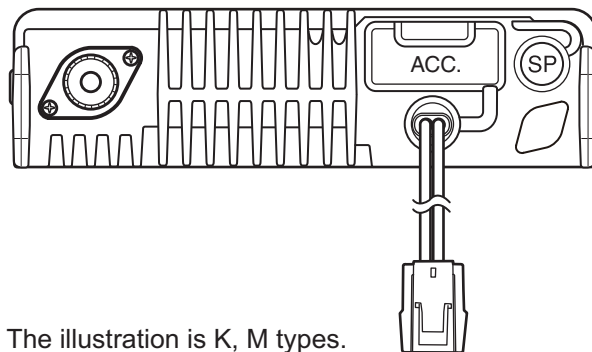
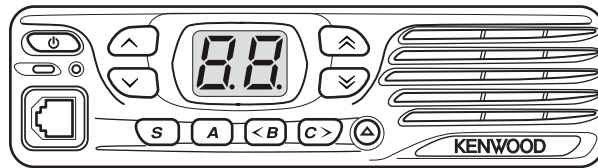


# KENWOOD

## SERVICE MANUAL

VHF DIGITAL TRANSCEIVER

### TK-D740H, TK-D740H(V), TK-D740



The illustration is K, M types.

#### TABLE OF CONTENTS

1	PRECAUTION .....	1-5
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This product complies with the **RoHS** directive for the European market.



This product uses Lead Free solder.

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Transceivers containing AMBE+2™ Vocoder: The AMBE+2™ voice coding technology is embedded in the firmware under the license of Digital Voice Systems, Inc.

# SPECIFICATION

## (K,M TYPE)

<b>GENERAL</b>		
Frequency Range		136 ~ 174MHz
Number of Channels		32 ch / 2 zones (Max. 16 ch/ zone)
Channel Spacing	Analog	25 / 12.5 kHz
	Digital	12.5 kHz
Operating Voltage		13.6V DC $\pm$ 15%
Operating Temperature Range		-22°F ~ +140°F (-30°C ~ +60°C)
Frequency Stability		$\pm$ 2.0ppm
Antenna Impedance		50 $\Omega$
Dimensions (W x H x D) (Projections not included)	Radio only	6.29 x 1.69 x 4.82 in. (160 x 43 x 122.6 mm)
Weight (net)	Radio only	2.42 lbs (1.1 kg)
<b>RECEIVER</b>		
Sensitivity	Digital 1 % BER	0.45 $\mu$ V
	Digital 5 % BER	0.3 $\mu$ V
	Analog (12dB SINAD) @ 25 / 12.5 kHz	0.25 $\mu$ V
Selectivity	Analog @ 25 / 12.5 kHz	75 dB / 65 dB
Intermodulation Distortion	Analog	73 dB
Spurious Response	Analog	75 dB
Audio Distortion		Less than 5%
Audio Output		4 W / 4 $\Omega$
<b>TRANSMITTER</b>		
RF Power Output		5W ~ 25W (TK-D740), 5W ~ 50W (TK-D740H)
Spurious Response		73 dB
FM Hum & Noise	Analog @ 25 / 12.5 kHz	45 / 40 dB
Audio Distortion		Less than 5%
Emission Designator		16K0F3E, 14K0F2D, 11K0F3E, 7K50F2D, 7K60FXE, 7K60FXD

Specifications shown are typical.

Analog 25 kHz is not included in the models sold in the USA or US territories.

Analog measurements accord with TIA 603. Digital measurements accord with EN 300 113.

JVC KENWOOD Corporation reserves the right to change specifications without prior notice or obligation.

# SPECIFICATION

## (E TYPE)

<b>GENERAL</b>		
Frequency Range		136 ~ 174MHz
Number of Channels		128 ch / 4 zones (Max. 32 ch/ zone)
Channel Spacing	Analogue	25 / 20 / 12.5 kHz
	Digital	12.5 kHz
Operating Voltage		13.2 V DC (10.8 - 15.6 V DC)
Operating Temperature Range		-30°C ~ +60°C
Frequency Stability		±2.0ppm
Antenna Impedance		50Ω
Dimensions (W x H x D) (Projections not included)	Radio only	160 x 43 x 122.6 mm
Weight (net)	Radio only	1.1 kg
<b>RECEIVER</b>		
Sensitivity	Digital 1 % BER	-1 dBμV (0.45μV)
	Digital 5 % BER	-4.5 dBμV (0.3μV)
	Analogue (20 dB SINAD) @ 25 / 20 / 12.5 kHz	-3 dB μV (0.35 μV) / -3 dB μV (0.35 μV) / -1 dB μV (0.45 μV)
Selectivity	Analogue @ 25 / 20 / 12.5 kHz	75dB / 73dB / 69dB
Intermodulation Distortion	Analogue	65 dB
Spurious Response	Analogue	75 dB
Audio Distortion		Less than 5%
Audio Output		4 W / 4 Ω
<b>TRANSMITTER</b>		
RF Power Output		5W ~ 25W
Spurious Response		<1 GHz ≤-36 dBm, 1 GHz - 4 GHz ≤-30 dBm
FM Hum & Noise	Analogue @ 25 / 20 / 12.5 kHz	45 / 45 / 40 dB
Audio Distortion		Less than 5%
Emission Designator		16K0F3E, 14K0F2D, 14K0F3E, 12K0F2D, 8K50F3E, 7K50F2D, 7K60FXE, 7K60FXD

Specifications shown are typical.

Analogue measurements accord with TIA 603, EN 300 086 & 219. Digital measurements accord with EN 300 113.

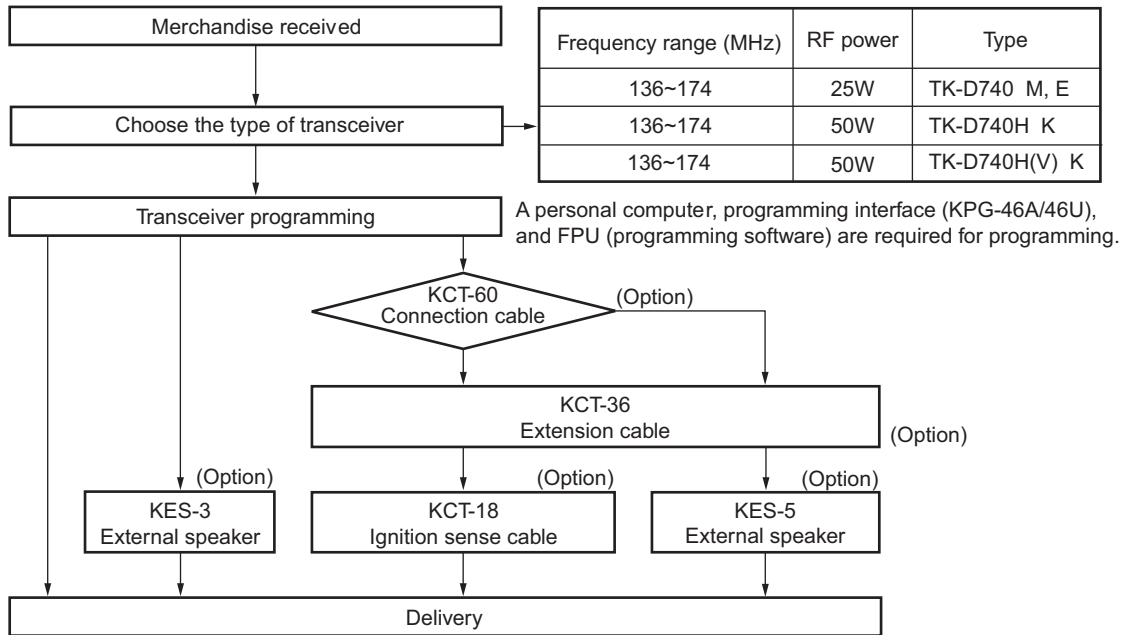
JVC KENWOOD Corporation reserves the right to change specifications without prior notice or obligation.

# SECTION 1 PRECAUTION

This service manual does not describe PRECAUTION.

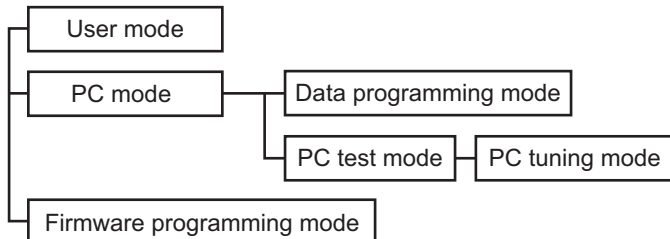
## SECTION 2 SPECIFIC SERVICE INSTRUCTIONS

### 2.1 SYSTEM SET-UP



### 2.2 REALIGNMENT

#### 2.2.1 Modes



#### 2.2.2 How to Enter Each Mode

Mode	Function
User mode	Power ON
PC mode	Received commands from PC
Firmware programming mode	[A] + Power ON

Mode	Function
User mode	For normal use.
PC mode	Used for communication between the transceiver and PC (IBM compatible).
PC programming mode	Used to read and write frequency data and other features to and from the transceiver.
PC test mode	Used to check the transceiver using the PC. This feature is included in the FPU.
PC tuning mode	Used to tune the transceiver using the PC.
Firmware programming mode	Used to change the main program of the flash memory.

## 2.2.3 PC Mode

### 2.2.3.1 Preface

The transceiver is programmed using a personal computer, a programming interface (KPG-46A/46U) and FPU (programming software).

The programming software can be used with a PC. Figure 1 shows the setup of a PC for programming.

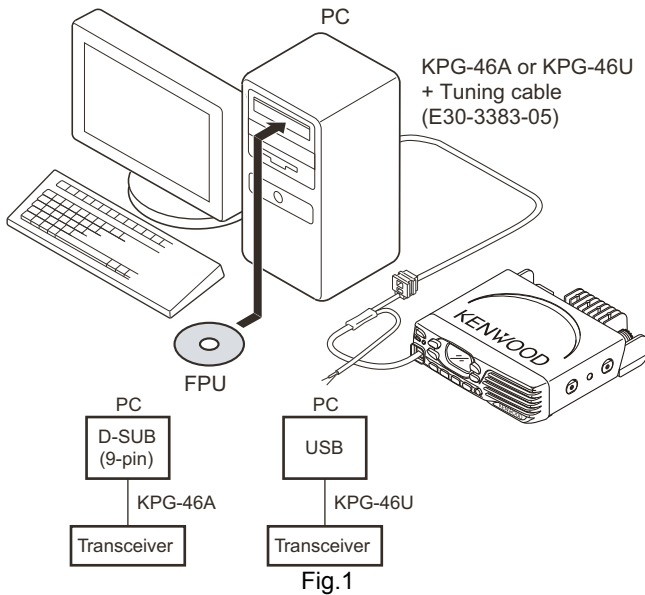


Fig.1

### 2.2.3.2 Connection procedure

- (1) Connect the transceiver to the computer using the interface cable.

#### Note:

You must install the KPG-46U driver in the computer to use the USB programming interface cable (KPG-46U).

- (2) When the Power is switched on, you can immediately enter user mode. When the PC sends a command, the transceiver enters PC mode, and "Pc" is displayed on the LED. When data is transmitting from the transceiver, the red LED lights. When data is receiving by the transceiver, the green LED lights.

#### Note:

The data stored in the computer must match the "Model Name" when it is written into the Flash memory.

### 2.2.3.3 KPG-46A description

#### (PC programming interface cable: Option)

The KPG-46A is required to interface the transceiver to the computer. It has a circuit in its D-sub connector (KPG-46A: 9-pin) case that converts the RS-232C logic level to the TTL level.

The KPG-46A connects the 8-pin microphone connector of the transceiver to the RS-232C serial port of the computer.

### 2.2.3.4 KPG-46U description

#### (USB programming interface cable: Option)

The KPG-46U is a cable which connects to a USB port on a computer.

When using the KPG-46U, install the supplied CD (with driver software) in the computer. The KPG-46U driver runs under Windows XP, Vista, 7, 8 or 8.1.

The latest version of the USB driver is available for download from the following URL:

<http://www.kenwood.com/usb-com/>

(This URL may change without notice.)

### 2.2.3.5 Programming Software: KPG-166D (Ver. 2.00 or later) description

The FPU is the programming software for the transceiver supplied on a CD. This software runs under Windows XP, Vista, 7, 8 or 8.1 on a PC.

The data can be input to or read from the transceiver and edited on the screen. The programmed or edited data can be printed out. It is also possible to tune the transceiver.

## 2.2.4 Firmware Programming Mode

### 2.2.4.1 Preface

Flash memory is mounted on the transceiver. This allows the transceiver to be upgraded when new features are released in the future. (For details on how to obtain the firmware, contact Customer Service.)

### 2.2.4.2 Connection procedure

Connect the transceiver to the personal computer using the interface cable (KPG-46A/46U). (Connection is the same as in the PC Mode.)

### 2.2.4.3 Programming

#### [Firmware upgrade in User Mode]

- (1) Start up the firmware programming software (Updater).
- (2) Set the communications speed (normally, 115200 bps) and communications port in the configuration item.
- (3) Power On the transceiver in User mode. Then, the orange LED turns on and the 7-segment LED displays "PG" on transceiver.
- (4) Press "write" button in the window. When the transceiver starts to receive data, the orange LED turns to green.
- (5) If writing ends successfully, the green LED turns to red.

#### Note:

- It is not necessary to enable the Firmware Programming mode in the Programming software.
- Normally, write in the high-speed mode.

#### [Firmware upgrade in Firmware Programming Mode]

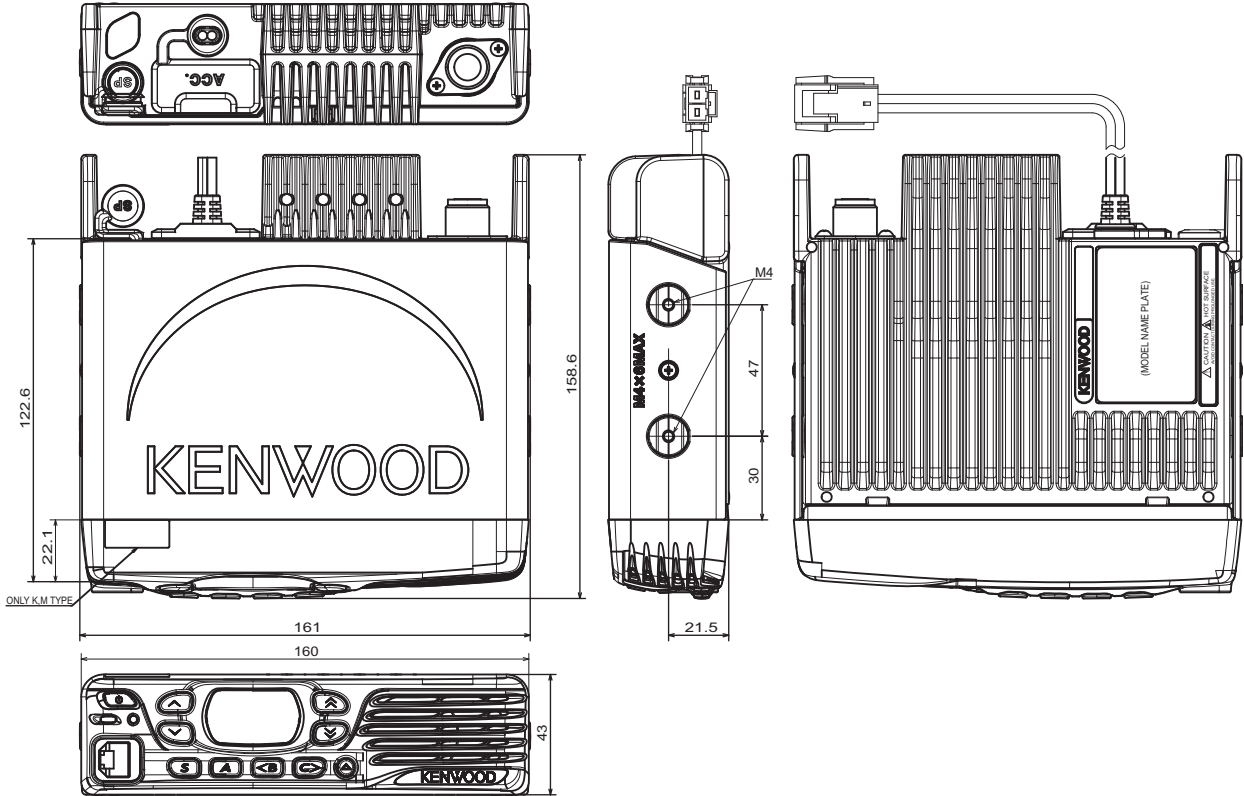
- (1) Start up the firmware programming software (Updater).
- (2) Set the communications speed (normally, 115200 bps) and communications port in the configuration item.
- (3) Press and hold the [A] key while turning the transceiver power ON. Then, the orange LED turns on and the 7-segment LED displays "PG" on transceiver.
- (4) Press "write" button in the window. When the transceiver starts to receive data, the orange LED turns to green.
- (5) If writing ends successfully, the green LED turns to red.

#### Note:

- This mode cannot be entered if the Firmware Programming mode is set to Disable in the Programming software.
- Normally, write in the high-speed mode.

## 2.3 INSTALLATION

### External View



#### 2.3.1 Connection Cable (KCT-60: Option)

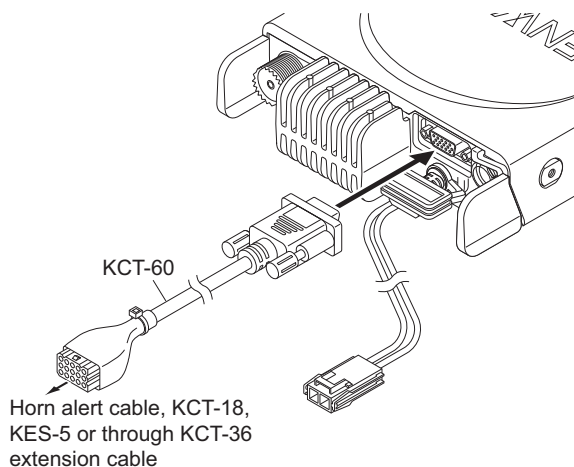
The KCT-60 connection cable kit is used to connect the transceiver to a Horn alert cable, KCT-18 (Ignition sense cable), KES-5 (External speaker), or through the KCT-36 extension cable.

##### 2.3.1.1 Installing the KCT-60 (Connection cable) in the transceiver

- (1) Remove the ACC. cap on the rear of the transceiver.
- (2) Connect the D-sub connector of the KCT-60 to the D-sub 15-pin terminal of the transceiver.
- (3) Connect the 15-pin connector of the KCT-60 to a Horn alert cable, KCT-18, KES-5, or through a KCT-36 extension cable.

#### Note:

You must set up using the KPG-166D.



#### 2.3.1.2 Terminal function

D-sub 15-pin Pin No.	Name	Molex 15-pin Pin No.
1	SB	1
2	IGN	2
3	PA or External SP	12
4	DETO	4
5	DATAI	5
6	FNC1	9
7	FNC2	11
8	FNC3	7
9	FNC4	6
10	FNC5	8
11	FNC6	10
12	5MS	NC
13	HR1	13
14	HR2	14
15	GND	3

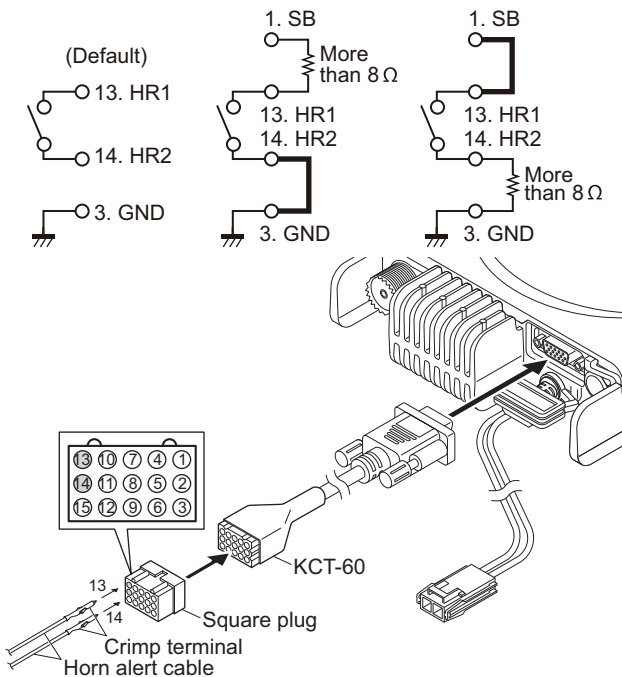
### 2.3.2 Horn Alert Function

The Horn alert function (max. 2A drive) is enabled by installing the KCT-60 in the transceiver.

#### 2.3.2.1 Installation Procedure

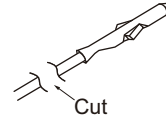
- (1) Remove the ACC. cap on the rear of the transceiver.
- (2) Connect the D-sub connector of the KCT-60 to the D-sub 15-pin terminal of the transceiver.
- (3) Insert the two crimp terminals of the Horn alert cable to pins 13 and 14 of the square plug.
- (4) Connect the square plug to the 15-pin connector of the KCT-60.
- (5) Connect the remaining two Horn alert cables to your car Horn alert signal control.

The internal FET switch can be controlled by turning the HA function on/off and by using a signaling decode output. The maximum current of HA is 2A. This FET switch is the open drain circuit. Therefore, a DC power supply is necessary to use the HR1. The voltage range is from 5V to 16V.

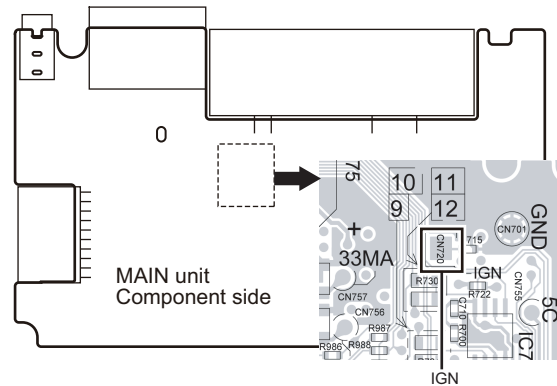


#### ■Installation Procedure: Method A

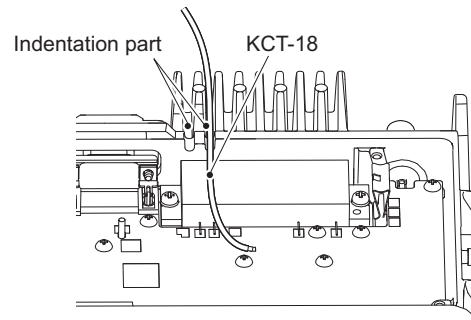
- (1) Remove the two screws on both the right and left sides of the transceiver, then remove the cabinet and top packing from the transceiver.
- (2) Cut the crimp terminal side of the KCT-18 using a pair of nippers or similar tool.



- (3) Solder the cable side cut in the above step 3 to the "IGN" pad on the Main unit.

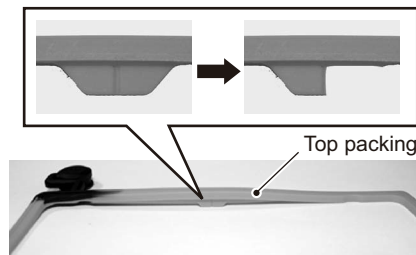


- (4) Dress the KCT-18 cable as shown in the figure. The KCT-18 cable needs to pass through one of two indentations located on the rear panel of the transceiver.



- (5) Cut off the projection of the top packing using a pair of nippers or similar tool.

If the KCT-18 cable is dressed to be routed through the indentations on the right side in step 5, the right side of the projection needs to be cut off. If the KCT-18 cable is dressed to be routed through the indentations on the left side, the left side of the projection needs to be cut off. Following is a figure presenting an example for when the right side of the projection is cut off.



- (6) Reinstall the top packing. Check the correct fitting of the top packing, then reinstall the cabinet and two screws for the right and left sides.
- (7) Connect the other side of the KCT-18 to the ignition line of the car.

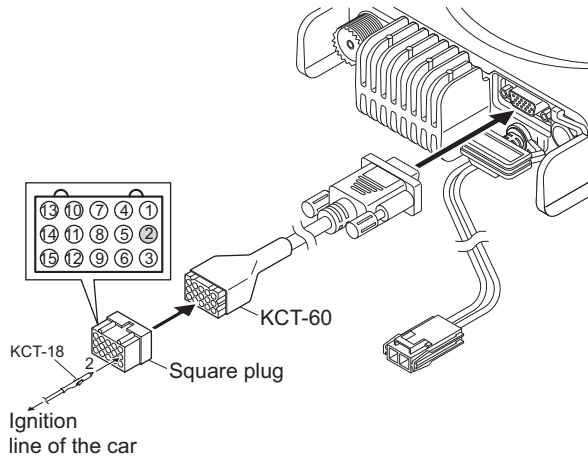


**Installation Procedure: Method B**

- (1) Remove the ACC. cap on the rear of the transceiver.
- (2) Connect the D-sub connector of the KCT-60 to the D-sub 15-pin terminal of the transceiver.
- (3) Insert the crimp terminal side of the KCT-18 to pin 2 of the square plug.
- (4) Connect the square plug to the 15-pin connector of the KCT-60.
- (5) Connect the other side of the KCT-18 to the ignition line of the car.

**Note:**

You must set up using the KPG-166D.



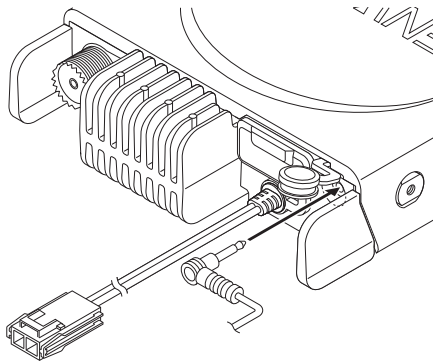
**2.3.4 External Speaker (Option)**

**2.3.4.1 KES-3**

The KES-3 is an external speaker for the 3.5-mm-diameter speaker jack.

**Connection procedure**

- (1) Remove the speaker-jack cap on the rear of the transceiver.
- (2) Connect the KES-3 to the 3.5-mm-diameter speaker jack on the rear of the transceiver.



**2.3.4.2 KES-5**

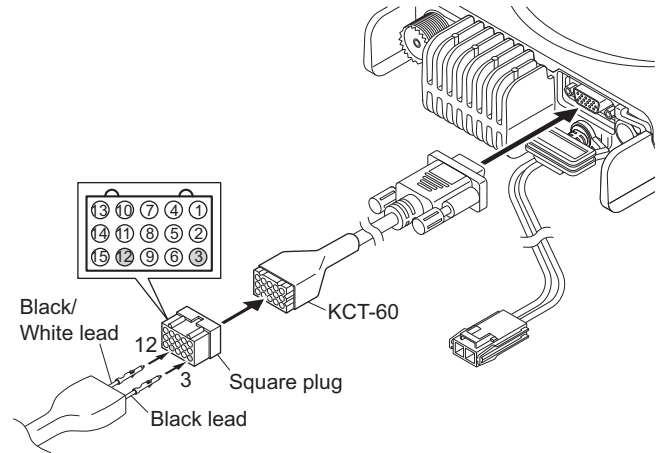
External speaker KES-5 can be installed for KCT-60.

**Connection procedure**

- (1) Remove the ACC. cap on the rear of the transceiver.
- (2) Connect the D-sub connector of the KCT-60 to the D-sub 15-pin terminal of the transceiver.
- (3) Insert the two crimp terminals of the KES-5 to pins 3 and 12 of the square plug.
- (4) Connect the square plug to the 15-pin connector of the KCT-60.

**Note:**

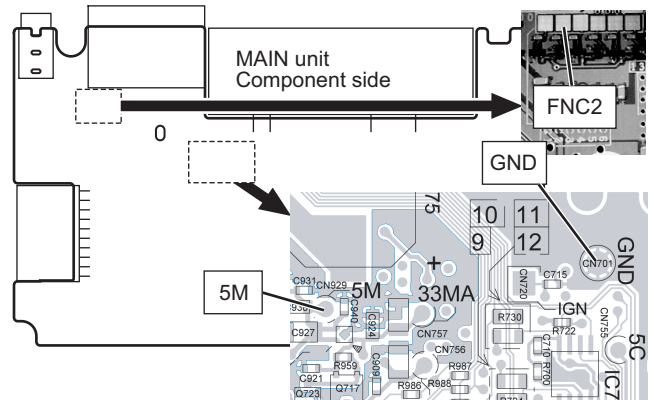
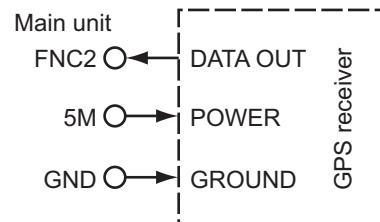
- You must set up using the KPG-166D.  
Before the external speaker can be used, you must assign one of the keys as "External Speaker", using the KPG-166D.
- This also applicable to public address provide you must assign one of the keys as "Public Address", using the KPG-166D.



**2.3.5 GPS Receiver Connection**

**2.3.5.1 Connecting the GPS receiver**

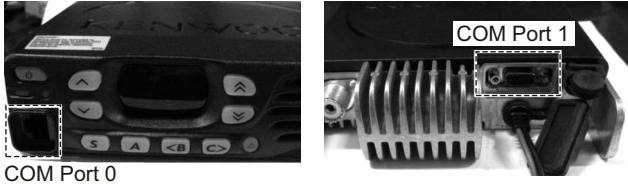
(1) Soldering position



(2) Refer to FNC2 (RXD) of "2.3.7 Changing Serial Port Level".

### 2.3.6 Extended Function: COM Port 0 and COM Port 1

Location of COM Port 0 and COM Port 1 of the transceiver is shown below.



You must configure the transceiver COM Port 0 and COM Port 1 using the KPG-166D.

When you set as "Data", the Function port 1 and 2 will be automatically fixed as Input ports.

The reason for this is because function port 1 (TXD) and 2 (RXD) share the same circuit path of TXD and RXD line.

### 2.3.7 Changing Serial Port Level

#### 2.3.7.1 Change FNC1 (TXD) and FNC2 (RXD) of D-SUB 15-pin connector from TTL level to RS-232C level

FNC1 (TXD /6pin ) and FNC2 (RXD /7pin ) of D-SUB 15-pin connector are configured at the TTL level as the default value. But you can change these serial port level to RS-232C level through the RS-232C level converter IC (IC704) by configuring the port.

##### ■FNC1 (TXD)

Remove the R761 chip jumper and solder the clip jumper to R767.

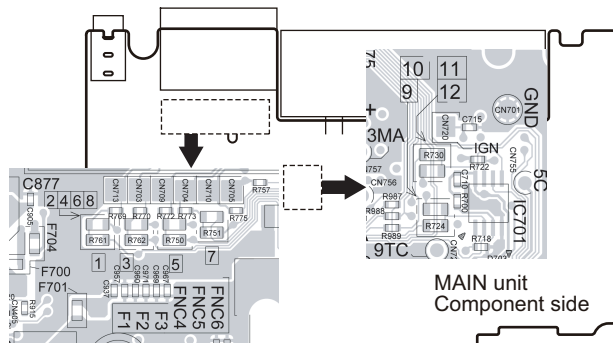
	TTL level	RS-232C level
R761[1] *1	0Ω chip jumper.	open
R767[2] *1	open	0Ω chip jumper.

##### ■FNC2 (RXD)

Remove the R724 and R762 chip jumpers and solder the chip jumpers to R725 and R756.

	TTL level	RS-232C level
R724[9], R762[3] *1	0Ω chip jumper.	open
R725[10], R756[4] *1	open	0Ω chip jumper.

\*1: The value in square bracket [ ] is the silk print number on the Main unit.

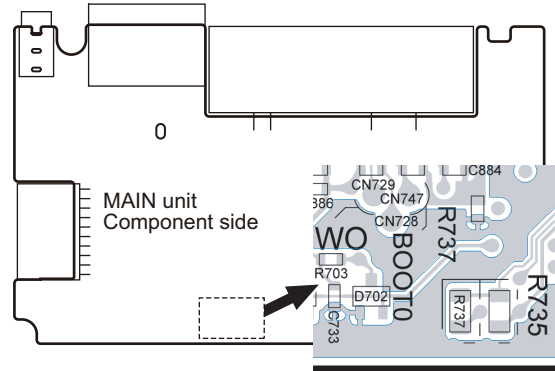


### 2.3.8 Changing of Signal Type

#### 2.3.8.1 Change signal input of D-SUB connector from DI to MIC

The input (5pin) of D-SUB 15-pin connector is configured at the DI as the default value.

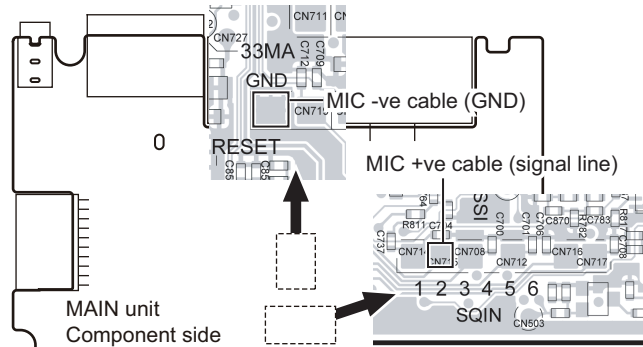
Remove the R737 chip jumper and solder the chip jumper to R735.



### 2.3.9 Emergency MIC

#### 2.3.9.1 Installation Procedure

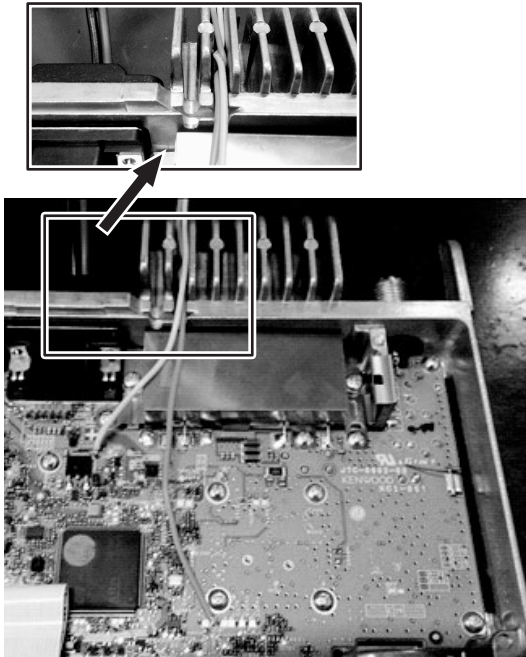
- Remove the two screws on both the right and left sides of the transceiver, then remove the cabinet and top packing from the transceiver.
- solder the MIC connection cable as below
  - solder the MIC +ve cable (signal line) to EMGMIC solder pad
  - solder the -ve cable (GND) to GND solder pad



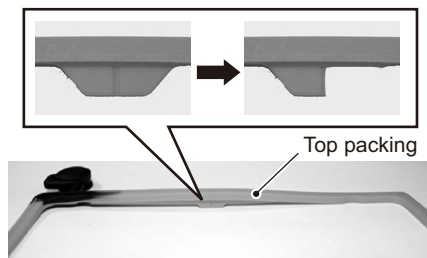
#### Note:

You must set up using the KPG-166D.

- (3) Dress the cable as shown in the figure. The cable needs to pass through one of two indentations located on the rear panel of the transceiver.



- (4) Cut off the projection of the top packing using a pair of nippers or similar tool.  
If the cable is dressed to be routed through the indentations on the right side in step 4, the right side of the projection needs to be cut off.  
If the cable is dressed to be routed through the indentations on the left side, the left side of the projection needs to be cut off.  
Following is a figure presenting an example for when the right side of the projection is cut off.



- (5) Reinstall the top packing. Check the correct fitting of the top packing, then reinstall the cabinet and two screws for the right and left sides.

## 2.4 CIRCUIT DESCRIPTION

### 2.4.1 Frequency Configuration

The receiver utilizes double conversion. The first IF is 49.95MHz and the second IF is 450kHz. The first local oscillator signal is supplied from the PLL circuit.

The PLL circuit in the transmitter generates the necessary frequencies. Figure 1 shows the frequencies.

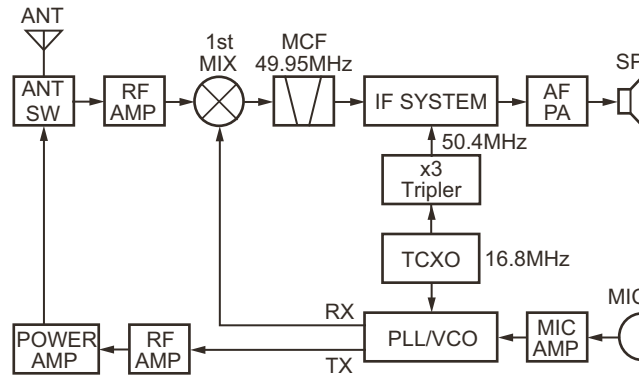


Fig.1 Frequency configuration

### 2.4.2 Receiver System

The receiver is double conversion superheterodyne.

The frequency configuration is shown in Figure 1.

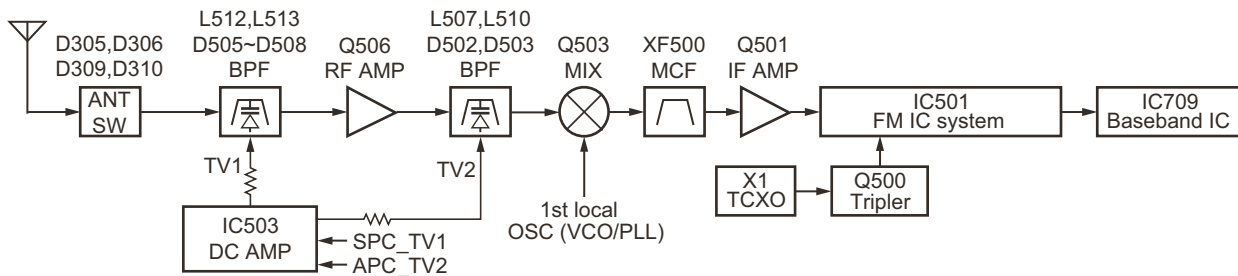


Fig.2 Receiver system

#### 2.4.2.1 Front-end RF Amplifier

An incoming signal from the antenna is applied to an RF amplifier (Q506) after passing through a transmit/receive switch circuit (D305, D306, D309 and D310), BPF (L512, L513, and varactor diodes: D505, D506, D507, D508).

After the signal is amplified (Q506), the signal is filtered by a BPF (L507, L510 and varactor diodes: D502, D503) to eliminate unwanted signals before it is passed to the first mixer.

The voltage of these diodes are controlled by the TV according to the channel frequency. (See Figure 2)

#### 2.4.2.2 First Mixer

The signal from the RF amplifier is heterodyned with the first local oscillator signal from the PLL frequency synthesizer circuit at the first mixer (Q503) to create a 49.95MHz first intermediate frequency (1st IF) signal. The first IF signal is then fed through one pair of monolithic crystal filter (MCF: XF500) to further remove spurious signals.

#### 2.4.2.3 IF Amplifier Circuit

The first IF signal is amplified by Q501, and enters IC501 (FM processing IC). The signal is heterodyned again with a second local oscillator signal within IC501 to create a 450kHz second IF signal. The second IF signal is fed through a 450 kHz filter in IC501 to further eliminate unwanted signals before it is amplified and FM detected in IC501.

### 2.4.2.4 AF Signal System

The detection signal from FM IC (IC501) goes to the baseband IC (IC709) DISC input (pin 16) after pass through IC500 for characterizing the signal.

- **Analog signal**

The demodulated AF signal pass through IC709 with the signal processing and output at AUDIO (pin26) to the pre-AMP(IC711) before the Audio amplifier (IC719). The AF signal from IC719 switches between the internal speaker and speaker jack (J701) output.

- **DMR (Digital signal)**

The demodulated 4L-FSK signal obtained from IC501 is decoded in the baseband IC (IC709).

Decoded signal is fed into microprocessor (IC714) and converted to PCM audio signal, and return to baseband IC (IC709) for converting to audio signal.

This audio signal will output at AUDIO (pin26) to the pre-AMP before the Audio amplifier (IC719).

The AF signal from IC719 switches between the internal speaker and speaker jack (J701) output.

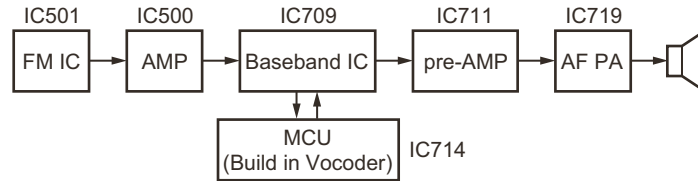


Fig.3 AF signal system

### 2.4.2.5 Squelch Circuit

Part of the AF signal goes a rectifier circuit to produce a DC voltage corresponding to the noise level after filtering and amplification. There are 2 Noise filters, use for analog wide 5k/ wide 4k mode and analog narrow/ DMR mode respectively. If W\_/N is high, Analog wide 5k/ wide 4k noise filter is selected and vice-versa. The selection of different noise filter is by 3 transistor (Q509,Q510,Q511).

This DC voltage send to MCU (IC714) SQIN input pin.

The MCU controls squelch according to the voltage (SQIN) level.

The signal from the RSSI pin of IC501 is monitored. The electric field strength of the receive signal can be known before the SQIN voltage is input to the MCU, and the scan stop speed is improved.

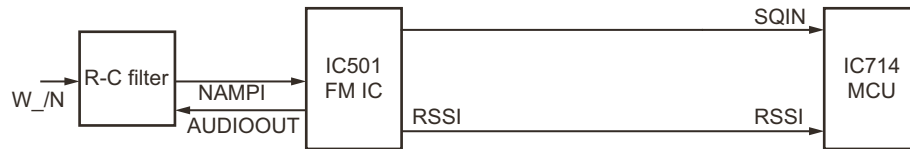


Fig.4 Squelch circuit

### 2.4.3 Transmitter System

#### 2.4.3.1 Outline

The transmitter circuit produces and amplifies the desired frequency directly. It FM-modulates the carrier signal by means of a varicap diode.

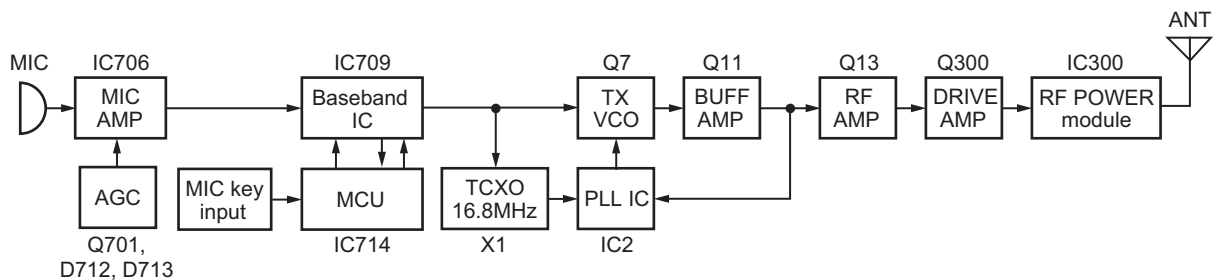


Fig.5 Transmitter system

#### 2.4.3.2 Power Amplifier Circuit

The transmit output signal from the VCO passes through the transmission/reception selection diode (D16) and amplified by Q300. The amplified signal goes to the RF power module (IC300) through a low-pass filter.

The lowpass filter removes unwanted high-frequency harmonic components, and the resulting signal is goes the antenna terminal.

### 2.4.3.3 APC Circuit

The automatic transmission power control (APC) circuit detects part of a final amplifier output with a coupler circuit and applies a voltage to IC301.

IC301 compares the APC control voltage (APC\_TV2) generated by the baseband IC (IC709) with the detection output voltage.

IC301 generates the voltage to control IC300 and stabilizes transmission output.

The APC circuit is configured to protect over current of Q300 and IC300 due to fluctuations of the load at the antenna end and to stabilize transmission output at voltage and temperature variations.

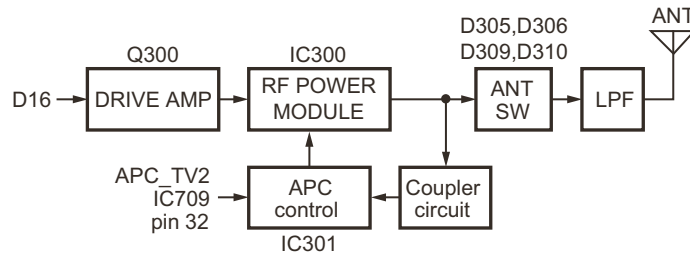


Fig.6 APC circuit and Power amplifier circuit

### 2.4.4 PLL Frequency Synthesizer

The PLL circuit generates the first local oscillator signal for reception and the RF signal for transmission.

#### 2.4.4.1 PLL Circuit

The frequency step of the PLL is 2.5, 3.125, 5.0 or 6.25 kHz. A 16.8MHz reference signal is divided at IC2 by a fixed counter to produce the reference frequency.

The voltage controlled oscillator (VCO) feedback output is divided by a programmable counter in IC2.

The 2 signals are phase compared, filtered through a low pass filter and passed to VCO to control the oscillator frequency.

#### 2.4.4.2 VCO Circuit

The operating frequency is generated by Q7 in transmit mode and Q5 in receive mode.

The oscillator frequency is controlled by applying the control voltage, which is obtained from the phase comparator, to varactor diodes (D5, D9, D10, D11 in transmit mode and D7, D12, D13, D14 in receive mode).

The TXRX pin is set "High" in receive mode causing turn on Q9. And TXRX pin is set "Low" in transmit mode causing turn on Q6.

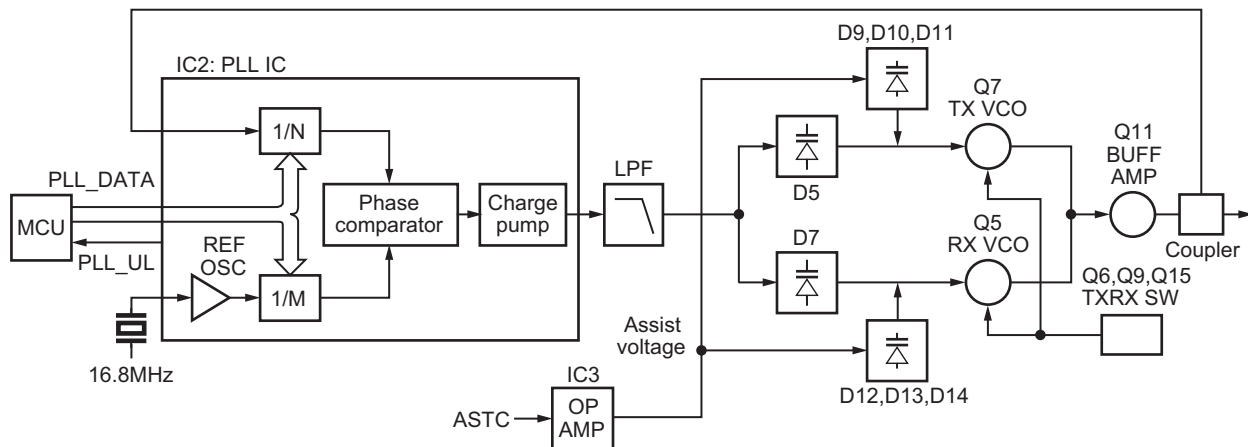


Fig.7 PLL and VCO circuit

#### 2.4.4.3 Unlock Circuit

If low level appears at the "LD" pin of IC2, then PLL an unlock condition occurs.

It causes the voltage applied to the "PLL\_UL" pin of the microprocessor to go low.

When the microprocessor detects this condition, the transmitter is disabled by ignoring the push-to-talk switch input signal.

### 2.4.5 Control Circuit

The MCU carries out the following tasks:

- (1) Controls the FM IC (IC501).
- (2) Controls the baseband IC (IC709).
- (3) Controls the PLL (IC2) & TX/RX outputs.
- (4) Controls IO expender through I2C level converter.
- (5) Controls the display unit.

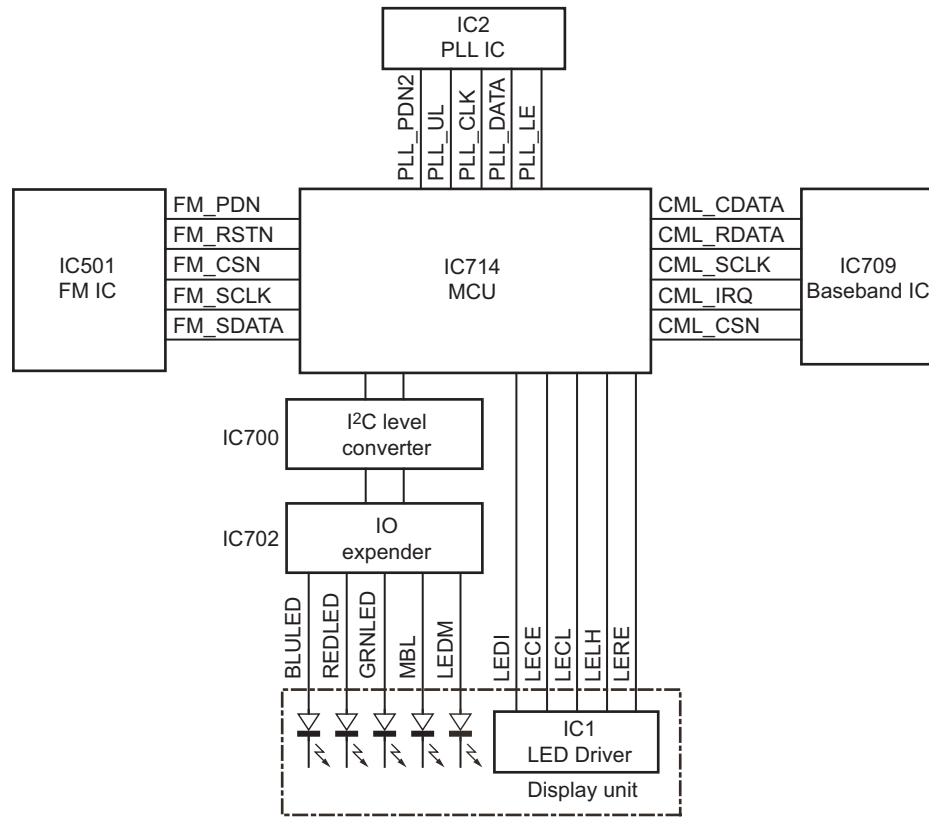


Fig.8 Control circuit

#### 2.4.5.1 Memory Circuit

The transceiver has an 4M-bit Flash memory (IC729). The Flash memory contains adjustment data. The MCU (IC714) controls the Flash memory through three serial data lines.

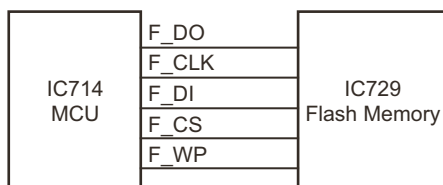


Fig.9 Memory circuit

#### 2.4.5.2 Display Circuit

The MCU (IC714) controls the Display 7-segment LED and LEDs.

When power is on, the MCU will use the MBL line to control the key backlight LEDs.

When the transceiver is busy, the GLED line goes high, Q1 turns on and the green LED (D23) lights after Q4 turn on. In transmit mode, the RLED line goes high, Q2 and Q8 turns on and the red LED (D23) lights.

BLED will be set high when the function select (FPU setting) is on, Q6 turn on and the blue LED (D22) lights.

The dimmer function is controlled by the switch Q5. The LED driver (IC1) controls the functions of the 7-segment LED through the LEDI, LECE, LECL, LELH lines from the MCU.

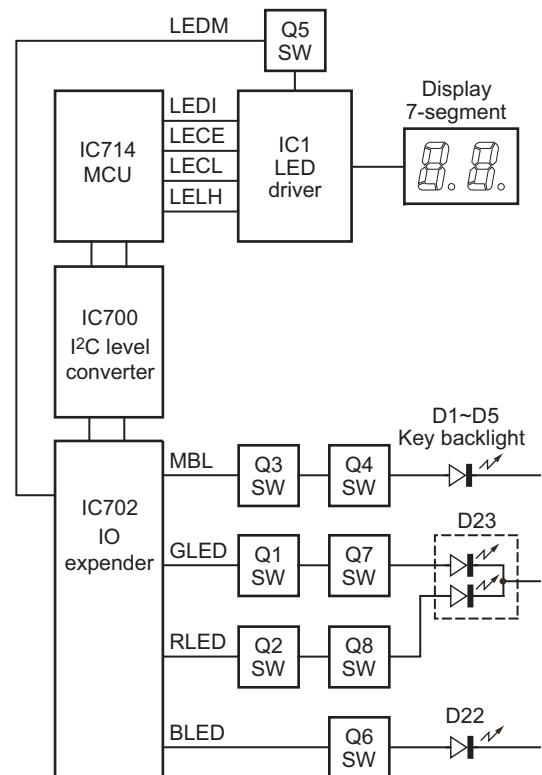


Fig.10 Display circuit

### 2.4.5.3 Key Matrix Circuit

The front panel has function keys. Each of them is connected to a cross point of a matrix of the KMI1 to KMO3 ports of the micro-processor.

The KMO1 to KMO3 ports are always high, while the KMI1 to KMI3 ports are always low.

The microprocessor monitors the status of the KMI1 to KMO3 ports. If the state of one of the ports changes, the microprocessor assumes that the key at the matrix point corresponding to that port has been pressed.

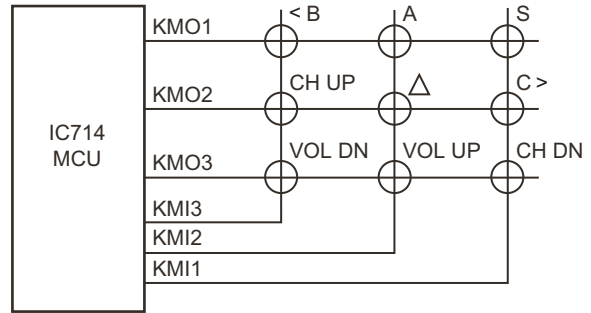


Fig.11 Key matrix circuit

### 2.4.6 Signaling Circuit

#### 2.4.6.1 Encode

##### (1) Low-speed data (QT, DQT)

Low-speed data is output from pin 40 (LSDO) of the MCU (IC714).

The signal passes through a low-pass CR filter. The signal is mixed with the audio signal and goes to the VCO and TCXO (X1) modulation input after signal processing in the baseband IC (IC709).

##### (2) High-speed data (2-tone/5-tone)

High-speed data (HSD) is output from pin 41 (HSDO) of the MCU.

The signal passes through a low-pass CR filter. TX deviation making an adjustment by microprocessor is applied to the baseband IC (IC709).

The signal is mixed with the audio signal and goes to the VCO and TCXO.

The side tone is audio output of baseband IC(IC709) at the same time to audio power amplifier and then to the speaker.

##### (3) MSK / DTMF

MSK and DTMF signal is self generated by the baseband IC(IC709).

The TX deviation adjustment is done by the output gain of baseband IC(IC709), and is routed to the VCO.

When encoding MSK/DTMF, the microphone-input signal is muted.

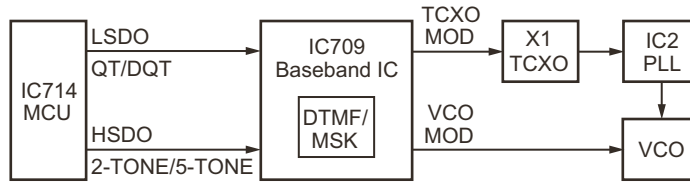


Fig.12 Encode

#### 2.4.6.2 Decode

##### (1) Low-speed data (QT, DQT)

The demodulated signal from the FM IC (IC501) will input to baseband IC(IC709) to remove frequency above 300Hz.

The signal is input to pin 27(LSDI) of the MCU.

The MCU digitizes this signal, performs processing such as DC restoration, and decodes the signal.

##### (2) High-speed data (2-tone/5-tone)

The demodulated signal from the FM IC (IC501) is amplified by IC500 to remove frequency of 3kHz or above and 300Hz or below.

The MCU digitizes this signal and decodes the signal after receive the signal at pin 26(HSDI).

##### (3) MSK / DTMF

The demodulated signal from the FM IC(IC501) will input to baseband IC(IC709), then the baseband IC will decode and send the decode information to MCU by the data line.

The MCU then processes the decoded information.

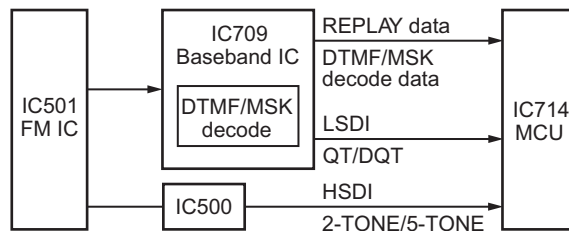


Fig.13 Decode



### 2.4.6.3 DMR Receiving

- For Digital Data Mode:  
The demodulated signal from IC501 (Pin13) feed into baseband IC (Pin 16) for DMR decoding.  
The decoded digital data will pass to MCU through C-BUS. MCU determines whether or not to output sound from speaker by checking if the data match.
- For Digital Voice Mode:  
If the digital data match in MCU, the digital voice payload data will goes into Vocoder in MCU for conversion to PCM.  
The PCM data will go to baseband IC through SPI input, where it will be converted to analog by DAC.  
Analog voice will be filtered and finally send to audio amplifier.

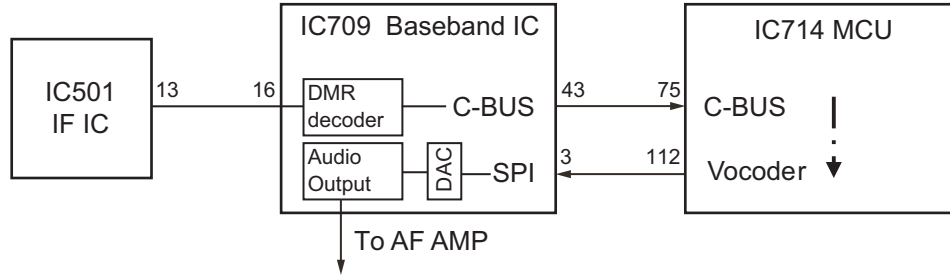


Fig.14 DMR receiver system

### 2.4.6.4 DMR Transmitting

- For Digital Data Mode:  
The digital data will be generated by MCU, where it will be pass to baseband IC, through C-BUS for encoding process. The encoded data finally will transmit through TCXO and VCO modulation.
- For Digital Voice Mode:  
The analog voice from mic will go to ADC (after audio filter) to convert to PCM data.  
The PCM data will send to Vocoder through SPI output.  
Vocoder will convert the PCM to DMR protocol, where it will be sent to baseband through C-BUS.  
In baseband IC, the data will be encoded and finally transmit through TCXO and VCO modulation.

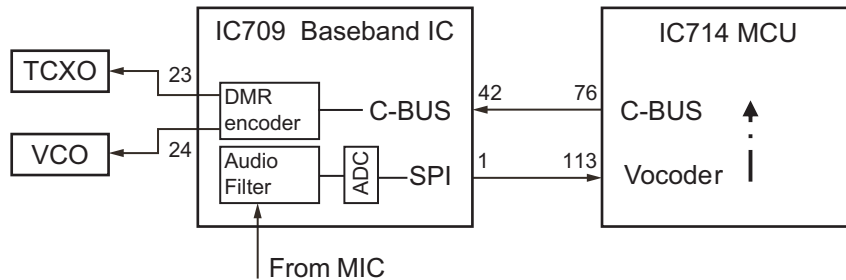


Fig.15 DMR transmit system

## 2.4.7 Power Supply Circuit

- When the power switch on the display unit is pressed, the power port on the display unit which is connected pin 116 (POWKEY), goes low, then pin90 (SBC) goes high, Q718 turns on, SB SW (Q719) turns on and power (SB) is supplied to the transceiver.
- When the DC power supplied to the transceiver, the voltage regulator IC (IC720 & IC718) and supply into the MCU VDD and reset voltage detect IC (IC723). IC723 will generate signal (RESET) into the reset terminal on the MCU (IC714) to carry out a power on reset.
- When the DC power voltage decreases from normal voltage, the INT voltage detector IC (IC722) will set to high on MCU port 141 (BATT\_INT). If B line becomes less than about 8.5V, MCU will send the backup data to Flash memory (IC729) and go into STOP mode.

This circuit has an overvoltage protection circuit. If a DC voltage of 18V or higher is applied to the base of Q712, this voltage turns Q712 on and sets port 141 (BATT\_INT) to low. As a result port 90 (SBC) is low, and turns Q718 and Q719 (SB) off.

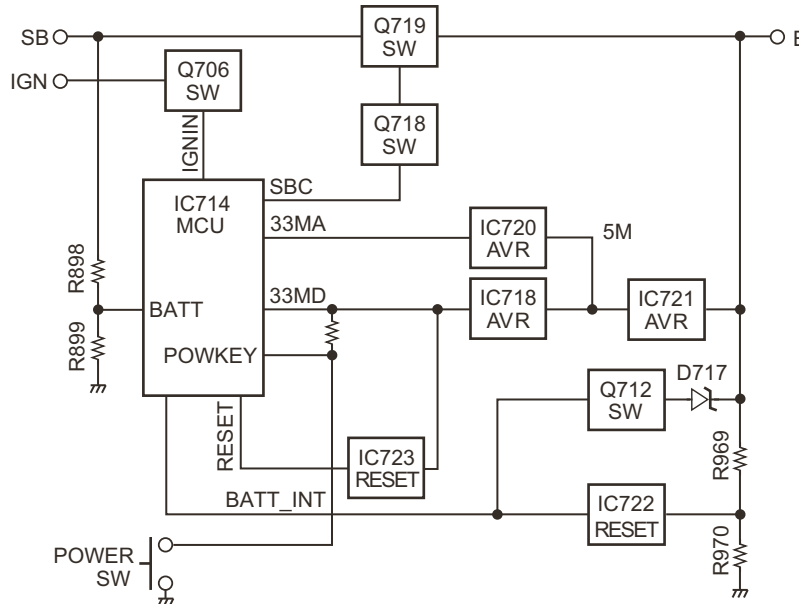


Fig.16 Power supply circuit

## 2.5 SEMICONDUCTOR DATA

### 2.5.1 MCU: 2F405ZGT6KGFA (MAIN unit IC714)

Pin No.	Port Name	I/O	Function
1	PLL_UL	I	PLL Unlock detect
2	FM_CSN	O	FM IC Chip select
3	FM_SCLK	O	FM IC Clock
4	FM_SDATA	I/O	FM IC Data In/Out
5	FM_RSTN	O	FM IC Hardware Reset
6	VBAT	-	33MD
7	FM_PDN	O	FM IC Power down
8	NC	O	No connection
9	NC	O	No connection
10	BSFT	O	Beat Shift
11	/H_L	O	TX Power Select
12	NC	O	No connection
13	NC	O	No connection
14	RSSI	I	RSSI input
15	SQIN	I	Squelch Input
16	VSS	-	GND
17	VDD	-	33MD
18	BEEP	O	Beep for Side Tone
19	FWD	I	Forward power Detect

Pin No.	Port Name	I/O	Function
20	REV	I	Reverse Power Detect
21	Ramp_Offset	O	Ramp offset Voltage
22	CVIN	I	CV voltage read
23	XIN	I	Crystal (19.2MHz)
24	NC	O	No connection
25	RESET	I	MCU Reset pin
26	HSDI	I	High-Speed Data Input
27	LSDI	I	Low-Speed Data Input
28	TEMP_1	I	Temperature 1
29	TEMP_2	I	Temperature 2
30	VDD	-	33MD
31	VSSA	-	GND
32	VREF+	-	33MA
33	VDDA	-	33MA
34	TEST_TX	O	
35	TEST_RX	I	
36	FNC_1	O	Function P1(TXD0)
37	FNC_2	I	Function P2(RXD0)
38	VSS	-	GND

Pin No.	Port Name	I/O	Function
39	VDD	-	33MD
40	LSDO	O	Low-Speed Data Output
41	HSDO	O	High-Speed Data Output
42	NC	O	No connection
43	TEMP_3	I	Temperature 3
44	NC	O	No connection
45	NC	O	No connection
46	BATT	I	BATT Voltage Detect
47	NC	O	No connection
48	BOOT1	I	Test Point to enable Bootloader
49	9RC	O	9R Control
50	5CC	O	5C Control
51	VSS	-	GND
52	VDD	-	33MD
53	PCBVER	I	PCB Version Check
54	SIM1	I	Shimuke Port 1
55	SIM2	I	Shimuke Port 2
56	TEST_1	I/O	
57	TEST_2	I/O	
58	HORN	O	Horn Alert
59	33BC	O	33B Control
60	/INT15P	I	I/O Expander Interrupt
61	VSS	-	GND
62	VDD	-	33MD
63	KMO1	O	Key Matrix Output 1
64	KMO2	O	Key Matrix Output 2
65	KMO3	O	Key Matrix Output 3
66	KMI1	I	Key Matrix Input 1
67	KMI2	I	Key Matrix Input 2
68	KMI3	I	Key Matrix Input 3
69	I2CCK	I/O	I/O Expander I2C Clock
70	I2CDT	I/O	I/O Expander I2C Data
71	VCAP_1	-	2.2uF
72	VDD	-	33MD
73	CML_SSOOUT	I	Audio Codec Chip Select
74	CML_EPSCLK	I	Audio Codec Clock
75	CML_EPSO	O	Audio Codec Data Out
76	CML_EPSI	I	Audio Codec Data In
77	S2GDT	O	No connection
78	G2SDT	I	No connection
79	NC	O	No connection
80	NC	O	No connection
81	NC	O	No connection
82	BUCNT1	O	PTT/TXD buffer control
83	VSS	-	GND

Pin No.	Port Name	I/O	Function
84	VDD	-	33MD
85	MKEYI	I	DTMF MIC key input
86	BUCNT2	O	DTMF MIC buffer control
87	PA	O	Public Address
88	IGNIN	I	Ignition Sense
89	SYSCLK2	I	System Clock 2
90	SBC	O	SB Control
91	PTT	I	PTT
92	HOOK	I	Hook
93	MKEYO	O	DTMF MIC Key Output
94	VSS	-	GND
95	VDD	-	33MD
96	CML_CDATA	O	C-Bus Command Data
97	CML_RDATA	I	C-Bus Command Reply Data
98	CML_SCLK	O	C-Bus Clock
99	CML_CSN	O	C-Bus Chip Select
100	SP_MUTE	O	Speaker Mute
101	TXD	O	Serial Data to Mic Jack
102	RXD	I	Serial Data from Mic Jack
103	TXRX	O	TX / RX Switch
104	AMP_SW	O	AF Amplifier
105	SWDIO	I/O	
106	VCAP2	-	2.2uF
107	VSS	-	GND
108	VDD	-	33MD
109	SWCLK	I/O	
110	F_CS	O	Flash Memory Chip Select
111	F_CLK	O	Flash Memory Clock
112	F_DI	I	Flash Memory Data In
113	F_DO	O	Flash Memory Data Out
114	F_WP	O	Flash Memory Write Protect
115	CML_IRQ	I	Baseband IC IRQ(CML_pin8)
116	POWKEY	I	Power Key Input
117	FNC_4	I	Function P4(CTS0)
118	FNC_3	O	Function P3(RTS0)
119	SCR_SW	O	SCR Switch
120	VSS	-	GND
121	VDD	-	33MD
122	33CC	O	33C Control
123	MIC1MUTE	O	MIC1 Mute Switch
124	MIC2MUTE	O	MIC2 Mute Switch
125	LEDI	O	LED Data
126	LECE	O	LED Enable
127	LECL	O	LED Clock
128	LELH	O	LED Latch

Pin No.	Port Name	I/O	Function
129	NC (LERE)	I	No connection
130	VSS	-	GND
131	VDD	-	33MD
132	PLL_PDN2	O	PLL IC Power Down
133	SWO	O	
134	SRST	O	
135	PLL_DATA	O	PLL IC Data
136	PLL_CLK	O	PLL IC Clock
137	PLL_LE	O	PLL IC Enable
138	BOOT_0		Test Point to enable Bootloader
139	ASTSW	O	Assist Speed-up Switch
140	W_N	O	Wide/Narrow Squelch Switch
141	BATT_INT	I	MSU stop
142	CML_RESET	O	Audio Codec Reset
143	Power On Reset	I	33MD
144	VDD	-	33MD

## 2.6 COMPONENTS DESCRIPTION

### 2.6.1 Display Unit (X54-3890-21)

Ref. No.	Part Name	Description
IC1	IC	LED driver
Q1, Q2	Transistor	TX/Busy indication LED switch
Q3, Q4	Transistor	KEY backlight control switch
Q5, Q9	Transistor	LED dimmer control switch
Q6	Transistor	Indication LED switch
Q7, Q8	Transistor	TX/Busy indication LED switch
D1~D5	LED	KEY backlight
D20	Diode	Voltage protection
D22	LED	Indication
D23	LED	TX/Busy indication
D33	Zener diode	Surge protection
D37	LED	LED display

### 2.6.2 MAIN Unit (XC1-1072-70)

Ref. No.	Part Name	Description
IC1	IC	OP AMP (FREQ/MOD1)
IC2	IC	PLL IC
IC3	IC	CV/Assist DC amplifier
IC301	IC	APC DC amplifier
IC500	IC	DETA/HSD amplifier
IC501	IC	FM IC
IC502	IC	Voltage regulator (33MS)
IC503	IC	RF BPF DC amplifier
IC700	IC	I2C level shifter
IC701	IC	3.3V level shifter (RXD0/CTS0)

Ref. No.	Part Name	Description
IC702	IC	IO expander
IC703	IC	5V level shifter (TXD0/RTS0)
IC704	IC	RS-232C driver
IC706	IC	MIC amp/VREF
IC707	IC	19.2MHz buffer
IC709	IC	Baseband IC
IC710	IC	Voltage regulator (33BD)
IC711	IC	SPC/AF amp
IC713	IC	19.2MHz amplifier
IC714	IC	MCU
IC717	IC	Voltage regulator (9C)
IC718	IC	Voltage regulator (33MD)
IC720	IC	Voltage regulator (33MA)
IC721	IC	Voltage regulator (5M)
IC722	IC	Voltage detection (INT)
IC723	IC	Voltage detection (Reset)
IC724	IC	5V level shifter (MKEY/PTT)
IC725	IC	3.3V level shifter (MKEY/HOOK)
IC726	IC	Voltage regulator (33C)
IC729	IC	Flash Memory
Q3, Q4	FET	Assist filter control switch
Q5	FET	RX VCO
Q6	FET	TX/RX VCO switch
Q7	FET	TX VCO
Q9	Transistor	TX/RX VCO switch
Q10	Transistor	Ripple filter
Q11	Transistor	VCO buffer amp
Q13	Transistor	VCO common amp
Q15	Transistor	TX/RX VCO switch
Q300	FET	Drive amp
Q302	FET	DC switch (Drive Gate)
Q303	Transistor	DC switch control (Drive Gate)
Q304	Transistor	DC switch
Q306	FET	High/Low power switch
Q308	Transistor	DC switch control (ANT SW)
Q309	FET	DC switch (ANT SW)
Q500	Transistor	RX 2nd local amp
Q501	Transistor	1st IF amp
Q503	FET	Mixer
Q504	Transistor	Squelch charge switch
Q505	Transistor	Squelch charge control switch
Q506	Transistor	Front-end LNA
Q509~511	Transistor	Wide/Narrow switch
Q700, 701	FET	MIC mute switch

Ref. No.	Part Name	Description
Q702	Transistor	Horn alert control switch
Q703	FET	Horn alert switch
Q704	Transistor	DETO amp
Q705	FET	MOD2 switch
Q706	Transistor	Ignition sense control switch
Q707	Transistor	9R control switch
Q708	Transistor	9T control switch
Q709	Transistor	9R switch
Q710	Transistor	9T switch
Q711	Transistor	5C control switch
Q712, 713	Transistor	Overvoltage detect
Q714	FET	Speaker mute switch
Q715	FET	Scrambler switch
Q716	Transistor	5C switch
Q717	FET	33BA switch
Q718	Transistor	SB control switch
Q719	FET	SB switch
Q720	Transistor	AF amp switch
Q721	FET	5MS switch
Q722	Transistor	5MS control switch
Q723	Transistor	33BA control switch
Q725	Transistor	33LS switch
Q726	Transistor	33LS control switch
D5	Variable Capacitance Diode	TX VCO tune
D7	Variable Capacitance Diode	RX VCO tune
D9~11	Variable Capacitance Diode	TX VCO tune
D12~14	Variable Capacitance Diode	RX VCO tune
D15	Variable Capacitance Diode	Modulation Control (TX VCO)
D16, D17	Diode	TX/RX band switch
D300	Zener Diode	Voltage Protection
D304	Diode	Reverse power rectifier
D305, D306	Diode	ANT switch
D307, D308	Diode	Power rectifier
D309, D310	Diode	ANT switch
D502, D503	Variable Capacitance Diode	RF BPF tuning
D505~D508	Variable Capacitance Diode	RF BPF tuning
D510, D511	Diode	Voltage Protection

Ref. No.	Part Name	Description
D700~D702	Diode	Surge protection
D703	Diode	Reverse current prevention
D704~D711	Diode	Surge protection
D712, D713	Diode	Reverse Current Prevention
D717	Zener Diode	Voltage Protection
D718	Diode	Reverse Current Prevention
D720	Diode	Reverse Current Prevention
D721	Diode	Reverse Current Prevention
D722	Zener Diode	Voltage Protection
D723	Surge Absorber	Surge Protection
D724	Diode	Voltage Protection
D725, D726	Diode	Reverse Current Prevention

## 2.7 TERMINAL FUNCTION

### 2.7.1 Display unit (X54-3890-21)

Pin No.	Name	I/O	Function
<b>CN1</b>			
1	POWER	O	Detection output of power switch
2	MKEY	I/O	MIC data detection
3	PTT/TXD	I/O	PTT/PC serial data
4	HOOK/RXD	I/O	HOOK/PC serial data
5	ME	-	MIC ground
6	MIC	O	MIC signal output
7	GND	-	Ground
8	NC	-	-
9	LELH	I	LED latch input
10	LECL	I	LED clock input
11	LECE	I	LED enable input
12	LEDI	I	LED data input
13	5C	I	5V DC power supply
14	KMI3	O	Key matrix output 3
15	KMI2	O	Key matrix output 2
16	KMI1	O	Key matrix output 1
17	KMO3	I	Key matrix input 3
18	KMO2	I	Key matrix input 2
19	KMO1	I	Key matrix input 1
20	BLED	I	Blue LED control signal input
21	GLED	I	Green LED control signal input
22	RLED	I	Red LED control signal input
23	MBL	I	MIC backlight control signal input
24	LEDM	I	LED dimmer input
25	SP-	I	Speaker input -

Pin No.	Name	I/O	Function
26	SP-	I	Speaker input -
27	SP+	I	Speaker input +
28	SP+	I	Speaker input +
29	SB	I	Battery voltage DC supply
30	SB	I	Battery voltage DC supply
<b>J1(MIC Jack)</b>			
1	MBL	O	Backlight of Microphone
2	SB	O	Battery voltage DC supply
3	GND	-	Ground
4	PTT	I/O	PTT/ PC serial data from radio
5	ME	-	MIC ground
6	MIC	I	MIC signal input
7	HOOK	I	HOOK/ PC serial data to radio
8	DM	I/O	MIC data detection

### 2.7.2 Main unit (XC1-1072-70)

Pin No.	Name	I/O	Function
<b>CN700</b>			
1	SB	O	Battery voltage DC supply
2	SB	O	Battery voltage DC supply
3	SP-	O	Speaker input -
4	SP-	O	Speaker input -
5	SP+	O	Speaker input +
6	SP+	O	Speaker input +
7	LEDM	O	LED dimmer output
8	MBL	O	MIC backlight control signal output
9	REDLED	O	Red LED control signal output
10	GRNLED	O	Green LED control signal output
11	BLULED	O	Blue LED control signal output
12	KMO1	O	Key matrix output 1
13	KMO2	O	Key matrix output 2
14	KMO3	O	Key matrix output 3
15	KMI1	I	Key matrix input 1
16	KMI2	I	Key matrix input 2
17	KMI3	I	Key matrix input 3
18	5MS	O	5V DC power supply
19	LEDI	O	LED data output
20	LECE	O	LED enable output
21	LECL	O	LED clock output
22	LELH	O	LED latch output
23	LERE	O	LED reset output
24	GND	-	Ground
25	MIC	I	MIC signal input

Pin No.	Name	I/O	Function
26	ME	-	MIC ground
27	HOOK/RXD	I/O	HOOK/PC serial data
28	PTT/TXD	I/O	PTT/PC serial data
29	MKEY	I/O	MIC data detection
30	POWER	I	Detection input of power switch
<b>J700 (D-SUB 15pin)</b>			
1	SB	O	Battery voltage DC supply DC 13.6V±15%,1.0A max
2	ING	I	Ignition sens input,16.0V max
3	SP2	O	Speaker output
4	DETO	O	FM detector output, 500mVp-p
5	DATAI	I	External transmit signal input 200±50mVp-p
6	FNC1	I/O	Programable I/O (programmed by FPU) 1.0mA max.
7	FNC2	I/O	Programable I/O (programmed by FPU) 1.0mA max.
8	FNC3	I/O	Programable I/O (programmed by FPU) 1.0mA max.
9	FNC4	I/O	Programable I/O (programmed by FPU) 1.0mA max.
10	FNC5	I/O	Programable I/O (programmed by FPU) 1.0mA max.
11	FNC6	I/O	Programable I/O (programmed by FPU) 1.0mA max.
12	5MS	O	5V DC power supply, 100mA max
13	HR1	O	Horn alert signal output,16.0V/ 2.0A max.
14	HR2	O	Horn alert signal output,16.0V/ 2.0A max.
15	GND	-	Ground

### 2.7.3 Function Port Assignment

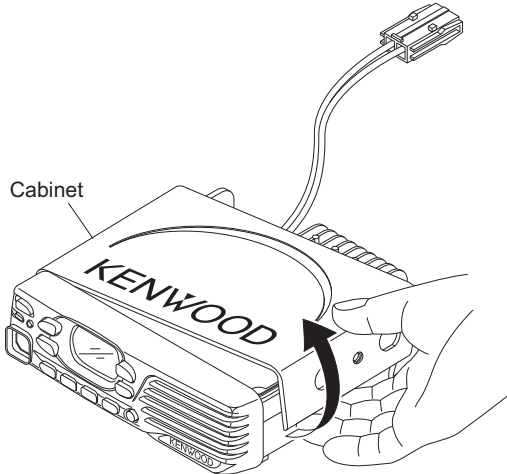
	GPS (NMEA)	
	Name	I/O
FNC1	None	O
FNC2	GPS (NMEA Input)	I
FNC3	-	-
FNC4	-	-

	GPS (NMEA)	
	Name	I/O
FNC5	-	-
FNC6	-	-
FNC7	-	-
FNC8	-	-

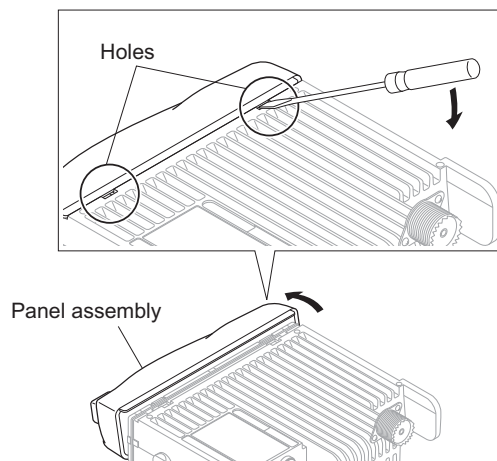
## SECTION 3 DISASSEMBLY

### 3.1 Disassembly Procedure

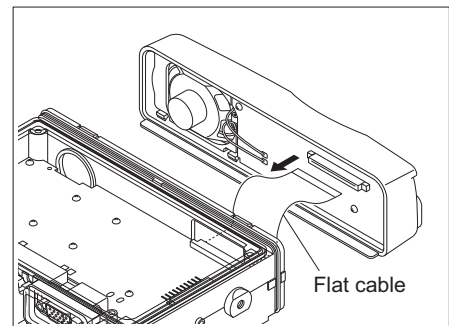
- (1) When removing the cabinet, first remove the two screws from the right and left with a phillips screwdriver. Then, hook your finger on the edge of the cabinet and pull it out until it is over the chassis protrusion. Remove the cabinet by prying the cabinet as shown below. Remove the shielding plate of the transceiver (E type only).



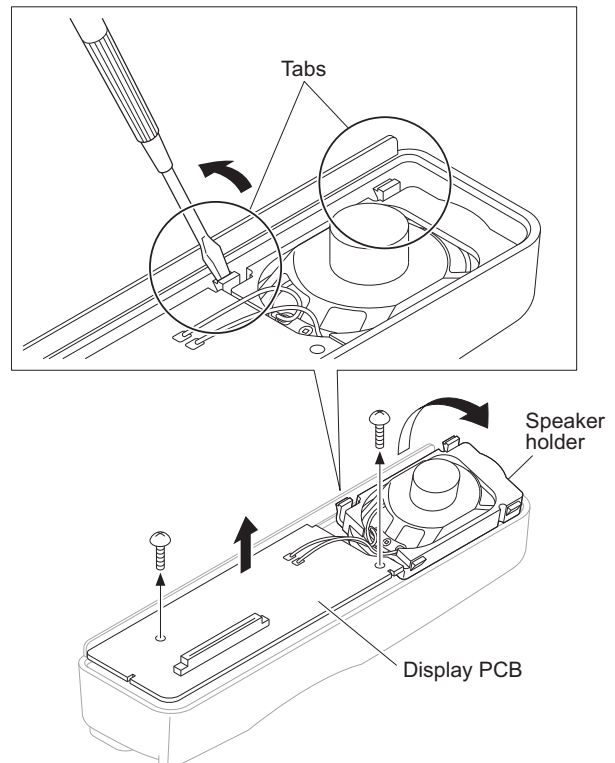
- (2) To remove the panel assembly, first turn the transceiver upside down. Then, insert a flat-head screwdriver into the holes of the chassis and tilt it in the direction as shown by the arrow.



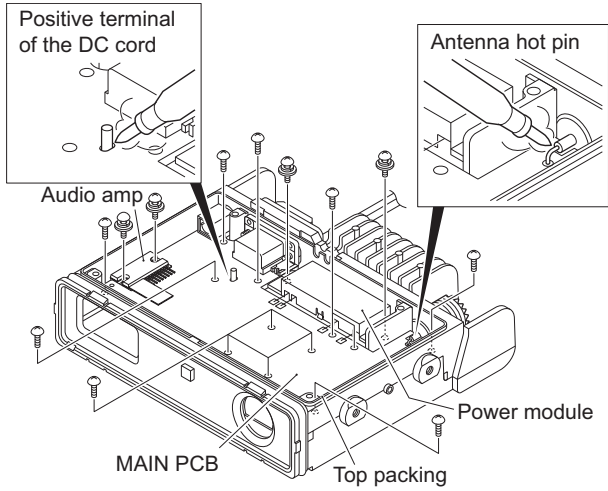
- (3) Disconnect the flat cable from connector of the panel assembly.



- (4) To remove the speaker holder, first remove the two screws from the display PCB using a phillips screwdriver. Then, insert a flat-head screwdriver under the tabs of the speaker holder and tilt it in the direction shown by the arrow. Remove the speaker from the front panel by turning it in the direction indicated, together with the speaker holder and display PCB.

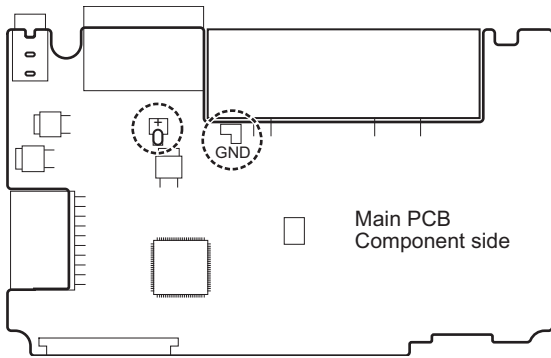


- (5) When removing the Main PCB, first remove the top packing.  
Then, remove the solder of the antenna hot pin and positive terminal of the DC cord.  
Remove the 17 screws from the Main PCB, power module, and audio amp.

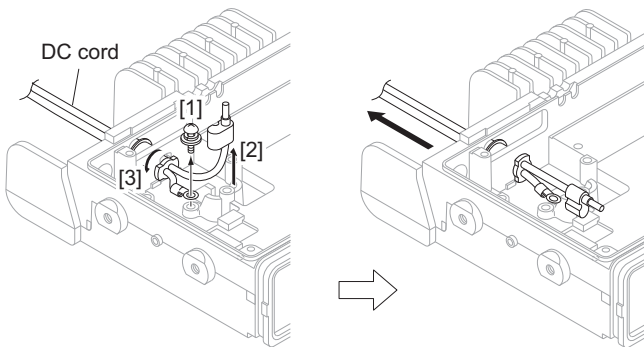


**Note:**

When you supply power to the Main PCB after removing the TX-RX PCB from the chassis, solder the positive and ground terminals of the DC cord (Recommendation: E30-3448-25) to the + and GND terminals of the Main PCB.

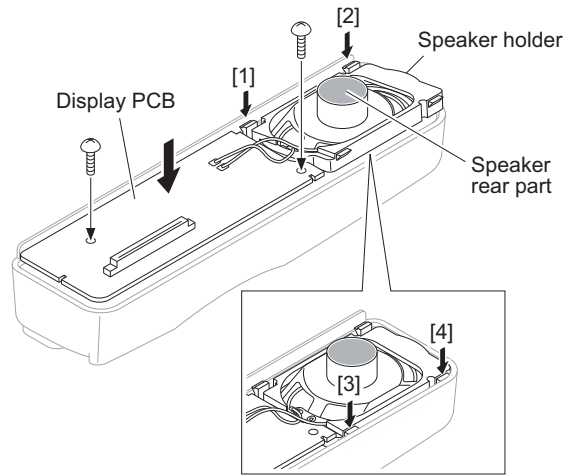


- (6) Pull it out behind the chassis by rotating the bush [3] of the DC cord 90 degrees in the direction of the arrow after the screw [1] in the negative terminal is removed, and the positive terminal [2] is removed from the chassis.

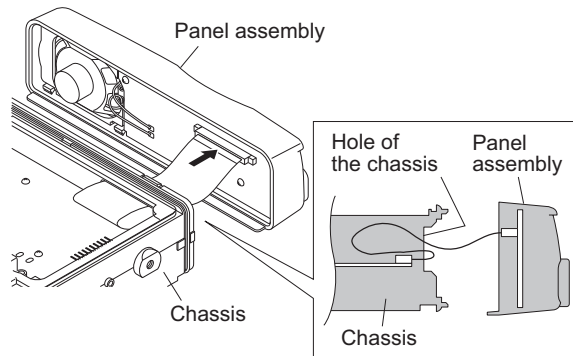


**3.2 Precautions for Reassembly**

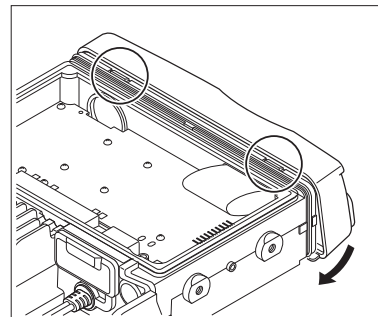
- (1) When mounting the speaker holder, while suppressing the speaker rear part (shaded area), fix the four tabs of the speaker holder into the hollows of the front panel in order ([1], [2], [3], and [4]). Then, tighten the two screws of the display PCB.



- (2) When mounting the panel assembly, pass the flat cable through the hole of the chassis as shown below then connect the flat cable to connector of the panel assembly.



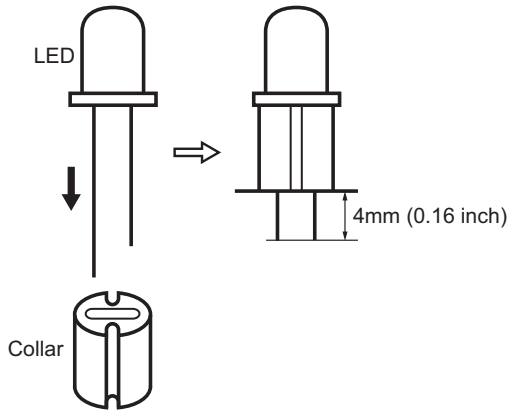
- (3) Fit the panel assembly into the two tabs of the chassis top side first. Then, fit the panel assembly into the two tabs of the chassis bottom side by turning the panel assembly.





### 3.3 Correspondence when replacing the LED (B30-2321-05)

When replacing the LED (B30-2321-05), cut the leg of the LED to 4mm (0.16 inch) after installing the Collar (J31-0565-15).



# SECTION 4 ADJUSTMENT

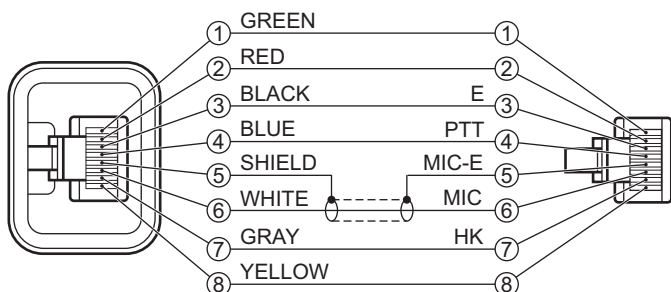
## 4.1 K, M TYPE

### Test Equipment Required for Alignment

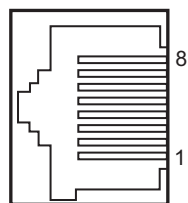
Test Equipment	Major Specifications	
1. Standard Signal Generator (SSG)	Frequency Range	100 to 520MHz
	Modulation	Frequency modulation and external modulation
	Output	-127dBm/0.1μV to greater than -47dBm/100mV
2. Power Meter	Input Impedance	50Ω
	Operation Frequency	100 to 520MHz
	Measuring Range	Vicinity of 100W
3. Deviation Meter	Frequency Range	100 to 520MHz
4. Digital Volt Meter (DVM)	Measuring Range	10mV to 20V DC
	Input Impedance	High input impedance for minimum circuit loading
5. Oscilloscope		DC through 30MHz
6. High Sensitivity Frequency Counter	Frequency Range	10Hz to 1000MHz
	Frequency Stability	0.2ppm or less
7. Ammeter		20A
8. AF Volt Meter (AF VM)	Frequency Range	50Hz to 10kHz
	Voltage Range	1mV to 10V
9. Audio Generator (AG)	Frequency Range	50Hz to 5kHz or more
	Output	0 to 1V
10. Distortion Meter	Capability	3% or less at 1kHz
	Input Level	50mV to 10Vrms
11. 4Ω Dummy Load		Approx. 4Ω, 10W
12. Regulated Power Supply		9V to 17V, approx. 20A Useful if ammeter equipped

\*The test equipment which is not used for adjustment is contained in this table.

#### ■ Test cable for microphone input (E30-3360-28)



#### ■ MIC connector (Front panel view)

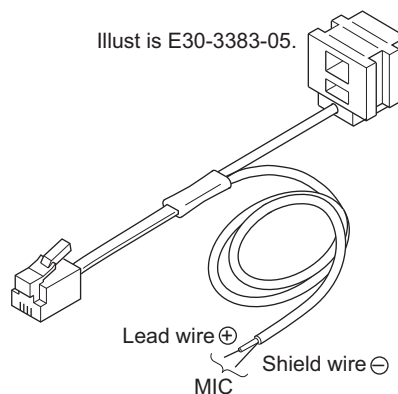


- 1 : MBL
- 2 : SB
- 3 : GND
- 4 : PTT
- 5 : ME
- 6 : MIC
- 7 : HOOK
- 8 : DM

#### ■ Tuning cable (E30-3383-05 or E30-7754-05)

Adapter cable (E30-3383-05) is required for injecting an audio if PC tuning is used.

See "PC Mode" section for the connection.



## 4.2 Frequency and Signaling

The transceiver has been adjusted for the frequencies shown in the following table. When required, re-adjust them following the adjustment procedure to obtain the frequencies you want in actual operation.

### ■Test frequency

Channel No.	RX (MHz)	TX (MHz)
1	155.05000	155.10000
2	136.05000	136.10000
3	173.95000	173.90000
4	155.00000	155.00000
5	155.20000	155.20000
6	155.40000	155.40000
7~16	-	-

### ■Analog mode Signaling

Signaling No.	RX	TX
1	None	None
2	None	100Hz Square wave
3	QT 67.0Hz	QT 67.0Hz
4	QT 151.4Hz	QT 151.4Hz
5	QT 210.7Hz	QT 210.7Hz
6	QT 254.1Hz	QT 254.1Hz
7	DQT D023N	DQT D023N
8	DQT D754I	DQT D754I
9	DTMF Decode (CODE: 159D)	DTMF Encode (CODE: 159D)
10	None	DTMF Encode (CODE: 9)
11	Single Tone: 979.9Hz	Single Tone: 979.9Hz
12	None	Single Tone: 1000Hz
13	None	MSK PN9
14	MSK Decode	MSK Encode

### ■DMR mode signaling

No.	RX	TX
1	CC 00 Burst	CC 00 Burst
2	PN9 Continuous Pattern	PN9 Continuous Pattern
3	CC 00 Burst	Maximum Deviation Continuous Pattern
5	CC 00 Burst	0 Continuous Pattern
6	SYNC (Each slot) + PN9 Burst Pattern	SYNC (Each slot) + PN9 Burst Pattern

PN9:Pseudo-Random Pattern (for production only)

## 4.3 Preparations for Tuning the Transceiver

Before attempting to tune the transceiver, connect the unit to a suitable power supply.

Whenever the transmitter is tuned, the unit must be connected to a suitable dummy load (i.e. power meter).

The speaker output connector must be terminated with a 4Ω dummy load and connected to an AC voltmeter and an audio distortion meter or a SINAD measurement meter at all times during tuning.

## ■5 reference level adjustments frequency

Tuning point	RX (MHz)	TX (MHz)
Low	136.05000	136.10000
Low'	145.55000	145.60000
Center	155.05000	155.10000
High'	164.55000	164.60000
High	173.95000	173.90000

### 4.3.1 Adjustment item supplement

Adjustment Item	Description
Receive Assist	The lock voltage of VCO (Receive) is adjusted. This item must be adjusted before all adjustment items for receiver section are adjusted.
Transmit Assist	The lock voltage of VCO (Transmit) is adjusted. This item must be adjusted before all adjustment items for transmitter section are adjusted.
Frequency	The Transmit Frequency is adjusted.
Ramp Offset	Adjust this item to the optimal Ramp voltage.
High Transmit Power	High Transmit Power is adjusted.
Mid Transmit Power (K type only)	Mid Transmit Power is adjusted.
Low Transmit Power	Low Transmit Power is adjusted.
Balance	The transmit audio frequency response is adjusted. This item is adjusted so that the deviation of 2kHz becomes the same deviation of 20Hz. This item must be adjusted before all adjustment items for deviations are adjusted.
Maximum Deviation (DMR)	Maximum Deviation of DMR is adjusted.
Maximum Deviation (Analog Wide/ Narrow)	Maximum Deviation of Analog (Wide/ Narrow) is adjusted. This item must be adjusted before all adjustment items for tone deviations are adjusted.
QT Deviation	QT tone deviation is adjusted.
DQT Deviation	DQT tone deviation is adjusted.
Single Tone Deviation	The deviation of Single Tone used in or "2-tone" is adjusted.
DTMF Deviation	DTMF tone deviation is adjusted.
MSK Deviation	MSK tone deviation is adjusted.
Sensitivity 1	Band-Pass Filter is adjusted. The performance of Receive Sensitivity is improved.
Sensitivity 2	Band-Pass Filter is adjusted. The performance of the interfering wave is improved.

Adjustment Item	Description
RSSI Reference	The minimum RSSI level for scan stop is adjusted.
Open Squelch	The squelch level at level "5" is adjusted.
Low RSSI	RSSI level is adjusted.
High RSSI	Both "Low RSSI" and "High RSSI" must be adjusted. (The curve data of RSSI level is applied.)
Tight Squelch	The squelch level at level "9" is adjusted.

#### 4.3.2 Adjustment item

Order	Adjustment item	Aw (Analog Wide)	An (Analog Narrow)	Dn (DMR)	Adjust item Number
		Adjustment range			
1	Receive Assist	5 point ADJ			Common Section 2
		1 ~ 1024			
2	Transmit Assist	5 point ADJ			Common Section 3
		1 ~ 1024			
3	Frequency	1 point ADJ			Common Section 4
		1 ~ 1024			
4	Ramp Offset	1 point ADJ			Transmitter Section 1
		1 ~ 512			
5	High Transmit Power	-	5	-	Transmitter Section 2
		1 ~ 1024			
6	Mid Transmit Power (K type only)	-	5	-	Transmitter Section 3
		1 ~ 1024			
7	Low Transmit Power	-	5	-	Transmitter Section 4
		1 ~ 1024			
8	Balance	-	5	-	Transmitter Section 5
		1 ~ 70			
9	Maximum Deviation (DMR)	-	-	5	Transmitter Section 6
		1 ~ 1024			
10	Maximum Deviation (Analog)	5	5	-	Transmitter Section 7
		1 ~ 1024			
11	QT Deviation	5	5	-	Transmitter Section 8
		1 ~ 1024			
12	DQT Deviation	5	5	-	Transmitter Section 9
		1 ~ 1024			
13	Single Tone Deviation	5	5	-	Transmitter Section 10
		1 ~ 1024			
14	Sensitivity 1	-	5	-	Receive Section 2
		1 ~ 1024			
15	Sensitivity 2	-	5	-	Receive Section 3
		1 ~ 1024			
16	RSSI Reference	-	5	-	Receive Section 4
		1 ~ 1024			
17	Open Squelch	5	5	5	Receive Section 5
		1 ~ 1024			

Order	Adjustment item	Aw (Analog Wide)	An (Analog Narrow)	Dn (DMR)	Adjust item Number
		Adjustment range			
18	Low RSSI	-	5	-	Receive Section 6
		1 ~ 1024			
19	High RSSI	-	5	-	Receive Section 7
		1 ~ 1024			
20	Tight Squelch	5	5	-	Receive Section 8
		1 ~ 1024			
21	DTMF Deviation	5	5	-	Transmitter Section 11
		1 ~ 1024			
22	MSK Deviation	5	5	-	Transmitter Section 12
		1 ~ 1024			

#### 4.4 Radio check Section

Item	Condition	Measurement			Adjustment			Specifications /Remarks
	PC test mode	Test- equipment	Unit	Terminal	Unit	Parts	Method	
1. Frequency check	1)Test Channel Channel: 1 Test Signaling Mode: Analog Signaling: 1 PTT: Press [Transmit] button.	f. counter		ANT			Check	155.099767~ 155.100233M Hz (±1.5ppm@ 155.1MHz)
2. High power check	1)Test Channel Channel: 1 Test Signaling Mode: Analog Signaling: 1 PTT: Press [Transmit] button.	Power meter Ammeter		ANT			Check	K: 45.0W~55.0W 13A or less M: 20.0W~30.0W 10A or less
	2)Test Channel Channel: 2 Test Signaling Mode: Analog Signaling: 1 PTT: Press [Transmit] button.	Power meter Ammeter		ANT			Check	K: 45.0W~55.0W 13A or less M: 20.0W~30.0W 10A or less
	3)Test Channel Channel: 3 Test Signaling Mode: Analog Signaling: 1 PTT: Press [Transmit] button.	Power meter Ammeter		ANT			Check	K: 45.0W~55.0W 13A or less M: 20.0W~30.0W 10A or less
2. Mid power check (K type only)	1)Test Channel Channel: 1 Test Signaling Mode: Analog Signaling: 1 PTT: Press [Transmit] button.	Power meter Ammeter		ANT			Check	20.0W~30.0W 10A or less
	2)Test Channel Channel: 2 Test Signaling Mode: Analog Signaling: 1 PTT: Press [Transmit] button.	Power meter Ammeter		ANT			Check	20.0W~30.0W 10A or less
	3)Test Channel Channel: 3 Test Signaling Mode: Analog Signaling: 1 PTT: Press [Transmit] button.	Power meter Ammeter		ANT			Check	20.0W~30.0W 10A or less

Item	Condition	Measurement			Adjustment			Specifications /Remarks
	PC test mode	Test-equipment	Unit	Terminal	Unit	Parts	Method	
3. Low power check	1)Test Channel Channel: 1 Test Signaling Mode: Analog Signaling: 1 PTT: Press [Transmit] button.	Power meter Ammeter		ANT			Check	3.5W~6.5W 7.0A or less
	2)Test Channel Channel: 2 Test Signaling Mode: Analog Signaling: 1 PTT: Press [Transmit] button.	Power meter Ammeter		ANT			Check	3.5W~6.5W 7.0A or less
	3)Test Channel Channel: 3 Test Signaling Mode: Analog Signaling: 1 PTT: Press [Transmit] button.	Power meter Ammeter		ANT			Check	3.5W~6.5W 7.0A or less
4. MIC sensi- sitivity check	1)Test Channel Channel: 1 Test Signaling Mode: Analog Signaling: 1 AG: 1kHz PTT: Press [Transmit] button.	Deviation meter Oscilloscope AG AF VM		ANT SP/MIC connector			Adjust AG input to get a standard MOD.	Dev 1.5kHz at 5.0mV ±1.0mV
5. Sensitivity check	1)Test Channel Channel: 1 Test Signaling Mode: Analog Signaling: 1 SSG output Wide: -115dBm (0.40μV) (MOD: 1kHz/±3kHz) Narrow: -115dBm (0.40μV) (MOD: 1kHz/±1.5kHz)	SSG AF VTVM Oscilloscope Distortion meter 4Ω Dummy load		ANT SP/MIC connector			Check	12dB SINAD or more


#### 4.5 Common Section

Item	Condition	Measurement			Adjustment			Specifications /Remarks
	PC test mode	Test-equipment	Unit	Terminal	Unit	Parts	Method	
1. Setting	1) BATT terminal voltage:13.6V 2) SSG standard modulation [Wide 5k] MOD:1kHz,DEV:3kHz [Narrow] MOD:1kHz,DEV:1.5kHz							
2. Receive Assist	1) Adj item: [Receive Assist] 2) Adj item: [Low], [Low'], [Center], [High'], [High] Press [Apply All] button to store the adjustment value.					[FPU] [<][>]	[V] indicator on the PC window shows VCO lock voltage. Change the adjustment value to get VCO lock voltage within the limit of the specified voltage. <b>Note:</b> Confirm the VCO lock voltage approximately 3 seconds after the adjustment value is changed.	2.4~2.6V  Press [Apply All] button to store the adjustment value after all adjustment point have been adjusted.

Item	Condition	Measurement			Adjustment			Specifications /Remarks
	PC test mode	Test-equipment	Unit	Terminal	Unit	Parts	Method	
3. Transmit Assist	1) Adj item: [Transmit Assist] 2) Adj item: [Low], [Low'], [Center], [High'], [High] PTT: Press [Transmit] button. Press [Apply All] button to store the adjustment value.					FPU [<][>]	[V] indicator on the PC window shows VCO lock voltage. Change the adjustment value to get VCO lock voltage within the limit of the specified voltage.  <b>Note:</b> Confirm the VCO lock voltage approximately 3 seconds after the adjustment value is changed.	[Low]:1.9~2.1V [Low'],[Center], [High']:2.4~2.6V [High]:2.9~3.1V  Press [Apply All] button to store the adjustment value after all adjustment point have been adjusted.
4. Frequency	1) Adj item: [Frequency] PTT: Press [Transmit] button. Press [Apply] button to store the adjustment value. 2) Adj item: [Center]	f. counter		ANT		[FPU] [<][>]	155.100MHz	155.099970~155.100030MHz

#### 4.6 Transmitter Section

Item	Condition	Measurement			Adjustment			Specifications /Remarks
	PC test mode	Test-equipment	Unit	Terminal	Unit	Parts	Method	
1. Ramp Offset	1) Adj item: [Ramp Offset] 2) Adj item: [Center]					[FPU] [<][>]	Write the value as followings. 1 Press [Apply All] button to store the adjustment value after all adjustment points have been adjusted.	
2. High transmit power	1) Adj item: [High Transmit Power] 2) Adj item: [Low], [Low'], [Center], [High'], [High] PTT: Press [Transmit] button. Press [Apply All] button to store the adjustment value.	Power meter Ammeter		ANT		[FPU] [<][>]	K: 50.0W M: 25.0W	±1.0W K: 13A or less M: 10A or less  Press [Apply] button to store the adjustment value whenever each adjustment points have been adjusted.
3. Mid transmit power (K type only)	1) Adj item: [Mid Transmit Power] 2) Adj item: [Low], [Low'], [Center], [High'], [High] PTT: Press [Transmit] button. Press [Apply All] button to store the adjustment value.	Power meter Ammeter		ANT		[FPU] [<][>]	25.0W	±1.0W 10A or less  Press [Apply] button to store the adjustment value whenever each adjustment points have been adjusted.

Item	Condition	Measurement			Adjustment			Specifications /Remarks
	PC test mode	Test-equipment	Unit	Terminal	Unit	Parts	Method	
4. Low transmit power	1) Adj item: [Low Transmit Power] 2) Adj item: [Low], [Low'], [Center], [High'], [High] PTT: Press [Transmit] button. Press [Apply All] button to store the adjustment value.	Power meter Ammeter		ANT		[FPU] [<][>]	5.0W	±0.2W 7.0A or less  Press [Apply] button to store the adjustment value whenever each adjustment points have been adjusted.
5. Balance 1 *1 *2	1) Adj item: [Balance] Deviation meter LPF : 3kHz HPF : OFF 2) Adj item: [Low], [Low'], [Center], [High'], [High] PTT: Press [Transmit] button. Press [Apply All] button to store the adjustment value. [2kHz Sine Wave Check box]: Check while transmitting change to 2kHz.	Deviation meter Oscilloscope		ANT		[FPU] [<][>]	The Deviation of 20Hz frequency is fixed. Change the 2kHz adjustment value to become the same deviation of 20Hz within the specified range.	2kHz Tone deviation is within ±0.2dB of 20Hz tone deviation.  Press [Apply All] button to store the adjustment value after all adjustment points have been adjusted.
5. Balance 2 *1 *2	1) Adj item: [Balance] Deviation meter LPF : 15kHz HPF : OFF 2) Adj item: [Low], [Low'], [Center], [High'], [High] PTT: Press [Transmit] button. Press [Apply All] button to store the adjustment value. [Square Wave Check box]: Check while transmitting change to Square Wave.	Deviation meter Oscilloscope		ANT		[FPU] [<][>]	Make the demodulation wave into square wave.	
<p>*1 : Refer to the "4.6.1 Necessary Deviation adjustment item for each signaling and mode" table. Balance adjustment is common with the adjustment of all signaling deviations. *2 :Only 1 Balance needs to be adjusted (either Balance 1 or Balance 2).</p>								
6. Maximum Deviation (DMR) *3	1) Adj item: [Maximum Deviation (DMR)] Deviation meter LPF : 3kHz HPF : OFF 2) Adj item: [Low], [Low'], [Center], [High'], [High] PTT: Press [Transmit] button. Press [Apply All] button to store the adjustment value.	Deviation meter Oscilloscope		ANT		[FPU] [<][>]	2749Hz	2695~2803Hz  Press [Apply All] button to store the adjustment value after all adjustment points have been adjusted.



Item	Condition	Measurement			Adjustment			Specifications /Remarks
	PC test mode	Test-equipment	Unit	Terminal	Unit	Parts	Method	
7. Maximum deviation (Analog) *3	1) Adj item: [Maximum Deviation (Analog Narrow)] Deviation meter LPF : 15kHz HPF : OFF 2) Adj item: [Low], [Low'], [Center], [High'], [High] PTT: Press [Transmit] button. Press [Apply All] button to store the adjustment value.	Deviation meter Oscilloscope		ANT		[FPU] [<][>]	2100Hz	2050~2150Hz  Press [Apply All] button to store the adjustment value after all adjustment points have been adjusted.
	1) Adj item: [Maximum Deviation (Analog Wide)] Deviation meter LPF : 15kHz HPF : OFF 2) Adj item: [Low], [Low'], [Center], [High'], [High] PTT: Press [Transmit] button. Press [Apply All] button to store the adjustment value.	Deviation meter Oscilloscope		ANT		[FPU] [<][>]	4200Hz	4150~4250Hz  Press [Apply All] button to store the adjustment value after all adjustment points have been adjusted.
*3: Refer to the "4.6.1 Necessary Deviation adjustment item for each signaling and mode" table. Regarding Maximum Deviation (Analog), it is common with the adjustment of all analog signalings.								
8. QT Deviation *4	1) Adj item: [QT Deviation (Analog Narrow)] Deviation meter LPF : 3kHz HPF : OFF 2) Adj item: [Low], [Low'], [Center], [High'], [High] PTT: Press [Transmit] button. Press [Apply] button to store the adjustment value.	Deviation meter Oscilloscope		ANT		[FPU] [<][>]	0.35kHz	0.35kHz ±0.05kHz
	1) Adj item: [QT Deviation(Analog Wide)] Deviation meter LPF : 3kHz HPF : OFF 2) Adj item: [Low], [Low'], [Center], [High'], [High] PTT: Press [Transmit] button. Press [Apply] button to store the adjustment value.	Deviation meter Oscilloscope		ANT		[FPU] [<][>]	0.75kHz	0.75kHz ±0.05kHz

Item	Condition	Measurement			Adjustment			Specifications /Remarks
	PC test mode	Test-equipment	Unit	Terminal	Unit	Parts	Method	
9. DQT Deviation *4	1) Adj item: [DQT Deviation (Analog Narrow)] Deviation meter LPF : 3kHz HPF : OFF 2) Adj item: [Low], [Low'], [Center], [High'], [High] PTT: Press [Transmit] button. Press [Apply] button to store the adjustment value.	Deviation meter Oscilloscope		ANT		[FPU] [<][>]	0.35kHz	0.35kHz ±0.05kHz
	1) Adj item: [DQT Deviation(Analog Wide)] Deviation meter LPF : 3kHz HPF : OFF 2) Adj item: [Low], [Low'], [Center], [High'], [High] PTT: Press [Transmit] button. Press [Apply] button to store the adjustment value.	Deviation meter Oscilloscope		ANT		[FPU] [<][>]	0.75kHz	0.75kHz ±0.05kHz
10. Single Tone Deviation *4	1) Adj item: [Single Tone Deviation (Analog Narrow)] Deviation meter LPF : 15kHz HPF : OFF 2) Adj item: [Low], [Low'], [Center], [High'], [High] PTT: Press [Transmit] button. Press [Apply] button to store the adjustment value.	Deviation meter Oscilloscope		ANT		[FPU] [<][>]	1.50kHz	1.50kHz ±0.05kHz
	1) Adj item: [Single Tone Deviation (Analog Wide)] Deviation meter LPF : 15kHz HPF : OFF 2) Adj item: [Low], [Low'], [Center], [High'], [High] PTT: Press [Transmit] button. Press [Apply] button to store the adjustment value.	Deviation meter Oscilloscope		ANT		[FPU] [<][>]	3.00kHz	3.00kHz ±0.05kHz
*4: Refer to the "4.6.1 Necessary Deviation adjustment item for each signaling and mode" table.								
11. DTMF Deviation	1) Adj item: [DTMF Deviation (Analog Narrow)] Deviation meter LPF : 15kHz HPF : OFF 2) Adj item: [Low], [Low'], [Center], [High'], [High] PTT: Press [Transmit] button. Press [Apply] button to store the adjustment value.	Deviation meter Oscilloscope		ANT		[FPU] [<][>]	1.25kHz	1.25kHz ±0.05kHz
	1) Adj item: [DTMF Deviation (Analog Wide)] Deviation meter LPF : 15kHz HPF : OFF 2) Adj item: [Low], [Low'], [Center], [High'], [High] PTT: Press [Transmit] button. Press [Apply] button to store the adjustment value.	Deviation meter Oscilloscope		ANT		[FPU] [<][>]	2.50kHz	2.50kHz ±0.05kHz

Item	Condition	Measurement			Adjustment			Specifications /Remarks
	PC test mode	Test-equipment	Unit	Terminal	Unit	Parts	Method	
12. MSK Deviation	1) Adj item: [MSK Deviation (Analog Narrow)] Deviation meter LPF : 15kHz HPF : OFF 2) Adj item: [Low], [Low'], [Center], [High'], [High] PTT: Press [Transmit] button. Press [Apply] button to store the adjustment value.	Deviation meter Oscilloscope		ANT		[FPU] [<][>]	1.50kHz	1.50kHz ±0.05kHz
	1) Adj item: [MSK Deviation (Analog Wide)] Deviation meter LPF : 15kHz HPF : OFF 2) Adj item: [Low], [Low'], [Center], [High'], [High] PTT: Press [Transmit] button. Press [Apply] button to store the adjustment value.	Deviation meter Oscilloscope		ANT		[FPU] [<][>]	3.00kHz	3.00kHz ±0.05kHz

#### 4.6.1 Necessary Deviation adjustment item for each signaling and mode

The following shows the necessary adjustment items for each signaling deviation. Please read the following table like the following example. In the case of the signaling "QT (Analog Wide)", this signaling is composed of three elements [Balance, Maximum Deviation (Analog Wide) and QT Deviation (Analog Wide)]. Please adjust Balance and Maximum Deviation (Analog Wide) before adjusting QT Deviation (Analog Wide).

Mode	Signaling	Necessary adjustment and order	
		Wide	Narrow
Analog	Audio	1. Balance 2. Maximum Deviation [Analog Wide]	1. Balance 2. Maximum Deviation [Analog Narrow]
	QT	1. Balance 2. Maximum Deviation [Analog Wide] 3. QT Deviation [Analog Wide]	1. Balance 2. Maximum Deviation [Analog Narrow] 3. QT Deviation [Analog Narrow]
	DQT	1. Balance 2. Maximum Deviation [Analog Wide] 3. DQT Deviation [Analog Wide]	1. Balance 2. Maximum Deviation [Analog Narrow] 3. DQT Deviation [Analog Narrow]
	2TONE	1. Balance 2. Maximum Deviation [Analog Wide] 3. Single Tone Deviation [Analog Wide]	1. Balance 2. Maximum Deviation [Analog Narrow] 3. Single Tone Deviation [Analog Narrow]
	DTMF	1. Balance 2. Maximum Deviation [Analog Wide] 3. DTMF Deviation [Analog Wide]	1. Balance 2. Maximum Deviation [Analog Narrow] 3. DTMF Deviation [Analog Narrow]
	MSK	1. Balance 2. Maximum Deviation [Analog Wide] 3. MSK Deviation [Analog Wide]	1. Balance 2. Maximum Deviation [Analog Narrow] 3. MSK Deviation [Analog Narrow]
DMR	Audio	-	1. Balance 2. Maximum Deviation [DMR]

- Balance is common with all the above deviation adjustments. If Balance (Transmitter Section 5) has already adjusted, please skip Step1 and adjust from Step2.
- Maximum Deviation (Analog Wide/Analog Narrow) is common with all the analog signaling deviations. If Balance and Maximum Deviation (Analog Wide/Analog Narrow) (Transmitter Section 7) have already adjusted, please skip Step2 and adjust from Step3.

#### 4.7 Receiver Section

Item	Condition	Measurement			Adjustment			Specifications /Remarks
		Test-equipment	Unit	Terminal	Unit	Parts	Method	
1. AF level setting	1) Test Channel Channel: 1 Test Signaling Mode: Analog Signaling: 1 Wide/Narrow: Narrow Beat Shift: Uncheck Compander: Uncheck SSG output:-47dBm (1mV) (MOD:1kHz/±1.5kHz)	SSG DVM AF VM Dummy load		ANT SP/MIC connec- tor		[FPU] [<][>]	Volume Up/Down key to obtain 1.41V AF output. (0.5W@4ohm Load)	1.4V±0.1V
2. Sensitivity 1 (SENS1)	1) Adj item: [Sensitivity 1] 2) Adj item:[Low], [Low'], [Center], [High'], [High] Press [Apply All] button to store the adjustment value. SSG output:-100dBm (2.24µV) (MOD:1kHz/±1.5kHz)	SSG DVM AF VM Dummy load		ANT SP/MIC connec- tor		[FPU] [<][>]	Press the "Auto Tuning" [Start] button, or increase the adjustment value from the preset value to get the maximum RSSI level. Press [Apply All] button to store the adjustment value after all adjustment points have been adjusted.  Preset value Low : 50 Low' : 150 Center : 200 High' : 250 High : 350	RSSI Peak Caution: Perform the adjustment of "3. Sensitivity 2" before performing this adjustment.
3. Sensitivity 2 (SENS2)	1) Adj item: [Sensitivity 2] 2) Adj item:[Low], [Low'], [Center], [High'], [High] Press [Apply All] button to store the adjustment value.	SSG DVM AF VM Dummy load		ANT SP/MIC connec- tor		[FPU] [<][>]	Write Preset value. (Fixed value)  Low : 320 Low' : 400 Center : 500 High' : 640 High : 800	
4.* RSSI Reference	1) Adj item: [RSSI Reference (Analog Narrow)] 2) Adj item:[Low], [Low'], [Center], [High'], [High] SSG output: 12dB SINAD level -3dB (MOD:1kHz/±1.5kHz)	SSG DVM AF VM Dummy load		ANT SP/MIC connec- tor		[FPU] [<][>]	After input signal from SSG, press [Apply] button to store the adjustment value.	*: Because RSSI Reference (Analog Wide and DMR) is adjusted by adjusting RSSI Reference (Analog Narrow), it is not necessary to adjust RSSI Reference (Analog Wide and DMR).
5. Open Squelch (DMR)	1) Adj item:[Open Squelch (DMR)] 2) Adj item:[Low], [Low'], [Center], [High'], [High] Reference SSG output: 12dB SINAD level@Analog Narrow -3dB (CW (without modulation))	SSG Distortion meter Oscilloscope		ANT SP/MIC connec- tor		[FPU] [<][>]	After input signal from SSG, press [Apply] button to store the adjustment value.	

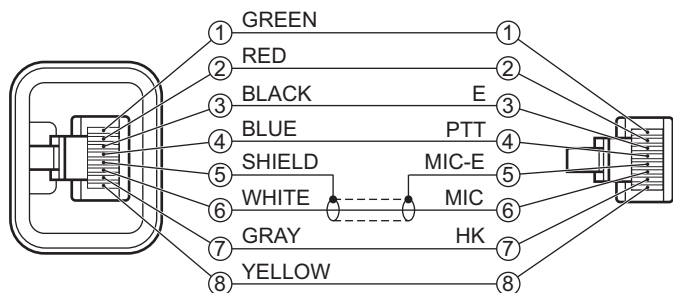
Item	Condition	Measurement			Adjustment			Specifications /Remarks
		Test-equipment	Unit	Terminal	Unit	Parts	Method	
5. Open Squelch (Analog Narrow)	1) Adj item: [Open Squelch (Analog Narrow)] 2) Adj item:[Low], [Low'], [Center], [High'], [High] SSG output:12dB SINAD level -1dB (MOD:1kHz/±1.5kHz)	SSG Distortion meter Oscilloscope		ANT SP/MIC connector		[FPU] [<][>]	After input signal from SSG, press [Apply] button to store the adjustment value.	
5. Open Squelch (Analog Wide)	1) Adj item: [Open Squelch (Analog Wide)] 2) Adj item:[Low], [Low'], [Center], [High'], [High] SSG output:12dB SINAD level -1dB (MOD:1kHz/±3.0kHz)	SSG Distortion meter Oscilloscope		ANT SP/MIC connector		[FPU] [<][>]	After input signal from SSG, press [Apply] button to store the adjustment value.	
6.* Low RSSI	1) Adj item:[Low RSSI (Analog Narrow)] 2) Adj item:[Low], [Low'], [Center], [High'], [High] SSG output :-118dBm (0.28uV) (MOD:1kHz/±1.5kHz)	SSG Distortion meter Oscilloscope		ANT SP/MIC connector		[FPU] [<][>]	After input signal from SSG, press [Apply] button to store the adjustment value.	*: Because Low RSSI at -118dBm (Analog Wide and DMR) is adjusted by adjusting Low RSSI at -118dBm (Analog Narrow), it is not necessary to adjust Low RSSI at -118dBm (Analog Wide and DMR).
7.* High RSSI	1) Adj item: [High RSSI (Analog Narrow)] 2) Adj item: [Low], [Low'], [Center], [High'], [High] SSG output : -80dBm (22.4uV) (MOD:1kHz/±1.5kHz)	SSG Distortion meter Oscilloscope		ANT SP/MIC connector		[FPU] [<][>]	After input signal from SSG, press [Apply] button to store the adjustment value.	*: Because High RSSI at -80dBm (Analog Wide and DMR) is adjusted by adjusting High RSSI at -80dBm (Analog Narrow), it is not necessary to adjust High RSSI at -80dBm (Analog Wide and DMR).
8. Tight Squelch (Analog Narrow)	1) Adj item: [Open Squelch (Analog Narrow)] 2) Adj item:[Low], [Low'], [Center], [High'], [High] SSG output:12dB SINAD level +3dB (MOD:1kHz/±1.5kHz)	SSG Distortion meter Oscilloscope		ANT SP/MIC connector		[FPU] [<][>]	After input signal from SSG, press [Apply] button to store the adjustment value.	
8. Tight Squelch (Analog Wide)	1) Adj item: [Open Squelch (Analog Wide)] 2) Adj item:[Low], [Low'], [Center], [High'], [High] SSG output:12dB SINAD level +3dB (MOD:1kHz/±3.0kHz)	SSG Distortion meter Oscilloscope		ANT SP/MIC connector		[FPU] [<][>]	After input signal from SSG, press [Apply] button to store the adjustment value.	

**4.8 E TYPE**  
**Test Equipment Required for Alignment**

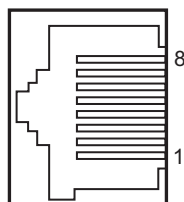
Test Equipment	Major Specifications	
1. Standard Signal Generator (SSG)	Frequency Range	100 to 520MHz
	Modulation	Frequency modulation and external modulation
	Output	-127dBm/0.1μV to greater than -47dBm/1mV
2. Power Meter	Input Impedance	50Ω
	Operation Frequency	100 to 520MHz
	Measuring Range	Vicinity of 100W
3. Deviation Meter	Frequency Range	100 to 520MHz
4. Digital Volt Meter (DVM)	Measuring Range	10mV to 20V DC
	Input Impedance	High input impedance for minimum circuit loading
5. Oscilloscope		DC through 30MHz
6. High Sensitivity Frequency Counter	Frequency Range	10Hz to 1000MHz
	Frequency Stability	0.2ppm or less
7. Ammeter		20A
8. AF Volt Meter (AF VM)	Frequency Range	50Hz to 10kHz
	Voltage Range	1mV to 10V
9. Audio Generator (AG)	Frequency Range	50Hz to 5kHz or more
	Output	0 to 1V
10. Distortion Meter	Capability	3% or less at 1kHz
	Input Level	50mV to 10Vrms
11. 4Ω Dummy Load		Approx. 4Ω, 10W
12. Regulated Power Supply		9V to 17V, approx. 20A Useful if ammeter equipped

\*The test equipment which is not used for adjustment is contained in this table.

■ **Test cable for microphone input (E30-3360-28)**



■ **MIC connector (Front panel view)**

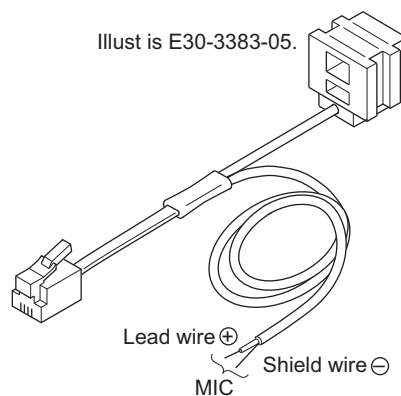


- 1 : MBL
- 2 : SB
- 3 : GND
- 4 : PTT
- 5 : ME
- 6 : MIC
- 7 : HOOK
- 8 : DM

■ **Tuning cable (E30-3383-05 or E30-7754-05)**

Adapter cable (E30-3383-05) is required for injecting an audio if PC tuning is used.

See "PC Mode" section for the connection.



#### 4.9 Frequency and Signaling

The transceiver has been adjusted for the frequencies shown in the following table. When required, readjust them following the adjustment procedure to obtain the frequencies you want in actual operation.

##### ■Test frequency

CH	RX (MHz)	TX (MHz)
1	155.05000	155.10000
2	136.05000	136.10000
3	173.95000	173.90000
4	155.00000	155.00000
5	155.20000	155.20000
6	155.40000	155.40000
7~16	-	-

##### ■Analog mode signaling

No.	RX	TX
1	None	None
2	None	100Hz Square Wave
3	QT 67.0 Hz	QT 67.0 Hz
4	QT 151.4 Hz	QT 151.4 Hz
5	QT 210.7 Hz	QT 210.7 Hz
6	QT 254.1 Hz	QT 254.1 Hz
7	DQT D023N	DQT D023N
8	DQT D754I	DQT D754I
9	DTMF Decode (CODE: 159D)	DTMF Encode (CODE: 159D)
10	None	DTMF Encode (CODE: 9)
11	Single Tone: 979.9Hz	Single Tone: 979.9Hz
12	None	Single Tone: 1000Hz
13	None	MSK PN9
14	MSK Decode	MSK Encode

##### ■DMR mode signaling

No.	RX	TX
1	CC 00 Burst	CC 00 Burst
2	PN9 Continuous Pattern	PN9 Continuous Pattern
3	CC 00 Burst	Maximum Deviation Continuous Pattern
5	CC 00 Burst	0 Continuous Pattern
6	SYNC (Each slot) + PN9 Burst Pattern	SYNC (Each slot) + PN9 Burst Pattern

#### 4.10 Preparations for Tuning the Transceiver

Before attempting to tune the transceiver, connect the unit to a suitable power supply.

Whenever the transmitter is tuned, the unit must be connected to a suitable dummy load (i.e. power meter).

The speaker output connector must be terminated with a 4Ω dummy load and connected to an AC voltmeter and an audio distortion meter or a SINAD measurement meter at all times during tuning.

#### ■5 reference level adjustments frequency

Tuning point	RX (MHz)	TX (MHz)
Low	136.05000	136.10000
Low'	145.55000	145.60000
Center	155.05000	155.10000
High'	164.55000	164.60000
High	173.95000	173.90000

PN9:Pseudo-Random Pattern (for production only)

#### 4.10.1 Adjustment item supplement

Adjustment Item	Description
Receive Assist	The lock voltage of VCO (Receive) is adjusted. This item must be adjusted before all adjustment items for receiver section are adjusted.
Transmit Assist	The lock voltage of VCO (Transmit) is adjusted. This item must be adjusted before all adjustment items for transmitter section are adjusted.
Frequency	The Transmit Frequency is adjusted.
Ramp Offset	Adjust this item to the optimal Ramp voltage.
High Transmit Power	High Transmit Power is adjusted.
Low Transmit Power	Low Transmit Power is adjusted.
Balance	The transmit audio frequency response is adjusted. This item is adjusted so that the deviation of 2kHz becomes the same deviation of 20Hz. This item must be adjusted before all adjustment items for deviations are adjusted.
Maximum Deviation (DMR)	Maximum Deviation of DMR is adjusted.
Maximum Deviation (Analog Wide 5k/ Wide 4k/ Narrow)	Maximum Deviation of Analog (Wide 5k/ Wide 4k/ Narrow) is adjusted. This item must be adjusted before all adjustment items for tone deviations are adjusted.
QT Deviation	QT tone deviation is adjusted.
DQT Deviation	DQT tone deviation is adjusted.
Single Tone Deviation	The deviation of Single Tone used in or "5-tone" is adjusted.
DTMF Deviation	DTMF tone deviation is adjusted.
MSK Deviation	MSK tone deviation is adjusted.
Sensitivity 1	Band-Pass Filter is adjusted. The performance of Receive Sensitivity is improved.
Sensitivity 2	Band-Pass Filter is adjusted. The performance of the interfering wave is improved.
RSSI Reference	The minimum RSSI level for scan stop is adjusted.



Adjustment Item	Description
Open Squelch	The squelch level at level "5" is adjusted.
Low RSSI	RSSI display level is adjusted.
High RSSI	Both "Low RSSI" and "High RSSI" must be adjusted. (The curve data of RSSI level is applied.)
Tight Squelch	The squelch level at level "9" is adjusted.

#### 4.1.0.2 Adjustment item

Order	Adjustment item	Aw (Analog Wide 5k)	As (Analog Wide 4k)	An (Analog Narrow)	Dn (DMR)	Adjust item Number
		Adjustment range				
1	Receive Assist	5 point ADJ				Common Section 2
		1 ~ 1024				
2	Transmit Assist	5 point ADJ				Common Section 3
		1 ~ 1024				
3	Frequency	1 point ADJ				Common Section 4
		1 ~ 1024				
4	Ramp Offset	1 point ADJ				Transmitter Section 1
		1 ~ 512				
5	High Transmit Power	-	-	5	-	Transmitter Section 2
		1 ~ 1024				
6	Low Transmit Power	-	-	5	-	Transmitter Section 3
		1 ~ 1024				
7	Balance	-	-	5	-	Transmitter Section 4
		1 ~ 70				
8	Maximum Deviation (DMR)	-	-	-	5	Transmitter Section 5
		1 ~ 1024				
9	Maximum Deviation (Analog)	5	5	5	-	Transmitter Section 6
		1 ~ 1024				
10	QT Deviation	5	5	5	-	Transmitter Section 7
		1 ~ 1024				
11	DQT Deviation	5	5	5	-	Transmitter Section 8
		1 ~ 1024				
12	Single Tone Deviation	5	5	5	-	Transmitter Section 9
		1 ~ 1024				
13	Sensitivity 1	-	-	5	-	Receive Section 2
		1 ~ 1024				
14	Sensitivity 2	-	-	5	-	Receive Section 3
		1 ~ 1024				
15	RSSI Reference	-	-	5	-	Receive Section 4
		1 ~ 1024				
16	Open Squelch	5	5	5	5	Receive Section 5
		1 ~ 1024				
17	Low RSSI	-	-	5	-	Receive Section 6
		1 ~ 1024				
18	High RSSI	-	-	5	-	Receive Section 7
		1 ~ 1024				

Order	Adjustment item	Aw (Analog Wide 5k)	As (Analog Wide 4k)	An (Analog Narrow)	Dn (DMR)	Adjust item Number
		Adjustment range				
19	Tight Squelch	5	5	5	-	Receive Section 8
		1 ~ 1024				
20	DTMF Deviation	5	5	5	-	Transmitter Section 10
		1 ~ 1024				
21	MSK Deviation	5	5	5	-	Transmitter Section 11
		1 ~ 1024				

#### 4.11 Radio check Section


Item	Condition	Measurement			Adjustment			Specifications /Remarks
	PC test mode	Test- equipment	Unit	Terminal	Unit	Parts	Method	
1. Frequency check	1)Test Channel Channel: 1 Test Signaling Mode: Analog Signaling: 1 PTT: Press [Transmit] button.	f. counter		ANT			Check	155.099767~ 155.100233M Hz ( $\pm 1.5\text{ppm}@$ 155.1MHz)
2. High power check	1)Test Channel Channel: 1 Test Signaling Mode: Analog Signaling: 1 PTT: Press [Transmit] button.	Power meter Ammeter		ANT			Check	20.0W~30.0W 10A or less
	2)Test Channel Channel: 2 Test Signaling Mode: Analog Signaling: 1 PTT: Press [Transmit] button.	Power meter Ammeter		ANT			Check	20.0W~30.0W 10A or less
	3)Test Channel Channel: 3 Test Signaling Mode: Analog Signaling: 1 PTT: Press [Transmit] button.	Power meter Ammeter		ANT			Check	20.0W~30.0W 10A or less
3. Low power check	1)Test Channel Channel: 1 Test Signaling Mode: Analog Signaling: 1 PTT: Press [Transmit] button.	Power meter Ammeter		ANT			Check	3.5W~6.5W 7.0A or less
	2)Test Channel Channel: 2 Test Signaling Mode: Analog Signaling: 1 PTT: Press [Transmit] button.	Power meter Ammeter		ANT			Check	3.5W~6.5W 7.0A or less
	3)Test Channel Channel: 3 Test Signaling Mode: Analog Signaling: 1 PTT: Press [Transmit] button.	Power meter Ammeter		ANT			Check	3.5W~6.5W 7.0A or less
4. MIC sensitivity check	1)Test Channel Channel: 1 Test Signaling Mode: Analog Signaling: 1 AG: 1kHz PTT: Press [Transmit] button.	Deviation meter Oscilloscope AG AF VM		ANT SP/MIC connector			Adjust AG input to get a standard MOD.	Dev 1.5kHz at 5.0mV $\pm 1.0\text{mV}$

Item	Condition	Measurement			Adjustment			Specifications /Remarks
	PC test mode	Test-equipment	Unit	Terminal	Unit	Parts	Method	
5. Sensitivity check	1)Test Channel Channel: 1 Test Signaling Mode: Analog Signaling: 1 SSG output Wide 5k: -115dBm (0.40μV) (MOD: 1kHz/±3kHz) Wide 4k: -115dBm (0.40μV) (MOD: 1kHz/±2.4kHz) Narrow: -115dBm (0.40μV) (MOD: 1kHz/±1.5kHz)	SSG AF VTVM Oscilloscope Distortion meter 4Ω Dummy load		ANT SP/MIC connector			Check	12dB SINAD or more

#### 4.12 Common Section

Item	Condition	Measurement			Adjustment			Specifications /Remarks
	PC test mode	Test-equipment	Unit	Terminal	Unit	Parts	Method	
1. Setting	1) BATT terminal voltage:13.2V 2) SSG standard modulation [Wide 5k] MOD:1kHz,DEV:3kHz [Wide 4k] MOD:1kHz,DEV:2.4kHz [Narrow] MOD:1kHz,DEV:1.5kHz							
2. Receive Assist	1) Adj item: [Receive Assist] 2) Adj item: [Low], [Low'], [Center], [High'], [High] Press [Apply All] button to store the adjustment value.					[FPU] [<][>]	[V] indicator on the PC window shows VCO lock voltage. Change the adjustment value to get VCO lock voltage within the limit of the specified voltage. <b>Note:</b> Confirm the VCO lock voltage approximately 3 seconds after the adjustment value is changed.	2.4~2.6V  Press [Apply All] button to store the adjustment value after all adjustment point have been adjusted.
3. Transmit Assist	1) Adj item: [Transmit Assist] 2) Adj item: [Low], [Low'], [Center], [High'], [High] PTT: Press [Transmit] button. Press [Apply All] button to store the adjustment value.					FPU [<][>]	[V] indicator on the PC window shows VCO lock voltage. Change the adjustment value to get VCO lock voltage within the limit of the specified voltage. <b>Note:</b> Confirm the VCO lock voltage approximately 3 seconds after the adjustment value is changed.	[Low]:1.9~2.1V [Low'],[Center], [High]:2.4~2.6V [High]:2.9~3.1V  Press [Apply All] button to store the adjustment value after all adjustment point have been adjusted.
4. Frequency	1) Adj item: [Frequency] PTT: Press [Transmit] button. Press [Apply] button to store the adjustment value. 2) Adj item: [Center]	f. counter		ANT		[FPU] [<][>]	155.100MHz	155.099970~155.100030MHz

#### 4.13 Transmitter Section

Item	Condition	Measurement			Adjustment			Specifications /Remarks
	PC test mode	Test-equipment	Unit	Terminal	Unit	Parts	Method	
1. Ramp Offset	1) Adj item: [Ramp Offset] 2) Adj item: [Center]					[FPU] [<][>]	Write the value as followings. 1 Press [Apply All] button to store the adjustment value after all adjustment points have been adjusted.	
2. High transmit power	1) Adj item: [High Transmit Power] 2) Adj item: [Low], [Low'], [Center], [High'], [High] PTT: Press [Transmit] button. Press [Apply All] button to store the adjustment value.	Power meter Ammeter		ANT		[FPU] [<][>]	25.0W	±1.0W 10A or less  Press [Apply] button to store the adjustment value whenever each adjustment points have been adjusted.
3. Low transmit power	1) Adj item: [Low Transmit Power] 2) Adj item: [Low], [Low'], [Center], [High'], [High] PTT: Press [Transmit] button. Press [Apply All] button to store the adjustment value.	Power meter Ammeter		ANT		[FPU] [<][>]	5.0W	±0.2W 7.0A or less  Press [Apply] button to store the adjustment value whenever each adjustment points have been adjusted.
4. Balance 1 *1 *2	1) Adj item: [Balance] Deviation meter LPF : 3kHz HPF : OFF 2) Adj item: [Low], [Low'], [Center], [High'], [High] PTT: Press [Transmit] button. Press [Apply All] button to store the adjustment value. [2kHz Sine Wave Check box]: Check while transmitting change to 2kHz.	Deviation meter Oscilloscope		ANT		[FPU] [<][>]	The Deviation of 20Hz frequency is fixed.  Change the 2kHz adjustment value to become the same deviation of 20Hz within the specified range.	2kHz Tone deviation is within ±0.2dB of 20Hz tone deviation.  Press [Apply All] button to store the adjustment value after all adjustment points have been adjusted.
4. Balance 2 *1 *2	1) Adj item: [Balance] Deviation meter LPF : 15kHz HPF : OFF 2) Adj item: [Low], [Low'], [Center], [High'], [High] PTT: Press [Transmit] button. Press [Apply All] button to store the adjustment value. [Square Wave Check box]: Check while transmitting change to Square Wave.	Deviation meter Oscilloscope		ANT		[FPU] [<][>]	Make the demodulation wave into square wave.	
<p>*1 : Refer to the "4.13.1 Necessary Deviation adjustment item for each signaling and mode" table. Balance adjustment is common with the adjustment of all signaling deviations. *2 : Only 1 Balance needs to be adjusted (either Balance 1 or Balance 2).</p>								
5. Maximum Deviation (DMR) *3	1) Adj item: [Maximum Deviation (DMR)] Deviation meter LPF : 3kHz HPF : OFF 2) Adj item: [Low], [Low'], [Center], [High'], [High] PTT: Press [Transmit] button. Press [Apply All] button to store the adjustment value.	Deviation meter Oscilloscope		ANT		[FPU] [<][>]	2749Hz	2695~2803Hz  Press [Apply All] button to store the adjustment value after all adjustment points have been adjusted.

Item	Condition	Measurement			Adjustment			Specifications /Remarks
	PC test mode	Test-equipment	Unit	Terminal	Unit	Parts	Method	
6. Maximum deviation (Analog) *3	1) Adj item: [Maximum Deviation (Analog Narrow)] Deviation meter LPF : 15kHz HPF : OFF 2) Adj item: [Low], [Low'], [Center], [High'], [High] PTT: Press [Transmit] button. Press [Apply All] button to store the adjustment value.	Deviation meter Oscilloscope		ANT		[FPU] [<][>]	2100Hz	2050~2150Hz  Press [Apply All] button to store the adjustment value after all adjustment points have been adjusted.
	1)Adj item: [Maximum Deviation (Analog Wide 4k)] Deviation meter LPF : 15kHz HPF : OFF 2)Adj item: [Low], [Low'], [Center], [High'], [High] PTT: Press [Transmit] button. Press [Apply All] button to store the adjustment value.	Deviation meter Oscilloscope		ANT		[FPU] [<][>]	3360Hz	3310~3410Hz  Press [Apply All] button to store the adjustment value after all adjustment points have been adjusted.
	1) Adj item: [Maximum Deviation (Analog Wide 5k)] Deviation meter LPF : 15kHz HPF : OFF 2) Adj item: [Low], [Low'], [Center], [High'], [High] PTT: Press [Transmit] button. Press [Apply All] button to store the adjustment value.	Deviation meter Oscilloscope		ANT		[FPU] [<][>]	4200Hz	4150~4250Hz  Press [Apply All] button to store the adjustment value after all adjustment points have been adjusted.
*3: Refer to the "4.13.1 Necessary Deviation adjustment item for each signaling and mode" table. Regarding Maximum Deviation (Analog), it is common with the adjustment of all analog signalings.								
7. QT Deviation *4	1) Adj item: [QT Deviation (Analog Narrow)] Deviation meter LPF : 3kHz HPF : OFF 2) Adj item: [Low], [Low'], [Center], [High'], [High] PTT: Press [Transmit] button. Press [Apply] button to store the adjustment value.	Deviation meter Oscilloscope		ANT		[FPU] [<][>]	0.35kHz	0.35kHz ±0.05kHz
	1) Adj item: [QT Deviation (Analog Wide 4k)] Deviation meter LPF : 3kHz HPF : OFF 2) Adj item: [Low], [Low'], [Center], [High'], [High] PTT: Press [Transmit] button. Press [Apply] button to store the adjustment value.	Deviation meter Oscilloscope		ANT		[FPU] [<][>]	0.60kHz	0.60kHz ±0.05kHz
	1) Adj item: [QT Deviation (Analog Wide 5k)] Deviation meter LPF : 3kHz HPF : OFF 2) Adj item: [Low], [Low'], [Center], [High'], [High] PTT: Press [Transmit] button. Press [Apply] button to store the adjustment value.	Deviation meter Oscilloscope		ANT		[FPU] [<][>]	0.75kHz	0.75kHz ±0.05kHz

Item	Condition	Measurement			Adjustment			Specifications /Remarks
	PC test mode	Test-equipment	Unit	Terminal	Unit	Parts	Method	
8. DQT Deviation *4	1) Adj item: [DQT Deviation (Analog Narrow)] Deviation meter LPF : 3kHz HPF : OFF 2) Adj item: [Low], [Low'], [Center], [High'], [High] PTT: Press [Transmit] button. Press [Apply] button to store the adjustment value.	Deviation meter Oscilloscope		ANT		[FPU] [<][>]	0.35kHz	0.35kHz ±0.05kHz
	1) Adj item: [DQT Deviation (Analog Wide 4k)] Deviation meter LPF : 3kHz HPF : OFF 2) Adj item: [Low], [Low'], [Center], [High'], [High] PTT: Press [Transmit] button. Press [Apply] button to store the adjustment value.	Deviation meter Oscilloscope		ANT		[FPU] [<][>]	0.60kHz	0.60kHz ±0.05kHz
	1) Adj item: [DQT Deviation (Analog Wide 5k)] Deviation meter LPF : 3kHz HPF : OFF 2) Adj item: [Low], [Low'], [Center], [High'], [High] PTT: Press [Transmit] button. Press [Apply] button to store the adjustment value.	Deviation meter Oscilloscope		ANT		[FPU] [<][>]	0.75kHz	0.75kHz ±0.05kHz
9. Single Tone Deviation *4	1) Adj item: [Single Tone Deviation (Analog Narrow)] Deviation meter LPF : 15kHz HPF : OFF 2) Adj item: [Low], [Low'], [Center], [High'], [High] PTT: Press [Transmit] button. Press [Apply] button to store the adjustment value.	Deviation meter Oscilloscope		ANT		[FPU] [<][>]	1.50kHz	1.50kHz ±0.05kHz
	1) Adj item: [Single Tone Deviation (Analog Wide 4k)] Deviation meter LPF : 15kHz HPF : OFF 2) Adj item: [Low], [Low'], [Center], [High'], [High] PTT: Press [Transmit] button. Press [Apply] button to store the adjustment value.	Deviation meter Oscilloscope		ANT		[FPU] [<][>]	2.40kHz	2.40kHz ±0.05kHz
	1) Adj item: [Single Tone Deviation (Analog Wide 5k)] Deviation meter LPF : 15kHz HPF : OFF 2) Adj item: [Low], [Low'], [Center], [High'], [High] PTT: Press [Transmit] button. Press [Apply] button to store the adjustment value.	Deviation meter Oscilloscope		ANT		[FPU] [<][>]	3.00kHz	3.00kHz ±0.05kHz

\*4: Refer to the "4.13.1 Necessary Deviation adjustment item for each signaling and mode" table.

Item	Condition	Measurement			Adjustment			Specifications /Remarks
	PC test mode	Test-equipment	Unit	Terminal	Unit	Parts	Method	
10. DTMF Deviation	1) Adj item: [DTMF Deviation (Analog Narrow)] Deviation meter LPF : 15kHz HPF : OFF 2) Adj item: [Low], [Low'], [Center], [High'], [High] PTT: Press [Transmit] button. Press [Apply] button to store the adjustment value.	Deviation meter Oscilloscope		ANT		[FPU] [<][>]	1.25kHz	1.25kHz ±0.05kHz
	1) Adj item: [DTMF Deviation (Analog Wide 4k)] Deviation meter LPF : 15kHz HPF : OFF 2) Adj item: [Low], [Low'], [Center], [High'], [High] PTT: Press [Transmit] button. Press [Apply] button to store the adjustment value.	Deviation meter Oscilloscope		ANT		[FPU] [<][>]	2.00kHz	2.00kHz ±0.05kHz
	1) Adj item: [DTMF Deviation (Analog Wide 5k)] Deviation meter LPF : 15kHz HPF : OFF 2) Adj item: [Low], [Low'], [Center], [High'], [High] PTT: Press [Transmit] button. Press [Apply] button to store the adjustment value.	Deviation meter Oscilloscope		ANT		[FPU] [<][>]	2.50kHz	2.50kHz ±0.05kHz
11. MSK Deviation	1) Adj item: [MSK Deviation (Analog Narrow)] Deviation meter LPF : 15kHz HPF : OFF 2) Adj item: [Low], [Low'], [Center], [High'], [High] PTT: Press [Transmit] button. Press [Apply] button to store the adjustment value.	Deviation meter Oscilloscope		ANT		[FPU] [<][>]	1.50kHz	1.50kHz ±0.05kHz
	1) Adj item: [MSK Deviation (Analog Wide 4k)] Deviation meter LPF : 15kHz HPF : OFF 2) Adj item: [Low], [Low'], [Center], [High'], [High] PTT: Press [Transmit] button. Press [Apply] button to store the adjustment value.	Deviation meter Oscilloscope		ANT		[FPU] [<][>]	2.40kHz	2.40kHz ±0.05kHz
	1) Adj item: [MSK Deviation (Analog Wide 5k)] Deviation meter LPF : 15kHz HPF : OFF 2) Adj item: [Low], [Low'], [Center], [High'], [High] PTT: Press [Transmit] button. Press [Apply] button to store the adjustment value.	Deviation meter Oscilloscope		ANT		[FPU] [<][>]	3.00kHz	3.00kHz ±0.05kHz

#### 4.13.1 Necessary Deviation adjustment item for each signaling and mode

The following shows the necessary adjustment items for each signaling deviation. Please read the following table like the following example. In the case of the signaling “QT (Analog Wide 5k)”, this signaling is composed of three elements [Balance, Maximum Deviation (Analog Wide 5k) and QT Deviation (Analog Wide 5k)]. Please adjust Balance and Maximum Deviation (Analog Wide 5k) before adjusting QT Deviation (Analog Wide 5k).

Mode	Signaling	Necessary adjustment and order		
		Wide 5k	Wide 4k	Narrow
Analog	Audio	1. Balance 2. Maximum Deviation [Analog Wide 5k]	1. Balance 2. Maximum Deviation [Analog Wide 4k]	1. Balance 2. Maximum Deviation [Analog Narrow]
	QT	1. Balance 2. Maximum Deviation [Analog Wide 5k] 3. QT Deviation [Analog Wide 5k]	1. Balance 2. Maximum Deviation [Analog Wide 4k] 3. QT Deviation [Analog Wide 4k]	1. Balance 2. Maximum Deviation [Analog Narrow] 3. QT Deviation [Analog Narrow]
	DQT	1. Balance 2. Maximum Deviation [Analog Wide 5k] 3. DQT Deviation [Analog Wide 5k]	1. Balance 2. Maximum Deviation [Analog Wide 4k] 3. DQT Deviation [Analog Wide 4k]	1. Balance 2. Maximum Deviation [Analog Narrow] 3. DQT Deviation [Analog Narrow]
	5TONE	1. Balance 2. Maximum Deviation [Analog Wide 5k] 3. Single Tone Deviation [Analog Wide 5k]	1. Balance 2. Maximum Deviation [Analog Wide 4k] 3. Single Tone Deviation [Analog Wide 4k]	1. Balance 2. Maximum Deviation [Analog Narrow] 3. Single Tone Deviation [Analog Narrow]
	DTMF	1. Balance 2. Maximum Deviation [Analog Wide 5k] 3. DTMF Deviation [Analog Wide 5k]	1. Balance 2. Maximum Deviation [Analog Wide 4k] 3. DTMF Deviation [Analog Wide 4k]	1. Balance 2. Maximum Deviation [Analog Narrow] 3. DTMF Deviation [Analog Narrow]
	MSK	1. Balance 2. Maximum Deviation [Analog Wide 5k] 3. MSK Deviation [Analog Wide 5k]	1. Balance 2. Maximum Deviation [Analog Wide 4k] 3. MSK Deviation [Analog Wide 4k]	1. Balance 2. Maximum Deviation [Analog Narrow] 3. MSK Deviation [Analog Narrow]
DMR	Audio	-	-	1. Balance 2. Maximum Deviation [DMR]

- Balance is common with all the above deviation adjustments. If Balance (Transmitter Section 4) has already adjusted, please skip Step1 and adjust from Step2.
- Maximum Deviation (Analog Wide 5k/Analog Wide 4k/Analog Narrow) is common with all the analog signaling deviations. If Balance and Maximum Deviation (Analog Wide 5k/Analog Wide 4k/Analog Narrow) (Transmitter Section 6) have already adjusted, please skip Step2 and adjust from Step3.



#### 4.14 Receiver Section

Item	Condition	Measurement			Adjustment			Specifications /Remarks
		Test-equipment	Unit	Terminal	Unit	Parts	Method	
1. AF level setting	1) Test Channel Channel: 1 Test Signaling Mode: Analog Signaling: 1 Wide 5k/Wide 4k/ Narrow: Narrow Beat Shift: Uncheck Compander: Uncheck SSG output:-47dBm (1mV) (MOD:1kHz/±1.5kHz)	SSG DVM AF VM Dummy load		ANT SP/MIC connec- tor		[FPU] [<][>]	Volume Up/Down key to obtain 1.41V AF output. (0.5W@4ohm Load)	1.41V±0.1V
2. Sensitivity 1 (SENS1)	1) Adj item: [Sensitivity 1] 2) Adj item:[Low], [Low'], [Cen- ter], [High'], [High] Press [Apply All] button to store the adjustment value. SSG output:-118dBm (0.28µV) (MOD:1kHz/ ±1.5kHz)	SSG DVM AF VM Dummy load		ANT SP/MIC connec- tor		[FPU] [<][>]	Increase the adjust- ment value from the preset value to the first 12dB SINAD point with SSG level -118dBm.  Preset value Low : 50 Low' : 150 Center : 200 High' : 250 High : 350	12dB SINAD Ad- just@-118dBm Caution: Perform the adjust- ment of "3. Sensitivi- ty 2" before performing this ad- justment.
3. Sensitivity 2 (SENS2)	1) Adj item: [Sensitivity 2] 2) Adj item:[Low], [Low'], [Cen- ter], [High'], [High] Press [Apply All] button to store the adjustment value.	SSG DVM AF VM Dummy load		ANT SP/MIC connec- tor		[FPU] [<][>]	Write Preset value. (Fixed value) Low : 320 Low' : 400 Center : 500 High' : 640 High : 800	
4.* RSSI Ref- erence	1) Adj item: [RSSI Reference (Analog Nar- row)] 2) Adj item:[Low], [Low'], [Cen- ter], [High'], [High] SSG output: 12dB SINAD level -3dB (MOD:1kHz/±1.5kHz)	SSG DVM AF VM Dummy load		ANT SP/MIC connec- tor		[FPU] [<][>]	After input signal from SSG, press [Apply] button to store the ad- justment value.	*: Because RSSI Reference (Analog Wide 5k, Analog Wide 4k and DMR) is adjusted by adjust- ing RSSI Reference (Analog Narrow), it is not necessary to ad- just RSSI Reference (Analog Wide 5k, Analog Wide 4k and DMR).
5. Open Squelch (DMR)	1) Adj item:[Open Squelch (DMR)] 2) Adj item:[Low], [Low'], [Cen- ter], [High'], [High] Reference SSG output: 12dB SINAD level@Analog Narrow -3dB (CW (without modulation))	SSG Distortion meter Oscilloscope		ANT SP/MIC connec- tor		[FPU] [<][>]	After input signal from SSG, press [Apply] button to store the ad- justment value.	
5. Open Squelch (Analog Narrow)	1) Adj item: [Open Squelch (Analog Narrow)] 2) Adj item:[Low], [Low'], [Cen- ter], [High'], [High] SSG output: 12dB SINAD level -1dB (MOD:1kHz/±1.5kHz)	SSG Distortion meter Oscilloscope		ANT SP/MIC connec- tor		[FPU] [<][>]	After input signal from SSG, press [Apply] button to store the ad- justment value.	

Item	Condition	Measurement			Adjustment			Specifications /Remarks
		Test-equipment	Unit	Terminal	Unit	Parts	Method	
5. Open Squelch (Analog Wide 4k)	1) Adj item: [Open Squelch (Analog Semi Wide)] 2) Adj item:[Low], [Low'], [Center], [High'], [High] SSG output:12dB SINAD level -1dB (MOD:1kHz/±2.4kHz)	SSG Distortion meter Oscilloscope		ANT SP/MIC connector		[FPU] [<][>]	After input signal from SSG, press [Apply] button to store the adjustment value.	
5. Open Squelch (Analog Wide 5k)	1) Adj item: [Open Squelch (Analog Wide)] 2) Adj item:[Low], [Low'], [Center], [High'], [High] SSG output:12dB SINAD level ±1dB (MOD:1kHz/±3.0kHz)	SSG Distortion meter Oscilloscope		ANT SP/MIC connector		[FPU] [<][>]	After input signal from SSG, press [Apply] button to store the adjustment value.	
6.* Low RSSI	1) Adj item:[Low RSSI (Analog Narrow)] 2) Adj item:[Low], [Low'], [Center], [High'], [High] SSG output :-118dBm (0.28uV) (MOD:1kHz/±1.5kHz)	SSG Distortion meter Oscilloscope		ANT SP/MIC connector		[FPU] [<][>]	After input signal from SSG, press [Apply] button to store the adjustment value.	*: Because Low RSSI at -118dBm (Analog Wide 5k, Wide 4k and DMR) is adjusted by adjusting Low RSSI at -118dBm (Analog Narrow), it is not necessary to adjust Low RSSI at -118dBm (Analog Wide 5k, Wide 4k and DMR).
7.* High RSSI	1) Adj item: [High RSSI (Analog Narrow)] 2) Adj item: [Low], [Low'], [Center], [High'], [High] SSG output : -80dBm (22.4uV) (MOD:1kHz/±1.5kHz)	SSG Distortion meter Oscilloscope		ANT SP/MIC connector		[FPU] [<][>]	After input signal from SSG, press [Apply] button to store the adjustment value.	*: Because High RSSI at -80dBm (Analog Wide 5k, Wide 4k and DMR) is adjusted by adjusting High RSSI at -80dBm (Analog Narrow), it is not necessary to adjust High RSSI at -80dBm (Analog Wide 5k, Wide 4k and DMR).
8. Tight Squelch (Analog Narrow)	1) Adj item: [Open Squelch (Analog Narrow)] 2) Adj item:[Low], [Low'], [Center], [High'], [High] SSG output:12dB SINAD level +3dB (MOD:1kHz/±1.5kHz)	SSG Distortion meter Oscilloscope		ANT SP/MIC connector		[FPU] [<][>]	After input signal from SSG, press [Apply] button to store the adjustment value.	
8. Tight Squelch (Analog Wide 4k)	1) Adj item: [Open Squelch (Analog Narrow)] 2) Adj item:[Low], [Low'], [Center], [High'], [High] SSG output:12dB SINAD level +3dB (MOD:1kHz/±2.4kHz)	SSG Distortion meter Oscilloscope		ANT SP/MIC connector		[FPU] [<][>]	After input signal from SSG, press [Apply] button to store the adjustment value.	
8. Tight Squelch (Analog Wide 5k)	1) Adj item: [Open Squelch (Analog Narrow)] 2) Adj item:[Low], [Low'], [Center], [High'], [High] SSG output:12dB SINAD level +3dB (MOD:1kHz/±3.0kHz)	SSG Distortion meter Oscilloscope		ANT SP/MIC connector		[FPU] [<][>]	After input signal from SSG, press [Apply] button to store the adjustment value.	

# SECTION 5 TROUBLESHOOTING

## 5.1 Replacing MAIN Unit

### ■MAIN unit Information

Model Name	Original Main unit Number	Service Unit Number (XCA-***)
TK-D740H K	XC1-1072-70	XCA-003E-00S (Main Unit Number: XC1-1072-72)
TK-D740HV K	XC1-1072-70	XCA-003E-00S (Main Unit Number: XC1-1072-72)
TK-D740 M	XC1-1072-70	XCA-003E-00S (Main Unit Number: XC1-1072-72)
TK-D740 E	XC1-1072-70	XCA-003E-00S (Main Unit Number: XC1-1072-72)

### ■Supplied Accessories of "Service Main unit"

Item (Including Parts Number)	Quantity
Main Unit (XC1-107)	1

### ■"Service Main unit" Data

The following data is written on the service Main unit:

Data Type	Description
Firmware	TK-D740/D840 Firmware.
FPU Data (PC programming mode)	XC1-107(TK-D740) E type data.
KENWOOD ESN	Model Name: TK-D740 Type: E

### ■After Changing the PCB

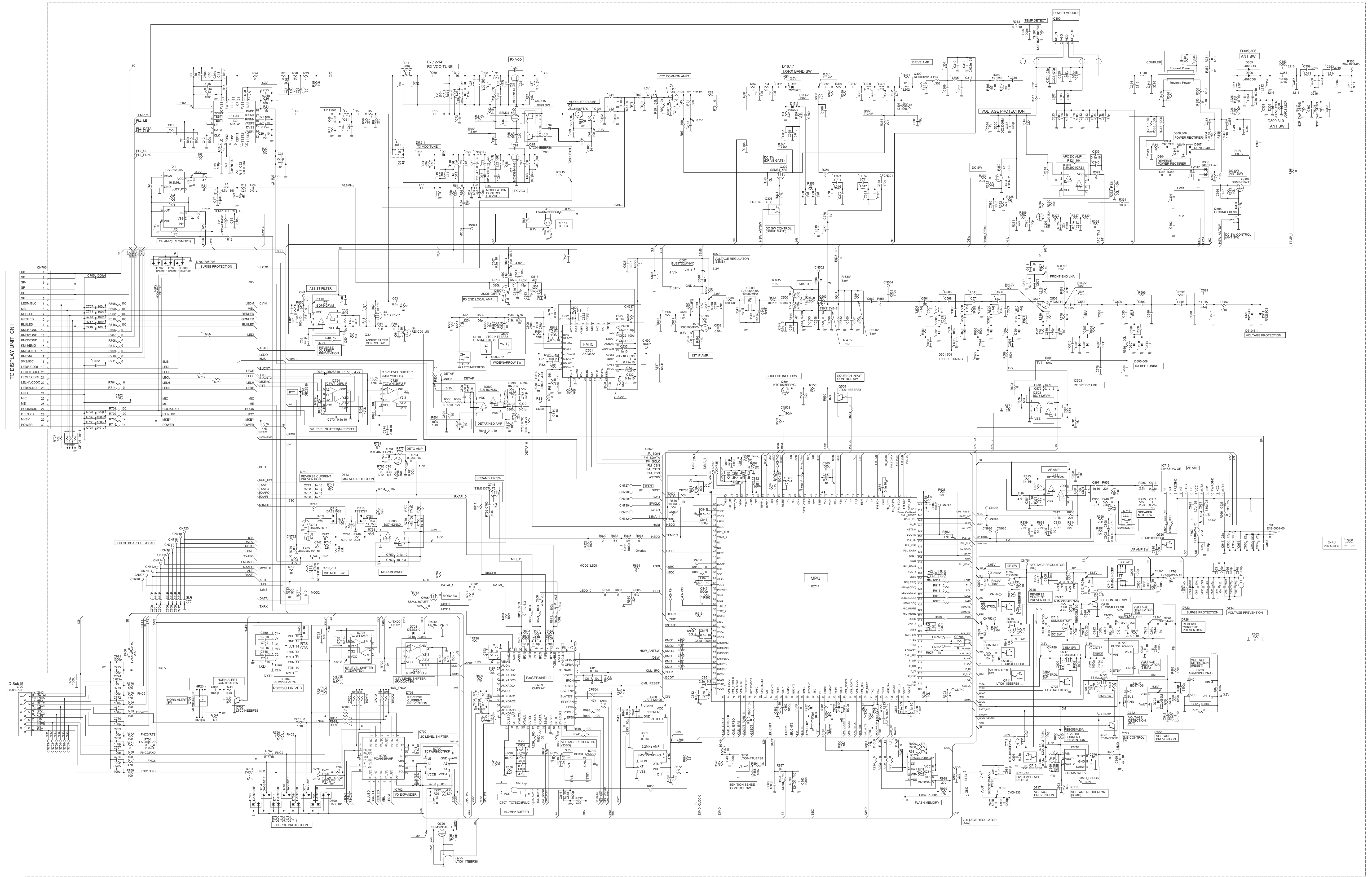
- (1) Using the KPG-166D, select your desired item (Model Name and Frequency) from the Model> Product Information menu, then use Program> Write Data to the Transceiver to write the FPU data (PC Programming mode). When writing to the transceiver, a Warning Message, corresponding to the item selected, appears. Click [OK] to continue writing the data.
- (2) Enter Program> Test Mode, then adjust the various adjustment data (PC Test Mode) as described in the "SECTION 4 ADJUSTMENT"
- (3) If necessary, write the FPU data used by the customer with the KPG-166D.

#### Note:

- When a new printed circuit board is used, the KENWOOD ESN changes, as does the Transceiver Information display of the KPG-166D, but this does not have any effect on the operation of the transceiver.
- If changing to the original ESN, please contact our service center.

# MEMO

SCHEMATIC DIAGRAM  
■ MAIN UNIT (1/2) (XC1-1072-70)



■ MAIN UNIT (2/2) (XC1-1072-70)

	D5	D7	D9	D10	D11	D12	D13	D14	D501	D502	D503	D504	D505	D506	D507	D508	IC1	IC714	L7	L9	L10	L11	L12	L14	L16	L19	L20	L21	L22	L23	L24	L25	L26	L27	L29	L30	L31	L32	L33
2-70	SMV1212-079LF	SMV1212-079LF	SMV1212-079LF	SMV1212-079LF	SMV1212-079LF	SMV1212-079LF	BB664-02V	BB664-02V	-	BB664-02V	BB664-02V	-	BBY56-02V	BBY56-02V	BBY56-02V	BBY56-02V	TC75S51FEF	2F4052GT6KGF	15n	4.7n	-	4.7n	-	3.3n	-	3.3n	1.8n	-	-	-	-	1.8n	10n	-	10n	120n	68n	4.7n	4.7n

	L34	L36	L38	L40	L41	L42	L45	L300	L301	L302	L303	L304	L305	L316	L317	L319	L505	L506	L507	L508	L509	L510	L511	L512	L513	L515	L516	L519	R2	R4	R5	R6	R16	R26	R27	R36	R47	R64	R67	R78	R79	R80	R311
2-70	-	-	3.3n	82n	56n	56n	68n	15n	10n	12n	8.2n	120n	47n	33n	39n	100n	5.6n	180n	27n	-	-	27n	270n	LR7920DD37N7J	LR7920DD37N7J	33n	100n	12n	22k	22k	10	-	68k	1.8k	68k	68k	1M	390	270	120	120	56	-

	R318	R327	R335	R336	R340	R344	R387	R397	R398	R399	R550	R551	R552	R554	R555	R564	R565	R567	R573	R578	R579	R582	R592	R593	R599	R600	R601	R605	R606	R611	R612	R653	R654
2-70	150k	18k	100	680	-	68	220k	18	270	270	390	100k	270	100k	330k	-	27	-	-	0	0	0	-	0	0	0	0	0	180	180	-	-	

	R705	R712	R713	R783	R798	R963	R980	R981	R982	R983	C3	C6	C35	C40	C46	C49	C51	C52	C58	C65	C67	C69	C70	C73	C75	C79	C80	C81	C82	C83	C84	C85	C86	C87	C88	C89	C90	C91	C92	C93	C95	C96	C99	C100	C101	C102
2-70	0	0	0	33k	1k	-	0	-	-	-	1000p	1000p	1000p	1000p	470p	27p	15p	47p	1000p	-	270p	270p	1000p	1000p	680p	0.75p	150p	1p	1000p	1000p	1000p	1000p	7p	1000p	6p	8p	1000p	8p	7p	9p	1p	1p	1000p	1000p	18p	27p

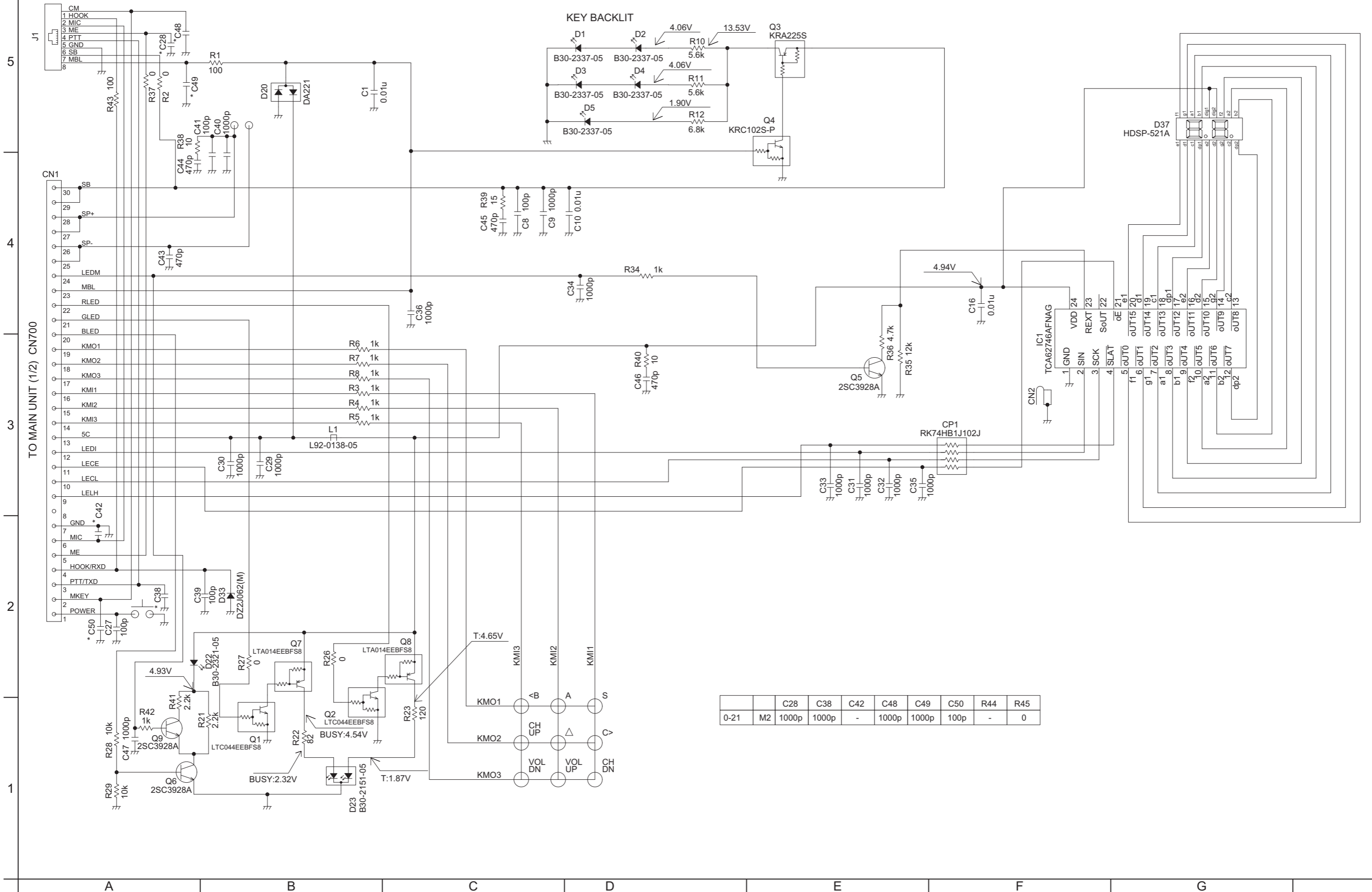
	C103	C104	C108	C111	C112	C113	C115	C117	C300	C301	C302	C303	C304	C309	C310	C311	C313	C314	C316	C317	C330	C332	C336	C337	C340	C341	C343	C344	C347	C348	C350	C351	C352	C355	C356	C357	C359	C360	C361	C362	C363	C364	C365	C367	C369	C370	C371
2-70	15p	15p	1000p	1000p	18p	1000p	1000p	1000p	1000p	1000p	8p	7p	12p	13p	1000p	2.5p	150p	6.8u	1000p	150p	1000p	-	9p	1000p	1000p	-	1000p	1000p	1000p	1000p	1000p	12p	12p	12p	43p	15p	2p	20p	2p	1000p	4p	15p	1000p	1000p	1000p	10p	6p

	C372	C374	C375	C377	C381	C391	C392	C393	C551	C555	C558	C560	C561	C562	C564	C566	C567	C568	C570	C571	C572
2-70	15p	3p	10p	1000p	-	1000p	1000p	1000p	1000p	-	1000p	1000p	1000p	1000p	4p	1000p	15p	-	1000p	-	1000p

	C573	C575	C576	C577	C578	C582	C584	C585	C587	C588	C590	C592	C593	C594	C595	C596	C597	C599	C600	C601	C603	C604	C605	C606	C607	C608	C614	C615	C619	C722	C753	C955	C956
2-70	-	-	1000p	5p	1000p	-	1000p	12p	-	47p	10p	-	-	1000p	-	-	27p	6p	27p	1000p	15p	-	-	1000p	-	-	6p	6p	56p	470p	39p	1000p	1000p

	L310	L312	L313	L314
2-70	L34-1039-05	L34-4903-05	L34-4903-05	L34-4903-05

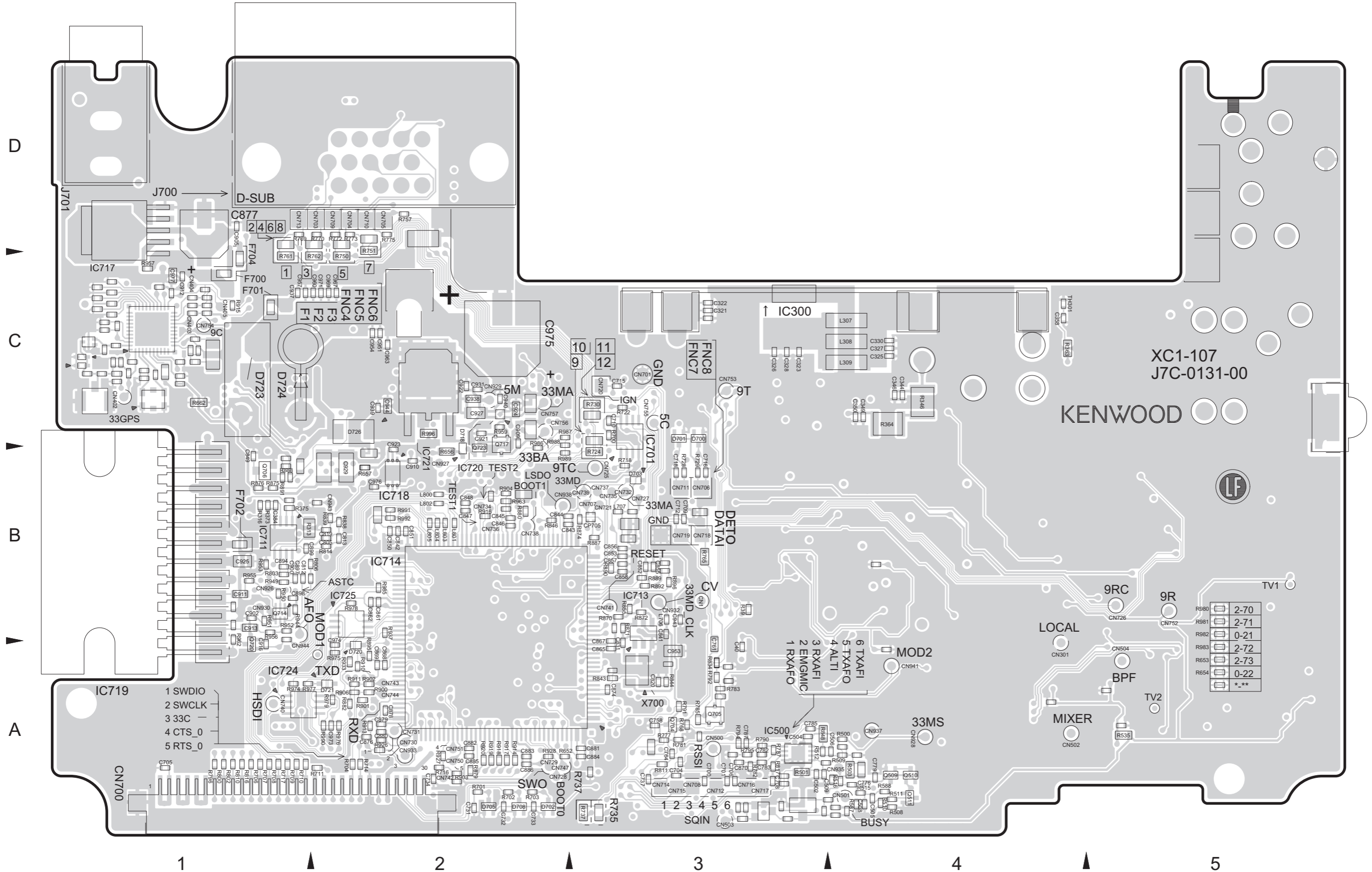
■ DISPLAY UNIT (X54-3890-21)



# PRINTED CIRCUIT BOARD

■ MAIN UNIT (XC1-1072-70)

--- Component side view (J7C-0131-00) ---



XC1-107  
J7C-0131-00  
KENWOOD

R580	2-70
R581	2-71
R582	0-21
R583	2-72
R584	2-73
R585	0-22
R586	*..*

1

2

3

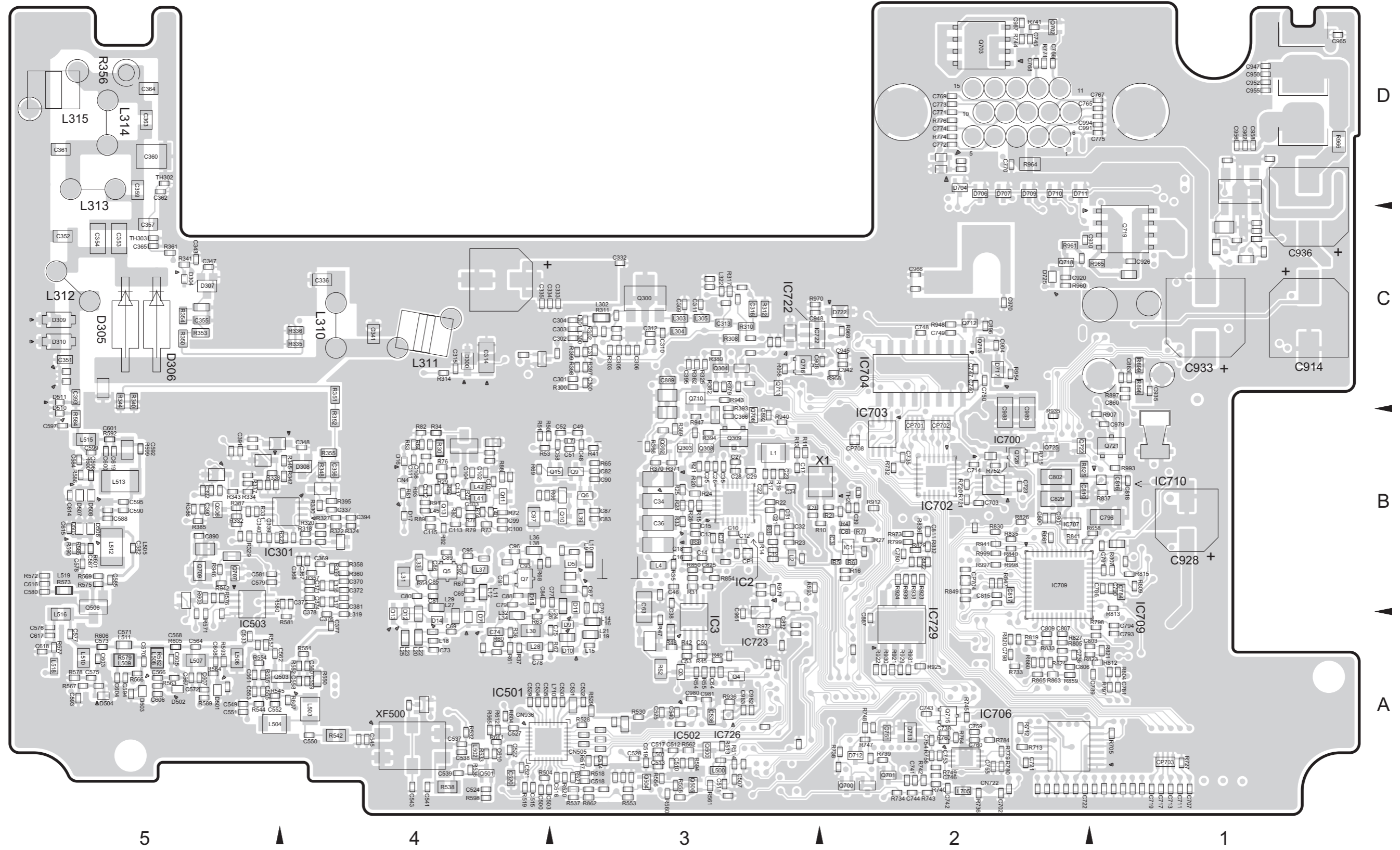
4

5



■ MAIN UNIT (XC1-1072-70)

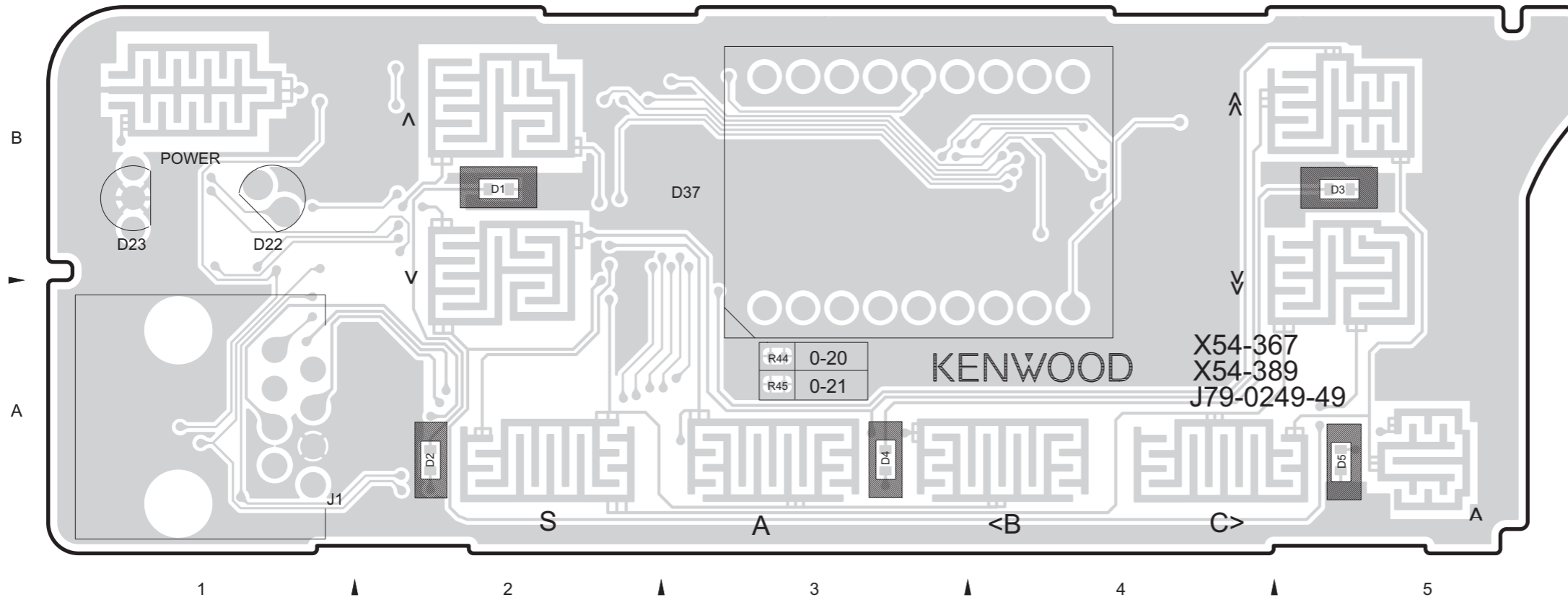
--- Foil side view (J7C-0131-00) ---





■ DISPLAY UNIT (X54-3890-21)

--- Component side view (J79-0249-49) ---

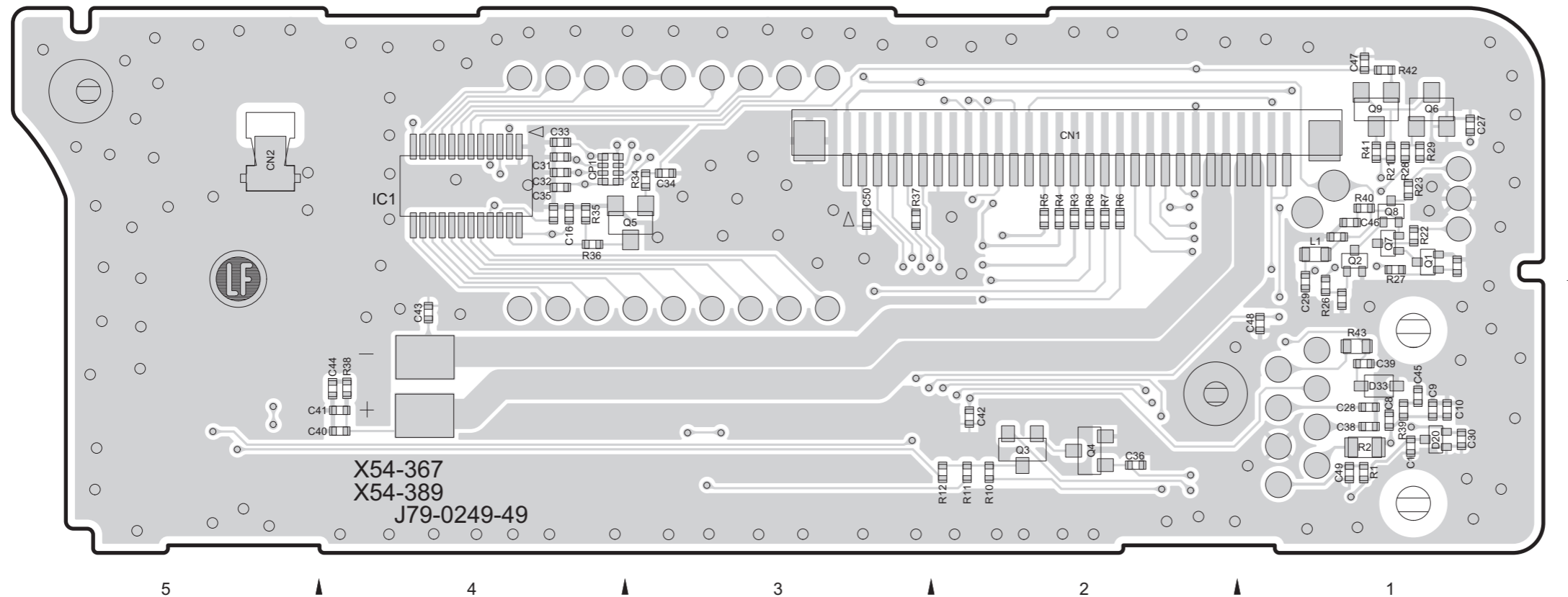


● ADDRESS TABLE OF BOARD PARTS  
Each address may have an address error by one interval.



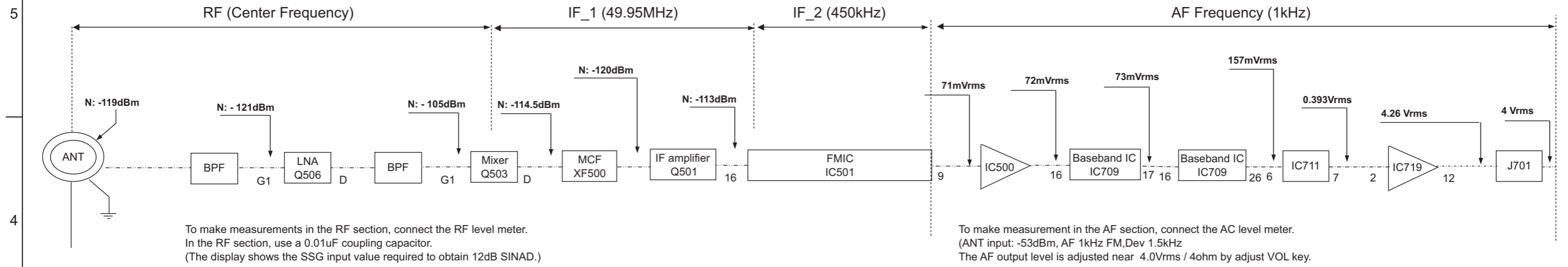
REF.NO.	LOCATION	REF.NO.	LOCATION	REF.NO.	LOCATION
IC		R11	B- 2A	C32	B- 4B
IC1	B- 4B	R12	B- 2A	C33	B- 4B
		R21	B- 1B	C34	B- 3B
		R22	B- 1B	C35	B- 4B
TRANSISTOR		R23	B- 1B	C36	B- 2A
Q1	B- 1B	R26	B- 1A	C38	B- 1A
Q2	B- 1B	R27	B- 1B	C39	B- 1A
Q3	B- 2A	R28	B- 1B	C40	B- 4A
Q4	B- 2A	R29	B- 1B	C41	B- 4A
Q5	B- 3B	R34	B- 3B	C42	B- 2A
Q6	B- 1B	R35	B- 4B	C43	B- 4A
Q7	B- 1B	R36	B- 4B	C44	B- 4A
Q8	B- 1B	R37	B- 3B	C45	B- 1A
Q9	B- 1B	R38	B- 4A	C46	B- 1B
DIODE		R39	B- 1A	C47	B- 1B
D20	B- 1A	R40	B- 1B	C48	B- 1A
D22	B- 1B	R41	B- 1B	C49	B- 1A
D23	B- 1B	R42	B- 1B	C50	B- 3B
D33	B- 1A	R43	B- 1A		
D37	A- 3B			OTHER	
				CN1	B- 2B
				CN2	B- 5B
RESISTOR		CAPACITOR		CP1	B- 4B
R1	B- 1A	C1	B- 1A	J1	A- 1A
R2	B- 1A	C8	B- 1A	L1	B- 1B
R3	B- 2B	C9	B- 1A		
R4	B- 2B	C10	B- 1A		
R5	B- 2B	C16	B- 4B		
R6	B- 2B	C17	B- 1B		
R7	B- 2B	C27	B- 1A		
R8	B- 2B	C28	B- 1A		
R9	B- 2B	C29	B- 1A		
R10	B- 2A	C30	B- 1A		
		C31	B- 4B		

--- Foil side view (J79-0249-49) ---

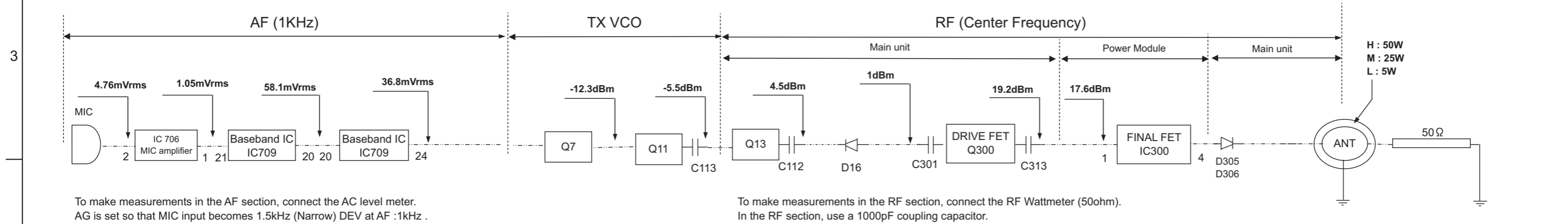


# LEVEL DIAGRAM

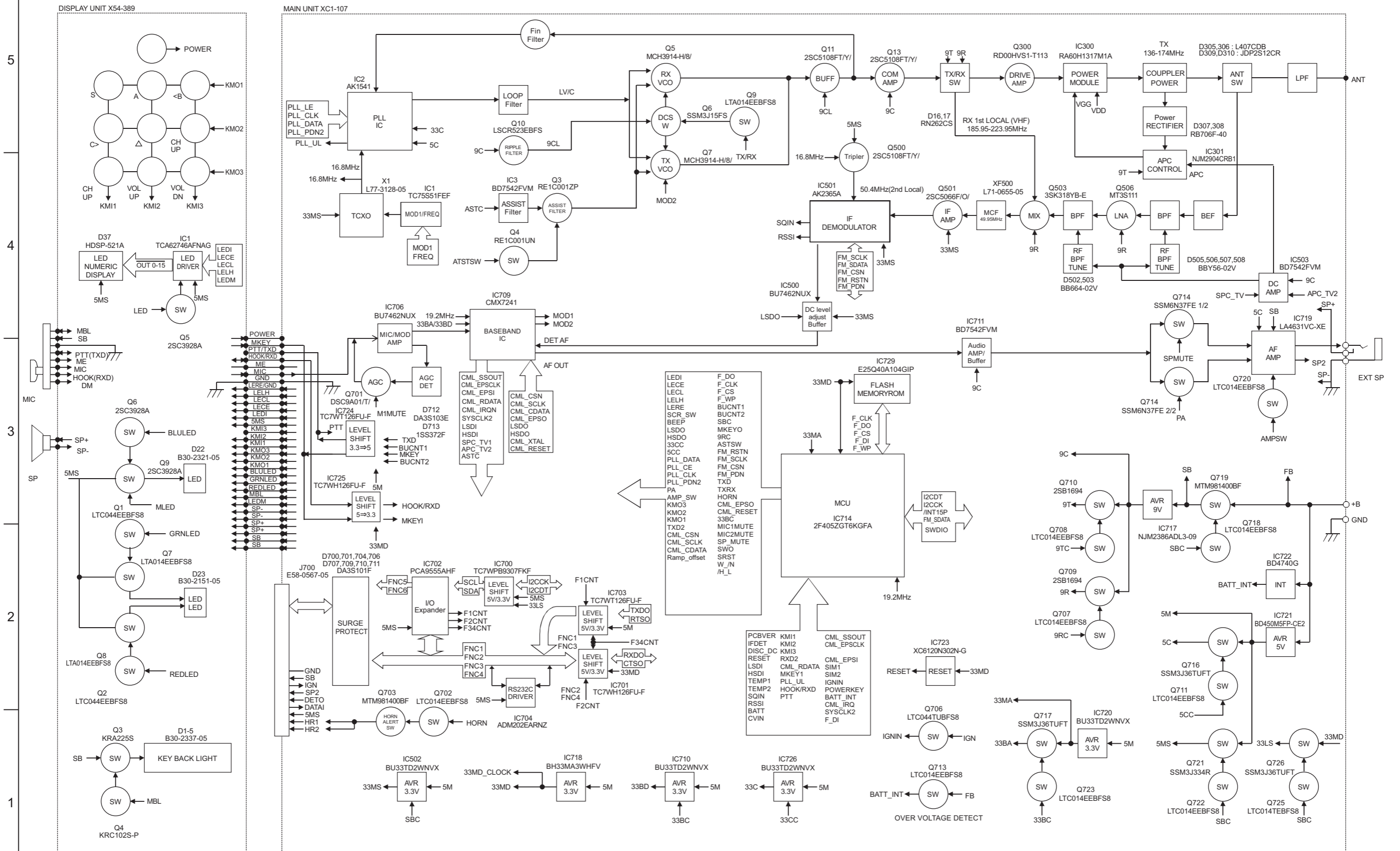
## Receiver Section



## Transmitter Section



# BLOCK DIAGRAM



MEMO

# PARTS LIST

[TK-D740H,TK-D740H(V),TK-D740]

\* SAFETY PRECAUTION

Parts identified by the  $\triangle$  symbol are critical for safety. Replace only with specified part numbers.

\* BEWARE OF BOGUS PARTS

Parts that do not meet specifications may cause trouble in regard to safety and performance. We recommend that genuine parts be used.

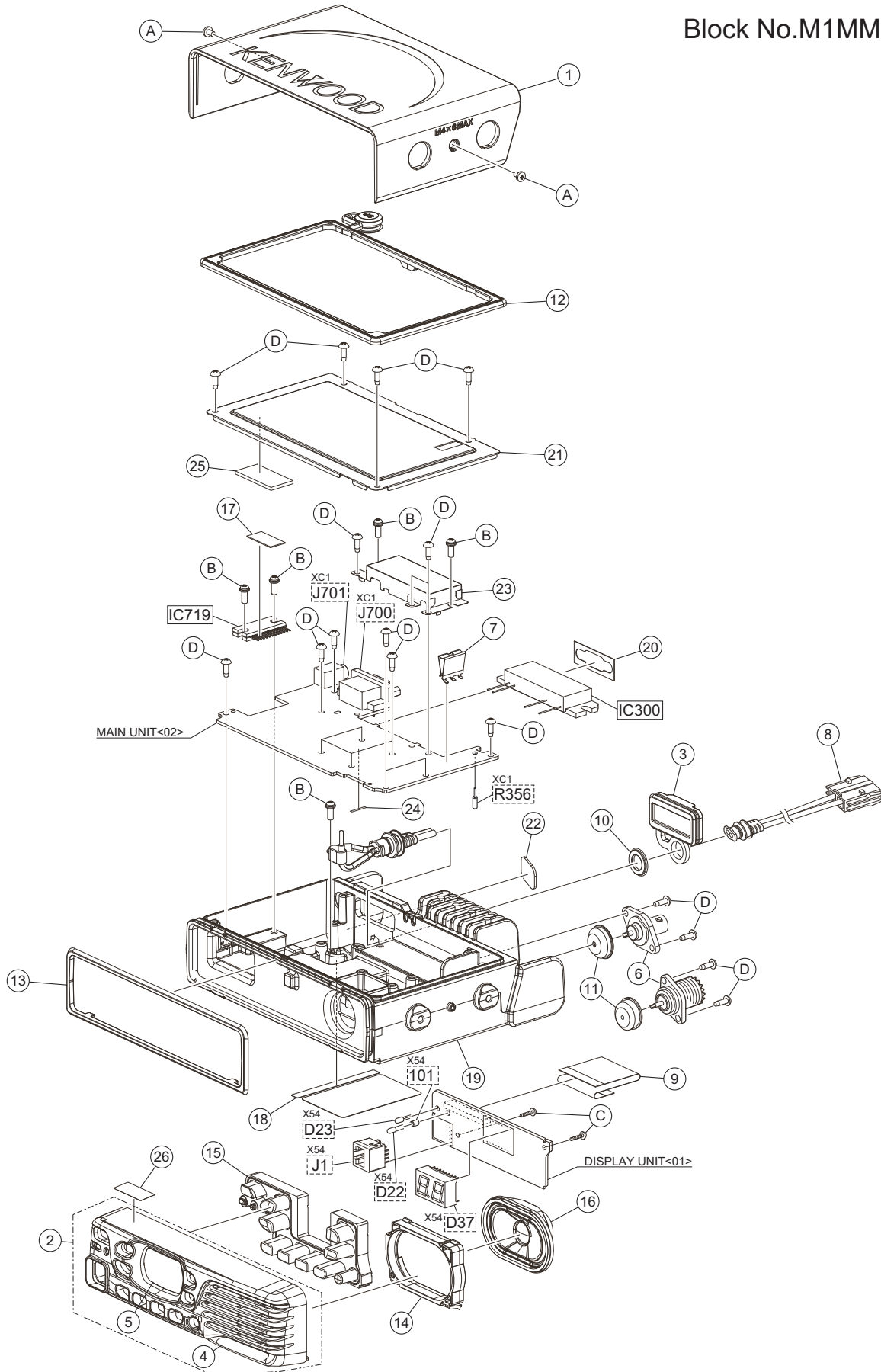
\* (x\_) in a description column shows the number of the used part.

- Contents -

Exploded view of general assembly and parts list .....	3-2
Electrical parts list .....	3-4
Packing materials and accessories parts list .....	3-12

# Exploded view of general assembly and parts list

Block No.M1MM





# General assembly

Block No. [M][1][M][M]

△ Symbol No.	Part No.	Part Name	Description	Local
1	A02-4073-31	PLASTIC CABINET		
2	A6C-0027-00	PANEL ASSEMBLY		
3	B09-0732-03	CAP	D-SUB	
4	B4D-0037-00	KENWOOD BADGE	PICASUS	
5	-----	FRONT GLASS		
6	E04-0167-15	C.RECEPTACLE-M	M TYPE	D740_M,D740H_K,D740HV_K
6	E04-0454-15	C.RECEPTACLE-BN	BNC	D740_E
7	E23-1346-04	GROUND TERMINAL	CLIP	
8	E30-7684-25	DC CORD	PIG BLADE	
9	E37-1461-05	FLAT CABLE	30P	
10	G53-1643-04	PACKING	PIG O-RING	
11	G53-1662-04	PACKING	ANT M	D740_M,D740H_K,D740HV_K
11	G53-1675-04	PACKING	ANT BNC	D740_E
12	G53-1819-21	PACKING	CHASSIS	
13	G53-1820-03	PACKING	PANEL	
14	J19-5528-03	HOLDER		
15	K29-9448-01	KEY TOP		
16	T07-0785-15	SPEAKER	6W	
17	G10-1365-04	FIBROUS SHEET	AMP	
18	B41-1837-04	CAUTION STICKER	HOT SURFACE	
19	A1A-0055-00	CHASSIS		
20	G11-4611-04	SHEET	D-SUB	
21	F1B-0010-00	SHIELDING COVER	TOP COVER	D740_E
22	G11-4578-04	SHEET	WITHOUT GPS	
23	F10-3183-03	SHIELDING CASE	P-MODULE	
24	F1C-0063-00	CONDUCT SHEET	PCB-B	
25	G1D-0164-00	CUSHION	S-COVER	D740_E
26	B4B-0008-00	CAUTION STICKER	FCC PANEL	D740_M,D740H_K,D740HV_K
A	N35-2604-43	BI.HEAD M.SCREW	CABINET(x2)	
B	N67-3010-48	P.H.SEMS SCREW	PM,AMP,DC/(x5)	
C	N80-2008-48	P.HEAD T.SCREW	DISP PCB(x2)	
D	N87-2608-48	BR.HEAD T.SCREW	PCB,ANT(x15)	D740_M,D740H_K,D740HV_K
D	N87-2608-48	BR.HEAD T.SCREW	PCB,ANT(x19)	D740_E
-	X54-3890-21	DISPLAY UNIT		
-	XCA-003E-00S	MAIN UNIT	SERVICE UNIT	

# Electrical parts list

## DISPLAY UNIT

**X54-3890-21**

		Block No. [0][1]	
△ Symbol No.	Part No.	Part Name	Description Local
IC1	TC62D748CFNAG	IC	
Q1	LTC044EEBFS8	DIGI TRANSISTOR	
Q2	LTC044EEBFS8	DIGI TRANSISTOR	
Q3	KRA225S	TRANSISTOR	
Q4	KRC102S-P	TRANSISTOR	
Q5	2SC3928A	TRANSISTOR	
Q6	2SC3928A	TRANSISTOR	
Q7	LTA014EEBFS8	DIGI TRANSISTOR	
Q8	LTA014EEBFS8	DIGI TRANSISTOR	
Q9	2SC3928A	TRANSISTOR	
D1	B30-2337-05	LED	
D2	B30-2337-05	LED	
D3	B30-2337-05	LED	
D4	B30-2337-05	LED	
D5	B30-2337-05	LED	
D20	DA221	DIODE ARRAY	
D22	B30-2321-05	LED	
D23	B30-2151-05	LED	
D33	DZ2J062(M)	ZENER DIODE	
D37	HDSP-521A	LED	
C1	CK73HBB1E103K	C CAPACITOR	0.01uF 25V K
C8	CC73HCH1H101J	C CAPACITOR	100pF 50V J
C9	CK73HBB1H102K	C CAPACITOR	1000pF 50V K
C10	CK73HBB1E103K	C CAPACITOR	0.01uF 25V K
C16	CK73HBB1E103K	C CAPACITOR	0.01uF 25V K
C27	CC73HCH1H101J	C CAPACITOR	100pF 50V J
C28	CK73HBB1H102K	C CAPACITOR	1000pF 50V K
C29	CK73HBB1H102K	C CAPACITOR	1000pF 50V K
C30	CK73HBB1H102K	C CAPACITOR	1000pF 50V K
C31	CK73HBB1H102K	C CAPACITOR	1000pF 50V K
C32	CK73HBB1H102K	C CAPACITOR	1000pF 50V K
C33	CK73HBB1H102K	C CAPACITOR	1000pF 50V K
C34	CK73HBB1H102K	C CAPACITOR	1000pF 50V K
C35	CK73HBB1H102K	C CAPACITOR	1000pF 50V K
C36	CK73HBB1H102K	C CAPACITOR	1000pF 50V K
C38	CK73HBB1H102K	C CAPACITOR	1000pF 50V K
C39	CC73HCH1H101J	C CAPACITOR	100pF 50V J
C40	CK73HBB1H102K	C CAPACITOR	1000pF 50V K
C41	CC73HCH1H101J	C CAPACITOR	100pF 50V J
C43	CK73HBB1H471K	C CAPACITOR	470pF 50V K
C44	CK73HBB1H471K	C CAPACITOR	470pF 50V K
C45	CK73HBB1H471K	C CAPACITOR	470pF 50V K
C46	CK73HBB1H471K	C CAPACITOR	470pF 50V K
C47	CK73HBB1H102K	C CAPACITOR	1000pF 50V K
C48	CK73HBB1H102K	C CAPACITOR	1000pF 50V K
C49	CK73HBB1H102K	C CAPACITOR	1000pF 50V K
C50	CC73HCH1H101J	C CAPACITOR	100pF 50V J
R1	RK73HB1J101J	MG RESISTOR	100Ω 1/16W J
R2	RK73FB2B000J	MG RESISTOR	0Ω 1/8W J
R3	RK73HB1J102J	MG RESISTOR	1kΩ 1/16W J
R4	RK73HB1J102J	MG RESISTOR	1kΩ 1/16W J
R5	RK73HB1J102J	MG RESISTOR	1kΩ 1/16W J
R6	RK73HB1J102J	MG RESISTOR	1kΩ 1/16W J
R7	RK73HB1J102J	MG RESISTOR	1kΩ 1/16W J
R8	RK73HB1J102J	MG RESISTOR	1kΩ 1/16W J
R10	RK73HB1J562J	MG RESISTOR	5.6kΩ 1/16W J
R11	RK73HB1J562J	MG RESISTOR	5.6kΩ 1/16W J
R12	RK73HB1J682J	MG RESISTOR	6.8kΩ 1/16W J
R21	RK73HB1J222J	MG RESISTOR	2.2kΩ 1/16W J
R22	RK73HB1J820J	MG RESISTOR	82Ω 1/16W J
R23	RK73HB1J121J	MG RESISTOR	120Ω 1/16W J
R26	RK73HB1J000J	MG RESISTOR	0Ω 1/16W J
R27	RK73HB1J000J	MG RESISTOR	0Ω 1/16W J
R28	RK73HB1J103J	MG RESISTOR	10kΩ 1/16W J
R29	RK73HB1J103J	MG RESISTOR	10kΩ 1/16W J
R34	RK73HB1J102J	MG RESISTOR	1kΩ 1/16W J
R35	RK73HB1J123J	MG RESISTOR	12kΩ 1/16W J

△ Symbol No.	Part No.	Part Name	Description Local
R36	RK73HB1J472J	MG RESISTOR	4.7kΩ 1/16W J
R37	RK73HB1J000J	MG RESISTOR	0Ω 1/16W J
R38	RK73HB1J100J	MG RESISTOR	10Ω 1/16W J
R39	RK73HB1J150J	MG RESISTOR	15Ω 1/16W J
R40	RK73HB1J100J	MG RESISTOR	10Ω 1/16W J
R41	RK73HB1J222J	MG RESISTOR	2.2kΩ 1/16W J
R42	RK73HB1J102J	MG RESISTOR	1kΩ 1/16W J
R43	RK73GB2A101J	MG RESISTOR	100Ω 1/10W J
R45	RK73HB1J000J	MG RESISTOR	0Ω 1/16W J
L1	LB73G0BD-005	CHIP FERRITE	
CN1	E40-6851-05	F.C.CONNECTOR	
CN2	E23-1262-05	TERMINAL	
CP1	RK74HB1J102J	NET RESISTOR	1kΩ 1/16W J
J1	E58-0535-05	MODULAR JACK	
101	J31-0565-15	COLLAR	

## MAIN UNIT

### XC1-1072-70

		Block No. [0][2]	
△ Symbol No.	Part No.	Part Name	Description Local
IC1	TC75S51FEF	IC	
IC2	AK1541	IC	
IC3	BD7542FVM	IC	
IC300	RA60H1317M1A	IC	
IC301	NJM2904CRB1	IC	
IC500	BU7462NUX	IC	
IC501	AK2365A	IC	
IC502	BU33TD2WNVX	IC	
IC503	BD7542FVM	IC	
IC700	TC7WPB9307FKF	IC	
IC701	TC7WH126FU-F	IC	
IC702	PCA9555AHF	IC	
IC703	TC7WT126FU-F	IC	
IC704	ADM202EARNZ	IC	
IC706	BU7462NUX	IC	
IC707	TC7S208FUJC	IC	
IC709	CMX7241	IC	
IC710	BU33TD2WNVX	IC	
IC711	BD7542FVM	IC	
IC713	SM5023CNDH-G	IC	
IC714	2F4052GT6KGFA	IC	
IC717	NJM2386ADL3-09	IC	
IC718	BH33MA3WHFV	IC	
IC719	LA4631VC-XE	IC	
IC720	BU33TD2WNVX	IC	
IC721	BD450M5FP-CE2	IC	
IC722	BD4740G	IC	
IC723	XC6120N302N-G	IC	
IC724	TC7WT126FU-F	IC	
IC725	TC7WH126FU-F	IC	
IC726	BU33TD2WNVX	IC	
IC729	E25Q40A104GIP	IC	
Q3	RE1C001ZP	FET	
Q4	RE1C001UN	FET	
Q5	MCH3914-H/8/	FET	
Q6	SSM3J15FS	FET	
Q7	MCH3914-H/8/	FET	
Q9	LTA014EEBFS8	DIGI TRANSISTOR	
Q10	LSCR523EBF58	TRANSISTOR	
Q11	2SC5108FT/Y/	TRANSISTOR	
Q13	2SC5108FT/Y/	TRANSISTOR	
Q15	LTC014EEBFS8	DIGI TRANSISTOR	
Q300	RD00HVS1-T113	FET	
Q302	SSM3J15FS	FET	
Q303	LTC014EEBFS8	DIGI TRANSISTOR	
Q304	LSCR523EBF58	TRANSISTOR	
Q306	RE1C001UN	FET	

△ Symbol No.	Part No.	Part Name	Description	Local	△ Symbol No.	Part No.	Part Name	Description	Local
Q308	LTC014EEBFS8	DIGI TRANSISTOR			D713	1SS372F	SCHOTTKY DIODE		
Q309	SSM3J334R	FET			D717	DZ2J180M	ZENER DIODE		
Q500	2SC5108FT/Y/	TRANSISTOR			D718	RBE05SM20A	DIODE		
Q501	2SC5066F/O/	TRANSISTOR			D720	DB2S310	SCHOTTKY DIODE		
Q503	3SK318YB-E	FET			D721	DB2S310	SCHOTTKY DIODE		
Q504	KTC4075EP/YG/	TRANSISTOR			D722	DZ2J082M	ZENER DIODE		
Q505	LTC014EEBFS8	DIGI TRANSISTOR			D723	22ZR-10D	SURGE ABSORBER		
Q506	MT3S111	TRANSISTOR			D724	DSA3A1	DIODE		
Q509	LTC014TEBFS8	DIGI TRANSISTOR			D725	RB520SM-30	DIODE		
Q510	LTA044TEBFS8	TRANSISTOR			D726	1SR154-400	DIODE		
Q511	LTC014EEBFS8	DIGI TRANSISTOR							
Q700	RE1C001UN	FET			C3	CK73HBB1H102K	C CAPACITOR	1000pF 50V K	
Q701	DSC9A01/T/	TRANSISTOR			C6	CK73HBB1H102K	C CAPACITOR	1000pF 50V K	
Q702	LTC014EEBFS8	DIGI TRANSISTOR			C7	CC73HCH1H101J	C CAPACITOR	100pF 50V J	
Q703	MTM981400BF	FET			C9	CK73HB1H103K	C CAPACITOR	10000pF 50V K	
Q704	KTC4075EP/YG/	TRANSISTOR			C10	CC73HCH1H101J	C CAPACITOR	100pF 50V J	
Q705	SSM3J36TUFT	FET			C12	CC73HCH1H101J	C CAPACITOR	100pF 50V J	
Q706	LTC044TUBFS8	DIGI TRANSISTOR			C13	CC73HCH1H101J	C CAPACITOR	100pF 50V J	
Q707	LTC014EEBFS8	DIGI TRANSISTOR			C14	CC73HCH1H271J	C CAPACITOR	270pF 50V J	
Q708	LTC014EEBFS8	DIGI TRANSISTOR			C15	CK73HB1H103K	C CAPACITOR	10000pF 50V K	
Q709	2SB1694	TRANSISTOR			C16	CK73HB1H103K	C CAPACITOR	10000pF 50V K	
Q710	2SB1694	TRANSISTOR			C17	CC73HCH1H100B	C CAPACITOR	10pF 50V B	
Q711	LTC014EEBFS8	DIGI TRANSISTOR			C18	CK73HBB1A104K	C CAPACITOR	0.1uF 10V K	
Q712	KTC4075EP/YG/	TRANSISTOR			C19	CC73HCH1H101J	C CAPACITOR	100pF 50V J	
Q713	LTC014EEBFS8	DIGI TRANSISTOR			C21	CK73HBB1C473K	C CAPACITOR	0.047uF 16V K	
Q714	SSM6N37FE	FET			C22	CK73HB1H103K	C CAPACITOR	10000pF 50V K	
Q715	SSM3J36TUFT	FET			C23	CC73HCH1H100B	C CAPACITOR	10pF 50V B	
Q716	SSM3J36TUFT	FET			C24	CK73HB1H103K	C CAPACITOR	10000pF 50V K	
Q717	SSM3J36TUFT	FET			C25	CK73HB1H103K	C CAPACITOR	10000pF 50V K	
Q718	LTC014EEBFS8	DIGI TRANSISTOR			C26	CC73HCH1H101J	C CAPACITOR	100pF 50V J	
Q719	MTM981400BF	FET			C27	CC73HCH1H101J	C CAPACITOR	100pF 50V J	
Q720	LTC014EEBFS8	DIGI TRANSISTOR			C28	CK73HB1A224K	C CAPACITOR	0.22uF 10V K	
Q721	SSM3J334R	FET			C29	CK73HB1A224K	C CAPACITOR	0.22uF 10V K	
Q722	LTC014EEBFS8	DIGI TRANSISTOR			C31	CC73HCH1H271J	C CAPACITOR	270pF 50V J	
Q723	LTC014EEBFS8	DIGI TRANSISTOR			C32	CK73HB1H103K	C CAPACITOR	10000pF 50V K	
Q725	LTC014TEBFS8	DIGI TRANSISTOR			C34	CS77AAV1D1R5M	TA E CAPACITOR	1.5uF 20V M	
Q726	SSM3J36TUFT	FET			C35	CK73HBB1H102K	C CAPACITOR	1000pF 50V K	
D5	SMV1212-079LF	VARI CAP DIODE			C36	CS77AAV1V0R1M	TA E CAPACITOR	0.1uF 35V M	
D7	SMV1212-079LF	VARI CAP DIODE			C38	CK73HBB1H471K	C CAPACITOR	470pF 50V K	
D9	SMV1212-079LF	VARI CAP DIODE			C39	CK73HB1H103K	C CAPACITOR	10000pF 50V K	
D10	SMV1212-079LF	VARI CAP DIODE			C40	CK73HBB1H102K	C CAPACITOR	1000pF 50V K	
D11	SMV1212-079LF	VARI CAP DIODE			C46	CK73HBB1H471K	C CAPACITOR	470pF 50V K	
D12	SMV1212-079LF	VARI CAP DIODE			C48	CK73HBB1H471K	C CAPACITOR	470pF 50V K	
D13	BB664-02V	VARI CAP DIODE			C49	CC73HCH1H270G	C CAPACITOR	27pF 50V G	
D14	BB664-02V	VARI CAP DIODE			C50	CK73HBB1H471K	C CAPACITOR	470pF 50V K	
D15	BBY57-02V	VARI CAP DIODE			C51	CC73HCH1H150J	C CAPACITOR	15pF 50V J	
D16	RN262CS	DIODE			C52	CC73HCH1H470J	C CAPACITOR	47pF 50V J	
D17	RN262CS	DIODE			C53	CC73HCH1H330J	C CAPACITOR	33pF 50V J	
D300	DZ2J056M	ZENER DIODE			C58	CK73HBB1H102K	C CAPACITOR	1000pF 50V K	
D304	RN262CS	DIODE			C63	CC730AD1H104J	C CAPACITOR	0.1uF 50V J	
D305	L407CDB	DIODE			C64	CK73HBB1A104K	C CAPACITOR	0.1uF 10V K	
D306	L407CDB	DIODE			C67	CC73HCH1H271J	C CAPACITOR	270pF 50V J	
D307	RB706F-40	DIODE			C69	CC73HCH1H271J	C CAPACITOR	270pF 50V J	
D308	RB706F-40	DIODE			C70	CK73HBB1H102K	C CAPACITOR	1000pF 50V K	
D309	JDP2S12CR	DIODE			C73	CK73HBB1H102K	C CAPACITOR	1000pF 50V K	
D310	JDP2S12CR	DIODE			C74	CK73GB0J106K	C CAPACITOR	10uF 6.3V K	
D502	BB664-02V	VARI CAP DIODE			C75	CC73HCH1H681J	C CAPACITOR	680pF 50V J	
D503	BB664-02V	VARI CAP DIODE			C77	CC73HCH1H0R5B	C CAPACITOR	0.5pF 50V B	
D505	BBY56-02V	VARI CAP DIODE			C78	CC73HCH1H101J	C CAPACITOR	100pF 50V J	
D506	BBY56-02V	VARI CAP DIODE			C79	CC73HCH1HR75B	C CAPACITOR	0.75pF 50V B	
D507	BBY56-02V	VARI CAP DIODE			C80	CC73HCH1H151J	C CAPACITOR	150pF 50V J	
D508	BBY56-02V	VARI CAP DIODE			C81	CC73HCH1H010B	C CAPACITOR	1pF 50V B	
D510	RN262CS	DIODE			C82	CK73HBB1H102K	C CAPACITOR	1000pF 50V K	
D511	RN262CS	DIODE			C83	CK73HBB1H102K	C CAPACITOR	1000pF 50V K	
D700	DA3S101F	DIODE ARRAY			C84	CK73HBB1H102K	C CAPACITOR	1000pF 50V K	
D701	DA3S101F	DIODE ARRAY			C85	CK73HBB1H102K	C CAPACITOR	1000pF 50V K	
D702	DA3S101F	DIODE ARRAY			C86	CC73HCH1H070B	C CAPACITOR	7pF 50V B	
D703	DB2S310	SCHOTTKY DIODE			C87	CK73HBB1H102K	C CAPACITOR	1000pF 50V K	
D704	DA3S101F	DIODE ARRAY			C88	CC73HCH1H060B	C CAPACITOR	6pF 50V B	
D705	DA3S101F	DIODE ARRAY			C89	CC73HCH1H080B	C CAPACITOR	8pF 50V B	
D706	DA3S101F	DIODE ARRAY			C90	CK73HBB1H102K	C CAPACITOR	1000pF 50V K	
D707	DA3S101F	DIODE ARRAY			C91	CC73HCH1H080B	C CAPACITOR	8pF 50V B	
D708	DA3S101F	DIODE ARRAY			C92	CC73HCH1H070B	C CAPACITOR	7pF 50V B	
D709	DA3S101F	DIODE ARRAY			C93	CC73HCH1H090B	C CAPACITOR	9pF 50V B	
D710	DA3S101F	DIODE ARRAY			C95	CC73HCH1H010B	C CAPACITOR	1pF 50V B	
D711	DA3S101F	DIODE ARRAY			C96	CC73HCH1H010B	C CAPACITOR	1pF 50V B	
D712	DA3S103E	DIODE ARRAY			C97	CS77PBQ1C100M	TA E CAPACITOR	10uF 16V M	
					C99	CK73HBB1H102K	C CAPACITOR	1000pF 50V K	









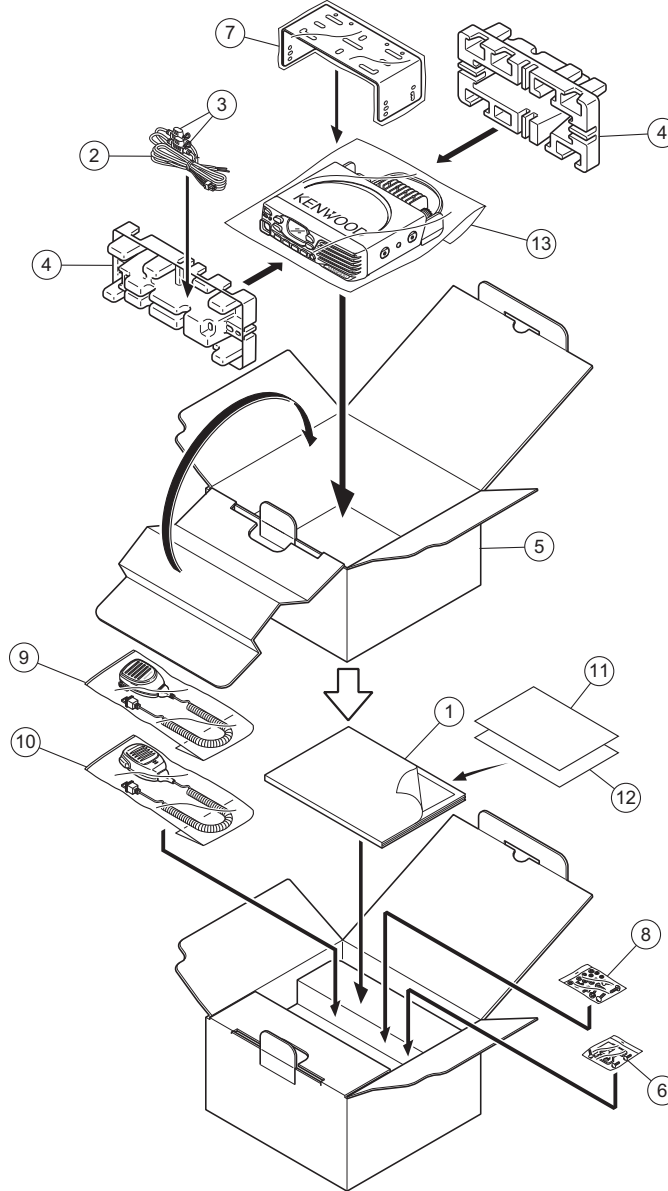




△ Symbol No.	Part No.	Part Name	Description	Local	△ Symbol No.	Part No.	Part Name	Description	Local
R928	RK73HB1J103J	MG RESISTOR	10kΩ 1/16W J		L30	L41-1288-14	CHIP INDUCTOR		
R929	RK73HB1J473J	MG RESISTOR	47kΩ 1/16W J		L31	L41-6878-14	CHIP INDUCTOR		
R930	RK73HB1J473J	MG RESISTOR	47kΩ 1/16W J		L32	LK73G0AQ4R7K	M.CHIP INDUCTOR	4.7uH	
R931	RK73HB1J473J	MG RESISTOR	47kΩ 1/16W J		L33	LK73G0AQ4R7K	M.CHIP INDUCTOR	4.7uH	
R933	RK73HB1J000J	MG RESISTOR	0Ω 1/16W J		L37	LK73G0AQ3R3K	M.CHIP INDUCTOR	3.3uH	
R935	RK73HB1J102J	MG RESISTOR	1kΩ 1/16W J		L38	LK73G0AQ3R3K	M.CHIP INDUCTOR	3.3uH	
R936	RK73HB1J473J	MG RESISTOR	47kΩ 1/16W J		L39	LB73G0BV-001	CHIP FERRITE		
R937	RK73HB1J102J	MG RESISTOR	1kΩ 1/16W J		L40	LK73H0AM82NJ	M.CHIP INDUCTOR	82nH	
R938	RK73HB1J473J	MG RESISTOR	47kΩ 1/16W J		L41	L41-5675-53	CHIP INDUCTOR		
R939	RK73HB1J473J	MG RESISTOR	47kΩ 1/16W J		L42	L41-5675-53	CHIP INDUCTOR		
R940	RK73HB1J103J	MG RESISTOR	10kΩ 1/16W J		L45	LK73H0AM68NJ	M.CHIP INDUCTOR	68nH	
R941	RK73HB1J102J	MG RESISTOR	1kΩ 1/16W J		L300	LK73H0AM15NJ	M.CHIP INDUCTOR	15nH	
R942	RK73HB1J472J	MG RESISTOR	4.7kΩ 1/16W J		L301	LK73H0AM10NJ	M.CHIP INDUCTOR	10nH	
R943	RK73HB1J152J	MG RESISTOR	1.5kΩ 1/16W J		L302	L41-1275-53	CHIP INDUCTOR		
R944	RK73HB1J682J	MG RESISTOR	6.8kΩ 1/16W J		L303	L41-8265-53	CHIP INDUCTOR		
R946	RK73HB1J103J	MG RESISTOR	10kΩ 1/16W J		L304	L41-1285-53	CHIP INDUCTOR		
R947	RK73HB1J103J	MG RESISTOR	10kΩ 1/16W J		L305	L41-4775-53	CHIP INDUCTOR		
R948	RK73HB1J000J	MG RESISTOR	0Ω 1/16W J		L307	LB73Z0AF-001	CHIP FERRITE		
R949	RK73HB1J223J	MG RESISTOR	22kΩ 1/16W J		L308	LB73Z0AF-001	CHIP FERRITE		
R950	RK73HB1J223J	MG RESISTOR	22kΩ 1/16W J		L309	LB73Z0AF-001	CHIP FERRITE		
R951	RK73HB1J223J	MG RESISTOR	22kΩ 1/16W J		L310	L34-1039-05	AIR CORE COIL		
R952	RK73HB1J223J	MG RESISTOR	22kΩ 1/16W J		L311	L34-4667-05	AIR CORE COIL		
R953	RK73HB1J682J	MG RESISTOR	6.8kΩ 1/16W J		L312	L34-4903-05	AIR CORE COIL		
R954	RK73HB1J471J	MG RESISTOR	470Ω 1/16W J		L313	L34-4903-05	AIR CORE COIL		
R955	RK73HB1J222J	MG RESISTOR	2.2kΩ 1/16W J		L314	L34-4903-05	AIR CORE COIL		
R956	RK73HB1J222J	MG RESISTOR	2.2kΩ 1/16W J		L315	L34-4667-05	AIR CORE COIL		
R957	RK73HB1J000J	MG RESISTOR	0Ω 1/16W J		L316	LK73H0AM33NJ	M.CHIP INDUCTOR	33nH	
R958	RK73HB1J104J	MG RESISTOR	100kΩ 1/16W J		L317	LK73H0AM39NJ	M.CHIP INDUCTOR	39nH	
R959	RK73HB1J104J	MG RESISTOR	100kΩ 1/16W J		L319	LK73H0AMR10J	M.CHIP INDUCTOR	0.1uH	
R960	RK73HB1J472J	MG RESISTOR	4.7kΩ 1/16W J		L322	LB73H0AV-003	CHIP FERRITE		
R961	RK73GB2A103J	MG RESISTOR	10kΩ 1/10W J		L500	L41-1885-53	CHIP INDUCTOR		
R962	RK73HB1J391J	MG RESISTOR	390Ω 1/16W J		L501	LK73H0AMR10J	M.CHIP INDUCTOR	0.1uH	
R964	RK73FB2B000J	MG RESISTOR	0Ω 1/8W J		L502	LK73G0AQ2R2K	M.CHIP INDUCTOR	2.2uH	
R965	RK73GB2A103J	MG RESISTOR	10kΩ 1/10W J		L503	LR77Z0AER27J	CHIP INDUCTOR	0.27uH	
R966	RK73FB2B000J	MG RESISTOR	0Ω 1/8W J		L504	LR77Z0AER56J	CHIP INDUCTOR	0.56uH	
R968	RK73HB1J334J	MG RESISTOR	330kΩ 1/16W J		L505	L40-5663-57	CHIP INDUCTOR		
R969	RK73HB1J474J	MG RESISTOR	470kΩ 1/16W J		L506	L41-1885-14	CHIP INDUCTOR		
R970	RK73HB1J564J	MG RESISTOR	560kΩ 1/16W J		L507	L41-2778-14	CHIP INDUCTOR		
R971	RK73HB1J000J	MG RESISTOR	0Ω 1/16W J		L510	L41-2778-14	CHIP INDUCTOR		
R972	RK73HB1J104J	MG RESISTOR	100kΩ 1/16W J		L511	L41-2785-53	CHIP INDUCTOR		
R973	RK73HB1J000J	MG RESISTOR	0Ω 1/16W J		L512	LR79Z0DD37N7J	CHIP INDUCTOR	37.7nH	
R974	RK73HB1J474J	MG RESISTOR	470kΩ 1/16W J		L513	LR79Z0DD37N7J	CHIP INDUCTOR	37.7nH	
R975	RK73HB1J474J	MG RESISTOR	470kΩ 1/16W J		L515	L41-3378-14	CHIP INDUCTOR		
R976	RK73HB1J473J	MG RESISTOR	47kΩ 1/16W J		L516	L41-1085-14	CHIP INDUCTOR		
R977	RK73HB1J472J	MG RESISTOR	4.7kΩ 1/16W J		L518	LB73G0BD-005	CHIP FERRITE		
R978	RK73HB1J103J	MG RESISTOR	10kΩ 1/16W J		L519	L41-1275-53	CHIP INDUCTOR		
R979	RK73HB1J223J	MG RESISTOR	22kΩ 1/16W J		L705	LB73G0BV-001	CHIP FERRITE		
R980	RK73HB1J000J	MG RESISTOR	0Ω 1/16W J		L706	LB73H0AV-003	CHIP FERRITE		
R985	RK73HB1J103J	MG RESISTOR	10kΩ 1/16W J		L707	LB73H0AV-003	CHIP FERRITE		
R986	RK73HB1J102J	MG RESISTOR	1kΩ 1/16W J		L710	LB73H0AV-001	CHIP FERRITE		
R987	RK73HB1J102J	MG RESISTOR	1kΩ 1/16W J		L800	LB73H0AV-003	CHIP FERRITE		
R988	RK73HB1J102J	MG RESISTOR	1kΩ 1/16W J		L801	LB73H0AV-003	CHIP FERRITE		
R989	RK73HB1J102J	MG RESISTOR	1kΩ 1/16W J		L802	LB73H0AV-003	CHIP FERRITE		
R990	RK73HB1J474J	MG RESISTOR	470kΩ 1/16W J		L803	LB73H0AV-003	CHIP FERRITE		
R991	RK73HB1J472J	MG RESISTOR	4.7kΩ 1/16W J		L804	LB73H0AV-003	CHIP FERRITE		
R992	RK73HB1J472J	MG RESISTOR	4.7kΩ 1/16W J		L805	LB73H0AV-003	CHIP FERRITE		
R993	RK73HB1J104J	MG RESISTOR	100kΩ 1/16W J		CN700	E40-6847-05	F.C.CONNECTOR		
R996	RK73GB2A000J	MG RESISTOR	0Ω 1/10W J		CP1	RK74HA1J101J	NET RESISTOR	100Ω 1/16W J	
R997	RK73HB1J101J	MG RESISTOR	100Ω 1/16W J		CP701	RK74HB1J104J	NET RESISTOR	100kΩ 1/16W J	
R998	RK73HB1J101J	MG RESISTOR	100Ω 1/16W J		CP702	RK74HB1J104J	NET RESISTOR	100kΩ 1/16W J	
R999	RK73HB1J101J	MG RESISTOR	100Ω 1/16W J		CP703	RK74HB1J103J	NET RESISTOR	10kΩ 1/16W J	
L1	LR77Z0AE4R7J	CHIP INDUCTOR	4.7uH		CP704	RK74HA1J473J	NET RESISTOR	47kΩ 1/16W J	
L2	LB73G0BJ-001	CHIP FERRITE			CP705	RK74HA1J102J	NET RESISTOR	1kΩ 1/16W J	
L3	LB73H0AV-003	CHIP FERRITE			CP708	RK74HA1J102J	NET RESISTOR	1kΩ 1/16W J	
L4	LB73G0BV-001	CHIP FERRITE			F700	FZA10AW-2R5	FUSE (CC)	2.5A	
L7	LK73H0AM15NJ	M.CHIP INDUCTOR	15nH		F701	FZA10AW-5R0	FUSE (CC)	5A	
L9	LK73G0AQ4R7K	M.CHIP INDUCTOR	4.7uH		F702	FZA10AW-2R5	FUSE (CC)	2.5A	
L11	LK73G0AQ4R7K	M.CHIP INDUCTOR	4.7uH		F704	F53-0315-15	FUSE		
L14	LK73G0AQ3R3K	M.CHIP INDUCTOR	3.3uH		J700	E58-0567-05	SUB SOCKET D		
L15	LB73H0AV-003	CHIP FERRITE			J701	E1B-0001-00	3.5D PHONE JACK		
L18	LB73H0AV-003	CHIP FERRITE			TH2	NCP15WF104F0S	N THERMISTOR		
L19	LK73G0AQ3R3K	M.CHIP INDUCTOR	3.3uH		TH301	NCP15WF104F0S	N THERMISTOR		
L20	LK73G0AQ1R8K	M.CHIP INDUCTOR	1.8uH		TH302	NCP15WF104F0S	N THERMISTOR		
L25	LK73G0AQ1R8K	M.CHIP INDUCTOR	1.8uH		TH303	NCP15WF104F0S	N THERMISTOR		
L26	LK73G0AQ100K	M.CHIP INDUCTOR	10uH		X1	L77-3128-05	TCXO		
L28	LB73G0BV-001	CHIP FERRITE			X700	L77-3129-05	TCXO		
L29	LK73G0AQ100K	M.CHIP INDUCTOR	10uH		XF500	L71-0655-05	MCF		

# Packing materials and accessories parts list

Block No.M2MM



## Packing and accessories

Block No. [M][2][M][M]

Symbol No.	Part No.	Part Name	Description	Local
1	B5A-0923-00	INST.MANUAL	A5,P24	D740_M
1	B5A-0921-00	INST.MANUAL	A5,P112	D740_E
1	B5A-0922-00	INST.MANUAL	A5,P40	D740H_K,D740HV_K
2	E30-7523-65	DC CORD ASSEMBLY	ACC BLADE	
3	FZB10AU-100	FUSE	BLADE,10A(x2)	D740_M,D740_E
3	FZB10AU-150	FUSE	BLADE,15A(x2)	D740H_K,D740HV_K
4	H12-3178-05	PACKING FIXTURE	(x2)	
5	H52-2674-22	ITEM CARTON		
6	J19-1584-15	HOLDER	ACC FOR MIC	D740H_K,D740HV_K
7	J29-0726-03	BRACKET	ACC	
8	N99-2039-05	SCREW SET	ACC	
9	T91-0624-75	MICROPHONE	ACC KMC-30	D740H_K
10	T91-0639-75	MICROPHONE	ACC KMC-35	D740HV_K
11	-----	PAMPHLET	HOT SURFACE	
12	-----	PAMPHLET	FCC, 60CM	D740_M,D740H_K,D740HV_K
12	-----	PAMPHLET	ROHS2	D740_E
13	-----	PROTECTION BAG	RADIO	

# MEMO



# KENWOOD

JVC KENWOOD Corporation  
Communications Systems Business Unit

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