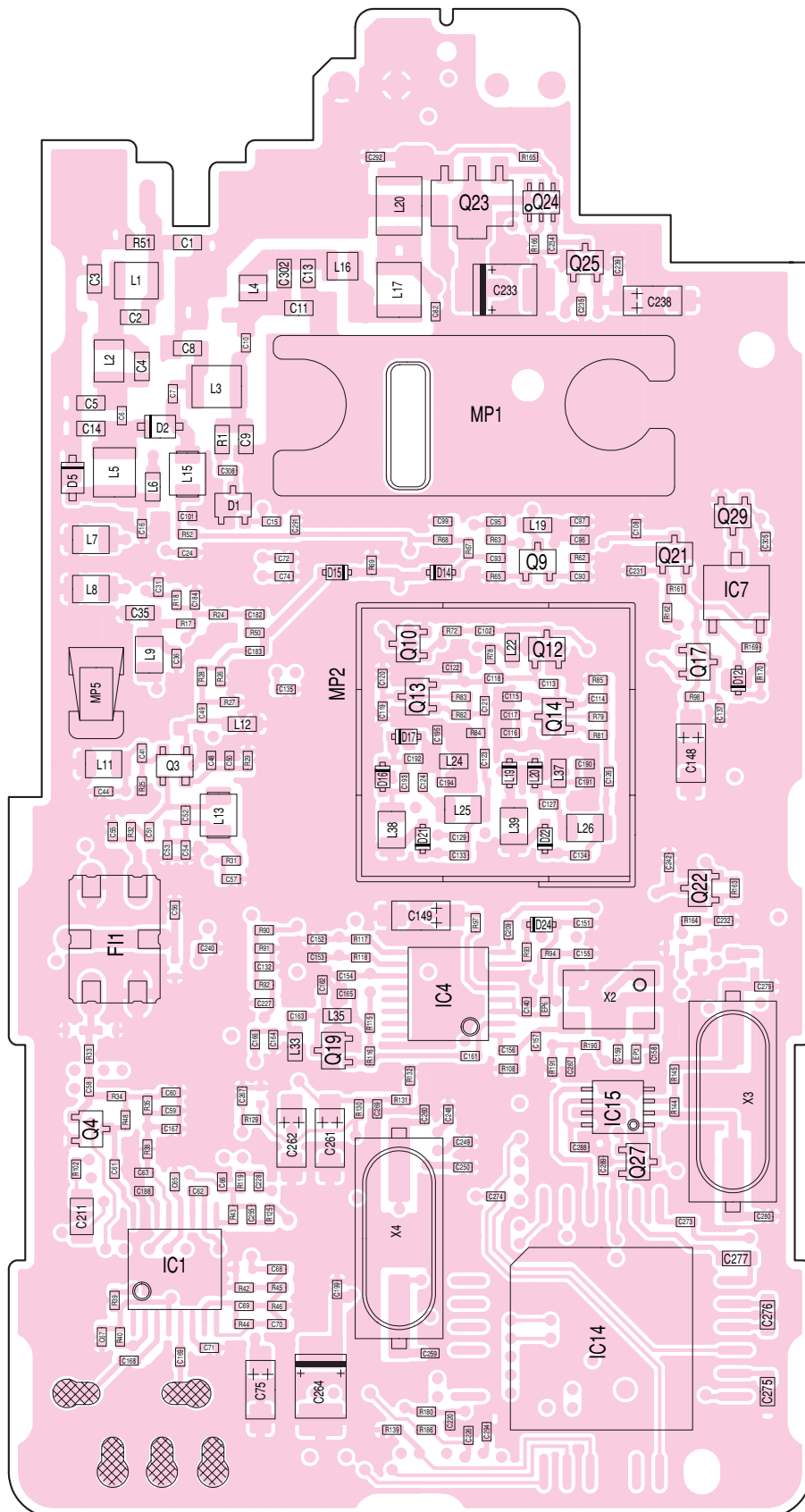
### • TOP VIEW



J1  
to the FRONT unit J401

|    |        |
|----|--------|
| 36 | VCC    |
|    | VCC    |
|    | NC     |
|    | +5V    |
|    | S5V    |
|    | GND    |
|    | GND    |
|    | PWON   |
|    | CSFT   |
|    | DAST   |
|    | MROF   |
|    | MDIA   |
|    | UNLK   |
|    | TEMP   |
|    | RSSI   |
|    | LVIN   |
|    | KR1    |
|    | CDEC   |
|    | SDEC   |
|    | NOIS   |
|    | MTCK   |
|    | MTOT   |
|    | EXOE   |
|    | EXSM   |
|    | SCAT   |
|    | PLST   |
|    | SCST   |
|    | MSCK   |
|    | MDIO   |
|    | SCK    |
|    | SO     |
|    | SIGNAL |
|    | CDCS   |
|    | TONE   |
|    | GND    |
| 1  | MIC    |

• BOTTOM VIEW



## 9-2 FRONT UNIT

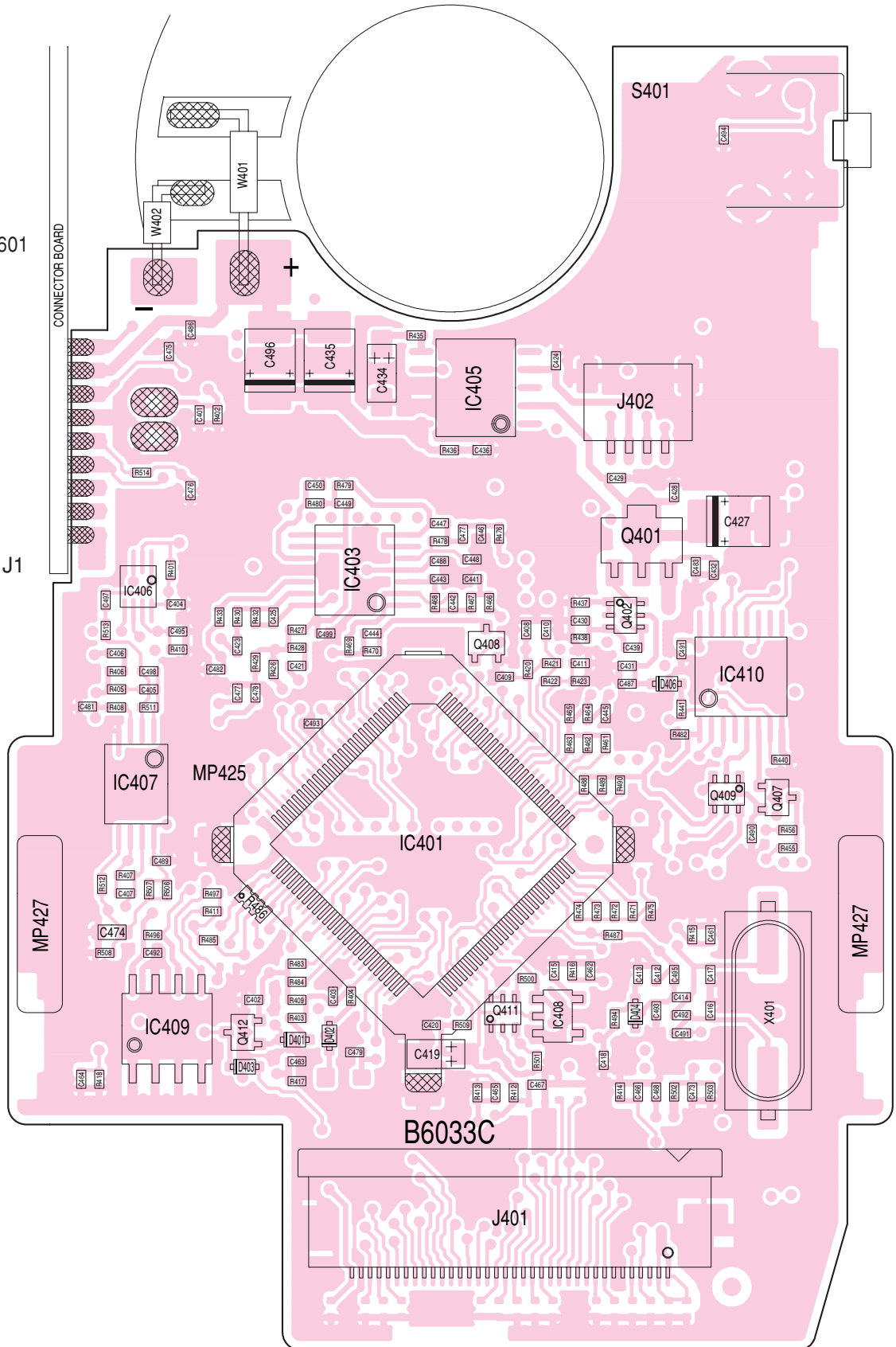
### • TOP VIEW

J402  
to the VR board W601

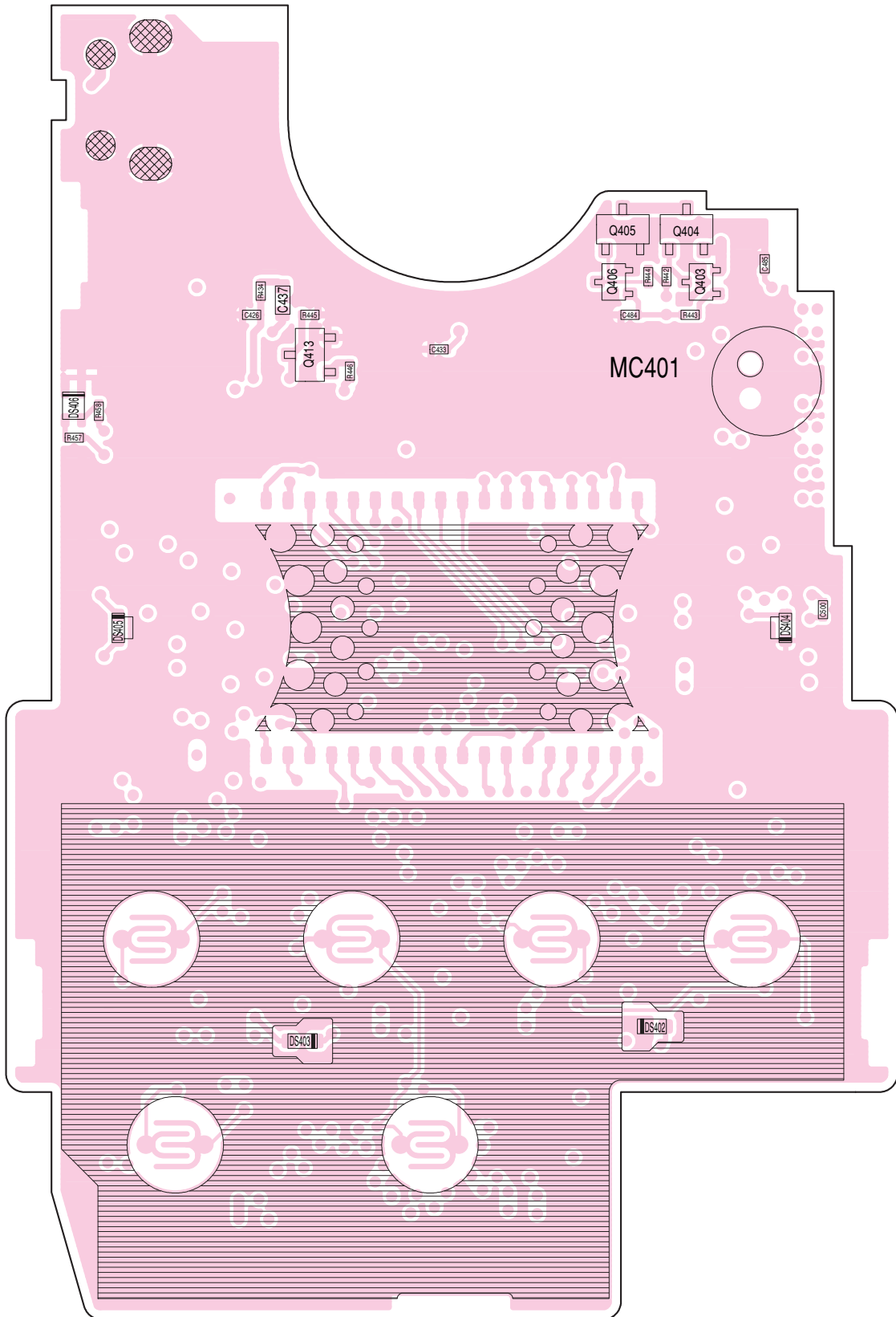
|   |        |
|---|--------|
| 6 | GND    |
|   | GND    |
|   | DUSE   |
|   | AFOUT  |
|   | SIGNAL |
| 1 | PWON   |

J401  
to the MAIN unit J1

|    |        |
|----|--------|
| 36 | MIC    |
|    | GND    |
|    | TONE   |
|    | CDCS   |
|    | SIGNAL |
|    | SO     |
|    | SCK    |
|    | MDIO   |
|    | MSCK   |
|    | SCST   |
|    | PLST   |
|    | SCAT   |
|    | EXSM   |
|    | EXOE   |
|    | MTOT   |
|    | MTCK   |
|    | NOIS   |
|    | SDEC   |
|    | CDEC   |
|    | KR1    |
|    | LVIN   |
|    | RSSI   |
|    | TEMP   |
|    | UNLK   |
|    | MDIA   |
|    | MROF   |
|    | DAST   |
|    | CSFT   |
|    | PWON   |
|    | GND    |
|    | GND    |
|    | S5V    |
|    | CPU5   |
|    | NC     |
|    | VCC    |
| 1  | VCC    |

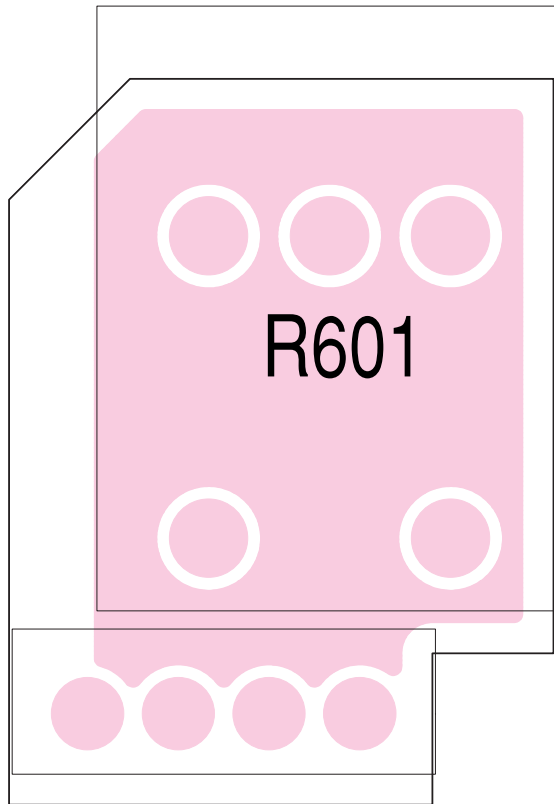


• BOTTOM VIEW

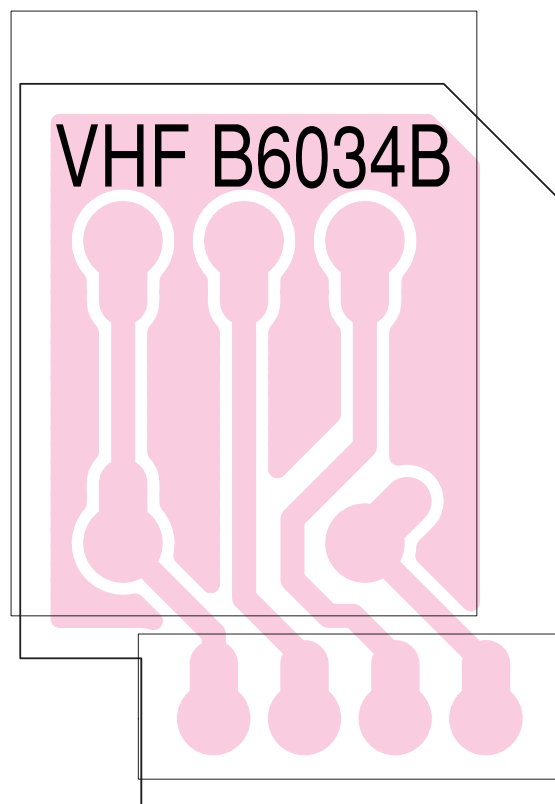


### 9-3 VR BOARD

- TOP VIEW

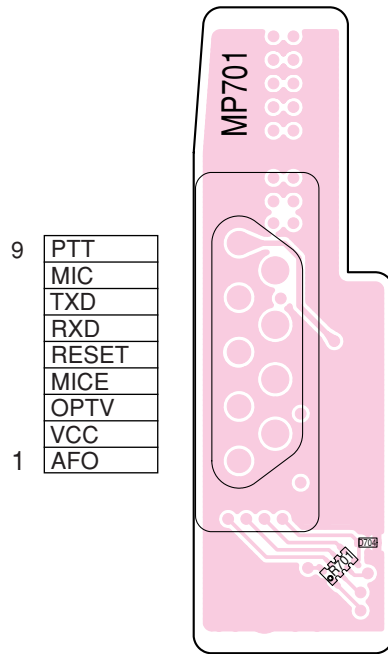


- BOTTOM VIEW

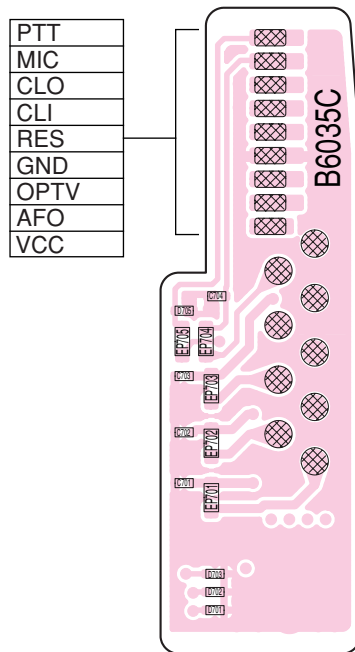


## 9-4 CONNECTOR BOARD

- TOP VIEW

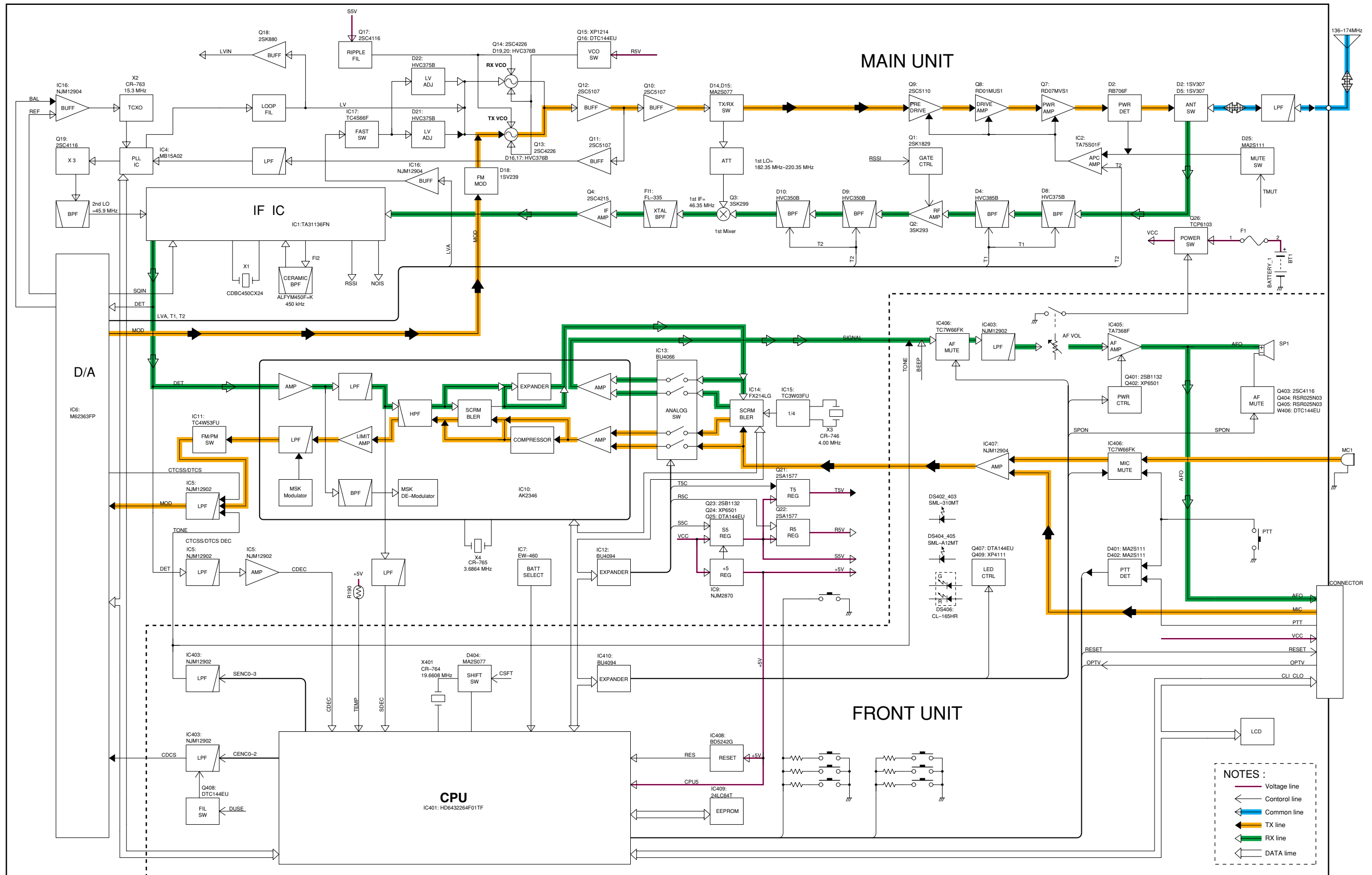


- BOTTOM VIEW



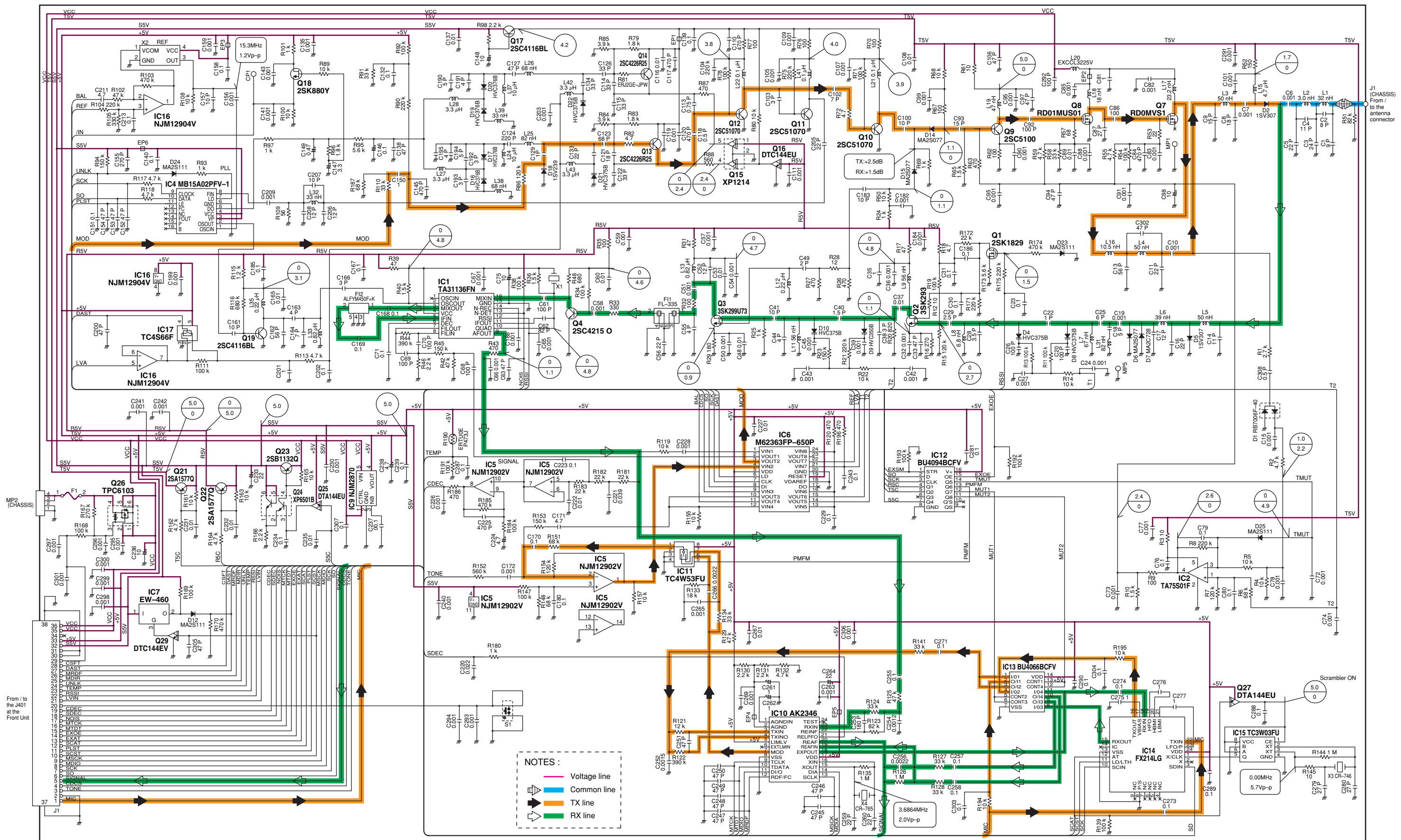


# SECTION 10 BLOCK DIAGRAM

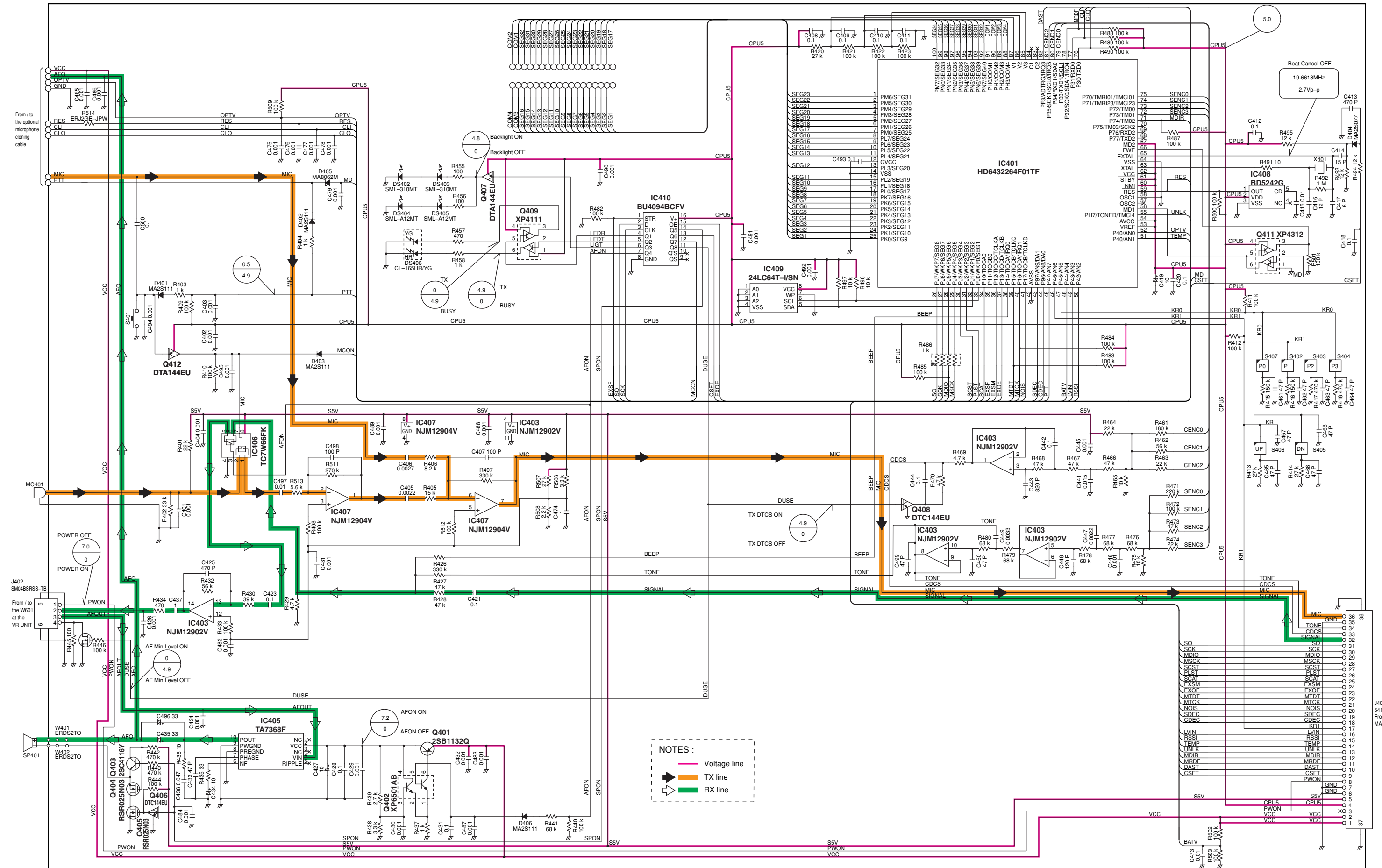


# SECTION 11 VOLTAGE DIAGRAM

## 11-1 MAIN UNIT

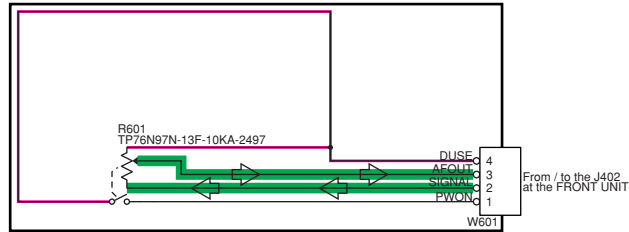


# 11-2 FRONT UNIT

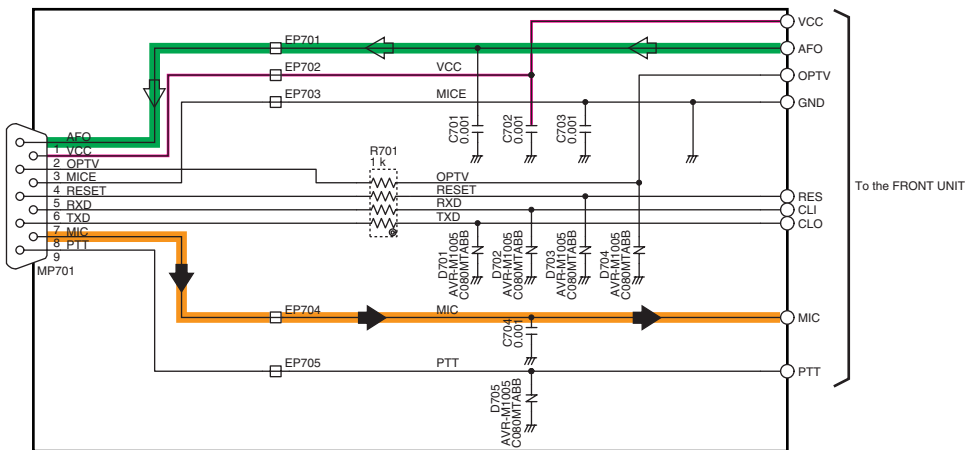


# 11-3 VR / CONNECTOR BOARDS

## VR BOARD



## CONNECTOR BOARD



- NOTES :
- Voltage line
  - TX line
  - ← RX line

## Icom Inc.

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

### Icom America Inc.

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

### Icom Canada

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

### Icom (Australia) Pty. Ltd.

A.B.N. 88 006 092 575  
290-294 Albert Street, Brunswick, Victoria, 3056, Australia  
Phone : +61 (03) 9387-0666 Fax : +61 (03) 9387-0022  
URL : <http://www.icom.net.au>  
E-mail : [sales@icom.net.au](mailto:sales@icom.net.au)

### Icom New Zealand

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

### Beijing Icom Ltd.

1305, Wanshang Plaza, Shijingshan Road, Beijing China  
Phone : +86 (010) 6866 6337 Fax : +86 (010) 6866 3553  
URL : <http://www.bjicom.com>  
E-mail : [bjicom@bjicom.com](mailto:bjicom@bjicom.com)

### Icom (Europe) GmbH

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

### Icom Spain S.L

Crta. de Gracia a Manresa Km. 14.750  
08190 Sant Cugat del Valles Barcelona, SPAIN  
Phone : +34 (93) 590 26 70 Fax : +34 (93) 589 04 46  
URL : <http://www.icomspain.com>  
E-mail : [icom@icomspain.com](mailto:icom@icomspain.com)

### Icom (UK) Ltd.

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

### Icom France S.a

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

### Asia Icom Inc.

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

### Icom Polska

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

**Count on us!**

**Icom Inc.**

1-1-32, Kamiminami, Hirano-ku, Osaka, 547-0003, Japan

Download from [www.semanuals.com](http://www.semanuals.com). All Manuals Search And Download.

S-14007IZ-C1  
© 2003 Icom Inc.

## Free Manuals Download Website

<http://myh66.com>

<http://usermanuals.us>

<http://www.somanuals.com>

<http://www.4manuals.cc>

<http://www.manual-lib.com>

<http://www.404manual.com>

<http://www.luxmanual.com>

<http://aubethermostatmanual.com>

Golf course search by state

<http://golfingnear.com>

Email search by domain

<http://emailbydomain.com>

Auto manuals search

<http://auto.somanuals.com>

TV manuals search

<http://tv.somanuals.com>