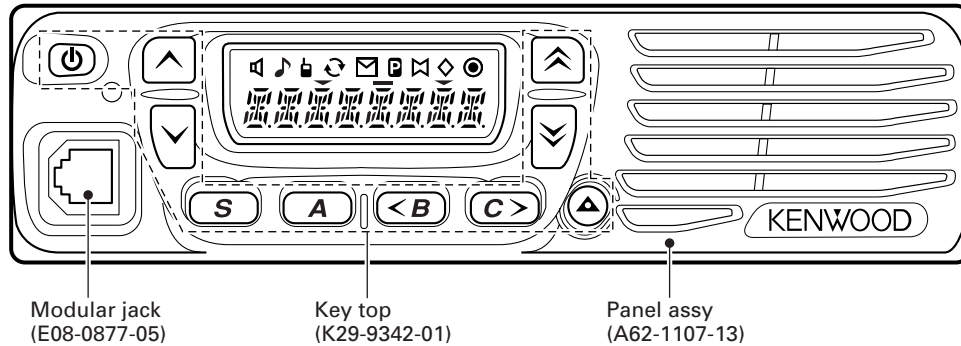
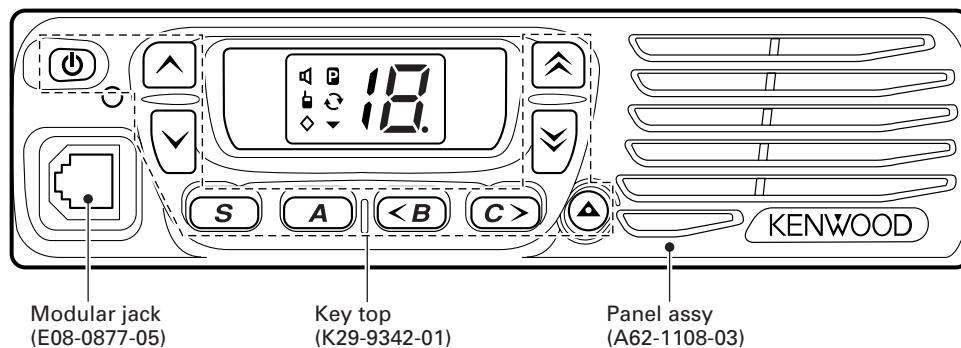


TK-7160 E



TK-7162 E



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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.

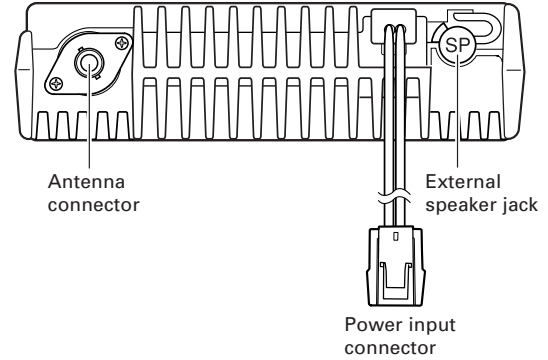
GENERAL / SYSTEM SET-UP

SERVICE

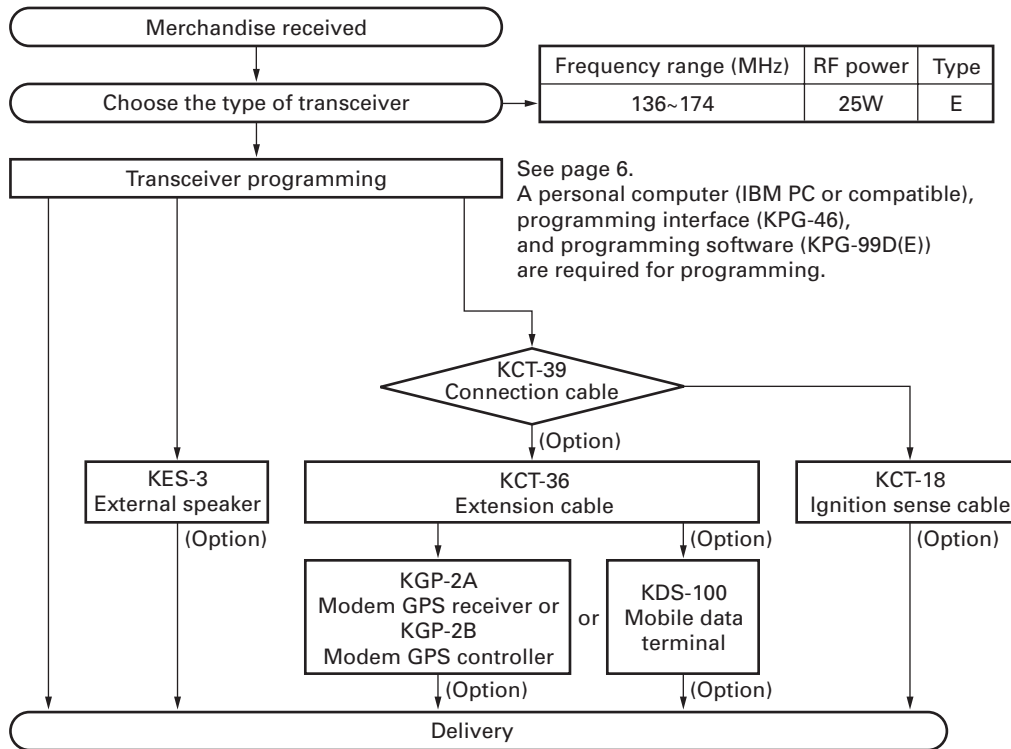
This radio is designed for easy servicing. Refer to the schematic diagrams, printed circuit board views, and alignment procedures contained in this manual.

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.



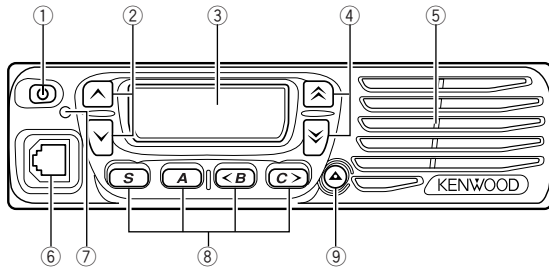
SYSTEM SET-UP



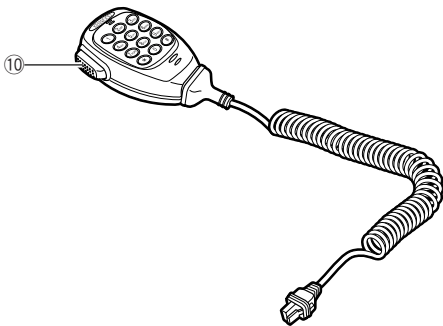
OPERATING FEATURES

1. Controls and Functions

1-1. Front Panel

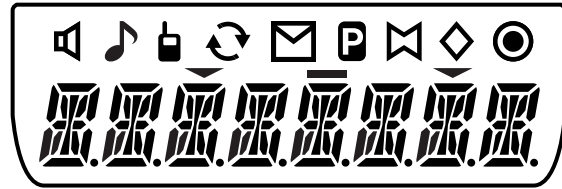


1-2. Microphone



- 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, , 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.

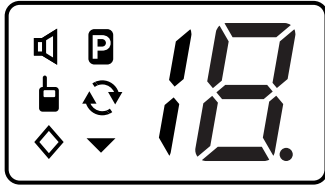
1-3. Display (TK-7160)



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

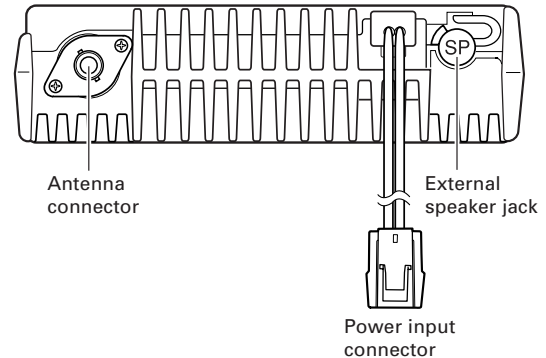
OPERATING FEATURES

1-4. Display (TK-7162)



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.

1-5. Rear Panel



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 ¹
- Digit 10x Down ¹
- Digit 1x Up ¹
- Digit 10x Up ¹
- Direct CH ^{2,3}
- Direct Zone-Channel ^{1,3}
- Display Character ¹
- Emergency ⁴
- Horn Alert
- Key Lock
- LCD Brightness ¹
- Lone Worker
- Monitor
- None
- Operator Selectable Tone ¹
- Scan Del/Add
- Scan
- Scrambler
- Selcall ¹
- Selcall (5-tone) ¹
- Selcall + Status ¹
- Send the GPS data ¹
- Squelch Level
- Squelch Off
- Squelch Off Momentary
- Status ¹
- 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-7160 transceivers.

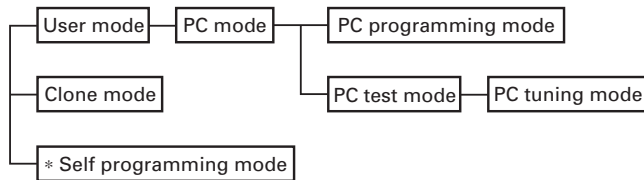
² Direct CH is available only on TK-7162 transceivers.

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.

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-7160 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	[s]+Power ON (Two seconds)

* : Only TK-7160 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-7160) or "P" (TK-7162) is displayed on the LCD.

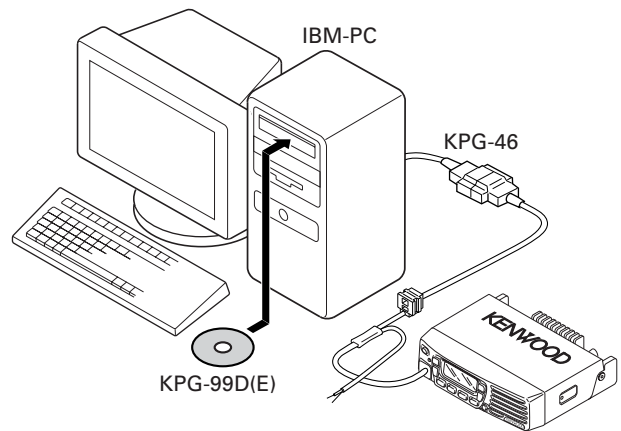


Fig. 1

TK-7160/TK-7162

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-7160) or "C" (TK-7162) 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-7160) or "P" (TK-7162) is displayed and green LED blinked. When cloning of data is completed, the master displays "END" (TK-7160) or "E" (TK-7162), 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.

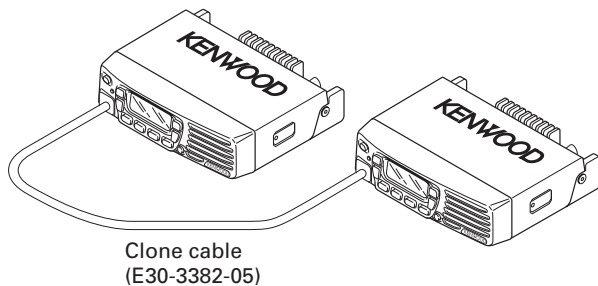
REALIGNMENT

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.

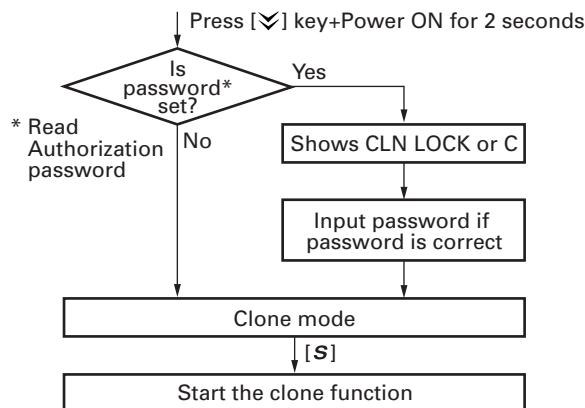
1. [∇]+Power ON.
2. "CLN LOCK" (TK-7160) or "P" (TK-7162) is displayed on the LCD.
3. If the [\wedge] and [∇] keys is pressed while "CLN LOCK" (TK-7160) or "P" (TK-7162) is displayed, numbers (0 to 9) are displayed flashing. When you press the [\mathbf{C} >] key, the currently selected number is determined. If you press the [\mathbf{S}] key after entering the password in this procedure, "CLONE" (TK-7160) or "C" (TK-7162) is displayed if the entered password is correct. If the password is incorrect, "CLN LOCK" (TK-7160) or "P" (TK-7162) 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-7160** 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 [∇] 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 [∇].
- 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

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).

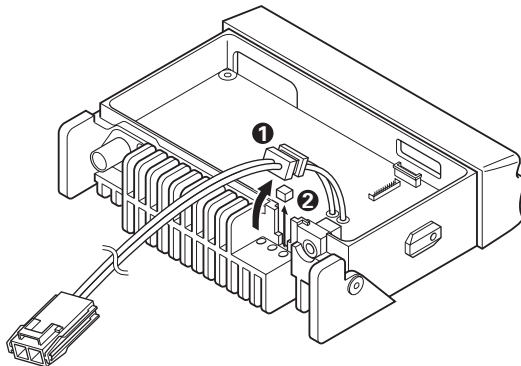


Fig. 3

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

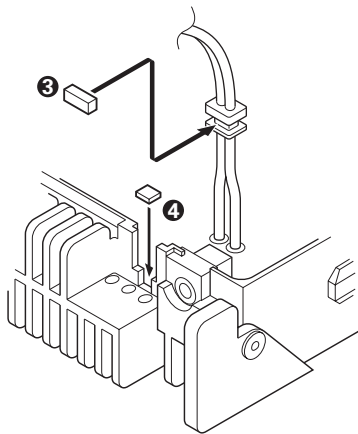


Fig. 4

■ 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				

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).

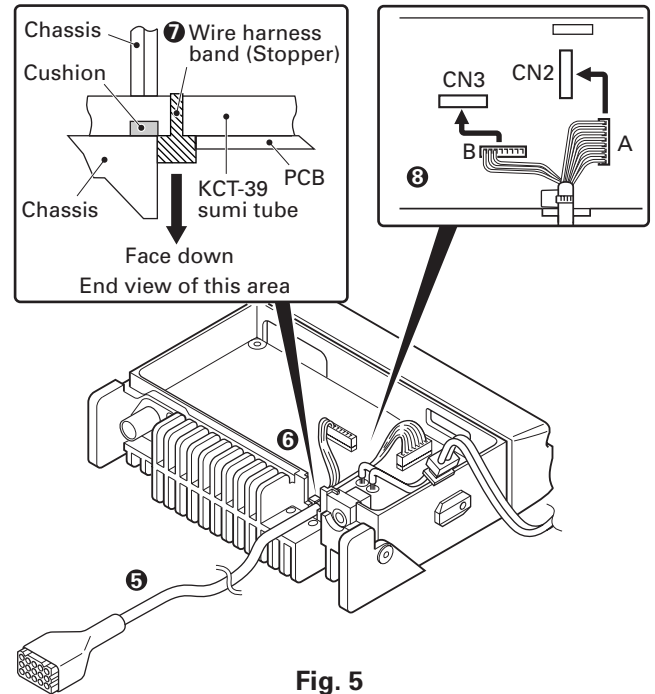


Fig. 5

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.

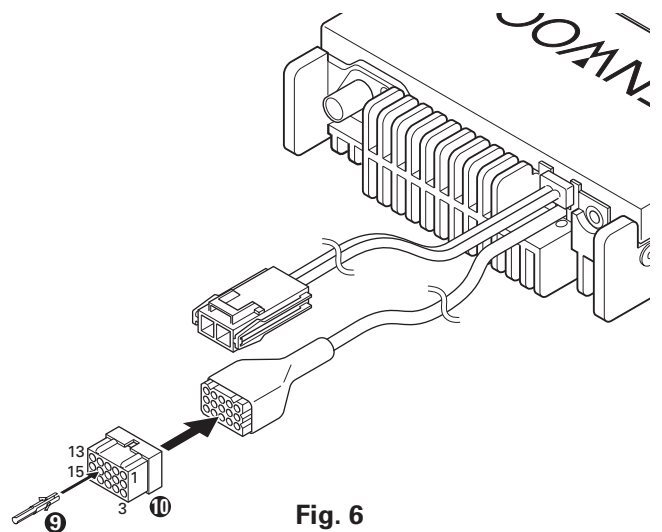
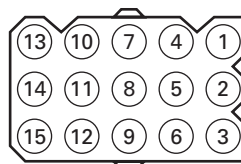


Fig. 6



TK-7160/7162

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).

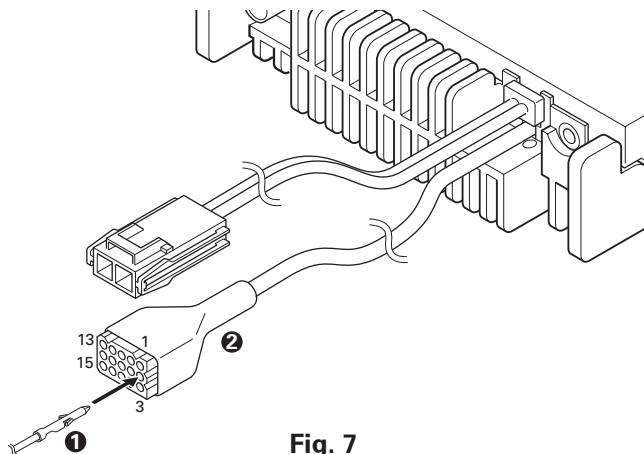


Fig. 7

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".

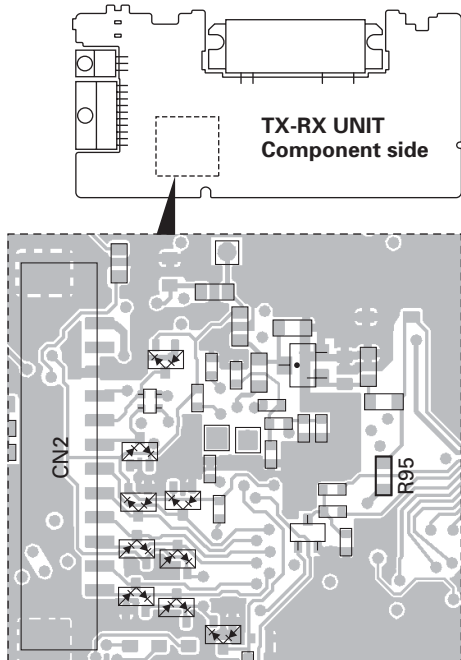


Fig. 8

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

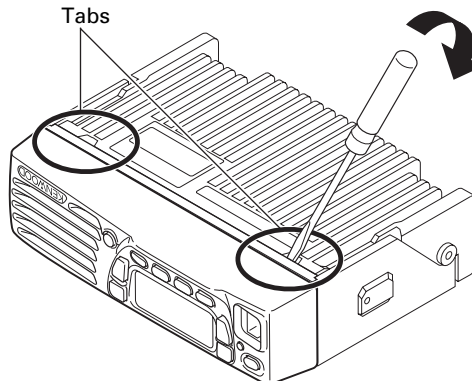


Fig. 1

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

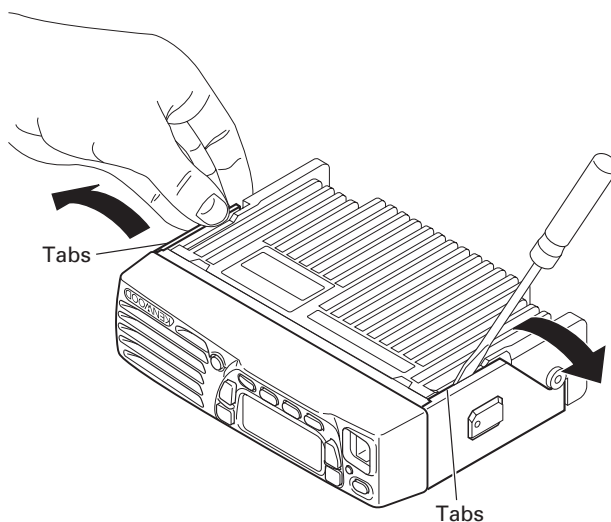


Fig. 2

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

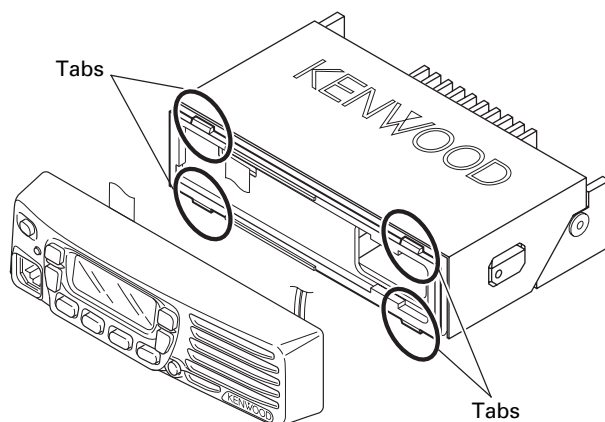


Fig. 3

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.

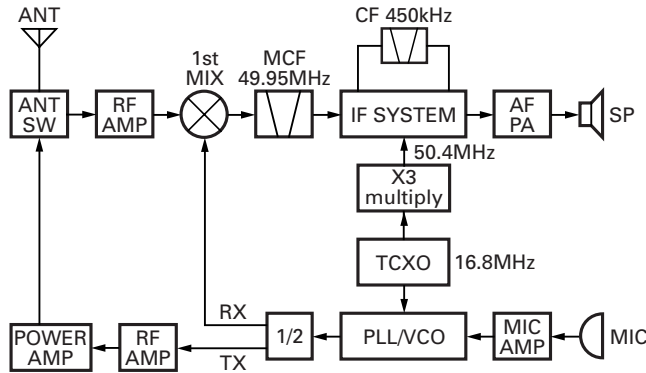


Fig. 1 Frequency configuration

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 (D602 and D603 are off) and a band pass filter (L357, L356 and varactor diodes : D353, D354). After the signal is amplified (Q353), the signal is filtered through a band pass filter (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.

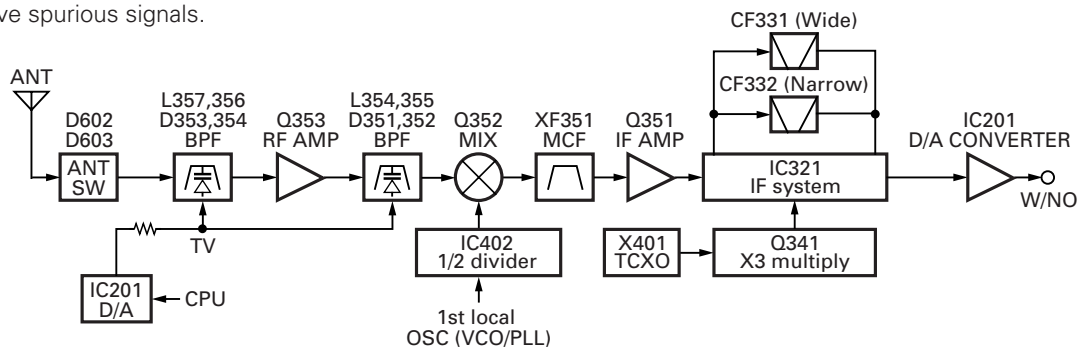


Fig. 2 Receiver system

■ 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

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.

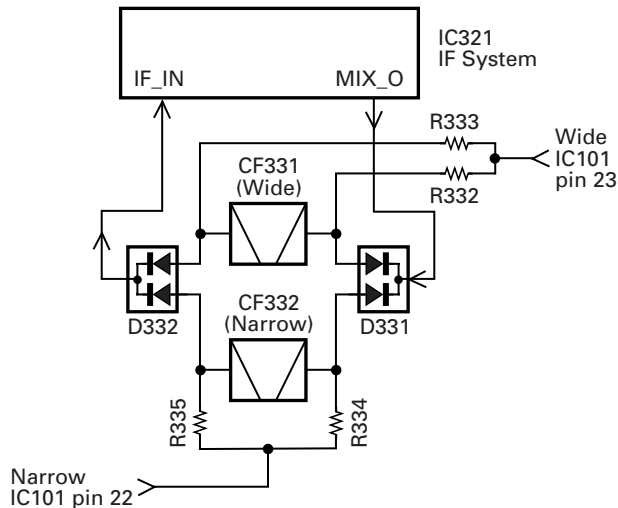


Fig. 3 Wide/Narrow switching circuit

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.

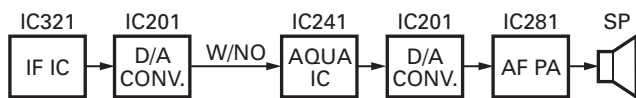


Fig. 4 AF signal system

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.

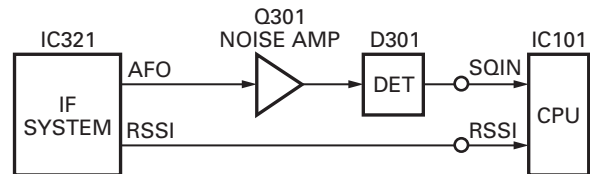


Fig. 5 Squelch circuit

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 Q444 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 Q444 off, and turn Q441 on. The TX/RX pin is set high in transmit mode. The outputs from Q441 and Q444 are amplified by Q446 and sent to the RF amplifiers.

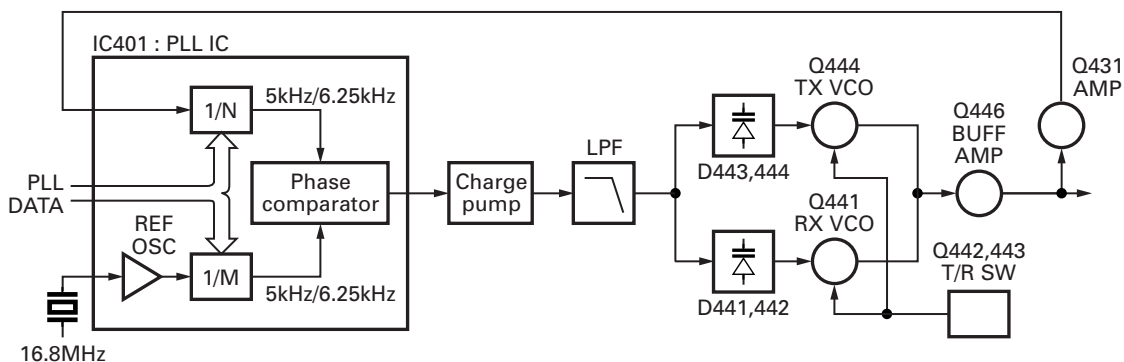


Fig. 6 PLL circuit

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.

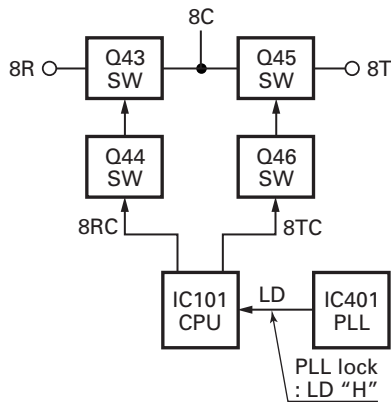


Fig. 7 Unlock circuit

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 RF power module (IC502) through a low-pass filter. The low-pass filter removes unwanted high-frequency harmonic components, and the resulting signal is sent to the antenna terminal.

■ APC Circuit

The automatic transmission power control (APC) circuit detects part of a final amplifier output with a diode (D606, D607 and D608) 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.

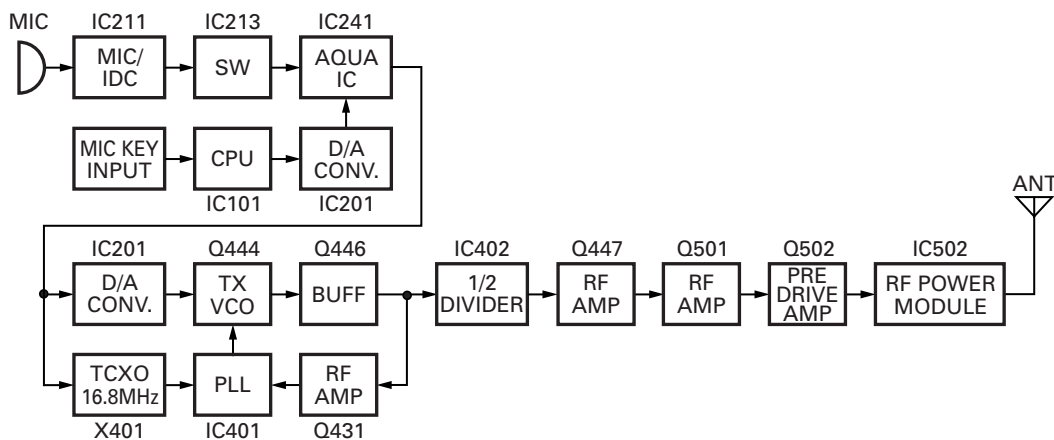


Fig. 8 Transmitter system

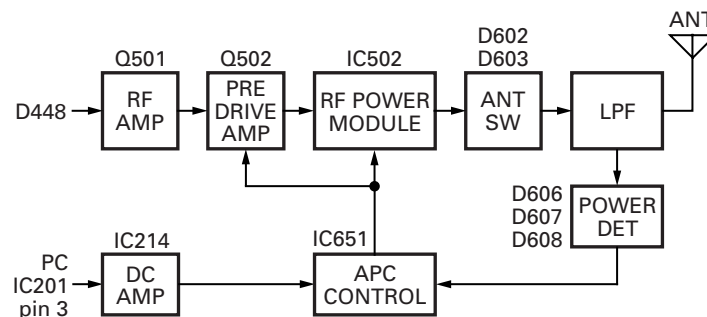


Fig. 9 APC circuit

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.

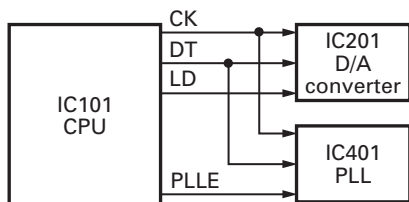


Fig. 10 Control circuit

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.

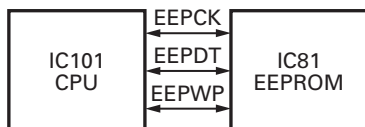


Fig. 11 Memory circuit

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.

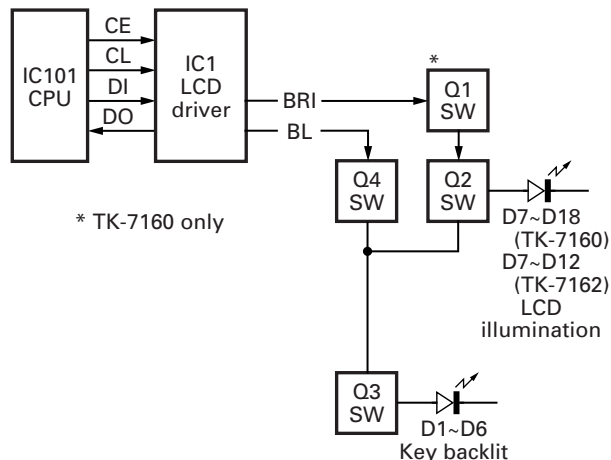


Fig. 12 Display circuit

Key Matrix Circuit

The TK-7160/7162 front panel has function keys. The TK-7162 terminal names are in parentheses 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.

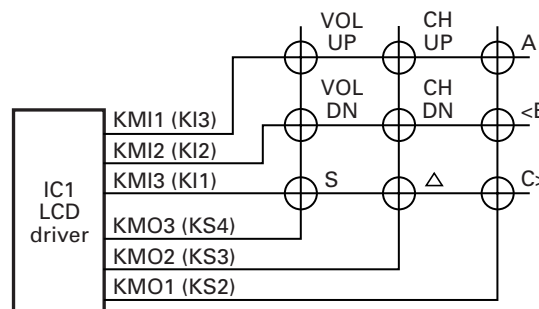


Fig. 13 Key matrix circuit

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

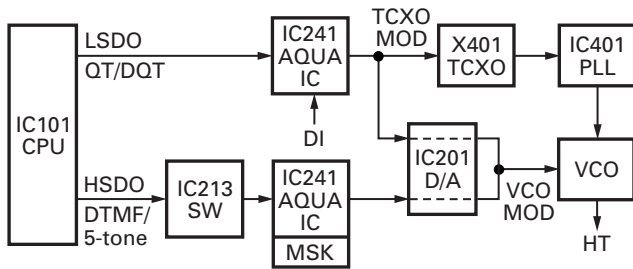


Fig. 14 Encode

• 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.

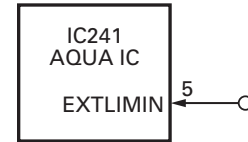


Fig. 15 Decode

■ 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.

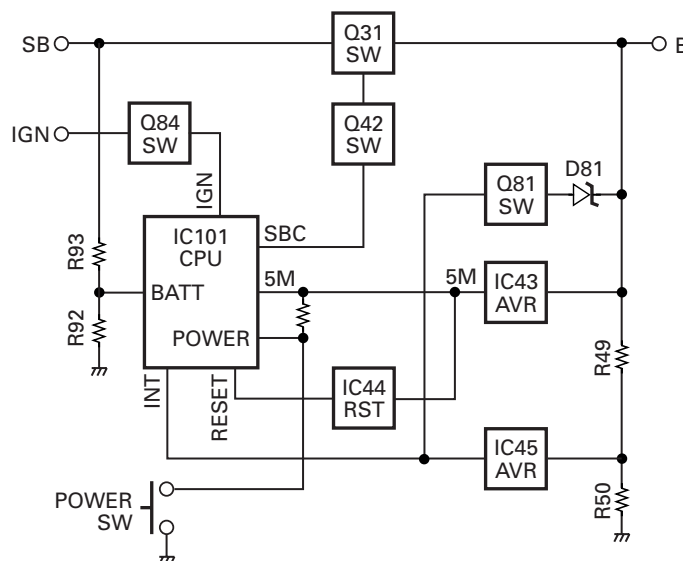


Fig. 16 Power supply circuit

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-7160

Display Unit (X54-3522-70) : TK-7162

Ref. No.	Parts name	Description
IC1	IC	LCD controller
Q1	Transistor	Dimmer function switch (TK-7160 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-7160 only)
D20	Diode	Surge absorption
D21	Diode	DC controller
D22	Diode	TX/RX LED

TX-RX Unit (X57-7102-70)

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 AMP
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
IC402	IC	VCO 1/2 divider
IC502	IIC	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

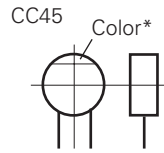
Ref. No.	Parts name	Description
Q212	FET	Emergency MIC
Q213	FET	MIC mute
Q241	Transistor	W/N switch / TX
Q242,243	Transistor	AQUA beat shift
Q281	Digital transistor	AF mute
Q282	Transistor	AF mute
Q301	Transistor	SQL amplifier
Q341	Transistor	Buffer amplifier
Q351	Transistor	IF amplifier
Q352	FET	Mixer
Q353	FET	RF amplifier
Q421,422	Transistor	Charge pump
Q431	Transistor	RF amplifier
Q441	FET	RX VCO
Q442	FET	T/R switch
Q443	Transistor	T/R switch
Q444	FET	TX VCO
Q445	Transistor	Ripple filter
Q446	Transistor	Buffer amplifier
Q447	Transistor	RF amplifier
Q501	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)
D351~354	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)
D501	Diode	Temperature compensation
D503	Diode	Voltage protection
D602,603	Diode	ANT switch
D606	Diode	APC voltage detect
D608	Diode	APC voltage detect
D609,610	Diode	Temperature compensation

PARTS LIST

CAPACITORS

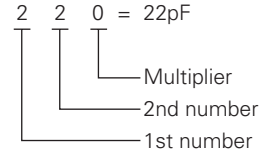
CC 45 TH 1H 220 J
 1 2 3 4 5 6

- 1 = Type ... ceramic, electrolytic, etc.
- 2 = Shape ... round, square, etc.
- 3 = Temp. coefficient
- 4 = Voltage rating
- 5 = Value
- 6 = Tolerance



• Capacitor value

- 010 = 1pF
- 100 = 10pF
- 101 = 100pF
- 102 = 1000pF = 0.001μF
- 103 = 0.01μF



• Temperature coefficient

1st Word	C	L	P	R	S	T	U
Color*	Black	Red	Orange	Yellow	Green	Blue	Violet
ppm/°C	0	-80	-150	-220	-330	-470	-750

2nd Word	G	H	J	K	L
ppm/°C	±30	±60	±120	±250	±500

Example : CC45TH = -470±60ppm/°C

• Tolerance (More than 10pF)

Code	C	D	G	J	K	M	X	Z	P	No code
(%)	±0.25	±0.5	±2	±5	±10	±20	+40 -20	+80 -20	+100 -0	More than 10μF : -10~+50 Less than 4.7μF : -10~+75

(Less than 10pF)

Code	B	C	D	F	G
(pF)	±0.1	±0.25	±0.5	±1	±2

• Voltage rating

2nd word \ 1st word	A	B	C	D	E	F	G	H	J	K	V
0	1.0	1.25	1.6	2.0	2.5	3.15	4.0	5.0	6.3	8.0	-
1	10	12.5	16	20	25	31.5	40	50	63	80	35
2	100	125	160	200	250	315	400	500	630	800	-
3	1000	1250	1600	2000	2500	2150	4000	5000	6300	8000	-

CHIP CAPACITORS

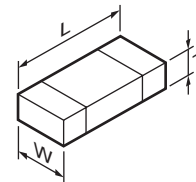
(EX) CC 73 F SL 1H 000 J
 1 2 3 4 5 6 7
 (Chip) (CH, RH, UJ, SL)

(EX) CK 73 F F 1H 000 Z
 1 2 3 4 5 6 7
 (Chip) (B, F)

Refer to the table above.

- 1 = Type
- 2 = Shape
- 3 = Dimension
- 4 = Temp. coefficient
- 5 = Voltage rating
- 6 = Value
- 7 = Tolerance

• Dimension



Chip capacitor

Code	L	W	T
Empty	5.6±0.5	5.0±0.5	Less than 2.0
A	4.5±0.5	3.2±0.4	Less than 2.0
B	4.5±0.5	2.0±0.3	Less than 2.0
C	4.5±0.5	1.25±0.2	Less than 1.25
D	3.2±0.4	2.5±0.3	Less than 1.5
E	3.2±0.2	1.6±0.2	Less than 1.25
F	2.0±0.3	1.25±0.2	Less than 1.25
G	1.6±0.2	0.8±0.2	Less than 1.0
H	1.0±0.05	0.5±0.05	0.5±0.05

Chip resistor

Code	L	W	T
E	3.2±0.2	1.6±0.2	1.0
F	2.0±0.3	1.25±0.2	1.0
G	1.6±0.2	0.8±0.2	0.5±0.1
H	1.0±0.05	0.5±0.05	0.35±0.05

RESISTORS

• Chip resistor (Carbon)

(EX) RD 73 E B 2B 000 J
 1 2 3 4 5 6 7
 (Chip) (B, F)

• Carbon resistor (Normal type)

(EX) RD 14 B B 2C 000 J
 1 2 3 4 5 6 7
 (Chip) (B, F)

- 1 = Type ... ceramic, electrolytic, etc.
- 2 = Shape ... round, square, etc.
- 3 = Dimension
- 4 = Temp. coefficient
- 5 = Voltage rating
- 6 = Value
- 7 = Tolerance

• Rating wattage

Code	Wattage	Code	Wattage	Code	Wattage
1J	1/16W	2C	1/6W	3A	1W
2A	1/10W	2E	1/4W	3D	2W
2B	1/8W	2H	1/2W		

PARTS LIST

* New Parts. Δ 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-7160/7162 (Y51-506X-XX)

DISPLAY UNIT (X54-3510-10)

DISPLAY UNIT (X54-3522-70)

Ref. No.	Address	New parts	Parts No.	Description	Desti-nation
TK-7160/7162					
1	1B		A02-3898-02	PLASTIC CABINET	
2	3A	*	A62-1107-13	PANEL ASSY	60E
2	3A	*	A62-1108-03	PANEL ASSY	62E
3	3A		B42-7729-04	STICKER (WEEE)	
4	1C	*	B62-1863-00	INSTRUCTION MANUAL	
8	3B		E04-0454-05	RF COAXIAL RECEPTACLE (BNC)	
10	2B		E30-3448-05	DC CORD	
11	3C		E30-7523-05	DC CORD ASSY ACCESSORY	
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	
20	3C		F52-0023-05	FUSE (BLADE TYPE) ACCESSORY	
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)	
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		H52-2078-02	ITEM CARTON CASE	60E
37	2C		H52-2087-02	ITEM CARTON CASE	62E
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	
DISPLAY UNIT (X54-3510-10) : TK-7160					
101	2A		B11-1829-03	ILLUMINATION GUIDE	
102	2A		B38-0902-05	LCD	
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	

Ref. No.	Address	New parts	Parts No.	Description	Desti-nation
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	
DISPLAY UNIT (X54-3522-70) : TK-7162					
101	2A		B11-1829-03	ILLUMINATION GUIDE	
102	2A		B38-0905-05	LCD	
D1-6			B30-2282-05	LED (Y)	
D7-12			B30-2281-05	LED (Y)	
D22			B30-2151-05	LED (RED/GREEN)	

PARTS LIST

DISPLAY UNIT (X54-3522-70)

TX-RX UNIT (X57-7102-70)

Ref. No.	Address	New parts	Parts No.	Description	Destination	Ref. No.	Address	New parts	Parts No.	Description	Destination
C1			CK73GB1H103K	CHIP C 0.010UF K		C43			CK73GB1H102K	CHIP C 1000PF K	
C6,7			CK73GB1H102K	CHIP C 1000PF K		C45			CK73GB1H471K	CHIP C 470PF K	
C9			CK73GB1H102K	CHIP C 1000PF K		C46			CK73GB1H221K	CHIP C 220PF K	
C10			CK73GB1H103K	CHIP C 0.010UF K		C47,48			CK73GB1H102K	CHIP C 1000PF K	
C11-14			CK73GB1H102K	CHIP C 1000PF K		C49			C92-0721-05	ELECTRO 330UF 25WV	
C15			CK73GB1H471K	CHIP C 470PF K		C50-53			CK73GB1H102K	CHIP C 1000PF K	
C16,17			CK73GB1A105K	CHIP C 1.0UF K		C54,55			CK73GB1C104K	CHIP C 0.10UF K	
C18			CK73GB1H103K	CHIP C 0.010UF K		C56			C92-0795-05	CHIP-TAN 22UF 10WV	
C19,20			CC73GCH1H101J	CHIP C 100PF J		C57			CK73GB1H103K	CHIP C 0.010UF K	
C21			CK73GB1H821K	CHIP C 820PF K		C58-60			C92-0795-05	CHIP-TAN 22UF 10WV	
C22,23			CK73GB1H102K	CHIP C 1000PF K		C63			CK73GB1E103K	CHIP C 0.010UF K	
C24			CK73GB1H103K	CHIP C 0.010UF K		C64,65			CK73GB1H103K	CHIP C 0.010UF K	
C25			CK73GB1H102K	CHIP C 1000PF K		C66			C92-0560-05	CHIP-TAN 10UF 6.3WV	
C27			CC73GCH1H101J	CHIP C 100PF J		C67,68			CK73GB1H102K	CHIP C 1000PF K	
						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		C110-117			CK73HB1C103K	CHIP C 0.010UF K	
R10,11			RK73FB2A331J	CHIP R 330 J 1/10W		C201			CK73GB1C104K	CHIP C 0.10UF K	
R17,18			RK73FB2A390J	CHIP R 39 J 1/10W		C202			C92-0507-05	CHIP-TAN 4.7UF 6.3WV	
R19			RK73GB1J392J	CHIP R 3.9K J 1/16W		C203			CK73GB1C333K	CHIP C 0.033UF K	
R20			R92-0670-05	CHIP R 0 OHM		C204			CK73GB1H102K	CHIP C 1000PF K	
R21			R92-1252-05	CHIP R 0 OHM J 1/16W		C206			CK73GB1H102K	CHIP C 1000PF K	
R22			RK73FB2A181J	CHIP R 180 J 1/10W		C211			CK73GB1H183K	CHIP C 0.018UF K	
R23			RK73FB2A820J	CHIP R 82 J 1/10W		C212			CK73HB1H152K	CHIP C 1500PF K	
R24,25			RK73GB1J103J	CHIP R 10K J 1/16W		C213			CK73GB1C104K	CHIP C 0.10UF K	
R26,27			RK73GB1J102J	CHIP R 1.0K J 1/16W		C214			CC73HCH1H390J	CHIP C 39PF J	
R28,29			RK73GB1J390J	CHIP R 39 J 1/16W		C215			CK73HB1A104K	CHIP C 0.10UF K	
D20,21			MC2850	DIODE		C216			C92-0514-05	CHIP-TAN 2.2UF 10WV	
IC1			LC75893M	MOS-IC		C217			CK73HB1H471K	CHIP C 470PF K	
Q2			2SB1132(Q,R)	TRANSISTOR		C218-221			CK73GB1C104K	CHIP C 0.10UF K	
Q3			KRA225S	DIGITAL TRANSISTOR		C222,223			CK73HB1A104K	CHIP C 0.10UF K	
Q4			KRC102S	DIGITAL TRANSISTOR		C224			CK73GB1H103K	CHIP C 0.010UF K	
Q7,8			2SC3928A	TRANSISTOR		C225			CK73GB1C104K	CHIP C 0.10UF K	
						C226			CK73HB1H471K	CHIP C 470PF K	
TX-RX UNIT (X57-7102-70)											
C10			CK73HB1H102K	CHIP C 1000PF K		C227			CK73HB1A104K	CHIP C 0.10UF K	
C13-23			CK73HB1H471K	CHIP C 470PF K		C228			CK73GB0J475K	CHIP C 4.7UF K	
C24			CC73GCH1H221J	CHIP C 220PF J		C229			CK73GB1A105K	CHIP C 1.0UF K	
C25			CC73GCH1H101J	CHIP C 100PF J		C230			C92-0560-05	CHIP-TAN 10UF 6.3WV	
C26			CC73GCH1H220J	CHIP C 22PF J		C231			C92-0662-05	CHIP-TAN 15UF 6.3WV	
C27			CC73GCH1H101J	CHIP C 100PF J		C233			CK73GB1H471K	CHIP C 470PF K	
C28			CC73GCH1H470J	CHIP C 47PF J		C234			CC73HCH1H050B	CHIP C 5.0PF B	
C29			CC73GCH1H220J	CHIP C 22PF J		C235			CK73HB1H102K	CHIP C 1000PF K	
C41			CK73GB1H221K	CHIP C 220PF K		C236			CC73HCH1H050B	CHIP C 5.0PF B	
C42			CK73GB1H471K	CHIP C 470PF K		C237,238			CK73HB1H102K	CHIP C 1000PF K	
						C241-245			CK73HB1H471K	CHIP C 470PF K	
						C246			CK73HB1C223K	CHIP C 0.022UF K	
						C247,248			CK73HB1H471K	CHIP C 470PF K	
						C249,250			CC73HCH1H050B	CHIP C 5.0PF B	
						C251			CK73HB1A473K	CHIP C 0.047UF K	

PARTS LIST

TX-RX UNIT (X57-7102-70)

Ref. No.	Address	New parts	Parts No.	Description	Desti-nation	Ref. No.	Address	New parts	Parts No.	Description	Desti-nation
C252			CK73HB1A104K	CHIP C 0.10UF K		C359			CC73GCH1H080B	CHIP C 8.0PF B	
C253			CK73GB1H102K	CHIP C 1000PF K		C360-362			CK73GB1H102K	CHIP C 1000PF K	
C254			CK73GB1H332K	CHIP C 3300PF K		C363			CK73GB1H103K	CHIP C 0.010UF K	
C255			CC73HCH1H560J	CHIP C 56PF J		C364			CK73GB1H102K	CHIP C 1000PF K	
C256			CK73GB1H331K	CHIP C 330PF K		C366			CK73GB1C104K	CHIP C 0.10UF K	
C257			CC73HCH1H090B	CHIP C 9.0PF B		C367			CC73GCH1H151J	CHIP C 150PF J	
C259			CC73HCH1H151J	CHIP C 150PF J		C368			CC73GCH1H270J	CHIP C 27PF J	
C260			CK73GB1A474K	CHIP C 0.47UF K		C369			CC73GCH1H3R5B	CHIP C 3.5PF B	
C261			CK73HB1A104K	CHIP C 0.10UF K		C370			CK73GB1H102K	CHIP C 1000PF K	
C262			CK73GB1A105K	CHIP C 1.0UF K		C371			CC73GCH1H020B	CHIP C 2.0PF B	
C263			CK73GB1H103K	CHIP C 0.010UF K		C372			CK73GB1H102K	CHIP C 1000PF K	
C264			CC73HCH1H330J	CHIP C 33PF J		C373			CC73GCH1H070B	CHIP C 7.0PF B	
C265			CK73HB1H391K	CHIP C 390PF K		C374			CC73GCH1H270J	CHIP C 27PF J	
C266			CK73GB1C104K	CHIP C 0.10UF K		C375-379			CK73GB1H102K	CHIP C 1000PF K	
C267			CK73HB1A104K	CHIP C 0.10UF K		C380			CC73GCH1H101G	CHIP C 100PF G	
C268			CC73HCH1H181J	CHIP C 180PF J		C381			CC73GCH1H1R5B	CHIP C 1.5PF B	
C269			C92-0507-05	CHIP-TAN 4.7UF 6.3WV		C382			CC73GCH1H220J	CHIP C 22PF J	
C270			C92-0560-05	CHIP-TAN 10UF 6.3WV		C383			CK73GB1H102K	CHIP C 1000PF K	
C271			CK73HB1A104K	CHIP C 0.10UF K		C384			CC73GCH1H1R5B	CHIP C 1.5PF B	
C272			C92-0507-05	CHIP-TAN 4.7UF 6.3WV		C385			CC73GCH1H110G	CHIP C 11PF G	
C273,274			CK73HB1H681K	CHIP C 680PF K		C386			CC73GCH1H470J	CHIP C 47PF J	
C275,276			CK73HB1H102K	CHIP C 1000PF K		C387			CK73GB1H102K	CHIP C 1000PF K	
C281			CK73GB1H102K	CHIP C 1000PF K		C388			CC73GCH1H040B	CHIP C 4.0PF B	
C282			CK73GB1A105K	CHIP C 1.0UF K		C392			CK73GB1H102K	CHIP C 1000PF K	
C283			CK73FB1C224K	CHIP C 0.22UF K		C401,402			CK73GB1H102K	CHIP C 1000PF K	
C284			CK73GB1C104K	CHIP C 0.10UF K		C403			CC73GCH1H101J	CHIP C 100PF J	
C285			C92-0516-05	CHIP-TAN 4.7UF 16WV		C404,405			CC73HCH1H101J	CHIP C 100PF J	
C286			C92-0040-05	CHIP-ELE 47UF 16WV		C406			CC73GCH1H020B	CHIP C 2.0PF B	
C287			C92-0722-05	ELECTRO 470UF 16WV		C407			CK73GB1H102K	CHIP C 1000PF K	
C288-290			CK73GB1H102K	CHIP C 1000PF K		C409			CC73HCH1H220J	CHIP C 22PF J	
C291			CC73GCH1H220J	CHIP C 22PF J		C410,411			CK73GB1C104K	CHIP C 0.10UF K	
C293			CK73GB1A105K	CHIP C 1.0UF K		C412			C92-0560-05	CHIP-TAN 10UF 6.3WV	
C301			C92-0507-05	CHIP-TAN 4.7UF 6.3WV		C413			CK73GB1C104K	CHIP C 0.10UF K	
C302			CK73GB1H102K	CHIP C 1000PF K		C414			C92-0560-05	CHIP-TAN 10UF 6.3WV	
C303			CK73GB1H472K	CHIP C 4700PF K		C415			CK73HB1C103K	CHIP C 0.010UF K	
C304			CC73GCH1H331J	CHIP C 330PF J		C416			CK73GB1C104K	CHIP C 0.10UF K	
C305			CK73GB1H471K	CHIP C 470PF K		C422,423			CK73HB1H102K	CHIP C 1000PF K	
C306			CK73GB1H102K	CHIP C 1000PF K		C424			CK73GB1H471K	CHIP C 470PF K	
C307			CK73GB1E223K	CHIP C 0.022UF K		C425			C92-0555-05	CHIP-TAN 0.047UF 35WV	
C308			CK73GB1H102K	CHIP C 1000PF K		C426			C92-0514-05	CHIP-TAN 2.2UF 10WV	
C309			CK73GB1E223K	CHIP C 0.022UF K		C427			C92-0001-05	CHIP-TAN 0.1UF 35WV	
C310			CK73FB1C334K	CHIP C 0.33UF K		C431			CK73GB1H102K	CHIP C 1000PF K	
C321			CK73GB1H103K	CHIP C 0.010UF K		C434			CK73GB1H471K	CHIP C 470PF K	
C322-324			CK73GB1C104K	CHIP C 0.10UF K		C441			CC73GCH1H300J	CHIP C 30PF J	
C325			C92-0662-05	CHIP-TAN 15UF 6.3WV		C442			CC73GCH1H080B	CHIP C 8.0PF B	
C326			CK73GB1H103K	CHIP C 0.010UF K		C443			CK73GB1H471K	CHIP C 470PF K	
C331-333			CK73GB1C104K	CHIP C 0.10UF K		C444			CC73GCH1H010B	CHIP C 1.0PF B	
C341			CC73GCH1H101J	CHIP C 100PF J		C445			CC73GCH1H4R5B	CHIP C 4.5PF B	
C343			CC73GCH1H680J	CHIP C 68PF J		C446			CC73GCH1H050B	CHIP C 5.0PF B	
C344			CC73GCH1H560J	CHIP C 56PF J		C447			CC73GCH1H0R3B	CHIP C 0.3PF B	
C345			CC73GCH1H271J	CHIP C 270PF J		C451			CK73GB1H471K	CHIP C 470PF K	
C346			CK73GB1H103K	CHIP C 0.010UF K		C453			CC73GCH1H470J	CHIP C 47PF J	
C349,350			CK73GB1E103K	CHIP C 0.010UF K		C454			CC73GCH1H100C	CHIP C 10PF C	
C351			CC73GCH1H330J	CHIP C 33PF J		C455			CC73GCH1HR75B	CHIP C 0.75PF B	
C353			CK73GB1H103K	CHIP C 0.010UF K		C456			CK73GB1H471K	CHIP C 470PF K	
C354			CC73GCH1H030B	CHIP C 3.0PF B		C457			CC73GCH1HR75B	CHIP C 0.75PF B	
C355			CC73GCH1H180J	CHIP C 18PF J		C458			CC73GCH1H100C	CHIP C 10PF C	
C356			CC73GCH1H060B	CHIP C 6.0PF B		C459			CC73GCH1H110G	CHIP C 11PF G	
C357			CK73GB1H103K	CHIP C 0.010UF K		C460			CC73GCH1H0R5B	CHIP C 0.5PF B	
C358			CK73GB1H102K	CHIP C 1000PF K		C461			C92-0560-05	CHIP-TAN 10UF 6.3WV	

PARTS LIST

TX-RX UNIT (X57-7102-70)

Ref. No.	Address	New parts	Parts No.	Description	Destination	Ref. No.	Address	New parts	Parts No.	Description	Destination
C463,464			CK73GB1H471K	CHIP C 470PF K		CN2			E40-5702-05	PIN ASSY	
C465			C92-0795-05	CHIP-TAN 22UF 10WV		CN3			E40-6292-05	PIN ASSY	
C466,467			CK73GB1H471K	CHIP C 470PF K		CN5			E40-3246-05	PIN ASSY	
C468			CK73GB1H221K	CHIP C 220PF K		CN301-304			E23-1081-05	TERMINAL	
C469			CC73GCH1H060B	CHIP C 6.0PF B		CN501-503			E23-1081-05	TERMINAL	
C470			CC73GCH1H020B	CHIP C 2.0PF B		CN504-506			E23-1262-05	TERMINAL	
C471			CC73GCH1H030B	CHIP C 3.0PF B		J1			E11-0425-05	3.5D PHONE JACK (3P)	
C472			CK73GB1H102K	CHIP C 1000PF K		F41			F53-0246-05	FUSE	
C473			CK73GB1H221K	CHIP C 220PF K		CF331			L72-0993-05	CERAMIC FILTER	
C474,475			CK73GB1H102K	CHIP C 1000PF K		CF332			L72-0999-05	CERAMIC FILTER	
C476			CC73GCH1H180J	CHIP C 18PF J		L1,2			L92-0179-05	CHIP FERRITE	
C477			CK73GB1H102K	CHIP C 1000PF K		L101			L92-0443-05	CHIP FERRITE	
C478			CC73GCH1H100C	CHIP C 10PF C		L211			L92-0443-05	CHIP FERRITE	
C479			CC73GCH1H220J	CHIP C 22PF J		L321			L34-4554-05	COIL	
C480			CC73GCH1H101J	CHIP C 100PF J		L341			L41-3385-08	SMALL FIXED INDUCTOR (330NH)	
C481-483			CK73GB1H102K	CHIP C 1000PF K		L342,343			L40-3381-86	SMALL FIXED INDUCTOR (0.33UH)	
C484			CK73GB1H221K	CHIP C 220PF K		L351			L41-8285-08	SMALL FIXED INDUCTOR (820NH)	
C487			CC73GCH1H110G	CHIP C 11PF G		L352			L41-5685-08	SMALL FIXED INDUCTOR (560NH)	
C501,502			CK73GB1H102K	CHIP C 1000PF K		L354,355			L34-4612-05	AIR-CORE COIL	
C503			CC73GCH1H101J	CHIP C 100PF J		L356			L34-4613-05	AIR-CORE COIL	
C504-507			CK73GB1H102K	CHIP C 1000PF K		L357			L34-4610-05	AIR-CORE COIL	
C509			CC73GCH1H150J	CHIP C 15PF J		L402			L41-1005-08	SMALL FIXED INDUCTOR (10UH)	
C510			CC73GCH1H080B	CHIP C 8.0PF B		L404			L92-0442-05	CHIP FERRITE	
C513-515			CK73GB1H102K	CHIP C 1000PF K		L421			L92-0443-05	CHIP FERRITE	
C516			CC73GCH1H270J	CHIP C 27PF J		L441,442			L40-2785-92	SMALL FIXED INDUCTOR (270NH)	
C517			CC73GCH1H220J	CHIP C 22PF J		L443			L41-3378-14	SMALL FIXED INDUCTOR (33NH)	
C518			CC73GCH1H470J	CHIP C 47PF J		L444,445			L40-2702-86	SMALL FIXED INDUCTOR (27UH)	
C519			CC73GCH1H101J	CHIP C 100PF J		L446,447			L40-2785-92	SMALL FIXED INDUCTOR (270NH)	
C523			CK73FB1H102K	CHIP C 1000PF K		L448			L41-4778-14	SMALL FIXED INDUCTOR (47NH)	
C527			CS77AA0J470M	CHIP-TAN 47UF 6.3WV		L449,450			L40-2702-86	SMALL FIXED INDUCTOR (27UH)	
C528,529			CK73GB1H102K	CHIP C 1000PF K		L451-453			L92-0443-05	CHIP FERRITE	
C530			CK73GB1H221K	CHIP C 220PF K		L454			L41-3375-06	SMALL FIXED INDUCTOR (33NH)	
C531			CK73GB1C104K	CHIP C 0.10UF K		L455			L41-1085-06	SMALL FIXED INDUCTOR (100NH)	
C532			CK73GB1H471K	CHIP C 470PF K		L456			L41-1585-06	SMALL FIXED INDUCTOR (150NH)	
C533			C92-0719-05	ELECTRO 47UF 25WV		L457			L41-1085-06	SMALL FIXED INDUCTOR (100NH)	
C535			CC73GCH1H101J	CHIP C 100PF J		L458			L41-5675-06	SMALL FIXED INDUCTOR (56NH)	
C536			CC73GCH1H470J	CHIP C 47PF J		L501,502			L41-6875-08	SMALL FIXED INDUCTOR (68NH)	
C541			CC73GCH1H220J	CHIP C 22PF J		L503			L34-4757-05	AIR-CORE COIL	
C554			C93-0557-05	CHIP C 7.0PF D		L504			L92-0179-05	CHIP FERRITE	
C555,556			C93-0563-05	CHIP C 18PF J		L509			L34-4753-05	AIR-CORE COIL	
C557			CK73GB1H102K	CHIP C 1000PF K		L601			L34-4759-05	AIR-CORE COIL	
C558,559			CK73GB1H103K	CHIP C 0.010UF K		L603,604			L34-4755-05	AIR-CORE COIL	
C601			CC73GCH1H120J	CHIP C 12PF J		L605			L34-4753-05	AIR-CORE COIL	
C603			C93-0603-05	CHIP C 1000PF K		X86			L77-1970-05	CRYSTAL RESONATOR (12.0MHZ)	
C606			CC73GCH1H0R5B	CHIP C 0.5PF B		X241			L77-1968-05	CRYSTAL RESONATOR (3.6864MHZ)	
C607			CC73GCH1H010B	CHIP C 1.0PF B		X401			L77-1944-05	TCXO (16.8MHZ)	
C608,609			C93-0564-05	CHIP C 22PF J		XF351			L71-0624-05	MCF (49.95MHZ)	
C613			C93-0555-05	CHIP C 5.0PF C		CP1-7			RK75HA1J102J	CHIP-COM 1.0K J 1/16W	
C614			C93-0562-05	CHIP C 15PF J		R1			R92-1252-05	CHIP R 0 OHM J 1/16W	
C615			CC73GCH1H0R5B	CHIP C 0.5PF B		R2			RK73HB1J101J	CHIP R 100 J 1/16W	
C616			CC73GCH1H020B	CHIP C 2.0PF B		R3			RK73HB1J102J	CHIP R 1.0K J 1/16W	
C618			CK73GB1H102K	CHIP C 1000PF K		R4			RK73HB1J332J	CHIP R 3.3K J 1/16W	
C620			CK73GB1H102K	CHIP C 1000PF K		R5			RK73HB1J223J	CHIP R 22K J 1/16W	
C626			C93-0553-05	CHIP C 3.0PF C		R41			RK73GB1J473J	CHIP R 47K J 1/16W	
C651			CK73GB1H103K	CHIP C 0.010UF K		R42			R92-1201-05	CHIP R 220 J 1/2W	
C652			CK73GB1H102K	CHIP C 1000PF K		R43			RK73GB1J473J	CHIP R 47K J 1/16W	
C672,673			CK73GB1H102K	CHIP C 1000PF K		R44			RK73GB1J472J	CHIP R 4.7K J 1/16W	
TC441,442			C05-0245-05	CERAMIC TRIMMER (10PF)		R45			RK73GB1J473J	CHIP R 47K J 1/16W	
CN1			E40-6268-05	FLAT CABLE CONNECTOR							

PARTS LIST

TX-RX UNIT (X57-7102-70)

Ref. No.	Address	New parts	Parts No.	Description	Desti-nation	Ref. No.	Address	New parts	Parts No.	Description	Desti-nation
R46			RK73GB1J152J	CHIP R 1.5K J 1/16W		R225-228			RK73GB1J223J	CHIP R 22K J 1/16W	
R47			RK73GB1J103J	CHIP R 10K J 1/16W		R229			RK73HB1J104J	CHIP R 100K J 1/16W	
R48			RK73HB1J334J	CHIP R 330K J 1/16W		R230			RK73HB1J393J	CHIP R 39K J 1/16W	
R49			RK73HB1J474J	CHIP R 470K J 1/16W		R231			RK73GB1J683J	CHIP R 68K J 1/16W	
R50			RK73HB1J394J	CHIP R 390K J 1/16W		R232,233			RK73HB1J683J	CHIP R 68K J 1/16W	
R51			RK73HB1J334J	CHIP R 330K J 1/16W		R236			RK73HB1J473J	CHIP R 47K J 1/16W	
R81,82			RK73GB1J103J	CHIP R 10K J 1/16W		R237			RK73HB1J474J	CHIP R 470K J 1/16W	
R83			R92-1252-05	CHIP R 0 OHM J 1/16W		R238			RK73HB1J473J	CHIP R 47K J 1/16W	
R84			R92-1368-05	CHIP R 0 OHM		R239			RK73HB1J474J	CHIP R 470K J 1/16W	
R85			RK73HB1J473J	CHIP R 47K J 1/16W		R240-245			R92-1368-05	CHIP R 0 OHM	
R86			RK73GB1J471J	CHIP R 470 J 1/16W		R246			RK73HB1J472J	CHIP R 4.7K J 1/16W	
R87			R92-1252-05	CHIP R 0 OHM J 1/16W		R247,248			R92-1368-05	CHIP R 0 OHM	
R88			RK73GB1J473J	CHIP R 47K J 1/16W		R249			RK73HB1J102J	CHIP R 1.0K J 1/16W	
R89			RK73HB1J474J	CHIP R 470K J 1/16W		R250			RK73HB1J105J	CHIP R 1.0M J 1/16W	
R90			RK73GB1J102J	CHIP R 1.0K J 1/16W		R251			RK73HB1J473J	CHIP R 47K J 1/16W	
R91			R92-1368-05	CHIP R 0 OHM		R252			RK73HB1J104J	CHIP R 100K J 1/16W	
R92			RK73GH1J183D	CHIP R 18K D 1/16W		R253			RK73GB1J562J	CHIP R 5.6K J 1/16W	
R93			RK73GH1J134D	CHIP R 130K D 1/16W		R254			RK73HB1J474J	CHIP R 470K J 1/16W	
R94			RK73GB1J102J	CHIP R 1.0K J 1/16W		R255			RK73HB1J154J	CHIP R 150K J 1/16W	
R95			RK73GB1J472J	CHIP R 4.7K J 1/16W		R256			RK73HB1J473J	CHIP R 47K J 1/16W	
R96			RK73GB1J105J	CHIP R 1.0M J 1/16W		R257			RK73HB1J184J	CHIP R 180K J 1/16W	
R97			RK73GB1J104J	CHIP R 100K J 1/16W		R258			RK73HH1J204D	CHIP R 200K D 1/16W	
R98			RK73GB1J473J	CHIP R 47K J 1/16W		R259			RK73HB1J274J	CHIP R 270K J 1/16W	
R99			RK73GB1J102J	CHIP R 1.0K J 1/16W		R260			RK73GB1J683J	CHIP R 68K J 1/16W	
R100			RK73HB1J102J	CHIP R 1.0K J 1/16W		R261			R92-1368-05	CHIP R 0 OHM	
R101			RK73GB1J473J	CHIP R 47K J 1/16W		R262			RK73HB1J563J	CHIP R 56K J 1/16W	
R102			RK73HB1J473J	CHIP R 47K J 1/16W		R263			RK73HB1J334J	CHIP R 330K J 1/16W	
R103-105			RK73GB1J102J	CHIP R 1.0K J 1/16W		R264,265			RK73HB1J473J	CHIP R 47K J 1/16W	
R108,109			RK73HB1J473J	CHIP R 47K J 1/16W		R266			RK73HB1J332J	CHIP R 3.3K J 1/16W	
R110			RK73GB1J152J	CHIP R 1.5K J 1/16W		R267			RK73HH1J683D	CHIP R 68K D 1/16W	
R111			RK73GB1J473J	CHIP R 47K J 1/16W		R268			RK73HH1J154D	CHIP R 150K D 1/16W	
R112			RK73HB1J102J	CHIP R 1.0K J 1/16W		R269			RK73HH1J683D	CHIP R 68K D 1/16W	
R113			RK73HB1J473J	CHIP R 47K J 1/16W		R270			RK73HB1J183J	CHIP R 18K J 1/16W	
R115			RK73HB1J473J	CHIP R 47K J 1/16W		R271			RK73HB1J563J	CHIP R 56K J 1/16W	
R124			R92-1252-05	CHIP R 0 OHM J 1/16W		R272			RK73HH1J563D	CHIP R 56K D 1/16W	
R125			RK73GB1J473J	CHIP R 47K J 1/16W		R273			RK73HH1J184D	CHIP R 180K D 1/16W	
R126,127			RK73HB1J102J	CHIP R 1.0K J 1/16W		R274			RK73HH1J332D	CHIP R 3.3K D 1/16W	
R128			RK73GB1J123J	CHIP R 12K J 1/16W		R275			RK73HH1J563D	CHIP R 56K D 1/16W	
R129			RK73GB1J153J	CHIP R 15K J 1/16W		R276,277			RK73HB1J223J	CHIP R 22K J 1/16W	
R130			R92-1252-05	CHIP R 0 OHM J 1/16W		R278,279			RK73HB1J823J	CHIP R 82K J 1/16W	
R201			RK73GB1J124J	CHIP R 120K J 1/16W		R281			RK73GB1J472J	CHIP R 4.7K J 1/16W	
R202			RK73GB1J561J	CHIP R 560 J 1/16W		R282			RK73GB1J473J	CHIP R 47K J 1/16W	
R203			RK73GB1J913J	CHIP R 91K J 1/16W		R283			RK73GB1J683J	CHIP R 68K J 1/16W	
R204-206			RK73GB1J102J	CHIP R 1.0K J 1/16W		R284			RK73GB1J123J	CHIP R 12K J 1/16W	
R207			R92-1368-05	CHIP R 0 OHM		R285			R92-0670-05	CHIP R 0 OHM	
R208			R92-1252-05	CHIP R 0 OHM J 1/16W		R286			RK73GB1J391J	CHIP R 390 J 1/16W	
R209,210			RK73HB1J473J	CHIP R 47K J 1/16W		R301			RK73GB1J105J	CHIP R 1.0M J 1/16W	
R211			RK73GB1J303J	CHIP R 30K J 1/16W		R302,303			RK73GB1J472J	CHIP R 4.7K J 1/16W	
R212,213			RK73GB1J753J	CHIP R 75K J 1/16W		R304			RK73GB1J223J	CHIP R 22K J 1/16W	
R214			RK73GB1J334J	CHIP R 330K J 1/16W		R305			RK73GB1J182J	CHIP R 1.8K J 1/16W	
R215			RK73HB1J222J	CHIP R 2.2K J 1/16W		R306			RK73GB1J822J	CHIP R 8.2K J 1/16W	
R216			R92-1368-05	CHIP R 0 OHM		R307			RK73GB1J274J	CHIP R 270K J 1/16W	
R217			RK73HB1J101J	CHIP R 100 J 1/16W		R309			RK73GB1J332J	CHIP R 3.3K J 1/16W	
R218			RK73HB1J821J	CHIP R 820 J 1/16W		R310			RK73GB1J334J	CHIP R 330K J 1/16W	
R219			RK73GB1J223J	CHIP R 22K J 1/16W		R311			RK73GB1J102J	CHIP R 1.0K J 1/16W	
R220			RK73GB1J681J	CHIP R 680 J 1/16W		R312			RK73GB1J333J	CHIP R 33K J 1/16W	
R221			RK73GB1J472J	CHIP R 4.7K J 1/16W		R313			RK73GB1J473J	CHIP R 47K J 1/16W	
R222			RK73HB1J223J	CHIP R 22K J 1/16W		R314			RK73GB1J104J	CHIP R 100K J 1/16W	
R223			RK73GB1J102J	CHIP R 1.0K J 1/16W		R321			RK73GB1J333J	CHIP R 33K J 1/16W	
R224			RK73GB1J561J	CHIP R 560 J 1/16W		R322			RK73GB1J183J	CHIP R 18K J 1/16W	

PARTS LIST

TX-RX UNIT (X57-7102-70)

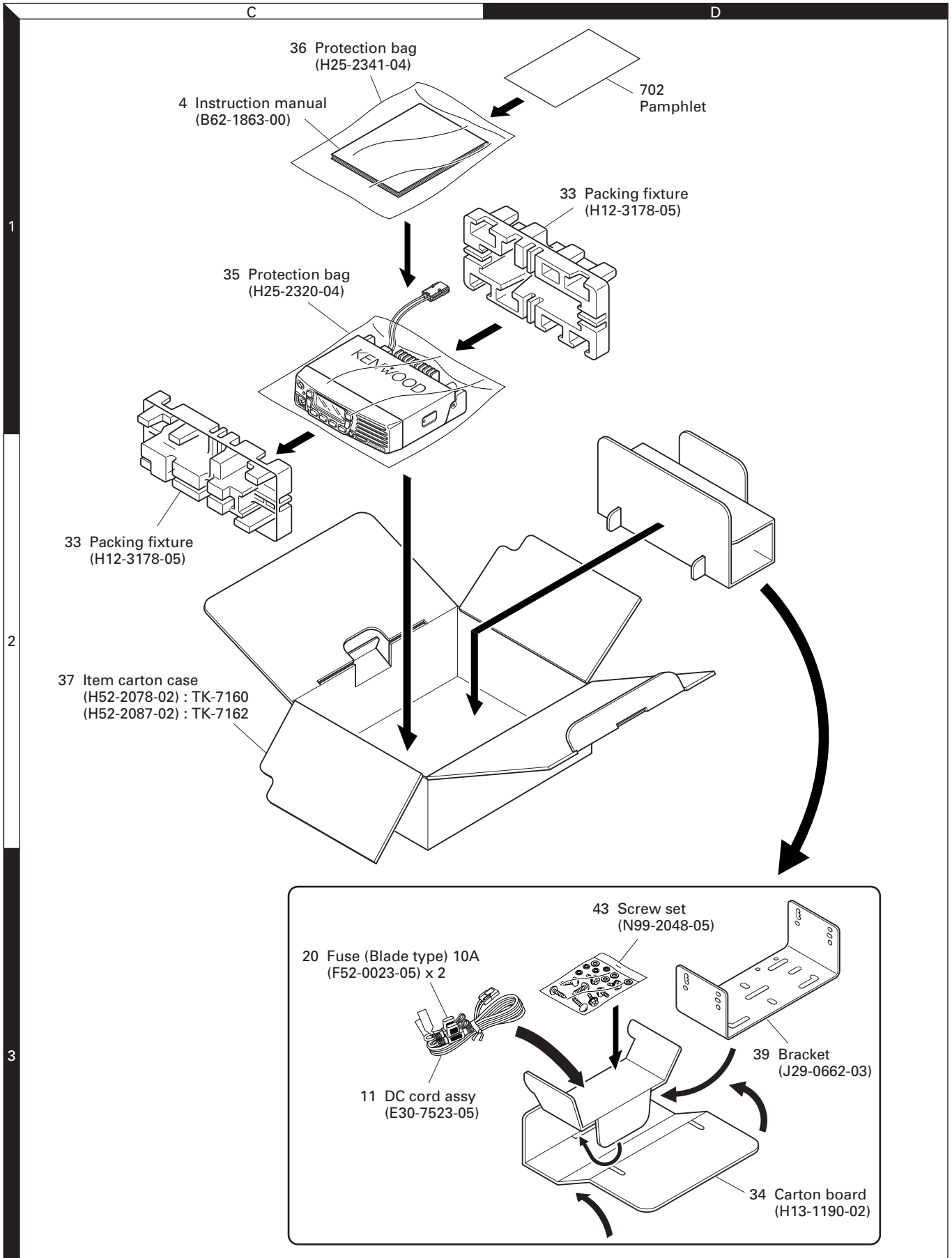
Ref. No.	Address	New parts	Parts No.	Description	Destination	Ref. No.	Address	New parts	Parts No.	Description	Destination
R323			RK73GB1J222J	CHIP R 2.2K J 1/16W		R450			RK73GB1J473J	CHIP R 47K J 1/16W	
R324			R92-1252-05	CHIP R 0 OHM J 1/16W		R451			RK73GB1J472J	CHIP R 4.7K J 1/16W	
R331-336			RK73GB1J103J	CHIP R 10K J 1/16W		R452			RK73GB1J124J	CHIP R 120K J 1/16W	
R341			RK73GB1J101J	CHIP R 100 J 1/16W		R453			RK73GB1J101J	CHIP R 100 J 1/16W	
R342			RK73GB1J224J	CHIP R 220K J 1/16W		R454			R92-1252-05	CHIP R 0 OHM J 1/16W	
R351			RK73GB1J471J	CHIP R 470 J 1/16W		R455			RK73GB1J102J	CHIP R 1.0K J 1/16W	
R352			RK73GB1J101J	CHIP R 100 J 1/16W		R456			RK73GB1J223J	CHIP R 22K J 1/16W	
R353			RK73GB1J103J	CHIP R 10K J 1/16W		R457			RK73GB1J473J	CHIP R 47K J 1/16W	
R354			RK73GB1J471J	CHIP R 470 J 1/16W		R458,459			RK73GB1J101J	CHIP R 100 J 1/16W	
R355			RK73GB1J331J	CHIP R 330 J 1/16W		R460			RK73GB1J222J	CHIP R 2.2K J 1/16W	
R356			RK73GB1J102J	CHIP R 1.0K J 1/16W		R461			RK73GB1J101J	CHIP R 100 J 1/16W	
R358			RK73GB1J221J	CHIP R 220 J 1/16W		R462			RK73GB1J102J	CHIP R 1.0K J 1/16W	
R359			RK73GB1J224J	CHIP R 220K J 1/16W		R463			R92-1252-05	CHIP R 0 OHM J 1/16W	
R360			RK73GB1J474J	CHIP R 470K J 1/16W		R501			RK73GB1J102J	CHIP R 1.0K J 1/16W	
R361			RK73GB1J331J	CHIP R 330 J 1/16W		R502			RK73GB1J271J	CHIP R 270 J 1/16W	
R362			RK73GB1J564J	CHIP R 560K J 1/16W		R503			RK73GB1J180J	CHIP R 18 J 1/16W	
R363			RK73GB1J334J	CHIP R 330K J 1/16W		R504			RK73GB1J271J	CHIP R 270 J 1/16W	
R364			R92-1252-05	CHIP R 0 OHM J 1/16W		R505			RK73GB1J222J	CHIP R 2.2K J 1/16W	
R365			RK73GB1J105J	CHIP R 1.0M J 1/16W		R506			RK73GB1J103J	CHIP R 10K J 1/16W	
R366			RK73GB1J471J	CHIP R 470 J 1/16W		R507			RK73GB1J100J	CHIP R 10 J 1/16W	
R367			RK73GB1J470J	CHIP R 47 J 1/16W		R508			RK73GB1J222J	CHIP R 2.2K J 1/16W	
R368			RK73GB1J105J	CHIP R 1.0M J 1/16W		R509			RK73GB1J330J	CHIP R 33 J 1/16W	
R369			R92-1252-05	CHIP R 0 OHM J 1/16W		R510			RK73GB1J183J	CHIP R 18K J 1/16W	
R370			RK73GB1J271J	CHIP R 270 J 1/16W		R511			RK73FB2A220J	CHIP R 22 J 1/10W	
R371,372			RK73GB1J393J	CHIP R 39K J 1/16W		R513			RK73GB1J333J	CHIP R 33K J 1/16W	
R373			RK73GB1J473J	CHIP R 47K J 1/16W		R514			RK73FB2A222J	CHIP R 2.2K J 1/10W	
R374			RK73GB1J393J	CHIP R 39K J 1/16W		R515			R92-1217-05	CHIP R 0 OHM	
R375,376			RK73GB1J105J	CHIP R 1.0M J 1/16W		R516			RK73FB2A221J	CHIP R 220 J 1/10W	
R378			R92-1252-05	CHIP R 0 OHM J 1/16W		R517			RK73FB2A220J	CHIP R 22 J 1/10W	
R381			RK73GB1J104J	CHIP R 100K J 1/16W		R518			RK73FB2A221J	CHIP R 220 J 1/10W	
R392,393			R92-1252-05	CHIP R 0 OHM J 1/16W		R519			RK73EB2B470J	CHIP R 47 J 1/8W	
R401-403			RK73HB1J102J	CHIP R 1.0K J 1/16W		R520			RK73GB1J822J	CHIP R 8.2K J 1/16W	
R404			RK73GB1J222J	CHIP R 2.2K J 1/16W		R521			RK73GB1J102J	CHIP R 1.0K J 1/16W	
R405			RK73GB1J103J	CHIP R 10K J 1/16W		R522			R92-1252-05	CHIP R 0 OHM J 1/16W	
R406			RK73GB1J152J	CHIP R 1.5K J 1/16W		R523			RK73GB1J101J	CHIP R 100 J 1/16W	
R407			RK73HB1J100J	CHIP R 10 J 1/16W		R527			R92-1261-05	CHIP R 150 J 1/2W	
R408			RK73HB1J104J	CHIP R 100K J 1/16W		R601			RK73GB1J223J	CHIP R 22K J 1/16W	
R409			RK73GB1J101J	CHIP R 100 J 1/16W		R603			RK73GB1J223J	CHIP R 22K J 1/16W	
R421			RK73GB1J822J	CHIP R 8.2K J 1/16W		R651			RK73GB1J334J	CHIP R 330K J 1/16W	
R422			RK73GB1J103J	CHIP R 10K J 1/16W		R652			RK73GB1J103J	CHIP R 10K J 1/16W	
R423			RK73GB1J562J	CHIP R 5.6K J 1/16W		R653			R92-1252-05	CHIP R 0 OHM J 1/16W	
R424			RK73HB1J471J	CHIP R 470 J 1/16W		R654			RK73GB1J102J	CHIP R 1.0K J 1/16W	
R425			RK73GB1J103J	CHIP R 10K J 1/16W		R655			RK73GB1J473J	CHIP R 47K J 1/16W	
R426			RK73GB1J102J	CHIP R 1.0K J 1/16W		R659			RK73GB1J103J	CHIP R 10K J 1/16W	
R427			RK73GB1J272J	CHIP R 2.7K J 1/16W		R660			RK73GB1J392J	CHIP R 3.9K J 1/16W	
R428			RK73GB1J102J	CHIP R 1.0K J 1/16W		R661			RK73GB1J473J	CHIP R 47K J 1/16W	
R429			RK73GB1J152J	CHIP R 1.5K J 1/16W		R662			R92-1252-05	CHIP R 0 OHM J 1/16W	
R430			RK73GB1J103J	CHIP R 10K J 1/16W		R800			R92-1061-05	JUMPER REST 0 OHM	
R431			R92-1252-05	CHIP R 0 OHM J 1/16W		R801			RK73HB1J104J	CHIP R 100K J 1/16W	
R432			RK73GB1J224J	CHIP R 220K J 1/16W		D1-11			DA221	DIODE	
R433			RK73GB1J471J	CHIP R 470 J 1/16W		D41			ZSH5MA27	SURGE ABSORBER	
R441			RK73GB1J221J	CHIP R 220 J 1/16W		D42			1812L110PR	VARIATOR	
R442			RK73GB1J271J	CHIP R 270 J 1/16W		D81			02DZ18(X,Y)	ZENER DIODE	
R443			RK73GB1J221J	CHIP R 220 J 1/16W		D82			1SS355	DIODE	
R444			RK73GB1J104J	CHIP R 100K J 1/16W		D211			1SS372	DIODE	
R445			RK73GB1J102J	CHIP R 1.0K J 1/16W		D212			MC2858	DIODE	
R446			RK73GB1J151J	CHIP R 150 J 1/16W		D301			MA742	DIODE	
R447			RK73GB1J473J	CHIP R 47K J 1/16W		D331,332			MC2858	DIODE	
R448			RK73GB1J393J	CHIP R 39K J 1/16W		D351-354			HVC376B	VARIABLE CAPACITANCE DIODE	
R449			RK73GB1J104J	CHIP R 100K J 1/16W							

PARTS LIST

TX-RX UNIT (X57-7102-70)

Ref. No.	Address	New parts	Parts No.	Description	Destination	Ref. No.	Address	New parts	Parts No.	Description	Destination
D401			1SS355	DIODE		Q502			RD00HVS1	FET	
D421			HZU5ALL	DIODE		TH301			B57331V2104J	THERMISTOR	
D441-444			MA2S304	VARIABLE CAPACITANCE DIODE		TH672,673			B57331V2104J	THERMISTOR	
D445			1SV278	VARIABLE CAPACITANCE DIODE							
D446			1SS355	DIODE							
D447,448			HSC277	DIODE							
D501			1SS355	DIODE							
D503			02DZ5.1(Y)	ZENER DIODE							
D602			MA4PH633	DIODE							
D603			XB15A709	DIODE							
D606			MA742	DIODE							
D608			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							
IC402			UPB1509GV	BI-POLAR IC							
IC502	2B		RA30H1317M-31	MOS-IC							
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							
Q242,243			2SC4649(N,P)	TRANSISTOR							
Q281			DTC363EU	DIGITAL TRANSISTOR							
Q282			KRC102S	DIGITAL TRANSISTOR							
Q301			2SC2412K	TRANSISTOR							
Q341			2SC3928A	TRANSISTOR							
Q351			2SC5488	TRANSISTOR							
Q352,353			3SK318	FET							
Q421			2SA1832(GR)	TRANSISTOR							
Q422			2SC4738(GR)	TRANSISTOR							
Q431			2SC4649(N,P)	TRANSISTOR							
Q441			2SK508NV(K52)	FET							
Q442			2SJ347	FET							
Q443			KRX102U	TRANSISTOR							
Q444			2SK508NV(K52)	FET							
Q445			2SC2412K	TRANSISTOR							
Q446			2SC5108(Y)	TRANSISTOR							
Q447			2SC4649(N,P)	TRANSISTOR							
Q501			2SC3357(RF)	TRANSISTOR							

PACKING



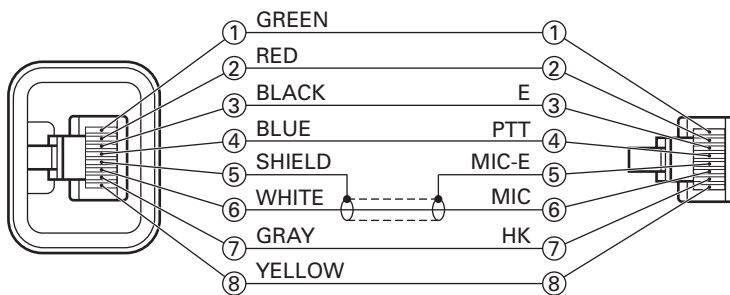
Parts with the exploded numbers larger than 700 are not supplied.

ADJUSTMENT

Test Equipment Required for Alignment

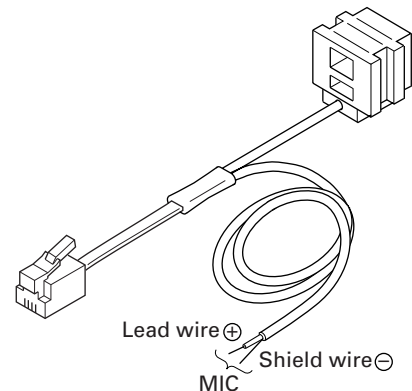
Test Equipment	Major Specifications	
1. Standard Signal Generator (SSG)	Frequency Range	136 to 175MHz
	Modulation	Frequency modulation and external modulation
	Output	-127dBm/0.1μV to greater than -7dBm/100mV
2. Power Meter	Input Impedance	50Ω
	Operation Frequency	136 to 175MHz or more
	Measurement Capability	Vicinity of 100W
3. Deviation Meter	Frequency Range	136 to 175MHz
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)

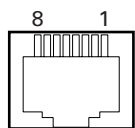


Tuning cable (E30-3383-05)

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)

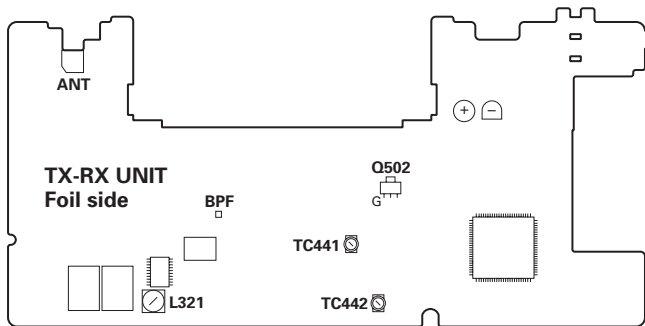
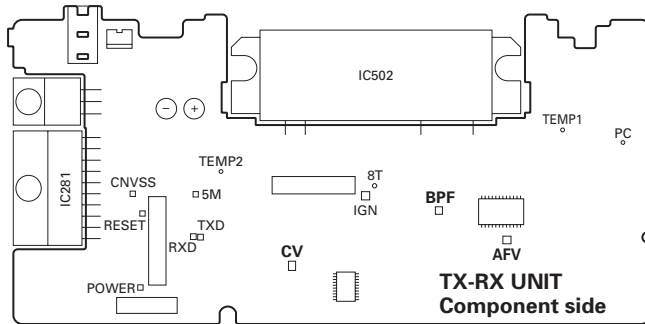


- 1 : BLC
- 2 : PSB
- 3 : E
- 4 : PTT
- 5 : ME
- 6 : MIC
- 7 : HOOK
- 8 : CM

ADJUSTMENT

Adjustment Location

■ Adjustment Points



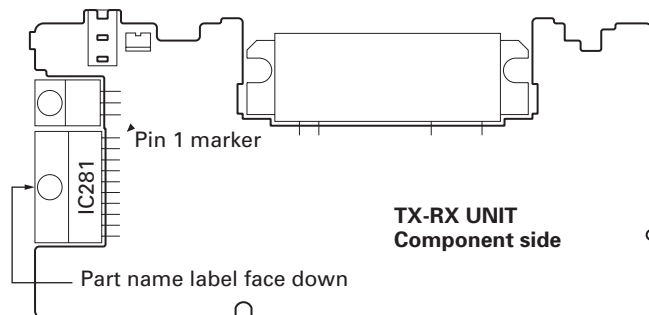
■ Notes

• EEPROM

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

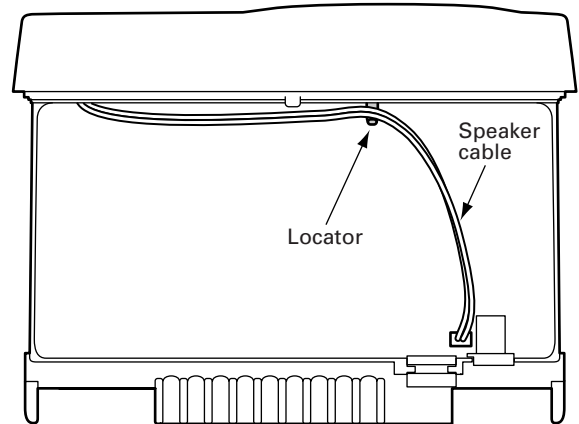
• AF PA IC (IC281)

How to mounting the IC281.



• Speaker Cable

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



Test Frequency

Channel	RX (MHz)	TX (MHz)
1	155.05	155.10
2	136.05	136.10
3	173.95	173.90
4	155.00	155.00
5	155.20	155.20
6	155.40	155.40

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	RX (MHz)	TX (MHz)
Low	136.05	136.10
Low'	145.55	145.60
Center	155.05	155.10
High'	164.55	164.60
High	173.95	173.90

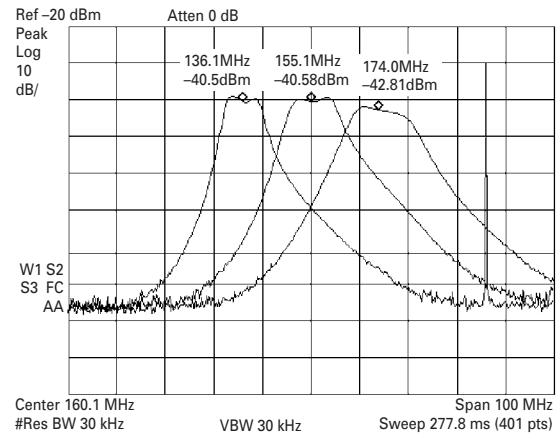


Fig. 1

PCB Section

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	5.5V	±0.1V
	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

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

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 Ω mode.

Normal condition

Input : 20k Ω ~50k Ω , Output : 1M Ω ~2M Ω

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

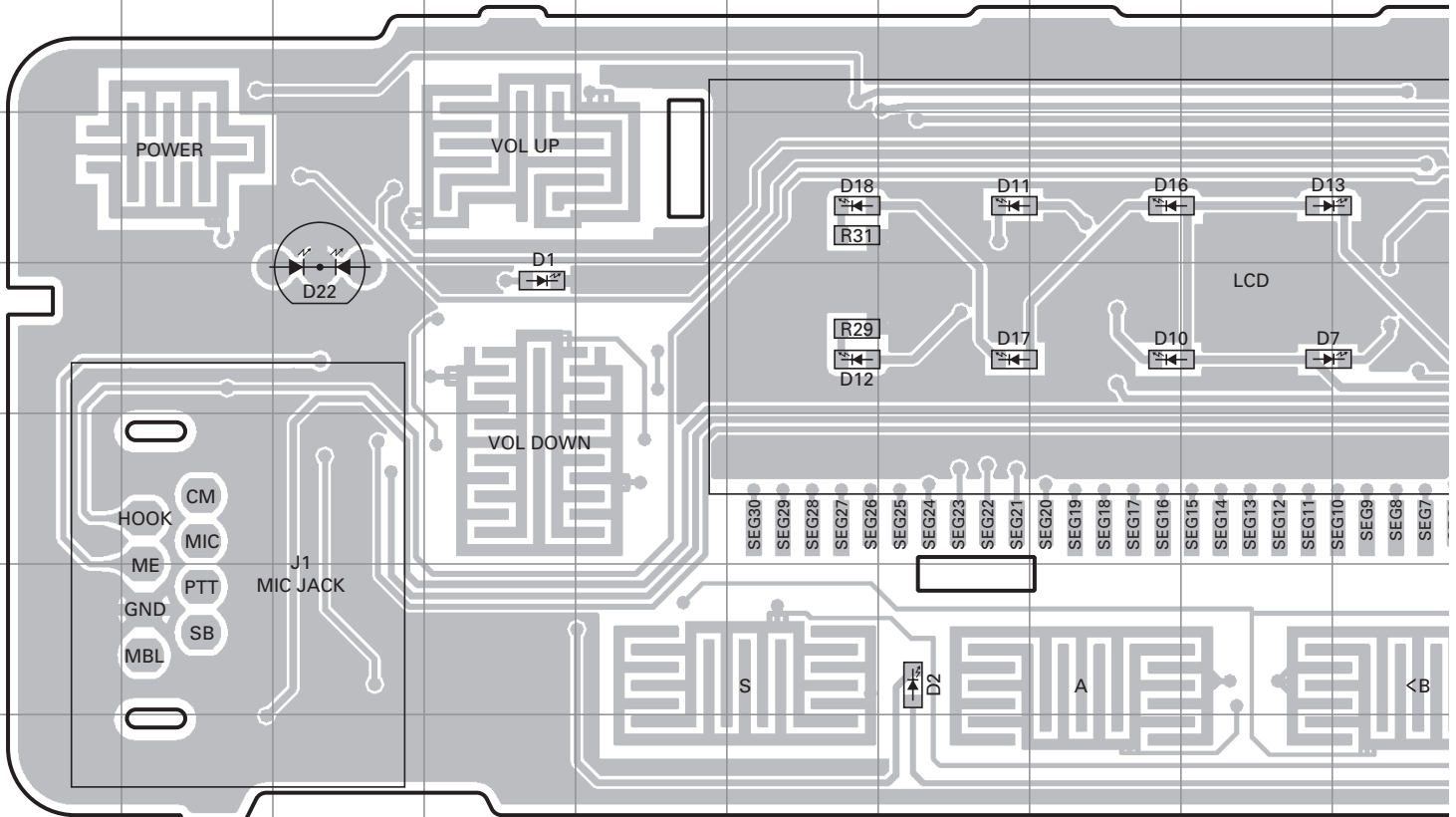
Port Function is Low Active. (Exclude : Scrambler Code)

	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

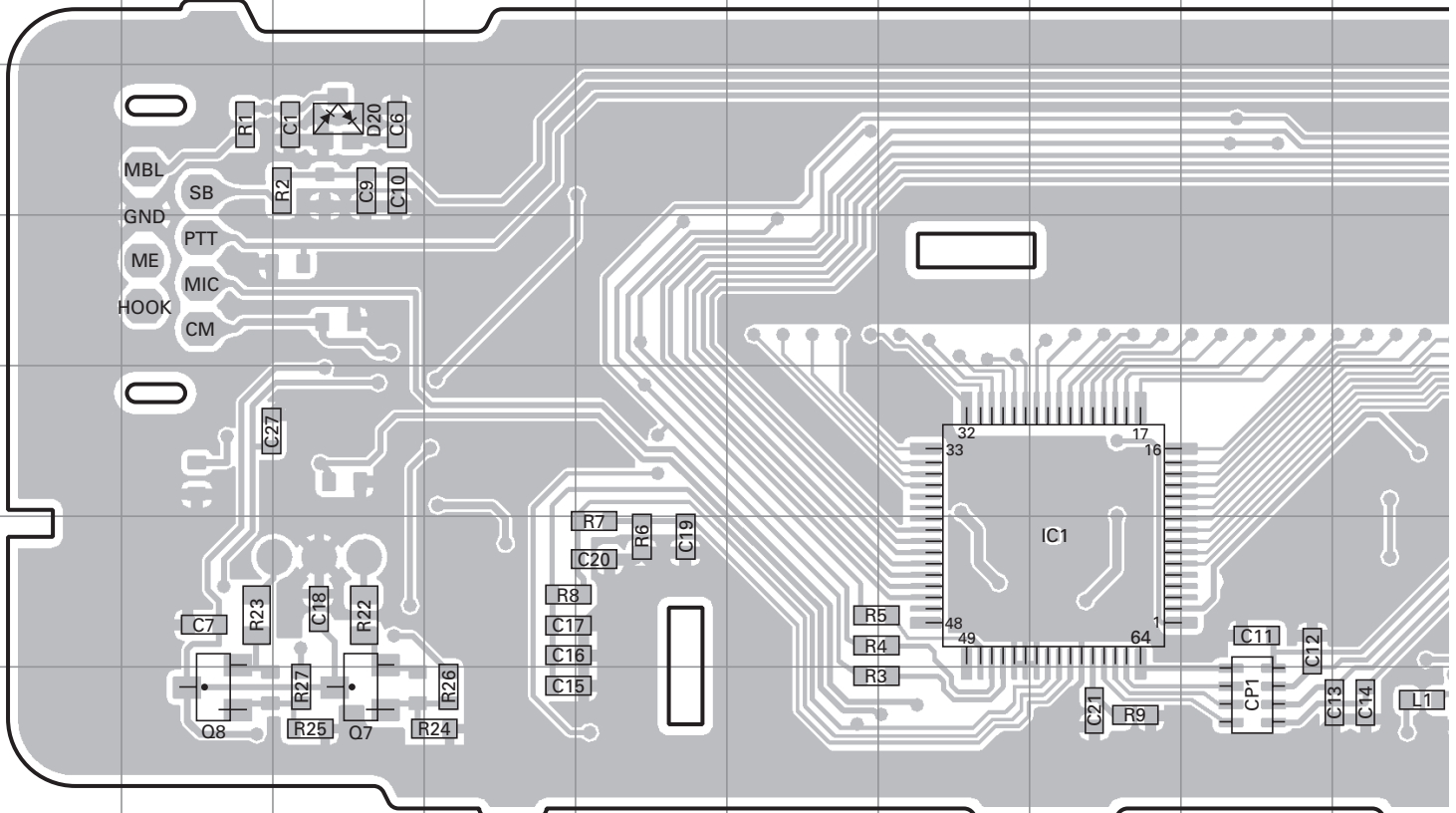
* GPS (NMEA Input) is TK-7160 only.

TK-7160 PC BOARD

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

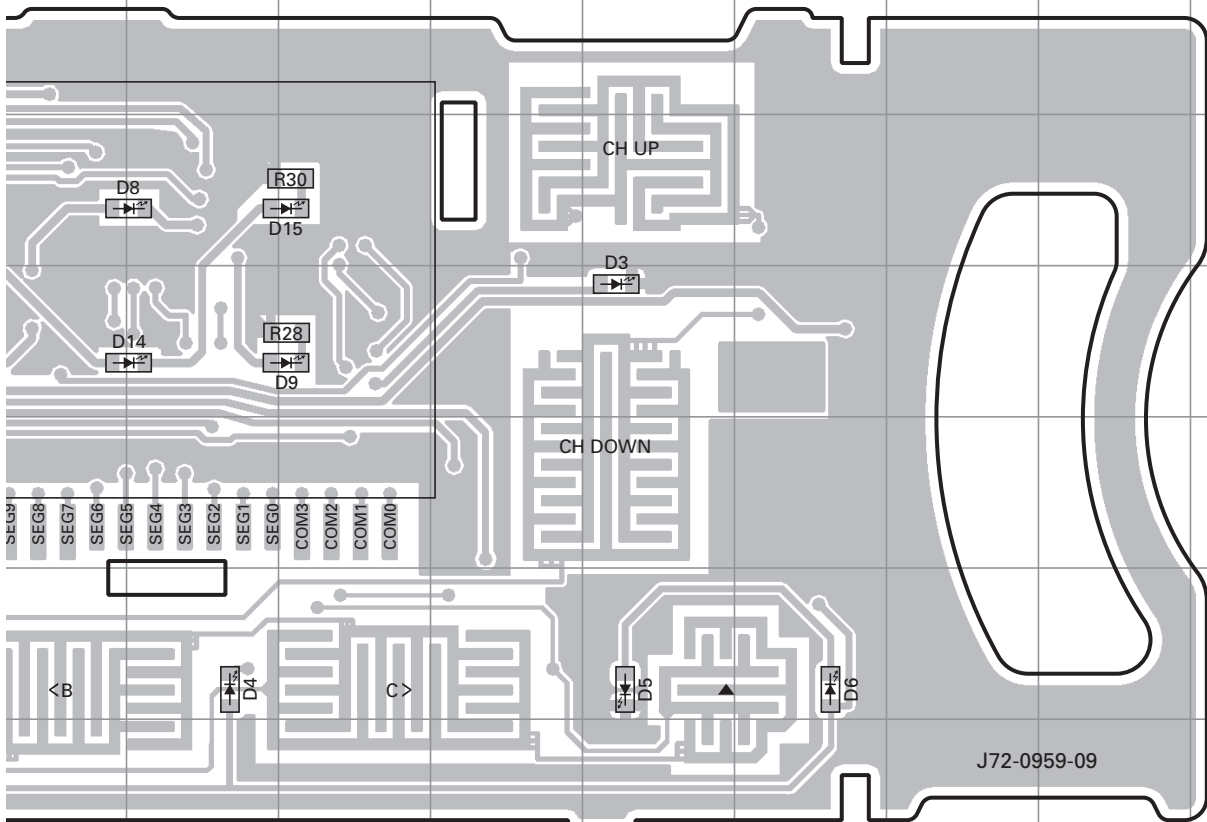


DISPLAY UNIT (X54-3510-10) Foil side view (J72-0959-09)

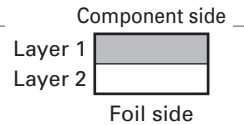


PC BOARD TK-7160

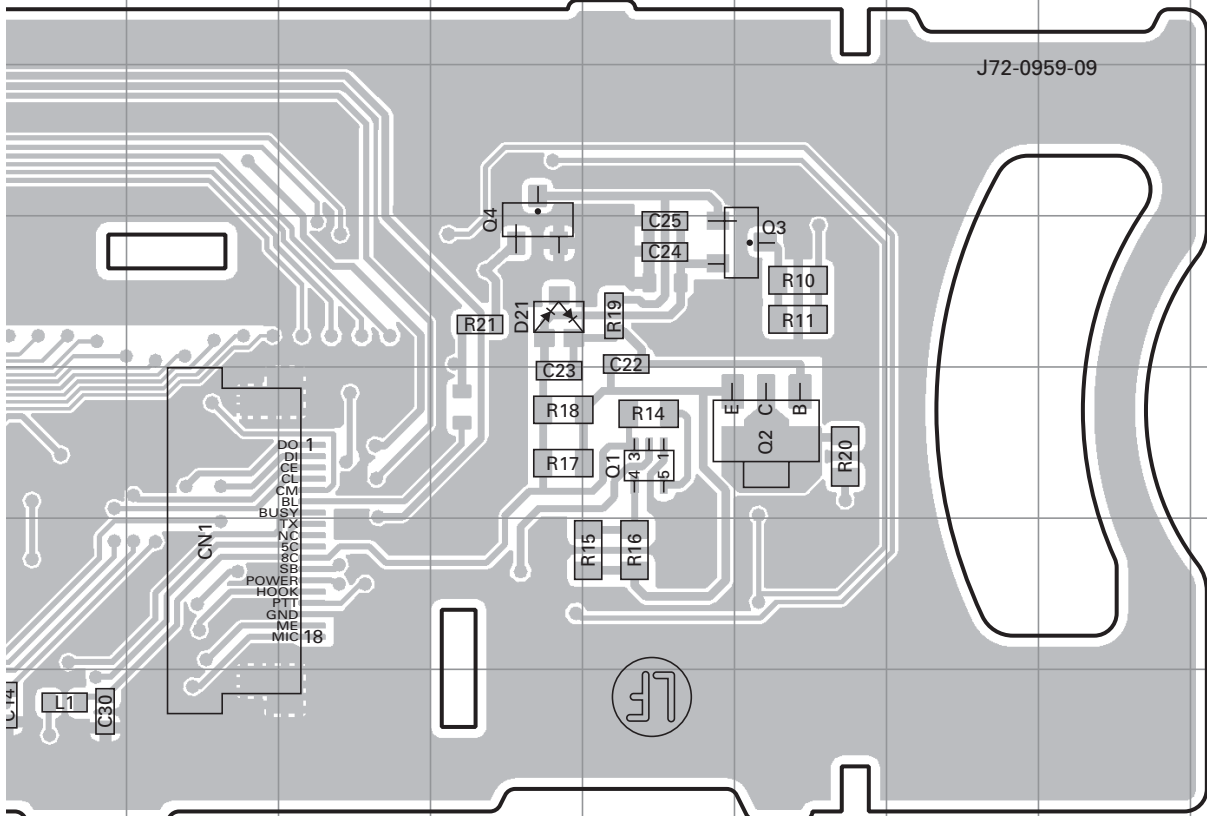
DISPLAY UNIT (X54-3510-10) Component side view (J72-0959-09)



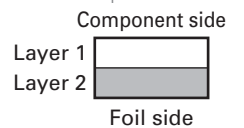
Ref. No.	Address
D1	4D
D2	6G
D3	4N
D4	6K
D5	6N
D6	6O
D7	4I
D8	3K
D9	4L
D10	4H
D11	3G
D12	4F
D13	3I
D14	4K
D15	3L
D16	3H
D17	4G
D18	3F
D22	4C



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

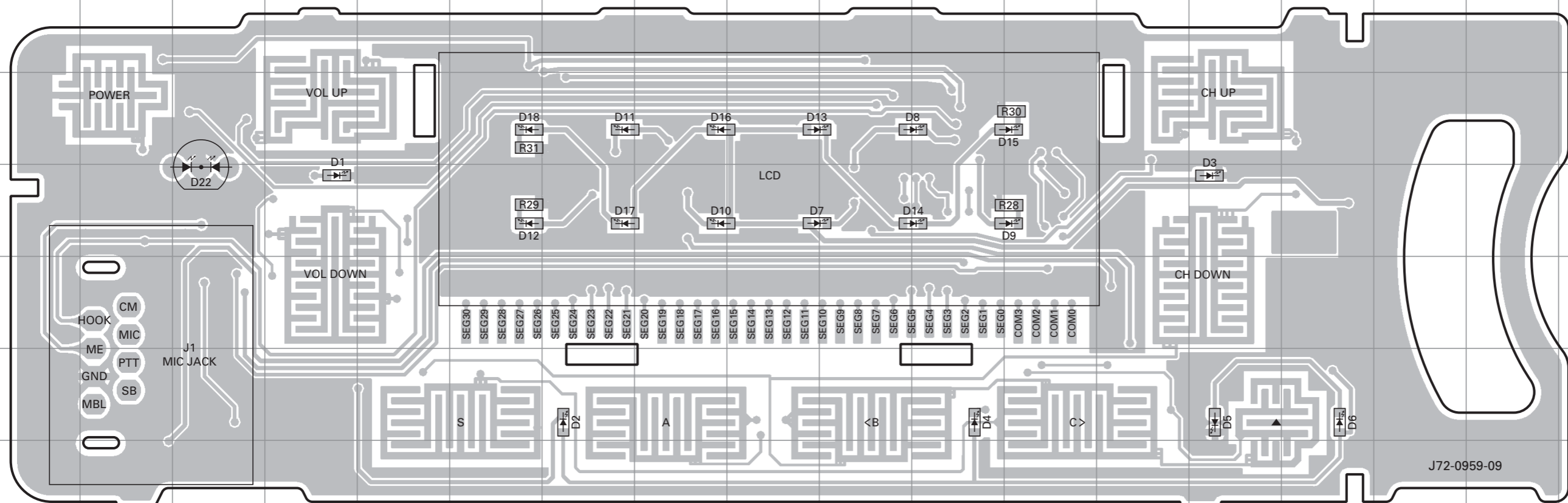


TK-7160 PC BOARD

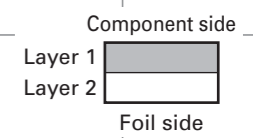
PC BOARD TK-7160

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

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

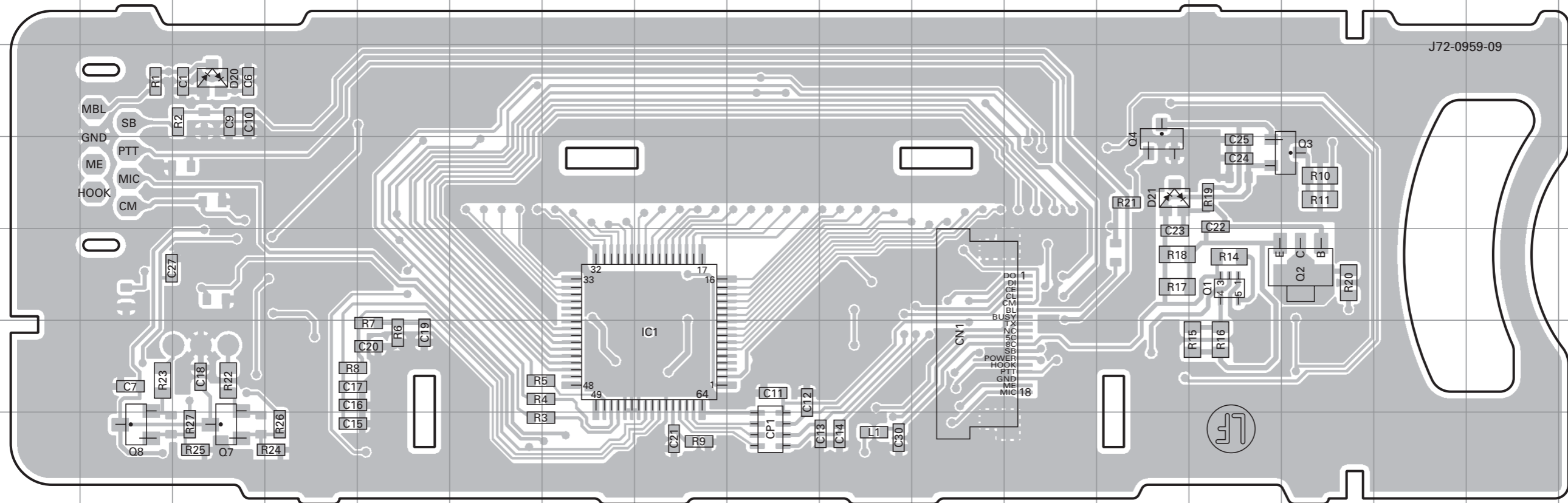


Ref. No.	Address
D1	4D
D2	6G
D3	4N
D4	6K
D5	6N
D6	6O
D7	4I
D8	3K
D9	4L
D10	4H
D11	3G
D12	4F
D13	3I
D14	4K
D15	3L
D16	3H
D17	4G
D18	3F
D22	4C

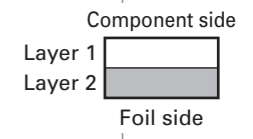


DISPLAY UNIT (X54-3510-10) Foil side view (J72-0959-09)

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

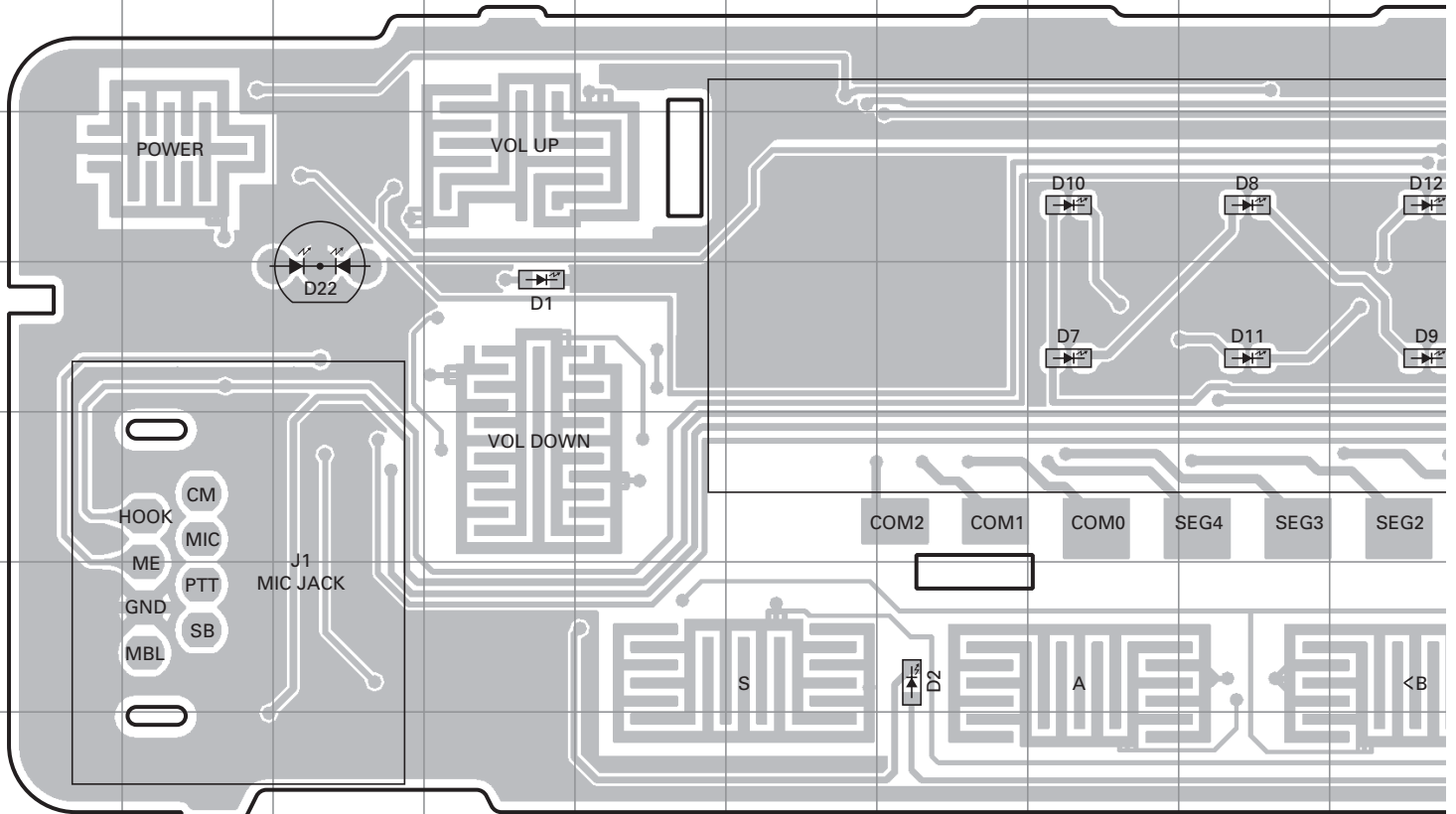


Ref. No.	Address
IC1	12H
Q1	11N
Q2	11O
Q3	10O
Q4	10M
Q7	13C
Q8	13B
D20	9C
D21	10M

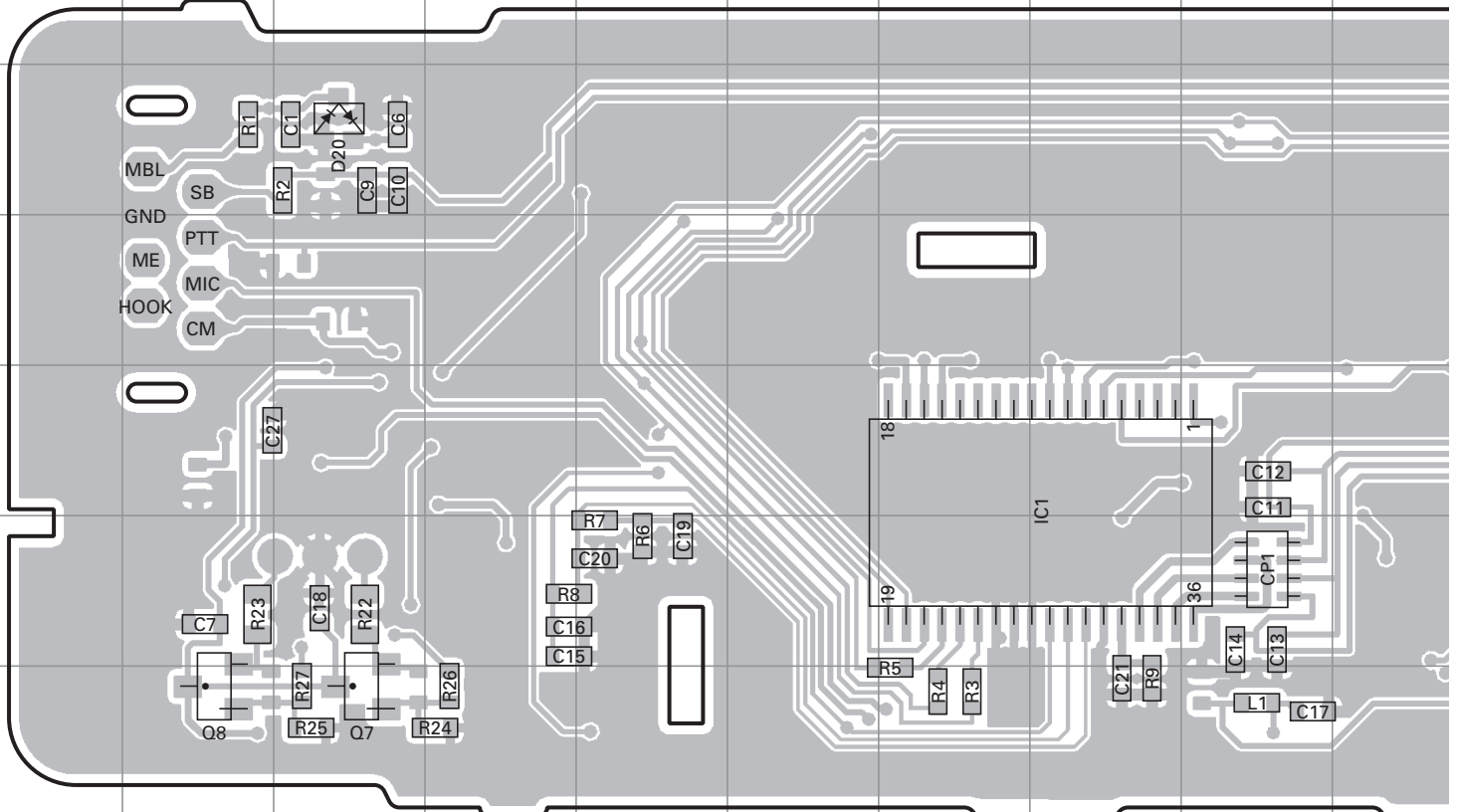


TK-7162 PC BOARD

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

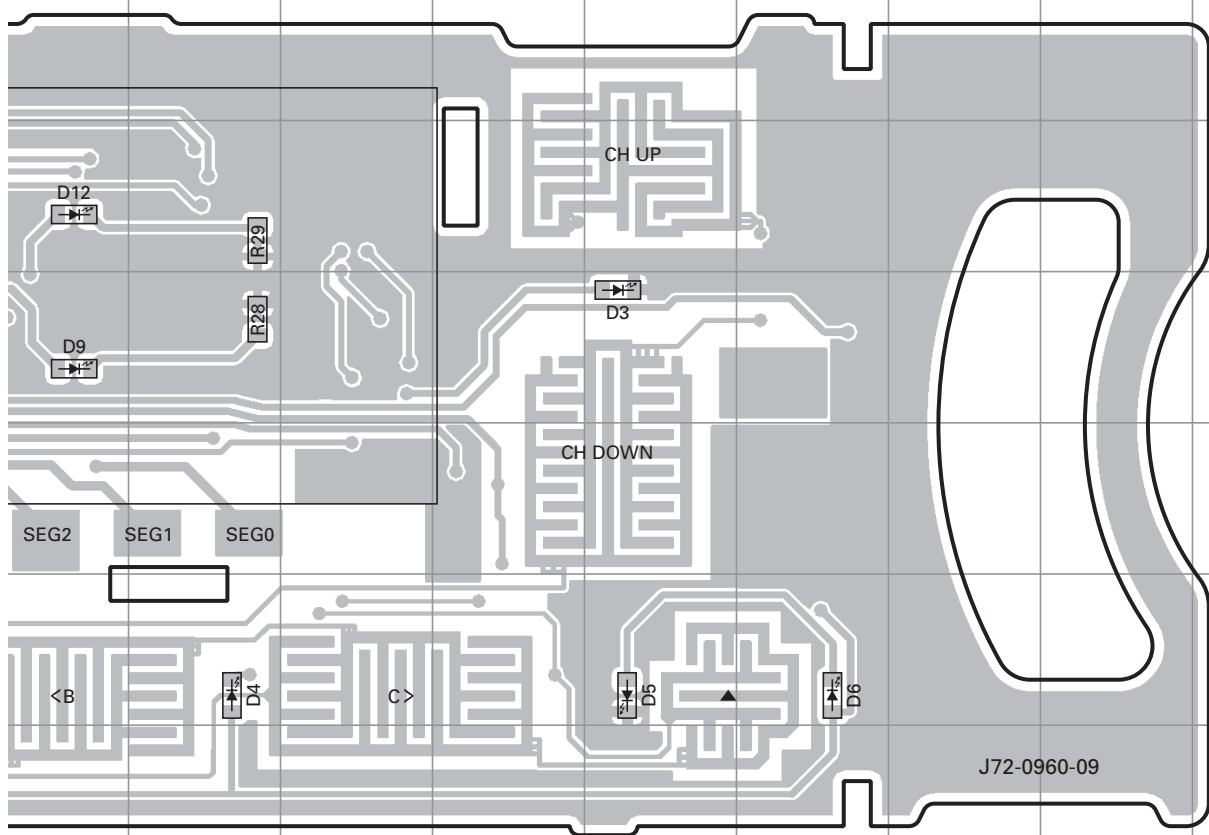


DISPLAY UNIT (X54-3522-70) Foil side view (J72-0960-09)

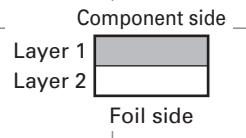


PC BOARD TK-7162

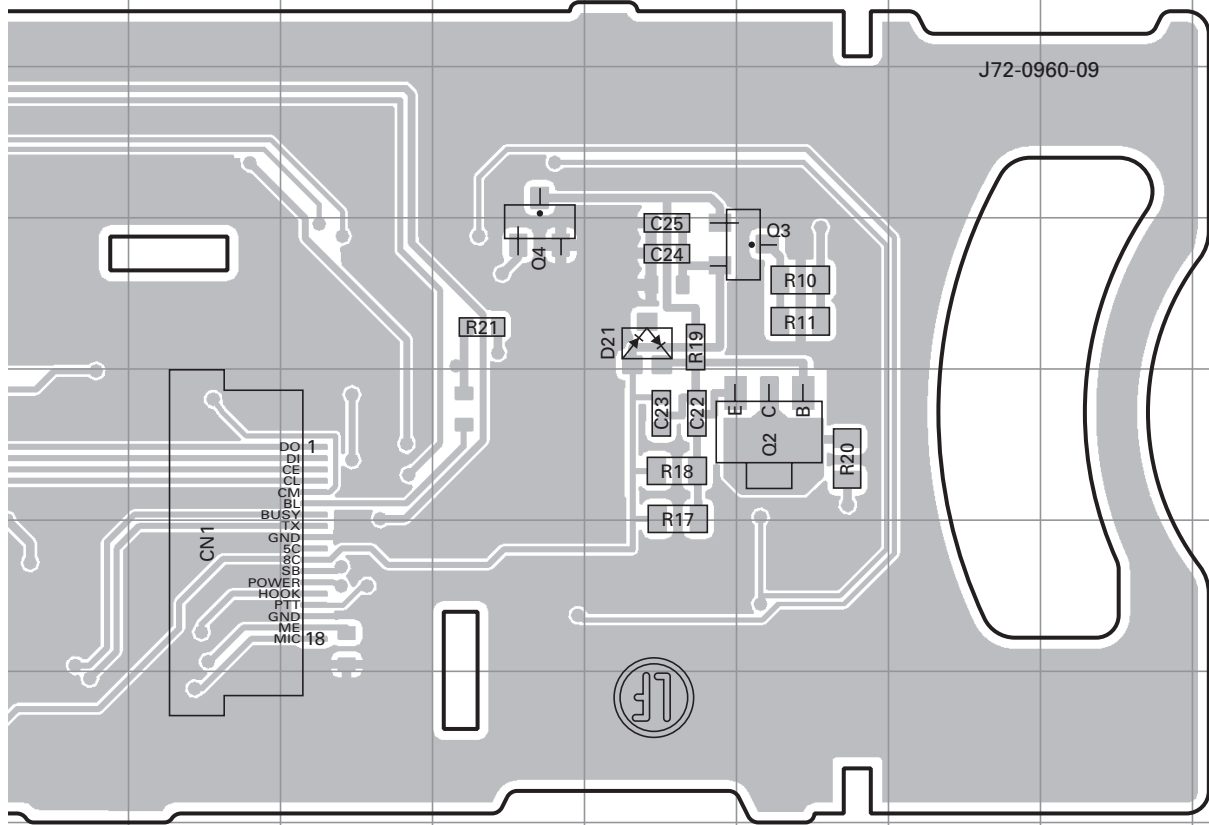
DISPLAY UNIT (X54-3522-70) Component side view (J72-0960-09)



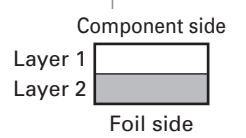
Ref. No.	Address
D1	4D
D2	6G
D3	4N
D4	6K
D5	6N
D6	6O
D7	4I
D8	3K
D9	4L
D10	4H
D11	3G
D12	4F
D22	4C



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



Ref. No.	Address
IC1	12H
O2	11O
O3	10O
O4	10M
O7	13C
O8	13B
D20	9C
D21	10M

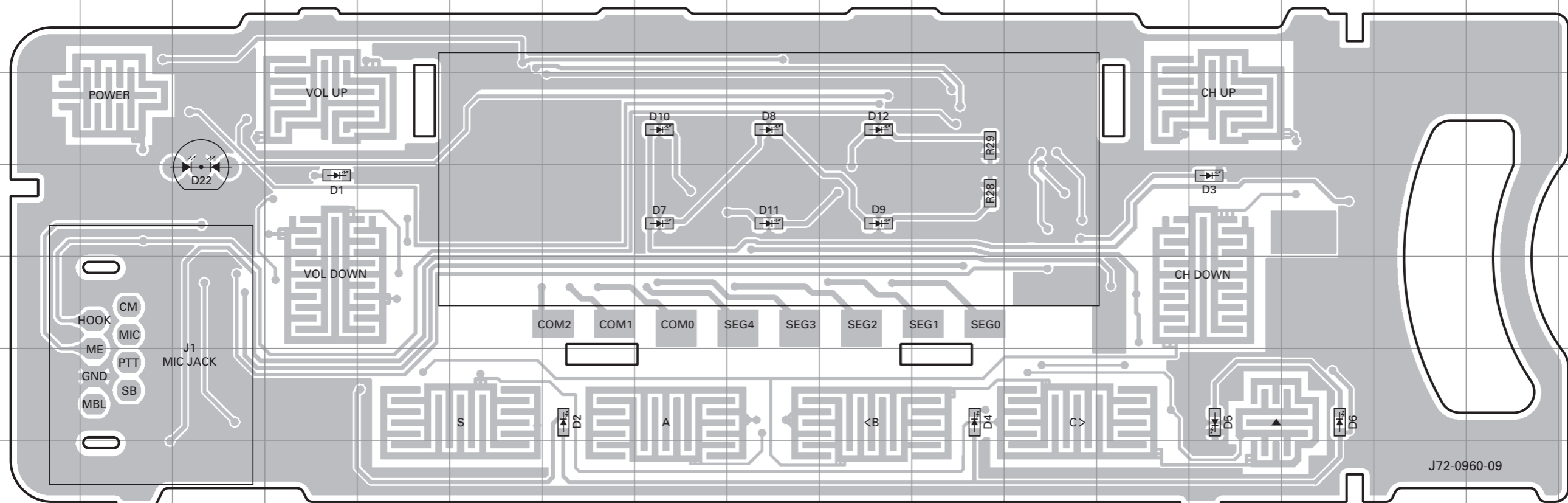


TK-7162 PC BOARD

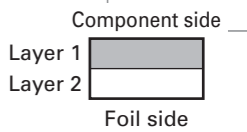
PC BOARD TK-7162

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

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

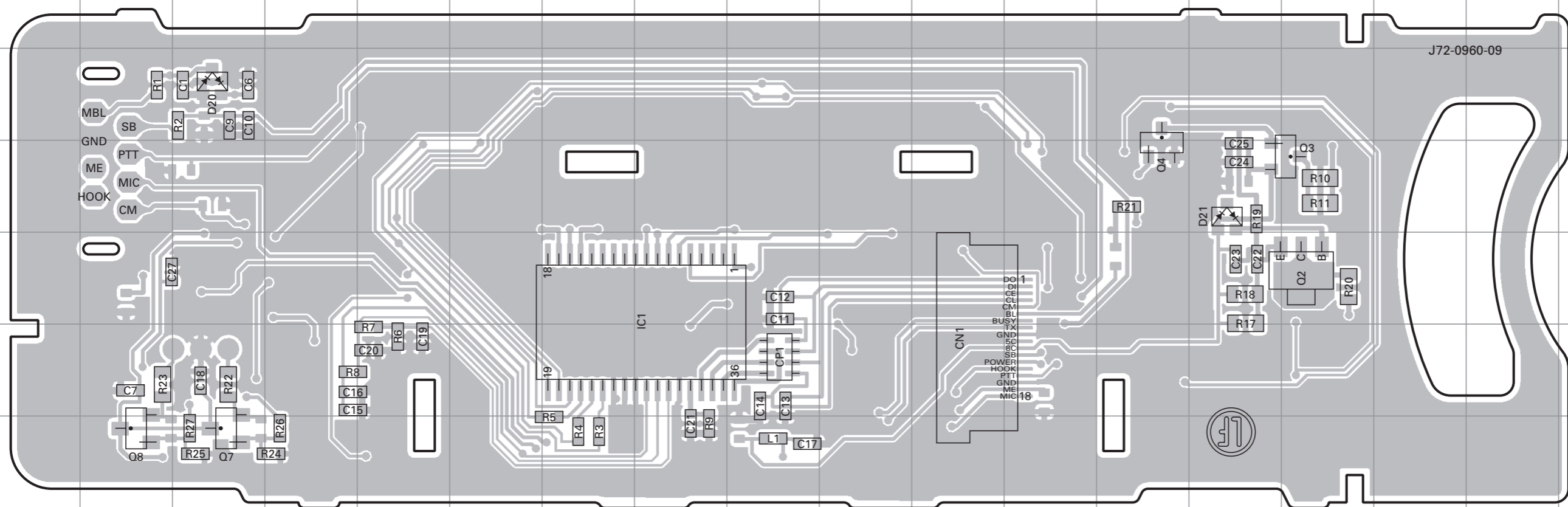


Ref. No.	Address
D1	4D
D2	6G
D3	4N
D4	6K
D5	6N
D6	6O
D7	4I
D8	3K
D9	4L
D10	4H
D11	3G
D12	4F
D22	4C

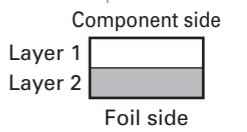


DISPLAY UNIT (X54-3522-70) Foil side view (J72-0960-09)

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

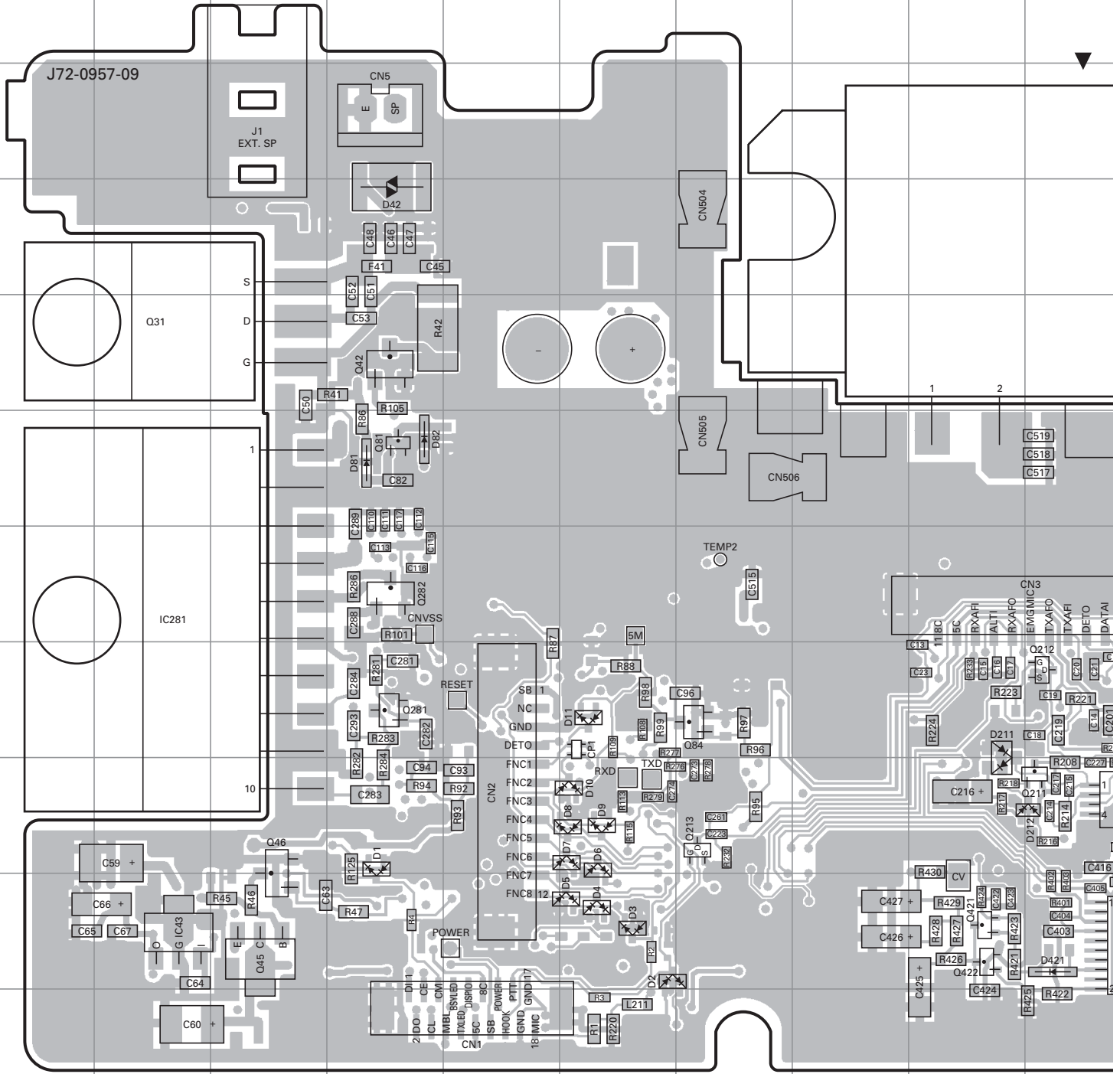


Ref. No.	Address
IC1	12H
Q2	11O
Q3	10O
Q4	10M
Q7	13C
Q8	13B
D20	9C
D21	10M



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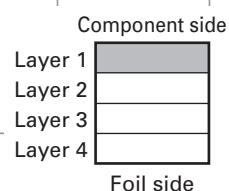
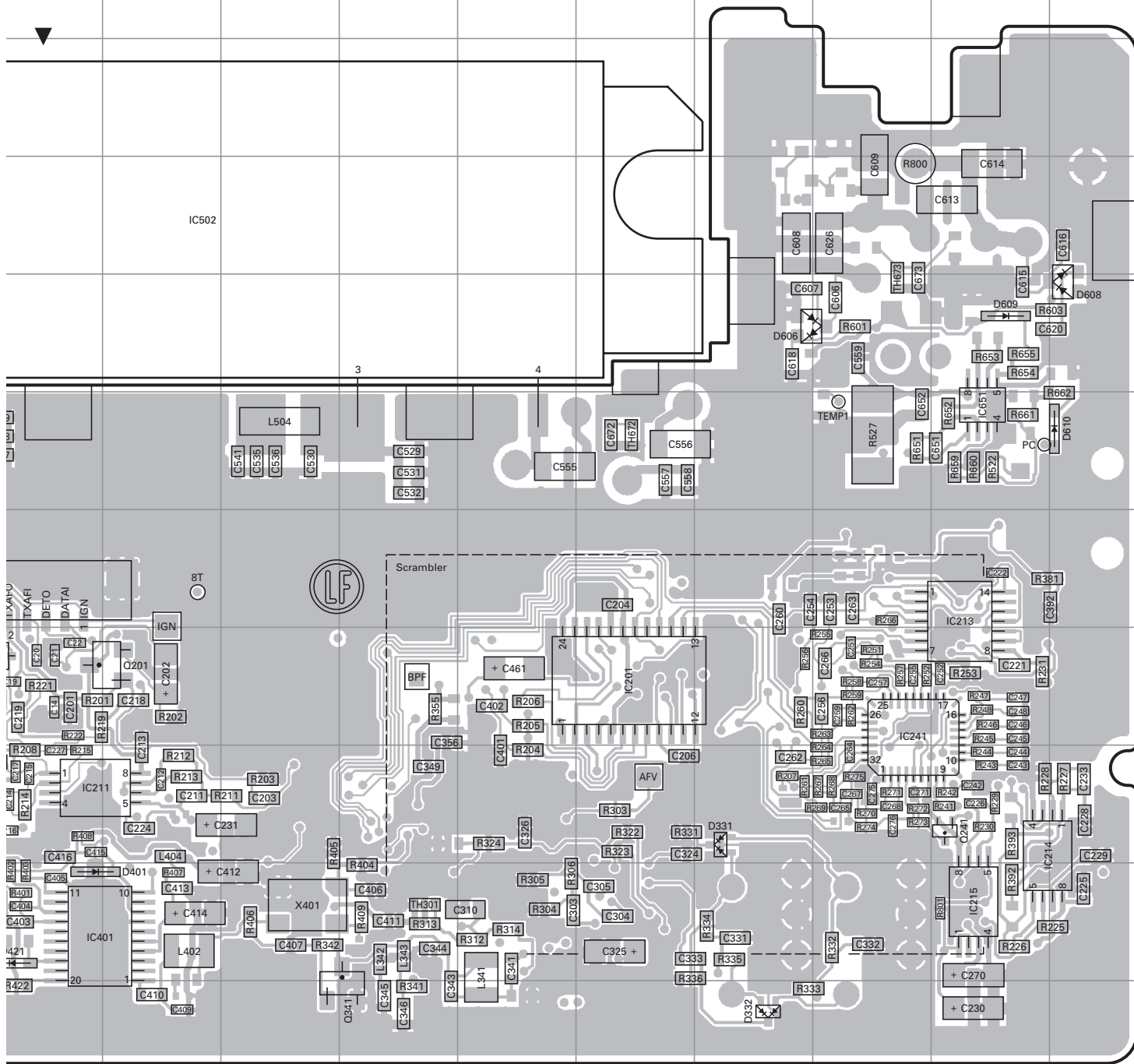
TX-RX UNIT (X57-7102-70) Component side view (J72-0957-09)



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	D608	5S
IC214	9R	Q45	10C	Q281	8D	D5	10F	D82	6D	D609	5R
IC215	10R	Q46	9C	Q282	7D	D6	9F	D211	8I	D610	6S
IC241	8Q	Q81	6D	Q341	11M	D7	9F	D212	9J		
IC281	7B	Q84	8G	Q421	10I	D8	9F	D331	9P		
IC401	10J	Q201	8K	Q422	10I	D9	9F	D332	11P		

PC BOARD TK-7160/7162

TX-RX UNIT (X57-7102-70) Component side view (J72-0957-09)

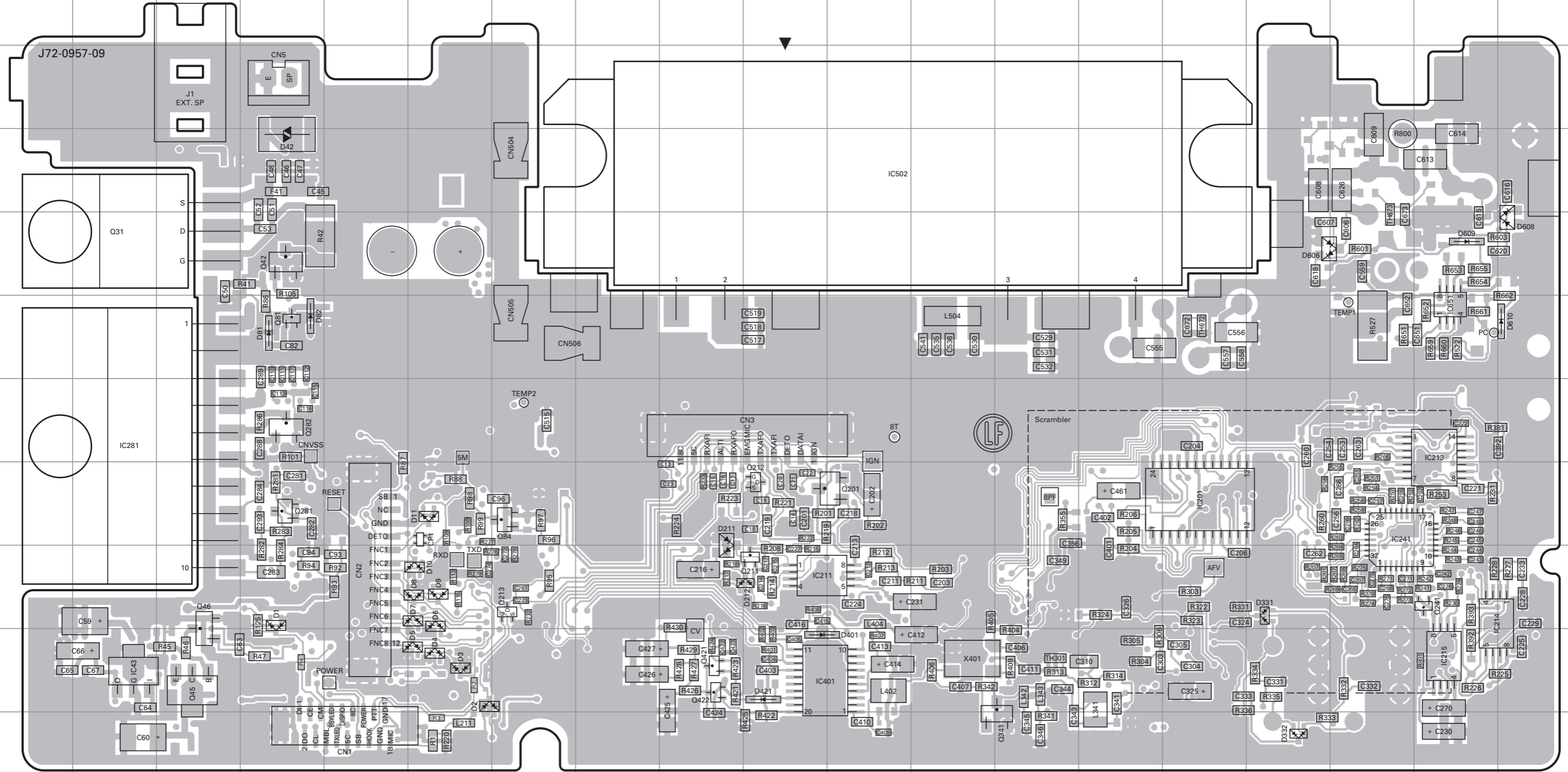


TK-7160/7162 PC BOARD

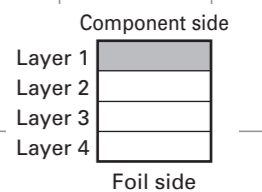
PC BOARD TK-7160/7162

TX-RX UNIT (X57-7102-70) Component side view (J72-0957-09)

TX-RX UNIT (X57-7102-70) Component side view (J72-0957-09)

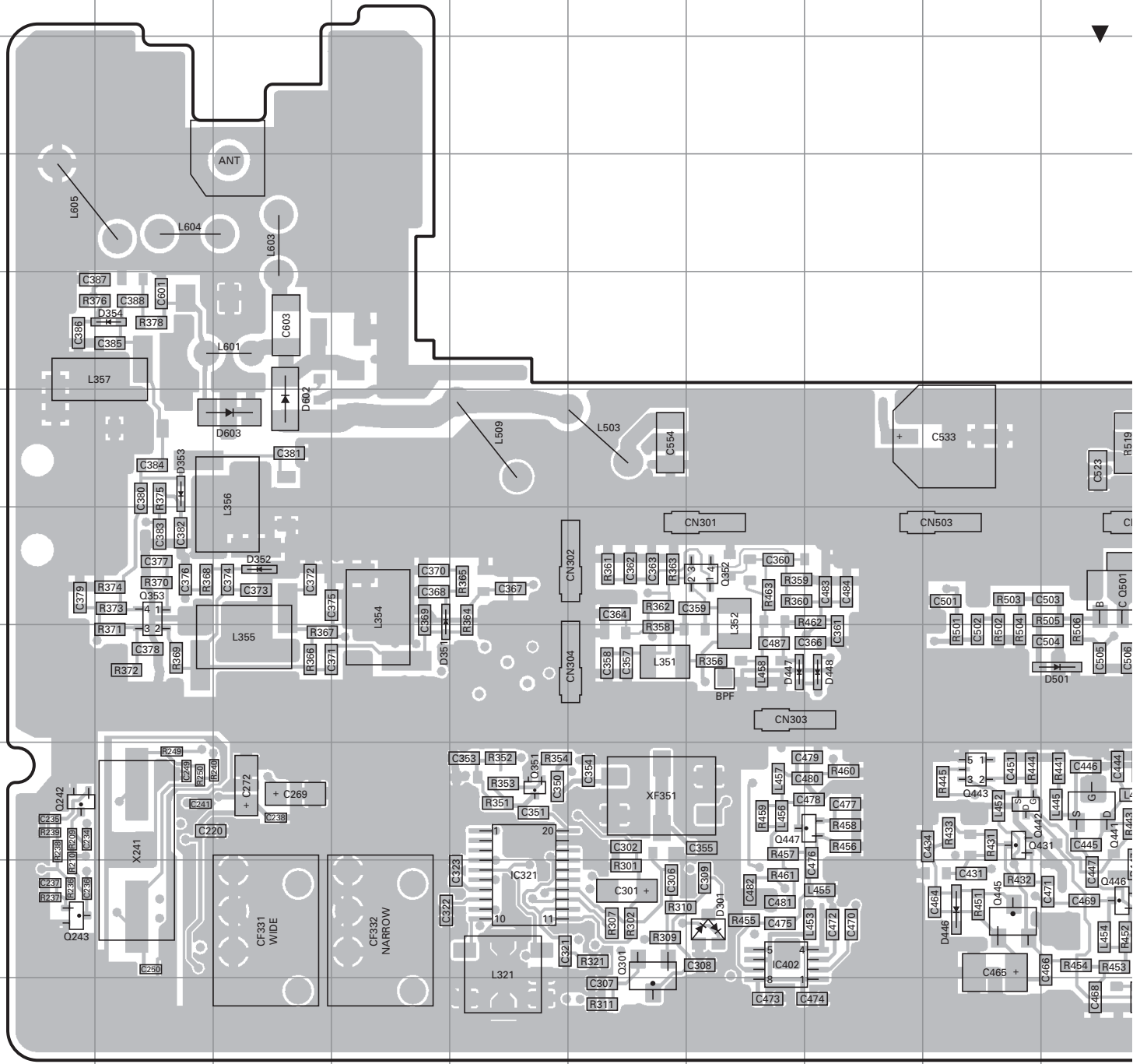


Ref. No.	Address	Ref. No.	Address	Ref. No.	Address	Ref. No.	Address	Ref. No.	Address	Ref. No.	Address
IC43	10B	IC502	4K	Q211	9J	D1	9D	D10	9F	D401	10J
IC201	8O	IC651	6R	Q212	8J	D2	10F	D11	8F	D421	10J
IC211	9J	Q31	5B	Q213	9G	D3	10F	D42	4D	D606	5P
IC213	7R	Q42	5D	Q241	9R	D4	10F	D81	6D	D608	5S
IC214	9R	Q45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



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TX-RX UNIT (X57-7102-70) Foil side view (J72-0957-09)



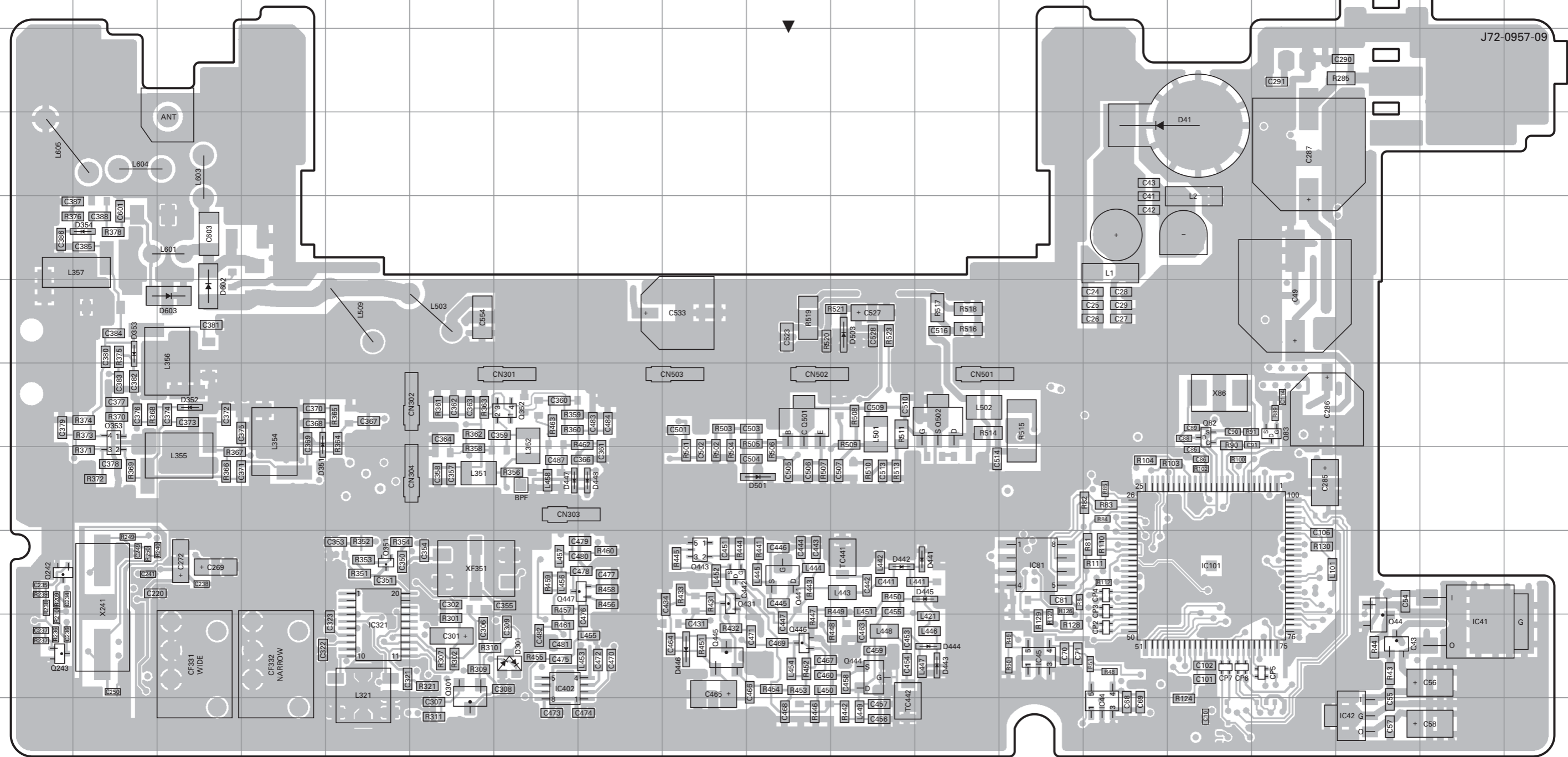
Ref. No.	Address	Ref. No.	Address	Ref. No.	Address	Ref. No.	Address	Ref. No.	Address	Ref. No.	Address
IC41	10R	Q43	10Q	Q352	7G	Q446	10J	D353	6B	D447	8G
IC42	11Q	Q44	10Q	Q353	7B	Q447	9H	D354	5B	D448	8H
IC44	11N	Q82	7O	Q431	9I	Q501	7J	D441	9L	D501	8J
IC45	10M	Q83	7P	Q441	9J	Q502	7L	D442	9K	D503	6K
IC81	9M	Q242	9A	Q442	9I	D41	4O	D443	10L	D602	6C
IC101	9O	Q243	10A	Q443	9I	D301	10G	D444	10L	D603	6C
IC321	10E	Q301	10F	Q444	10K	D351	8D	D445	9L		
IC402	10G	Q351	9E	Q445	10I	D352	7C	D446	10I		

TK-7160/7162 PC BOARD

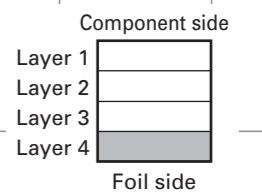
PC BOARD TK-7160/7162

TX-RX UNIT (X57-7102-70) Foil side view (J72-0957-09)

TX-RX UNIT (X57-7102-70) Foil side view (J72-0957-09)

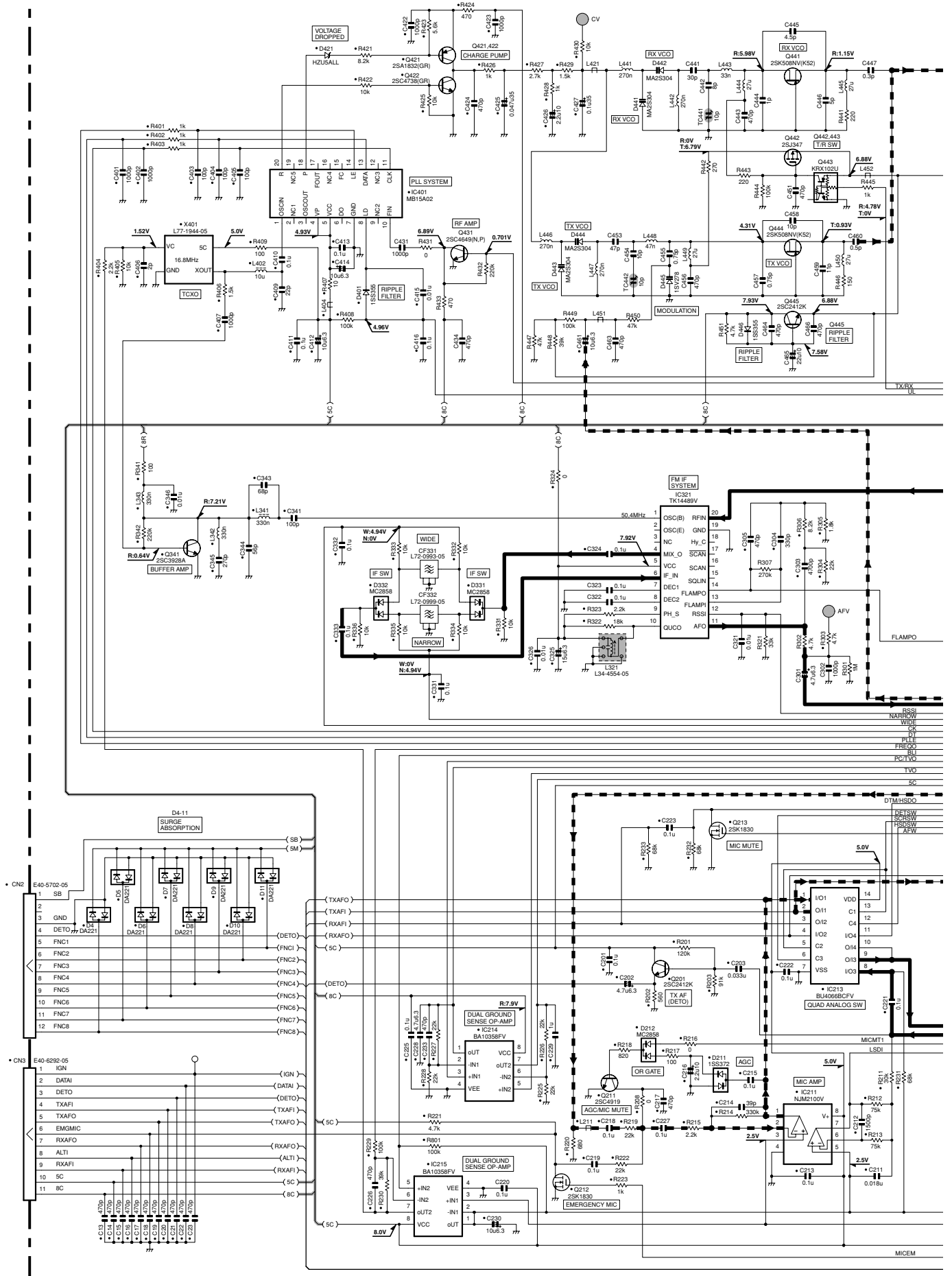


Ref. No.	Address	Ref. No.	Address	Ref. No.	Address	Ref. No.	Address	Ref. No.	Address	Ref. No.	Address
IC41	10R	Q43	10Q	Q352	7G	Q446	10J	D353	6B	D447	8G
IC42	11Q	Q44	10Q	Q353	7B	Q447	9H	D354	5B	D448	8H
IC44	11N	Q82	7O	Q431	9I	Q501	7J	D441	9L	D501	8J
IC45	10M	Q83	7P	Q441	9J	Q502	7L	D442	9K	D503	6K
IC81	9M	Q242	9A	Q442	9I	D41	4O	D443	10L	D602	6C
IC101	9O	Q243	10A	Q443	9I	D301	10G	D444	10L	D603	6C
IC321	10E	Q301	10F	Q444	10K	D351	8D	D445	9L		
IC402	10G	Q351	9E	Q445	10I	D352	7C	D446	10I		



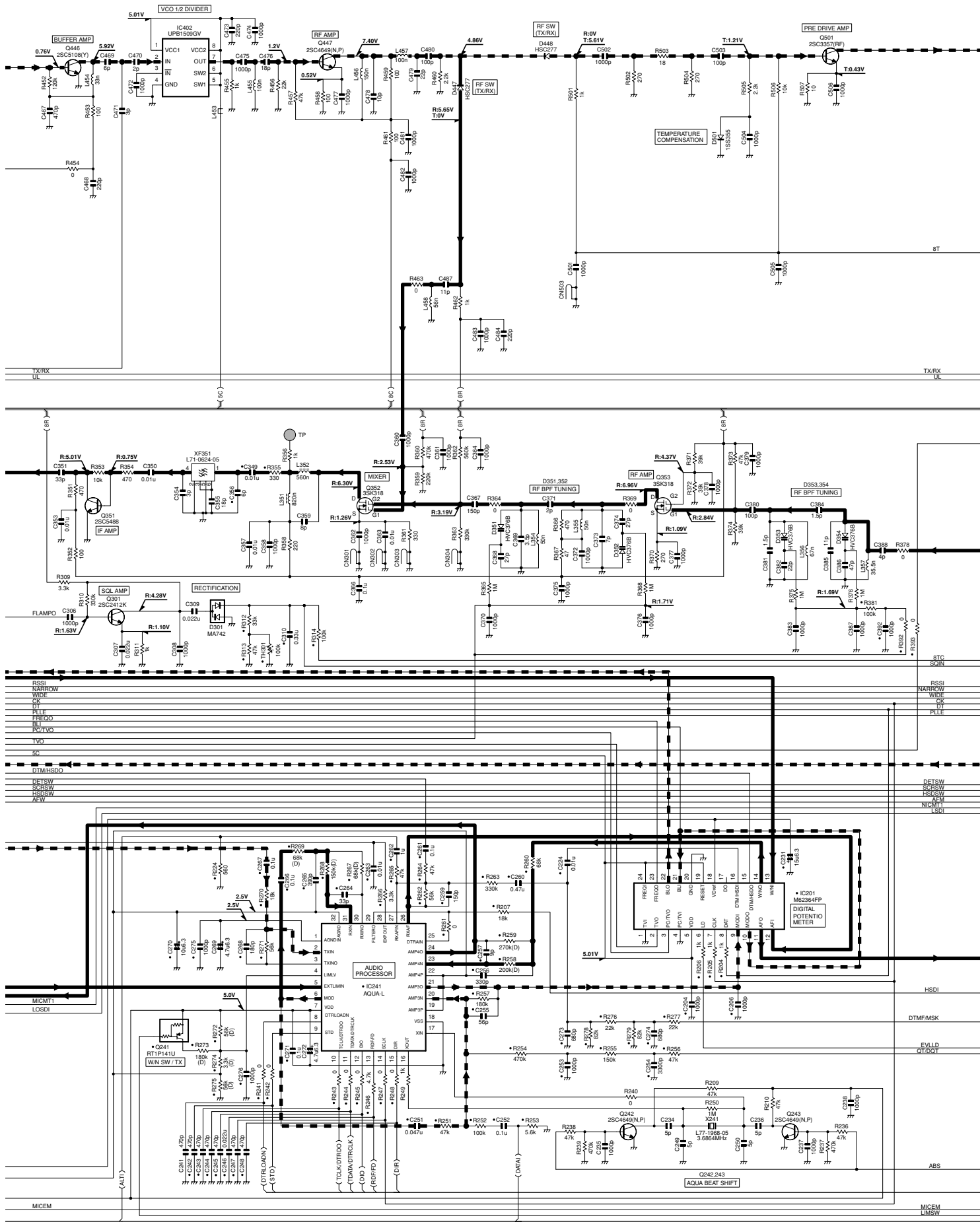
TK-7160/7162 SCHEMATIC DIAGRAM

TX-RX UNIT (X57-7102-70)



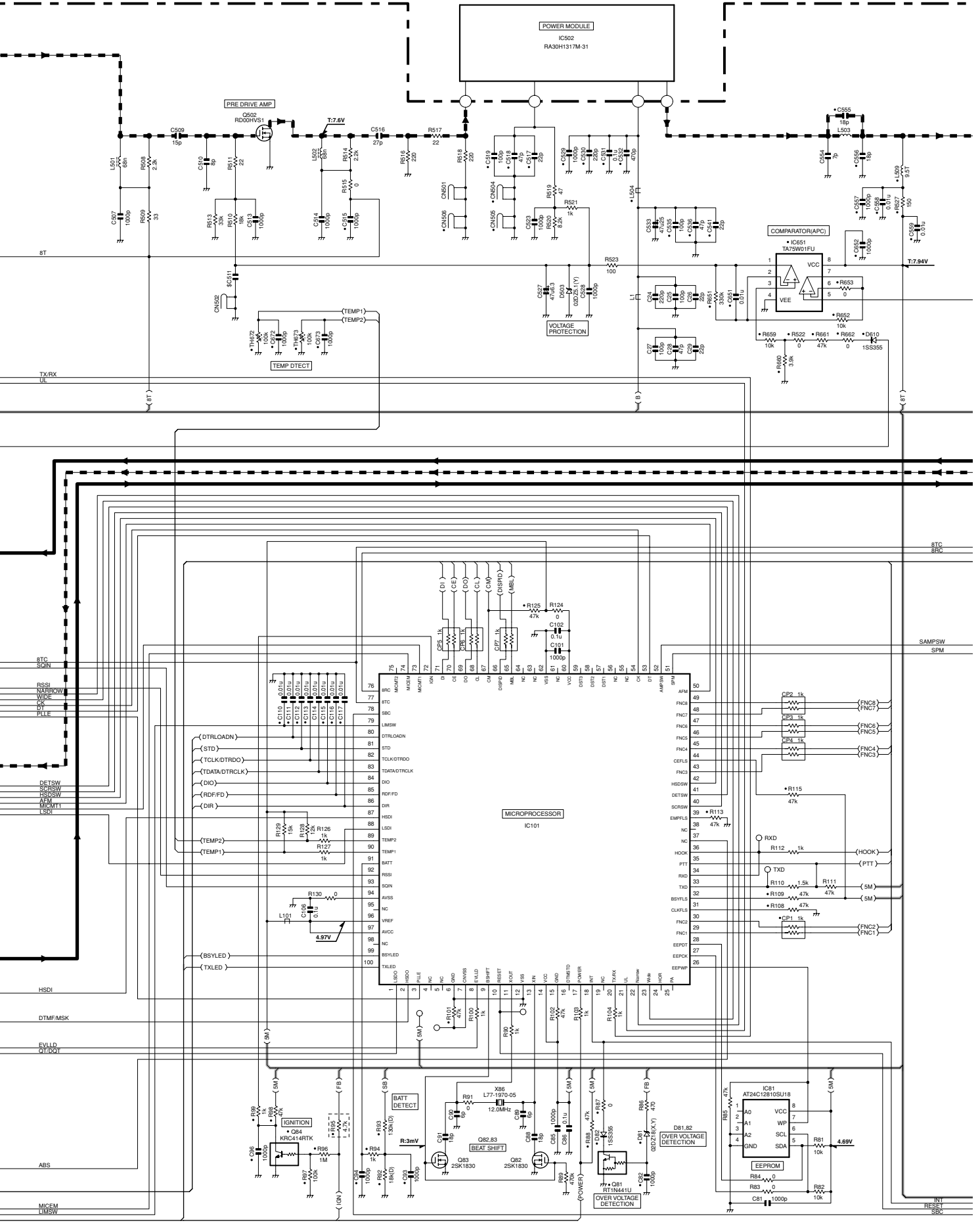
SCHEMATIC DIAGRAM TK-7160/7162

TX-RX UNIT (X57-7102-70)



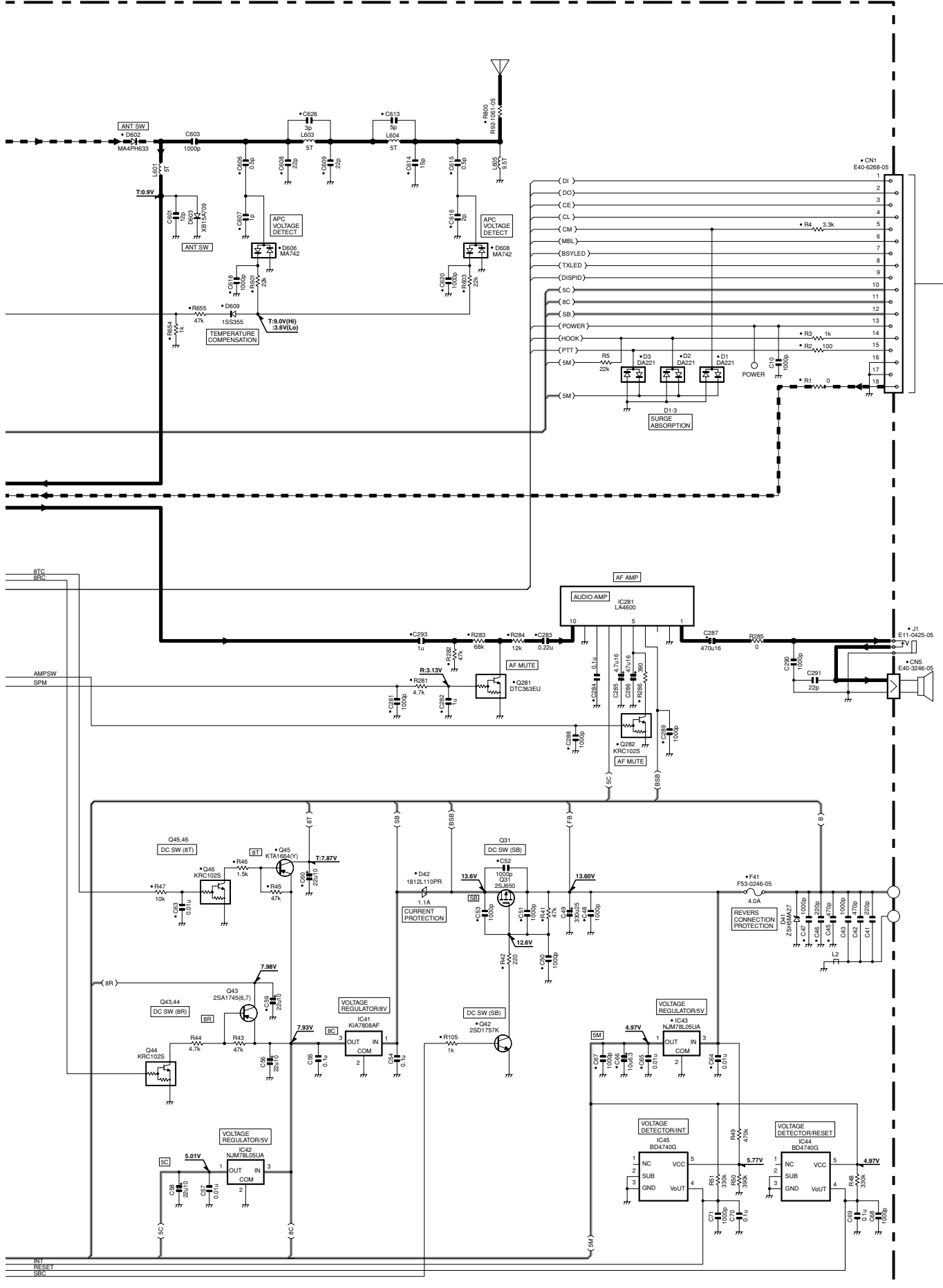
TK-7160/7162 SCHEMATIC DIAGRAM

TX-RX UNIT (X57-710-70)



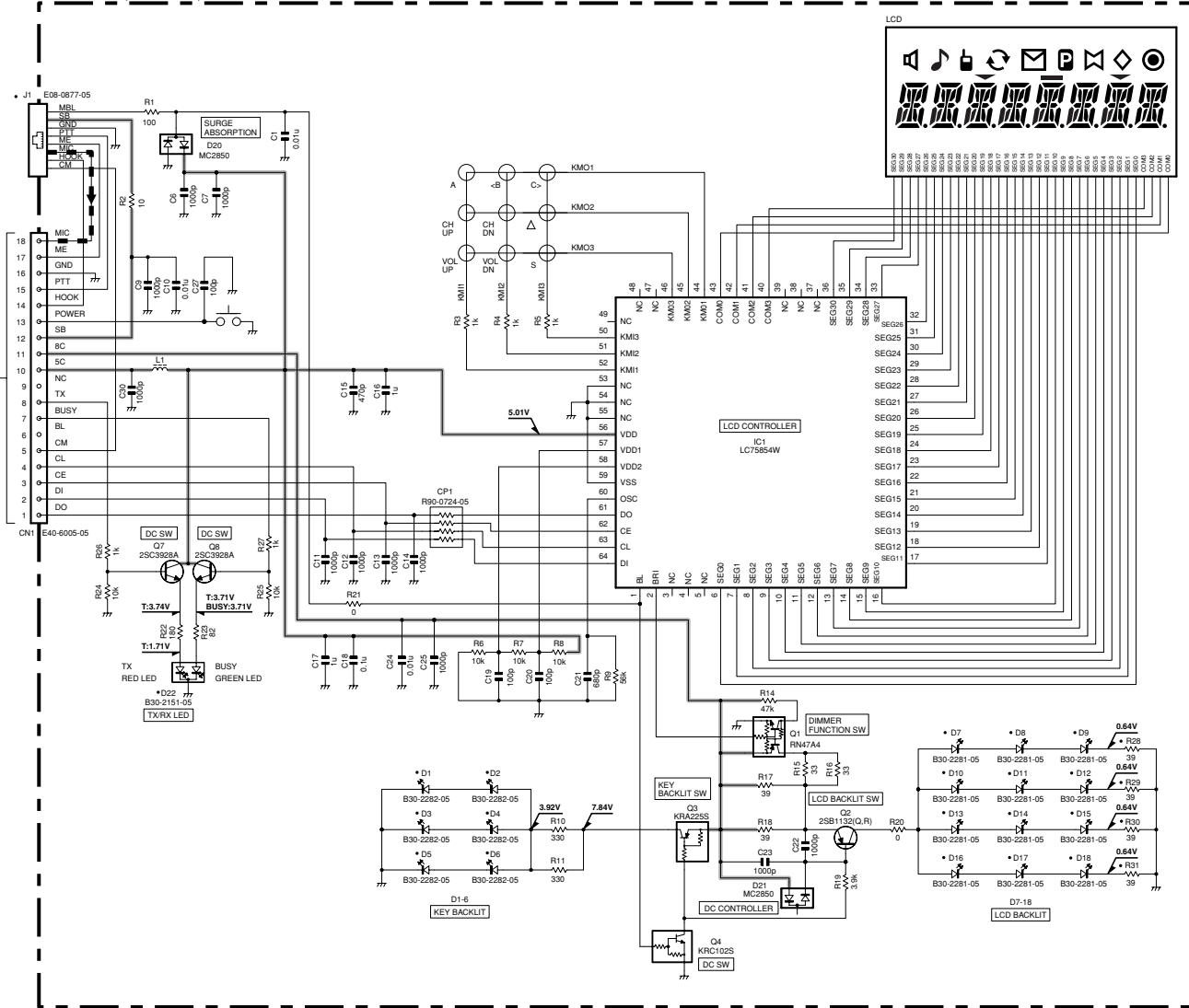
SCHEMATIC DIAGRAM TK-7160/7162

TX-RX UNIT (X57-7102-70)

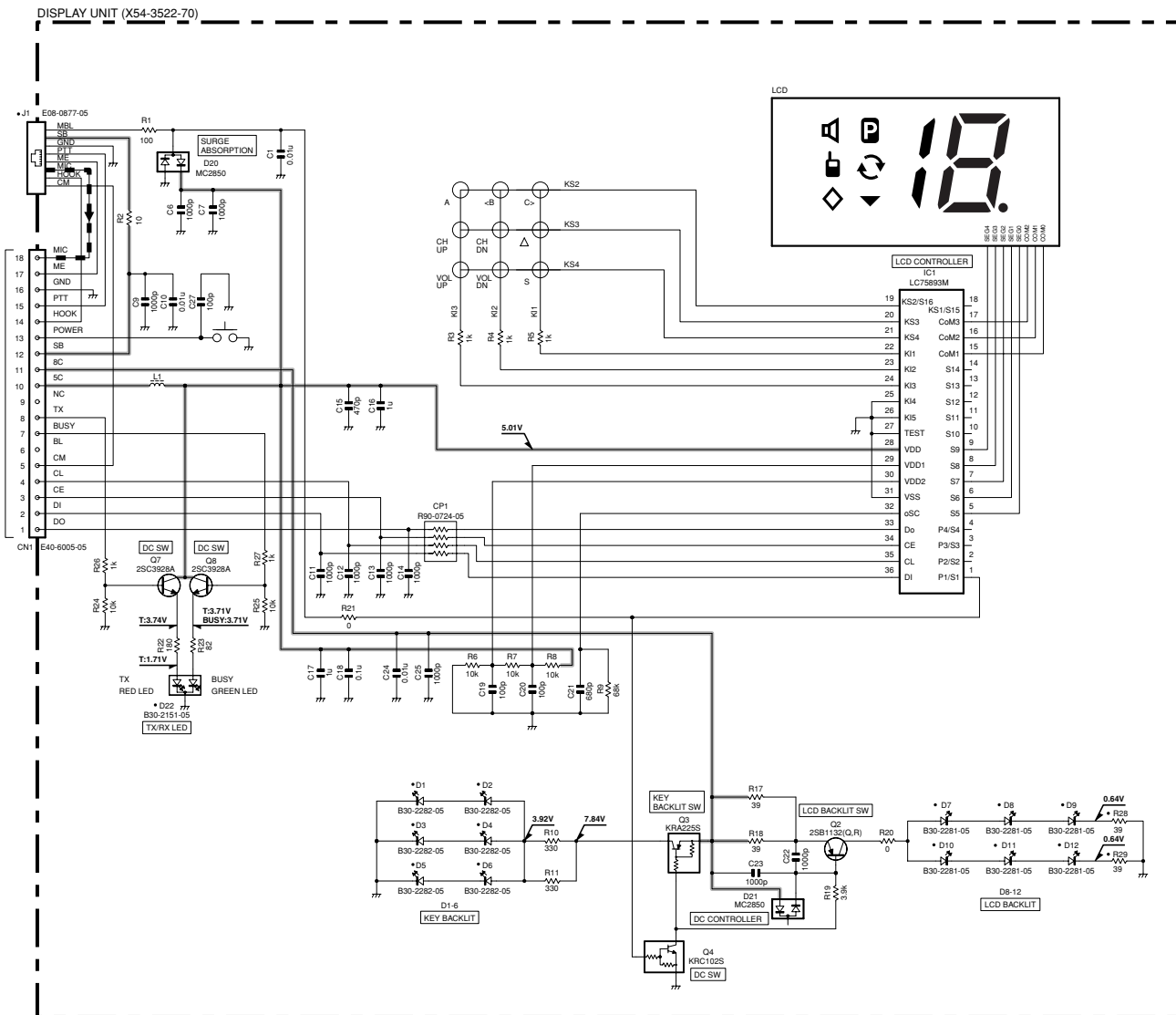


TK-7160/7162 SCHEMATIC DIAGRAM

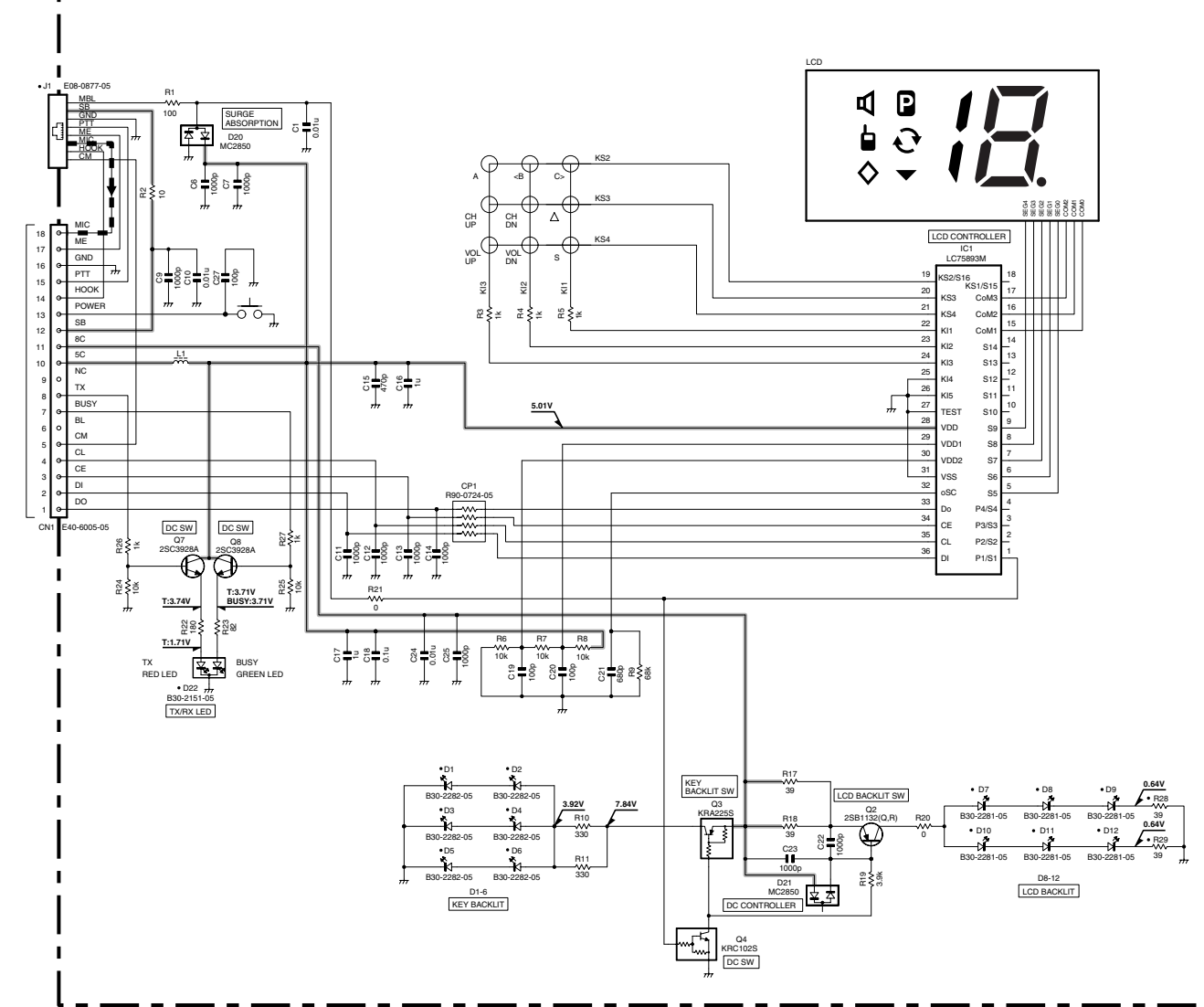
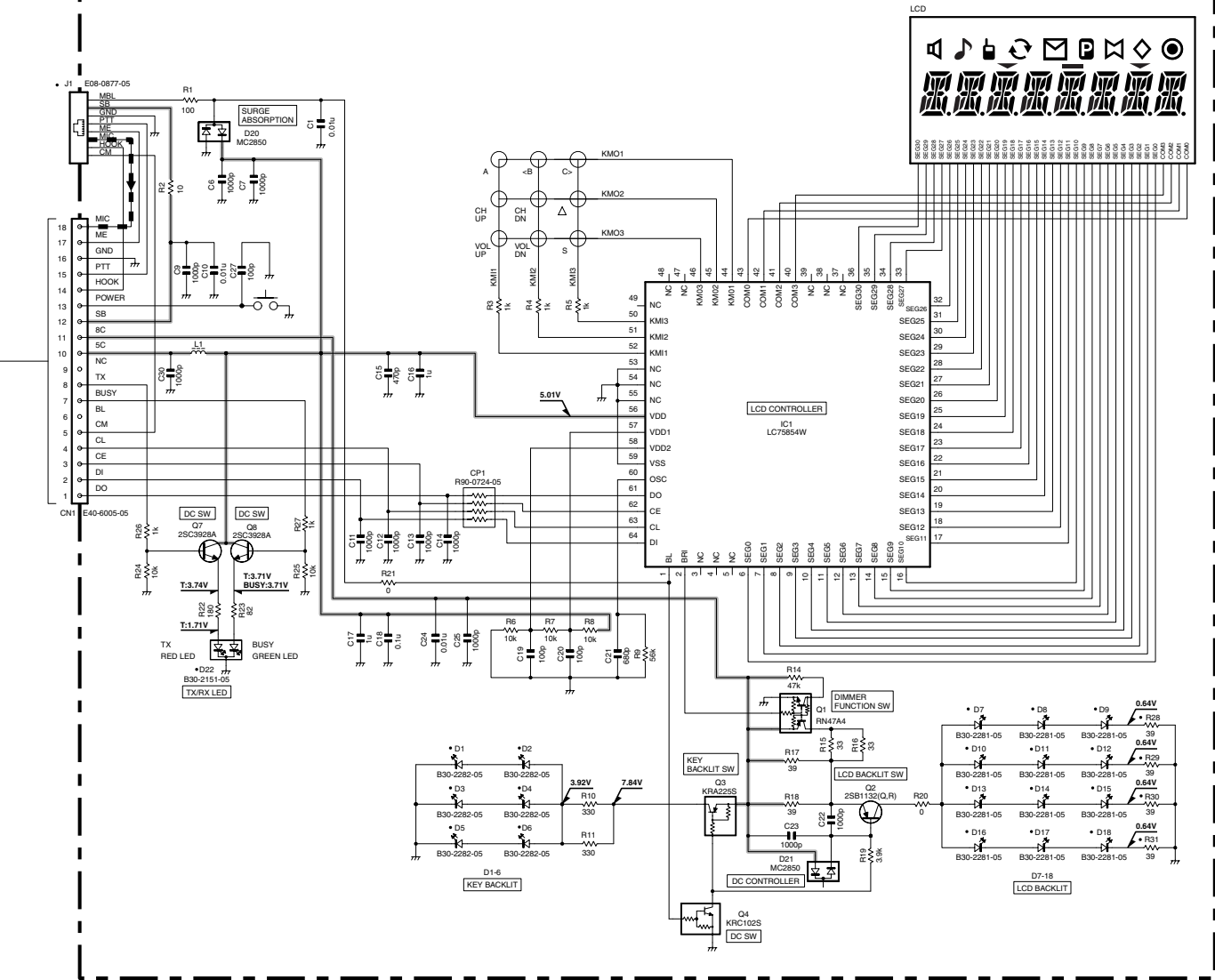
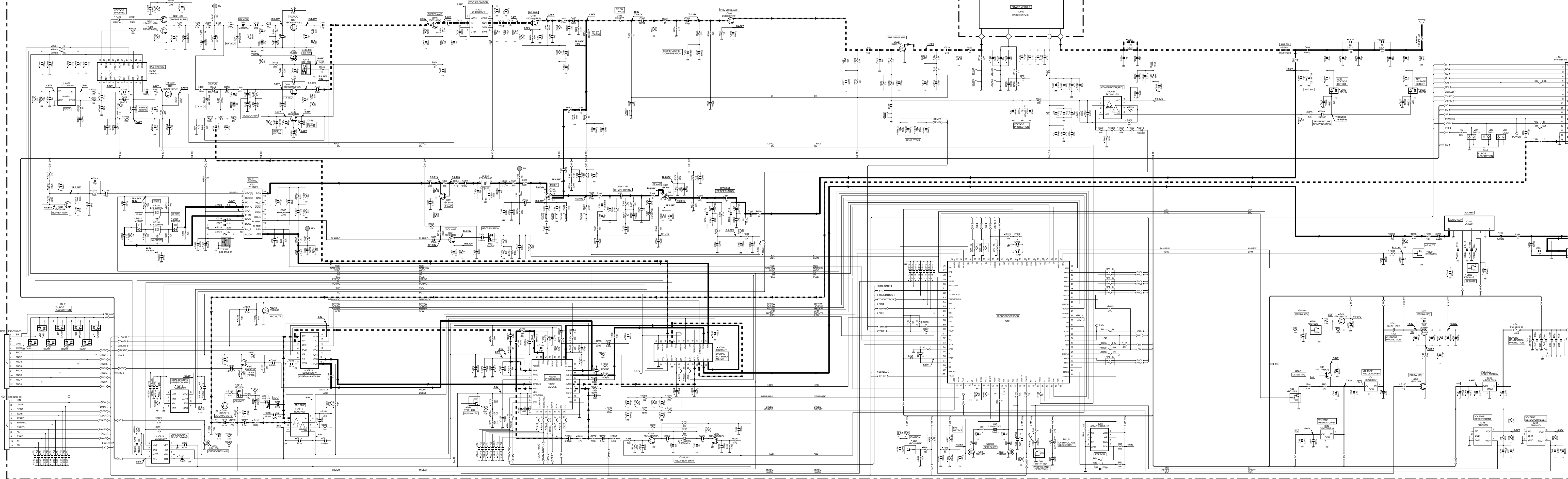
DISPLAY UNIT (X54-3510-10)



SCHEMATIC DIAGRAM TK-7160/7162

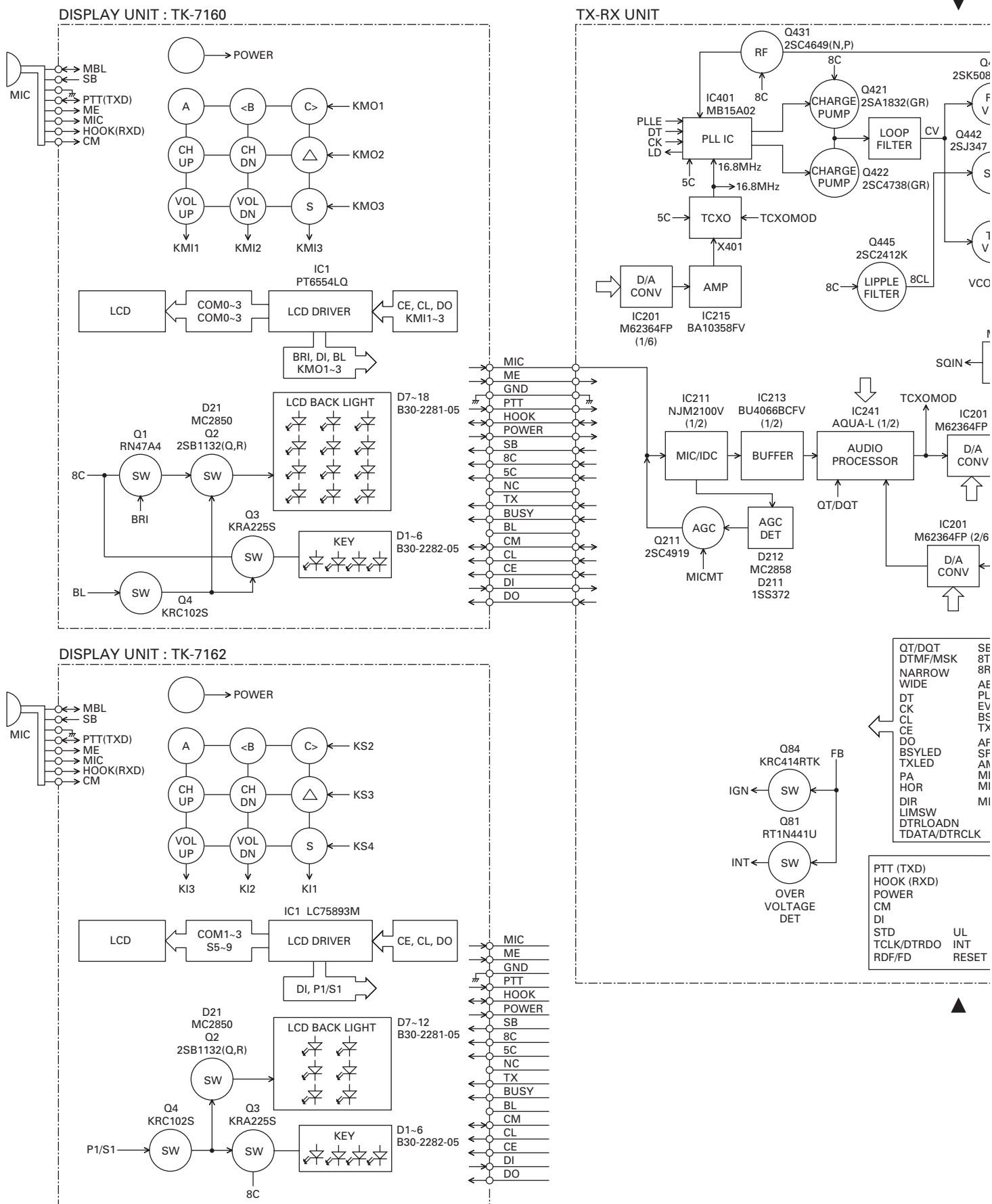


Note : The components marked with a dot (•) are parts of layer 1.

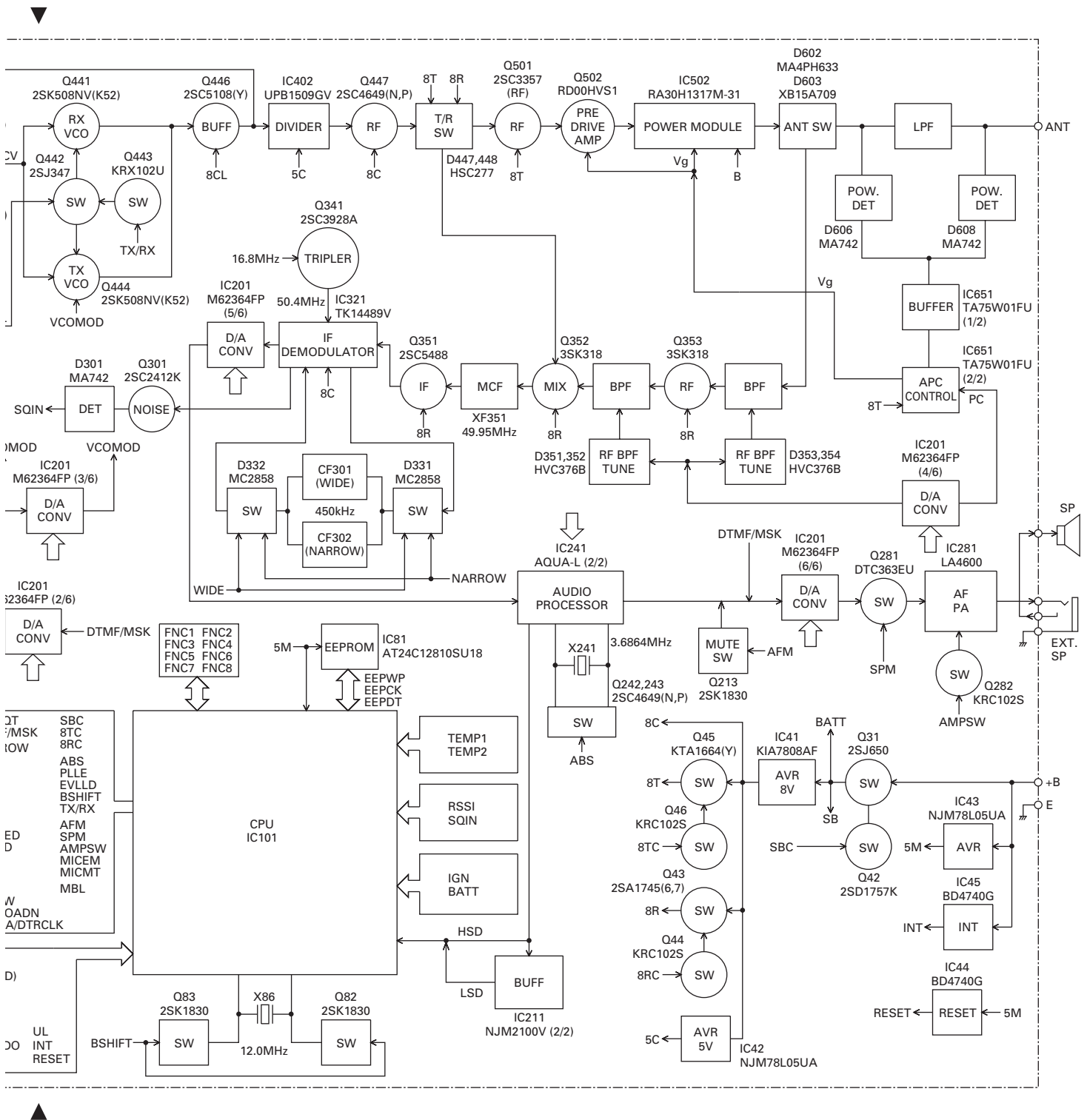


TK-7160/7162

BLOCK DIAGRAM

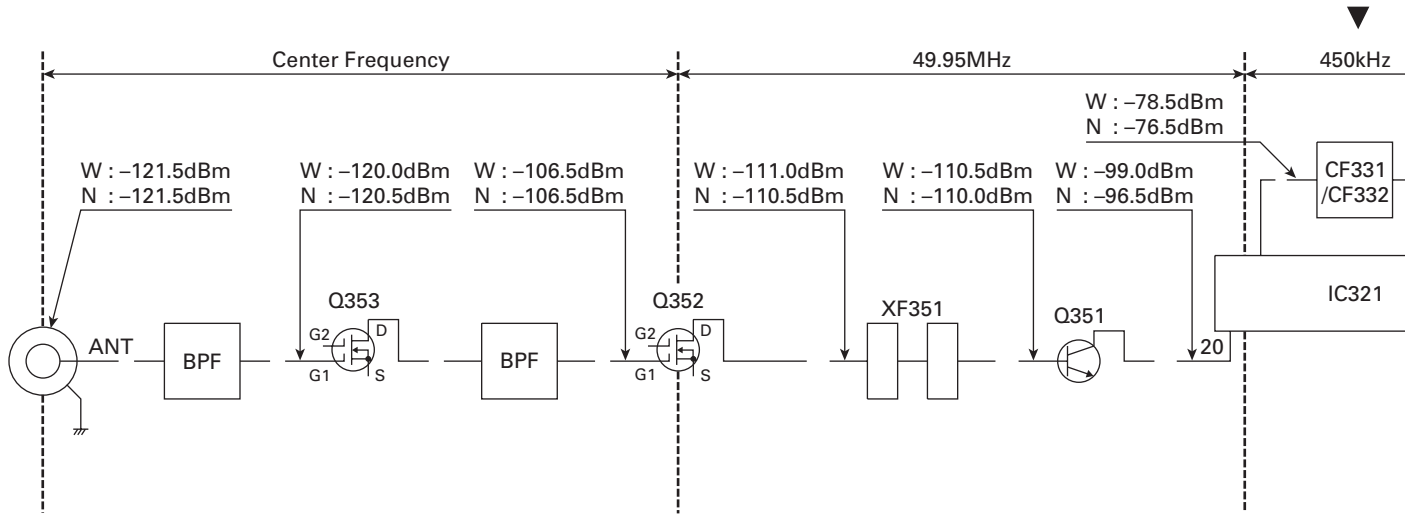


BLOCK DIAGRAM



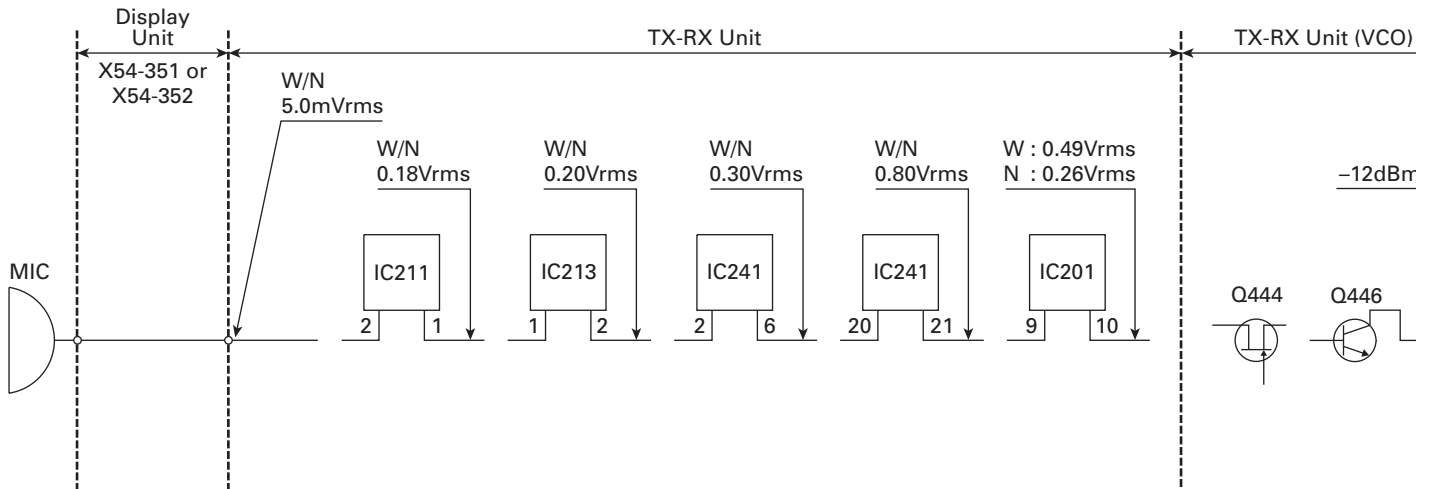
LEVEL DIAGRAM

Receiver Section



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

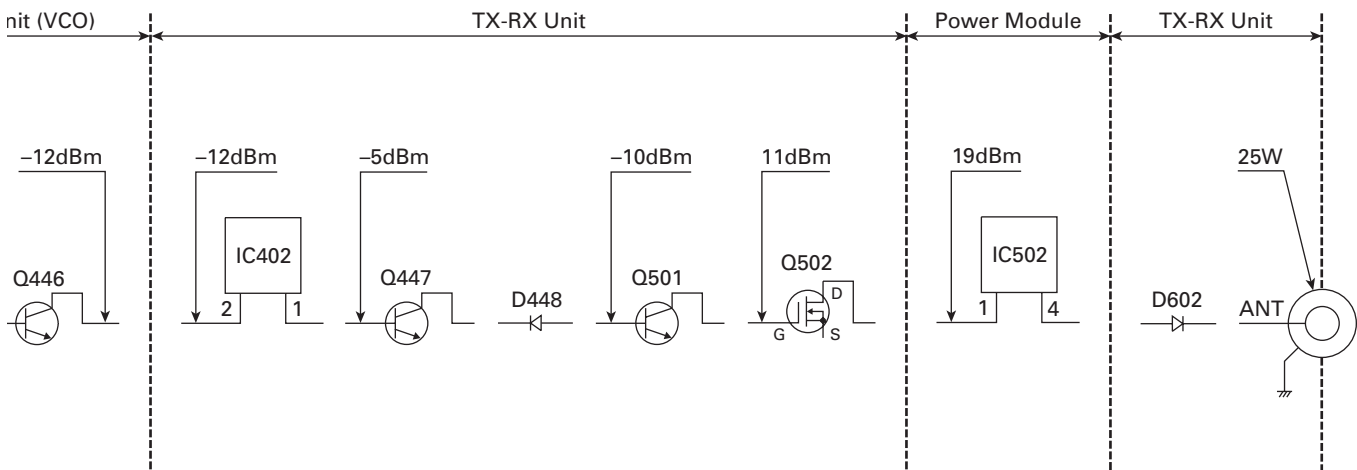
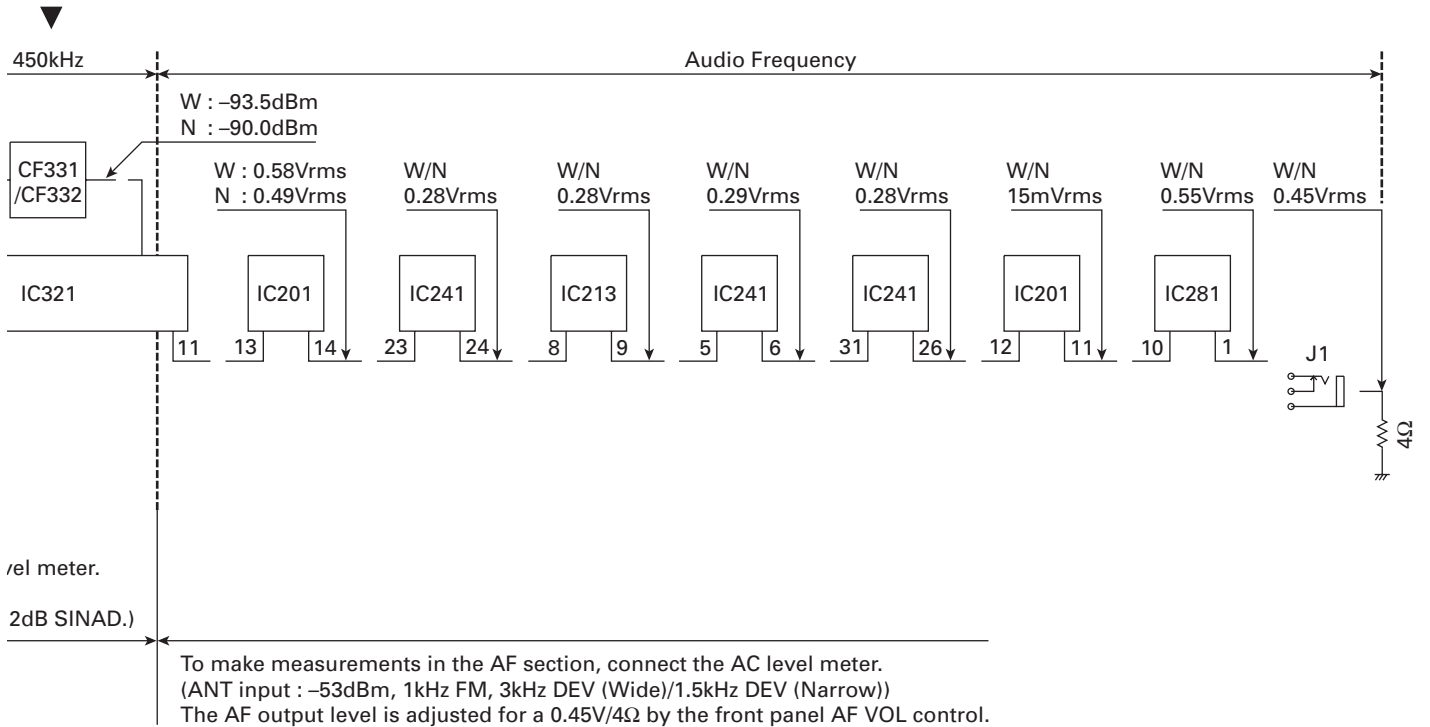
Transmitter Section



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



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

▲

TK-7160/7162

SPECIFICATIONS

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

Frequency range	136~174MHz		
Number of channels			
TK-7160	Max. 128 Channels total per radio		
	Zone : Max. 128 per radio		
	Channel : Max. 128 per zone		
TK-7162	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 Ω		
Channel frequency spread	38MHz		
Dimensions (W x H x D Projections not included)	160 x 43 x 107 mm		
Weight (net)	1.0 kg		

RECEIVER (Measurements made per EN standard)

Sensitivity			
EIA 12dB SINAD	Wide 5k : 0.28 μ V	Wide 4k : 0.28 μ V	Narrow : 0.35 μ V
EN 20dB SINAD	Wide 5k : -3dB μ V	Wide 4k : -3dB μ V	Narrow : -2dB μ V
Adjust channel selectivity	Wide 5k : 70dB	Wide 4k : 70dB	Narrow : 60dB
Inter modulation	65dB		
Spurious response rejection	70dB		
Audio output (8 Ω impedance)	4W with less than 5% distortion		

TRANSMITTER (Measurements made per EN standard)

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

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