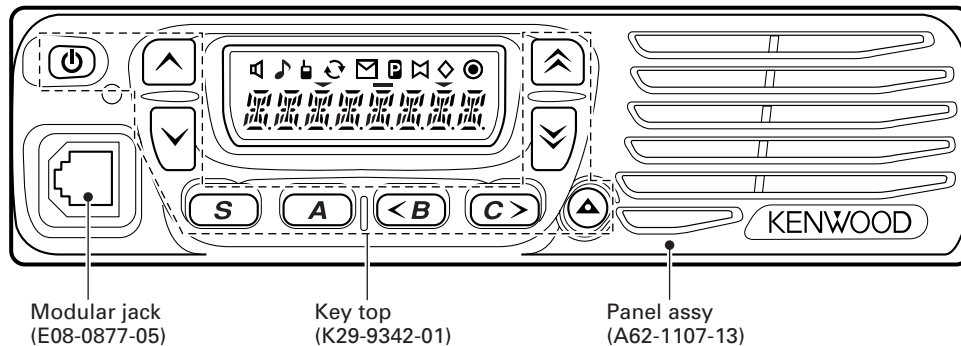
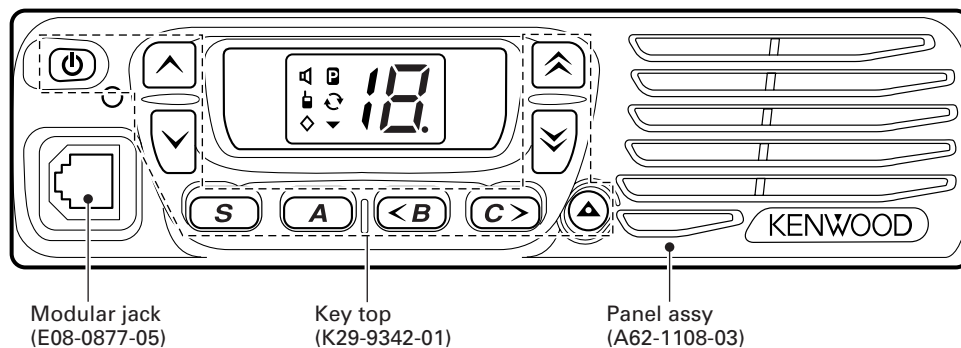


### TK-8160 E, E3, X2



### TK-8162 E, E3



## CONTENTS

<b>GENERAL</b> .....	<b>2</b>	<b>ADJUSTMENT</b> .....	<b>28</b>
<b>SYSTEM SET-UP</b> .....	<b>3</b>	<b>TERMINAL FUNCTION</b> .....	<b>33</b>
<b>OPERATING FEATURES</b> .....	<b>4</b>	<b>PC BOARD</b>	
<b>REALIGNMENT</b> .....	<b>6</b>	<b>DISPLAY UNIT (X54-3510-10)</b> .....	<b>34</b>
<b>DISASSEMBLY FOR REPAIR</b> .....	<b>10</b>	<b>DISPLAY UNIT (X54-3522-70)</b> .....	<b>36</b>
<b>CIRCUIT DESCRIPTION</b> .....	<b>11</b>	<b>TX-RX UNIT (X57-711X-XX)</b> .....	<b>38</b>
<b>SEMICONDUCTOR DATA</b> .....	<b>16</b>	<b>SCHEMATIC DIAGRAM</b> .....	<b>42</b>
<b>COMPONENTS DESCRIPTION</b> .....	<b>17</b>	<b>BLOCK DIAGRAM</b> .....	<b>48</b>
<b>PARTS LIST</b> .....	<b>18</b>	<b>LEVEL DIAGRAM</b> .....	<b>50</b>
<b>EXPLODED VIEW</b> .....	<b>26</b>	<b>SPECIFICATION</b> .....	<b>BACK COVER</b>
<b>PACKING</b> .....	<b>27</b>		

## GENERAL

### INTRODUCTION

#### SCOPE OF THIS MANUAL

This manual is intended for use by experienced technicians familiar with similar types of commercial grade communications equipment. It contains all required service information for the equipment and is current as of this publication date. Changes which may occur after publication are covered by either Service Bulletins or Manual Revisions, which are issued as required.

### ORDERING REPLACEMENT PARTS

When ordering replacement parts or equipment information, the full part identification number should be included. This applies to all parts : components, kits, and chassis. If the part number is not known, include the chassis or kit number of which it is a part and a sufficient description of the required component for proper identification.

### PERSONAL SAFETY

The following precautions are recommended for personal safety :

- DO NOT transmit if someone is within two feet (0.6 meter) of the antenna.
- DO NOT transmit until all RF connectors are secure and any open connectors are properly terminated.
- SHUT OFF this equipment when near electrical blasting caps or while in an explosive atmosphere.
- All equipment should be properly grounded before power-up for safe operation.
- This equipment should be serviced by only qualified technicians.

### PRE-INSTALLATION CONSIDERATIONS

#### 1. UNPACKING

Unpack the radio from its shipping container and check for accessory items. If any item is missing, please contact KENWOOD immediately.

#### 2. PRE-INSTALLATION CHECKOUT

##### 2-1. Introduction

Each radio is adjusted and tested before shipment. However, it is recommended that receiver and transmitter operation be checked for proper operation before installation.

##### 2-2. Testing

The radio should be tested complete with all cabling and accessories as they will be connected in the final installation. Transmitter frequency, deviation, and power output should be checked, as should receiver sensitivity, squelch operation, and audio output. Signalling equipment operation should be verified.

### 3. PLANNING THE INSTALLATION

#### 3-1. General

Inspect the vehicle and determine how and where the radio antenna and accessories will be mounted.

Plan cable runs for protection against pinching or crushing wiring, and radio installation to prevent overheating.

#### 3-2. Antenna

The favored location for an antenna is in the center of a large, flat conductive area, usually at the roof center. The trunk lid is preferred, bond the trunk lid and vehicle chassis using ground straps to ensure the lid is at chassis ground.

#### 3-3. Radio

The universal mount bracket allows the radio to be mounted in a variety of ways. Be sure the mounting surface is adequate to support the radio's weight. Allow sufficient space around the radio for air cooling. Position the radio close enough to the vehicle operator to permit easy access to the controls when driving.

#### 3-4. DC Power and wiring

1. This radio may be installed in negative ground electrical systems only. Reverse polarity will cause the cable fuse to blow. Check the vehicle ground polarity before installation to prevent wasted time and effort.
2. Connect the positive power lead directly to the vehicle battery positive terminal. Connecting the Positive lead to any other positive voltage source in the vehicle is not recommended.
3. Connect the ground lead directly to the battery negative terminal.
4. The cable provided with the radio is sufficient to handle the maximum radio current demand. If the cable must be extended, be sure the additional wire is sufficient for the current to be carried and length of the added lead.

### 4. INSTALLATION PLANNING – CONTROL STATIONS

#### 4-1. Antenna system

Control station. The antenna system selection depends on many factors and is beyond the scope of this manual. Your KENWOOD dealer can help you select an antenna system that will best serve your particular needs.

#### 4-2. Radio location

Select a convenient location for your control station radio which is as close as practical to the antenna cable entry point. Secondly, use your system's power supply (which supplies the voltage and current required for your system). Make sure sufficient air can flow around the radio and power supply to allow adequate cooling.

## GENERAL / SYSTEM SET-UP

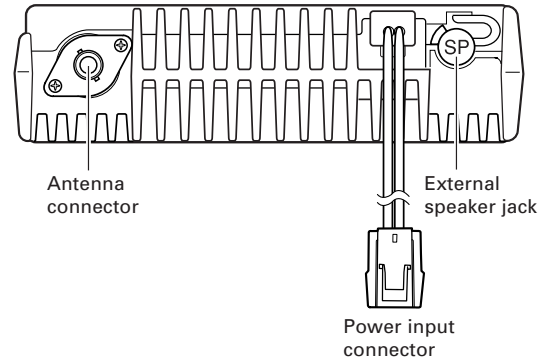
### SERVICE

This radio is designed for easy servicing. Refer to the schematic diagrams, printed circuit board views, and alignment procedures contained in this manual.

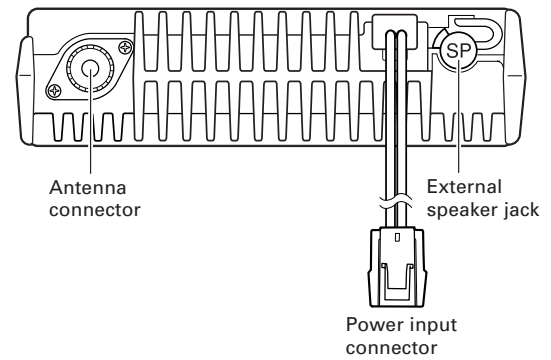
### NOTE

If you do not intend to use the 3.5-mm jack for the external speaker, fit the supplied speaker-jack cap to stop dust and sand from getting in.

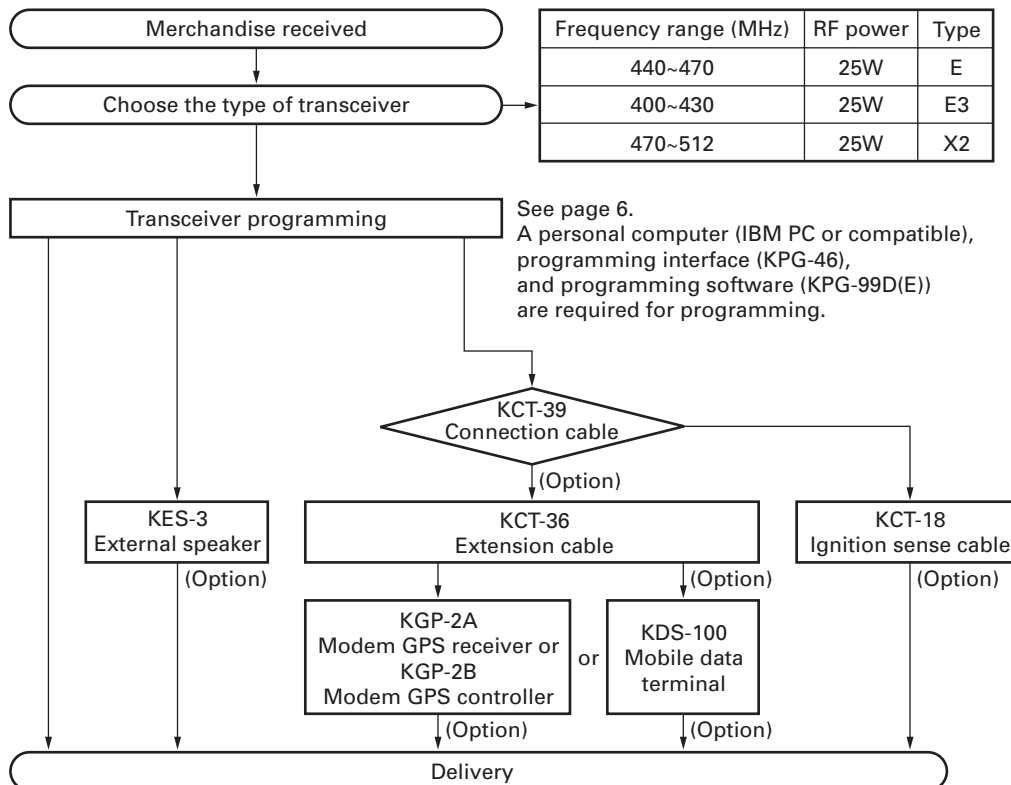
E,E3



X2



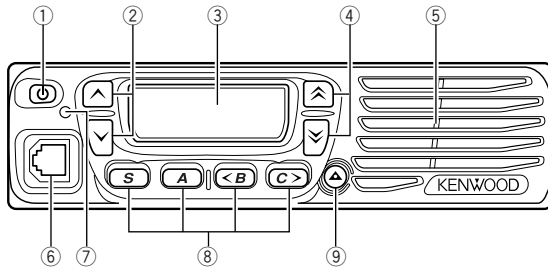
### SYSTEM SET-UP



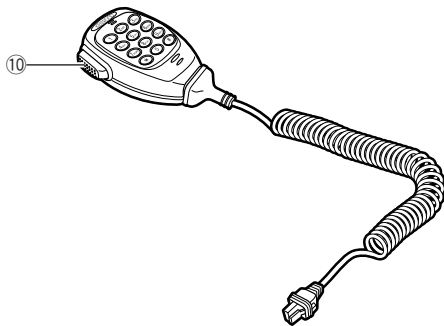
## OPERATING FEATURES

### 1. Controls and Functions

#### 1-1. Front Panel

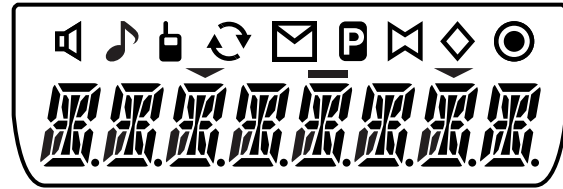


#### 1-2. Microphone



- ① **⏻** (Power) switch  
Press to switch the transceiver ON or OFF.
- ② **▲ / ▼** keys  
Press to activate their programmable functions (page 5).
- ③ Display  
Refer to right or next page.
- ④ **⏶ / ⏷** keys  
Press to activate their programmable functions (page 5).
- ⑤ Speaker  
Internal speaker.
- ⑥ Microphone jack  
Insert the microphone plug into this jack.
- ⑦ TX/RX Indicator  
Lights red while transmitting. Lights green while receiving a signal.
- ⑧ **S, A, <B>, and <C>** keys  
Press to activate their programmable functions (page 5).
- ⑨ **▲** key  
Press to activate its programmable function (page 5).
- ⑩ PTT switch  
Press this switch, then speak into the microphone to call a station.

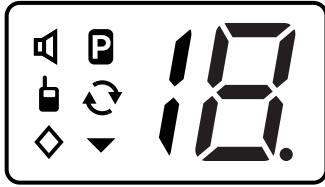
#### 1-3. Display (TK-8160)



Indicator	Description
<b>A</b>	Appears when the key programmed as Monitor or Squelch Off is pressed.
<b>♪</b>	Appears when the DTMF code of a call matches the code in your transceiver.
<b>📞</b>	Appears while using the Talk Around function.
	The selected zone is added to the scanning sequence.
<b>↻</b>	Appears while scanning.
<b>✉</b>	Appears when a message is stored in the transceiver stack memory. Appears and blinks when a new message has arrived.
	Appears when the AUX port has been activated.
<b>P</b>	The selected channel is set as a Priority channel.
<b>📣</b>	Appears when the Horn Alert function has been activated.
	The selected channel is added to the scanning sequence.
<b>◇</b>	Appears when Scrambler function has been selected.
<b>⦿</b>	This icon is not used on this transceiver.
	Displays the currently selected zone and channel number, or the channel name.

## OPERATING FEATURES

### 1-4. Display (TK-8162)



Indicator	Description
	Appears when the key programmed as Monitor or Squelch Off is pressed.
	Appears while using the Talk Around function.
	Appears when Scrambler function has been selected.
	The selected channel is set as a Priority channel.
	Appears while scanning.
	The selected channel is added to the scanning sequence.
	Displays the currently selected channel number (max 16 channels).
	Appears when the AUX port or Horn Alert function has been activated.

### 1-6. Programmable Functions

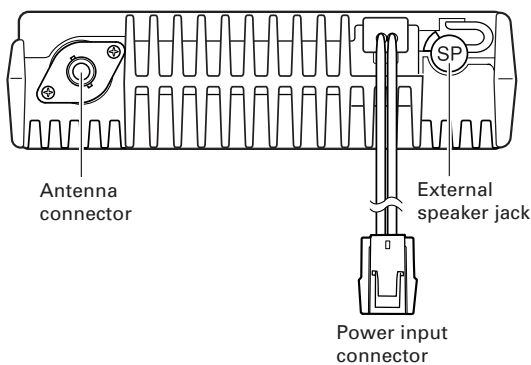
The  $\wedge$ ,  $\vee$ ,  $\hat{\wedge}$ ,  $\hat{\vee}$ , **S**, **A**, **<B**, **C>**, and  $\blacktriangle$  keys can be programmed with the functions listed below. Ask your dealer for details on these functions.

- AUX
- Call 1~Call 2
- Channel Down
- Channel Up
- Digit 1x Down <sup>1</sup>
- Digit 10x Down <sup>1</sup>
- Digit 1x Up <sup>1</sup>
- Digit 10x Up <sup>1</sup>
- Direct CH <sup>2,3</sup>
- Direct Zone-Channel <sup>1,3</sup>
- Display Character <sup>1</sup>
- Emergency <sup>4</sup>
- Horn Alert
- Key Lock
- LCD Brightness <sup>1</sup>
- Lone Worker
- Monitor
- None
- Operator Selectable Tone <sup>1</sup>
- Scan Del/Add
- Scan
- Scrambler
- Selcall <sup>1</sup>
- Selcall (5-tone) <sup>1</sup>
- Selcall + Status <sup>1</sup>
- Send the GPS data <sup>1</sup>
- Squelch Level
- Squelch Off
- Squelch Off Momentary
- Status <sup>1</sup>
- Talk Around
- Volume Down
- Volume Up
- Zone Down
- Zone Up

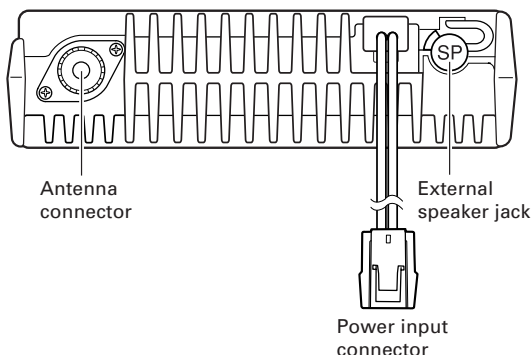
- 1 Digit 1x Down, Digit 10x Down, Digit 1x Up, Digit 10x Up, Direct Zone-Channel, Display Character, LCD Brightness, Operator Selectable Tone, Selcall, Selcall (5-tone), Selcall + Status, Send the GPS data, and Status are available only on TK-8160 transceivers.
- 2 Direct CH is available only on TK-8162 transceivers.
- 3 Direct CH and Direct Zone-Channel can be programmed only on the **S**, **A**, **<B**, **C>**, and  $\blacktriangle$  keys.
- 4 Emergency can be programmed only on the  $\blacktriangle$  key.

### 1-5. Rear Panel

E,E3

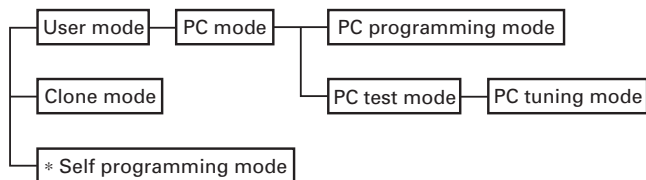


X2



## REALIGNMENT

### 1. Modes



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.
Clone mode	Used to transfer programming data from one transceiver to another.
* Self programming mode	You can program the frequency, signalling and other functions using only the transceiver.

\* : Only TK-8160 transceiver

### 2. How to Enter Each Mode

Mode	Operation
User mode	Power ON
PC mode	Received commands from PC
Clone mode	[ $\checkmark$ ]+Power ON (Two seconds)
* Self programming mode	[ <b>s</b> ]+Power ON (Two seconds)

\* : Only TK-8160 transceiver

### 3. PC Mode

#### 3-1. Preface

This transceiver is programmed using a personal computer, a programming interface (KPG-46) and programming software (KPG-99D(E)).

The programming software can be used with an IBM PC or compatible. Figure 1 shows the setup of an IBM PC for programming.

#### 3-2. Connection Procedure

1. Connect the transceiver to the personal computer with the interface cable.
2. When the Power is switched on, user mode can be entered immediately. When the PC sends a command, the transceiver enters PC mode.  
When data is transmitted from transceiver, the TX indicator blink.  
When data is received by the transceiver, the BUSY indicator blink.  
In the PC mode, "PROGRAM" (TK-8160) or "P" (TK-8162) is displayed on the LCD.

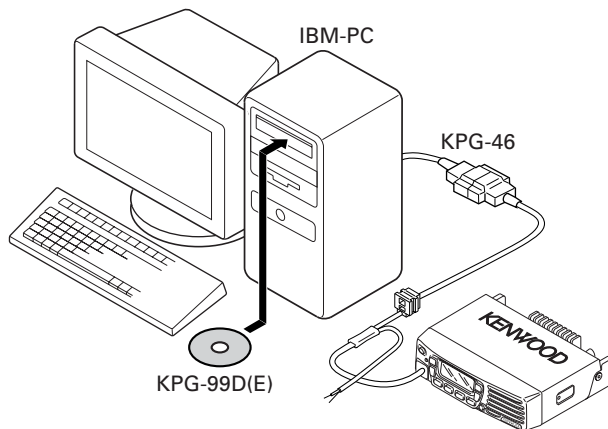


Fig. 1

TK-8160/TK-8162

#### 3-3. KPG-46 Description

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

The KPG-46 is required to interface the transceiver to the computer. It has a circuit in its D-subconnector (25-pin) case that converts the RS-232C logic level to the TTL level.

The KPG-46 connects the modular microphone jack of the transceiver to the computers RS-232C serial port.

#### 3-4. Programming Software Description

KPG-99D(E) is the programming software for transceiver supplied on a CD-ROM. This software runs under Windows 98, ME, Windows 2000 or XP on an IBM-PC or compatible machine.

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

### 4. Clone Mode

Programming data can be transferred from one transceiver to another by connecting them via their modular microphone jacks. The operation is as follows (the transmit transceiver is the master and the receive transceiver is the slave).

#### Note :

Clone mode should be enabled.

1. Turn the master transceiver power ON with the [  $\checkmark$  ] key held down (2 seconds), "CLONE" (TK-8160) or "C" (TK-8162) is displayed on the LCD.
2. Power on the slave transceiver.
3. Connect the cloning cable (No. E30-3382-05) to the modular microphone jacks on the master and slave.
4. Press the [ **s** ] key on the master transceiver. The data of the master is sent to the slave. While the master is sending data, red LED blinked. While the slave is receiving the data, "PROGRAM" (TK-8160) or "P" (TK-8162) is displayed and green LED blinked. When cloning of data is completed, the master displays "END" (TK-8160) or "E" (TK-8162), and the master red LED turned off, and the slave automatically operates in the User mode. The slave can then be operated by the same program as the master.
5. The other slave can be continuously cloned. Carry out the operation in step 2 to 4.

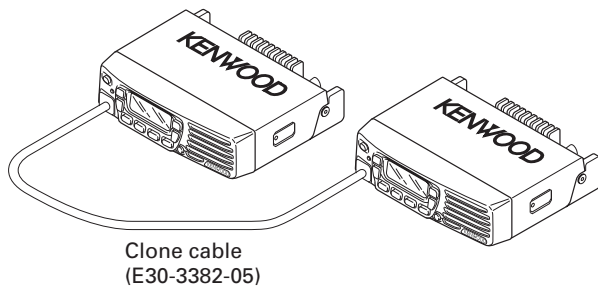
## REALIGNMENT

### 4-1. Adding the data password.

If the Read Authorization password is set in the optional feature menu, you must enter the password (Master transceiver) to activate a clone mode.

You can use 0~9 to configure the password. The maximum length of the password is 6 digits.

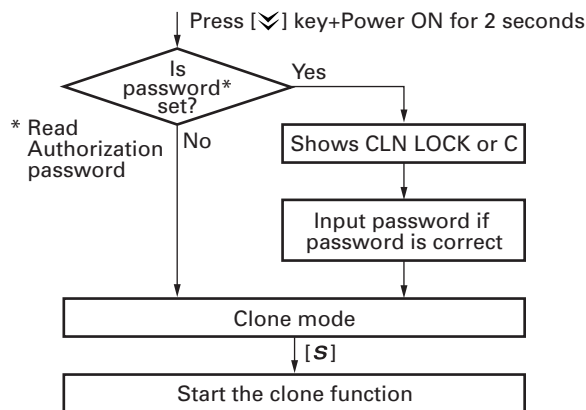
1. [  $\nabla$  ]+Power ON.
2. "CLN LOCK" (TK-8160) or "P" (TK-8162) is displayed on the LCD.
3. If the [  $\wedge$  ] and [  $\nabla$  ] keys is pressed while "CLN LOCK" (TK-8160) or "P" (TK-8162) is displayed, numbers (0 to 9) are displayed flashing. When you press the [  $\mathbf{C}$ > ] key, the currently selected number is determined. If you press the [  $\mathbf{S}$  ] key after entering the password in this procedure, "CLONE" (TK-8160) or "C" (TK-8162) is displayed if the entered password is correct. If the password is incorrect, "CLN LOCK" (TK-8160) or "P" (TK-8162) is redisplayed.



Clone cable  
(E30-3382-05)

Fig. 2

### ■ Flow Chart (Master radio)



### 5. Self Programming Mode

Self programming mode operates with only the **TK-8160** transceiver.

Write mode for frequency data and signaling, etc. To be used **ONLY** by the authorized service person maintaining the user's equipment. After programming, reset the FPU to the "Self- Programming" disabled mode. Radios **CANNOT** be delivered to the end-user in the self-programming mode.

#### 5-1. Enter to the Self Programming Mode

Hold down the [  $\mathbf{S}$  ] key 2 seconds and turn the power switch on. When enter the self programming mode, "1- 1" is displayed 2 seconds after " SELF " is displayed.

#### 5-2. Adding the Data Password

If the data password is set in the optional feature menu, you must enter the password to activate a self programming mode.

You can use 0~9 to configure the password. The maximum length of the password is 6 digits.

1. [  $\mathbf{S}$  ]+Power ON.
2. "SLF.LOCK.R"\* is displayed on the LCD.
3. If the [  $\wedge$  ] and [  $\nabla$  ] keys is pressed while "SLF.LOCK.R" is displayed, numbers (0 to 9) are displayed flashing. When you press the [  $\mathbf{C}$ > ] key, the currently selected number is determined. If you press the [  $\mathbf{S}$  ] key after entering the password in this procedure, "SELF" is displayed if the entered password is correct. If the password is incorrect, "SLF.LOCK.R"\* is redisplayed.

\* Read authorization password → "SLF.LOCK.R"  
Overwrite password → "SLF.LOCK.W"

#### Note :

This mode (self programming mode) cannot be set when it has been disabled with the FPU.

#### 5-3. Channel Setting Mode

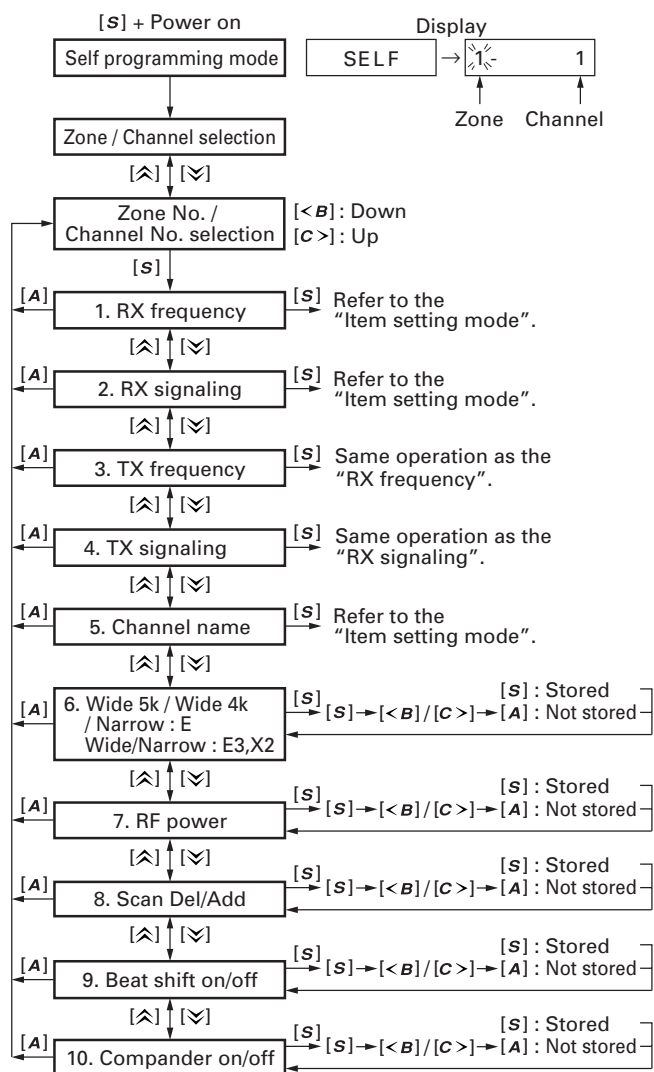
Each channel can be setup in its action mode by using the panel keys.

The 5-tone functions cannot be programmed in this mode.

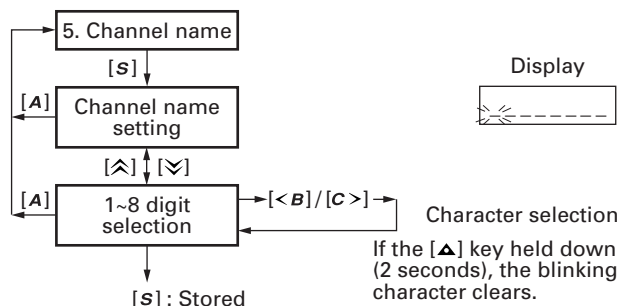
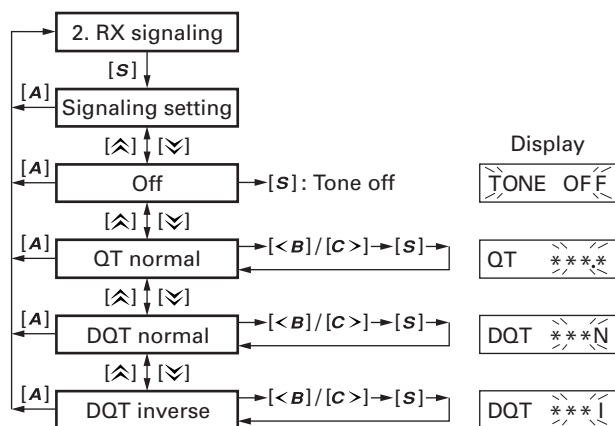
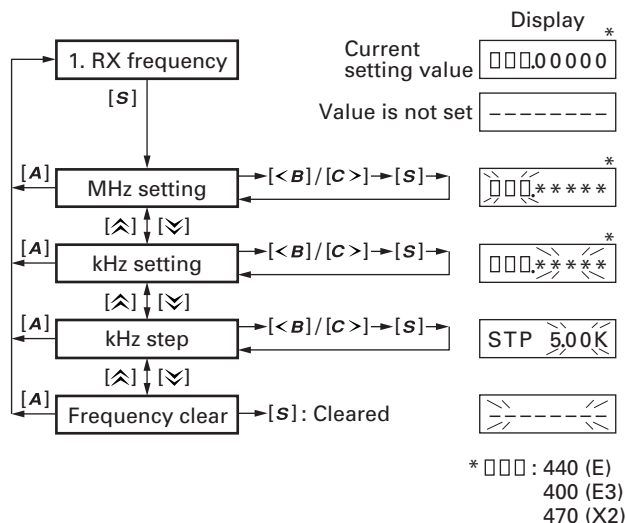
- Pressing [  $\mathbf{S}$  ] when "1- 1" is displayed, sets channel setting mode.
- Select an item set using [  $\mathbf{S}$  ] then change the selection with the [  $\wedge$  ] or [  $\nabla$  ].
- The data displayed using [  $\mathbf{S}$  ] is stored in the memory.
- Pressing [  $\wedge$  ] proceeds to the next item without storing it in the memory.
- Press [  $\mathbf{A}$  ] to set the display to " SELF " and return to reset (default) status.

## REALIGNMENT

### ■ Item Selection Mode



### ■ Item Setting Mode





## REALIGNMENT

### 6. Accessory Connection Cable (KCT-39)

The KCT-39 is an accessory connection cable for connecting external equipment. The connector has 15 pins and the necessary signal lines are selected for use.

#### 6-1. Installing the KCT-39 in the Transceiver

1. Lift the DC cord bushing ( ❶ ) from the chassis. Peel the pad as shown in Figure 3 ( ❷ ).

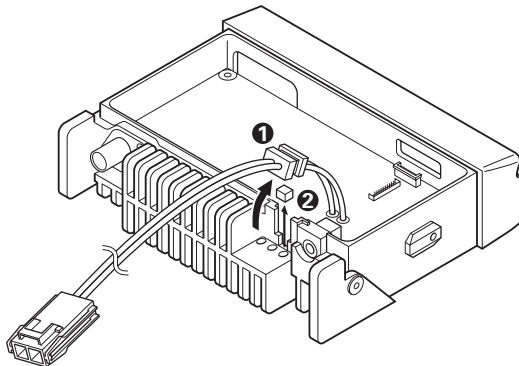


Fig. 3

2. Stick the pad to the DC cord ( ❸ ) and chassis ( ❹ ), both of which are supplied with the KCT-39.

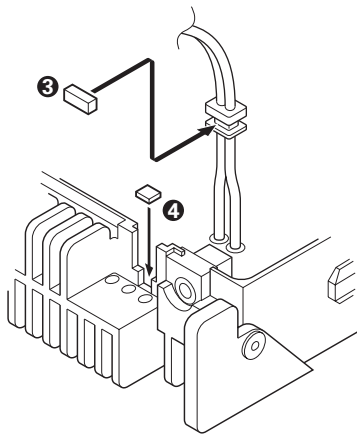


Fig. 4

3. Insert the KCT-39 cable ( ❺ ) into the chassis ( ❻ ). The wire harness band ( ❼ ) must be inside the chassis and face down.
4. Connect the KCT-39 to the TX-RX unit as shown in Figure 5 ( ❸ ).

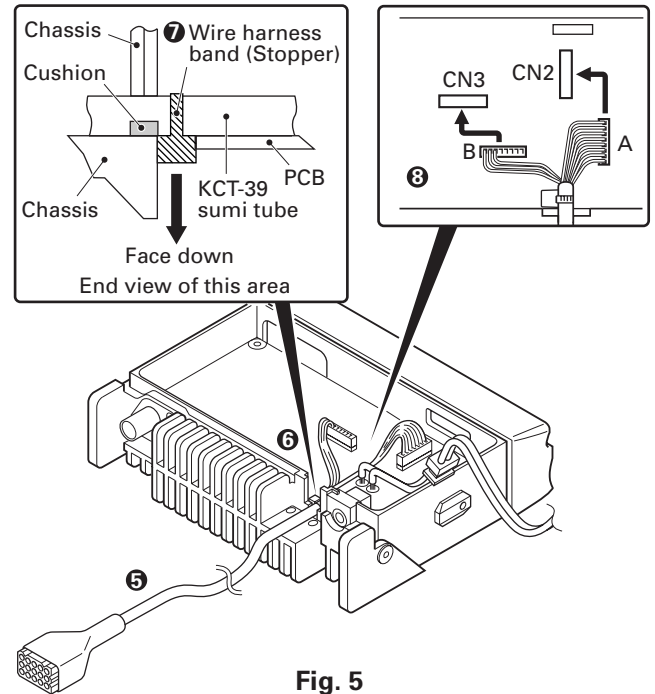


Fig. 5

5. Connect the KCT-39 to the external accessory by inserting the crimp terminal ( ❾ ) into the square plug ( ❿ ), both of which are supplied with the KCT-39.

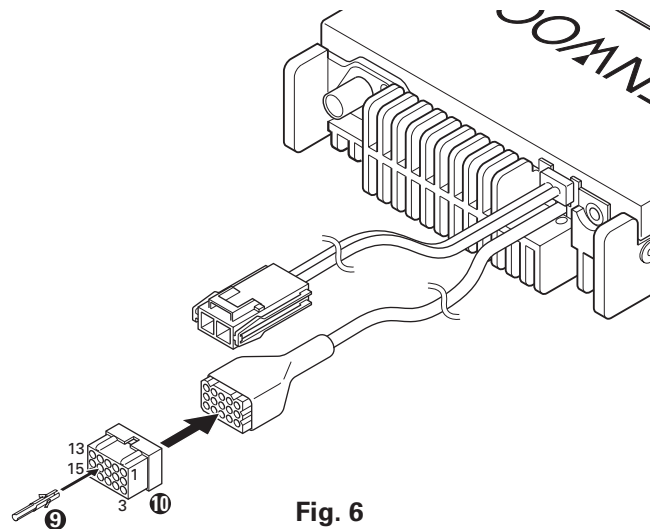
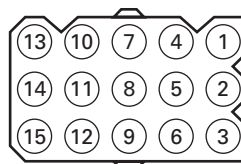


Fig. 6

#### ■ Accessory Port Function

No.	Color	Internal connector	Name	No.	Color	Internal connector	Name
1	Red	CN2-1	SB	9	Purple	CN2-12	FNC8
2	Pink	CN3-1	IGN	10	Grey	CN2-10	FNC6
3	Black	CN2-3	GND	11	White	CN2-11	FNC7
4	Brown	CN3-3	DETO	12	NC	NC	
5	Orange	CN3-2	DATAI	13	NC	NC	
6	Yellow	CN2-8	FNC4	14	Sky blue	CN2-6	FNC2
7	Green	CN2-7	FNC3	15	Turquoise	CN2-5	FNC1
8	Blue	CN2-9	FNC5				



# TK-8160/8162

## REALIGNMENT / DISASSEMBLY FOR REPAIR

### 7. Ignition Sense Cable (KCT-18)

The KCT-18 is an optional cable for enabling the ignition function. The ignition function lets you turn the power to the transceiver on and off with the car ignition key.

#### 7-2. Connecting the KCT-18 to the Transceiver

1. Install the KCT-39 in the transceiver. (See the KCT-39 section)
2. Insert the KCT-18 lead terminal (❶) into pin 2 of the KCT-39 (❷).

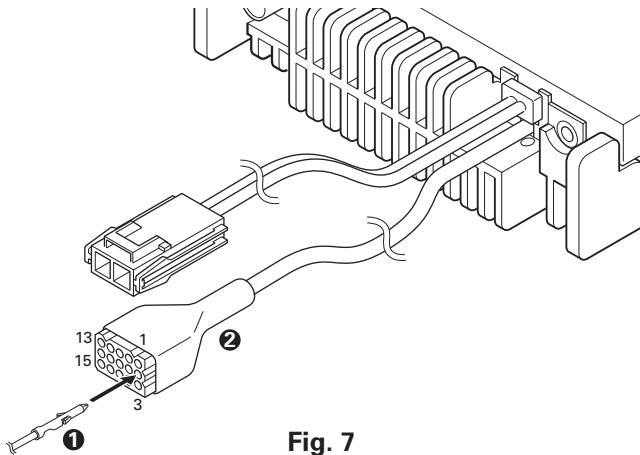


Fig. 7

#### 7-3. Modifying the Transceiver

Modify the transceiver as follows to turn the power on and off with the ignition key.

1. Remove the resistor R95 of the TX-RX unit.

#### ■ Setting With the KPG-99D(E)

Select "Function port" from the "Edit" menu and enable the "Ignition Sense".

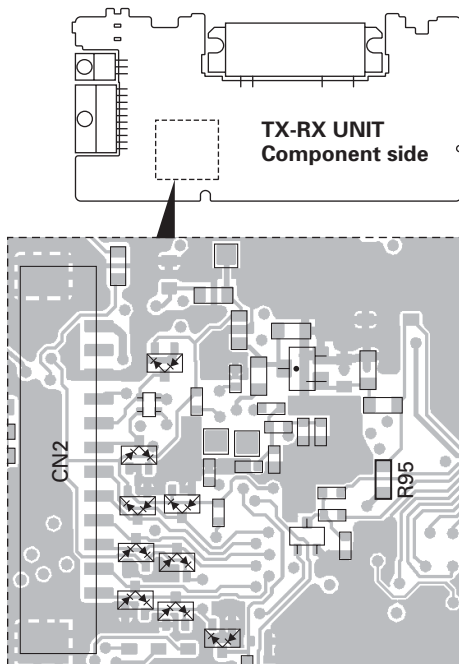


Fig. 8

1. When you remove the panel, turn the transceiver up side down. Detach the panel by lifting the tabs as shown below.

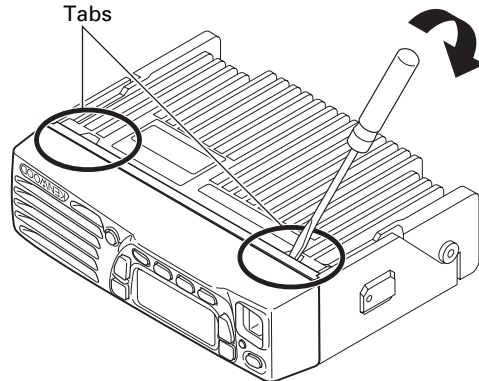


Fig. 1

2. To remove the cabinet, first turn the transceiver up side down. Detach the cabinet by prying the tabs as shown below.

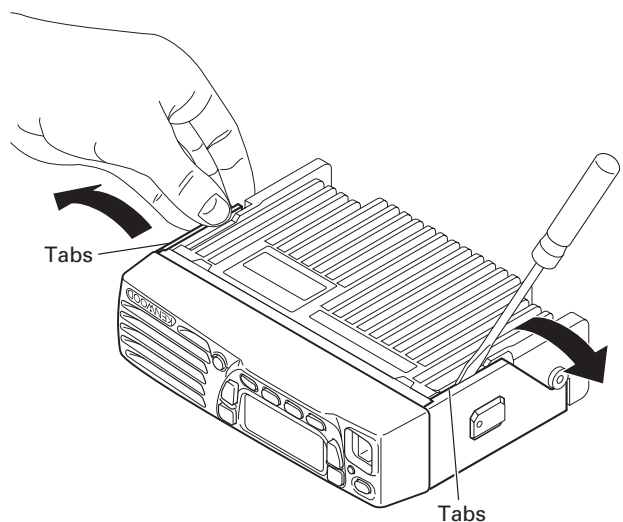


Fig. 2

3. When mounting the front panel, match the 4 tabs of the chassis with the panel, being sure they attach securely.

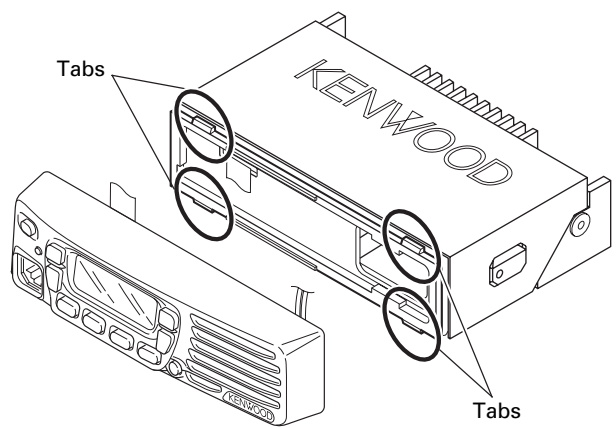


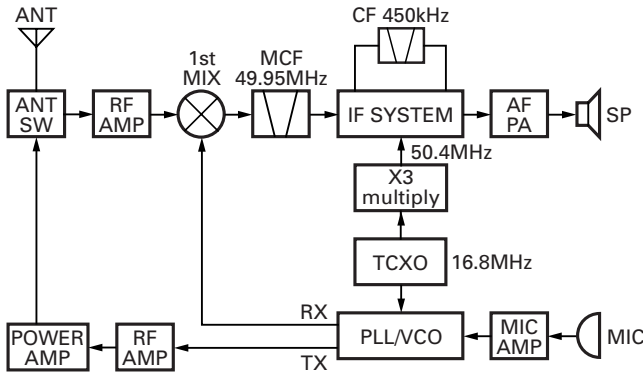
Fig. 3

## CIRCUIT DESCRIPTION

### 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

### Receiver System

The receiver is double conversion superheterodyne. The frequency configuration is shown in Figure 1.

#### ■ Front-end RF Amplifier Circuit

An incoming signal from the antenna is applied to an RF amplifier (Q353) after passing through a transmit/receive switch circuit (D604 and D605 are off) and a BPF (L359, L358, L360, L361 and varactor diodes : D353, D354, D355). After the signal is amplified (Q353), the signal is filtered by a BPF (L354, L355 and varactor diodes : D351, D352) to eliminate unwanted signals before it is passed to the first mixer.

The voltage of these diodes are controlled by tracking the CPU (IC101) center frequency of the band pass filter. (See Fig. 2)

#### ■ First Mixer Circuit

The signal from the RF amplifier is heterodyned with the first local oscillator signal from the PLL frequency synthesizer circuit at the first mixer (Q352) to create a 49.95MHz first intermediate frequency (1st IF) signal. The first IF signal is then fed through a monolithic crystal filter (MCF : XF351) to further remove spurious signals.

#### ■ IF Amplifier Circuit

The first IF signal is amplified by Q351, and the enters IC321 (FM processing IC). The signal is heterodyned again with a second local oscillator signal within IC321 to create a 450kHz second IF signal. The second IF signal is then fed through a 450kHz ceramic filter (Wide : CF331, Narrow : CF332) to further eliminate unwanted signals before it is amplified and FM detected in IC321.

Item	Rating
Nominal center frequency	49.95MHz
Pass bandwidth	±5.0kHz or more at 3dB
35dB stop bandwidth	±20.0kHz or less
Ripple	1.0dB or less
Insertion loss	5.0dB or less
Guaranteed attenuation	80dB or more at fo±1MHz
	Spurious : 40dB or more within fo±1MHz
Terminal impedance	350Ω / 5.5pF

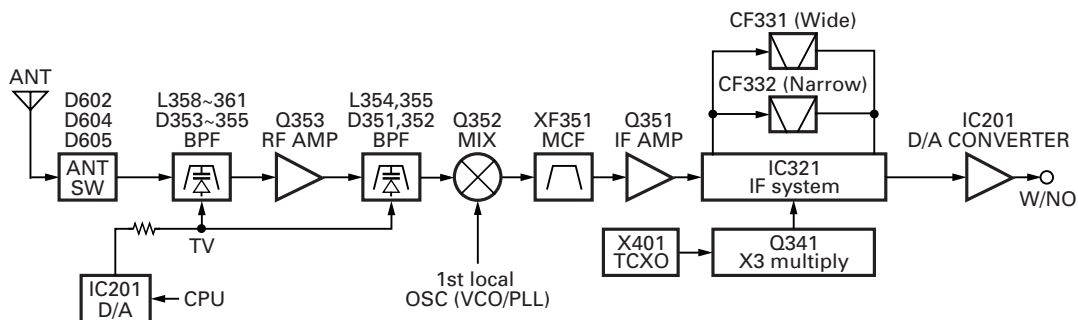
**Table 1** Crystal filter (L71-0624-05) : XF351

Item	Rating
Nominal center frequency	450kHz
6dB bandwidth	±6.0kHz or more
50dB bandwidth	±12.5kHz or less
Ripple	2.0dB or less
Insertion loss	6.0dB or less
Guaranteed attenuation	35.0dB or more within fo±100kHz
Terminal impedance	2.0kΩ

**Table 2** Ceramic filter (L72-0993-05) : CF331

Item	Rating
Nominal center frequency	450kHz
6dB bandwidth	±4.5kHz or more
50dB bandwidth	±10.0kHz or less
Ripple	2.0dB or less
Insertion loss	6.0dB or less
Guaranteed attenuation	60.0dB or more within fo±100kHz
Terminal impedance	2.0kΩ

**Table 3** Ceramic filter (L72-0999-05) : CF332



**Fig. 2** Receiver system

## CIRCUIT DESCRIPTION

### Wide/Narrow Switching Circuit

The Wide port (pin 23) and Narrow port (pin 22) of the CPU is used to switch between ceramic filters. When the Wide port is high, the ceramic filter SW diodes (D332, D331) cause CF331 to turn on to receive a Wide signal.

When the Narrow port is high, the ceramic filter SW diodes (D332, D331) cause CF332 to turn on to receive a Narrow signal.

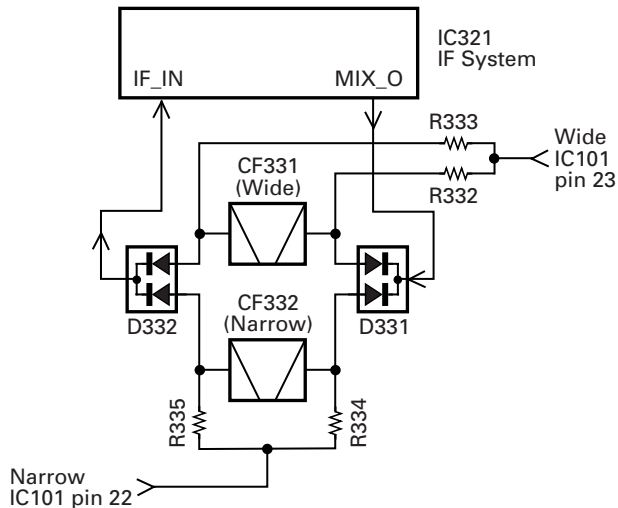


Fig. 3 Wide/Narrow switching circuit

### AF Signal System

The detection signal from IF IC (IC321) goes to D/A converter (IC201) to adjust the gain and is output to AQUA IC (IC241) for characterizing the signal. The AF signal output from IC241 and the DTMF/MSK signal, BEEP signal are summed and the resulting signal goes to the D/A converter (IC201). The AFO output level is adjusted by the D/A converter. The signal output from the D/A converter is input to the audio power amplifier (IC281). The AF signal from IC281 switches between the internal speaker and speaker jack (J1) output.

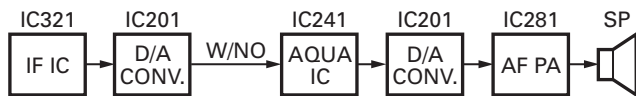


Fig. 4 AF signal system

### Squelch Circuit

The detection output from the FM IF IC (IC321) passes through a noise amplifier (Q301) to detect noise. A voltage is applied to the CPU (IC101). The CPU controls squelch according to the voltage (SQIN) level. The signal from the RSSI pin of IC321 is monitored. The electric field strength of the receive signal can be known before the SQIN voltage is input to the CPU, and the scan stop speed is improved.

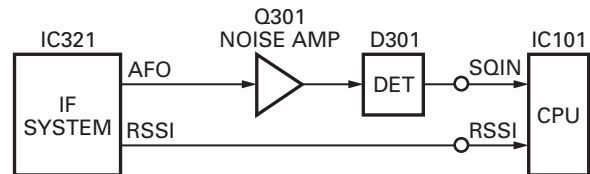


Fig. 5 Squelch circuit

### PLL Frequency Synthesizer

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

#### PLL Circuit

The frequency step of the PLL circuit is 5 or 6.25kHz. A 16.8MHz reference oscillator signal is divided at IC401 by a fixed counter to produce the 5 or 6.25kHz reference frequency. The voltage controlled oscillator (VCO) output signal is buffer amplified by Q446, then divided in IC401 by a dual-module programmable counter. The divided signal is compared in phase with the 5 or 6.25kHz reference signal in the phase comparator in IC401. The output signal from the phase comparator is filtered through a low-pass filter and passed to the VCO to control the oscillator frequency. (See Fig. 6)

#### VCO Circuit

The operating frequency is generated by Q406 in transmit mode and Q441 in receive mode. The oscillator frequency is controlled by applying the VCO control voltage, obtained from the phase comparator, to the varactor diodes (D443 and D444 in transmit mode and D441 and D442 in receive mode). The TX/RX pin is set low in receive mode causing Q443 and Q442 to turn Q406 off, and turn Q441 on. The TX/RX pin is set high in transmit mode. The outputs from Q441 and Q406 are amplified by Q446 and sent to the RF amplifiers.

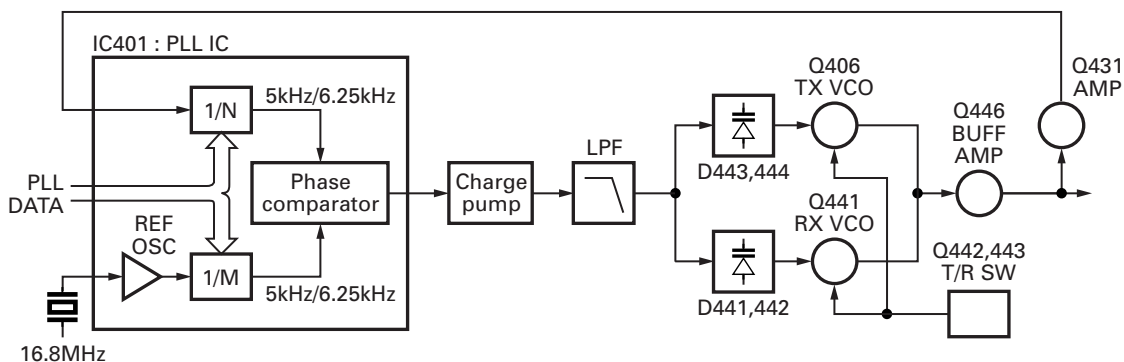


Fig. 6 PLL circuit

## CIRCUIT DESCRIPTION

### ■ Unlock Circuit

During reception, the 8RC signal goes high, the 8TC signal goes low, and Q44 turns on. Q43 turns on and a voltage is applied to the collector (8R). During transmission, the 8RC signal goes low, the 8TC signal goes high and Q46 turns on. Q45 turns on and a voltage is applied to 8T.

The CPU in the control unit monitors the PLL (IC401) LD signal directly. When the PLL is unlocked during transmission, the PLL LD signal goes low. The CPU detects this signal and makes the 8TC signal low. When the 8TC signal goes low, no voltage is applied to 8T, and no signal is transmitted.

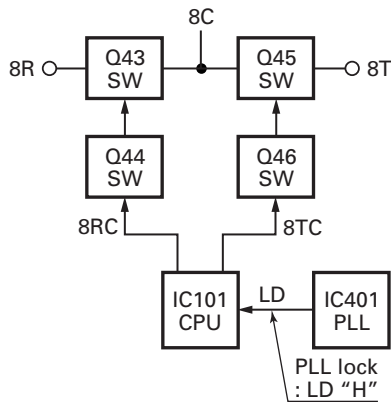


Fig. 7 Unlock circuit

### Transmitter System

#### ■ Outline

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

#### ■ Power Amplifier Circuit

The transmit output signal from the VCO passes through the transmission/reception selection diode (D448) and amplified by Q501 and Q502. The amplified signal goes to the rRF power module (IC502) through a low-pass filter. The low-pass filter removes unwanted high-frequency harmonic components, and the resulting signal is goes the antenna terminal.

#### ■ APC Circuit

The automatic transmission power control (APC) circuit detects part of a final amplifier output with a diode (D606, D607, D608 and D609) and applies a voltage to IC651. IC651 compares the APC control voltage (PC) generated by the D/A converter (IC201) and DC amplifier (IC214) with the detection output voltage. IC651 generates the voltage to control Q502 and IC502 and stabilizes transmission output.

The APC circuit is configured to protect over current of Q502 and IC502 due to fluctuations of the load at the antenna end and to stabilize transmission output at voltage and temperature variations.

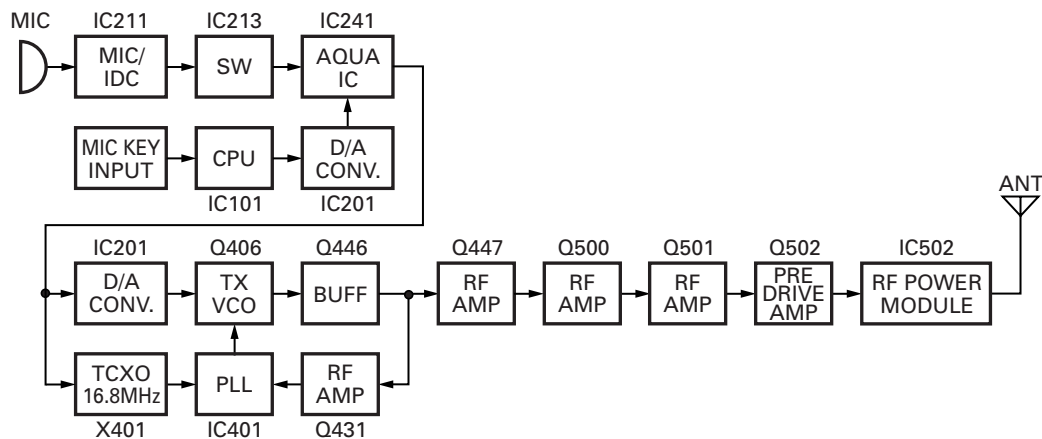


Fig. 8 Transmitter system

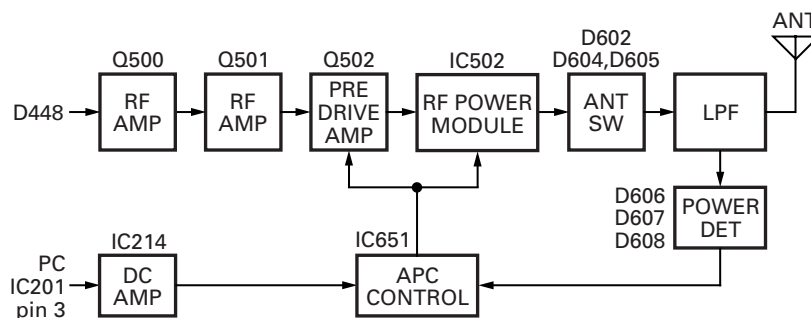


Fig. 9 APC circuit

## CIRCUIT DESCRIPTION

### Control Circuit

The CPU carries out the following tasks:

- 1) Controls the WIDE, NARROW, TX/RX outputs.
- 2) Controls the AQUA IC (IC241).
- 3) Controls the PLL (IC401).
- 4) Controls the D/A converter (IC201) and adjusts the volume, modulation and transmission power.

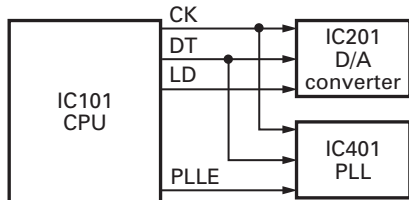


Fig. 10 Control circuit

### Memory Circuit

The transceiver has an 64k-bit EEPROM (IC81). The EEPROM contains adjustment data. The CPU (IC101) controls the EEPROM through three serial data lines.

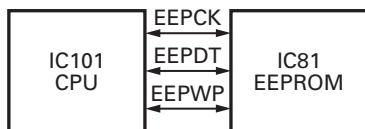


Fig. 11 Memory circuit

### Display Circuit

The CPU (IC101) controls the display LCD and LEDs. When power is on, the CPU will use the MBL line to control the LCD illumination and key backlight LEDs.

The dimmer function is controlled by the switch Q1\*. The LCD controller (IC1) controls the functions of the LCD through the DO, CE, CL, DI lines from the CPU.

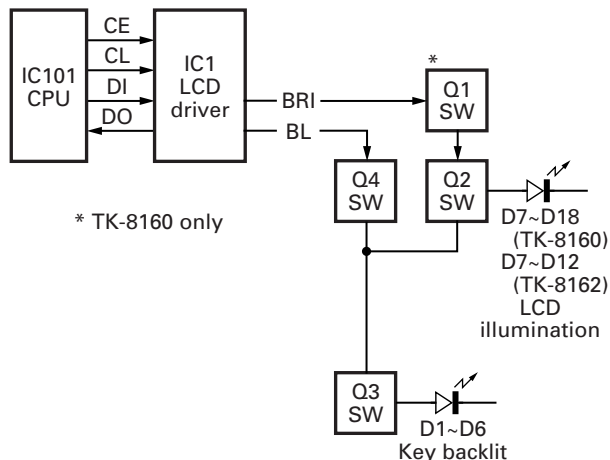


Fig. 12 Display circuit

### Key Matrix Circuit

The TK-8160/8162 front panel has function keys. The TK-8162 terminal name are parenthese inside. Each of them is connected to a cross point of a matrix of the KMI1 (KI3) to KMO3 (KS4) ports of the IC1 LCD driver. The KMO1 (KS2) to KMO3 (KS4) ports are always high, while the KMI1 (KI3) to KMI3 (KI1) ports are always low.

The microprocessor monitors the status of the KMI1 (KI3) to KMO3 (KS4) 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.

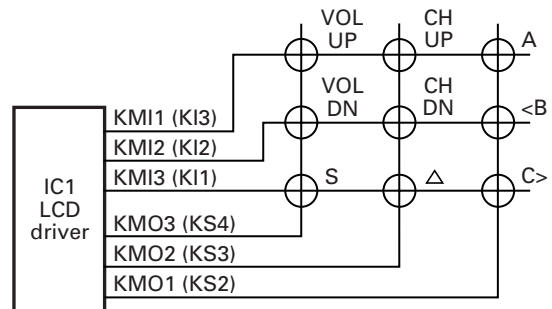


Fig. 13 Key matrix circuit

### Signaling Circuit

#### Encode

##### • Low-speed data (QT, DQT)

Low-speed data is output from pin 1 of the CPU (IC101). The signal passes through a low-pass CR filter. The signal is mixed with the audio signal and goes to the VCO and TCXO (X401) modulation input after passing through the D/A converter (IC201) for BAL adjustment.

##### • High-speed data (5-tone, DTMF)

High-speed data (HSD) is output from pin 2 of the CPU. The signal passes through a low-pass CR filter. TX deviation making an adjustment by microprocessor is passed through the switch (IC213) and then applied to the audio processor (IC241). The signal is mixed with the audio signal and goes to the VCO and TCXO.

The RX tone is passed a summing amplifier (IC241). The D/A converter (IC201) for audio control, audio power amplifier and then to the speaker.

##### • MSK

MSK signal is output from pin 6 of IC241. The signal passes through the D/A converter (IC201) for the MSK deviation adjustment, and is routed to the VCO. When encoding MSK, the microphone-input signal is muted.

## CIRCUIT DESCRIPTION

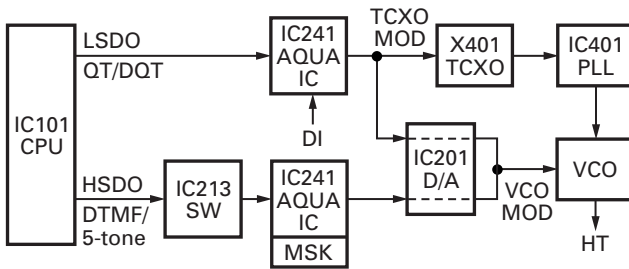


Fig. 14 Encode

### • MSK

The MSK input signal from the IF IC goes to pin 5 of IC241. The signal is demodulated by MSK demodulator in IC241. The demodulated data goes to the CPU for processing.

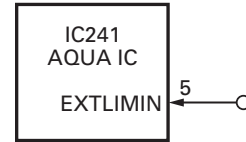


Fig. 15 Decode

### ■ Decode

#### • Low-speed data (QT, DQT)

The demodulated signal from the FM IC (IC321) is passed through a low-pass filter (IC211 1/2) to remove frequency of 300Hz or more.

The signal is input to pin 88 of the CPU. The CPU digitizes this signal, performs processing such as DC restoration, and decodes the signal.

#### • High-speed data (DTMF)

The DTMF input signal from the IF IC is amplified by IC241 and goes to the DTMF decoder in the IC241. The CPU then processes the decoded information.

#### • High-speed data (5-tone)

The demodulated signal from the IF IC (IC321) is amplified by IC241 and passes through a high-pass filter to remove frequency of 300Hz or less. The CPU digitizes this signal and decodes the signal.

### Power Supply Circuit

When the power switch on the display unit is pressed, the power port on the display unit which is connected port 17 (POWER), goes low, then port 78 (SBC) goes high, Q42 turns on, SB SW (Q31) turns on and power (SB) is supplied to the radio.

When the DC power supplied to the radio, the voltage regulator IC (IC43) supply into the CPU VDD and reset voltage detect IC (IC44). IC44 will generate signal (RESET) in to the reset terminal on the CPU (IC101) to carry out a power ON reset. Also, CPU (IC101) is checking on port 91 (BATT). If DC power is less than about 9.5V, the radio is unable to power on.

When the DC power voltage decreases from normal voltage, the INT voltage detector IC (IC45) will set to high on CPU port 18 (INT). If B line becomes less than about 9.5V, CPU will send the backup data to EEPROM (IC81) and go into STOP mode.

This circuit has an overvoltage protection circuit. If a DC voltage of 16V or higher is applied to the base of Q81, this voltage turns Q81 on and sets port 18 (INT) to low. As a result port 78 (SBC) is low, and turns Q42 and Q31 (SB) off.

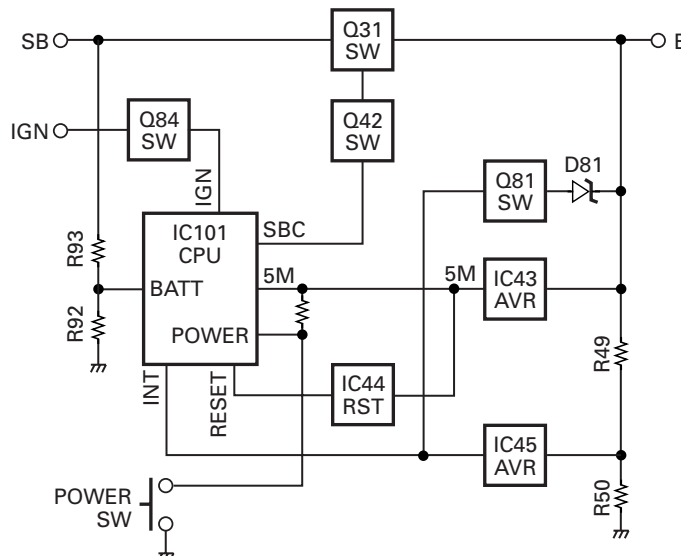


Fig. 16 Power supply circuit

## SEMICONDUCTOR DATA

## Microprocessor : TX-RX unit IC101

## ■ Pin Function

Pin No.	Name	I/O	Function
1	LSDO	O	QT/DQT output
2	HSDO	O	DTMF/5-tone/BEEP output
3	PLLE	O	PLL IC chip select
4,5	NC	O	
6	GND	-	GND
7	CNVSS	-	CNVss for flash
8	EVLDD	O	E-Volume LD
9	BSHIFT	O	Beat shift
10	RESET	-	RESET
11	XOUT	-	X'TAL (12MHz)
12	VSS	-	GND
13	XIN	-	X'TAL (12 MHz)
14	VCC	-	+5V
15	GND	-	GND (Input only)
16	NC	I	
17	POWER	I	Power key input
18	INT	I	μCom stop
19	NC	I	
20	TX/RX	O	TX/RX H : RX, L : TX
21	UL	I	PLL unlock detect
22	NARROW	O	Wide/Narrow2 H : Narrow
23	WIDE	O	Wide/Narrow H : Wide
24	HOR	O	Horn alert
25	PA	O	Public address
26	EEPWP	O	EEPROM write protect
27	EEPCK	O	EEPROM clock (Nch open drain)
28	EEPDT	I/O	EEPROM Data (Nch open drain)
29	FNC1	I/O	Function P1/TxD for flash
30	FNC2	I/O	Function P2/RxD for flash
31	CLKFLS	I	SCLK for flash
32	BSYFLS	O	Busy for flash
33	TXD	O	To FPU
34	RXD	I	From FPU
35	PTT	I	PTT KEY
36	HOOK	I	Hook
37	ABS	I	AQUA clock beat shift
38	NC	I	
39	EMPFLS	I/O	EPM for flash
40	SCRSW	O	For Ext. scrambler H : No Board, L : Mounted
41	DETSW	O	For DET H : RX, L : TX
42	HSDSW	O	For High Speed Data H : HSD send, L : Others
43	FNC3	I/O	Function Port 3
44	CEFLS	I/O	CE for flash
45~49	FNC4~FNC8	I/O	Function Port 4~8
50	AFM	O	AF Mute H : Mute, L : Unmute
51	SPM	O	Speaker mute H : Mute, L : Unmute

Pin No.	Name	I/O	Function
52	AMPSW	O	AF AMP SW H : SW off, L : SW on
53	DT	O	Common data
54	CK	O	Common clock
55,56	NC	I	
57	DST1	I	Destination 1 H : 25W, L : 50W
58	DST2	I	Destination 2
59	DST3	I	Destination 3
60	VCC	-	+5V
61	NC	I	
62	VSS	-	GND
63,64	NC	I	
65	MBL	O	MIC backlight
66	DISPID	I	Display type information
67	CM	I/O	From MIC keypad
68	CL	O	Clock for LCD
69	DO	O	Transfer data to LCD
70	CE	O	Chip enable for LCD
71	DI	I	Transfer data from LCD
72	IGN	I	Ignition
73	MICMT	O	MIC 1 mute
74	MICEM	O	MIC 2 mute
75	MICMT2	I	
76	8RC	O	8R control
77	8TC	O	8T control
78	SBC	O	Battery switch
79	LIMSW	O	For limiter
80	DTRLOADN	O	
81	STD	I	
82	TCLK/DTRDO	I	
83	TDATA/DTRCLK	O	
84	DI/O	I/O	
85	RDF/FD	I	
86	DIR	O	
87	HSDI	I	HSD input
88	LSDI	I	LSD input
89	TEMP2	I	Temperature 2
90	TEMP1	I	Temperature 1
91	BATT	I	Battery voltage
92	RSSI	I	RSSI input
93	SQIN	I	Squelch input
94	AVSS	-	GND
95	NC	I	
96	VREF	-	+5V
97	AVCC	-	+5V
98	NC	O	
99	RXLED	O	For panel PCB
100	TXLED	O	For panel PCB



## COMPONENTS DESCRIPTION

### Display Unit (X54-3510-10) : TK-8160

### Display Unit (X54-3522-70) : TK-8162

Ref. No.	Parts name	Description
IC1	IC	LCD controller
Q1	Transistor	Dimmer function switch (TK-8160 only)
Q2	Transistor	LCD backlit switch
Q3	Transistor	KEY backlit switch
Q4	Transistor	DC switch
Q7,8	Transistor	DC switch
D1~6	Diode	Key backlit
D7~18	Diode	LCD backlit (D13~18 : TK-8160 only)
D20	Diode	Surge absorption
D21	Diode	DC controller
D22	Diode	TX/RX LED

### TX-RX Unit (X57-711X-XX)

Ref. No.	Parts name	Description
IC41	IC	Voltage Regulator / 8V
IC42,43	IC	Voltage Regulator / 5V
IC44	IC	Voltage detector / Reset
IC45	IC	Voltage detector / Int
IC81	IC	EEPROM
IC101	IC	Microprocessor
IC201	IC	Digital potentiometer
IC211	IC	MIC amplifier
IC213	IC	Quad analog switch
IC214,215	IC	Dual ground sense op-amplifier
IC241	IC	Audio processor
IC281	IC	Audio amplifier
IC321	IC	FM IF system
IC401	IC	PLL system
IC502	IC	RF power module
IC651	IC	Comparator (APC)
Q31	FET	DC switch (SB)
Q42	Transistor	DC switch (SB)
Q43,44	Transistor	DC switch (8R)
Q45,46	Transistor	DC switch (8T)
Q81	Transistor	Over voltage detection
Q82,83	Transistor	Beat shift
Q84	Transistor	Ignition
Q201	Transistor	TX AF (DETO)
Q211	Transistor	AGC/MIC mute

Ref. No.	Parts name	Description
Q212	FET	Emergency MIC
Q213	FET	MIC mute
Q241	Transistor	W/N switch / TX
Q281	Digital transistor	AF mute
Q282	Transistor	AF mute
Q301	Transistor	SQL amplifier
Q341	Transistor	Buffer amplifier
Q351	Transistor	IF amplifier
Q352	FET	Mixer
Q353	FET	RF amplifier
Q406	FET	TX VCO
Q421,422	Transistor	Charge pump
Q431	Transistor	RF amplifier
Q441	FET	RX VCO
Q442	FET	T/R switch
Q443	Transistor	T/R switch
Q445	Transistor	Ripple filter
Q446	Transistor	Buffer amplifier
Q447	Transistor	RF amplifier
Q500,501	Transistor	RF amplifier
Q502	FET	Pre drive amplifier
D1~11	Diode	Surge absorption
D41	Diode	Reverse connection protection
D42	Poly SW	Current protection
D81,82	Diode	Over voltage detection
D211	Diode	AGC
D212	Diode	OR gate
D301	Diode	Rectification
D331,332	Diode	IF switch (Wide/Narrow)
D351~355	Varicap	RF BPF tuning
D401	Diode	Ripple filter
D421	Diode	Voltage dropped
D441,442	Varicap	RX VCO
D443,444	Varicap	TX VCO
D445	Diode	Modulation
D446	Diode	Ripple filter
D447,448	Diode	RF switch (TX/RX)
D502	Diode	Temperature compensation
D503	Diode	Voltage protection
D602	Diode	ANT switch
D604,605	Diode	ANT switch
D606~608	Diode	APC voltage detect
D609,910	Diode	Temperature compensation

# TK-8160/8162

## PARTS LIST

\* New Parts.  $\Delta$  indicates safety critical components.

Parts without **Parts No.** are not supplied.

Les articles non mentionnés dans le **Parts No.** ne sont pas fournis.

Teile ohne **Parts No.** werden nicht geliefert.

L : Scandinavia

Y : PX (Far East, Hawaii)

Y : AAFES (Europe)

K : USA

T : England

X : Australia

P : Canada

E : Europe

M : Other Areas

### TK-8160/8162 (Y51-507X-XX)

### DISPLAY UNIT (X54-3510-10)

Ref. No.	Address	New parts	Parts No.	Description	Desti-nation
<b>TK-8160/8162</b>					
1	1B		A02-3898-02	PLASTIC CABINET	
2	3A	*	A62-1107-13	PANEL ASSY	60E,60E3,X2
2	3A	*	A62-1108-03	PANEL ASSY	62E,62E3
3	3A		B42-7729-04	STICKER (WEEE)	
4	1C	*	B62-1863-00	INSTRUCTION MANUAL	
7	3B		E04-0167-05	RF COAXIAL RECEPTACLE (M)	X2
8	3B		E04-0454-05	RF COAXIAL RECEPTACLE (BNC)	60E,60E3
8	3B		E04-0454-05	RF COAXIAL RECEPTACLE (BNC)	62E,62E3
9	3C		E30-3339-05	DC CORD ASSY ACCESSORY	X2
10	2B		E30-3448-05	DC CORD	
11	3C		E30-7523-05	DC CORD ASSY ACCESSORY	60E,60E3
11	3C		E30-7523-05	DC CORD ASSY ACCESSORY	62E,62E3
12	3A		E37-0962-05	SPEAKER CABLE	
13	2A		E37-1187-05	FLAT CABLE	
15	2B	*	F10-2491-12	SHIELDING COVER (UPPER)	
16	3B		F10-3011-03	SHIELDING CASE	
17	2B		F10-3019-03	SHIELDING CASE	
18	2B	*	F10-3047-13	SHIELDING PLATE	
19	3C		F51-0016-15	FUSE (6X30) ACCESSORY	X2
20	3C		F52-0023-05	FUSE (BLADE TYPE) ACCESSORY	60E,60E3
20	3C		F52-0023-05	FUSE (BLADE TYPE) ACCESSORY	62E,62E3
22	2B		G02-1825-03	EARTH SPRING	
23	3B		G02-1826-03	EARTH SPRING	
24	2B	*	G02-1827-14	EARTH SPRING	
25	2B		G10-0792-14	FIBROUS SHEET	
26	2A		G10-1324-04	FIBROUS SHEET (DISPLAY)	
27	3B		G13-2003-04	CUSHION	
28	2B	*	G13-2119-04	CONDUCTIVE CUSHION	
29	1B		G53-1524-02	PACKING	
30	2B		G53-1542-03	PACKING	
31	3B		G53-1664-03	PACKING	
33	2C,1D		H12-3178-05	PACKING FIXTURE	
34	3D		H13-1190-02	CARTON BOARD	
35	1C		H25-2320-04	PROTECTION BAG	
36	1C		H25-2341-04	PROTECTION BAG	
37	2C		H52-2090-02	ITEM CARTON CASE	60E,60E3,X2
37	2C		H52-2091-02	ITEM CARTON CASE	62E,62E3
39	3D		J29-0662-03	BRACKET ACCESSORY	
41	3A		K29-9342-01	KEY TOP	
A	2B		N67-3008-48	PAN HEAD SEMS SCREW	
B	2A		N80-2008-48	PAN HEAD TAPTITE SCREW	
C	2B,3B		N87-2606-48	BRAZIER HEAD TAPTITE SCREW	
D	1B,2B		N87-2614-48	BRAZIER HEAD TAPTITE SCREW	
43	3D		N99-2048-05	SCREW SET	
45	3A		T07-0753-05	SPEAKER	
<b>DISPLAY UNIT (X54-3510-10) : TK-8160 E,E3,X2</b>					
101	2A		B11-1829-03	ILLUMINATION GUIDE	
102	2A		B38-0902-05	LCD	

Ref. No.	Address	New parts	Parts No.	Description	Desti-nation
D1-6			B30-2282-05	LED (Y)	
D7-18			B30-2281-05	LED (Y)	
D22			B30-2151-05	LED (RED/GREEN)	
C1			CK73GB1H103K	CHIP C 0.010UF K	
C6,7			CK73GB1H102K	CHIP C 1000PF K	
C9			CK73GB1H102K	CHIP C 1000PF K	
C10			CK73GB1H103K	CHIP C 0.010UF K	
C11-14			CK73GB1H102K	CHIP C 1000PF K	
C15			CK73GB1H471K	CHIP C 470PF K	
C16,17			CK73GB1A105K	CHIP C 1.0UF K	
C18			CK73GB1C104K	CHIP C 0.10UF K	
C19,20			CC73GCH1H101J	CHIP C 100PF J	
C21			CK73GB1H681K	CHIP C 680PF K	
C22,23			CK73GB1H102K	CHIP C 1000PF K	
C24			CK73GB1H103K	CHIP C 0.010UF K	
C25			CK73GB1H102K	CHIP C 1000PF K	
C27			CC73GCH1H101J	CHIP C 100PF J	
C30			CK73GB1H102K	CHIP C 1000PF K	
103	2A		E29-1206-05	INTER CONNECTOR	
CN1			E40-6005-05	FLAT CABLE CONNECTOR	
J1			E08-0877-05	MODULAR JACK	
104	2A		G10-1348-04	FIBROUS SHEET	
105	2A		J21-8494-03	MOUNTING HARDWARE	
-			J31-0553-05	COLLAR	
L1			L92-0138-05	CHIP FERRITE	
CP1			R90-0724-05	MULTI-COMP 1K X4	
R1			RK73GB1J101J	CHIP R 100 J 1/16W	
R2			RK73GB1J100J	CHIP R 10 J 1/16W	
R3-5			RK73GB1J102J	CHIP R 1.0K J 1/16W	
R6-8			RK73GB1J103J	CHIP R 10K J 1/16W	
R9			RK73GB1J563J	CHIP R 56K J 1/16W	
R10,11			RK73FB2A331J	CHIP R 330 J 1/10W	
R14			RK73FB2A473J	CHIP R 47K J 1/10W	
R15,16			RK73FB2A330J	CHIP R 33 J 1/10W	
R17,18			RK73FB2A390J	CHIP R 39 J 1/10W	
R19			RK73GB1J392J	CHIP R 3.9K J 1/16W	
R20			R92-0670-05	CHIP R 0 OHM	
R21			R92-1252-05	CHIP R 0 OHM J 1/16W	
R22			RK73FB2A181J	CHIP R 180 J 1/10W	
R23			RK73FB2A820J	CHIP R 82 J 1/10W	
R24,25			RK73GB1J103J	CHIP R 10K J 1/16W	
R26,27			RK73GB1J102J	CHIP R 1.0K J 1/16W	
R28-31			RK73GB1J390J	CHIP R 39 J 1/16W	
D20,21			MC2850	DIODE	
IC1			PT6554LQ	MOS-IC	
Q1			RN47A4	TRANSISTOR	
Q2			2SB1132(Q,R)	TRANSISTOR	
Q3			KRA225S	DIGITAL TRANSISTOR	
Q4			KRC102S	DIGITAL TRANSISTOR	
Q7,8			2SC3928A	TRANSISTOR	

## PARTS LIST

DISPLAY UNIT (X54-3522-70)  
TX-RX UNIT (X57-711X-XX)

Ref. No.	Address	New parts	Parts No.	Description	Desti-nation	Ref. No.	Address	New parts	Parts No.	Description	Desti-nation
<b>DISPLAY UNIT (X54-3522-70) : TK-8162 E,E3</b>											
101	2A		B11-1829-03	ILLUMINATION GUIDE		C25			CC73GCH1H101J	CHIP C 100PF J	E,E3
102	2A		B38-0905-05	LCD		C26			CC73GCH1H220J	CHIP C 22PF J	E,E3
D1-6			B30-2282-05	LED (Y)		C41			CK73GB1H221K	CHIP C 220PF K	X2
D7-12			B30-2281-05	LED (Y)		C42			CK73GB1H471K	CHIP C 470PF K	X2
D22			B30-2151-05	LED (RED/GREEN)		C43			CK73GB1H102K	CHIP C 1000PF K	X2
C1			CK73GB1H103K	CHIP C 0.010UF K		C45			CK73GB1H471K	CHIP C 470PF K	
C6,7			CK73GB1H102K	CHIP C 1000PF K		C46			CK73GB1H221K	CHIP C 220PF K	
C9			CK73GB1H102K	CHIP C 1000PF K		C47,48			CK73GB1H102K	CHIP C 1000PF K	
C10			CK73GB1H103K	CHIP C 0.010UF K		C49			C92-0721-05	ELECTRO 330UF 25WV	
C11-14			CK73GB1H102K	CHIP C 1000PF K		C50-53			CK73GB1H102K	CHIP C 1000PF K	
C15			CK73GB1H471K	CHIP C 470PF K		C54,55			CK73GB1C104K	CHIP C 0.10UF K	
C16,17			CK73GB1A105K	CHIP C 1.0UF K		C56			C92-0795-05	CHIP-TAN 22UF 10WV	
C18			CK73GB1H103K	CHIP C 0.010UF K		C57			CK73GB1H103K	CHIP C 0.010UF K	
C19,20			CC73GCH1H101J	CHIP C 100PF J		C58-60			C92-0795-05	CHIP-TAN 22UF 10WV	
C21			CK73GB1H821K	CHIP C 820PF K		C63			CK73GB1E103K	CHIP C 0.010UF K	
C22,23			CK73GB1H102K	CHIP C 1000PF K		C64,65			CK73GB1H103K	CHIP C 0.010UF K	
C24			CK73GB1H103K	CHIP C 0.010UF K		C66			C92-0560-05	CHIP-TAN 10UF 6.3WV	
C25			CK73GB1H102K	CHIP C 1000PF K		C67,68			CK73GB1H102K	CHIP C 1000PF K	
C27			CC73GCH1H101J	CHIP C 100PF J		C69,70			CK73GB1C104K	CHIP C 0.10UF K	
103	2A		E29-1206-05	INTER CONNECTOR		C71			CK73GB1H102K	CHIP C 1000PF K	
CN1			E40-6005-05	FLAT CABLE CONNECTOR		C81,82			CK73GB1H102K	CHIP C 1000PF K	
J1			E08-0877-05	MODULAR JACK		C85			CK73HB1H102K	CHIP C 1000PF K	
104	2A		G10-1348-04	FIBROUS SHEET		C86			CK73HB1A104K	CHIP C 0.10UF K	
105	2A		J21-8494-03	MOUNTING HARDWARE		C88			CC73HCH1H180J	CHIP C 18PF J	
-			J31-0553-05	COLLAR		C89,90			CC73HCH1H060B	CHIP C 6.0PF B	
L1			L92-0138-05	CHIP FERRITE		C91			CC73HCH1H180J	CHIP C 18PF J	
CP1			R90-0724-05	MULTI-COMP 1K X4		C93,94			CK73GB1H102K	CHIP C 1000PF K	
R1			RK73GB1J101J	CHIP R 100 J 1/16W		C96			CK73GB1H102K	CHIP C 1000PF K	
R2			RK73GB1J100J	CHIP R 10 J 1/16W		C101			CK73GB1H102K	CHIP C 1000PF K	
R3-5			RK73GB1J102J	CHIP R 1.0K J 1/16W		C102			CK73GB1C104K	CHIP C 0.10UF K	
R6-8			RK73GB1J103J	CHIP R 10K J 1/16W		C106			CK73GB1C104K	CHIP C 0.10UF K	
R9			RK73GB1J683J	CHIP R 68K J 1/16W		C110			CK73HB1H221K	CHIP C 220PF K	X2
R10,11			RK73FB2A331J	CHIP R 330 J 1/10W		C110-117			CK73HB1C103K	CHIP C 0.010UF K	E3
R17,18			RK73FB2A390J	CHIP R 39 J 1/10W		C110-117			CK73HB1H471K	CHIP C 470PF K	E
R19			RK73GB1J392J	CHIP R 3.9K J 1/16W		C112			CK73HB1H221K	CHIP C 220PF K	X2
R20			R92-0670-05	CHIP R 0 OHM		C114-117			CK73HB1C103K	CHIP C 0.010UF K	X2
R21			R92-1252-05	CHIP R 0 OHM J 1/16W		C201			CK73GB1C104K	CHIP C 0.10UF K	
R22			RK73FB2A181J	CHIP R 180 J 1/10W		C202			C92-0507-05	CHIP-TAN 4.7UF 6.3WV	
R23			RK73FB2A820J	CHIP R 82 J 1/10W		C203			CK73GB1C333K	CHIP C 0.033UF K	
R24,25			RK73GB1J103J	CHIP R 10K J 1/16W		C204			CK73GB1H102K	CHIP C 1000PF K	
R26,27			RK73GB1J102J	CHIP R 1.0K J 1/16W		C206			CK73GB1H102K	CHIP C 1000PF K	
R28,29			RK73GB1J390J	CHIP R 39 J 1/16W		C211			CK73GB1H183K	CHIP C 0.018UF K	
D20,21			MC2850	DIODE		C212			CK73HB1H152K	CHIP C 1500PF K	
IC1			LC75893M	MOS-IC		C213			CK73GB1C104K	CHIP C 0.10UF K	
Q2			2SB1132(Q,R)	TRANSISTOR		C214			CC73HCH1H390J	CHIP C 39PF J	
Q3			KRA225S	DIGITAL TRANSISTOR		C215			CK73HB1A104K	CHIP C 0.10UF K	
Q4			KRC102S	DIGITAL TRANSISTOR		C216			C92-0514-05	CHIP-TAN 2.2UF 10WV	
Q7,8			2SC3928A	TRANSISTOR		C217			CK73HB1H471K	CHIP C 470PF K	
<b>TX-RX UNIT (X57-711X-XX) 0-71 : TK-8160 X2 2-70 : TK-8160/8162 E 2-71 : TK-8160/8162 E3</b>						C218-221			CK73GB1C104K	CHIP C 0.10UF K	
C10			CK73HB1H102K	CHIP C 1000PF K		C222,223			CK73HB1A104K	CHIP C 0.10UF K	
C13-23			CK73HB1H471K	CHIP C 470PF K		C224			CK73GB1H103K	CHIP C 0.010UF K	
C24			CC73GCH1H221J	CHIP C 220PF J	E,E3	C225			CK73GB1C104K	CHIP C 0.10UF K	
						C226			CK73HB1H471K	CHIP C 470PF K	
						C227			CK73HB1A104K	CHIP C 0.10UF K	
						C228			CK73GB0J475K	CHIP C 4.7UF K	
						C229			CK73GB1A105K	CHIP C 1.0UF K	
						C230			C92-0560-05	CHIP-TAN 10UF 6.3WV	
						C231			C92-0662-05	CHIP-TAN 15UF 6.3WV	
						C233			CK73GB1H471K	CHIP C 470PF K	
						C241-245			CK73HB1H471K	CHIP C 470PF K	

## PARTS LIST

## TX-RX UNIT (X57-711X-XX)

Ref. No.	Address	New parts	Parts No.	Description	Destination	Ref. No.	Address	New parts	Parts No.	Description	Destination
C246			CK73HB1C223K	CHIP C 0.022UF K		C345			CC73GCH1H271J	CHIP C 270PF J	
C247,248			CK73HB1H471K	CHIP C 470PF K		C346			CK73GB1H103K	CHIP C 0.010UF K	
C249,250			CC73HCH1H100D	CHIP C 10PF D		C349,350			CK73GB1E103K	CHIP C 0.010UF K	
C251			CK73HB1A473K	CHIP C 0.047UF K		C351			CC73GCH1H330J	CHIP C 33PF J	
C252			CK73HB1A104K	CHIP C 0.10UF K		C353			CK73GB1H103K	CHIP C 0.010UF K	
C253			CK73GB1H102K	CHIP C 1000PF K		C354			CC73GCH1H030B	CHIP C 3.0PF B	
C254			CK73GB1H332K	CHIP C 3300PF K		C355			CC73GCH1H180J	CHIP C 18PF J	
C255			CC73HCH1H560J	CHIP C 56PF J		C356			CC73GCH1H060B	CHIP C 6.0PF B	
C256			CK73GB1H331K	CHIP C 330PF K		C357			CK73GB1H103K	CHIP C 0.010UF K	
C257			CC73HCH1H090B	CHIP C 9.0PF B		C358			CK73GB1H471K	CHIP C 470PF K	
C259			CC73HCH1H151J	CHIP C 150PF J		C359			CC73GCH1H120J	CHIP C 12PF J	
C260			CK73GB1A474K	CHIP C 0.47UF K		C360			CC73GCH1H080B	CHIP C 8.0PF B	X2
C261			CK73HB1A104K	CHIP C 0.10UF K		C360			CC73GCH1H090B	CHIP C 9.0PF B	E3
C262			CK73GB1A105K	CHIP C 1.0UF K		C360-362			CK73GB1H471K	CHIP C 470PF K	E
C263			CK73GB1H103K	CHIP C 0.010UF K		C361,362			CK73GB1H471K	CHIP C 470PF K	E3,X2
C264			CC73HCH1H330J	CHIP C 33PF J		C363			CK73GB1H103K	CHIP C 0.010UF K	
C265			CK73HB1H391K	CHIP C 390PF K		C364			CK73GB1H471K	CHIP C 470PF K	
C266			CK73GB1C104K	CHIP C 0.10UF K		C366			CK73GB1C104K	CHIP C 0.10UF K	
C267			CK73HB1A104K	CHIP C 0.10UF K		C367			CC73GCH1H470J	CHIP C 47PF J	X2
C268			CC73HCH1H181J	CHIP C 180PF J		C367			CK73GB1H471K	CHIP C 470PF K	E,E3
C269			C92-0507-05	CHIP-TAN 4.7UF 6.3WV		C368			CC73GCH1H060B	CHIP C 6.0PF B	E3
C270			C92-0560-05	CHIP-TAN 10UF 6.3WV		C368			CC73GCH1H090B	CHIP C 9.0PF B	X2
C271			CK73HB1A104K	CHIP C 0.10UF K		C368			CC73GCH1H100C	CHIP C 10PF C	E
C272			C92-0507-05	CHIP-TAN 4.7UF 6.3WV		C369			CC73GCH1HR75B	CHIP C 0.75PF B	E3
C273,274			CK73HB1H681K	CHIP C 680PF K		C369			CC73GCH1H010B	CHIP C 1.0PF B	E
C275,276			CK73HB1H102K	CHIP C 1000PF K		C369			CC73GCH1H050B	CHIP C 5.0PF B	X2
C281			CK73GB1H102K	CHIP C 1000PF K		C370			CK73GB1H471K	CHIP C 470PF K	
C282			CK73GB1A105K	CHIP C 1.0UF K		C371			CC73GCH1HR75B	CHIP C 0.75PF B	E
C283			CK73FB1C224K	CHIP C 0.22UF K		C371			CC73GCH1H0R5B	CHIP C 0.5PF B	E3,X2
C284			CK73GB1C104K	CHIP C 0.10UF K		C372			CC73GCH1H100C	CHIP C 10PF C	X2
C285			C92-0516-05	CHIP-TAN 4.7UF 16WV		C372			CC73GCH1H150J	CHIP C 15PF J	E,E3
C286			C92-0040-05	CHIP-ELE 47UF 16WV		C373			CC73GCH1H050B	CHIP C 5.0PF B	X2
C287			C92-0722-05	ELECTRO 470UF 16WV		C373			CC73GCH1H080B	CHIP C 8.0PF B	E,E3
C288-290			CK73GB1H102K	CHIP C 1000PF K		C374			CC73GCH1H070B	CHIP C 7.0PF B	
C291,292			CC73GCH1H220J	CHIP C 22PF J	E,E3	C375-380			CK73GB1H471K	CHIP C 470PF K	
C293			CK73GB1A105K	CHIP C 1.0UF K		C381			CC73GCH1H060B	CHIP C 6.0PF B	E
C294			CC73GCH1H101J	CHIP C 100PF J	E,E3	C381			CC73GCH1H080B	CHIP C 8.0PF B	E3,X2
C295			CC73GCH1H470J	CHIP C 47PF J	E,E3	C382			CK73GB1H471K	CHIP C 470PF K	
C296			CC73GCH1H220J	CHIP C 22PF J	E,E3	C383			CC73GCH1HR75B	CHIP C 0.75PF B	E,E3
C301			C92-0507-05	CHIP-TAN 4.7UF 6.3WV		C383			CC73GCH1H0R5B	CHIP C 0.5PF B	X2
C302			CK73GB1H102K	CHIP C 1000PF K	E,X2	C384			CC73GCH1H060B	CHIP C 6.0PF B	E3,X2
C302,303			CK73GB1H102K	CHIP C 1000PF K	E3	C384			CC73GCH1H090B	CHIP C 9.0PF B	E
C303			CK73GB1H472K	CHIP C 4700PF K	E,X2	C385			CK73GB1H471K	CHIP C 470PF K	
C304			CC73GCH1H331J	CHIP C 330PF J	E	C386			CC73GCH1HR75B	CHIP C 0.75PF B	E3
C304,305			CC73GCH1H121J	CHIP C 120PF J	E3	C386			CC73GCH1H010B	CHIP C 1.0PF B	E
C304,305			CC73GCH1H221J	CHIP C 220PF J	X2	C386,387			CC73GCH1H0R5B	CHIP C 0.5PF B	X2
C305			CC73GCH1H391J	CHIP C 390PF J	E	C387			CC73GCH1H0R5B	CHIP C 0.5PF B	E,E3
C306			CK73GB1H102K	CHIP C 1000PF K		C388			CC73GCH1H030B	CHIP C 3.0PF B	E
C307			CK73GB1E223K	CHIP C 0.022UF K		C388			CC73GCH1H040B	CHIP C 4.0PF B	E3
C308			CK73GB1H102K	CHIP C 1000PF K		C388			CC73GCH1H050B	CHIP C 5.0PF B	X2
C309			CK73GB1E223K	CHIP C 0.022UF K		C389			CK73GB1H103K	CHIP C 0.010UF K	
C310			CK73FB1C334K	CHIP C 0.33UF K		C390			CC73GCH1H050B	CHIP C 5.0PF B	X2
C321			CK73GB1H103K	CHIP C 0.010UF K		C390			CC73GCH1H080B	CHIP C 8.0PF B	E
C322-324			CK73GB1C104K	CHIP C 0.10UF K		C390			CC73GCH1H100C	CHIP C 10PF C	E3
C325			C92-0662-05	CHIP-TAN 15UF 6.3WV		C391			CK73GB1H471K	CHIP C 470PF K	
C326			CK73GB1H103K	CHIP C 0.010UF K		C392			CC73GCH1H040B	CHIP C 4.0PF B	E3
C331-333			CK73GB1C104K	CHIP C 0.10UF K		C392			CC73GCH1H050B	CHIP C 5.0PF B	X2
C341			CC73GCH1H101J	CHIP C 100PF J		C392			CC73GCH1H4R5B	CHIP C 4.5PF B	E
C343			CC73GCH1H680J	CHIP C 68PF J		C393			CC73GCH1H030B	CHIP C 3.0PF B	E3
C344			CC73GCH1H560J	CHIP C 56PF J		C393			CC73GCH1H070B	CHIP C 7.0PF B	X2

## PARTS LIST

TX-RX UNIT (X57-711X-XX)

Ref. No.	Address	New parts	Parts No.	Description	Desti-nation	Ref. No.	Address	New parts	Parts No.	Description	Desti-nation
C394			CC73GCH1HR75B	CHIP C 0.75PF B	E	C486			CC73GCH1H050B	CHIP C 5.0PF B	E
C394			CC73GCH1H2R5B	CHIP C 2.5PF B	E3	C486			CC73GCH1H2R5B	CHIP C 2.5PF B	E3
C395			CC73GCH1H030B	CHIP C 3.0PF B	E3	C488			CC73GCH1H060B	CHIP C 6.0PF B	E
C401,402			CK73GB1H102K	CHIP C 1000PF K		C488			CC73GCH1H100C	CHIP C 10PF C	E3
C403			CC73GCH1H101J	CHIP C 100PF J		C489			CC73GCH1H020B	CHIP C 2.0PF B	E
C404,405			CC73HCH1H101J	CHIP C 100PF J		C501			CK73GB1H471K	CHIP C 470PF K	
C406			CC73GCH1H020B	CHIP C 2.0PF B		C502			CC73GCH1H020B	CHIP C 2.0PF B	E,X2
C407			CK73GB1H102K	CHIP C 1000PF K		C502			CC73GCH1H050B	CHIP C 5.0PF B	E3
C409			CC73HCH1H220J	CHIP C 22PF J		C503			CK73GB1H681K	CHIP C 680PF K	X2
C410,411			CK73GB1C104K	CHIP C 0.10UF K		C504,505			CK73GB1H471K	CHIP C 470PF K	
C412			C92-0560-05	CHIP-TAN 10UF 6.3WV		C507			CK73GB1H471K	CHIP C 470PF K	
C413			CK73GB1C104K	CHIP C 0.10UF K		C509			CC73GCH1H050B	CHIP C 5.0PF B	
C414			C92-0560-05	CHIP-TAN 10UF 6.3WV		C510-515			CK73GB1H471K	CHIP C 470PF K	
C415			CK73HB1C103K	CHIP C 0.010UF K		C516			CC73GCH1H080B	CHIP C 8.0PF B	
C416			CK73GB1C104K	CHIP C 0.10UF K		C517			CK73GB1H471K	CHIP C 470PF K	
C422,423			CK73HB1H471K	CHIP C 470PF K		C520,521			CK73GB1H471K	CHIP C 470PF K	X2
C424			CK73GB1H471K	CHIP C 470PF K		C522			CK73GB1C104K	CHIP C 0.10UF K	X2
C425			C92-0555-05	CHIP-TAN 0.047UF 35WV		C523			CC73GCH1H470J	CHIP C 47PF J	E3,X2
C426			C92-0003-05	CHIP-TAN 0.47UF 25WV	E	C523			CC73GCH1H680J	CHIP C 68PF J	E
C426			C92-0004-05	CHIP-TAN 1.0UF 16WV	X2	C526,527			CC73FCH1H090D	CHIP C 9.0PF D	E
C426			C92-0504-05	CHIP-TAN 0.68UF 20WV	E3	C526,527			CC73FCH1H120J	CHIP C 12PF J	E3
C427			C92-0001-05	CHIP-TAN 0.1UF 35WV		C528			C93-0552-05	CHIP C 2.0PF C	X2
C431			CK73GB1H102K	CHIP C 1000PF K		C531	*		CS77AA0J470M	CHIP-TAN 47UF 6.3WV	E,E3
C434			CK73GB1H471K	CHIP C 470PF K		C532			CK73GB1H471K	CHIP C 470PF K	
C441			CC73GCH1H080B	CHIP C 8.0PF B	E3,X2	C534			CK73FB1H471K	CHIP C 470PF K	
C441			CC73GCH1H150J	CHIP C 15PF J	E	C535			CK73GB1H221K	CHIP C 220PF K	
C442			CC73GCH1H040B	CHIP C 4.0PF B	X2	C536			CK73GB1H471K	CHIP C 470PF K	
C442			CC73GCH1H070B	CHIP C 7.0PF B	E3	C537			C92-0719-05	ELECTRO 47UF 25WV	
C442			CC73GCH1H120G	CHIP C 12PF G	E	C538			CK73GB1H102K	CHIP C 1000PF K	E,E3
C443			CK73GB1H471K	CHIP C 470PF K		C539			CK73GB1H221K	CHIP C 220PF K	E,E3
C444			CC73GCH1H030B	CHIP C 3.0PF B	E	C540			CK73GB1H102K	CHIP C 1000PF K	E,E3
C444,445			CC73GCH1H020B	CHIP C 2.0PF B	E3,X2	C541			CK73GB1C104K	CHIP C 0.10UF K	
C445			CC73GCH1H040B	CHIP C 4.0PF B	E	C542			CC73GCH1H101J	CHIP C 100PF J	E,E3
C446			CC73GCH1H030B	CHIP C 3.0PF B	E3,X2	C543			CC73GCH1H470J	CHIP C 47PF J	E,E3
C446			CC73GCH1H050B	CHIP C 5.0PF B	E	C544			CC73GCH1H220J	CHIP C 22PF J	E,E3
C447			CC73GCH1H0R5B	CHIP C 0.5PF B		C545			CC73GCH1H101J	CHIP C 100PF J	E,E3
C451,452			CK73GB1H471K	CHIP C 470PF K		C546			CC73GCH1H470J	CHIP C 47PF J	E,E3
C453			CC73GCH1H050B	CHIP C 5.0PF B	E3,X2	C547			CC73GCH1H220J	CHIP C 22PF J	E,E3
C453			CC73GCH1H070B	CHIP C 7.0PF B	E	C571			CK73GB1H471K	CHIP C 470PF K	
C454			CC73GCH1H030B	CHIP C 3.0PF B	X2	C572,573			CK73GB1H103K	CHIP C 0.010UF K	
C454			CC73GCH1H060B	CHIP C 6.0PF B	E,E3	C601			CC73GCH1H010B	CHIP C 1.0PF B	X2
C455			CC73GCH1H0R5B	CHIP C 0.5PF B		C601			CC73GCH1H050B	CHIP C 5.0PF B	E3
C456			CK73GB1H471K	CHIP C 470PF K		C603			C93-0603-05	CHIP C 1000PF K	
C457			CC73GCH1H1R5B	CHIP C 1.5PF B	E,X2	C606			CC73GCH1H0R5B	CHIP C 0.5PF B	
C457,458			CC73GCH1H020B	CHIP C 2.0PF B	E3	C607			CC73GCH1H020B	CHIP C 2.0PF B	E3,X2
C458			CC73GCH1H020B	CHIP C 2.0PF B	X2	C607			CC73GCH1H1R5B	CHIP C 1.5PF B	E
C458,459			CC73GCH1H050B	CHIP C 5.0PF B	E	C608			C93-0550-05	CHIP C 1.0PF C	X2
C459			CC73GCH1H030B	CHIP C 3.0PF B	E3,X2	C608			C93-0552-05	CHIP C 2.0PF C	E3
C460			CC73GCH1H0R3B	CHIP C 0.3PF B		C608			C93-0555-05	CHIP C 5.0PF C	E
C461			C92-0560-05	CHIP-TAN 10UF 6.3WV		C609			C93-0554-05	CHIP C 4.0PF C	X2
C463,464			CK73GB1H471K	CHIP C 470PF K		C609			C93-0557-05	CHIP C 7.0PF D	E,E3
C465			C92-0795-05	CHIP-TAN 22UF 10WV		C610			CC73GCH1H0R5B	CHIP C 0.5PF B	
C466,467			CK73GB1H471K	CHIP C 470PF K		C611			CC73GCH1H020B	CHIP C 2.0PF B	
C469			CC73GCH1H060B	CHIP C 6.0PF B		C612			C93-0550-05	CHIP C 1.0PF C	E,E3
C470			CC73GCH1H040B	CHIP C 4.0PF B		C612,613			C93-0550-05	CHIP C 1.0PF C	X2
C471			CC73GCH1H020B	CHIP C 2.0PF B		C613			C93-0553-05	CHIP C 3.0PF C	E
C477			CK73GB1H471K	CHIP C 470PF K		C613			C93-0556-05	CHIP C 6.0PF D	E3
C480			CC73GCH1H050B	CHIP C 5.0PF B		C614			CC73GCH1H0R5B	CHIP C 0.5PF B	
C481-483			CK73GB1H471K	CHIP C 470PF K		C615			CC73GCH1H020B	CHIP C 2.0PF B	
C484			CC73GCH1H060B	CHIP C 6.0PF B	E,E3	C616			C93-0550-05	CHIP C 1.0PF C	E3,X2

## PARTS LIST

## TX-RX UNIT (X57-711X-XX)

Ref. No.	Address	New parts	Parts No.	Description	Destination	Ref. No.	Address	New parts	Parts No.	Description	Destination
C616			C93-0551-05	CHIP C 1.5PF C	E	L449,450			L40-4791-86	SMALL FIXED INDUCTOR (4.7UH)	E
C617			C93-0550-05	CHIP C 1.0PF C	E	L450			L40-2785-92	SMALL FIXED INDUCTOR (270NH)	E3,X2
C617			C93-0552-05	CHIP C 2.0PF C	E3,X2	L451,452			L92-0443-05	CHIP FERRITE	
C618,619			CK73GB1H471K	CHIP C 470PF K		L454			L41-2775-06	SMALL FIXED INDUCTOR (27NH)	
C620			CK73GB1H102K	CHIP C 1000PF K		L456			L41-2775-06	SMALL FIXED INDUCTOR (27NH)	
C651			CK73GB1H103K	CHIP C 0.010UF K		L460			L40-1875-92	SMALL FIXED INDUCTOR (18NH)	E3
C652			CK73GB1H471K	CHIP C 470PF K		L460			L41-1875-38	SMALL FIXED INDUCTOR (18NH)	E
C672,673			CK73GB1H471K	CHIP C 470PF K		L461			L41-2775-38	SMALL FIXED INDUCTOR (27NH)	E
TC441			C05-0245-05	CERAMIC TRIMMER (10PF)	E3	L501			L41-2775-06	SMALL FIXED INDUCTOR (27NH)	
TC441,442			C05-0245-05	CERAMIC TRIMMER (10PF)	E,X2	L502			L41-1875-08	SMALL FIXED INDUCTOR (18NH)	
TC442			C05-0399-05	CERAMIC TRIMMER (6PF)	E3	L503,504			L41-3363-08	SMALL FIXED INDUCTOR (3.3NH)	X2
CN1			E40-6268-05	FLAT CABLE CONNECTOR		L504			L41-3363-08	SMALL FIXED INDUCTOR (3.3NH)	E3
CN2			E40-5702-05	PIN ASSY		L504			L41-6865-08	SMALL FIXED INDUCTOR (6.8NH)	E
CN3			E40-6292-05	PIN ASSY		L506			L92-0179-05	CHIP FERRITE	
CN5			E40-3246-05	PIN ASSY		L508			L41-1078-14	SMALL FIXED INDUCTOR (10NH)	E,E3
CN301-304			E23-1081-05	TERMINAL		L509			L34-4753-05	AIR-CORE COIL	
CN501-503			E23-1081-05	TERMINAL		L601			L34-4757-05	AIR-CORE COIL	
CN504-506			E23-1262-05	TERMINAL	E,E3	L603,604			L34-4754-05	AIR-CORE COIL	E3,X2
J1			E11-0425-05	3.5D PHONE JACK (3P)		L603,604			L34-4757-05	AIR-CORE COIL	E
						L605			L34-4753-05	AIR-CORE COIL	
F41			F53-0246-05	FUSE		X86			L77-1970-05	CRYSTAL RESONATOR (12.0MHZ)	
CF331			L72-0993-05	CERAMIC FILTER		X241			L77-1968-05	CRYSTAL RESONATOR (3.6864MHZ)	
CF332			L72-0999-05	CERAMIC FILTER		X401			L77-1944-05	TCXO (16.8MHZ)	
L1,2			L92-0179-05	CHIP FERRITE		XF351			L71-0624-05	MCF (49.95MHZ/5.0K)	
L101			L92-0443-05	CHIP FERRITE		CP1-7			RK75HA1J102J	CHIP-COM 1.0K J 1/16W	
L211			L92-0443-05	CHIP FERRITE		R1			R92-1252-05	CHIP R 0 OHM J 1/16W	
L321			L34-4554-05	COIL		R2			RK73HB1J101J	CHIP R 100 J 1/16W	
L341			L41-3385-08	SMALL FIXED INDUCTOR (330NH)		R3			RK73HB1J102J	CHIP R 1.0K J 1/16W	
L342,343			L40-3381-86	SMALL FIXED INDUCTOR (0.33UH)		R4			RK73HB1J332J	CHIP R 3.3K J 1/16W	
L351,352			L40-3385-85	SMALL FIXED INDUCTOR (0.33UH)	X2	R5			RK73HB1J223J	CHIP R 22K J 1/16W	
L351,352			L40-4785-85	SMALL FIXED INDUCTOR (0.47UH)	E,E3	R41			RK73GB1J473J	CHIP R 47K J 1/16W	
L354			L34-4603-05	AIR-CORE COIL	X2	R42			R92-1201-05	CHIP R 220 J 1/2W	
L354,355			L34-4604-05	AIR-CORE COIL	E	R43			RK73GB1J473J	CHIP R 47K J 1/16W	
L354,355			L34-4605-05	AIR-CORE COIL	E3	R44			RK73GB1J472J	CHIP R 4.7K J 1/16W	
L355			L34-4605-05	AIR-CORE COIL	X2	R45			RK73GB1J473J	CHIP R 47K J 1/16W	
L356			L40-1875-92	SMALL FIXED INDUCTOR (18NH)	E,X2	R46			RK73GB1J152J	CHIP R 1.5K J 1/16W	
L356			L40-2275-92	SMALL FIXED INDUCTOR (22NH)	E3	R47			RK73GB1J103J	CHIP R 10K J 1/16W	
L357			L40-3975-92	SMALL FIXED INDUCTOR (39NH)		R48			RK73HB1J334J	CHIP R 330K J 1/16W	
L358			L34-4603-05	AIR-CORE COIL	X2	R49			RK73HB1J474J	CHIP R 470K J 1/16W	
L358			L34-4605-05	AIR-CORE COIL	E	R50			RK73HB1J394J	CHIP R 390K J 1/16W	
L358,359			L34-4605-05	AIR-CORE COIL	E3	R51			RK73HB1J334J	CHIP R 330K J 1/16W	
L359-361			L34-4604-05	AIR-CORE COIL	E,X2	R81,82			RK73GB1J103J	CHIP R 10K J 1/16W	
L360,361			L34-4604-05	AIR-CORE COIL	E3	R83			R92-1252-05	CHIP R 0 OHM J 1/16W	
L402			L41-1005-08	SMALL FIXED INDUCTOR (10UH)		R84			R92-1368-05	CHIP R 0 OHM	
L404			L92-0442-05	CHIP FERRITE		R85			RK73HB1J473J	CHIP R 47K J 1/16W	
L421			L92-0443-05	CHIP FERRITE		R86			RK73GB1J471J	CHIP R 470 J 1/16W	
L441,442			L40-2785-92	SMALL FIXED INDUCTOR (270NH)	E3,X2	R87			R92-1252-05	CHIP R 0 OHM J 1/16W	
L441,442			L40-4791-86	SMALL FIXED INDUCTOR (4.7UH)	E	R88			RK73GB1J473J	CHIP R 47K J 1/16W	
L443			L41-2778-14	SMALL FIXED INDUCTOR (27NH)	E	R90			RK73GB1J102J	CHIP R 1.0K J 1/16W	
L443			L41-3978-14	SMALL FIXED INDUCTOR (39NH)	X2	R91			R92-1368-05	CHIP R 0 OHM	
L443			L41-5678-14	SMALL FIXED INDUCTOR (56NH)	E3	R92			RK73GH1J183D	CHIP R 18K D 1/16W	
L444			L40-1885-92	SMALL FIXED INDUCTOR (180NH)	X2	R93			RK73GH1J134D	CHIP R 130K D 1/16W	
L444-447			L40-2785-92	SMALL FIXED INDUCTOR (270NH)	E3	R94			RK73GB1J102J	CHIP R 1.0K J 1/16W	
L444-447			L40-4791-86	SMALL FIXED INDUCTOR (4.7UH)	E	R95			RK73GB1J472J	CHIP R 4.7K J 1/16W	
L445-447			L40-2785-92	SMALL FIXED INDUCTOR (270NH)	X2	R96			RK73GB1J105J	CHIP R 1.0M J 1/16W	
L448			L41-2778-14	SMALL FIXED INDUCTOR (27NH)	E	R97			RK73GB1J104J	CHIP R 100K J 1/16W	
L448			L41-3378-14	SMALL FIXED INDUCTOR (33NH)	X2	R98			RK73GB1J473J	CHIP R 47K J 1/16W	
L448			L41-4778-14	SMALL FIXED INDUCTOR (47NH)	E3	R99			RK73GB1J102J	CHIP R 1.0K J 1/16W	
L449			L40-1885-92	SMALL FIXED INDUCTOR (180NH)	E3,X2	R100			RK73HB1J102J	CHIP R 1.0K J 1/16W	

## PARTS LIST

TX-RX UNIT (X57-711X-XX)

Ref. No.	Address	New parts	Parts No.	Description	Desti-nation	Ref. No.	Address	New parts	Parts No.	Description	Desti-nation
R101			RK73GB1J473J	CHIP R 47K J 1/16W		R267			RK73HH1J683D	CHIP R 68K D 1/16W	
R102			RK73HB1J473J	CHIP R 47K J 1/16W		R268			RK73HH1J154D	CHIP R 150K D 1/16W	
R103-105			RK73GB1J102J	CHIP R 1.0K J 1/16W		R269			RK73HH1J683D	CHIP R 68K D 1/16W	
R108,109			RK73HB1J473J	CHIP R 47K J 1/16W		R270			RK73HB1J183J	CHIP R 18K J 1/16W	
R110			RK73GB1J152J	CHIP R 1.5K J 1/16W		R271			RK73HB1J563J	CHIP R 56K J 1/16W	
R111			RK73GB1J473J	CHIP R 47K J 1/16W		R272			RK73HH1J563D	CHIP R 56K D 1/16W	
R112			RK73HB1J102J	CHIP R 1.0K J 1/16W		R273			RK73HH1J184D	CHIP R 180K D 1/16W	
R113			RK73HB1J473J	CHIP R 47K J 1/16W		R274			RK73HH1J332D	CHIP R 3.3K D 1/16W	
R115			RK73HB1J473J	CHIP R 47K J 1/16W		R275			RK73HH1J563D	CHIP R 56K D 1/16W	
R124			R92-1252-05	CHIP R 0 OHM J 1/16W		R276,277			RK73HB1J223J	CHIP R 22K J 1/16W	
R125			RK73GB1J473J	CHIP R 47K J 1/16W		R278,279			RK73HB1J823J	CHIP R 82K J 1/16W	
R126,127			RK73HB1J102J	CHIP R 1.0K J 1/16W		R281			RK73GB1J472J	CHIP R 4.7K J 1/16W	
R128			RK73GB1J123J	CHIP R 12K J 1/16W		R282			RK73GB1J473J	CHIP R 47K J 1/16W	
R129			RK73GB1J153J	CHIP R 15K J 1/16W		R283			RK73GB1J683J	CHIP R 68K J 1/16W	
R130			R92-1252-05	CHIP R 0 OHM J 1/16W		R284			RK73GB1J123J	CHIP R 12K J 1/16W	
R201			RK73GB1J124J	CHIP R 120K J 1/16W		R285			R92-0670-05	CHIP R 0 OHM	
R202			RK73GB1J561J	CHIP R 560 J 1/16W		R286			RK73GB1J391J	CHIP R 390 J 1/16W	
R203			RK73GB1J913J	CHIP R 91K J 1/16W		R301			RK73GB1J105J	CHIP R 1.0M J 1/16W	
R204-206			RK73GB1J102J	CHIP R 1.0K J 1/16W		R302,303			RK73GB1J472J	CHIP R 4.7K J 1/16W	
R207			R92-1368-05	CHIP R 0 OHM		R304			RK73GB1J223J	CHIP R 22K J 1/16W	
R208			R92-1252-05	CHIP R 0 OHM J 1/16W		R305			RK73GB1J182J	CHIP R 1.8K J 1/16W	E,X2
R211			RK73GB1J303J	CHIP R 30K J 1/16W		R305			RK73GB1J183J	CHIP R 18K J 1/16W	E3
R212,213			RK73GB1J753J	CHIP R 75K J 1/16W		R306			RK73GB1J123J	CHIP R 12K J 1/16W	E3
R214			RK73GB1J334J	CHIP R 330K J 1/16W		R306			RK73GB1J472J	CHIP R 4.7K J 1/16W	X2
R215			RK73HB1J222J	CHIP R 2.2K J 1/16W		R306			RK73GB1J822J	CHIP R 8.2K J 1/16W	E
R216			R92-1368-05	CHIP R 0 OHM		R307			RK73GB1J224J	CHIP R 220K J 1/16W	E3
R217			RK73HB1J101J	CHIP R 100 J 1/16W		R307			RK73GB1J274J	CHIP R 270K J 1/16W	E,X2
R218			RK73HB1J821J	CHIP R 820 J 1/16W		R309			RK73GB1J332J	CHIP R 3.3K J 1/16W	
R219			RK73GB1J223J	CHIP R 22K J 1/16W		R310			RK73GB1J334J	CHIP R 330K J 1/16W	
R220			RK73GB1J681J	CHIP R 680 J 1/16W		R311			RK73GB1J102J	CHIP R 1.0K J 1/16W	
R221			RK73GB1J472J	CHIP R 4.7K J 1/16W		R312			RK73GB1J273J	CHIP R 27K J 1/16W	X2
R222			RK73HB1J223J	CHIP R 22K J 1/16W		R312			RK73GB1J333J	CHIP R 33K J 1/16W	E,E3
R223			RK73GB1J102J	CHIP R 1.0K J 1/16W		R313			RK73GB1J154J	CHIP R 150K J 1/16W	X2
R224			RK73GB1J561J	CHIP R 560 J 1/16W		R313			RK73GB1J473J	CHIP R 47K J 1/16W	E,E3
R225-228			RK73GB1J223J	CHIP R 22K J 1/16W		R314			RK73GB1J104J	CHIP R 100K J 1/16W	
R229			RK73HB1J683J	CHIP R 68K J 1/16W		R321			RK73GB1J333J	CHIP R 33K J 1/16W	
R230			RK73HB1J393J	CHIP R 39K J 1/16W		R322			RK73GB1J183J	CHIP R 18K J 1/16W	
R231			RK73GB1J683J	CHIP R 68K J 1/16W		R323			RK73GB1J222J	CHIP R 2.2K J 1/16W	
R232,233			RK73HB1J683J	CHIP R 68K J 1/16W		R324			R92-1252-05	CHIP R 0 OHM J 1/16W	
R240-245			R92-1368-05	CHIP R 0 OHM		R331-336			RK73GB1J103J	CHIP R 10K J 1/16W	
R246			RK73HB1J472J	CHIP R 4.7K J 1/16W		R341			RK73GB1J101J	CHIP R 100 J 1/16W	
R247,248			R92-1368-05	CHIP R 0 OHM		R342			RK73GB1J224J	CHIP R 220K J 1/16W	
R249			RK73HB1J102J	CHIP R 1.0K J 1/16W	E3,X2	R351			RK73GB1J471J	CHIP R 470 J 1/16W	
R249			RK73HB1J562J	CHIP R 5.6K J 1/16W	E	R352			RK73GB1J101J	CHIP R 100 J 1/16W	
R250			RK73HB1J105J	CHIP R 1.0M J 1/16W		R353			RK73GB1J103J	CHIP R 10K J 1/16W	
R251			RK73HB1J473J	CHIP R 47K J 1/16W		R354			RK73GB1J471J	CHIP R 470 J 1/16W	
R252			RK73HB1J104J	CHIP R 100K J 1/16W		R355			RK73GB1J331J	CHIP R 330 J 1/16W	
R253			RK73GB1J562J	CHIP R 5.6K J 1/16W		R358			RK73GB1J470J	CHIP R 47 J 1/16W	
R254			RK73HB1J474J	CHIP R 470K J 1/16W		R359			RK73GB1J184J	CHIP R 180K J 1/16W	X2
R255			RK73HB1J154J	CHIP R 150K J 1/16W		R359			RK73GB1J224J	CHIP R 220K J 1/16W	E
R256			RK73HB1J473J	CHIP R 47K J 1/16W		R359			RK73GB1J912J	CHIP R 9.1K J 1/16W	E3
R257			RK73HB1J104J	CHIP R 100K J 1/16W		R360			RK73GB1J393J	CHIP R 39K J 1/16W	E3
R258			RK73HH1J204D	CHIP R 200K D 1/16W		R360			RK73GB1J394J	CHIP R 390K J 1/16W	X2
R259			RK73HB1J274J	CHIP R 270K J 1/16W		R360			RK73GB1J824J	CHIP R 820K J 1/16W	E
R260			RK73GB1J683J	CHIP R 68K J 1/16W		R361			RK73GB1J101J	CHIP R 100 J 1/16W	E
R261			R92-1368-05	CHIP R 0 OHM		R361			RK73GB1J151J	CHIP R 150 J 1/16W	X2
R262			RK73HB1J563J	CHIP R 56K J 1/16W		R361			RK73GB1J220J	CHIP R 22 J 1/16W	E3
R263			RK73HB1J334J	CHIP R 330K J 1/16W		R362			RK73GB1J394J	CHIP R 390K J 1/16W	E
R264,265			RK73HB1J473J	CHIP R 47K J 1/16W		R362			RK73GB1J474J	CHIP R 470K J 1/16W	E3,X2
R266			RK73HB1J332J	CHIP R 3.3K J 1/16W		R363			RK73GB1J154J	CHIP R 150K J 1/16W	

## PARTS LIST

## TX-RX UNIT (X57-711X-XX)

Ref. No.	Address	New parts	Parts No.	Description	Destination	Ref. No.	Address	New parts	Parts No.	Description	Destination
R364			R92-1252-05	CHIP R 0 OHM J 1/16W		R461			RK73GB1J101J	CHIP R 100 J 1/16W	
R365,366			RK73GB1J105J	CHIP R 1.0M J 1/16W		R462			RK73GB1J102J	CHIP R 1.0K J 1/16W	
R367			RK73GB1J101J	CHIP R 100 J 1/16W		R463			R92-1252-05	CHIP R 0 OHM J 1/16W	X2
R369			RK73GB1J151J	CHIP R 150 J 1/16W	X2	R464			RK73GB1J222J	CHIP R 2.2K J 1/16W	
R369			RK73GB1J820J	CHIP R 82 J 1/16W	E,E3	R465			R92-1252-05	CHIP R 0 OHM J 1/16W	E3,X2
R370			RK73GB1J473J	CHIP R 47K J 1/16W		R501			RK73GB1J102J	CHIP R 1.0K J 1/16W	
R371			RK73GB1J393J	CHIP R 39K J 1/16W		R503			RK73GB1J101J	CHIP R 100 J 1/16W	X2
R372			RK73GB1J473J	CHIP R 47K J 1/16W	E3	R503,504			R92-1252-05	CHIP R 0 OHM J 1/16W	E,E3
R372			RK73GB1J683J	CHIP R 68K J 1/16W	E,X2	R504			R92-1252-05	CHIP R 0 OHM J 1/16W	X2
R373			RK73GB1J153J	CHIP R 15K J 1/16W	X2	R505			RK73GB1J152J	CHIP R 1.5K J 1/16W	
R373			RK73GB1J223J	CHIP R 22K J 1/16W	E3	R506			RK73GB1J563J	CHIP R 56K J 1/16W	
R373			RK73GB1J363J	CHIP R 36K J 1/16W	E	R507			RK73GB1J181J	CHIP R 180 J 1/16W	
R374			RK73GB1J105J	CHIP R 1.0M J 1/16W		R509			RK73GB1J101J	CHIP R 100 J 1/16W	
R375			R92-1252-05	CHIP R 0 OHM J 1/16W	X2	R510			R92-1252-05	CHIP R 0 OHM J 1/16W	E,E3
R376			RK73GB1J105J	CHIP R 1.0M J 1/16W		R511			RK73GB1J471J	CHIP R 470 J 1/16W	
R377			R92-1252-05	CHIP R 0 OHM J 1/16W	E,X2	R512			RK73GB1J332J	CHIP R 3.3K J 1/16W	
R378			RK73GB1J105J	CHIP R 1.0M J 1/16W		R513			RK73GB1J682J	CHIP R 6.8K J 1/16W	
R380			R92-1252-05	CHIP R 0 OHM J 1/16W		R514			RK73FB2A470J	CHIP R 47 J 1/10W	
R381			RK73GB1J104J	CHIP R 100K J 1/16W		R515			RK73GB1J100J	CHIP R 10 J 1/16W	E,X2
R392,393			R92-1252-05	CHIP R 0 OHM J 1/16W		R515			RK73GB1J470J	CHIP R 47 J 1/16W	E3
R401-403			RK73HB1J102J	CHIP R 1.0K J 1/16W		R516			RK73GB1J332J	CHIP R 3.3K J 1/16W	
R404			R92-1252-05	CHIP R 0 OHM J 1/16W		R517			RK73GB1J100J	CHIP R 10 J 1/16W	
R405			RK73GB1J103J	CHIP R 10K J 1/16W		R518			RK73GB1J223J	CHIP R 22K J 1/16W	X2
R406			RK73GB1J152J	CHIP R 1.5K J 1/16W		R519			RK73GB1J220J	CHIP R 22 J 1/16W	X2
R407			RK73HB1J100J	CHIP R 10 J 1/16W		R520			RK73GB1J822J	CHIP R 8.2K J 1/16W	X2
R408			RK73HB1J104J	CHIP R 100K J 1/16W		R521			RK73GB1J101J	CHIP R 100 J 1/16W	
R409			RK73GB1J101J	CHIP R 100 J 1/16W		R522			R92-1217-05	CHIP R 0 OHM	X2
R421			RK73GB1J103J	CHIP R 10K J 1/16W		R524			RK73FB2A821J	CHIP R 820 J 1/10W	X2
R422			RK73GB1J123J	CHIP R 12K J 1/16W		R525			RK73FB2A5R6J	CHIP R 5.6 J 1/10W	X2
R423			RK73GB1J103J	CHIP R 10K J 1/16W		R526			RK73FB2A821J	CHIP R 820 J 1/10W	X2
R424			R92-1368-05	CHIP R 0 OHM		R534			RK73GB1J822J	CHIP R 8.2K J 1/16W	
R425			RK73GB1J103J	CHIP R 10K J 1/16W		R535			RK73GB1J102J	CHIP R 1.0K J 1/16W	
R426,427			RK73GB1J102J	CHIP R 1.0K J 1/16W		R536			RK73EB2B470J	CHIP R 47 J 1/8W	
R428			RK73GB1J222J	CHIP R 2.2K J 1/16W		R538			R92-0679-05	CHIP R 0 OHM	
R429			RK73GB1J152J	CHIP R 1.5K J 1/16W		R539			R92-1213-05	CHIP R 100 J 1/2W	
R430			RK73GB1J103J	CHIP R 10K J 1/16W		R601-603			RK73GB1J223J	CHIP R 22K J 1/16W	
R431			R92-1252-05	CHIP R 0 OHM J 1/16W		R651			RK73GB1J474J	CHIP R 470K J 1/16W	
R432			RK73GB1J471J	CHIP R 470 J 1/16W		R652			RK73GB1J103J	CHIP R 10K J 1/16W	
R433			RK73GB1J224J	CHIP R 220K J 1/16W		R653			R92-1252-05	CHIP R 0 OHM J 1/16W	
R441			RK73GB1J221J	CHIP R 220 J 1/16W	E	R654			RK73GB1J102J	CHIP R 1.0K J 1/16W	
R441			RK73GB1J271J	CHIP R 270 J 1/16W	X2	R655			RK73GB1J473J	CHIP R 47K J 1/16W	
R441			RK73GB1J331J	CHIP R 330 J 1/16W	E3	R659			RK73GB1J103J	CHIP R 10K J 1/16W	
R442,443			RK73GB1J101J	CHIP R 100 J 1/16W		R660			RK73GB1J562J	CHIP R 5.6K J 1/16W	
R444			RK73GB1J104J	CHIP R 100K J 1/16W		R661			RK73GB1J473J	CHIP R 47K J 1/16W	
R445			RK73GB1J102J	CHIP R 1.0K J 1/16W		R662			R92-1252-05	CHIP R 0 OHM J 1/16W	
R446			RK73GB1J151J	CHIP R 150 J 1/16W	E	R800			R92-1061-05	JUMPER REST 0 OHM	
R446			RK73GB1J221J	CHIP R 220 J 1/16W	X2	R824			RK73HB1J104J	CHIP R 100K J 1/16W	
R446			RK73GB1J271J	CHIP R 270 J 1/16W	E3	R825			RK73GB1J223J	CHIP R 22K J 1/16W	X2
R447			RK73GB1J473J	CHIP R 47K J 1/16W		D1-11			DA221	DIODE	
R448			RK73GB1J393J	CHIP R 39K J 1/16W		D41			ZSH5MA27	SURGE ABSORBER	
R449			RK73GB1J104J	CHIP R 100K J 1/16W		D42			1812L110PR	VARIATOR	
R450			RK73GB1J473J	CHIP R 47K J 1/16W		D81			02DZ18(X,Y)	ZENER DIODE	
R451			RK73GB1J472J	CHIP R 4.7K J 1/16W		D82			1SS355	DIODE	
R452			RK73GB1J124J	CHIP R 120K J 1/16W		D211			1SS372	DIODE	
R453			RK73GB1J101J	CHIP R 100 J 1/16W		D212			MC2858	DIODE	
R454			R92-1252-05	CHIP R 0 OHM J 1/16W		D301			MA742	DIODE	
R457			RK73GB1J124J	CHIP R 120K J 1/16W		D331,332			MC2858	DIODE	
R458			RK73GB1J101J	CHIP R 100 J 1/16W		D351			HVC376B	VARIABLE CAPACITANCE DIODE	X2
R459			RK73GB1J102J	CHIP R 1.0K J 1/16W		D351-355			HVC350B	VARIABLE CAPACITANCE DIODE	E
R460			R92-1252-05	CHIP R 0 OHM J 1/16W							



## PARTS LIST

TX-RX UNIT (X57-711X-XX)

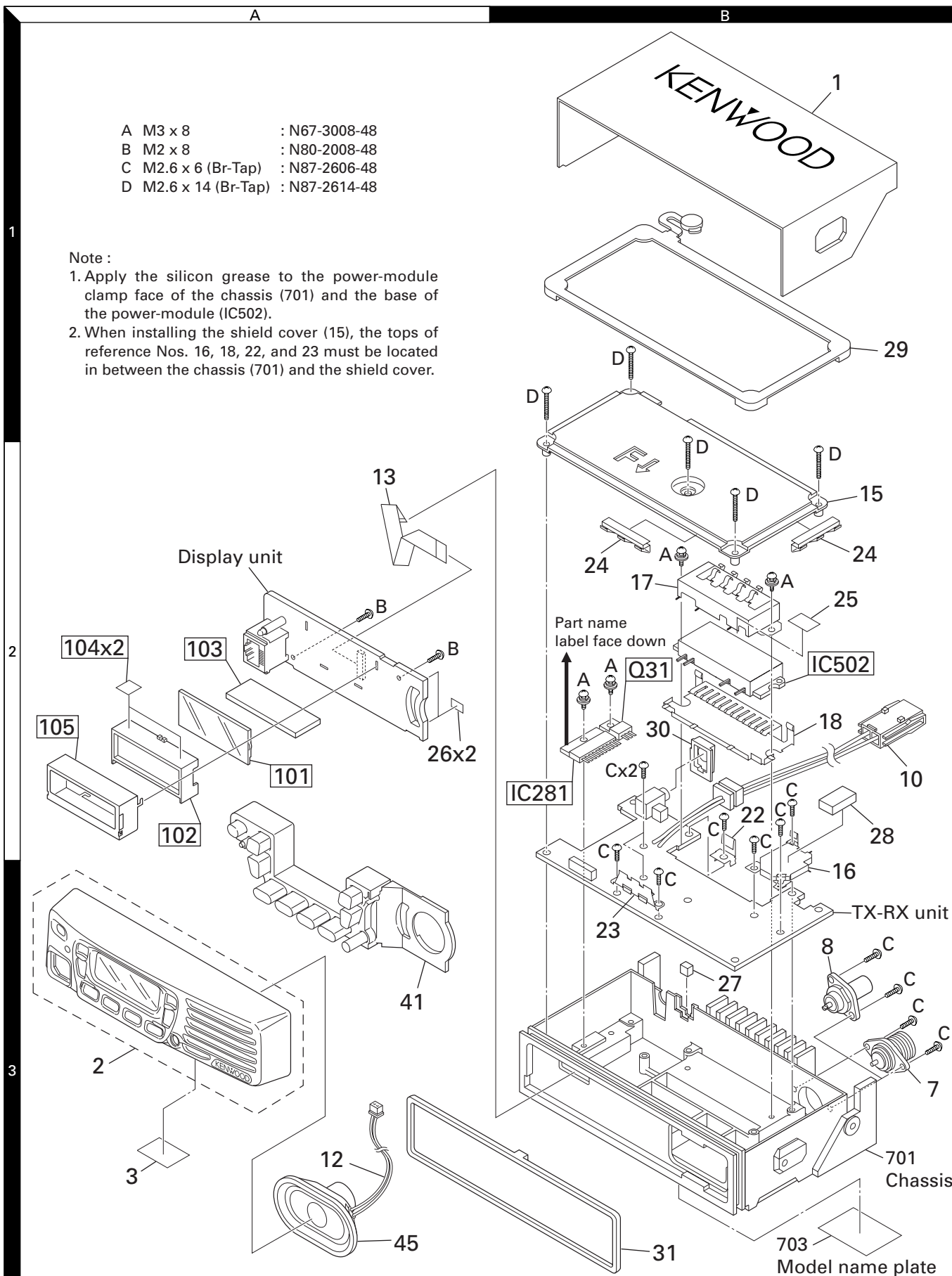
Ref. No.	Address	New parts	Parts No.	Description	Destination	Ref. No.	Address	New parts	Parts No.	Description	Destination
D351,352			HVC350B	VARIABLE CAPACITANCE DIODE	E3	Q443			KRX102U	TRANSISTOR	
D352			HVC355B	VARIABLE CAPACITANCE DIODE	X2	Q445			2SC2412K	TRANSISTOR	
D353			HVC355B	VARIABLE CAPACITANCE DIODE	E3	Q446,447			2SC5108(Y)	TRANSISTOR	
D353,354			HVC376B	VARIABLE CAPACITANCE DIODE	X2	Q500			2SC5108(Y)	TRANSISTOR	
D354,355			HVC350B	VARIABLE CAPACITANCE DIODE	E3	Q501			2SC3357(RF)	TRANSISTOR	
D355			HVC355B	VARIABLE CAPACITANCE DIODE	X2	Q502			RD00HVS1	FET	X2
D401			1SS355	DIODE		TH301			B57331V2104J	THERMISTOR	
D421			HZU5ALL	DIODE		TH351			NCP18XW332J03	THERMISTOR	
D441-444			MA2S304	VARIABLE CAPACITANCE DIODE		TH441			NCP18XH103K03	THERMISTOR	E
D445			1SV278	VARIABLE CAPACITANCE DIODE		TH672,673			B57331V2104J	THERMISTOR	
D446			1SS355	DIODE							
D447,448			HSC277	DIODE							
D502			DA221	DIODE							
D503			02DZ5.1(Y)	ZENER DIODE							
D602			MA4PH633	DIODE							
D604,605			XB15A709	DIODE							
D606-608			MA742	DIODE							
D609,610			1SS355	DIODE							
IC41			KIA7808AF	ANALOGUE IC							
IC42,43			NJM78L05UA	BI-POLAR IC							
IC44,45			BD4740G	MOS-IC							
IC81			AT24C12810SU18	ROM IC							
IC101			30624FGPGKAGA	MICROCONTROLLER IC							
IC201			M62364FP	MOS-IC							
IC211			NJM2100V	MOS-IC							
IC213			BU4066BCFV	MOS-IC							
IC214,215			BA10358FV	MOS-IC							
IC241			AQUA-L	MOS-IC							
IC281	2B		LA4600	BI-POLAR IC							
IC321			TK14489V	BI-POLAR IC							
IC401			MB15A02	MOS-IC							
IC502	2B		RA30H4047M-31	MOS-IC	E3						
IC502	2B		RA30H4452M-31	MOS-IC	E,X2						
IC651			TA75W01FU	MOS-IC							
Q31	2B		2SJ650	TRANSISTOR							
Q42			2SD1757K	TRANSISTOR							
Q43			2SA1745(6.7)	TRANSISTOR							
Q44			KRC102S	DIGITAL TRANSISTOR							
Q45			KTA1664(Y)	TRANSISTOR							
Q46			KRC102S	DIGITAL TRANSISTOR							
Q81			RT1N441U	TRANSISTOR							
Q82,83			2SK1830	FET							
Q84			KRC414RTK	DIGITAL TRANSISTOR							
Q201			2SC2412K	TRANSISTOR							
Q211			2SC4919	TRANSISTOR							
Q212,213			2SK1830	FET							
Q241			RT1P141U	TRANSISTOR							
Q281			DTC363EU	DIGITAL TRANSISTOR							
Q282			KRC102S	DIGITAL TRANSISTOR							
Q301			2SC2412K	TRANSISTOR							
Q341			2SC2412K	TRANSISTOR							
Q351			2SC5108(Y)	TRANSISTOR							
Q352			3SK318	FET							
Q353			3SK255	FET							
Q406			2SK508NV(K52)	FET							
Q421			2SA1832(GR)	TRANSISTOR							
Q422			2SC4738(GR)	TRANSISTOR							
Q431			2SC4649(N,P)	TRANSISTOR							
Q441			2SK508NV(K52)	FET							
Q442			2SJ347	FET							

## EXPLODED VIEW

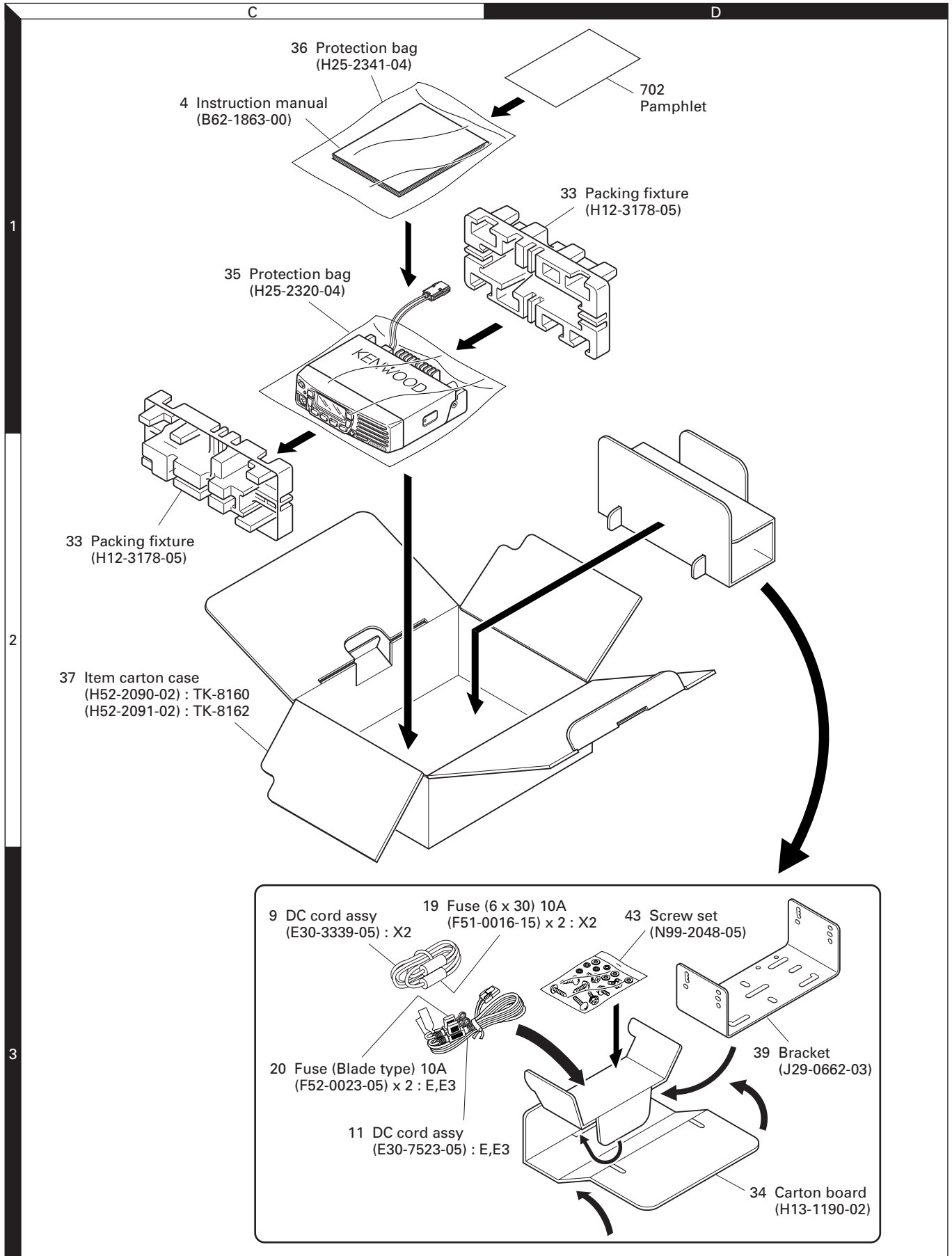
- |   |                    |               |
|---|--------------------|---------------|
| A | M3 x 8             | : N67-3008-48 |
| B | M2 x 8             | : N80-2008-48 |
| C | M2.6 x 6 (Br-Tap)  | : N87-2606-48 |
| D | M2.6 x 14 (Br-Tap) | : N87-2614-48 |

**Note :**

1. Apply the silicon grease to the power-module clamp face of the chassis (701) and the base of the power-module (IC502).
2. When installing the shield cover (15), the tops of reference Nos. 16, 18, 22, and 23 must be located in between the chassis (701) and the shield cover.



## PACKING



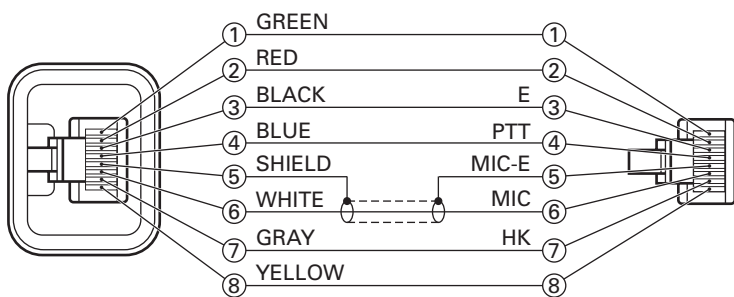
Parts with the exploded numbers larger than 700 are not supplied.

## ADJUSTMENT

### Test Equipment Required for Alignment

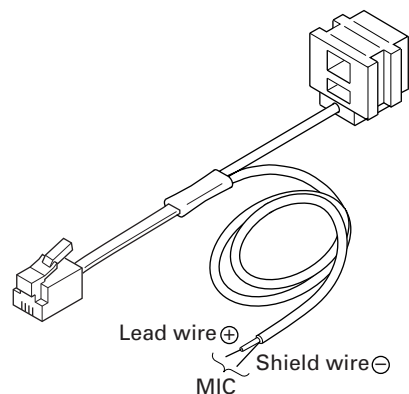
Test Equipment	Major Specifications	
1. Standard Signal Generator (SSG)	Frequency Range	400 to 520MHz
	Modulation	Frequency modulation and external modulation
	Output	-127dBm/0.1μV to greater than -7dBm/100mV
2. Power Meter	Input Impedance	50Ω
	Operation Frequency	400 to 520MHz or more
	Measurement Capability	Vicinity of 100W
3. Deviation Meter	Frequency Range	400 to 520MHz
4. Digital Volt Meter (DVM)	Measuring Range	1 to 20V DC
	Accuracy	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 VTVM)	Frequency Range	50Hz to 10kHz
	Voltage Range	1mV to 3V
9. Audio Generator (AG)	Frequency Range	20Hz to 20kHz 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 or more
12. Regulated Power Supply		13.6V, approx. 20A (adjustable from 9 to 17V) Useful if ammeter required
13. Spectrum Analyzer	Center frequency	50KHz to 600MHz
14. Tracking Generator	Output Voltage	100mV or more

### Test cable for microphone input (E30-3360-08)

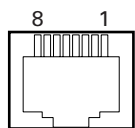


### Tuning cable (E30-3383-05)

Adapter cable (E30-3383-05) is required for injecting an audio if PC tuning is used. See "PC Mode" section for the connection.



### MIC connector (Front view)

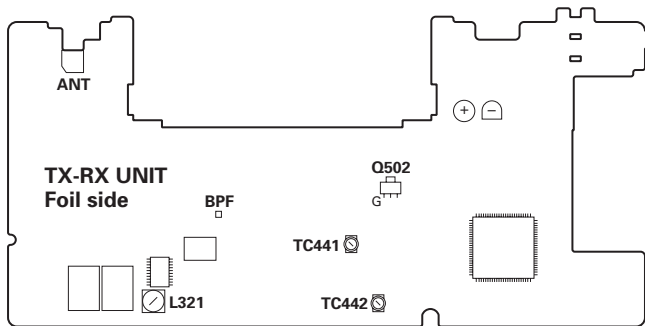
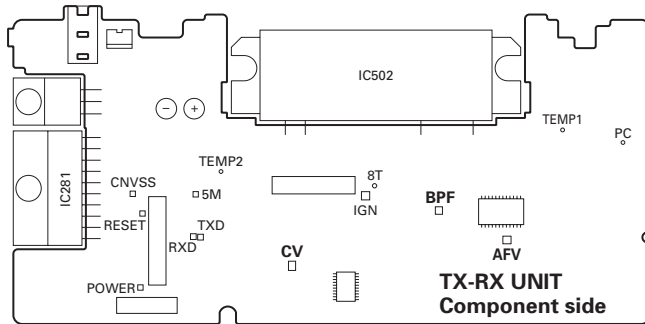


- 1 : BLC
- 2 : PSB
- 3 : E
- 4 : PTT
- 5 : ME
- 6 : MIC
- 7 : HOOK
- 8 : CM

## ADJUSTMENT

### Adjustment Location

#### ■ Adjustment Points



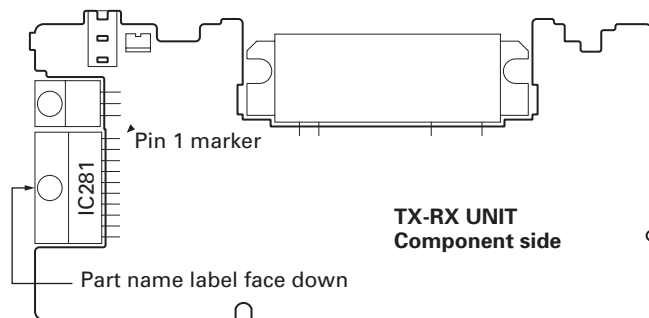
#### ■ Notes

##### • EEPROM

The tuning data (Deviation, Squelch, etc.) for the EEPROM, is stored in memory. When parts are changed, re-adjust the transceiver.

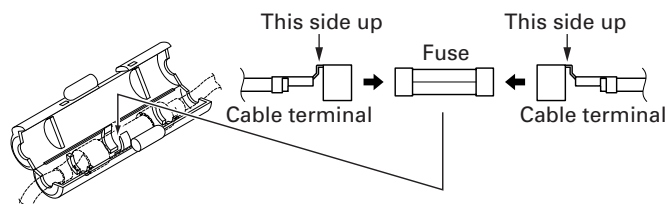
##### • AF PA IC (IC281)

How to mounting the IC281.



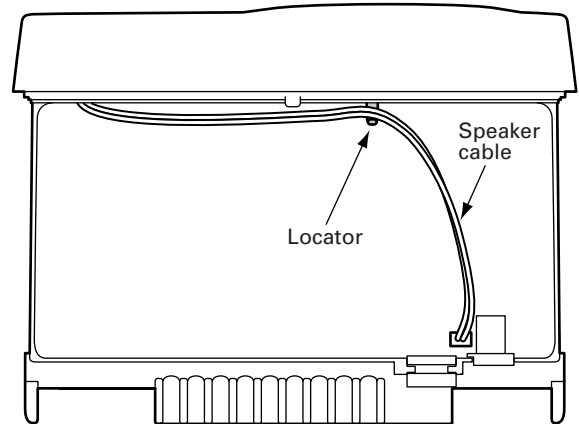
##### • Fuse (TK-8160 X2 only)

To mount the fuse, the cable terminal direction must be as follows.



##### • Speaker Cable

The speaker cable should be formed before mounting the shield cover as below.



### Test Frequency

Channel	E		E3		X2	
	RX (MHz)	TX (MHz)	RX (MHz)	TX (MHz)	RX (MHz)	TX (MHz)
1	455.05	455.10	415.05	415.10	491.05	491.10
2	440.05	440.10	400.05	400.10	470.05	470.10
3	469.95	469.90	429.95	429.90	511.95	511.90
4	455.00	455.00	415.00	415.00	491.00	491.00
5	455.20	455.20	415.20	415.20	491.20	491.20
6	455.40	455.40	415.40	415.40	491.40	491.40

### Test Signaling

	RX	TX
1	None	None
2	None	10Hz Square
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 : 023N	DQT : 023N
8	DQT : 754I	DQT : 754I
9	DTMF : 159D	DTMF : 159D
10	None	DTMF Code 9
11	None	MSK 1200 bps
12	None	MSK 2400 bps
13	FleetSync 1200 bps : 100~1000	FleetSync 1200 bps : 100~1000
14	FleetSync 2400 bps : 100~1000	FleetSync 2400 bps : 100~1000
15	None	Single Tone : 1000Hz
16	5-Tone CCIR 12345	5-Tone CCIR 12345

## ADJUSTMENT

### 3 or 5 Reference Level Adjustment Frequency

Tuning point	E		E3		X2	
	RX (MHz)	TX (MHz)	RX (MHz)	TX (MHz)	RX (MHz)	TX (MHz)
Low	440.05	440.10	400.05	400.10	470.05	470.10
Low'	447.55	447.60	407.55	407.60	480.55	480.60
Center	455.05	455.10	415.05	415.10	491.05	491.10
High'	462.55	462.60	422.55	422.60	501.55	501.60
High	469.95	469.90	429.95	429.90	511.95	511.90

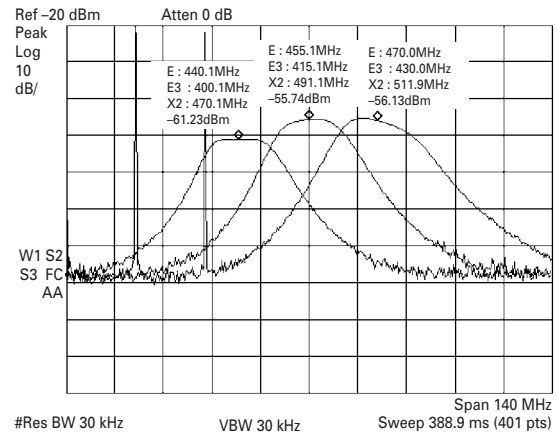


Fig. 1

### PCB Section (Note : The market code of the E3 and the X2 do not perform "Wide 4k" adjustment)

Item	Condition	Measurement		Adjustment		Specifications/Remarks
		Test equipment	Terminal	Parts	Method	
1. Setting	1) Power supply voltage DC Power supply terminal : 13.6V					
2. VCO lock voltage	1) CH : TX high	Digital voltmeter	CV	TC442	5.5V	±0.1V
	2) CH : RX high				TC441	4.0V <b>E</b> 5.5V <b>E3,X2</b>
	3) CH : TX low				Check	0.7V or more
	4) CH : RX low					
3. IF coil	1) CH : RX center (Wide) 2) SSG output : -53dBm (501μV) Mod : 1kHz, Dev : 3kHz	SSG Digital voltmeter	AFV	L321	3.25~3.35V (DC)	
4. RF bandpass filter	1) CH : RX center (Wide) CH : RX low (Wide) CH : RX high (Wide) 2) Tra generator output : -30dBm Connect the spectrum analyzer to BPF terminal	Tra generator Spectrum analyzer	ANT BPF	PC key	Adjust the BPF waveform to Fig. 1	

### Receiver Section (Note : The market code of the E3 and the X2 do not perform "Wide 4k" adjustment)

Item	Condition	Measurement		Adjustment		Specifications/Remarks
		Test equipment	Terminal	Parts	Method	
1. Seisitivity	1) CH : RX low (Wide/Wide 4k/Narrow) CH : RX center (Wide/Wide 4k/Narrow) CH : RX high (Wide/Wide 4k/Narrow) 2) SSG output : -118dBm (0.28μV) (Wide/Wide 4k) : -116dBm (0.35μV) (Narrow) Mod : 1kHz Dev : ±3.0kHz (Wide) Dev : ±2.4kHz (Wide 4k) Dev : ±1.5kHz (Narrow)	SSG Oscilloscope AF V.M Distortion meter	ANT EXT. SP		Check	SINAD : 12dB or higher


## ADJUSTMENT

Item	Condition	Measurement		Adjustment		Specifications/ Remarks
		Test equipment	Terminal	Parts	Method	
2. Squelch 9	1) CH : RX low (Wide) CH : RX center (Wide/Wide 4k/Narrow) CH : RX high (Wide) 2) SSG output : 12dB SINAD+7dB Mod : 1kHz Dev : ±3.0kHz (Wide) Dev : ±2.4kHz (Wide 4k) Dev : ±1.5kHz (Narrow)			PC key	Adjust to open the squelch	
3. Squelch 1	1) CH : RX low (Wide) CH : RX center (Wide/Wide 4k/Narrow) CH : RX high (Wide) 2) SSG output : 12dB SINAD+2dB Mod : 1kHz Dev : ±3.0kHz (Wide) Dev : ±2.4kHz (Wide 4k) Dev : ±1.5kHz (Narrow)					
4. RSSI -80dBm	1) CH : RX low CH : RX center CH : RX high 2) SSG output : -80dBm (22.4μV) Dev : OFF					
5. RSSI -120dBm	1) CH : RX low CH : RX center CH : RX high 2) SSG output : -120dBm (0.22μV) Dev : OFF					

**Transmitter Section (Note : The market code of the E3 and the X2 do not perform "Wide 4k" adjustment)**

Item	Condition	Measurement		Adjustment		Specifications/ Remarks
		Test equipment	Terminal	Parts	Method	
1. Frequency	1) CH : TX center 2) Transmit	Frequency counter	ANT	PC key	Adjust to center frequency	Within ±100Hz
2. Maximum power limiting	1) CH : TX high 2) Transmit	Power meter			28W	±1W
3. High power	1) CH : TX low CH : TX low' CH : TX center CH : TX high' CH : TX high 2) Transmit				25W	±1.0W

## ADJUSTMENT

Item	Condition	Measurement		Adjustment		Specifications/ Remarks
		Test equipment	Terminal	Parts	Method	
4. Low power	1) CH : TX low CH : TX low' CH : TX center CH : TX high' CH : TX high 2) Transmit	Power meter	ANT	PC key	5W	±1.0W
5. DQT balance	1) CH : TX low (Wide) CH : TC center (Wide/Wide 4k/Narrow) CH : TX high (Wide) 2) Transmit	Modulation analyzer or Linear detector (LPF : 3kHz) Oscilloscope			Adjust the waveform as below 	
6. MAX balance	1) CH : TX low (Wide) CH : TC center (Wide/Wide 4k/Narrow) CH : TX high (Wide) 2) AG : 1kHz/50mV 3) Transmit	Modulation analyzer or Linear detector (LPF : 15kHz) Oscilloscope AG AF V.M	ANT MIC	PC key	±4.0kHz (Wide) ±3.2kHz (Wide 4k) ±2.0kHz (Narrow) According to the large +, -	±50Hz
7. MIC sensitivity	1) CH : TX center (Wide/Wide 4k/Narrow) 2) AG : 1kHz/5mV 3) Transmit				Check	±3kHz±0.2kHz (Wide) ±2.4kHz±0.2kHz (Wide 4k) ±1.5kHz±0.1kHz (Narrow)
8. DQT deviation	1) CH : TX center (Wide/Wide 4k/Narrow) 2) Transmit	Modulation analyzer or Linear detector (LPF : 3kHz) Oscilloscope			±0.75kHz (Wide) ±0.60kHz (Wide 4k) ±0.35kHz (Narrow)	±0.05kHz
9. QT deviation	1) CH : TX center (Wide/Wide 4k/Narrow) 2) Transmit				±0.75kHz (Wide) ±0.60kHz (Wide 4k) ±0.35kHz (Narrow)	±0.05kHz
10. DTMF/ MSK deviation	1) CH : TX center (Wide/Wide 4k/Narrow) 2) Transmit	LPF : 15kHz			±3.0kHz (Wide) ±2.4kHz (Wide 4k) ±1.5kHz (Narrow)	±0.2kHz
11. Single tone deviation	1) CH : TX center (Wide/Wide 4k/Narrow) 2) Transmit					

**If normal power is not obtained, please follow the step below**

Open the shielding cover (upper), and screw 3 locations around ANT pin.

1. Switch off the transceiver.

Impedance of Power module (IC502) can be measured easily using DVM  $\Omega$  mode.

Normal condition

Input : 20k $\Omega$ ~50k $\Omega$ , Output : 1M $\Omega$  ~2M $\Omega$

The above impedance values are rough estimations.

2. Check input power level at Drive FET (Q502) gate location.

Connect the wire to [RF] location.

Transmit and check for power to be within the range of 0.3W~0.6W.

If power found is less than 0.3W, check the circuit before the Drive FET.



## TERMINAL FUNCTION

### CN2

No.	Name	I/O	Function
1	SB	O	Battery voltage DC supply
2	NC	-	-
3	GND	O	Ground
4	DETO	O	FM detector output
5	FNC1	I/O	Programable I/O (programmed by FPU)
6	FNC2	I/O	Programable I/O (programmed by FPU)
7	FNC3	I/O	Programable I/O (programmed by FPU)
8	FNC4	I/O	Programable I/O (programmed by FPU)
9	FNC5	I/O	Programable I/O (programmed by FPU)
10	FNC6	I/O	Programable I/O (programmed by FPU)
11	FNC7	I/O	Programable I/O (programmed by FPU)
12	FNC8	I/O	Programable I/O (programmed by FPU)

### CN3

No.	Name	I/O	Function
1	IGN	I	Ignition sens input
2	DATAI	I	External transmit signal input
3	DETO	O	FM detector output
4	TXAFI	I	TX audio input from scrambler board
5	TXAFO	O	TX audio output to scrambler board
6	EMGMIC	I	Emergency MIC input (1kHz/3mVrms)
7	RXAFO	O	RX audio output to scrambler board
8	ALTI	I	External alert tone signal input
9	RXAFI	I	RX audio input from scrambler board
10	5C	O	5V DC power supply (50mA MAX)
11	8C	O	8V DC power supply (50mA MAX)

### ■ Function Port Assignment

	KDS-100, KGP-2A/2B	
	Name	I/O
FNC1	-	-
FNC2	-	-
FNC3	Data Channel	I
FNC4	PTT	I
FNC5	Carrier Operated Relay	O
FNC6	Audio Mute	I
FNC7	Mic Mute	I
FNC8	TX Relay	O
	Scrambler	
	Name	I/O
FNC1	-	-
FNC2	-	-
FNC3	TX Relay	O
FNC4	Scrambler	O
FNC5	Scrambler Code1 (1)	O
FNC6	Scrambler Code2 (2)	O
FNC7	Scrambler Code3 (4)	O
FNC8	Scrambler Code4 (8)	O

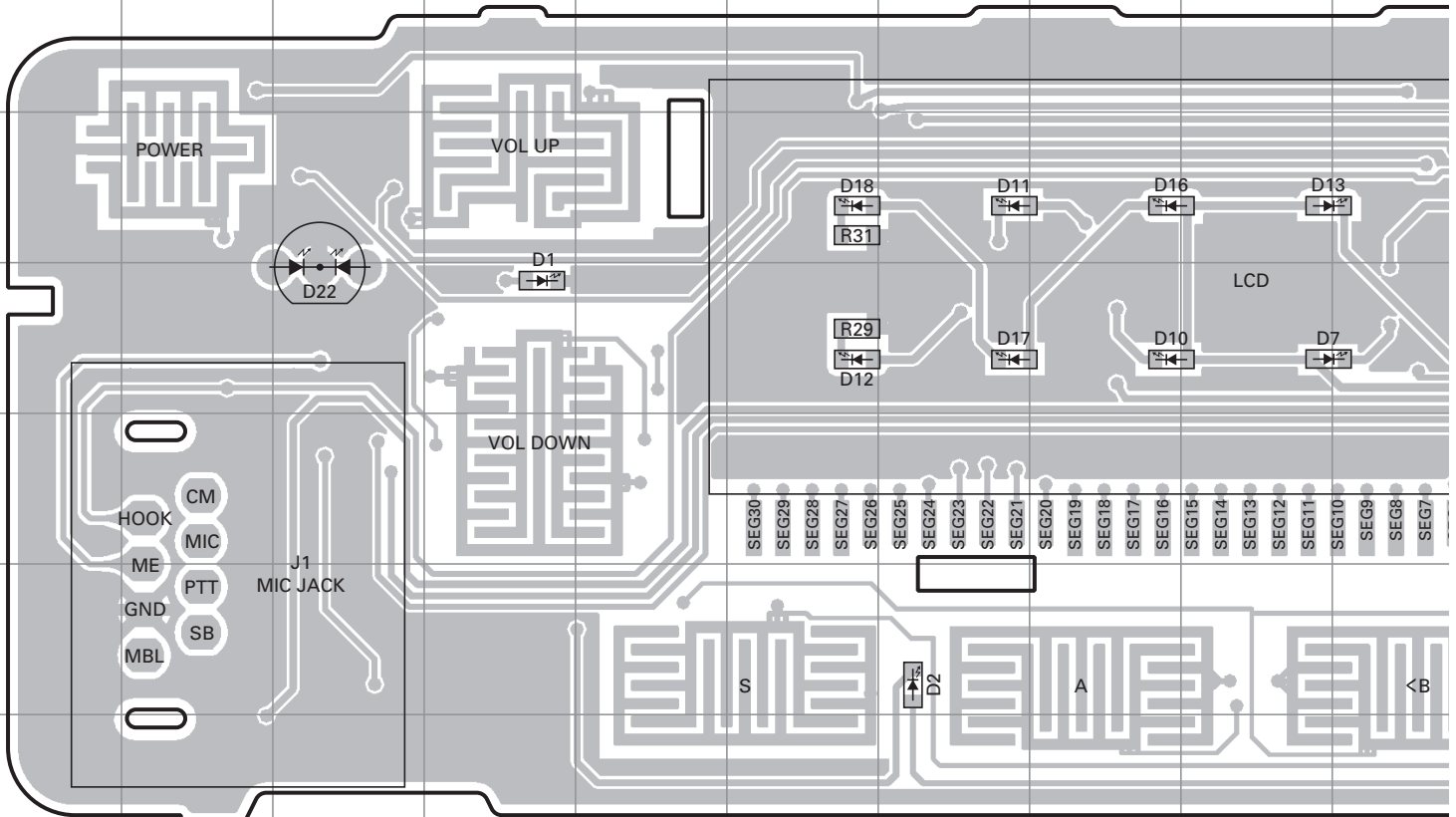
Port Function is Low Active. (Exclude : Scrambler Code)

	ANI Board	
	Name	I/O
FNC1	-	-
FNC2	-	-
FNC3	Emergency for ANI Board	O
FNC4	PTT	I
FNC5	Carrier Operated Relay	O
FNC6	Speaker On	I
FNC7	Mic Mute	I
FNC8	PTT	O
	GPS (NMEA)	
	Name	I/O
FNC1	-	O
FNC2	GPS (NMEA Input)*	I
FNC3	-	I
FNC4	-	I
FNC5	-	I
FNC6	-	I
FNC7	-	I
FNC8	-	I

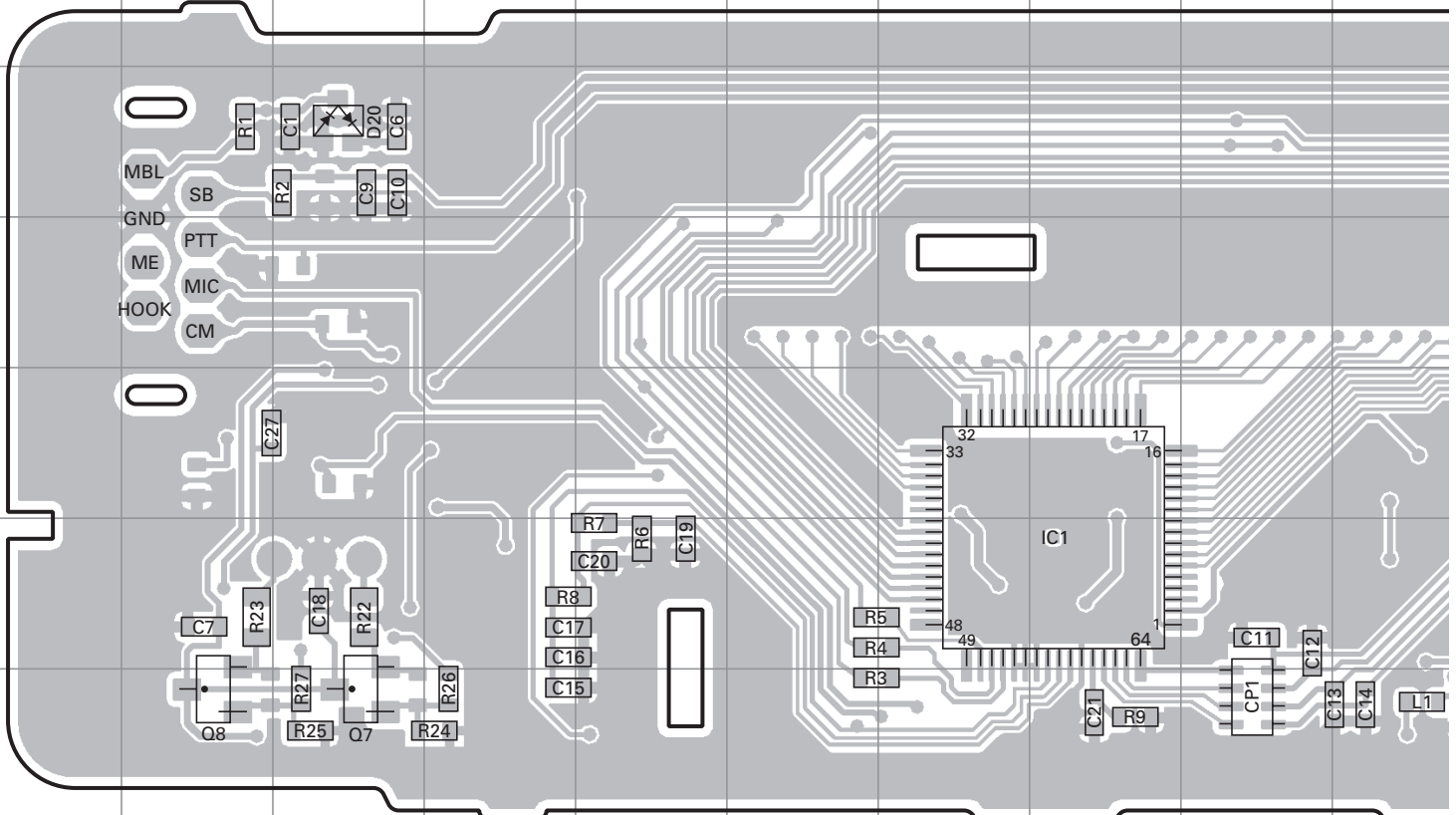
\* GPS (NMEA Input) is TK-8160 only.

# TK-8160 PC BOARD

DISPLAY UNIT (X54-3510-10) Component side view (J72-0959-09)

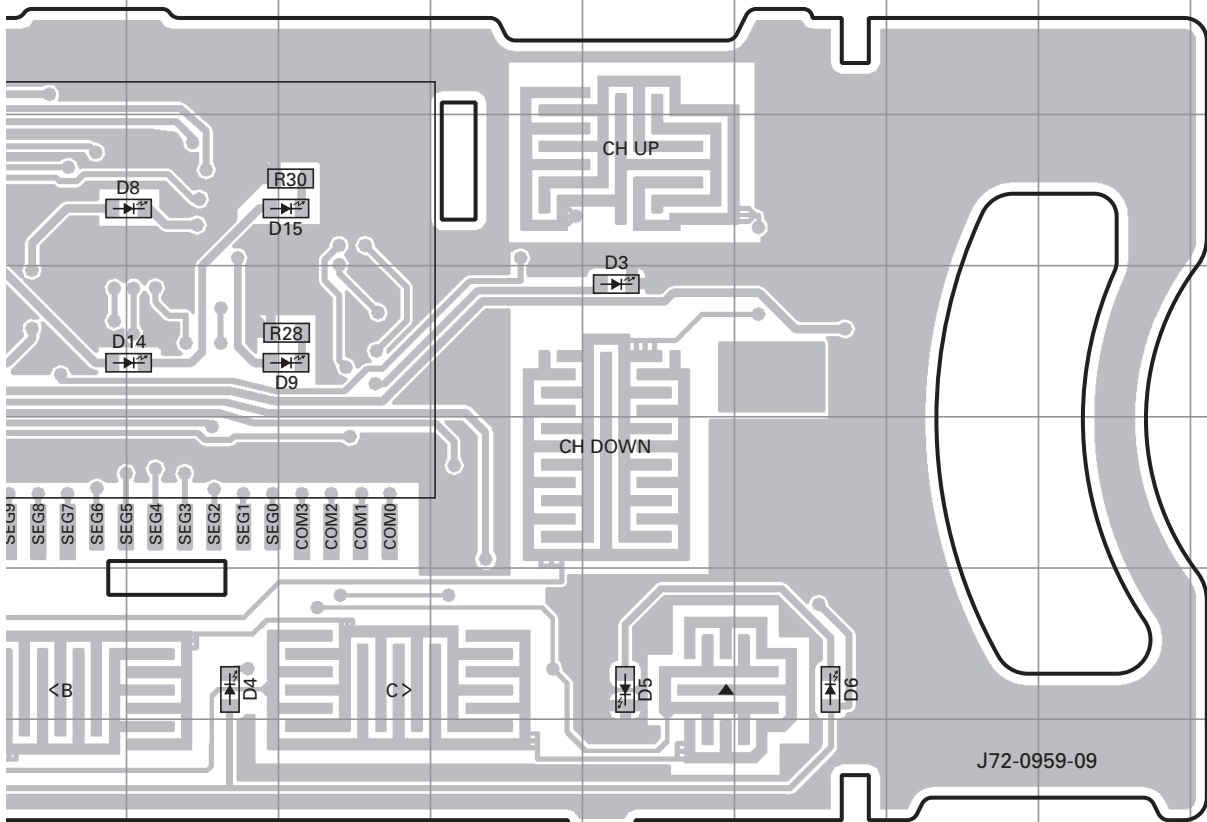


DISPLAY UNIT (X54-3510-10) Foil side view (J72-0959-09)

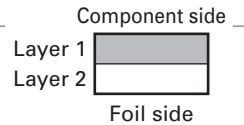


# PC BOARD TK-8160

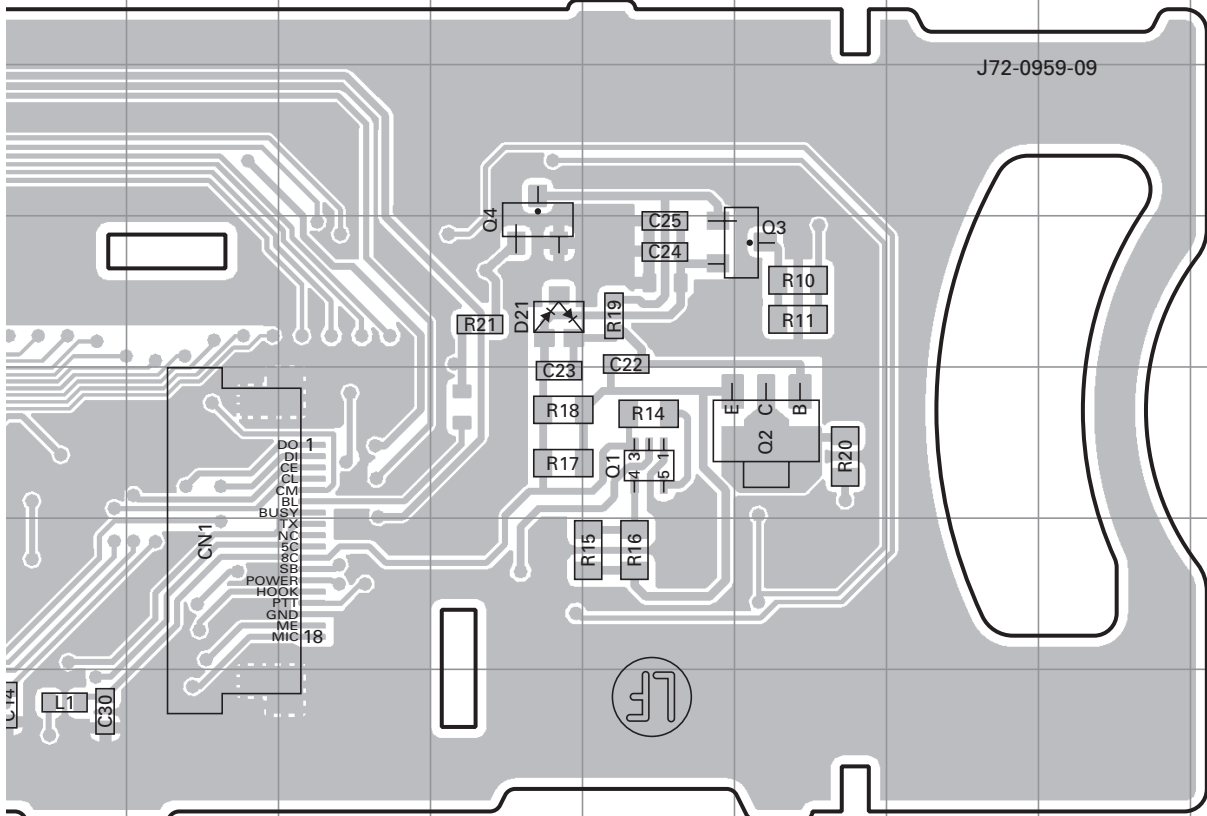
## DISPLAY UNIT (X54-3510-10) Component side view (J72-0959-09)



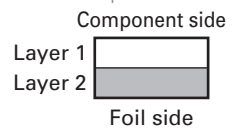
Ref. No.	Address
D1	4D
D2	6G
D3	4N
D4	6K
D5	6N
D6	6O
D7	4I
D8	3K
D9	4L
D10	4H
D11	3G
D12	4F
D13	3I
D14	4K
D15	3L
D16	3H
D17	4G
D18	3F
D22	4C



## DISPLAY UNIT (X54-3510-10) Foil side view (J72-0959-09)



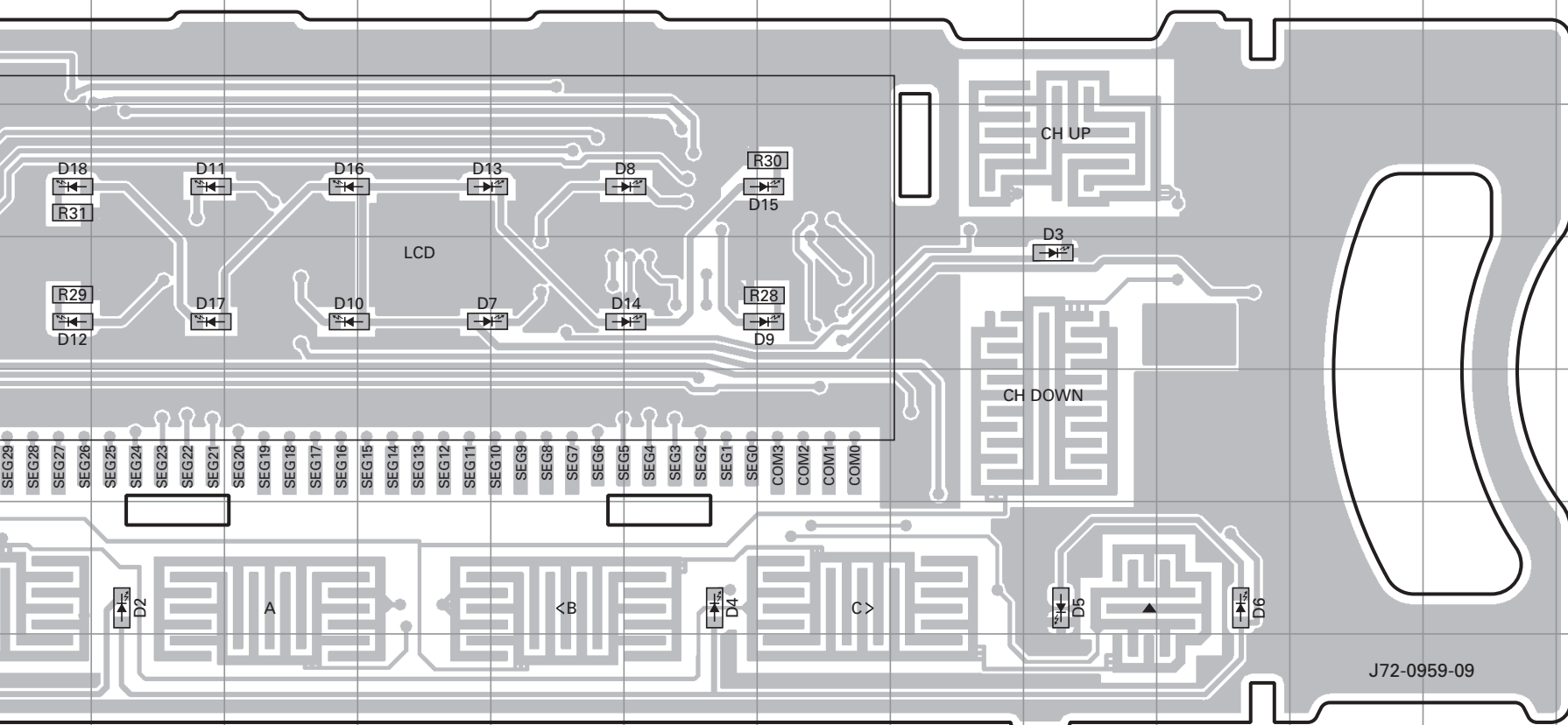
Ref. No.	Address
IC1	12H
Q1	11N
Q2	11O
Q3	10O
Q4	10M
Q7	13C
Q8	13B
D20	9C
D21	10M



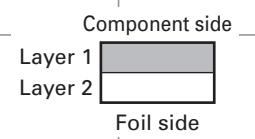
# PC BOARD TK-8160

v (J72-0959-09)

## DISPLAY UNIT (X54-3510-10) Component side view (J72-0959-09)

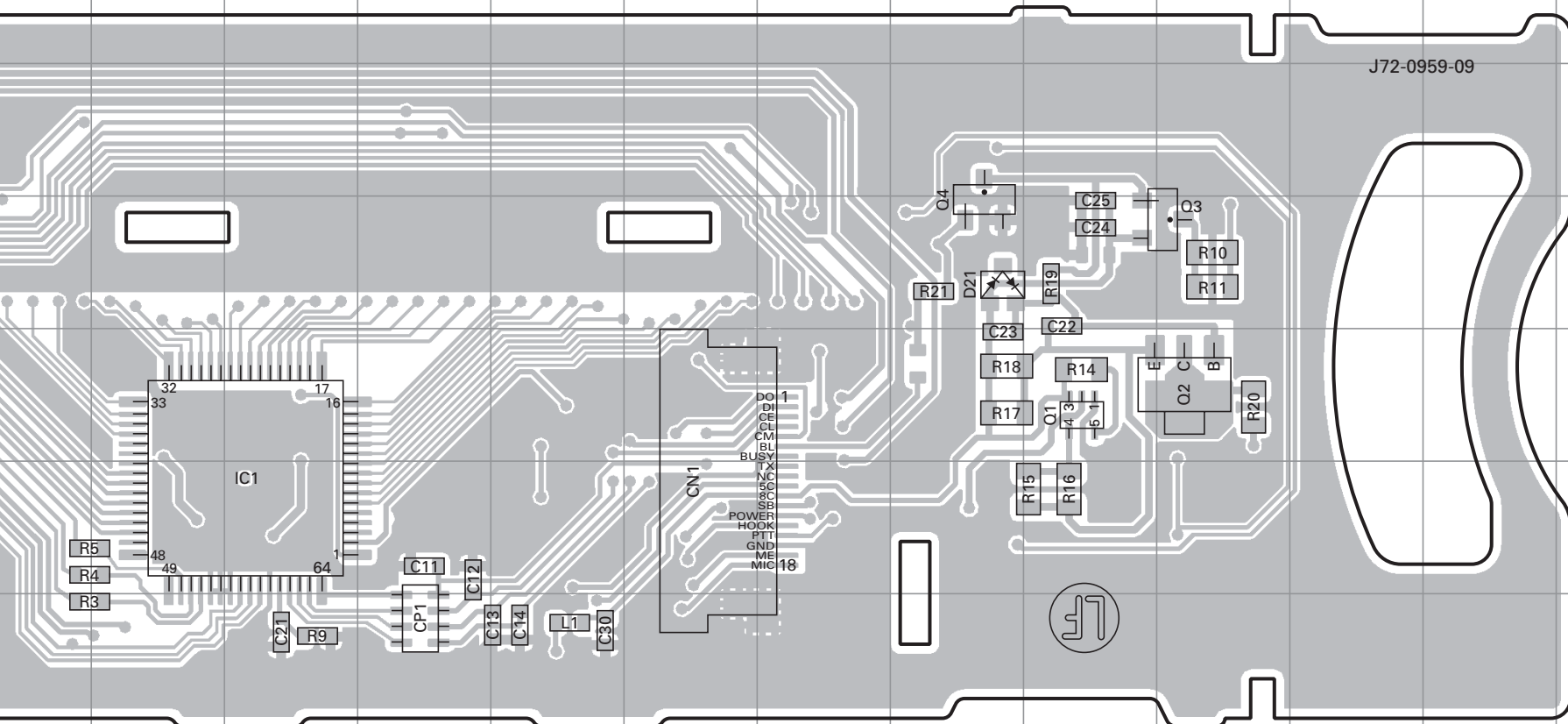


Ref. No.	Address
D1	4D
D2	6G
D3	4N
D4	6K
D5	6N
D6	6O
D7	4I
D8	3K
D9	4L
D10	4H
D11	3G
D12	4F
D13	3I
D14	4K
D15	3L
D16	3H
D17	4G
D18	3F
D22	4C

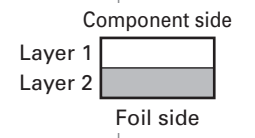


959-09)

## DISPLAY UNIT (X54-3510-10) Foil side view (J72-0959-09)

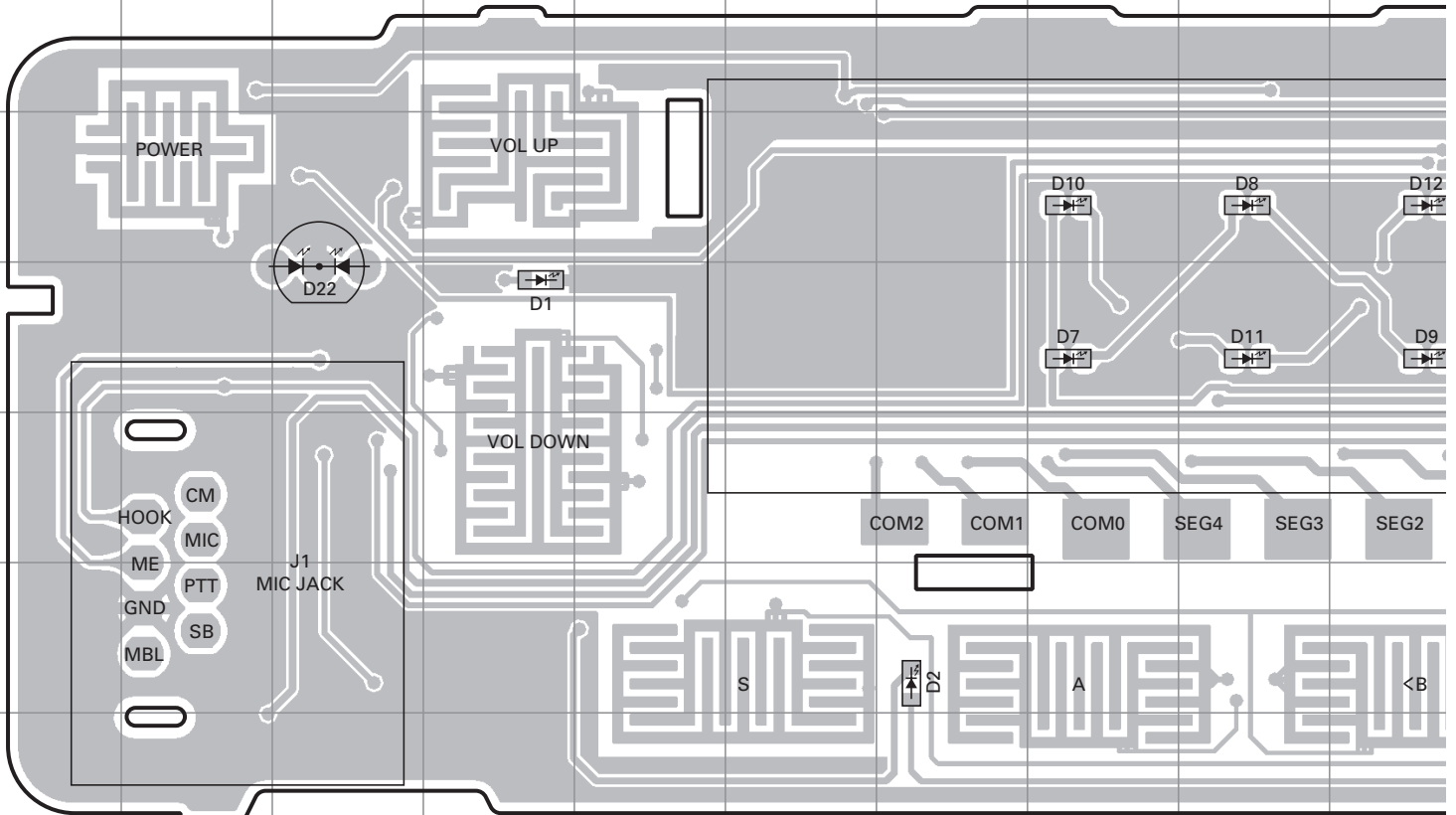


Ref. No.	Address
IC1	12H
Q1	11N
Q2	11O
Q3	10O
Q4	10M
Q7	13C
Q8	13B
D20	9C
D21	10M

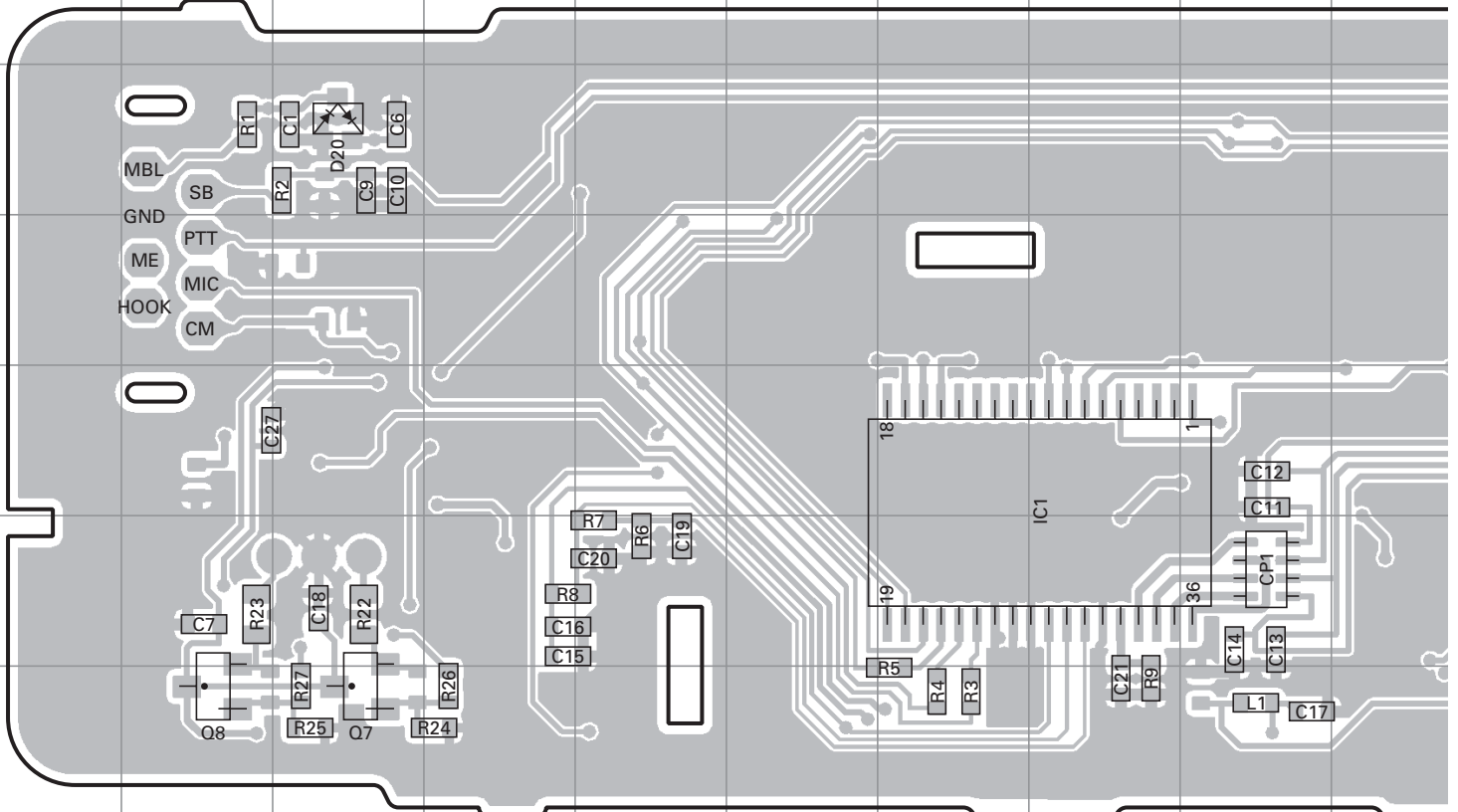


# TK-8162 PC BOARD

DISPLAY UNIT (X54-3522-70) Component side view (J72-0960-09)

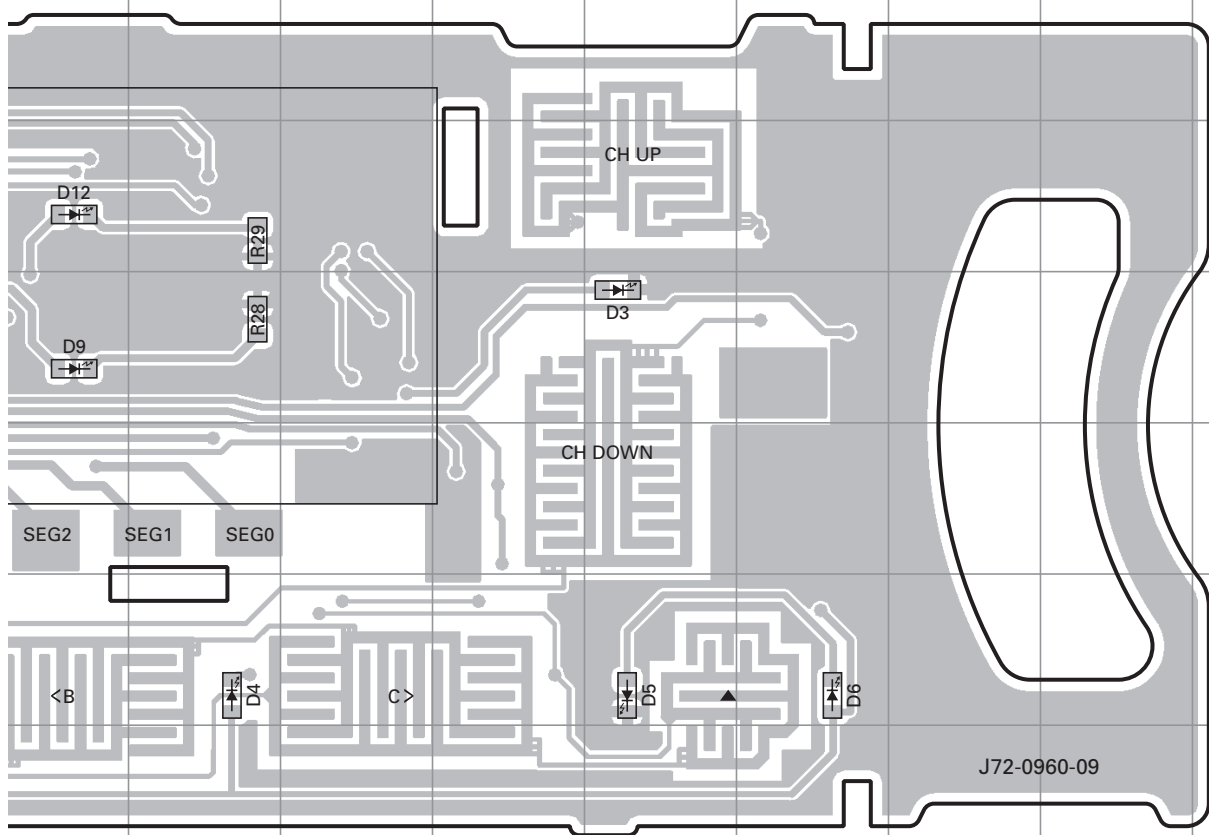


DISPLAY UNIT (X54-3522-70) Foil side view (J72-0960-09)

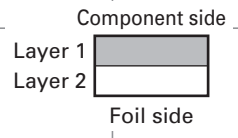


# PC BOARD TK-8162

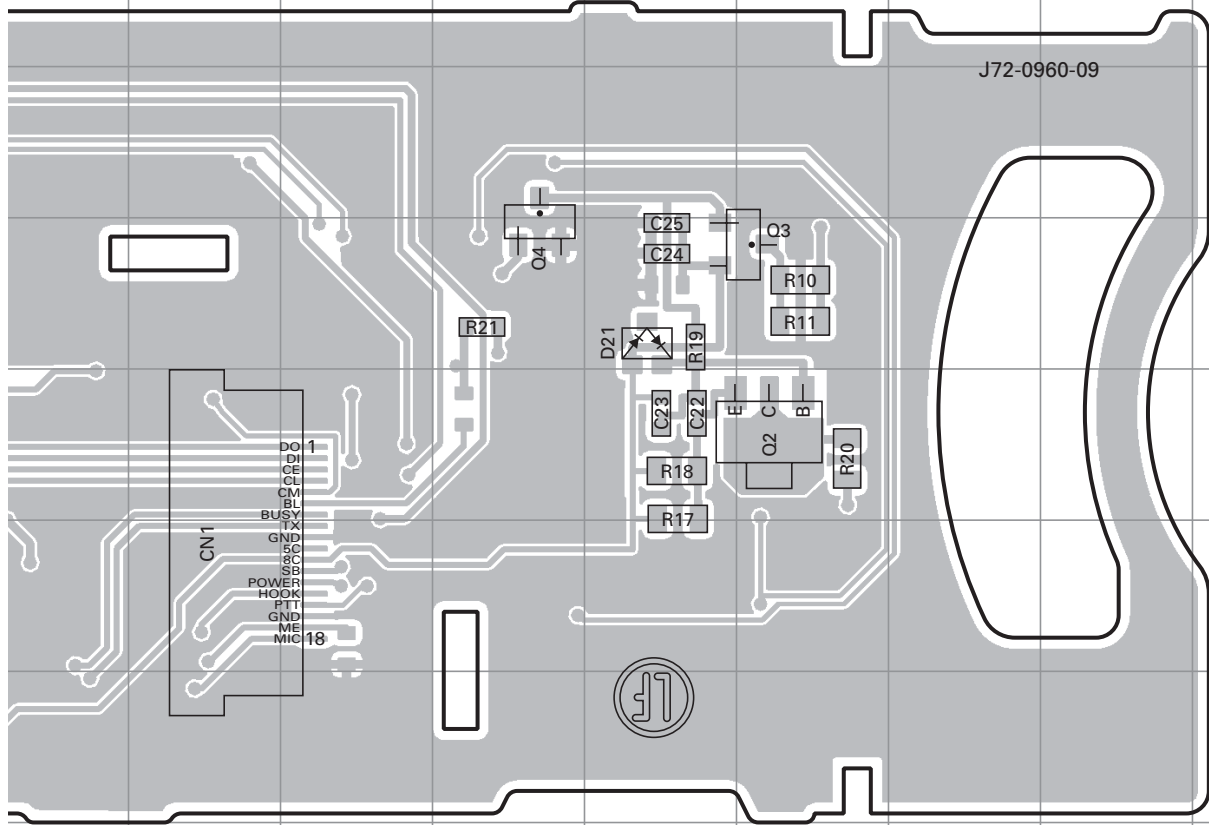
**DISPLAY UNIT (X54-3522-70) Component side view (J72-0960-09)**



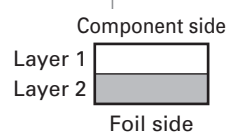
Ref. No.	Address
D1	4D
D2	6G
D3	4N
D4	6K
D5	6N
D6	6O
D7	4I
D8	3K
D9	4L
D10	4H
D11	3G
D12	4F
D22	4C



**DISPLAY UNIT (X54-3522-70) Foil side view (J72-0960-09)**



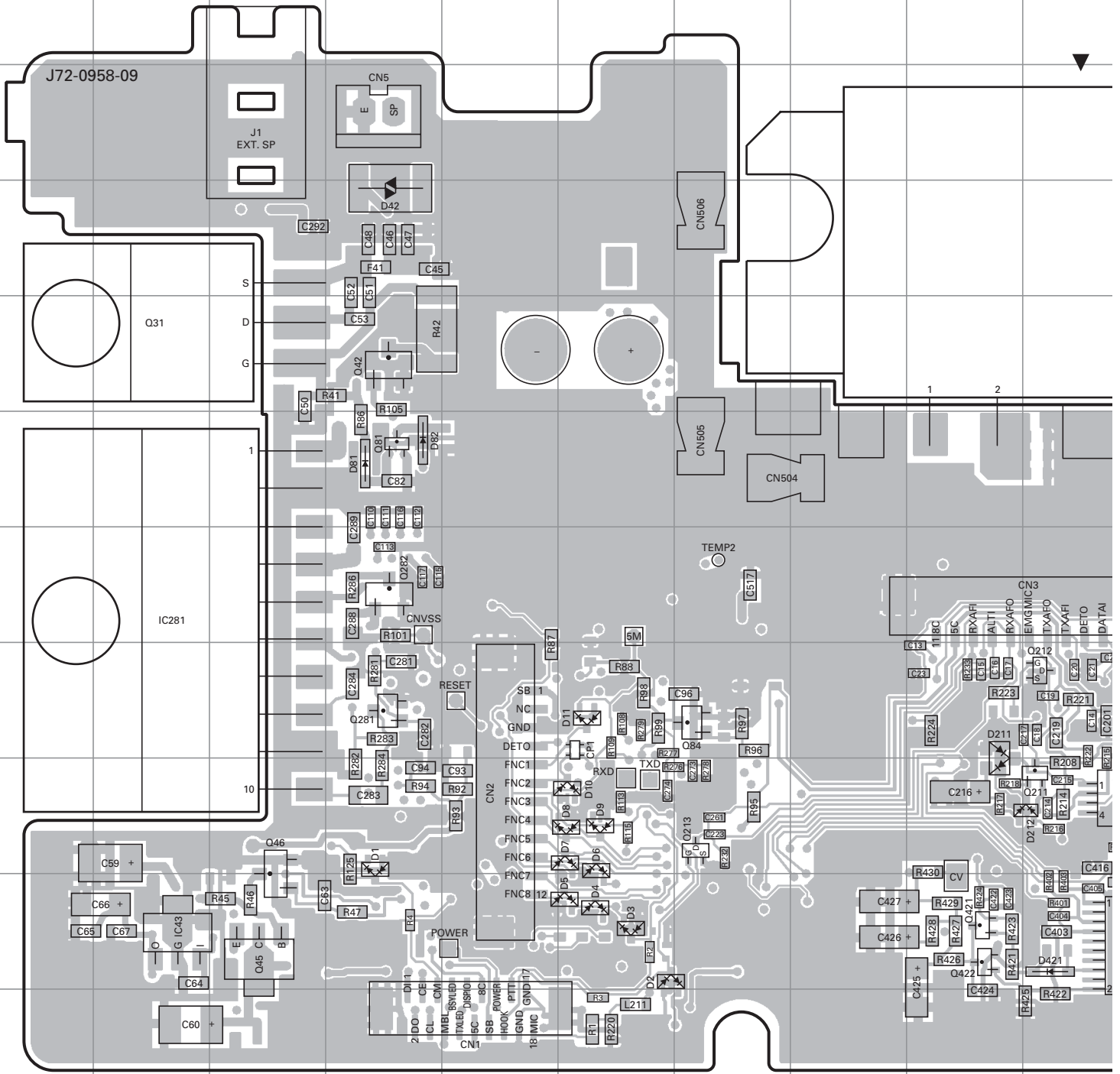
Ref. No.	Address
IC1	12H
Q2	11O
Q3	10O
Q4	10M
Q7	13C
Q8	13B
D20	9C
D21	10M





# TK-8160/8162 PC BOARD

**TX-RX UNIT (X57-711X-XX) Component side view (J72-0958-09)**  
**2-70 : TK-8160/8162 E 2-71 : TK-8160/8162 E3 0-71 : TK-8160 X2**

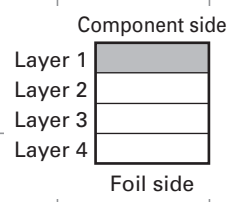
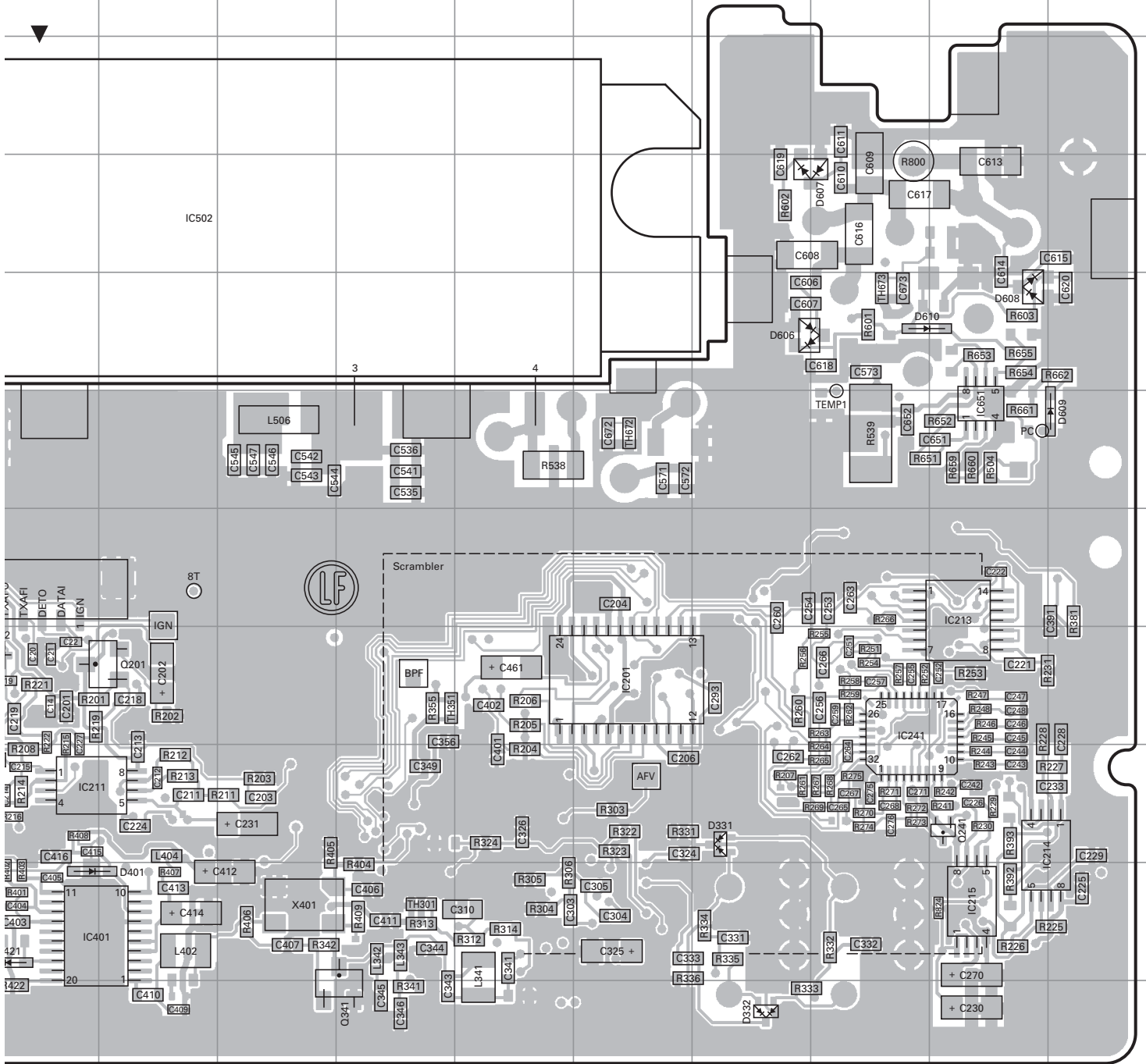


Ref. No.	Address	Ref. No.	Address	Ref. No.	Address	Ref. No.	Address	Ref. No.	Address	Ref. No.	Address
IC43	10B	IC502	4K	Q211	9J	D1	9D	D10	9F	D401	10J
IC201	8O	IC651	6R	Q212	8J	D2	10F	D11	8F	D421	10J
IC211	9J	Q31	5B	Q213	9G	D3	10F	D42	4D	D606	5P
IC213	7R	Q42	5D	Q241	9R	D4	10F	D81	6D	D607	4Q
IC214	9R	Q45	10C	Q281	8D	D5	10F	D82	6D	D608	5R
IC215	10R	Q46	9C	Q282	7D	D6	9F	D211	8I	D609	6S
IC241	8Q	Q81	6D	Q341	11M	D7	9F	D212	9J	D610	5Q
IC281	7B	Q84	8G	Q421	10I	D8	9F	D331	9P		
IC401	10J	Q201	8K	Q422	10I	D9	9F	D332	11P		



# PC BOARD TK-8160/8162

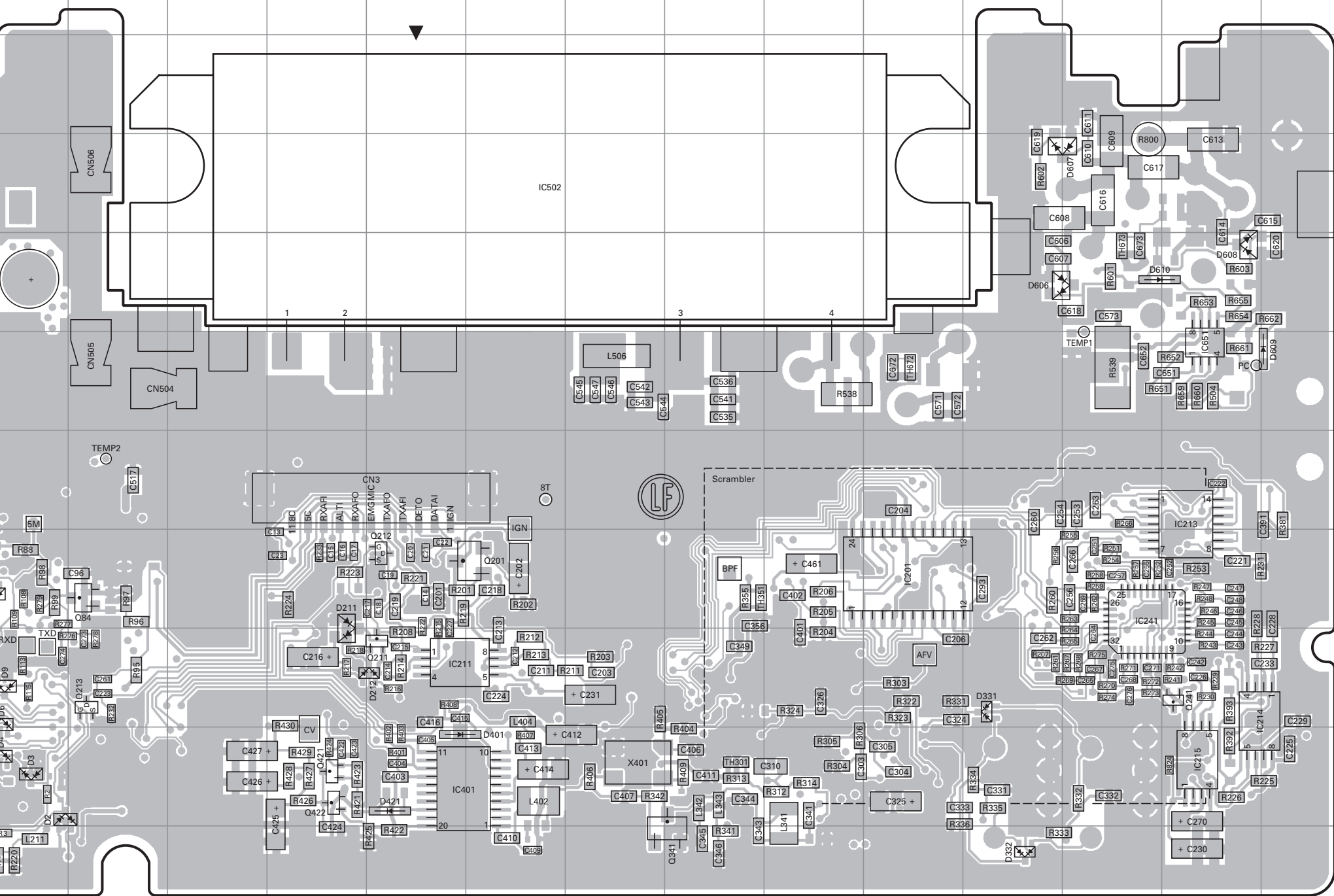
**TX-RX UNIT (X57-711X-XX) Component side view (J72-0958-09)**  
**2-70 : TK-8160/8162 E 2-71 : TK-8160/8162 E3 0-71 : TK-8160 X2**



# PC BOARD TK-8160/8162

v (J72-0958-09)  
1 : TK-8160 X2

TX-RX UNIT (X57-711X-XX) Component side view (J72-0958-09)  
2-70 : TK-8160/8162 E 2-71 : TK-8160/8162 E3 0-71 : TK-8160 X2



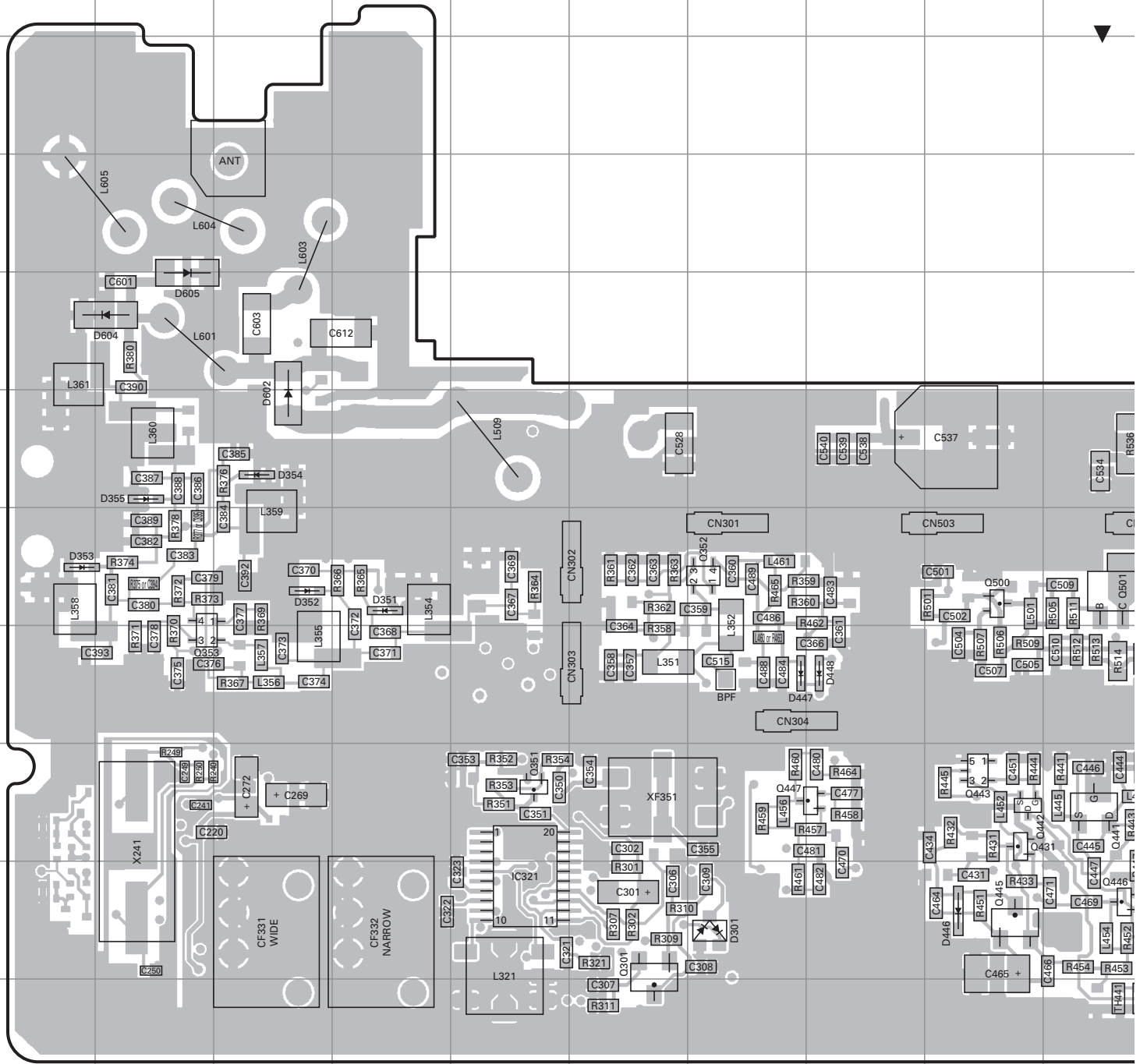
Address	Ref. No.	Address	Ref. No.	Address
9D	D10	9F	D401	10J
10F	D11	8F	D421	10J
10F	D42	4D	D606	5P
10F	D81	6D	D607	4Q
10F	D82	6D	D608	5R
9F	D211	8I	D609	6S
9F	D212	9J	D610	5Q
9F	D331	9P		
9F	D332	11P		

Component side  
 Layer 1  
 Layer 2  
 Layer 3  
 Layer 4  
 Foil side

# TK-8160/8162 PC BOARD

TX-RX UNIT (X57-711X-XX) Foil side view (J72-0958-09)

2-70 : TK-8160/8162 E 2-71 : TK-8160/8162 E3 0-71 : TK-8160 X2

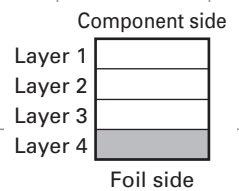
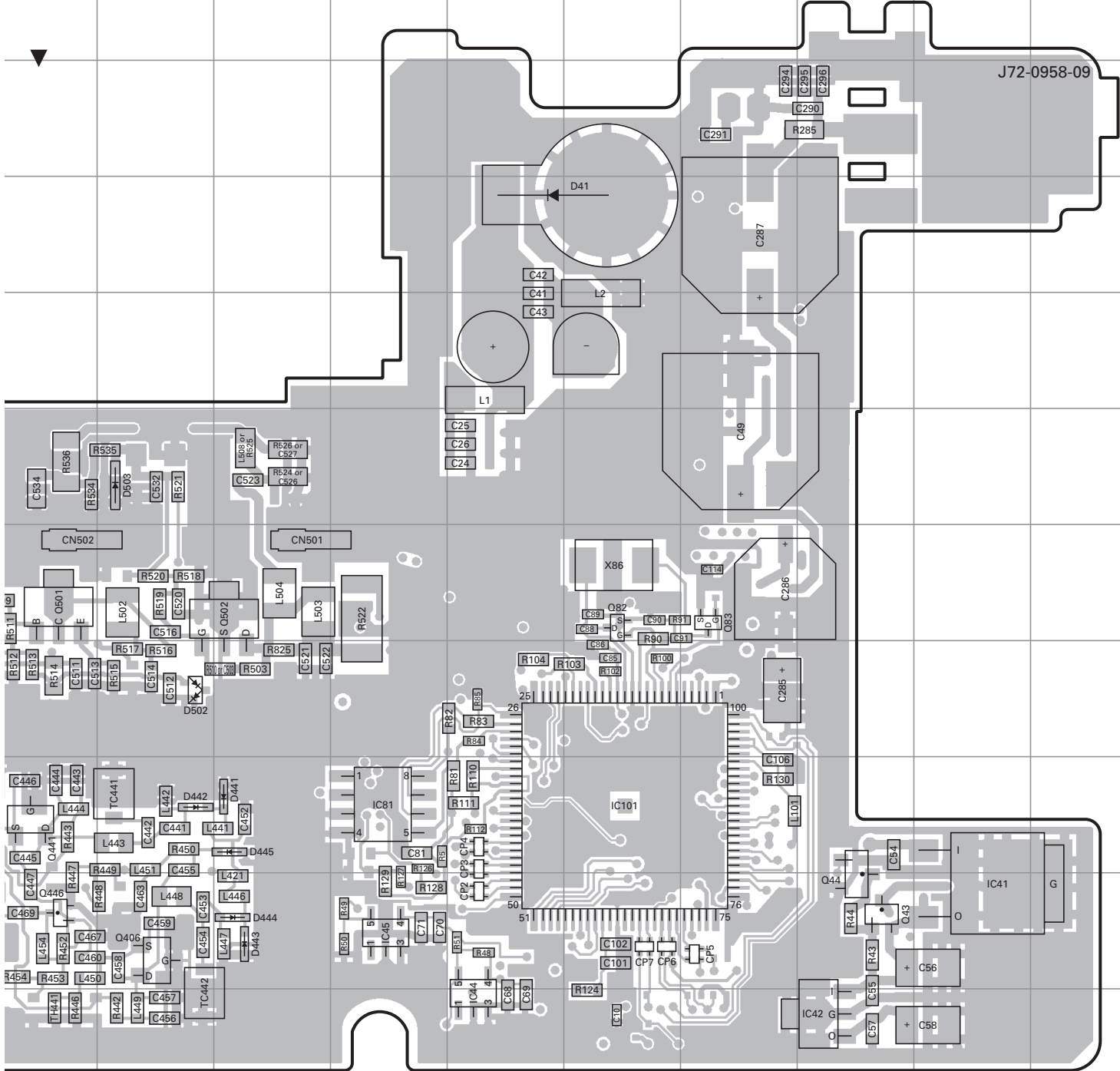


Ref. No.	Address	Ref. No.	Address	Ref. No.	Address	Ref. No.	Address	Ref. No.	Address	Ref. No.	Address
IC41	10R	Q44	10Q	Q431	9I	Q501	7J	D355	6B	D448	8H
IC42	11Q	Q82	7O	Q441	9J	Q502	7L	D441	9L	D502	8K
IC44	11N	Q83	7P	Q442	9I	D41	4O	D442	9K	D503	6K
IC45	10M	Q301	10F	Q443	9I	D301	10G	D443	10L	D602	6C
IC81	9M	Q351	9E	Q445	10I	D351	7D	D444	10L	D604	5B
IC101	9O	Q352	7G	Q446	10J	D352	7C	D445	9L	D605	5B
IC321	10E	Q353	8B	Q447	9H	D353	7A	D446	10I		
Q43	10Q	Q406	10K	Q500	7I	D354	6C	D447	8G		

# PC BOARD TK-8160/8162

TX-RX UNIT (X57-711X-XX) Foil side view (J72-0958-09)

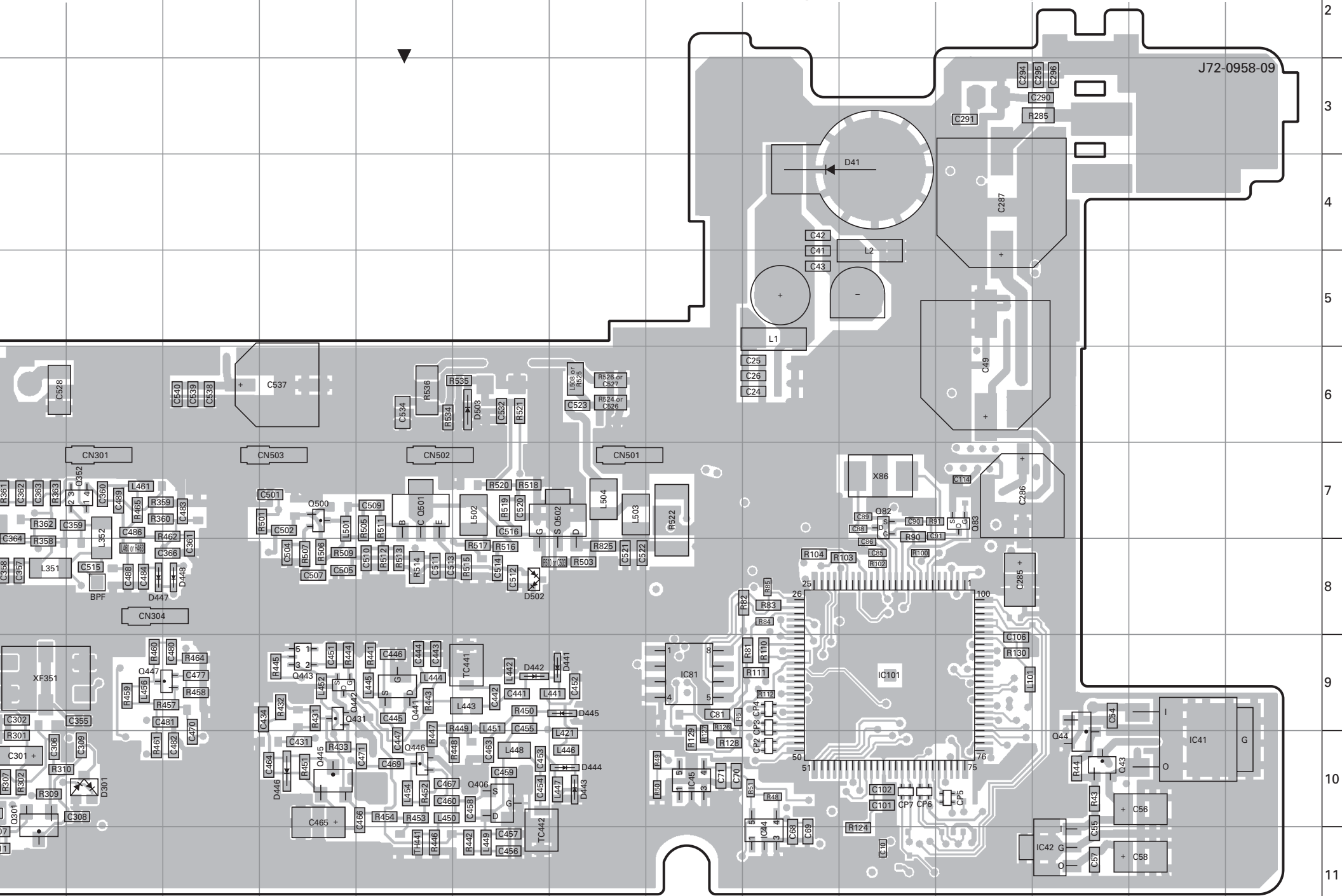
2-70 : TK-8160/8162 E 2-71 : TK-8160/8162 E3 0-71 : TK-8160 X2



# PC BOARD TK-8160/8162

58-09)  
1 : TK-8160 X2

TX-RX UNIT (X57-711X-XX) Foil side view (J72-0958-09)  
2-70 : TK-8160/8162 E 2-71 : TK-8160/8162 E3 0-71 : TK-8160 X2



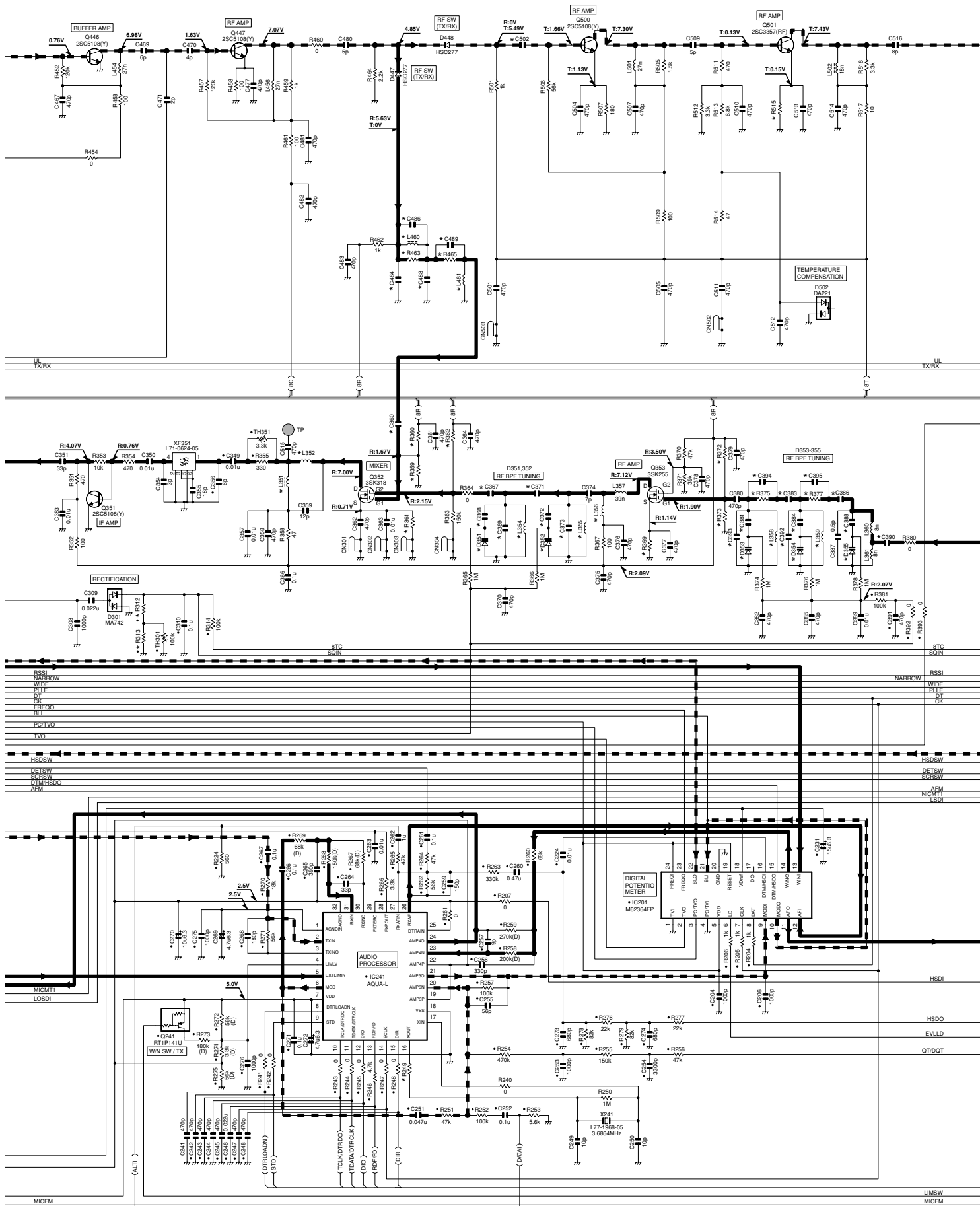
Address	Ref. No.	Address	Ref. No.	Address
7J	D355	6B	D448	8H
7L	D441	9L	D502	8K
4O	D442	9K	D503	6K
10G	D443	10L	D602	6C
7D	D444	10L	D604	5B
7C	D445	9L	D605	5B
7A	D446	10I		
6C	D447	8G		

Component side  
Layer 1  
Layer 2  
Layer 3  
Layer 4  
Foil side



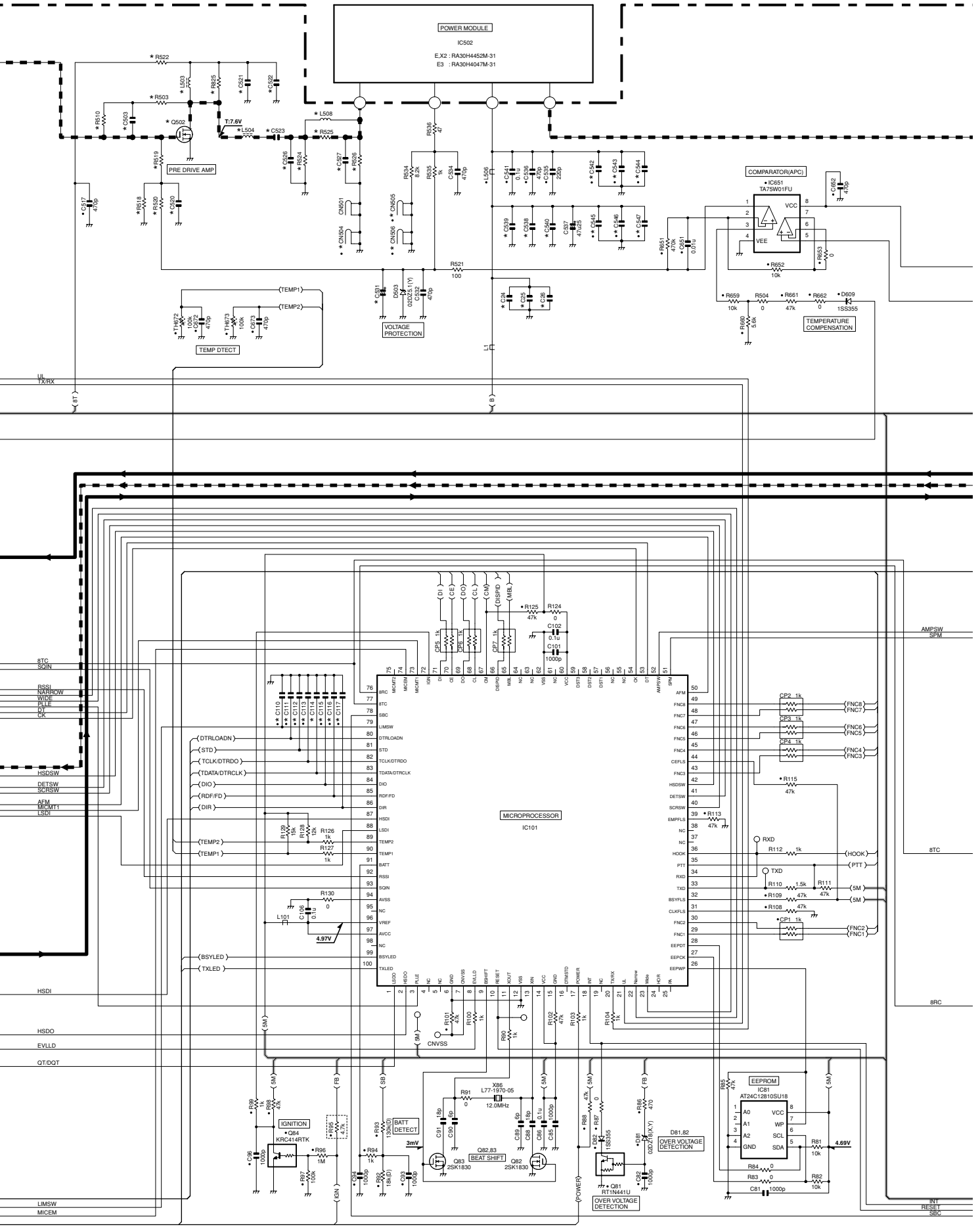
# SCHEMATIC DIAGRAM TK-8160/8162

TX-RX UNIT (X57-711X-XX)



# TK-8160/8162 SCHEMATIC DIAGRAM

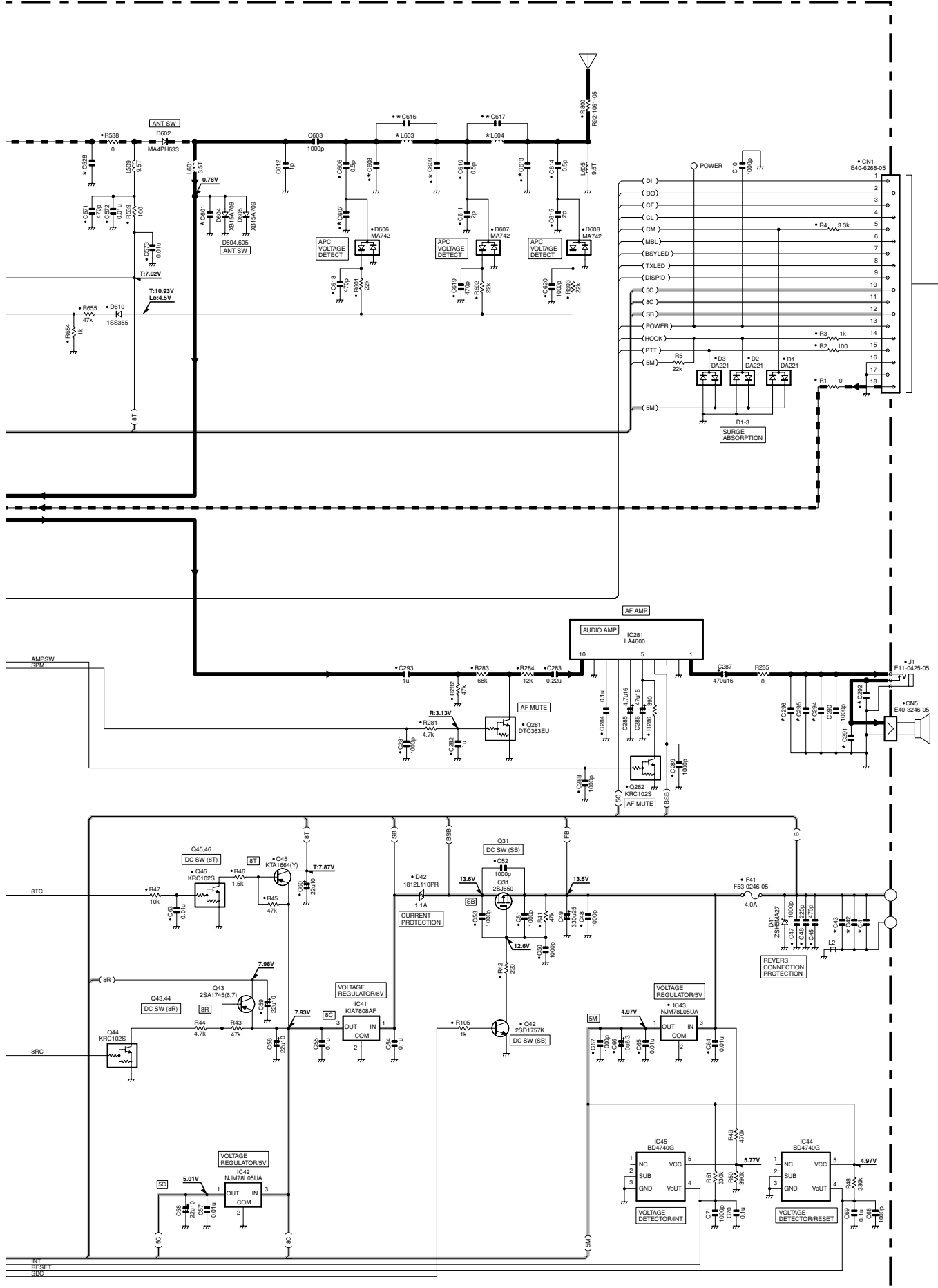
TX-RX UNIT (X57-711X-XX)





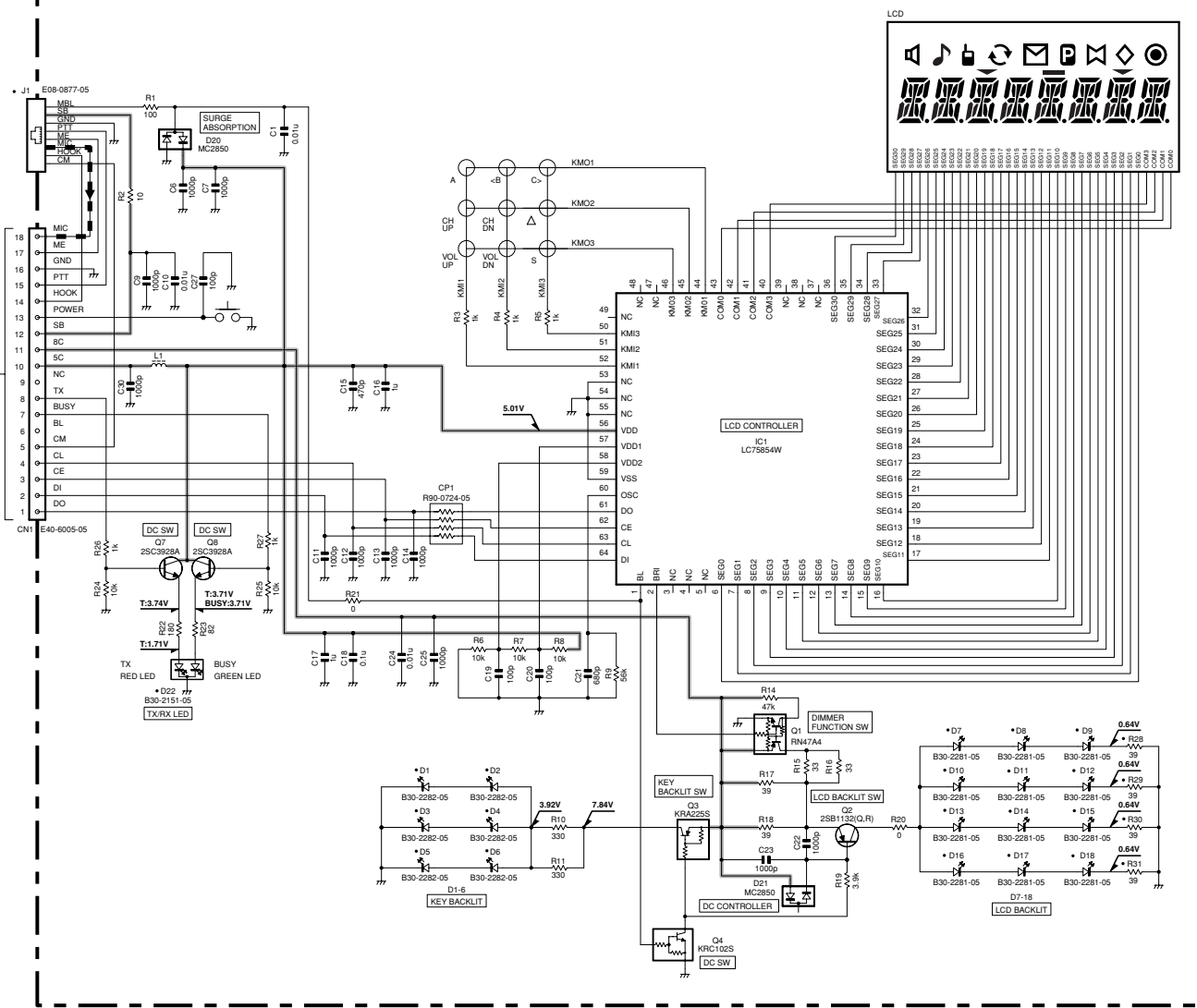
# SCHEMATIC DIAGRAM TK-8160/8162

TX-RX UNIT (X57-711X-XX)



# TK-8160/8162 SCHEMATIC DIAGRAM

DISPLAY UNIT (X54-3510-10)



X57-71X-XX		C24	C25	C26	C41	C42	C43	C110	C111	C112	C113	C114	C115	C116	C117	C291	C292	C294	C295	C296	C303	C304	C305	C360	C367	C368	C369	C371	C372	C373	C381	C383	C384	C386	C388
2-70	E	440-470MHz	220p	100p	22p	NO	NO	NO	470p	470p	470p	470p	470p	470p	470p	22p	22p	100p	47p	22p	4700p	330p	390p	470p	470p	10p	1p	0.75p	15p	8p	6p	0.75p	9p	1p	3p
2-71	E3	400-430MHz	220p	100p	22p	NO	NO	0.01u	0.01u	0.01u	0.01u	0.01u	0.01u	0.01u	0.01u	22p	22p	100p	47p	22p	1000p	120p	120p	9p	470p	6p	0.75p	0.5p	15p	8p	8p	0.75p	6p	0.75p	4p
0-71	X2	470-512MHz	NO	NO	NO	220p	470p	1000p	220p	NO	220p	NO	0.01u	0.01u	0.01u	NO	NO	NO	NO	NO	4700p	220p	220p	8p	47p	9p	5p	0.5p	10p	5p	8p	0.5p	6p	0.5p	5p

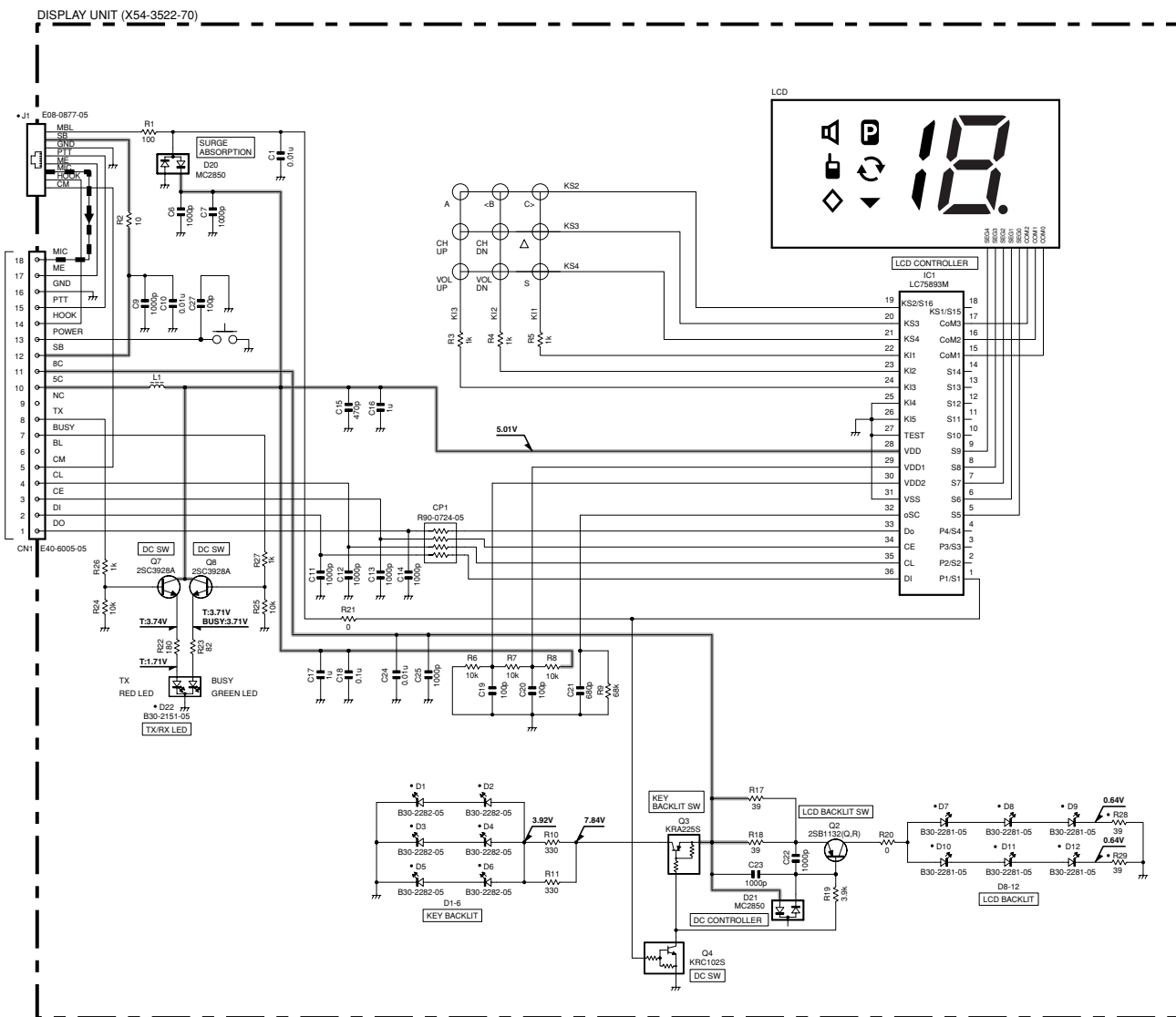
X57-71X-XX		C390	C392	C393	C394	C395	C426	C441	C442	C444	C445	C446	C453	C454	C457	C458	C459	C484	C486	C488	C489	C502	C503	C520	C521	C522	C523	C526	C527	C529	C531	C538	C539	C540	
2-70	E	440-470MHz	8p	4.5p	NO	0.75p	NO	0.47u25	15p	12p	3p	4p	5p	7p	6p	1.5p	5p	5p	6p	5p	6p	2p	2p	NO	NO	NO	NO	68p	9p	9p	NO	47u6.3	1000p	220p	1000p
2-71	E3	400-430MHz	10p	4p	3p	2.5p	3p	0.88u20	8p	7p	2p	2p	3p	5p	6p	2p	2p	3p	6p	2.5p	10p	NO	5p	NO	NO	NO	47p	12p	12p	NO	NO	47u6.3	1000p	220p	1000p
0-71	X2	470-512MHz	5p	5p	7p	NO	NO	1u16	8p	4p	2p	2p	3p	5p	3p	1.5p	2p	3p	NO	NO	NO	NO	2p	680p	470p	470p	0.1u	47p	NO	NO	2p	NO	NO	NO	NO

X57-71X-XX		C542	C543	C544	C545	C546	C547	C601	C607	C608	C609	C613	C616	C617	L351	L352	L354	L355	L356	L358	L359	L441	L442	L443	L444	L445	L446	L447	L448	L449	L450	L460	L461	L503	L504
2-70	E	440-470MHz	100p	47p	22p	100p	47p	22p	NO	1.5p	5p	7p	3p	1.5p	1p	470n	470n	8n	8n	18n	12.5n	8n	4.7u	4.7u	27n	4.7u	4.7u	4.7u	4.7u	4.7u	18n	27n	NO	NO	6.8n
2-71	E3	400-430MHz	10p	4p	22p	100p	47p	22p	5p	2p	2p	7p	6p	1p	2p	470n	470n	12.5n	12.5n	22n	12.5n	27n	27n	56n	270n	270n	270n	270n	270n	180n	270n	18n	NO	NO	3.3n
0-71	X2	470-512MHz	NO	NO	NO	NO	NO	NO	1p	2p	1p	4p	1p	1p	2p	330n	330n	5n	12.5n	18n	5n	8n	270n	270n	39n	180n	270n	270n	270n	33n	180n	270n	NO	NO	3.3n

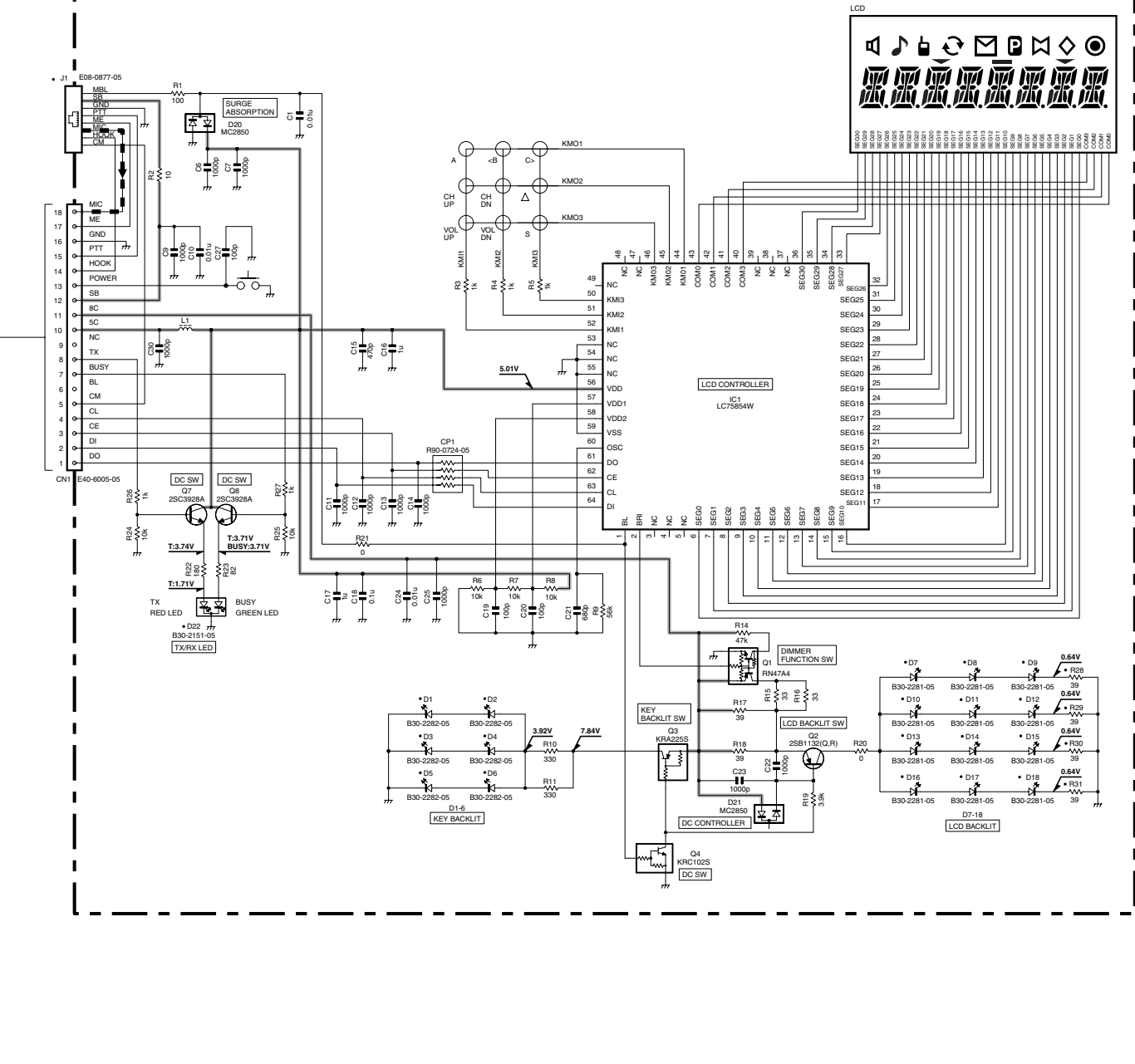
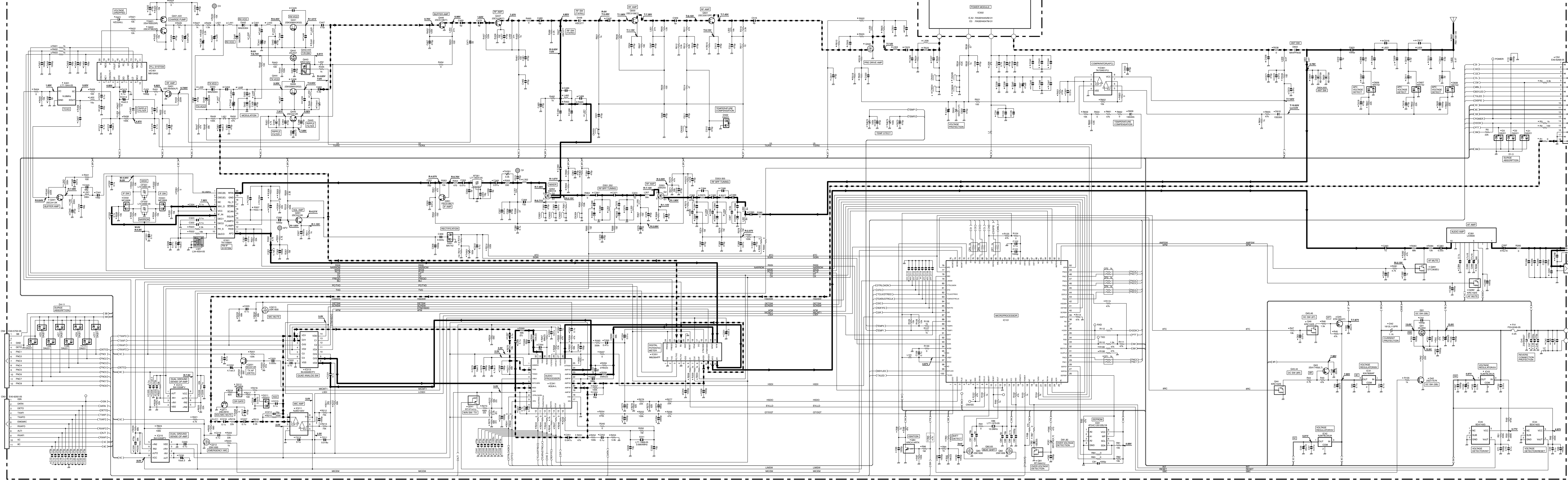
X57-71X-XX		L508	L603	L604	R249	R305	R306	R307	R312	R313	R359	R360	R361	R362	R369	R372	R373	R375	R377	R441	R446	R463	R465	R503	R510	R515	R518	R519	R520	R522	R524	R525	R526	
2-70	E	440-470MHz	10n	L34-4757-05	L34-4757-05	5.6k	1.8k	8.2k	270k	33k	47k	220k	820k	100	390k	82	68k	36k	NO	0	220	150	NO	NO	0	0	10	NO	NO	NO	NO	NO	NO	NO
2-71	E3	400-430MHz	10n	L34-4754-05	L34-4754-05	1k	18k	12k	220k	33k	47k	9.1k	39k	22	470k	82	47k	22k	NO	NO	330	270	NO	0	0	0	47	NO	NO	NO	NO	270	NO	NO
0-71	X2	470-512MHz	NO	L34-4754-05	L34-4754-05	1k	1.8k	4.7k	270k	27k	150k	180k	390k	150	470k	150	68k	15k	0	0	270	220	0	0	100	NO	10	22k	22	8.2k	0	820	5.6	820

X57-71X-XX		R825	TC442	TH401	CN504	CN505	CN506	D351	D352	D353	D354	D355	C502
2-70	E	440-470MHz	NO	10p	10k	E23-1262-05	E23-1262-05	E23-1262-05	HVC350B	HVC350B	HVC350B	HVC350B	NO
2-71	E3	400-430MHz	NO	6p	NO	E23-1262-05	E23-1262-05	E23-1262-05	HVC350B	HVC350B	HVC355B	HVC350B	NO
0-71	X2	470-512MHz	22k	10p	NO	NO	NO	HVC376B	HVC355B	HVC376B	HVC376B	HVC355B	RD00HV51

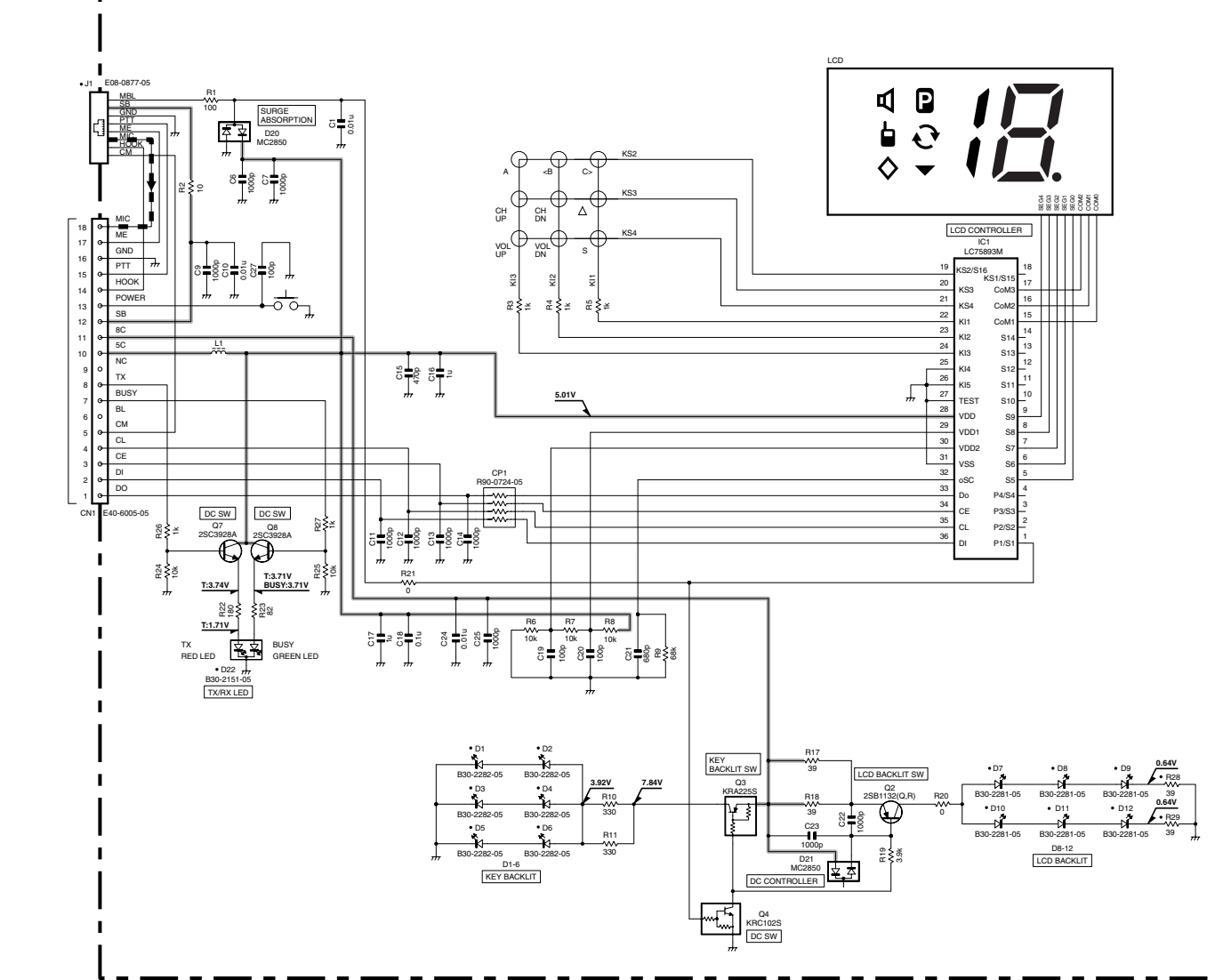
# SCHEMATIC DIAGRAM TK-8160/8162



Note : The components marked with a dot (•) are parts of layer 1.



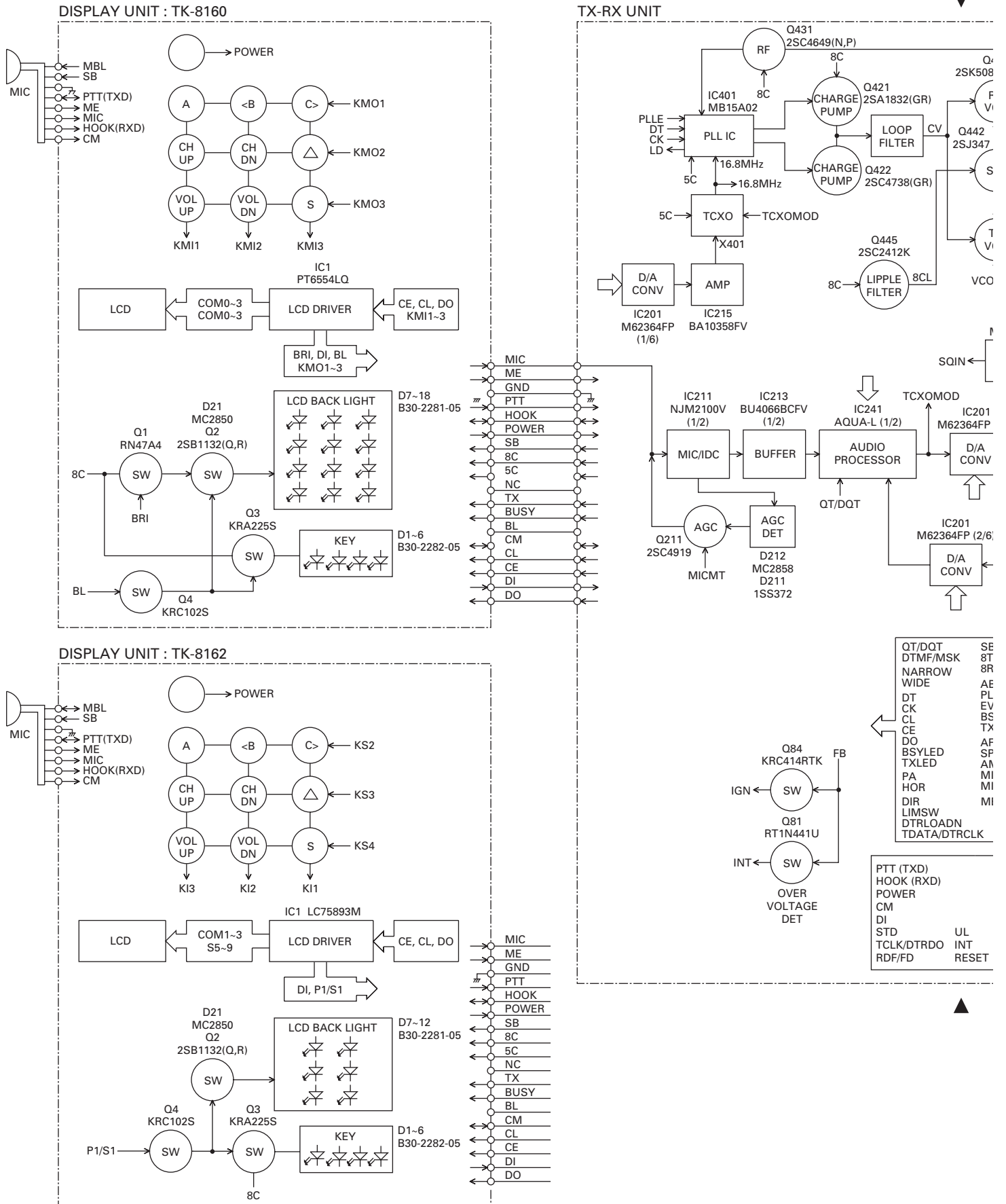
UNIT	NO.	DESCRIPTION	QTY	UNIT	NO.	DESCRIPTION	QTY
K54-711X-70	1	RECEIVER SECTION	1	K54-3520-70	1	DISPLAY UNIT	1
	2	TRANSMITTER SECTION	1		2	LED BACKLIGHT	1
	3	CONTROL SECTION	1		3	LED BACKLIGHT	1



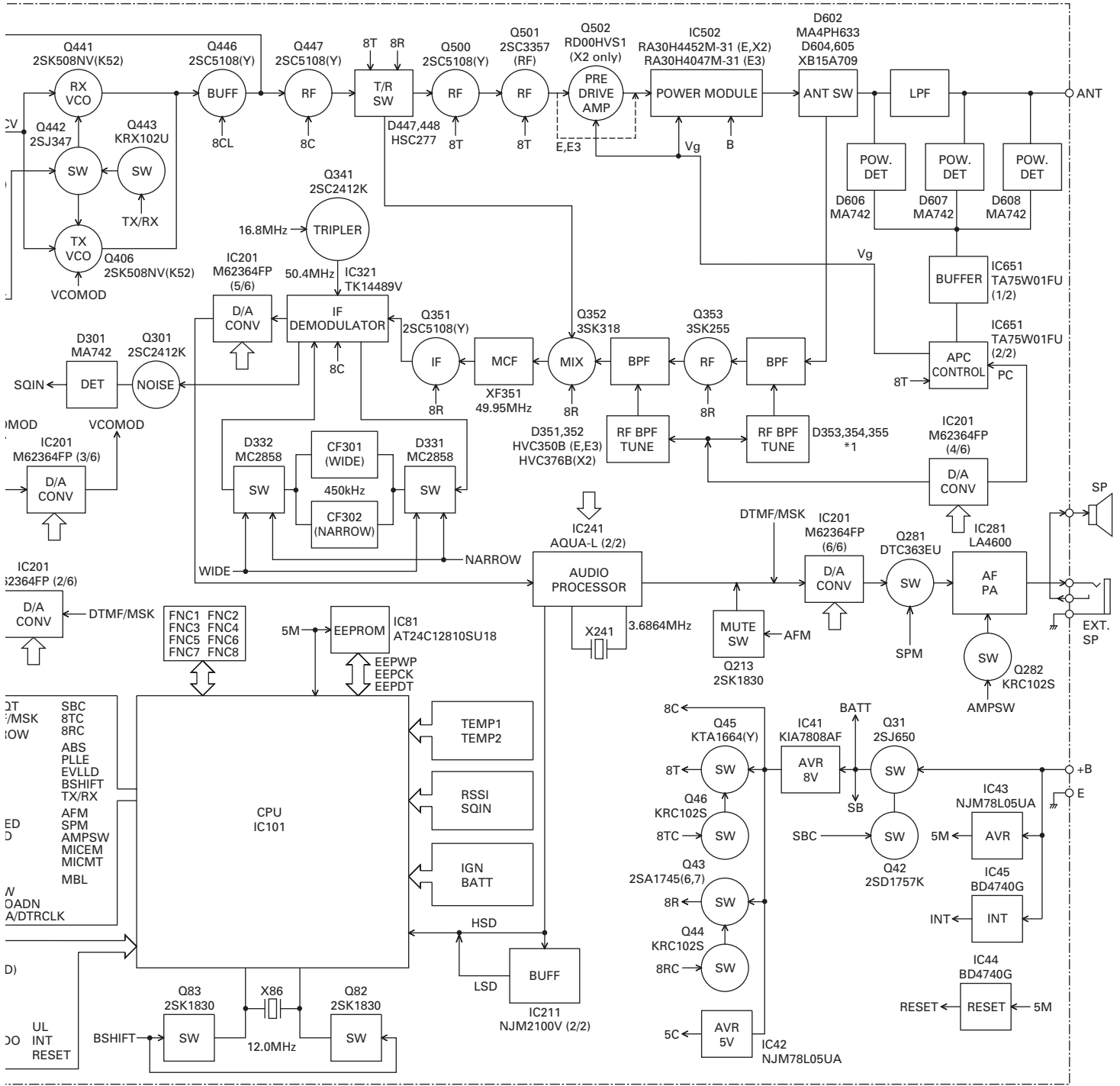
UNIT	NO.	DESCRIPTION	QTY	UNIT	NO.	DESCRIPTION	QTY
K54-711X-70	1	RECEIVER SECTION	1	K54-3520-70	1	DISPLAY UNIT	1
	2	TRANSMITTER SECTION	1		2	LED BACKLIGHT	1
	3	CONTROL SECTION	1		3	LED BACKLIGHT	1

# TK-8160/8162

## BLOCK DIAGRAM



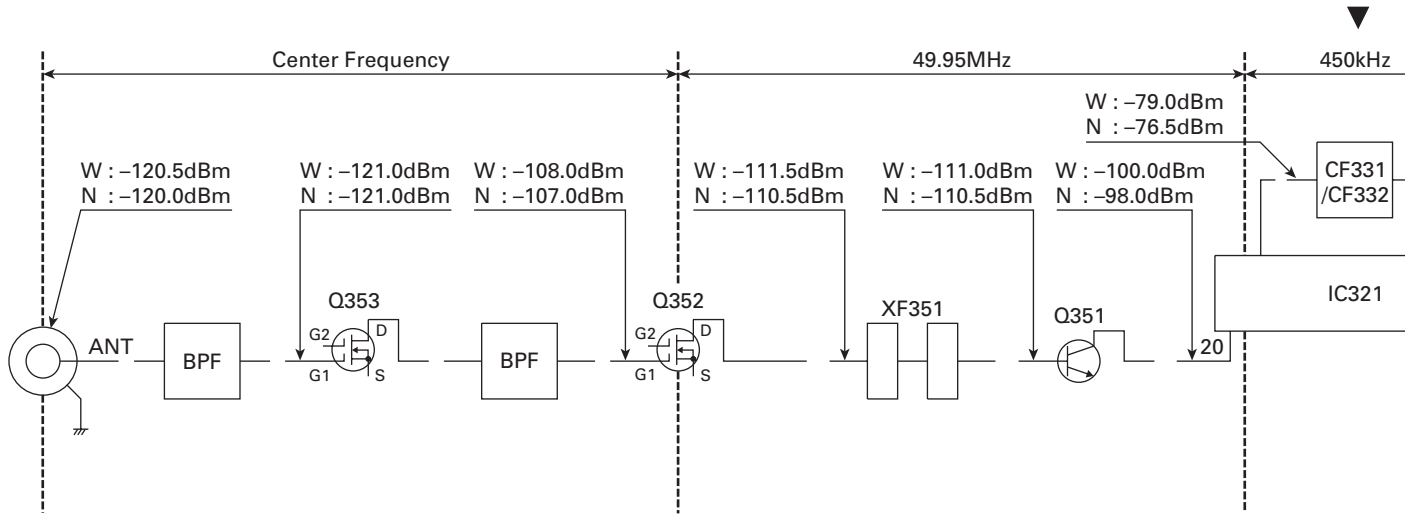
## BLOCK DIAGRAM



- \*1  
 D353 HVC350B (E)  
 HVC355B (E3)  
 HVC376B (X2)
- D354 HVC350B (E,E3)  
 HVC376B (X2)
- D355 HVC350B (E,E3)  
 HVC355B (X2)

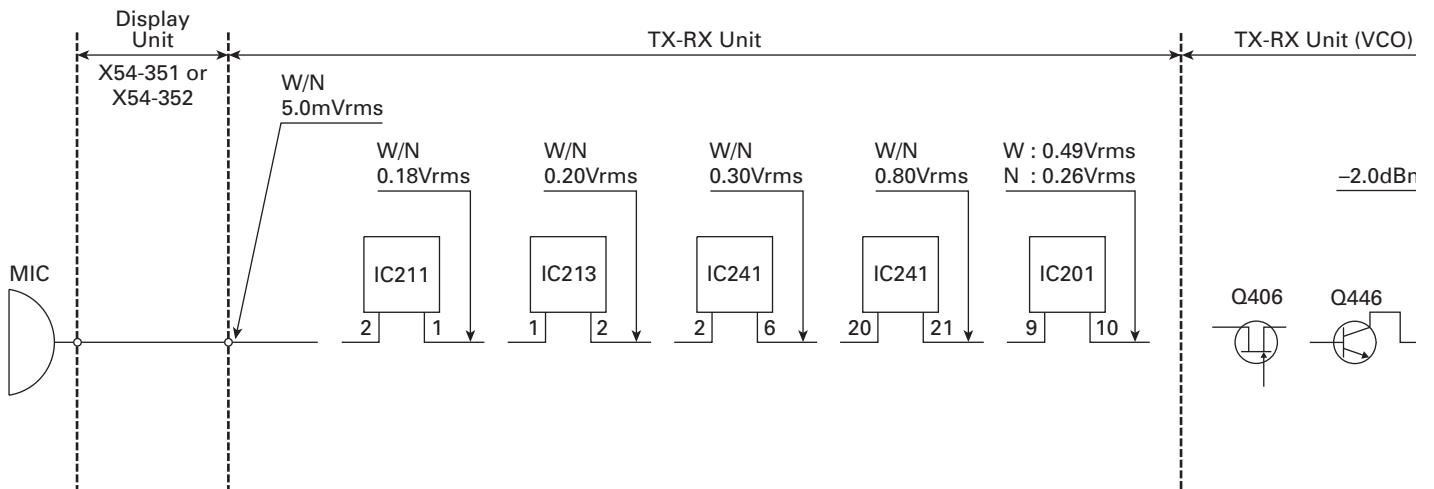
## LEVEL DIAGRAM

### Receiver Section



To make measurements in the RF section, connect the RF level meter. In the RF section, use a 0.01 $\mu$ F coupling capacitor. (The display shows the SSG input value required to obtain 12dB SIN/

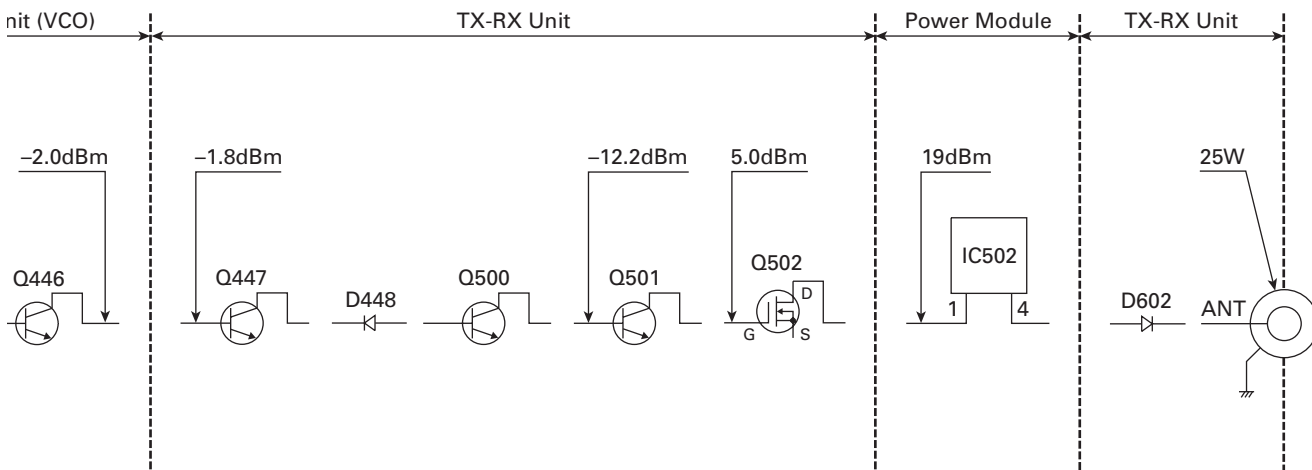
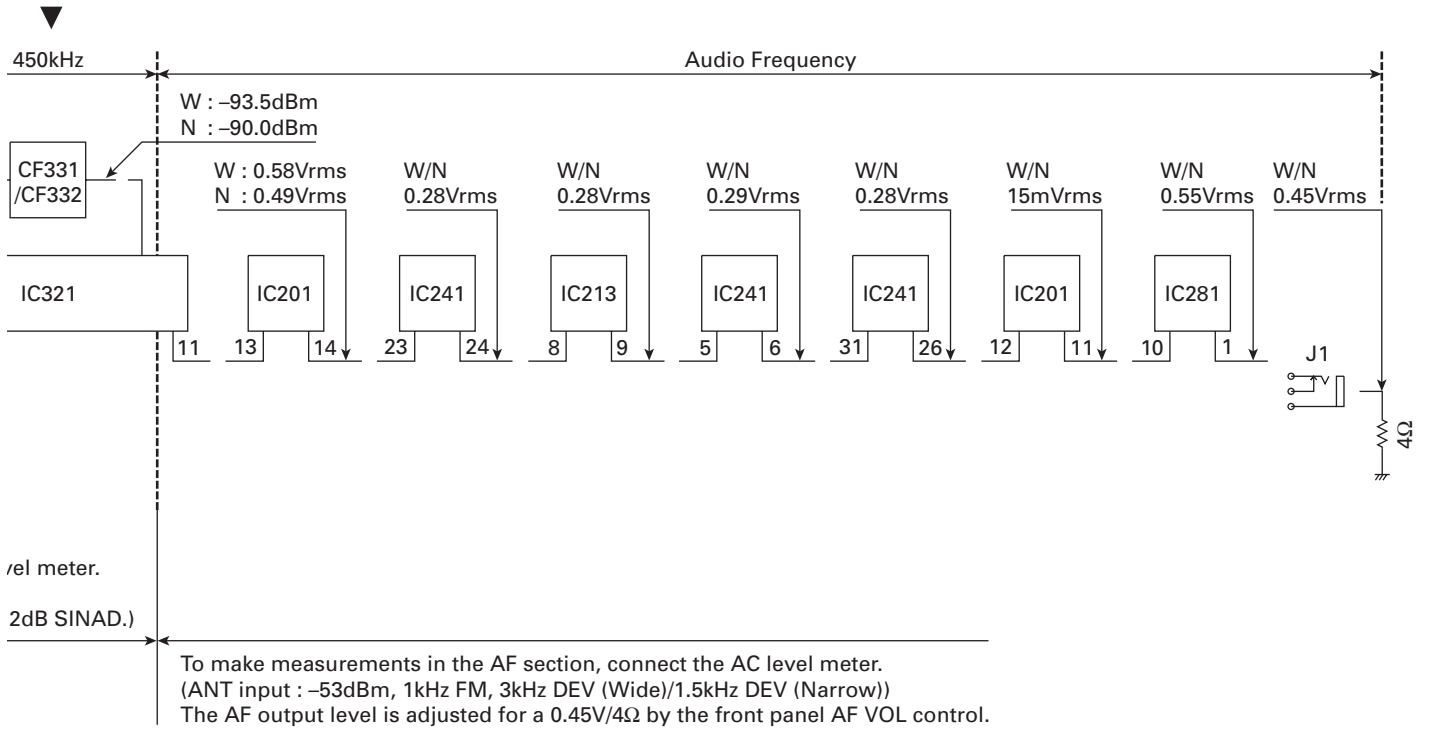
### Transmitter Section



To make measurements in the AF section, connect the AC level meter. AG is set so that MIC input becomes 3kHz/1.5kHz (Wide/Narrow) DEV at 1kHz MOD.

To make measureme

## LEVEL DIAGRAM



asurements in the RF section, connect the RF Wattmeter (50Ω).





# TK-8160/8162

## SPECIFICATIONS

### GENERAL (Applicable standards : EN standard, AS-4295)

Frequency range .....	E : 440~470 MHz	E3 : 400~430MHz	X2 : 470~512MHz
Number of channels			
TK-8160 (E,E3,X2) .....	Max. 128 Channels total per radio		
	Zone : Max. 128 per radio		
	Channel : Max. 128 per zone		
TK-8162 (E,E3) .....	Max. 16 Channels		
Channel spacing .....	Wide 5k : 25kHz	*Wide 4k : 20kHz	Narrow : 12.5kHz
Operating voltage .....	13.6 V DC $\pm$ 15%		
Operating temperature range .....	-30°C~+60°C		
Frequency stability .....	$\pm$ 2.5ppm (-30°C~+60°C)		
Antenna impedance .....	50 $\Omega$		
Channel frequency spread .....	E,E3 : 30MHz	X2 : 42MHz	
Dimensions (W x H x D Projections not included) .....	160 x 43 x 107 mm		
Weight (net) .....	1.0kg		

### RECEIVER (Measurements made per EN standard)

Sensitivity			
EIA 12dB SINAD .....	Wide 5k : 0.28 $\mu$ V	* Wide 4k : 0.28 $\mu$ V	Narrow : 0.35 $\mu$ V
EN 20dB SINAD .....	Wide 5k : -3dB $\mu$ V	* Wide 4k : -3dB $\mu$ V	Narrow : -2dB $\mu$ V
Adjust channel selectivity			
E,E3 .....	Wide 5k : 70dB	* Wide 4k : 70dB	Narrow : 60dB
X2 .....	Wide : 73dB	Narrow : 65dB	
Inter modulation .....	E,E3 : 65dB	X2 : 70dB	
Spurious response rejection .....	70dB		
Audio output (8 $\Omega$ impedance) .....	4W with less than 5% distortion		

### TRANSMITTER (Measurements made per EN standard)

RF output power .....	E,E3 : 5~25W	X2 : 5/25W
Modulation limiting .....	Wide 5k : $\pm$ 5.0kHz at $\pm$ 25kHz	
	* Wide 4k : $\pm$ 4.0kHz at $\pm$ 20kHz	
	Narrow : $\pm$ 2.5kHz at $\pm$ 12.5kHz	
Spurious emission .....	-36dBm $\leq$ 1GHz, -30dBm $>$ 1GHz (X2 type : -30dBm)	
FM noise (EIA) .....	Wide 5k : 45dB	Narrow : 40dB
Modulation distortion .....	Wide 5k : 3%	Narrow : 5%

\* : E type only

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