UHF FM TRANSCEIVER

# TK-3312

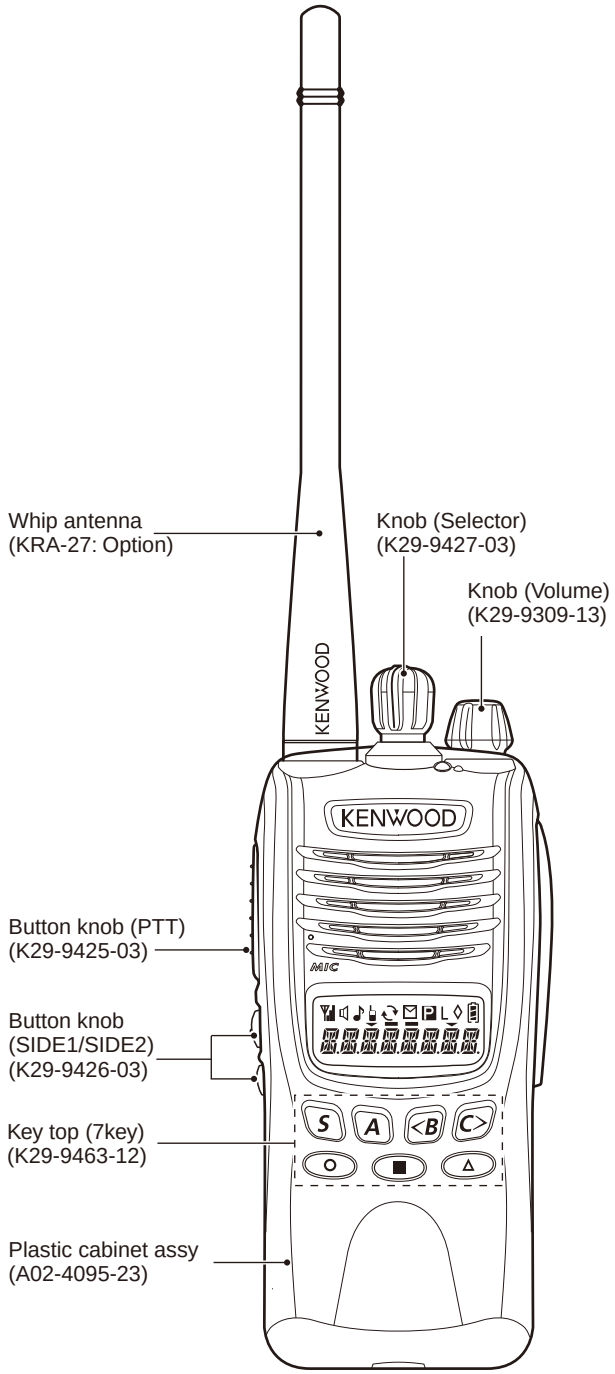
## SERVICE MANUAL

## E version

KENWOOD

Kenwood Corporation


B51-8971-00 (Y) 87

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This product complies with the **RoHS** directive for the European market.

This product uses Lead Free solder.

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## Firmware Copyrights



# 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 the publication date. Changes which may occur after publication are covered by either Service Bulletins or Manual Revisions. These 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, or 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:

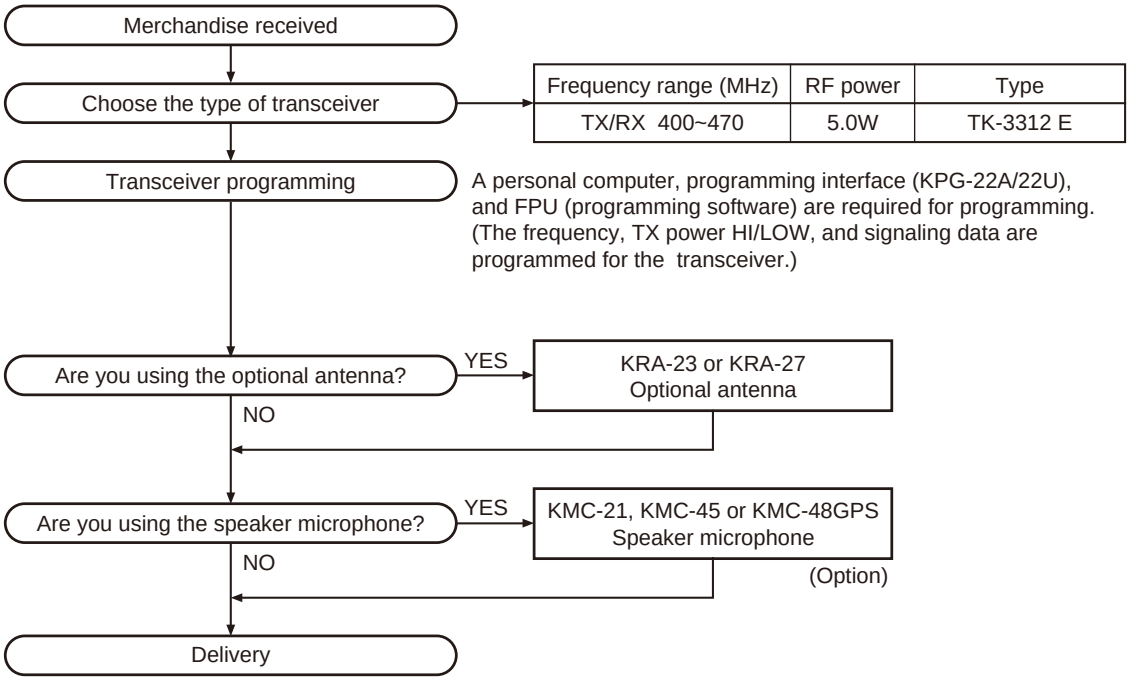
- DO NOT transmit until all RF connectors are verified secure and any open connectors are properly terminated.
- SHUT OFF and DO NOT operate this equipment near electrical blasting caps or in an explosive atmosphere.
- This equipment should be serviced by a qualified technician only.

## SERVICE

This transceiver is designed for easy servicing. Refer to the schematic diagrams, printed circuit board views, and alignment procedures contained within.

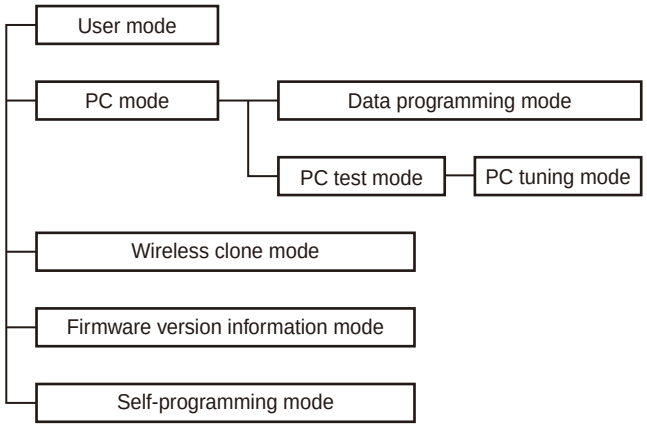
| Model | Type | TX-RX unit | Frequency range | Remarks |
|---|---|---|---|---|
| TK-3312 | E | X57-7892-71 | 400~470MHz | IF1: 49.95MHz<br>LOC: 50.4MHz |

# SYSTEM SET-UP




# REALIGNMENT

## 1. Modes




| Mode | Function |
|---|---|
| User mode | For normal use. |
| PC mode | Used for communication between the transceiver and PC. |

| Mode | Function |
|---|---|
| Data 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. |
| Wireless clone mode | Used to transfer programming data from one transceiver to another. |
| Firmware version information mode | Used to confirm the internal firmware version. |
| Self-programming mode | You can program the frequency signaling and other function using only the transceiver. |

## 2. How to Enter Each Mode

| Mode | Operation |
|---|---|
| User mode | Power ON |
| PC mode | Received commands from PC |
| Wireless clone mode | [<B] + Power ON (Two seconds) |
| Firmware version information mode | [Side1] + [Side2] + Power ON (Two seconds) |
| Self-programming mode | [S] + Power ON (Two seconds) |

# REALIGNMENT

## 3. PC Mode

### 3-1. Preface

The transceiver is programmed by using a personal computer, a programming interface (KPG-22A/22U, USB adapter (KCT-53U)) and programming software (KPG-134D).

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

### 3-2. Connection Procedure

1. Connect the transceiver to the personal computer with the interface cable and USB adapter (when the interface cable is KPG-22A, the KCT-53U can be used).

**Note:**

- You must install the KPG-22U driver in the computer to use the USB programming interface cable (KPG-22U).
- You must install the KCT-53U driver in the computer to use the USB adapter (KCT-53U).
- When using the USB adapter (KCT-53U) for the first time, plug the KCT-53U into a USB port on the computer with the computer power ON.

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 read from the transceiver, the red LED lights.
   When data is written to by the transceiver, the green LED lights.

**Note:**

- The data stored in the personal computer must match Model Name and Model Type when it is written into EEPROM.
- Do not press the [PTT] key during data transmission or reception.

### 3-3. KPG-22A Description (PC programming interface cable: Option)

The KPG-22A is required to interface the transceiver with the computer. It has a circuit in its D-sub connector (KPG-22A: 9-pin) case that converts the RS-232C logic level to the TTL level.

The KPG-22A connects the SP/MIC connector of the transceiver to the RS-232C serial port of the computer.

### 3-4. KPG-22U Description (USB programming interface cable: Option)

The KPG-22U is a cable which connects to a USB port on a computer.

When using the KPG-22U, install the supplied CD-ROM (with driver software) in the computer. The KPG-22U driver runs under Windows XP, Vista or 7.

### 3-5. KCT-53U Description (USB adapter: Option)

The KCT-53U is a cable which connects the KPG-22A to a USB port on a computer.

When using the KCT-53U, install the supplied CD-ROM (with driver software) in the computer. The KCT-53U driver runs under Windows 2000, XP or Vista (32-bit).

### 3-6. Programming Software KPG-134D Description

The KPG-134D is the programming software for the transceiver supplied on a CD-ROM. This software runs under windows XP, Vista or 7 on a PC. The software on this disk allows a user to program the transceiver transceivers via Programming interface cable (KPG-22A/22U).

### 3-7. Programming with PC

If data is transferred to the transceiver from a PC with the FPU, the data for each set can be modified.

Data can be programmed into the EEPROM in RS-232C format via the SP/MIC jack.

In this mode the PTT line operate as TXD and RXD data lines respectively.

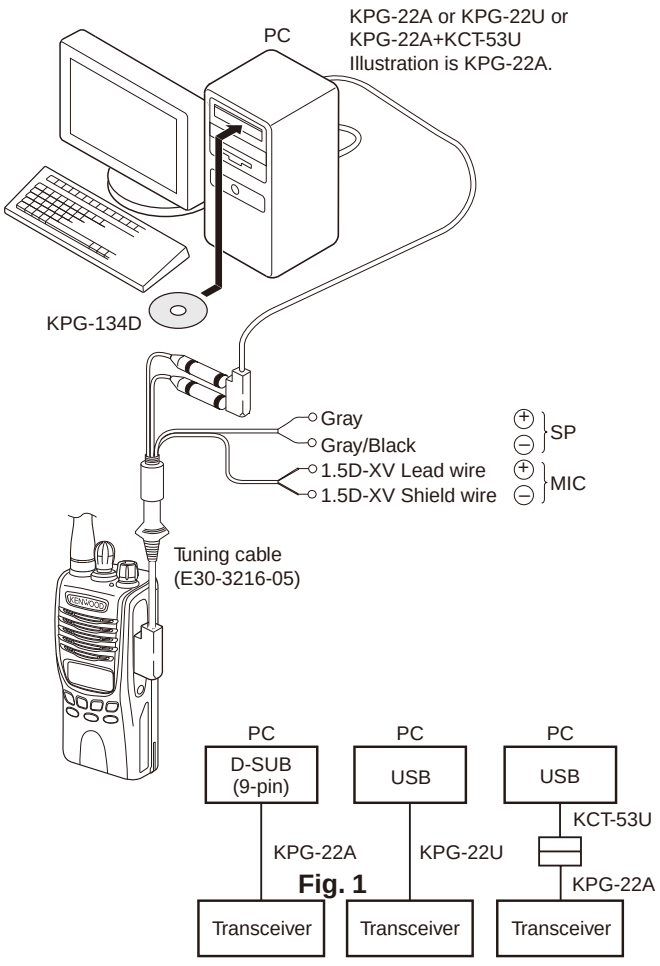



**Fig. 1**

# REALIGNMENT

## 4. Wireless Clone Mode

### 4-1. Outline

"Wireless Clone Mode" copies the transceiver data to another transceiver.

The dealer can copy the transceiver data to another transceiver even without the use of a personal computer.

### 4-2. Example

The transceiver can copy the programming data to one or more transceivers via RF communication.

The clone source and clone target/s must be in wireless clone mode.

### 4-3. Operation

1. To switch the clone target/s to Wireless Clone mode, press and hold the [<B] key while turning the transceiver power ON.
2. Wait for 2 seconds. "CLONE" appears on the LCD, followed by "FRQTBL 1".
3. Select a channel table number using the [Selector] knob.
4. To switch the clone source to Wireless Clone mode, press and hold the [<B] key while turning the transceiver power ON.
5. Wait for 2 seconds. "CLONE" appears on the LCD, followed by "FRQTBL 1".
6. Select the same channel table number as the clone target/s.
7. Press the [S] key on the clone source to begin data transmission. When the clone target starts to receive data, the green LED will light and "CLONING" will appear on the LCD. The source unit will display "MASTER".
8. When the clone source finishes sending data, a "confirmation" tone will sound and "COMPLETE" will appear on the LCD. If data transmission failed while cloning, the target unit will produced an error tone and "CLONE NG" will appear on the LCD.
9. If the cloning fails, no data will be available in the target unit when it is returned to User mode.
10. When the cloning is successful, the target unit's "Scan" and "Key lock" functions will return to their default values (Scan = OFF, Key lock = OFF).
11. The source will remain in clone mode after cloning. The target unit will return to user mode after a successful cloning.

**Note:**

- The dealer can clone data to two or more transceivers by repeating the above procedures.
- If the transceivers wireless clone Mode is configured as "Disabled", the transceiver cannot enter Clone mode.
- The table shown below will cover the frequency tables used for wireless cloning.
- Wireless clone mode cannot be entered in battery low state.
- A unit cannot be a "Source Unit" if it is unprogrammed. If the [S] key is pressed, an "error" tone will sound.
- Once a unit is set to be the source, it cannot be a target after the data has been transmitted. This protects the data in the source unit.
- MSK signaling is used in cloning.
- Electronic interface may cause a failure in data transfer during Wireless Clone, such as when waveforms or electromagnetics are being performed at the workbench.
- Wireless clone mode can be used ONLY by the authorized service personnel.
- The wireless clone mode setting must be configured as "Disable" before being delivered to the end-user.
- To wireless clone, replace the antenna from both the source transceiver and the target transceiver with a dummy load.
- The transmit output power is automatically set to Low in Clone mode.

### 4-4. Adding the Data Password

If the Data password is set to the transceiver, you must enter the password to activate a clone mode. The maximum length of the password is 6 digits.

The following describes how to enter the password.

1. Press and hold the [<B] key for 2 seconds while turning the transceiver power on.
2. "CLN.LOCK.R"(When the Read authorization password is set to the transceiver.) / "CLN.LOCK.W" (When the Overwrite password is set to the transceiver.) is displayed on the LCD.
3. If the [selector] knob is rotated while "CLN.LOCK.R"/ "CLN.LOCK.W" is displayed, the number (0 to 9) flashes on the LCD.
   When you press the [C>] key, the currently selected number is determined.
   If you press the [A] key, the least digit of the password is deleted.
   If you press the [S] key after entering the password in this procedure, "FRQTBL 1" is displayed if the entered password is correct.
   If the password is incorrect, "CLN.LOCK.R"/ "CLN.LOCK.W" is redisplayed. (with error tone)

**• Clone frequency table**

| No. | Operating frequency 400~470 (MHz) |
|---|---|
| 1 | 400.000 |
| 2 | 402.000 |
| 3 | 404.000 |
| 4 | 406.000 |
| 5 | 408.000 |
| 6 | 410.000 |
| 7 | 412.000 |
| 8 | 414.000 |
| 9 | 416.000 |
| 10 | 418.000 |
| 11 | 420.000 |
| 12 | 422.000 |
| 13 | 424.000 |
| 14 | 426.000 |
| 15 | 428.000 |
| 16 | 430.000 |
| 17 | 432.000 |
| 18 | 434.000 |
| 19 | 436.000 |
| 20 | 438.000 |

# REALIGNMENT

## 5. Self Programming Mode

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. Transceivers CANNOT be delivered to the end-user in the self-programming mode.

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

Press and hold the [S] key for 2 seconds while turning the transceiver power on.

When the transceiver enters in the self programming mode, "1- 1" is displayed 2 seconds after "SELF" is displayed.

**Note:**

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

### 5-2. Adding the Data Password

If the Data password is set to the transceiver, you must enter the password to activate a self programming mode. The maximum length of the password is 6 digits.

The following describes how to enter the password.

1. Press and hold the [S] key for 2 seconds while turning the transceiver power on.
2. "SLF.LOCK.R" (When the Read authorization password is set to the transceiver.) / "SLF.LOCK.W" (When the Overwrite password is set to the transceiver.) is displayed on the LCD.
3. If the [selector] knob is rotated while "SLF.LOCK.R"/ "SLF.LOCK.W" is displayed, the number (0 to 9) flashes on the LCD.
   When you press the [C>] key, the currently selected number is determined.
   If you press the [A] key, the least digit of the password is deleted.
   If you press the [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"/ "SLF.LOCK.W" is redisplayed.

### 5-3. Channel Selection Mode

In this mode, the Zone or Channel can be selected.

Press and hold the [S] key for 2 seconds while turning the transceiver power on to enter self programming mode. When the transceiver enters in the self programming mode, the transceiver automatically enters the Channel Selection mode.

2 seconds after displaying "SELF", "1- 1" appears on the LCD.

**The setup item for channel selection mode is as follows.**

| Setup item | Display | Remarks |
|---|---|---|
| Select Zone/Channel | ⁄*** - *** <br> *** - ⁄*** | Zone: 1~128 <br> Channel: 1~128 |

**Key operation**

| Key | Key Function |
|---|---|
| [Selector] | Toggle between Zone selection and Channel selection |
| [Side1] | No action |
| [Side2] | No action |
| [S] | Enter the Item Setting mode |
| [A] | Return to the Channel Selection mode |
| [<B] | Decrement the blinking Zone/Channel number by 1. Press and hold to decrement in steps of 10. |
| [C>] | Increment the blinking Zone/Channel number by 1. Press and hold to decrement in steps of 10. |

**Note:**

If a non-existing Zone-Channel is selected and the memory for all 128 channels is already filled, an error tone will sound and "MEM.FULL" will appear on the LCD for 2 seconds.

### 5-4. Item Selection Mode

In this mode, the following items can be selected.

- RX frequency
- RX signaling
- TX frequency
- TX signaling
- RF power Hi/Low
- Scan Del/Add
- Beat shift on/off
- Compander on/off

When the [S] key is pressed in the Channel Selection mode, the transceiver enters the Item Selection mode.

**Key operation**

| Key | Key Function |
|---|---|
| [Selector] | The selected item changes |
| [Side1] | No action |
| [Side2] | No action |
| [S] | Enter the Item Setting mode |
| [A] | Return to the Channel Selection mode |
| [<B] | Error tone sounds |
| [C>] | Error tone sounds |

# REALIGNMENT

## 5-5. Item Setting Mode

In this mode, the selected item in the Item Selection mode can be programmed.

When the [S] key is pressed in the Item Selection mode, the transceiver enters the Item Setting mode.

**The setup items for item setting mode are as follows**

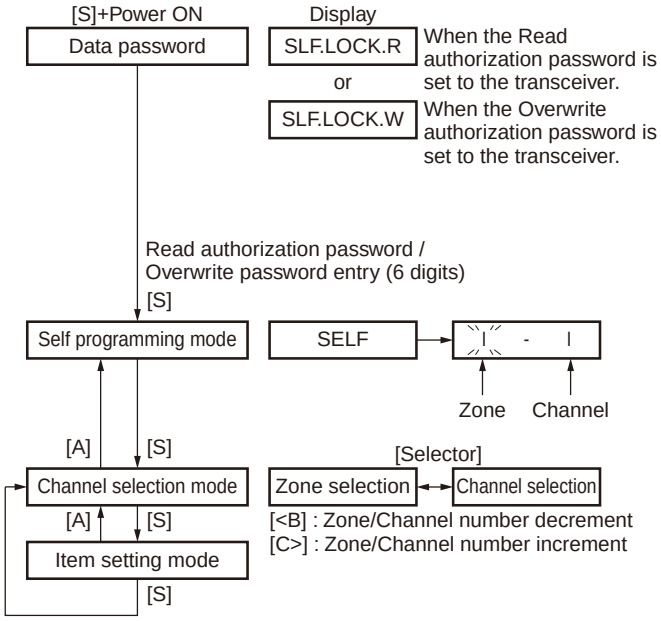
| Setup item | Display | Remarks |
|---|---|---|
| 1. RX frequency | 1. RX FREQ → ***.***** | Receive frequency 400.00000~470.00000MHz |
| 2. RX signaling | 2. RX SIG TONE OFF/ QT ***.*/ DQT ***N/ DQT ***I | Receive QT/DQT |
| 3. TX frequency | 3. TX FREQ → ***.***** | Transmit frequency 400.00000~470.00000MHz |
| 4. TX signaling | 4. TX SIG → TONE OFF/ QT ***.*/ DQT***N/ DQT***I | Transmit QT/DQT |
| 5. RF power Hi/Low | 5. PWR *** | HI/LOW |
| 6. Scan Del/Add | 6. SCN *** | DEL/ADD |
| 7. Beat shift on/off | 7. SFT *** | ON/OFF |
| 8. Compander on/off | 8. CMP *** | ON/OFF |

**Key operation**

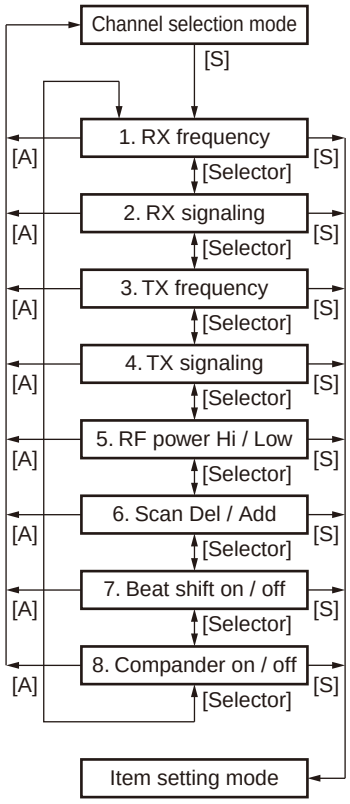
| Key | Key Function |
|---|---|
| [Selector] | Changing the selection item (RX/TX frequency and RX/TX signaling only) |
| [Side1] | No action |
| [Side2] | No action |
| [S] | • Store the current settings and return to the Item Selection mode without backup.<br>• A MHz digit of the frequency blinks. (RX/TX frequency only)<br>• The icon of the current signaling configuration blinks. (RX/TX signaling only) |
| [A] | Abort the current settings and return to the Item Selection mode without backup. |
| [<B] | Toggle/Decrease the blinking value. |
| [C>] | Toggle/Increase the blinking value. |

## 5-6. Self Programming Mode flow chart

### ■ Channel selection mode flow chart

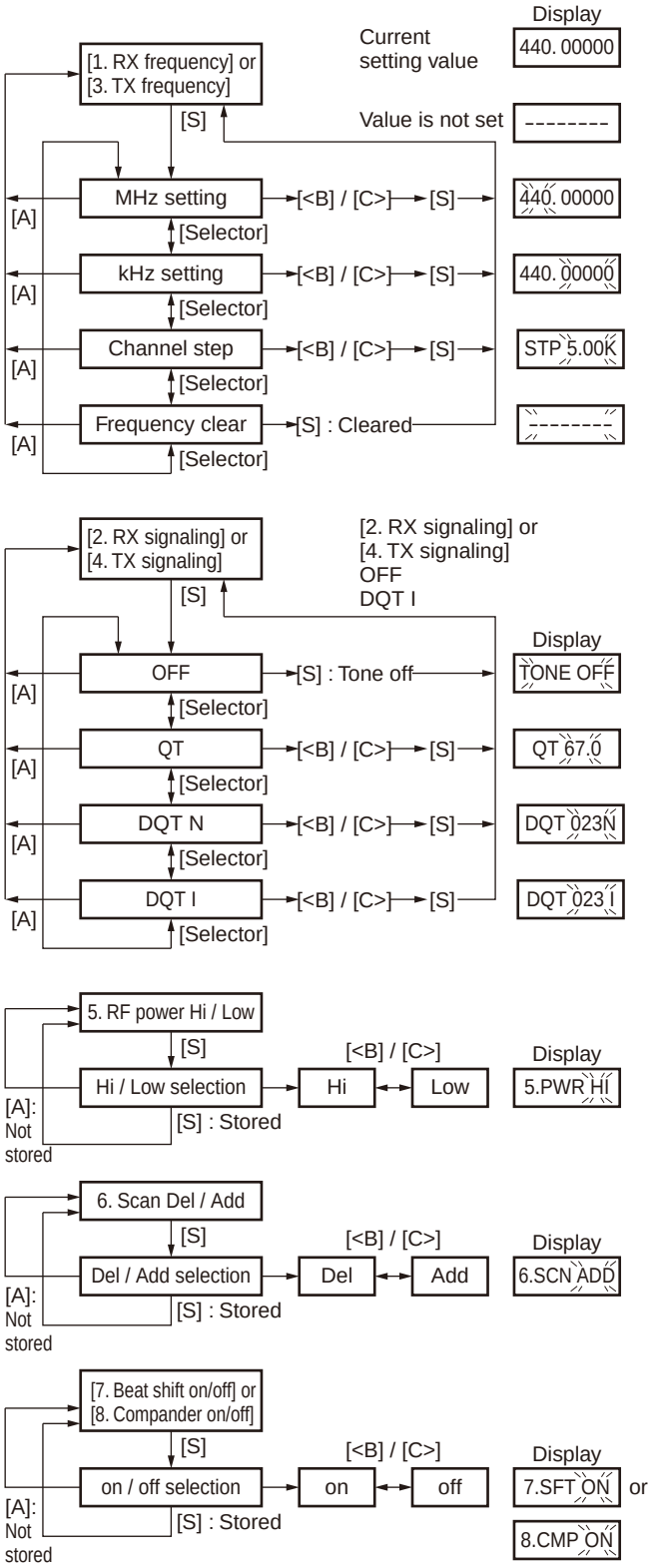



### ■ Item selection mode flow chart



# REALIGNMENT

■ **Item setting mode flow chart**



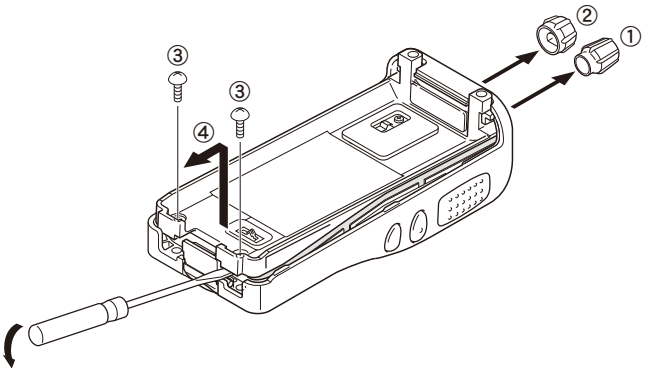

## 6. Firmware Version Information Mode

Turn the transceiver ON with the [Side1] and [Side2] keys held down. Then, the version is displayed during holding the [Side1] and [Side2] keys.

# DISASSEMBLY FOR REPAIR

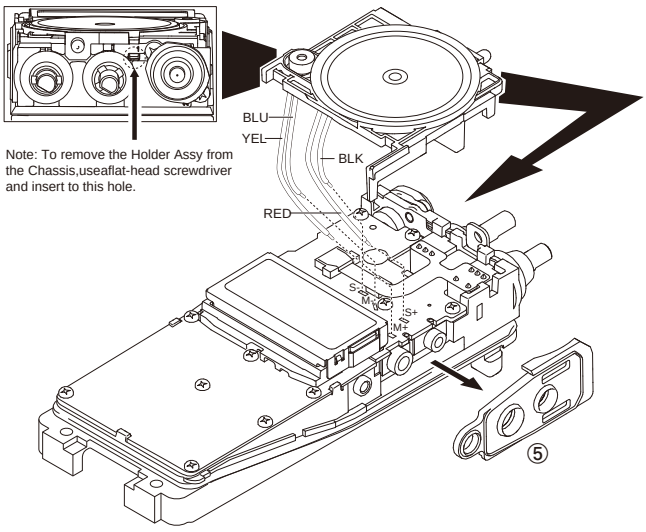
## 1. Removing the Case Assembly from the Chassis

1. Remove the selector knob ① and volume knob ②.
2. Remove the two screws ③.
3. Lift and remove the chassis from the case assembly ④. (Use a flat-blade screwdriver to easily lift the chassis.)



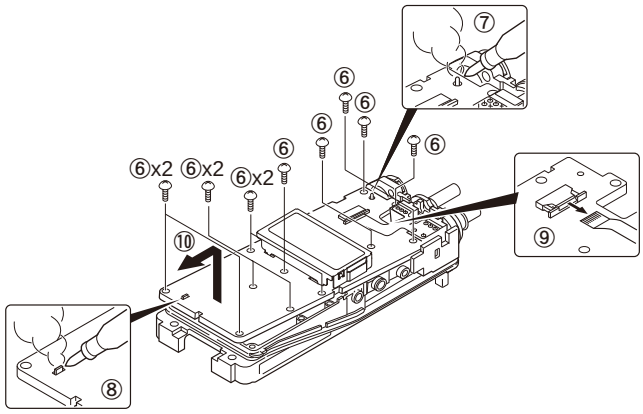

## 2. Removing the Holder Assembly from the Chassis

1. Remove the holder from the chassis.
   **Note:** Taking care not to cut the speaker and microphone lead.
2. Detach the solder of speaker and microphone lead from the PCB beforehand.
3. Remove the packing ⑤ from the SP/MIC jack of the TX-RX unit.



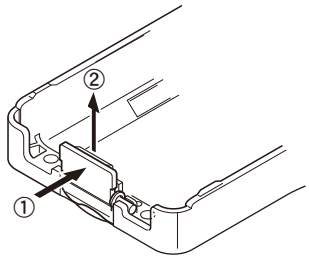

## 3. Removing the TX-RX unit from the Chassis

1. Remove the eleven screws⑥ fixing the TX-RX unit.
2. Remove the solder of the antenna terminal with a soldering iron ⑦.
3. Remove the solder of the positive terminal with a soldering iron ⑧.
   **Note:** You can remove the TX-RX unit from the chassis without removing the solder at the positive terminal.
   However, in this case, you can not attach the packing (G53-1605-03) that is on the positive terminal to the chassis in assembling. So, it is advisable to remove the solder on the positive terminal first.
4. Remove the FPC from the flat cable connector ⑨.
5. Lift and remove the TX-RX unit from the chassis ⑩.




## 4. Removing the Battery Release Lever from the Case Assembly

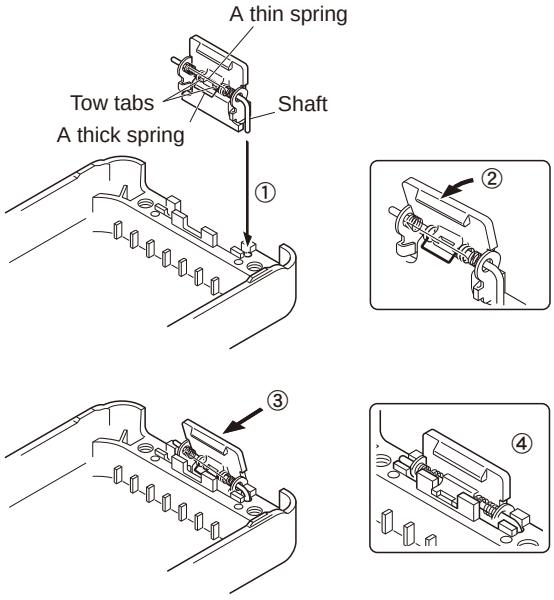
1. Press the upper part of the lever toward the inside of the case assembly. One side of the shaft will be removed ①.
2. Lift and remove the battery release lever from the case assembly ②.
   **Note:** Scratch and widen the glue hole if there is difficulty in removing the other end of the shaft.
   No glue is required when you reassemble the battery release lever.



# DISASSEMBLY FOR REPAIR

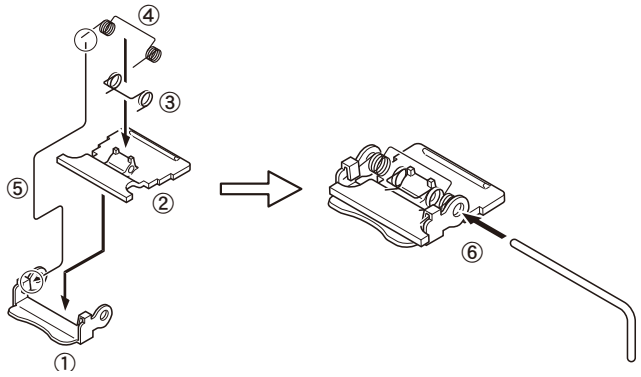
## 5. Attaching the Battery Release Lever to the Case Assembly

1. Insert one side of the shaft into the hole at the lever fitting section on the case assembly ①.
   Caution: The thin spring (G01-4543-14) should be positioned above the two tabs of the lever.
2. Tilt the battery release lever slightly forward ②, so that the thick spring (G01-4542-04) is positioned below the case surface.
3. With the thick spring positioned below the case surface, attach the other side of the shaft to the case assembly by pressing the battery release lever ③ until it snaps into place ④.
   **Caution:** Be careful not to tilt the battery release lever too forward.
   If the battery release lever is pushed in this state where the two tabs come below the case surface, there is a possibility of damaging the two tabs.




## 6. Assembling the Battery Release Lever

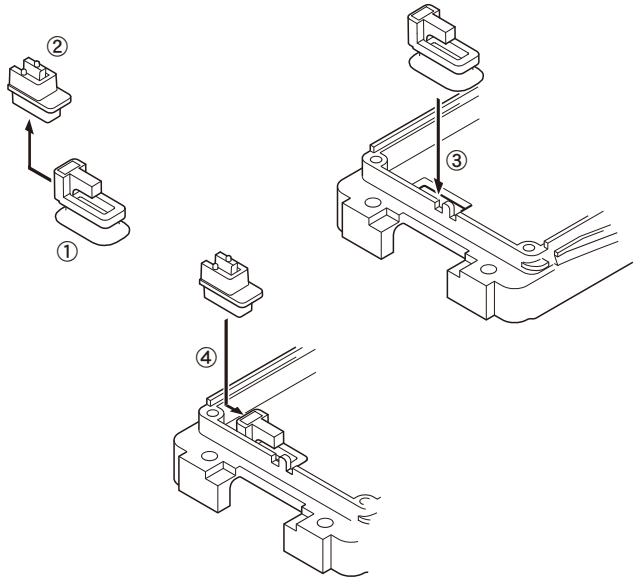
1. Place the lever ② onto the stopper ①.
2. Place the thick spring ③ onto the lever.
3. Hook the right and left ends of the thin spring ④ onto the tabs of the stopper, then place the thin spring onto the lever ⑤.
4. Slide the shaft through the hole of the stopper and lever ⑥.




## 7. Attaching the Positive Terminal to the Chassis

Always attach the positive terminal to the chassis, using the following procedures, before mounting the TX-RX unit onto the chassis.

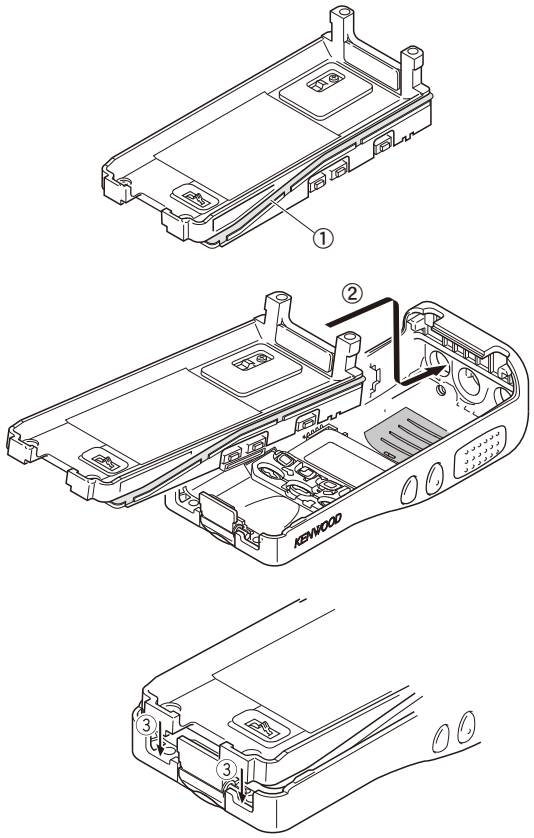
1. Remove the holder assembly ② from the packing ① of the positive terminal.
2. Mount the packing of the positive terminal into the chassis hole ③.
3. Mount the holder assembly into the packing of the positive terminal ④.



# DISASSEMBLY FOR REPAIR

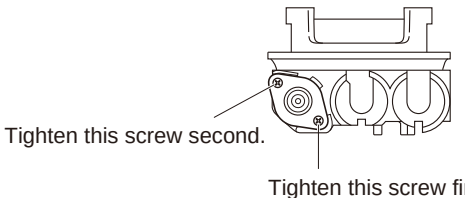
## 8. Mounting the Chassis to the Case Assembly

1. Confirm that the waterproof packing attached to the circumference of the chassis is securely inserted in the groove of the chassis ①.
2. Insert the upper part of the chassis into the case assembly ②.
3. Press the chassis ③ and the case assembly together to attach them.
   **Caution:** If the packing of the SP/MIC does not come to the correct position after attaching the chassis to the case assembly, reposition the packing with your fingers.



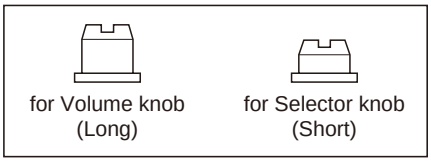

## 9. Attaching the Antenna Receptacle to the Chassis

Screw the antenna receptacle to the chassis in the order shown in the drawing so that the antenna receptacle comes to the center of the case hole.



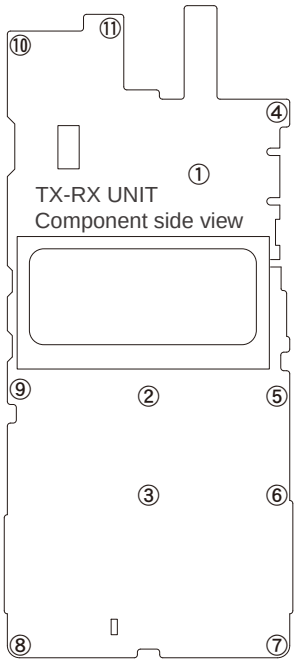

## 10. The Nuts of the Volume Knob and Channel Knob

Note that the shapes, colors and heights of nuts of the volume knob and channel knob are different from one another. (The nut of volume knob is silver, and the nut of channel knob is gold.)
Use the following jig when removing the nuts of the volume knob and channel knob.
• Jig (Part No.: W05-1012-00)




## 11. Screw sequence for mounting the TX-RX unit to the chassis

Attach the TX-RX unit to the chassis using the screws in the order shown in the drawing below.



# CIRCUIT DESCRIPTION

## 1. Frequency Configuration

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

The PLL circuit in the transmitter generates the necessary frequencies.

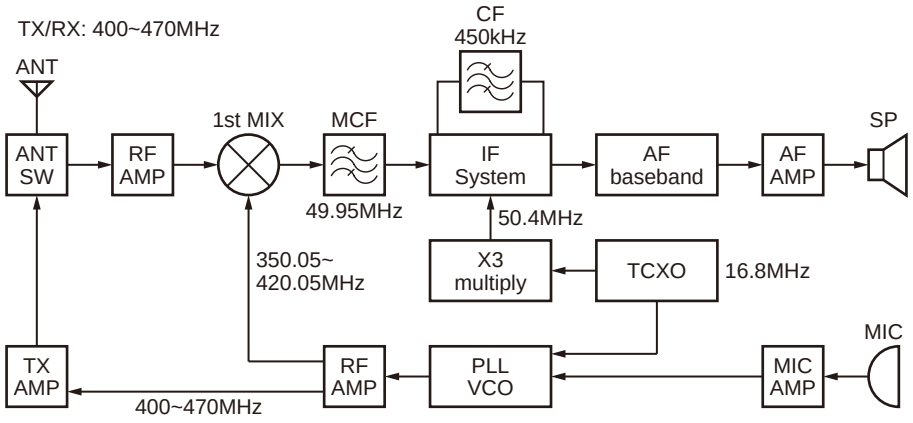



**Fig. 1 Frequency configuration**

## 2. Receiver System

The receiver system is shown in Figure 2.

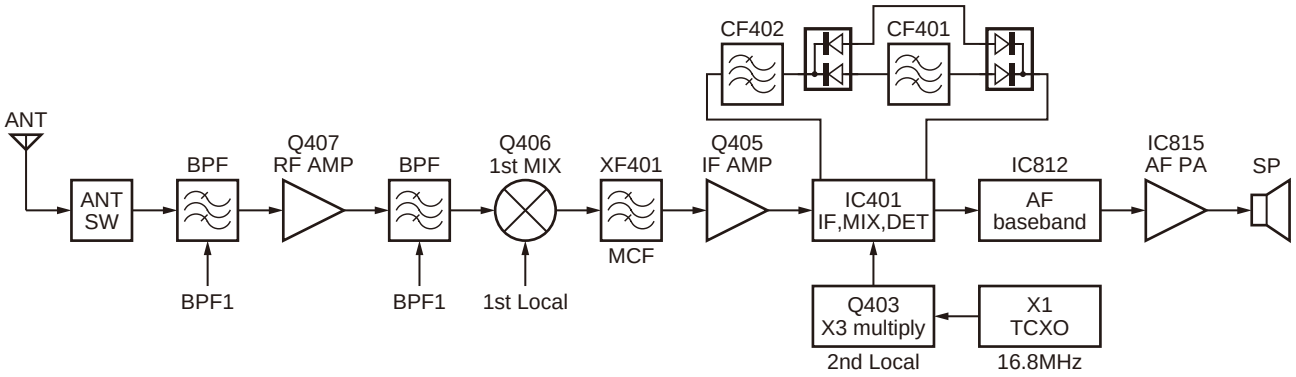



**Fig. 2 Receiver system**

### 2-1. Front End (RF Amplifier) Circuit

The signal coming from the antenna passes through the transmit / receive switching diode circuit (D201, D202, D203 and D204) and a BPF (L418 and L419), and is then amplified by the RF amplifier (Q407).

The resulting signal passes through a BPF (L419, L418, L491, L414 and L413) and goes to the mixer. These BPFs are adjusted by variable capacitance diodes (D408, D407, D405, D404 and D403). The input voltage to the variable capacitance diodes is a regulated voltage output from the DC amplifier (IC811).

### 2-2. First Mixer

The signal from the front end is mixed with the first local oscillator signal generated in the PLL circuit by Q406 to produce a first IF frequency of 49.95MHz.

The resulting signal passes through the XF401 MCF to cut the adjacent spurious and provide the optimum characteristics, such as adjacent frequency selectivity.

# CIRCUIT DESCRIPTION

### 2-3. IF Amplifier Circuit

The first IF signal is passed through a four-pole monolithic crystal filter (XF401) to remove the adjacent channel signal. The filtered first IF signal is amplified by the first IF amplifier (Q405) and is then applied to the IF system IC (IC401).

The IF system IC provides a second mixer, limiting amplifier, quadrature detector and RSSI (Received Signal Strength Indicator). The second mixer mixes the first IF signal with the 50.4MHz signal of the second local oscillator output (Q403) and produces the second IF signal of 450kHz.

The second IF signal is passed through the ceramic filter (Wide: CF402, Narrow: CF401) to remove the adjacent channel signal. The filtered second IF signal is amplified by the limiting amplifier and demodulated by the quadrature detector with the ceramic discriminator (CD401). The demodulated signal is routed to the audio circuit.

### 2-4. Wide/Narrow Switching Circuit

Wide and narrow settings can be made for each channel by switching the ceramic filters CF401 (narrow).

The second IF signal always passes the ceramic filters CF402 (Wide).

The wide and narrow switching data is output from the MCU (IC820).

D401 and D402 are switched to ceramic filters when a narrow mode is selected.

Q404 turns on/off with the Narrow and the IC401 detector output level is changed to maintain a constant output level during wide or narrow signals.

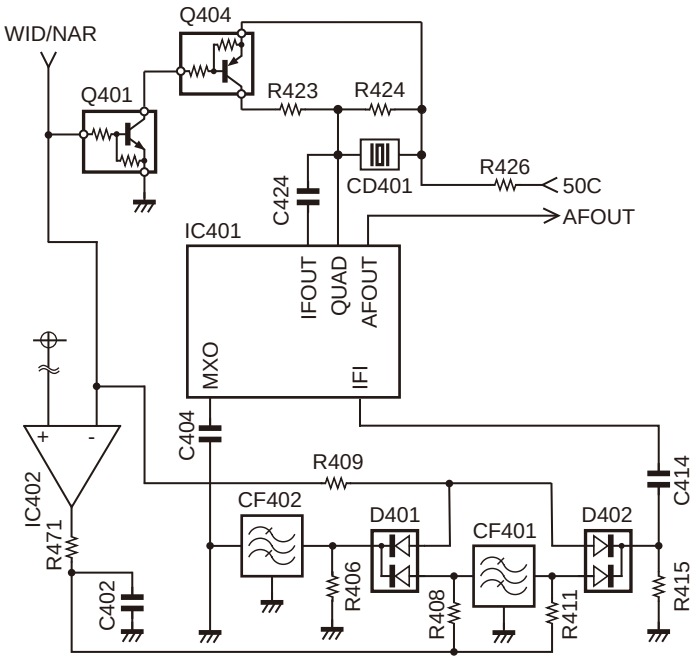



**Fig. 3 Wide/Narrow switching circuit**

### 2-5. Audio Amplifier Circuit

The demodulated signal from IC401 is sent to an AF amplifier through baseband IC (IC812), and is routed to an audio power amplifier (IC815) where it is amplified and output to the speaker.

### 2-6. Squelch Circuit

Part of the AF signal from the IC401 enters the FM system IC (IC401) again, and the noise component is amplified and rectified by a filter and an amplifier to produce a DC voltage corresponding to the noise level.

The DC signal from the FM IC goes to the analog port of the MCU (IC820). IC820 determines whether or not to output sounds from the speaker by checking if the input voltage is higher or lower than the preset value.

To output sounds from the speaker, IC820 sends a high signal to the AF_CONT line and turns IC815 on through Q813, Q814, Q818 and Q819.

## 3. Transmitter System

### 3-1. Microphone Amplifier Circuit

The signal from the microphone is limited by the AGC circuit, which is composed of D807, D808, Q810, Q811 and the mute switch (Q809). IC812 is composed of a high-pass filter, low-pass filter and pre-emphasis/IDC circuit.

The signal from the microphone and the low speed data from the MCU (IC820) enter the baseband IC (IC812) and pass through each path and are mixed inside the IC.

The output signal from the baseband IC goes to the VCO modulation input. The other output signal goes to the TCXO modulation input.

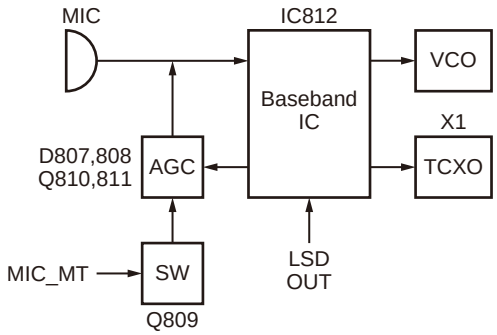



**Fig. 4 Microphone amplifier circuit**

# CIRCUIT DESCRIPTION

### 3-2. Drive and Final Amplifier Circuit

The signal from the T/R switch (D18 is on) is amplified by the RF AMP (Q201) and pre-drive amplifier (Q203) to 50mW.

The output of the pre-drive amplifier is amplified by the drive amplifier (Q204) and the RF final amplifier (Q205) to 5.0W (1W when the power is low).

The drive amplifier and the RF final amplifier consist of two MOS FET stages.

The output of the RF final amplifier is then passed through the harmonic filter (LPF) and antenna switch (D201 and D202) and is applied to the antenna terminal.

### 3-3. APC Circuit

The APC circuit always monitors the current flowing through the drive amplifier (Q204) and the RF power amplifier (Q205) and keeps a constant current. The voltage drop at R307, R309 and R310 is caused by the current flowing through the RF final amplifier. This voltage is applied to the differential amplifier IC301 (1/2).

IC301 (2/2) compares the output voltage of IC301 (1/2) with the reference voltage from IC811. The output of IC301 (2/2) controls the VG of the RF power amplifier and the drive amplifier to make both voltages the same.

The change of power high/low is carried out by the change of the reference voltage.

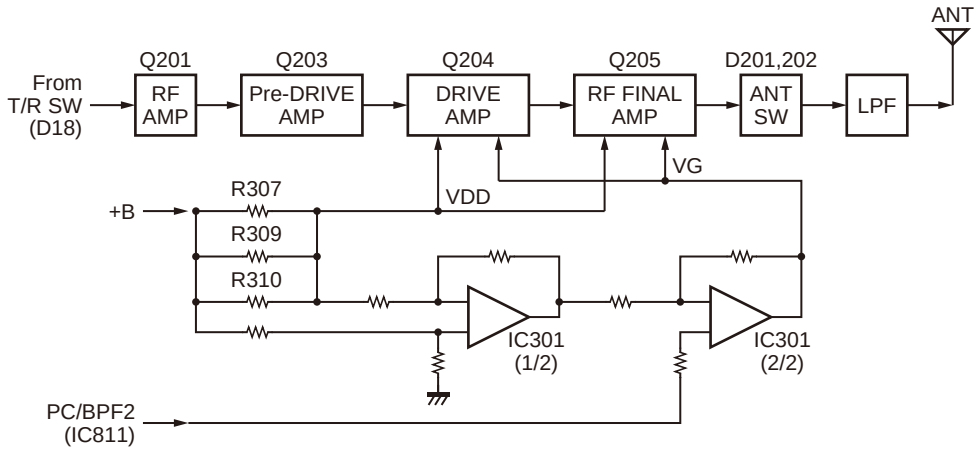



**Fig. 5 Drive and final amplifier and APC circuit**

## 4. Frequency Synthesizer Unit

### 4-1. Frequency synthesizer

The frequency synthesizer consists of the TCXO (X1), VCO, PLL-IC (IC1), and buffer amplifiers.

The TCXO generates 16.8MHz. The frequency stability is 1.5ppm within the temperature range of –30°C to +60°C. The frequency tuning and modulation of the TCXO are done to apply voltage to pin 1 of the TCXO. The output of the TCXO is applied to pin 10 of PLL-IC.

The VCO consists of 2 VCO and covers a dual range of 400.05~470.05MHz and 450~520MHz or 350.05~420.05MHz and 400~470MHz. The VCO generates 400.05~470.05MHz or 350.05~420.05MHz for providing the first local signal for reception. The operating frequency is generated by Q5 in transmitting mode and Q4 in receiving mode. The oscillation frequency is controlled by applying the VCO control voltage, obtained from the phase comparator (IC1) to the variable capacitance diodes (D6 and D9 in transmitting mode and D10 and D12 in receiving mode)

The TX/RX pin of IC820 goes “high” in transmitting mode, causing Q7 and Q4 to turn off, and Q5 turn on. The TX/RX pin goes “low” in receiving mode.

The output from Q4 and Q5 are amplified by a buffer amplifier (Q8) and Q2, and then sent to the PLL-IC.

The PLL-ICconsists of a prescaler, reference divider, phase comparator, and charge pump. The input signal from pin 10 and 17 of the PLL-IC is divided down and compared at the phase comparator. The pulsed output signal of the phase comparator is applied to the charge pump and transformed into a DC signal in the loop filter (LPF). The DC signal is applied to the CV of the VCO and locked to keep the VCO frequency constant.

PLL data is output from PL_STB (pin 20), PL_CLK (pin 8), and PL_DAT (pin 21) of the MCU (IC820). The data is input to the PLL-IC when the channel is changed or transmission is changed to reception and vice versa. PLL lock condition is always monitored by pin 18 (PL_UL) of the MCU. When the PLL is unlocked, PL_UL goes low.

# CIRCUIT DESCRIPTION

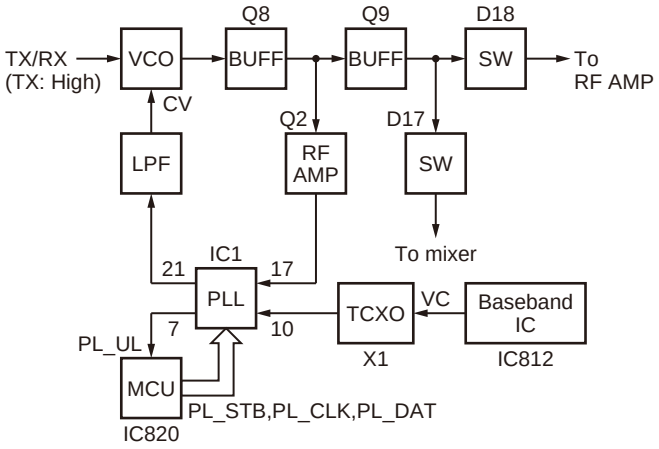



**Fig. 6 PLL block diagram**

## 5. Control Circuit

The control consists of the MCU (IC820) and its peripheral circuits. It controls the TX-RX unit. IC820 mainly performs the following;

1) Switching between transmission and reception by PTT signal input.
2) Reading channel information, frequency, and program data from the memory circuit.
3) Sending frequency program data to the PLL.
4) Controlling squelch on/off via the DC voltage from the squelch circuit.
5) Controlling the audio mute circuit via the decode data input.
6) Transmitting tone and encode data.

### 5-1. Frequency Shift Circuit

The MCU (IC820) and baseband IC (IC812) operates at a clock frequency of 19.2MHz. The oscillator circuit has the baseband IC. This oscillator has a circuit that shifts the frequency via Beat shift switch (Q806).

A beat sound may be able to be evaded if “Beat Shift“ is set to ON when it is generated in the internal spurious transmission modulated sound of the transceiver.

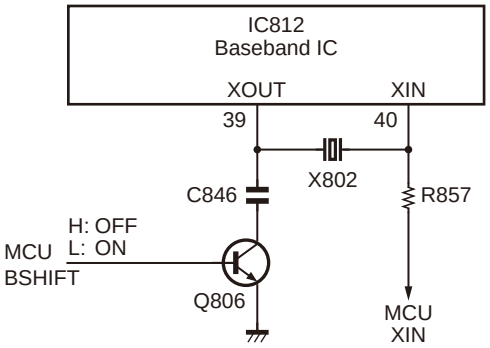



**Fig. 7 Frequency shift circuit**

### 5-2. Memory Circuit

The Memory circuit consists of the MCU (IC820) and EEPROM (IC810). The EEPROM has a capacity of 512k bits and stores the channel information, the last channel data, the scan on status, and other parameters.

**■ EEPROM**

**Note:**

The EEPROM stores tuning data (Deviation, Squelch, etc.).

Realign the transceiver after replacing the EEPROM.

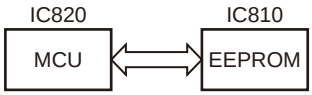



**Fig. 8 Memory circuit**

### 5-3. Low Battery Warning

The battery voltage is monitored by the MCU (IC820 pin 63: BATT). When the battery voltage falls below the voltage set by the Low Battery Warning adjustment, the red LED blinks, notifying the operator that it is time to replace the battery (when the always option (default setting) under the Battery Warning function in the FPU is selected). If the battery voltage falls bellow 5.9V, the transceiver does not transmit and the warning tone beeps while the PTT switch is pressed.

| Low battery warning | Battery status |
|---|---|
| The red LED blinks during transmission. | The battery voltage is low but the transceiver is still usable. |
| The red LED blinks and the warning tone beeps while the PTT switch is pressed. | The battery voltage is lowand the transceiver cannotbe used to make calls. |

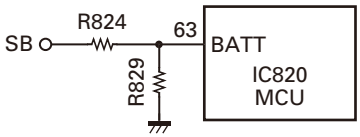



**Fig. 9 Low battery warning**

# CIRCUIT DESCRIPTION

### 5-4. Key Input

Keys and channel selector circuit.

The signal from the keys and channel selector are directly input to the MCU, as shown in Figure 10.

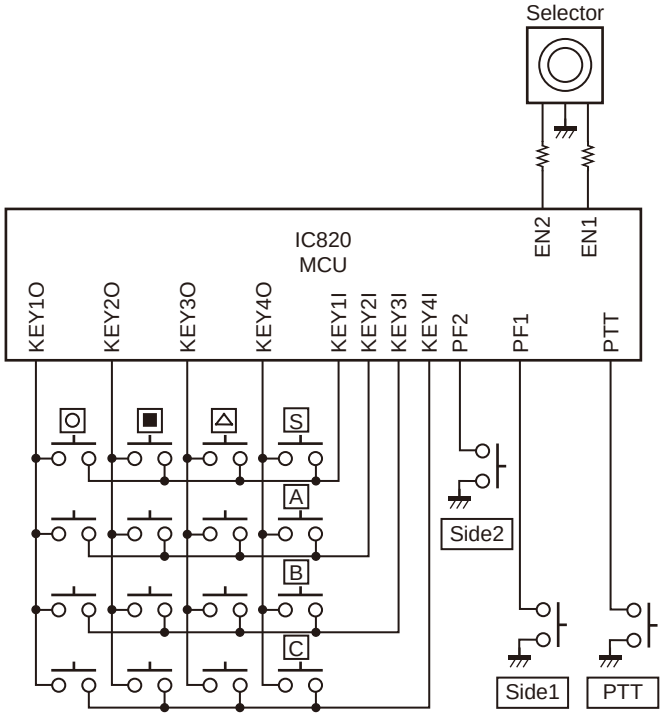



**Fig. 10 Key input**

## 6. Signaling Circuit

### 6-1. Encode

**■ Low-speed data (QT, DQT)**

Low-speed data is output from pin 2 of the MCU. The signal passes through the low pass CR filter, and goes to the baseband IC (IC812). The signal is mixed with the audio signal and goes to the VCO and TCXO (X1) modulation input after passing through the D/A converter inside the baseband IC (IC812) for BAL adjustment.

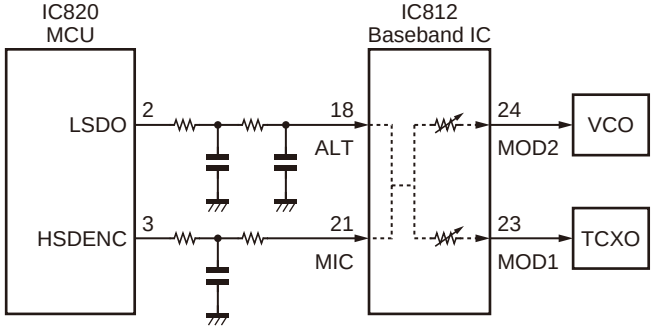



**Fig. 11 Encode**

**■ High-speed data (5-tone)**

High-speed data (HSD) is output from pin 3 of the MCU. HSD deviation made by an adjustment in the MCU is passed through the low pass CR filter and then applied to the baseband (IC812).

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

**■ MSK/DTMF**

The MSK/DTMF signal is generated in the baseband IC (IC812). The signal passes through the D/A converter (inside the audio processor: IC812) and is routed to the VCO. When encoding the MSK/DTMF, the microphone input signal is muted.

### 6-2. Decode

**■ QT/DQT**

The output signal from the IF IC (IC401) enters the MCU (IC820) through IC812. IC820 determines whether or not the QT or DQT matches the preset value, and controls the AFSW and speaker output sounds according to the squelch results.

**■ 5-tone**

Part of the received AF signal output from the IF IC (IC401) passes through the baseband IC (IC812) goes to the other AF amplifier IC808, is compared, and then goes to IC820. IC820 checks whether or not the 2-tone data is necessary. If it matches, IC820 carries out a specified operation, such as turning the speaker on.

**■ MSK (Fleet Sync)**

The MSK input signal from the IF IC (IC401) goes to IC812. The decoded information is then processed by the MCU.

## 7. Power Supply

There are five 5V power supplies and three 3.3V power supplies: 50M, 50V, 50C, 50R, 50T, 33M, 33MS and 33B.

50M and 33M are always output while the power is on.

33MS is always output, but turns off when the power is turned off, to prevent malfunction of the MCU.

50C is a common 5V and is output when SAVE is not set to ON.

50R is 5V for reception and output during reception.

50T is 5V for transmission and output during transmission.

50V is 5V for the SP/MIC connector.

33B is 3.3V for the baseband IC (IC812).

# SEMICONDUCTOR DATA

## MCU: F363BEDFEKDLB (TX-RX unit IC820)

| Pin No. | Signal Name | I/O | Function |
|---|---|---|---|
| 1 | BSHIFT | O | CPU clock frequency shift |
| 2 | LSDO | O | QT/DQT output |
| 3 | HSDENC | O | 2-Tone/BEEP output |
| 4 | EN1 | I | Encoder detect for direction |
| 5 | EN2 | I | Pull up for P8_4 (EN2) |
| 6 | MODE | I | (Using E8a emulator) |
| 7 | NC | - | NC |
| 8 | PL_CLK | O | PLL IC clock output |
| 9 | RESET | - | Hardware reset input |
| 10 | XOUT | - | NC |
| 11 | VSS | - | GND |
| 12 | XIN | - | Main clock input (19.2MHz) |
| 13 | VCC | - | 3.3V |
| 14 | EMPTT | O | Emergency PTT |
| 15 | EN2 | I | Encoder interrupt |
| 16 | CM_IRQ | I | Baseband IC IRQ |
| 17 | INT0 | I | Battery low interrupt (4.5V) |
| 18 | PL_UL | I | PLL IC unlock input |
| 19 | PTT | I | PTT input |
| 20 | PL_STB | O | PLL IC STB output |
| 21 | PL_DAT | O | PLL IC data output |
| 22 | NC | | NC |
| 23 | 33MSC | O | 33MS control for switched 33M |
| 24 | TXD | O | Serial data (FPU) to PC |
| 25 | RXD | I | Serial data (FPU) from PC |
| 26 | EM_CLK | O | For E8a emulator |
| 27 | APCSW | O | APC enable/disable |
| 28 | TX/RX | O | TX/RX switch H: TX, L: RX |
| 29 | 50VC | O | 5V AVR control for GPS MIC option/OPT DET |
| 30 | 5TC | O | 5T control output |
| 31 | EP_DTO | O | EEPROM IC data output |
| 32 | EP_CLK | O | EEPROM IC clock output |
| 33 | CM_DTO | O | Baseband IC data output |
| 34 | EMP | O | For FDT tool |
| 35 | 5RC | O | 5R control output |
| 36 | EP_WP | O | EEPROM IC write protect output |
| 37 | EP_DTI | I | EEPROM IC data input |
| 38 | EP_CS | O | EEPROM IC chip select output |
| 39 | CE | O | For FDT tool |
| 40 | CM_CLK | O | Baseband IC clock output |
| 41 | CM_DTI | I | Baseband IC data input |
| 42 | CM_CNS | O | Baseband IC chip select output |
| 43 | DC_SW | O | APC voltage discharge switch |
| 44 | KEY1O | O | Key matrix output 1 |
| 45 | KEY2O | O | Key matrix output 2 |
| 46 | KEY3O | O | Key matrix output 3 |
| 47 | KEY4O | O | Key matrix output 4 |
| 48 | KEY1I | I | Key matrix input 1 |
| 49 | KEY2I | I | Key matrix input 2 |
| 50 | KEY3I | I | Key matrix input 3 |
| 51 | KEY4I | I | Key matrix input 4 |
| 52 | PF1 | I | Side key 1 input |
| 53 | PF2 | I | Side key 2 input |
| 54 | LCDBL | O | LCD backlight switch L: ON, H: OFF |
| 55 | LC_INH | O | LCD diver IC INH output |
| 56 | LC_CLK | O | LCD diver IC clock output |
| 57 | LC_DAT | O | LCD diver IC date output |
| 58 | LC_CE | O | LCD diver IC chip enble output |
| 59 | LC_MOD | O | LCD diver IC mode output |
| 60 | HSDDEC | I | 2-Tone/5-Tone decode input |
| 61 | QT/DQT | I | QT/DQT decode input |
| 62 | CVIN | I | VCO lock voltage reading for auto alignment |
| 63 | BATT | I | Battery level input |
| 64 | VOX | I | VOX level input |
| 65 | BUSY | I | RX busy input |
| 66 | TH_DET | I | Temperature level input |
| 67 | RSSI | I | RSSI input |
| 68 | WID/NAR | O | Wide Narrow switch H: WID, L: NAR |
| 69 | ASSIST | O | Assist switch |
| 70 | AF_MUT | O | Speaker mute output |
| 71 | MIC_MT | O | Mic mute output |
| 72 | MAN_DN | I | MAN down |
| 73 | 5CC | O | 5C control output |
| 74 | LEDBLU | O | Blue LED light control |
| 75 | AVSS | - | GND |
| 76 | LEDGRN | O | Green LED light control |
| 77 | VREF | - | 3.3V for A/D reference |
| 78 | AVCC | - | 3.3V |
| 79 | LEDRED | O | Red LED light control |
| 80 | OPTDET | I | Option detection input |

# COMPONENTS DESCRIPTION

## TX-RX unit (X57-7892-71)

| Ref. No. | Use / Function | Operation / Condition |
|---|---|---|
| IC1 | PLL IC | TX/RX 1st local |
| IC2,301 | OP amplifier | CVIN/CVADJ amplifier |
| IC401 | FM IC | RX FM system |
| IC402 | Comparator | Narrow filter switching |
| IC801 | 5V AVR | 50M |
| IC802 | 5V AVR | 50C |
| IC803 | 5V AVR | 50V |
| IC804 | 3.3V AVR | 33M |
| IC805 | Reset IC | Low battery level detector |
| IC806 | 3.3V AVR | 33B |
| IC807 | Reset IC | MCU reset signal |
| IC808 | OP amplifier | HSD amplifier |
| IC810 | EEPROM | EEPROM |
| IC811 | OP amplifier | RX BPF tuning |
| IC812 | Baseband IC | Audio processor |
| IC815 | AF amplifier | Audio power amplifier |
| IC817 | OP amplifier | VOX signal amplifier |
| IC820 | MCU | Microcontroller unit |
| IC821 | LCD driver | |
| Q2 | RF buffer | PLL-IC input |
| Q3 | Ripple filter | TX/RX VCO |
| Q4 | Oscillator | RX VCO |
| Q5 | Oscillator | TX VCO |
| Q6 | DC switching | TX VCO switching |
| Q7 | DC switching | RX VCO switching |
| Q8 | RF buffer | VCO output |
| Q9 | RF amplifier | VCO output |
| Q11,12 | DC switching | Assist switching |
| Q201 | RF amplifier | TX amplifier |
| Q203 | RF amplifier | Pri-drive amplifier |
| Q204 | FET amplifier | Drive amplifier |
| Q205 | FET amplifier | Final power amplifier |
| Q301 | DC switching | TX FET bias |
| Q303~306 | DC switching | APC circuit |
| Q401 | DC switching | Q404 control |
| Q403 | Tripler | 2nd local (16.8MHz x 3) |
| Q404 | DC switching | FM-DET level switching |
| Q405 | IF amplifier | 1st IF (49.95MHz) |
| Q406 | Mixer | 1st mixer |
| Q407 | RF amplifier | RX (VHF) |
| Q801 | DC switching | Blue LED |
| Q802 | DC switching | 50T from 50M |
| Q803 | DC switching | 50R from 50M |
| Q804 | DC switching | 33MS from 33M |

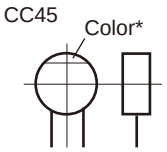
| Ref. No. | Use / Function | Operation / Condition |
|---|---|---|
| Q805 | DC switching | Green/Red LED |
| Q806 | DC switching | MCU clock shift circuit |
| Q809 | DC switching | MIC mute |
| Q810,811 | Amplifier | AGC control |
| Q813 | DC switching | Q814 control |
| Q814 | DC switching | AF power mute |
| Q815 | Level converter | EXT PTT/RXD |
| Q816 | Level converter | EXT TXD |
| Q817 | DC switching | Pop noise mute |
| Q818,819 | AF switching | AF power mute |
| Q820 | DC switching | Q821 control |
| Q821 | DC switching | Backlight LED |
| Q822 | DC switching | EMG PTT |
| D6,9 | Varicap | TX VCO tune |
| D10,12 | Varicap | RX VCO tune |
| D13 | Speed up | Ripple filter |
| D14 | Varicap | TX VCO assist tune |
| D15 | Varicap | RX VCO assist tune |
| D16 | Varicap | Modulation |
| D17,18 | Switching | TX-f/RX 1st local |
| D201~204 | Switching | TX/RX ANT switching |
| D301 | 5.1V zone | Over voltage prevention |
| D401,402 | Switching | Narrow filter on/through |
| D403~405 | Varicap | RX RF BPT tune |
| D407,408 | Varicap | RX RF BPT tune |
| D801 | LED (green) | Busy |
| D803 | Protection | Power supply |
| D804 | LED (blue) | Signal |
| D805 | LED (red) | TX |
| D806 | 5.1V zener | Over voltage prevention |
| D807,808 | Detection | MIC level |
| D809,810 | Detection | VOX level |
| D817 | Speed up | LCD back light |
| D818~821 | LED (yellow) | Backlight |
| D824 | LED (yellow) | Backlight |
| D829 | Key input detect | Key1I input |
| D830 | Key input detect | Key2I input |
| D831 | Key input detect | Key3I input |
| D832 | Key input detect | Key4I input |

# PARTS LIST

## CAPACITORS

C C 4 5 T H 1 H 2 2 0 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 = 0.001mF
103 = 0.01mF

2 2 0 = 22pF
Multiplier
2nd number
1st number

**• 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 10mF : –10~+50 Less than 4.7mF : –10~+75 |

**(Less than 10pF)**

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

**• Voltage rating**

| 1st word \ 2nd 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 | – |

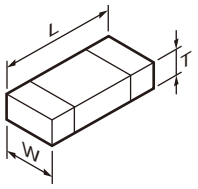
**• Chip capacitors**

(EX) C C 7 3 F S L 1 H 0 0 0 J
1 2 3 4 5 6 7
(Chip) (CH, RH, UJ, SL)

(EX) C K 7 3 F F 1 H 0 0 0 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 |

## RESISTORS

**• Chip resistor (Carbon)**

(EX) R D 7 3 E B 2 B 0 0 0 J
1 2 3 4 5 6 7
(Chip) (B, F)

**• Carbon resistor (Normal type)**

(EX) R D 1 4 B B 2 C 0 0 0 J
1 2 3 4 5 6 7

1 = Type
2 = Shape
3 = Dimension
4 = Temp. coefficient
5 = Rating wattage
6 = Value
7 = Tolerance

**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 |

**• 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 | | |

# TK-3312

# PARTS LIST

✻ New Parts. ⚠indicates safety critical components.
Parts without **Parts No.** are not supplied.
Les articles non mentionnes dans le **Parts No.** ne sont pas fournis.
Teile ohne **Parts No.** werden nicht geliefert.

**L** : Scandinavia **K** : USA **P** : Canada
**Y** : PX (Far East, Hawaii) **T** : England **E** : Europe
**C** : China **X** : Australia **M** : Other Areas

**TK-3312**
**TX-RX UNIT (X57-7892-71)**

| Ref. No. | Address | New parts | Parts No. | Description | Destination |
|---|---|---|---|---|---|
| **TK-3312** | | | | | |
| 1 | 1A | | A02-4095-23 | PLASTIC CABINET ASSY | |
| 3 | 2C,2E | | B09-0725-03 | CAP(SP/MIC) ACCSESSORY | |
| 4 | 1B | | B43-1622-04 | BADGE(FRONT) | |
| 5 | 1B | | B43-1623-04 | BADGE(REAR) | |
| 6 | 1E | ✻ | B62-2262-00 | INSTRUCTION MANUAL ACCSESSORY | |
| 9 | 1A | | D10-0649-03 | LEVER | |
| 10 | 1A | | D21-0863-04 | SHAFT(LEVER) | |
| 11 | 1A | | D32-0441-13 | STOPPER(LEVER) | |
| 13 | 2A | | E04-0477-15 | RF COAXIAL RECEPTACLE(SMA) | |
| 14 | 3A | | E23-1253-04 | TERMINAL(GROUND) | |
| 15 | 2A | | E23-1254-04 | TERMINAL(+VE) | |
| 16 | 1B | | E37-1165-15 | PROCESSED LEAD WIRE(SP/RED) | |
| 17 | 1B | | E37-1514-05 | PROCESSED LEAD WIRE(SP/BLK) | |
| 19 | 3A | | F20-3353-14 | INSULATING SHEET | |
| 21 | 2A | | G01-4542-04 | COIL SPRING | |
| 22 | 2A | | G01-4543-14 | COIL SPRING | |
| 23 | 2B | | G10-1330-04 | FIBROUS SHEET(IC) | |
| 24 | 2A | | G11-4465-04 | RUBBER SHEET(FET) | |
| 25 | 3A | | G13-2009-04 | CUSHION(CHASSIS) | |
| 27 | 3A | | G13-2033-04 | CUSHION(-VE) | |
| 28 | 3A | | G13-2034-14 | CUSHION(CHASSIS(-)) | |
| 29 | 2B | | G13-2038-34 | CUSHION(X57) | |
| 31 | 3B | | G13-2340-14 | CUSHION(CF401/402) | |
| 32 | 2B | | G13-2346-04 | CUSHION(X57) | |
| 33 | 2B | | G13-2358-04 | CUSHION(IC820) | |
| 35 | 3A | | G53-1604-03 | PACKING(CHASSIS) | |
| 36 | 2A | | G53-1605-03 | PACKING(+VE) | |
| 37 | 2B | | G53-1802-04 | PACKING(SMA) | |
| 39 | 2B | | G53-1845-03 | PACKING(VOL/SEL) | |
| 40 | 1B | | G53-1846-03 | PACKING(SP) | |
| 41 | 1B | | G53-1847-03 | PACKING(SP/MIC) | |
| 46 | 2A | | J19-5463-03 | HOLDER(+VE) | |
| 47 | 2A | | J19-5473-03 | HOLDER ASSY(+VE) | |
| 49 | 1B | | J19-5545-14 | HOLDER ASSY(SP) | |
| 48 | 2C | | J19-5549-03 | HOLDER(SP/MIC) ACCSESSORY | |
| 50 | 1C | | J29-0734-05 | BELT CLIP ACCSESSORY | |
| 52 | 2A | | J82-0127-05 | FPC | |
| 54 | 1B | | K29-9309-13 | KNOB(VOL) | |
| 55 | 1A | | K29-9425-03 | BUTTON KNOB(PTT) | |
| 56 | 1A | | K29-9426-03 | BUTTON KNOB(SIDE1/2) | |
| 57 | 1B | | K29-9427-03 | KNOB(SELECTOR) | |
| 58 | 1A | | K29-9463-12 | KEY TOP(7KEY) | |
| A | 2A | | N14-0848-05 | CIRCULAR NUT(SELECTOR) | |
| B | 2B | | N14-0849-05 | CIRCULAR NUT(VOL) | |
| C | 2A | | N30-2604-48 | PAN HEAD MACHINE SCREW | |
| D | 3A | | N30-2606-48 | PAN HEAD MACHINE SCREW | |
| E | 2B,3A | | N83-2005-48 | PAN HEAD TAPTITE SCREW | |
| 60 | 2C | | N99-2046-05 | SCREW SET ACCSESSORY | |
| VR1 | 2A | | R31-0676-05 | VARIABLE RESISTOR | |
| 62 | 1B | | T07-0787-05 | SPEAKER | |
| 64 | 1B | | T91-0672-05 | MIC ELEMENT | |
| W1 | 2A | | W02-3748-05 | ENCODER(SELECTOR) | |
| **TX-RX UNIT (X57-7892-71)** | | | | | |
| 101 | 2B | | B11-1876-03 | ILLUMINATION GUIDE(LCD) | |
| 102 | 2B | | B11-1877-14 | FILTER | |
| 103 | 2B | | B38-0935-05 | LCD | |
| D801 | | | B30-1790-05 | LED(BLUE) | |
| D804 | | | B30-2314-05 | LED(GREEN) | |
| D805 | | | B30-2315-05 | LED(RED) | |
| D818-821 | | | B30-2337-05 | LED(YELLOW) | |
| D824 | | | B30-2337-05 | LED(YELLOW) | |
| C1 | | | CC73HCH1H101J | CHIP C 100PF J | |
| C3 | | | CC73HCH1H100B | CHIP C 10PF B | |
| C4 | | | CK73HB1H102K | CHIP C 1000PF K | |
| C5 | | | CC73HCH1H101J | CHIP C 100PF J | |
| C7 | | | CC73HCH1H100B | CHIP C 10PF B | |
| C8 | | | CC73HCH1H101J | CHIP C 100PF J | |
| C9 | | | CK73HB1E103K | CHIP C 0.010UF K | |
| C10 | | | CC73HCH1H101J | CHIP C 100PF J | |
| C11 | | | CK73HB1E103K | CHIP C 0.010UF K | |
| C12 | | | CC73HCH1H101J | CHIP C 100PF J | |
| C14 | | | CK73HB1A473K | CHIP C 0.047UF K | |
| C15 | | | CK73HB1A224K | CHIP C 0.22UF K | |
| C16 ,17 | | | CC73HCH1H101J | CHIP C 100PF J | |
| C18 | | | CK73HB1E103K | CHIP C 0.010UF K | |
| C19 | | | CC73HCH1H101J | CHIP C 100PF J | |
| C20 | | | CK73HB1H471K | CHIP C 470PF K | |
| C21 | | | CK73HB1E103K | CHIP C 0.010UF K | |
| C24 | | | C92-0588-05 | CHIP TNTL 1.5UF 16WV | |
| C25 | | | CS77CA1VR22M | CHIP TNTL 0.22UF 35WV | |
| C27 | | | CK73HB1A224K | CHIP C 0.22UF K | |
| C28 | | | CK73HB1H471K | CHIP C 470PF K | |
| C29 | | | CC73HCH1H030B | CHIP C 3.0PF B | |
| C30 | | | CC73HCH1H080B | CHIP C 8.0PF B | |
| C33 | | | CC73HCH1H080B | CHIP C 8.0PF B | |
| C34 | | | CC73HCH1H100B | CHIP C 10PF B | |

# PARTS LIST

TX-RX UNIT (X57-7892-71)

| Ref. No. | Address | New parts | Parts No. | Description | | | Destination |
|---|---|---|---|---|---|---|---|
| C35 | | | CK73HB1E103K | CHIP C | 0.010UF | K | |
| C37 ,38 | | | CK73HB1A104K | CHIP C | 0.10UF | K | |
| C39 | | | CK73HB1H471K | CHIP C | 470PF | K | |
| C41 | | | CC73HCH1H101J | CHIP C | 100PF | J | |
| C43 | | | CC73HCH1H101J | CHIP C | 100PF | J | |
| C44 | | | CK73HB1H471K | CHIP C | 470PF | K | |
| C47 | | | CC73HCH1H680J | CHIP C | 68PF | J | |
| C48 | | | CC73HCH1H080B | CHIP C | 8.0PF | B | |
| C49 | | | CK73HB1H471K | CHIP C | 470PF | K | |
| C50 | | | CK73HB1A104K | CHIP C | 0.10UF | K | |
| C51 | | | CC73HCH1H820J | CHIP C | 82PF | J | |
| C52 | | | CC73HCH1H040B | CHIP C | 4.0PF | B | |
| C53 | | | CC73HCH1H090B | CHIP C | 9.0PF | B | |
| C55 | | | CK73FB0J106K | CHIP C | 10UF | K | |
| C57 | | | CC73HCH1H030B | CHIP C | 3.0PF | B | |
| C58 | | | CC73HCH1H050B | CHIP C | 5.0PF | B | |
| C59 | | | CC73HCH1H060B | CHIP C | 6.0PF | B | |
| C60 | | | CC73HCH1H030B | CHIP C | 3.0PF | B | |
| C61 | | | CC73HCH1H060B | CHIP C | 6.0PF | B | |
| C62 ,63 | | | CC73HCH1H101J | CHIP C | 100PF | J | |
| C64 ,65 | | | CC73HCH1H050B | CHIP C | 5.0PF | B | |
| C66 | | | CC73HCH1H0R3B | CHIP C | 0.3PF | B | |
| C67 | | | CC73HCH1H0R5B | CHIP C | 0.5PF | B | |
| C68 ,69 | | | CC73HCH1H101J | CHIP C | 100PF | J | |
| C70 | | | CK73HB1H471K | CHIP C | 470PF | K | |
| C71 | | | CC73HCH1H330J | CHIP C | 33PF | J | |
| C72 | | | CC73HCH1H100B | CHIP C | 10PF | B | |
| C73 | | | CC73HCH1H150J | CHIP C | 15PF | J | |
| C74 ,75 | | | CK73HB1H471K | CHIP C | 470PF | K | |
| C76 | | | CK73HB1A104K | CHIP C | 0.10UF | K | |
| C77 | | | CC73HCH1H100B | CHIP C | 10PF | B | |
| C78 | | | CK73HB1A105K | CHIP C | 1.0UF | K | |
| C81 | | | CC73HCH1H010B | CHIP C | 1.0PF | B | |
| C85 | | | CC73HCH1H080B | CHIP C | 8.0PF | B | |
| C86 | | | CC73HCH1H050B | CHIP C | 5.0PF | B | |
| C87 | | | CK73HB1H471K | CHIP C | 470PF | K | |
| C88 | | | CC73HCH1H050B | CHIP C | 5.0PF | B | |
| C201 | | | CK73HB1H471K | CHIP C | 470PF | K | |
| C203 | | | CK73HB1H471K | CHIP C | 470PF | K | |
| C204 | | | CK73HB1A104K | CHIP C | 0.10UF | K | |
| C205 | | | CK73HB1H471K | CHIP C | 470PF | K | |
| C209 | | | CC73HCH1H330J | CHIP C | 33PF | J | |
| C210 | | | CK73GB1A224K | CHIP C | 0.22UF | K | |
| C211 | | | CK73HB1H471K | CHIP C | 470PF | K | |
| C212 | | | CK73HB1A105K | CHIP C | 1.0UF | K | |
| C213 | | | CK73HB1H471K | CHIP C | 470PF | K | |
| C214 | | | CK73HB1A105K | CHIP C | 1.0UF | K | |
| C215 | | | CC73HCH1H130J | CHIP C | 13PF | J | |
| C216,217 | | | CK73HB1H471K | CHIP C | 470PF | K | |
| C218 | | | CC73HCH1H120J | CHIP C | 12PF | J | |
| C219 | | | CK73HB1H471K | CHIP C | 470PF | K | |
| C221 | | | CK73HB1H471K | CHIP C | 470PF | K | |
| C222 | | | CC73HCH1H470J | CHIP C | 47PF | J | |
| C223-225 | | | CK73HB1H471K | CHIP C | 470PF | K | |
| C226 | | | CC73HCH1H330J | CHIP C | 33PF | J | |
| C227 | | | CC73GCH1H430J | CHIP C | 43PF | J | |
| C228 | | | CC73GCH1H100C | CHIP C | 10PF | C | |
| C229,230 | | | CC73HCH1H151J | CHIP C | 150PF | J | |
| C233 | | | CK73GB1C104K | CHIP C | 0.10UF | K | |
| C234 | | | CK73GB1A105K | CHIP C | 1.0UF | K | |

| Ref. No. | Address | New parts | Parts No. | Description | | | Destination |
|---|---|---|---|---|---|---|---|
| C235 | | | CK73HB1E103K | CHIP C | 0.010UF | K | |
| C237 | | | CC73GCH1H3R5B | CHIP C | 3.5PF | B | |
| C238 | | | CC73GCH1H0R3B | CHIP C | 0.3PF | B | |
| C242 | | | CC73GCH1H070B | CHIP C | 7.0PF | B | |
| C243 | | | CC73GCH1H471J | CHIP C | 470PF | J | |
| C244 | | | CK73HB1H471K | CHIP C | 470PF | K | |
| C245 | | | CC73HCH1H090B | CHIP C | 9.0PF | B | |
| C246 | | | CC73GCH1H060B | CHIP C | 6.0PF | B | |
| C247 | | | CC73GCH1H470J | CHIP C | 47PF | J | |
| C248 | | | CC73GCH1HR75B | CHIP C | 0.75PF | B | |
| C249 | | | CC73GCH1H030B | CHIP C | 3.0PF | B | |
| C250 | | | CC73GCH1H060B | CHIP C | 6.0PF | B | |
| C253 | | | CC73GCH1H0R3B | CHIP C | 0.3PF | B | |
| C255 | | | CC73GCH1H070B | CHIP C | 7.0PF | B | |
| C256 | | | CC73GCH1H020B | CHIP C | 2.0PF | B | |
| C257 | | | CC73GCH1H2R5B | CHIP C | 2.5PF | B | |
| C260 | | | CC73GCH1H240J | CHIP C | 24PF | J | |
| C261 | | | CC73GCH1H060B | CHIP C | 6.0PF | B | |
| C263 | | | CC73GCH1H100C | CHIP C | 10PF | C | |
| C264 | | | CK73HB1H471K | CHIP C | 470PF | K | |
| C265 | | | CC73HCH1H040B | CHIP C | 4.0PF | B | |
| C266 | | | CC73HCH1H560J | CHIP C | 56PF | J | |
| C301 | | | CK73HB1A104K | CHIP C | 0.10UF | K | |
| C302 | | | CK73HB1H471K | CHIP C | 470PF | K | |
| C303 | | | CK73FB1E225K | CHIP C | 2.2UF | K | |
| C304 | | | CK73HB1H471K | CHIP C | 470PF | K | |
| C305 | | | CC73HCH1H101J | CHIP C | 100PF | J | |
| C307 | | | CC73HCH1H470J | CHIP C | 47PF | J | |
| C308 | | | CC73HCH1H100B | CHIP C | 10PF | B | |
| C309 | | | CK73HB1H471K | CHIP C | 470PF | K | |
| C311 | | | CK73HB1H471K | CHIP C | 470PF | K | |
| C314 | | | CK73HB1H471K | CHIP C | 470PF | K | |
| C315 | | | CK73HB1H102K | CHIP C | 1000PF | K | |
| C402-406 | | | CK73HB1A104K | CHIP C | 0.10UF | K | |
| C407 | | | CK73HB1A105K | CHIP C | 1.0UF | K | |
| C408 | | | CC73HCH1H330J | CHIP C | 33PF | J | |
| C409 | | | CK73HB1E103K | CHIP C | 0.010UF | K | |
| C410 | | | CC73HCH1H220J | CHIP C | 22PF | J | |
| C411 | | | CC73HCH1H820J | CHIP C | 82PF | J | |
| C412 | | | CK73HB1H271K | CHIP C | 270PF | K | |
| C414 | | | CK73HB1A104K | CHIP C | 0.10UF | K | |
| C415 | | | CC73HCH1H390J | CHIP C | 39PF | J | |
| C416 | | | CC73HCH1H820J | CHIP C | 82PF | J | |
| C417 | | | CK73HB1H271K | CHIP C | 270PF | K | |
| C418 | | | CK73HB1A104K | CHIP C | 0.10UF | K | |
| C419 | | | CC73HCH1H560J | CHIP C | 56PF | J | |
| C420 | | | CK73HB1H182K | CHIP C | 1800PF | K | |
| C421 | | | CK73HB1H681K | CHIP C | 680PF | K | |
| C422,423 | | | CK73GB0J106K | CHIP C | 10UF | K | |
| C424 | | | CC73HCH1H560J | CHIP C | 56PF | J | |
| C425 | | | CK73HB1E103K | CHIP C | 0.010UF | K | |
| C426 | | | CK73HB1H471K | CHIP C | 470PF | K | |
| C427 | | | CK73HB1A104K | CHIP C | 0.10UF | K | |
| C428 | | | CK73HB1A333K | CHIP C | 0.033UF | K | |
| C429 | | | CC73HCH1H330J | CHIP C | 33PF | J | |
| C431 | | | CK73HB1A104K | CHIP C | 0.10UF | K | |
| C433 | | | CK73HB1E103K | CHIP C | 0.010UF | K | |
| C435 | | | CK73HB1E103K | CHIP C | 0.010UF | K | |
| C436 | | | CC73HCH1H020B | CHIP C | 2.0PF | B | |
| C437 | | | CC73HCH1H220J | CHIP C | 22PF | J | |

# PARTS LIST

**TX-RX UNIT (X57-7892-71)**

| Ref. No. | Address | New parts | Parts No. | Description | | | Destination |
|---|---|---|---|---|---|---|---|
| C438 | | | CC73HCH1H020B | CHIP C | 2.0PF | B | |
| C439 | | | CK73HB1E103K | CHIP C | 0.010UF | K | |
| C440,441 | | | CK73HB1H471K | CHIP C | 470PF | K | |
| C442 | | | CC73HCH1H050B | CHIP C | 5.0PF | B | |
| C443 | | | CK73HB1E103K | CHIP C | 0.010UF | K | |
| C444 | | | CC73HCH1H020B | CHIP C | 2.0PF | B | |
| C445 | | | CC73HCH1H120J | CHIP C | 12PF | J | |
| C446 | | | CC73HCH1H080B | CHIP C | 8.0PF | B | |
| C447 | | | CC73HCH1H020B | CHIP C | 2.0PF | B | |
| C448 | | | CC73HCH1H050B | CHIP C | 5.0PF | B | |
| C449 | | | CK73HB1E103K | CHIP C | 0.010UF | K | |
| C450 | | | CC73HCH1H010B | CHIP C | 1.0PF | B | |
| C451,452 | | | CK73HB1H471K | CHIP C | 470PF | K | |
| C453 | | | CC73HCH1H020B | CHIP C | 2.0PF | B | |
| C454-456 | | | CK73HB1H471K | CHIP C | 470PF | K | |
| C457 | | | CC73HCH1H040B | CHIP C | 4.0PF | B | |
| C458 | | | CC73HCH1H180J | CHIP C | 18PF | J | |
| C459 | | | CC73HCH1H3R5B | CHIP C | 3.5PF | B | |
| C460 | | | CK73HB1H471K | CHIP C | 470PF | K | |
| C461 | | | CC73HCH1H010B | CHIP C | 1.0PF | B | |
| C462 | | | CK73HB1H471K | CHIP C | 470PF | K | |
| C463 | | | CC73HCH1H050B | CHIP C | 5.0PF | B | |
| C464 | | | CC73HCH1H220J | CHIP C | 22PF | J | |
| C465 | | | CK73HB1H471K | CHIP C | 470PF | K | |
| C466 | | | CC73HCH1H020B | CHIP C | 2.0PF | B | |
| C467 | | | CC73HCH1H010B | CHIP C | 1.0PF | B | |
| C468 | | | CC73HCH1H180J | CHIP C | 18PF | J | |
| C469 | | | CC73HCH1H050B | CHIP C | 5.0PF | B | |
| C470 | | | CK73HB1H471K | CHIP C | 470PF | K | |
| C474,475 | | | CK73HB1H471K | CHIP C | 470PF | K | |
| C477 | | | CK73HB1A104K | CHIP C | 0.10UF | K | |
| C478 | | | CK73HB1H471K | CHIP C | 470PF | K | |
| C479 | | | CC73HCH1H030B | CHIP C | 3.0PF | B | |
| C480 | | | CC73HCH1H150J | CHIP C | 15PF | J | |
| C481 | | | CK73HB1H471K | CHIP C | 470PF | K | |
| C482 | | | CC73HCH1H1R5B | CHIP C | 1.5PF | B | |
| C484 | | | CC73HCH1H030B | CHIP C | 3.0PF | B | |
| C485 | | | CC73HCH1H150J | CHIP C | 15PF | J | |
| C486 | | | CC73HCH1H020B | CHIP C | 2.0PF | B | |
| C487 | | | CC73HCH1H100D | CHIP C | 10PF | D | |
| C489 | | | CC73HCH1H050B | CHIP C | 5.0PF | B | |
| C492 | | | CK73HB1H471K | CHIP C | 470PF | K | |
| C495 | | | CK73HB1H471K | CHIP C | 470PF | K | |
| C496 | | | CK73HB1A104K | CHIP C | 0.10UF | K | |
| C497 | | | CC73HCH1H110J | CHIP C | 11PF | J | |
| C803,804 | | | CK73HB1H102K | CHIP C | 1000PF | K | |
| C806,807 | | | CK73HB1H102K | CHIP C | 1000PF | K | |
| C808 | | | CK73GB1C104K | CHIP C | 0.10UF | K | |
| C809 | | | CK73GB1A105K | CHIP C | 1.0UF | K | |
| C810,811 | | | CK73HB1H102K | CHIP C | 1000PF | K | |
| C812 | | | CK73GB1C104K | CHIP C | 0.10UF | K | |
| C813 | | | CK73GB1A105K | CHIP C | 1.0UF | K | |
| C814 | | | CK73GB1C104K | CHIP C | 0.10UF | K | |
| C815,816 | | | CK73GB1A105K | CHIP C | 1.0UF | K | |
| C818,819 | | | CK73HB1H102K | CHIP C | 1000PF | K | |
| C821 | | | CK73HB1H102K | CHIP C | 1000PF | K | |
| C823 | | | CK73GB1A105K | CHIP C | 1.0UF | K | |
| C825 | | | CK73HB1A105K | CHIP C | 1.0UF | K | |
| C826 | | | CK73HB1A104K | CHIP C | 0.10UF | K | |
| C828 | | | CK73GB1A105K | CHIP C | 1.0UF | K | |

| Ref. No. | Address | New parts | Parts No. | Description | | | Destination |
|---|---|---|---|---|---|---|---|
| C829 | | | CK73HB1E103K | CHIP C | 0.010UF | K | |
| C831 | | | CK73GB0J106K | CHIP C | 10UF | K | |
| C832 | | | CK73HB1A104K | CHIP C | 0.10UF | K | |
| C833 | | | CK73HB1H471K | CHIP C | 470PF | K | |
| C834 | | | CK73HB1H102K | CHIP C | 1000PF | K | |
| C837 | | | CK73HB1H102K | CHIP C | 1000PF | K | |
| C840 | | | CK73HB1H332K | CHIP C | 3300PF | K | |
| C842 | | | CK73HB1H392K | CHIP C | 3900PF | K | |
| C843 | | | CK73HB1H102K | CHIP C | 1000PF | K | |
| C844 | | | CK73HB1A104K | CHIP C | 0.10UF | K | |
| C846 | | | CC73HCH1H050B | CHIP C | 5.0PF | B | |
| C848 | | | CK73HB1H271K | CHIP C | 270PF | K | |
| C849,850 | | | CK73HB0J475M | CHIP C | 4.7UF | M | |
| C852 | | | CK73HB1A104K | CHIP C | 0.10UF | K | |
| C857 | | | CK73HB1H332K | CHIP C | 3300PF | K | |
| C858 | | | CK73HB1E682K | CHIP C | 6800PF | K | |
| C859 | | | CK73HB1A105K | CHIP C | 1.0UF | K | |
| C861 | | | CK73HB1H102K | CHIP C | 1000PF | K | |
| C863 | | | CK73HB1E103K | CHIP C | 0.010UF | K | |
| C865 | | | CK73HB1H471K | CHIP C | 470PF | K | |
| C866 | | | CK73GB0J106K | CHIP C | 10UF | K | |
| C869 | | | CK73GB0J106K | CHIP C | 10UF | K | |
| C872 | | | CK73HB1H102K | CHIP C | 1000PF | K | |
| C873 | | | CK73HB1E103K | CHIP C | 0.010UF | K | |
| C874 | | | CK73HB1A104K | CHIP C | 0.10UF | K | |
| C876 | | | CK73GB0J106K | CHIP C | 10UF | K | |
| C877 | | | CK73HB1H102K | CHIP C | 1000PF | K | |
| C878 | | | CK73HB1H103K | CHIP C | 0.010UF | K | |
| C879 | | | CK73GB0J106K | CHIP C | 10UF | K | |
| C881 | | | CK73HB1A104K | CHIP C | 0.10UF | K | |
| C882 | | | CK73HB1H102K | CHIP C | 1000PF | K | |
| C883 | | | CK73HB1H152K | CHIP C | 1500PF | K | |
| C884 | | | CK73HB1A105K | CHIP C | 1.0UF | K | |
| C885 | | | CC73HCH1H181J | CHIP C | 180PF | J | |
| C886 | | | CC73HCH1H221J | CHIP C | 220PF | J | |
| C887 | | | CC73HCH1H121J | CHIP C | 120PF | J | |
| C890,891 | | | CK73HB1H391K | CHIP C | 390PF | K | |
| C892 | | | CK73HB1A105K | CHIP C | 1.0UF | K | |
| C893 | | | CK73HB0J475M | CHIP C | 4.7UF | M | |
| C894 | | | CK73HB1A105K | CHIP C | 1.0UF | K | |
| C896 | | | CK73HB1A104K | CHIP C | 0.10UF | K | |
| C897,898 | | | CK73HB1A474K | CHIP C | 0.47UF | K | |
| C899,900 | | | CK73HB1H471K | CHIP C | 470PF | K | |
| C901 | | | CK73HB1A474K | CHIP C | 0.47UF | K | |
| C902,903 | | | CK73GB0J225K | CHIP C | 2.2UF | K | |
| C904 | | | CK73HB1A474K | CHIP C | 0.47UF | K | |
| C905,906 | | | CK73HB1H471K | CHIP C | 470PF | K | |
| C907 | | | CC73HCH1H470J | CHIP C | 47PF | J | |
| C909 | | | CK73HB1A104K | CHIP C | 0.10UF | K | |
| C910 | | | CK73HB1A683K | CHIP C | 0.068UF | K | |
| C911 | | | CK73GB0J106K | CHIP C | 10UF | K | |
| C912 | | | CK73HB1H102K | CHIP C | 1000PF | K | |
| C913 | | | CK73HB1H332K | CHIP C | 3300PF | K | |
| C914,915 | | | CK73HB1A105K | CHIP C | 1.0UF | K | |
| C916-919 | | | CK73HB1H102K | CHIP C | 1000PF | K | |
| C920 | | | CK73GB1A105K | CHIP C | 1.0UF | K | |
| C921 | | | CC73HCH1H101J | CHIP C | 100PF | J | |
| C922 | | | CK73HB1A104K | CHIP C | 0.10UF | K | |
| C923 | | | CK73FB0J106K | CHIP C | 10UF | K | |
| C924 | | | CC73HCH1H101J | CHIP C | 100PF | J | |

# PARTS LIST

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| Ref. No. | Address | New parts | Parts No. | Description | Destination |
|---|---|---|---|---|---|
| C925 | | | CK73HB1A473J | CHIP C 0.047UF J | |
| C926 | | | CS77CC0J101M | CHIP TNTL 100UF 6.3WV | |
| C928 | | | CC73HCH1H560J | CHIP C 56PF J | |
| C929 | | | CK73HB1H471K | CHIP C 470PF K | |
| C930 | | | CK73HB1H102K | CHIP C 1000PF K | |
| C931,932 | | | CK73HB1H471K | CHIP C 470PF K | |
| C934 | | | CC73HCH1H560J | CHIP C 56PF J | |
| C936 | | | CK73HB1H102K | CHIP C 1000PF K | |
| C945 | | | CK73HB1A104K | CHIP C 0.10UF K | |
| C946 | | | CK73HB1A105K | CHIP C 1.0UF K | |
| C947 | | | CK73HB1H471K | CHIP C 470PF K | |
| C948,949 | | | CK73HB1H102K | CHIP C 1000PF K | |
| C950 | | | CK73HB0J105K | CHIP C 1.0UF K | |
| C951 | | | CK73HB1H102K | CHIP C 1000PF K | |
| C964,965 | | | CK73GB1C225K | CHIP C 2.2UF K | |
| 105 | 2B | | E29-1229-15 | INTER CONNECTOR | |
| CN801 | | | E40-6827-05 | FLAT CABLE CONNECTOR | |
| J802 | | | E11-0703-05 | PHONE JACK(EXT SP/MIC) | |
| F801 | | | F53-0324-15 | FUSE(2.5A) | |
| F802 | | | F53-0319-15 | FUSE(1A) | |
| 107 | 2B | | G11-4525-14 | SHEET | |
| 109 | 1B | | J21-8619-03 | MOUNTING HARDWARE(LCD) | |
| CD401 | | | L79-1866-05 | TUNING COIL(450KHZ) | |
| CF401 | | | L72-1045-05 | CERAMIC FILTER(450KHZ/NAR) | |
| CF402 | | | L72-1010-05 | CERAMIC FILTER(450KHZ/WID) | |
| L1 | | | L41-4795-39 | SMALL FIXED INDUCTOR(4.7UH) | |
| L2 | | | L40-1575-57 | SMALL FIXED INDUCTOR(15.0NH) | |
| L4 | | | L92-0163-05 | BEADS CORE | |
| L5 | | | L40-1001-86 | SMALL FIXED INDUCTOR(10UH) | |
| L8 | | | L40-1001-86 | SMALL FIXED INDUCTOR(10UH) | |
| L10 | | | L40-2285-92 | SMALL FIXED INDUCTOR(220NH) | |
| L11 | | | L40-1001-86 | SMALL FIXED INDUCTOR(10UH) | |
| L14 | | | L40-2285-92 | SMALL FIXED INDUCTOR(220NH) | |
| L15 | | | L41-1878-14 | SMALL FIXED INDUCTOR(18NH) | |
| L16 | | | L92-0163-05 | BEADS CORE | |
| L17 | | | L41-2278-14 | SMALL FIXED INDUCTOR(22NH) | |
| L19 | | | L40-3391-86 | SMALL FIXED INDUCTOR(3.3UH) | |
| L20 | | | L40-2775-71 | SMALL FIXED INDUCTOR(27NH) | |
| L21 | | | L40-2775-57 | SMALL FIXED INDUCTOR(27.0NH) | |
| L22 ,23 | | | L40-2785-92 | SMALL FIXED INDUCTOR(270NH) | |
| L25 | | | L40-6865-71 | SMALL FIXED INDUCTOR(6.8NH) | |
| L27 | | | L40-2275-57 | SMALL FIXED INDUCTOR(22.0NH) | |
| L30 ,31 | | | L40-2285-92 | SMALL FIXED INDUCTOR(220NH) | |
| L201 | | | L40-6865-71 | SMALL FIXED INDUCTOR(6.8NH) | |
| L202 | | | L40-2275-71 | SMALL FIXED INDUCTOR(22NH) | |
| L203 | | | L40-1275-71 | SMALL FIXED INDUCTOR(12NH) | |
| L204 | | | L40-1575-71 | SMALL FIXED INDUCTOR(15NH) | |
| L205 | | | L92-0162-05 | BEADS CORE | |
| L206 | | * | L40-1063-71 | SMALL FIXED INDUCTOR(1.0NH) | |
| L207 | | | L34-4574-05 | AIR-CORE COIL | |
| L208 | | | L92-0149-05 | CHIP FERRITE | |
| L210 | | | L92-0149-05 | CHIP FERRITE | |
| L211 | | | L34-4565-05 | AIR-CORE COIL | |
| L216 | | | L41-2285-43 | SMALL FIXED INDUCTOR(220NH) | |
| L217 | | | L34-4564-05 | AIR-CORE COIL | |
| L218 | | | L40-1863-92 | SMALL FIXED INDUCTOR(1.8NH) | |
| L219 | | | L34-4563-05 | AIR-CORE COIL | |

| Ref. No. | Address | New parts | Parts No. | Description | Destination |
|---|---|---|---|---|---|
| L220 | | | L34-4565-05 | AIR-CORE COIL | |
| L221 | | | L34-4564-05 | AIR-CORE COIL | |
| L229 | | | L40-1263-92 | SMALL FIXED INDUCTOR(1.2NH) | |
| L302 | | | L92-0138-05 | CHIP FERRITE | |
| L401 | | | L40-1885-92 | SMALL FIXED INDUCTOR(180NH) | |
| L402 | | | L40-1085-57 | SMALL FIXED INDUCTOR(100NH) | |
| L403 | | | L40-1591-86 | SMALL FIXED INDUCTOR(1.5UH) | |
| L406 | | | L92-0138-05 | CHIP FERRITE | |
| L407 | | | L41-6885-39 | SMALL FIXED INDUCTOR(0.68UH) | |
| L408 | | | L40-1575-57 | SMALL FIXED INDUCTOR(15.0NH) | |
| L409 | | | L40-2785-92 | SMALL FIXED INDUCTOR(270NH) | |
| L410 | | | L40-1575-57 | SMALL FIXED INDUCTOR(15.0NH) | |
| L411 | | | L40-3975-92 | SMALL FIXED INDUCTOR(39NH) | |
| L413,414 | | | L41-8268-14 | SMALL FIXED INDUCTOR(8.2NH) | |
| L415 | | | L92-0138-05 | CHIP FERRITE | |
| L416 | | | L41-2785-14 | SMALL FIXED INDUCTOR(270NH) | |
| L418,419 | | | L41-8268-14 | SMALL FIXED INDUCTOR(8.2NH) | |
| L445 | | | L33-2538-05 | SMALL FIXED INDUCTOR(91NH) | |
| L491 | | | L41-8268-14 | SMALL FIXED INDUCTOR(8.2NH) | |
| L801 | | | L92-0472-05 | CHIP FERRITE | |
| L802,803 | | | L92-0161-05 | BEADS CORE | |
| X1 | | | L77-3050-05 | TCXO(16.8MHZ) | |
| X802 | | | L78-1434-05 | RESONATOR(19.2MHZ) | |
| XF401 | | | L71-0655-05 | MCF(49.95MHZ) | |
| CP1 | | | RK74HB1J101J | CHIP-COM 100 J 1/16W | |
| CP802 | | | RK75HA1J102J | CHIP-COM 1.0K J 1/16W | |
| CP812 | | | RK75HA1J102J | CHIP-COM 1.0K J 1/16W | |
| CP814 | | | RK75HA1J474J | CHIP-COM 470K J 1/16W | |
| CP817 | | | RK75HA1J473J | CHIP-COM 47K J 1/16W | |
| CP818-821 | | | RK74HB1J103J | CHIP-COM 10K J 1/16W | |
| CP823 | | | RK74HB1J103J | CHIP-COM 10K J 1/16W | |
| CP826 | | | RK74HB1J103J | CHIP-COM 10K J 1/16W | |
| CP827,828 | | | RK75HA1J473J | CHIP-COM 47K J 1/16W | |
| CP836,837 | | | RK75HA1J102J | CHIP-COM 1.0K J 1/16W | |
| CP840-844 | | | RK75HA1J103J | CHIP-COM 10K J 1/16W | |
| CP845,846 | | | RK75HA1J472J | CHIP-COM 4.7K J 1/16W | |
| CP847 | | | RK75HA1J473J | CHIP-COM 47K J 1/16W | |
| R1 | | | RK73HB1J000J | CHIP R 0 J 1/16W | |
| R2 | | | RK73HB1J473J | CHIP R 47K J 1/16W | |
| R5 | | | RK73HB1J103J | CHIP R 10K J 1/16W | |
| R6 | | | RK73HB1J000J | CHIP R 0 J 1/16W | |
| R7 | | | RK73HB1J683J | CHIP R 68K J 1/16W | |
| R8 | | | RK73HB1J331J | CHIP R 330 J 1/16W | |
| R9 | | | RK73HB1J101J | CHIP R 100 J 1/16W | |
| R10 | | | RK73HB1J392J | CHIP R 3.9K J 1/16W | |
| R11 | | | RK73HB1J103J | CHIP R 10K J 1/16W | |
| R13 | | | RK73HB1J102J | CHIP R 1.0K J 1/16W | |
| R14 | | | RK73HB1J273J | CHIP R 27K J 1/16W | |
| R15 ,16 | | | RK73HB1J100J | CHIP R 10 J 1/16W | |
| R17 | | | RK73HB1J000J | CHIP R 0 J 1/16W | |
| R18 | | | RK73HB1J122J | CHIP R 1.2K J 1/16W | |
| R19 | | | RK73HB1J681J | CHIP R 680 J 1/16W | |
| R20 -22 | | | RK73HB1J000J | CHIP R 0 J 1/16W | |
| R26 | | | RK73HB1J105J | CHIP R 1.0M J 1/16W | |
| R27 | | | RK73HB1J103J | CHIP R 10K J 1/16W | |
| R28 | | | RK73HB1J000J | CHIP R 0 J 1/16W | |
| R29 | | | RK73HB1J474J | CHIP R 470K J 1/16W | |
| R30 | | | RK73HB1J220J | CHIP R 22 J 1/16W | |
| R31 | | | RK73HB1J106J | CHIP R 10M J 1/16W | |

# PARTS LIST

**TX-RX UNIT (X57-7892-71)**

| Ref. No. | Address | New parts | Parts No. | Description | | | | Destination |
|---|---|---|---|---|---|---|---|---|
| R37 | | | RK73HB1J332J | CHIP R | 3.3K | J | 1/16W | |
| R39 | | | RK73HB1J154J | CHIP R | 150K | J | 1/16W | |
| R40 | | | RK73HB1J104J | CHIP R | 100K | J | 1/16W | |
| R41 | | | RK73HB1J221J | CHIP R | 220 | J | 1/16W | |
| R42 | | | RK73HB1J391J | CHIP R | 390 | J | 1/16W | |
| R43 | | | RK73HB1J104J | CHIP R | 100K | J | 1/16W | |
| R44 ,45 | | | RK73HB1J100J | CHIP R | 10 | J | 1/16W | |
| R46 | | | RK73HB1J154J | CHIP R | 150K | J | 1/16W | |
| R47 | | | RK73HB1J101J | CHIP R | 100 | J | 1/16W | |
| R48 | | | RK73HB1J682J | CHIP R | 6.8K | J | 1/16W | |
| R49 | | | RK73HB1J562J | CHIP R | 5.6K | J | 1/16W | |
| R50 | | | RK73HB1J220J | CHIP R | 22 | J | 1/16W | |
| R51 | | | RK73HB1J331J | CHIP R | 330 | J | 1/16W | |
| R52 | | | RK73HB1J222J | CHIP R | 2.2K | J | 1/16W | |
| R53 | | | RK73HB1J472J | CHIP R | 4.7K | J | 1/16W | |
| R56 ,57 | | | RK73HB1J000J | CHIP R | 0 | J | 1/16W | |
| R58 | | | RK73HB1J104J | CHIP R | 100K | J | 1/16W | |
| R60 | | | RK73HB1J102J | CHIP R | 1.0K | J | 1/16W | |
| R62 | | | RK73HB1J154J | CHIP R | 150K | J | 1/16W | |
| R63 | | | RK73HB1J102J | CHIP R | 1.0K | J | 1/16W | |
| R67 | | | RK73HB1J103J | CHIP R | 10K | J | 1/16W | |
| R68 | | | RK73HB1J000J | CHIP R | 0 | J | 1/16W | |
| R97 | | | RK73HB1J000J | CHIP R | 0 | J | 1/16W | |
| R98 | | | RK73HB1J474J | CHIP R | 470K | J | 1/16W | |
| R99 | | | RK73HB1J000J | CHIP R | 0 | J | 1/16W | |
| R104,105 | | | RK73HB1J103J | CHIP R | 10K | J | 1/16W | |
| R201 | | | RK73HB1J472J | CHIP R | 4.7K | J | 1/16W | |
| R203 | | | RK73HB1J102J | CHIP R | 1.0K | J | 1/16W | |
| R205 | | | RK73HB1J101J | CHIP R | 100 | J | 1/16W | |
| R206 | | | RK73HB1J822J | CHIP R | 8.2K | J | 1/16W | |
| R207 | | | RK73HB1J101J | CHIP R | 100 | J | 1/16W | |
| R209 | | | RK73HB1J181J | CHIP R | 180 | J | 1/16W | |
| R211 | | | RK73HB1J102J | CHIP R | 1.0K | J | 1/16W | |
| R212 | | | RK73HB1J152J | CHIP R | 1.5K | J | 1/16W | |
| R213 | | | RK73HB1J182J | CHIP R | 1.8K | J | 1/16W | |
| R214 | | | RK73HB1J220J | CHIP R | 22 | J | 1/16W | |
| R215,216 | | | RK73HB1J471J | CHIP R | 470 | J | 1/16W | |
| R217 | | | RK73HB1J100J | CHIP R | 10 | J | 1/16W | |
| R218 | | | RK73HB1J471J | CHIP R | 470 | J | 1/16W | |
| R219 | | | RK73HB1J273J | CHIP R | 27K | J | 1/16W | |
| R220 | | | RK73HB1J102J | CHIP R | 1.0K | J | 1/16W | |
| R221 | | | RK73HB1J153J | CHIP R | 15K | J | 1/16W | |
| R222 | | | RK73HB1J000J | CHIP R | 0 | J | 1/16W | |
| R224 | | | RK73HB1J183J | CHIP R | 18K | J | 1/16W | |
| R226 | | | RK73HB1J150J | CHIP R | 15 | J | 1/16W | |
| R227 | | | RK73GB2A000J | CHIP R | 0 | J | 1/10W | |
| R228 | | | RK73HB1J223J | CHIP R | 22K | J | 1/16W | |
| R231 | | | RK73FB2B000J | CHIP R | 0 | J | 1/8W | |
| R232,233 | | | RK73HB1J271J | CHIP R | 270 | J | 1/16W | |
| R235 | | | RK73GB2A823J | CHIP R | 82K | J | 1/10W | |
| R237 | | | RK73HB1J000J | CHIP R | 0 | J | 1/16W | |
| R301 | | | RK73HB1J000J | CHIP R | 0 | J | 1/16W | |
| R303 | | | RK73HB1J561J | CHIP R | 560 | J | 1/16W | |
| R304 | | | RK73HB1J000J | CHIP R | 0 | J | 1/16W | |
| R305 | | | RK73HB1J333J | CHIP R | 33K | J | 1/16W | |
| R306 | | | RK73HB1J472J | CHIP R | 4.7K | J | 1/16W | |
| R307 | | | RK73EB2ER39K | CHIP R | 0.39 | K | 1/4W | |
| R308 | | | RK73HB1J182J | CHIP R | 1.8K | J | 1/16W | |
| R309,310 | | | RK73EB2ER39K | CHIP R | 0.39 | K | 1/4W | |
| R311,312 | | | RK73HH1J154D | CHIP R | 150K | D | 1/16W | |
| R313,314 | | | RK73HH1J474D | CHIP R | 470K | D | 1/16W | |
| R315 | | | RK73HB1J103J | CHIP R | 10K | J | 1/16W | |
| R316 | | | RK73HB1J563J | CHIP R | 56K | J | 1/16W | |
| R317 | | | RK73HB1J000J | CHIP R | 0 | J | 1/16W | |
| R318 | | | RK73HB1J474J | CHIP R | 470K | J | 1/16W | |
| R319 | | | RK73HB1J224J | CHIP R | 220K | J | 1/16W | |
| R320 | | | RK73HB1J105J | CHIP R | 1.0M | J | 1/16W | |
| R406 | | | RK73HB1J182J | CHIP R | 1.8K | J | 1/16W | |
| R408 | | | RK73HB1J103J | CHIP R | 10K | J | 1/16W | |
| R409 | | | RK73HB1J153J | CHIP R | 15K | J | 1/16W | |
| R410 | | | RK73HB1J334J | CHIP R | 330K | J | 1/16W | |
| R411 | | | RK73HB1J103J | CHIP R | 10K | J | 1/16W | |
| R414 | | | RK73HB1J101J | CHIP R | 100 | J | 1/16W | |
| R415 | | | RK73HB1J182J | CHIP R | 1.8K | J | 1/16W | |
| R416 | | | RK73HB1J122J | CHIP R | 1.2K | J | 1/16W | |
| R417 | | | RK73HB1J474J | CHIP R | 470K | J | 1/16W | |
| R419 | | | RK73HB1J564J | CHIP R | 560K | J | 1/16W | |
| R421,422 | | | RK73HB1J332J | CHIP R | 3.3K | J | 1/16W | |
| R423 | | | RK73HB1J222J | CHIP R | 2.2K | J | 1/16W | |
| R424 | | | RK73HB1J182J | CHIP R | 1.8K | J | 1/16W | |
| R425 | | | RK73HB1J000J | CHIP R | 0 | J | 1/16W | |
| R426 | | | RK73HB1J100J | CHIP R | 10 | J | 1/16W | |
| R427 | | | RK73HB1J683J | CHIP R | 68K | J | 1/16W | |
| R428 | | | RK73HB1J000J | CHIP R | 0 | J | 1/16W | |
| R429 | | | RK73HB1J101J | CHIP R | 100 | J | 1/16W | |
| R433 | | | RK73HB1J684J | CHIP R | 680K | J | 1/16W | |
| R434 | | | RK73HB1J221J | CHIP R | 220 | J | 1/16W | |
| R435 | | | RK73HB1J101J | CHIP R | 100 | J | 1/16W | |
| R436 | | | RK73HB1J470J | CHIP R | 47 | J | 1/16W | |
| R437 | | | RK73HB1J472J | CHIP R | 4.7K | J | 1/16W | |
| R438 | | | RK73HB1J222J | CHIP R | 2.2K | J | 1/16W | |
| R439 | | | RK73HB1J271J | CHIP R | 270 | J | 1/16W | |
| R440 | | | RK73HB1J104J | CHIP R | 100K | J | 1/16W | |
| R441 | | | RK73HB1J224J | CHIP R | 220K | J | 1/16W | |
| R442 | | | RK73HB1J000J | CHIP R | 0 | J | 1/16W | |
| R443 | | | RK73HB1J104J | CHIP R | 100K | J | 1/16W | |
| R444 | | | RK73HB1J274J | CHIP R | 270K | J | 1/16W | |
| R445 | | | RK73HB1J000J | CHIP R | 0 | J | 1/16W | |
| R446 | | | RK73HB1J474J | CHIP R | 470K | J | 1/16W | |
| R447 | | | RK73HB1J152J | CHIP R | 1.5K | J | 1/16W | |
| R448 | | | RK73HB1J151J | CHIP R | 150 | J | 1/16W | |
| R449 | | | RK73HB1J331J | CHIP R | 330 | J | 1/16W | |
| R450,451 | | | RK73HB1J474J | CHIP R | 470K | J | 1/16W | |
| R452 | | | RK73HB1J104J | CHIP R | 100K | J | 1/16W | |
| R453 | | | RK73HB1J824J | CHIP R | 820K | J | 1/16W | |
| R455 | | | RK73HB1J104J | CHIP R | 100K | J | 1/16W | |
| R456 | | | RK73HB1J154J | CHIP R | 150K | J | 1/16W | |
| R457-459 | | | RK73HB1J000J | CHIP R | 0 | J | 1/16W | |
| R461,462 | | | RK73HB1J474J | CHIP R | 470K | J | 1/16W | |
| R463 | | | RK73HB1J000J | CHIP R | 0 | J | 1/16W | |
| R467 | | | RK73HB1J000J | CHIP R | 0 | J | 1/16W | |
| R469,470 | | | RK73HB1J333J | CHIP R | 33K | J | 1/16W | |
| R471 | | | RK73HB1J102J | CHIP R | 1.0K | J | 1/16W | |
| R481 | | | RK73HB1J474J | CHIP R | 470K | J | 1/16W | |
| R701-704 | | | RK73HB1J473J | CHIP R | 47K | J | 1/16W | |
| R705-712 | | | RK73HB1J102J | CHIP R | 1.0K | J | 1/16W | |
| R713,714 | | | RK73HB1J472J | CHIP R | 4.7K | J | 1/16W | |
| R802 | | | RK73GB2A221J | CHIP R | 220 | J | 1/10W | |
| R803 | | | RK73HB1J473J | CHIP R | 47K | J | 1/16W | |
| R804,805 | | | RK73HB1J104J | CHIP R | 100K | J | 1/16W | |

# PARTS LIST

TX-RX UNIT (X57-7892-71)

| Ref. No. | Address | New parts | Parts No. | Description | | | Destination |
|---|---|---|---|---|---|---|---|
| R806 | | | RK73HB1J000J | CHIP R | 0 | J 1/16W | |
| R810 | | | RK73HB1J104J | CHIP R | 100K | J 1/16W | |
| R811 | | | RK73GB2A271J | CHIP R | 270 | J 1/10W | |
| R813 | | | RK73HB1J473J | CHIP R | 47K | J 1/16W | |
| R814-816 | | | RK73HB1J104J | CHIP R | 100K | J 1/16W | |
| R817 | | | RK73HB1J223J | CHIP R | 22K | J 1/16W | |
| R818 | | | RK73GB2A331J | CHIP R | 330 | J 1/10W | |
| R819,820 | | | RK73HB1J104J | CHIP R | 100K | J 1/16W | |
| R821 | | | RK73HB1J473J | CHIP R | 47K | J 1/16W | |
| R822 | | | RK73HB1J102J | CHIP R | 1.0K | J 1/16W | |
| R824 | | | RK73HH1J824D | CHIP R | 820K | D 1/16W | |
| R829 | | | RK73HH1J394D | CHIP R | 390K | D 1/16W | |
| R830 | | | RK73HH1J103D | CHIP R | 10K | D 1/16W | |
| R831,832 | | | RK73HB1J000J | CHIP R | 0 | J 1/16W | |
| R835,836 | | | RK73HB1J102J | CHIP R | 1.0K | J 1/16W | |
| R839 | | | RK73HB1J000J | CHIP R | 0 | J 1/16W | |
| R842 | | | RK73HB1J223J | CHIP R | 22K | J 1/16W | |
| R844 | | | RK73HB1J000J | CHIP R | 0 | J 1/16W | |
| R845 | | | RK73HB1J103J | CHIP R | 10K | J 1/16W | |
| R847 | | | RK73HB1J105J | CHIP R | 1.0M | J 1/16W | |
| R848 | | | RK73HB1J332J | CHIP R | 3.3K | J 1/16W | |
| R849 | | | RK73HB1J000J | CHIP R | 0 | J 1/16W | |
| R850 | | | RK73HB1J102J | CHIP R | 1.0K | J 1/16W | |
| R851 | | | RK73HB1J223J | CHIP R | 22K | J 1/16W | |
| R852 | | | RK73HB1J104J | CHIP R | 100K | J 1/16W | |
| R853 | | | RK73HB1J103J | CHIP R | 10K | J 1/16W | |
| R854 | | | RK73HB1J100J | CHIP R | 10 | J 1/16W | |
| R855,856 | | | RK73HB1J000J | CHIP R | 0 | J 1/16W | |
| R857 | | | RK73HB1J680J | CHIP R | 68 | J 1/16W | |
| R858 | | | RK73HB1J000J | CHIP R | 0 | J 1/16W | |
| R860 | | | RK73HB1J104J | CHIP R | 100K | J 1/16W | |
| R861 | | | RK73HB1J823J | CHIP R | 82K | J 1/16W | |
| R865 | | | RK73HB1J223J | CHIP R | 22K | J 1/16W | |
| R867,868 | | | RK73HB1J103J | CHIP R | 10K | J 1/16W | |
| R869 | | | RK73HB1J472J | CHIP R | 4.7K | J 1/16W | |
| R871 | | | RK73HB1J104J | CHIP R | 100K | J 1/16W | |
| R872 | | | RK73HB1J121J | CHIP R | 120 | J 1/16W | |
| R874 | | | RK73HB1J150J | CHIP R | 15 | J 1/16W | |
| R875 | | | RK73HB1J000J | CHIP R | 0 | J 1/16W | |
| R876 | | | RK73HB1J564J | CHIP R | 560K | J 1/16W | |
| R877 | | | RK73HB1J105J | CHIP R | 1.0M | J 1/16W | |
| R878 | | | RK73HB1J103J | CHIP R | 10K | J 1/16W | |
| R879-883 | | | RK73HB1J000J | CHIP R | 0 | J 1/16W | |
| R884 | | | RK73HB1J564J | CHIP R | 560K | J 1/16W | |
| R885 | | | RK73HB1J105J | CHIP R | 1.0M | J 1/16W | |
| R887 | | | RK73HB1J100J | CHIP R | 10 | J 1/16W | |
| R888 | | | RK73HB1J473J | CHIP R | 47K | J 1/16W | |
| R890 | | | RK73HB1J153J | CHIP R | 15K | J 1/16W | |
| R891 | | | RK73HB1J473J | CHIP R | 47K | J 1/16W | |
| R892,893 | | | RK73HB1J000J | CHIP R | 0 | J 1/16W | |
| R894 | | | RK73HB1J104J | CHIP R | 100K | J 1/16W | |
| R895 | | | RK73HB1J394J | CHIP R | 390K | J 1/16W | |
| R896 | | | RK73HB1J104J | CHIP R | 100K | J 1/16W | |
| R897 | | | RK73HB1J222J | CHIP R | 2.2K | J 1/16W | |
| R898 | | | RK73HB1J273J | CHIP R | 27K | J 1/16W | |
| R899 | | | RK73HB1J124J | CHIP R | 120K | J 1/16W | |
| R900 | | | RK73HB1J104J | CHIP R | 100K | J 1/16W | |
| R902 | | | RK73HB1J103J | CHIP R | 10K | J 1/16W | |
| R903 | | | RK73HB1J101J | CHIP R | 100 | J 1/16W | |
| R904 | | | RK73HB1J474J | CHIP R | 470K | J 1/16W | |

| Ref. No. | Address | New parts | Parts No. | Description | | | Destination |
|---|---|---|---|---|---|---|---|
| R905 | | | RK73HB1J272J | CHIP R | 2.7K | J 1/16W | |
| R906 | | | RK73HB1J102J | CHIP R | 1.0K | J 1/16W | |
| R907 | | | RK73HB1J272J | CHIP R | 2.7K | J 1/16W | |
| R908 | | | RK73HB1J104J | CHIP R | 100K | J 1/16W | |
| R909 | | | RK73HB1J105J | CHIP R | 1.0M | J 1/16W | |
| R910,911 | | | RK73HB1J103J | CHIP R | 10K | J 1/16W | |
| R912 | | | RK73HB1J000J | CHIP R | 0 | J 1/16W | |
| R913 | | | RK73HB1J182J | CHIP R | 1.8K | J 1/16W | |
| R914 | | | RK73HB1J471J | CHIP R | 470 | J 1/16W | |
| R915 | | | RK73HB1J152J | CHIP R | 1.5K | J 1/16W | |
| R916 | | | RK73HB1J123J | CHIP R | 12K | J 1/16W | |
| R918 | | | RK73HB1J473J | CHIP R | 47K | J 1/16W | |
| R919 | | | RK73HB1J682J | CHIP R | 6.8K | J 1/16W | |
| R920 | | | RK73HB1J561J | CHIP R | 560 | J 1/16W | |
| R921,922 | | | RK73HB1J473J | CHIP R | 47K | J 1/16W | |
| R923 | | | RK73HB1J151J | CHIP R | 150 | J 1/16W | |
| R924 | | | RK73HB1J474J | CHIP R | 470K | J 1/16W | |
| R925 | | | RK73HB1J334J | CHIP R | 330K | J 1/16W | |
| R926 | | | RK73HB1J274J | CHIP R | 270K | J 1/16W | |
| R927 | | | RK73HB1J473J | CHIP R | 47K | J 1/16W | |
| R928 | | | RK73HB1J273J | CHIP R | 27K | J 1/16W | |
| R929 | | | RK73HB1J102J | CHIP R | 1.0K | J 1/16W | |
| R930 | | | RK73HB1J101J | CHIP R | 100 | J 1/16W | |
| R931 | | | RK73HB1J000J | CHIP R | 0 | J 1/16W | |
| R932 | | | RK73HB1J103J | CHIP R | 10K | J 1/16W | |
| R933 | | | RK73HB1J102J | CHIP R | 1.0K | J 1/16W | |
| R934 | | | RK73HB1J472J | CHIP R | 4.7K | J 1/16W | |
| R935-937 | | | RK73HB1J103J | CHIP R | 10K | J 1/16W | |
| R952 | | | RK73HB1J331J | CHIP R | 330 | J 1/16W | |
| R953 | | | RK73HB1J472J | CHIP R | 4.7K | J 1/16W | |
| R954,955 | | | RK73HB1J121J | CHIP R | 120 | J 1/16W | |
| R956 | | | RK73HB1J471J | CHIP R | 470 | J 1/16W | |
| R960,961 | | | RK73HB1J000J | CHIP R | 0 | J 1/16W | |
| R962 | | | RK73HB1J103J | CHIP R | 10K | J 1/16W | |
| R963 | | | RK73HB1J184J | CHIP R | 180K | J 1/16W | |
| R964 | | | RK73HB1J332J | CHIP R | 3.3K | J 1/16W | |
| R965 | | | RK73HB1J000J | CHIP R | 0 | J 1/16W | |
| R967 | | | RK73HB1J000J | CHIP R | 0 | J 1/16W | |
| R968 | | | RK73HB1J102J | CHIP R | 1.0K | J 1/16W | |
| R978 | | | RK73HB1J000J | CHIP R | 0 | J 1/16W | |
| R980 | | | RK73HH1J472D | CHIP R | 4.7K | D 1/16W | |
| R981 | | | RK73HB1J000J | CHIP R | 0 | J 1/16W | |
| R982 | | | RK73HB1J121J | CHIP R | 120 | J 1/16W | |
| R986 | | | RK73HB1J471J | CHIP R | 470 | J 1/16W | |
| R989 | | | RK73HB1J102J | CHIP R | 1.0K | J 1/16W | |
| R991 | | | RK73HB1J472J | CHIP R | 4.7K | J 1/16W | |
| R992 | | | RK73HB1J105J | CHIP R | 1.0M | J 1/16W | |
| R993 | | | RK73HH1J472D | CHIP R | 4.7K | D 1/16W | |
| S1 | | | S70-0414-05 | TACT SWITCH | | | |
| S2 ,3 | | | S70-0483-05 | TACT SWITCH | | | |
| D6 | | | 1SV323F | VARIABLE CAPACITANCE DIODE | | | |
| D9 | | | 1SV323F | VARIABLE CAPACITANCE DIODE | | | |
| D10 | | | 1SV325F | VARIABLE CAPACITANCE DIODE | | | |
| D12 | | | 1SV325F | VARIABLE CAPACITANCE DIODE | | | |
| D13 | | | HSC119 | DIODE | | | |
| D14 ,15 | | | HVC375B-E | VARIABLE CAPACITANCE DIODE | | | |
| D16 | | | KDV214E-P | DIODE | | | |
| D17 ,18 | | | HSC277 | DIODE | | | |
| D201,202 | | | HVC131 | DIODE | | | |

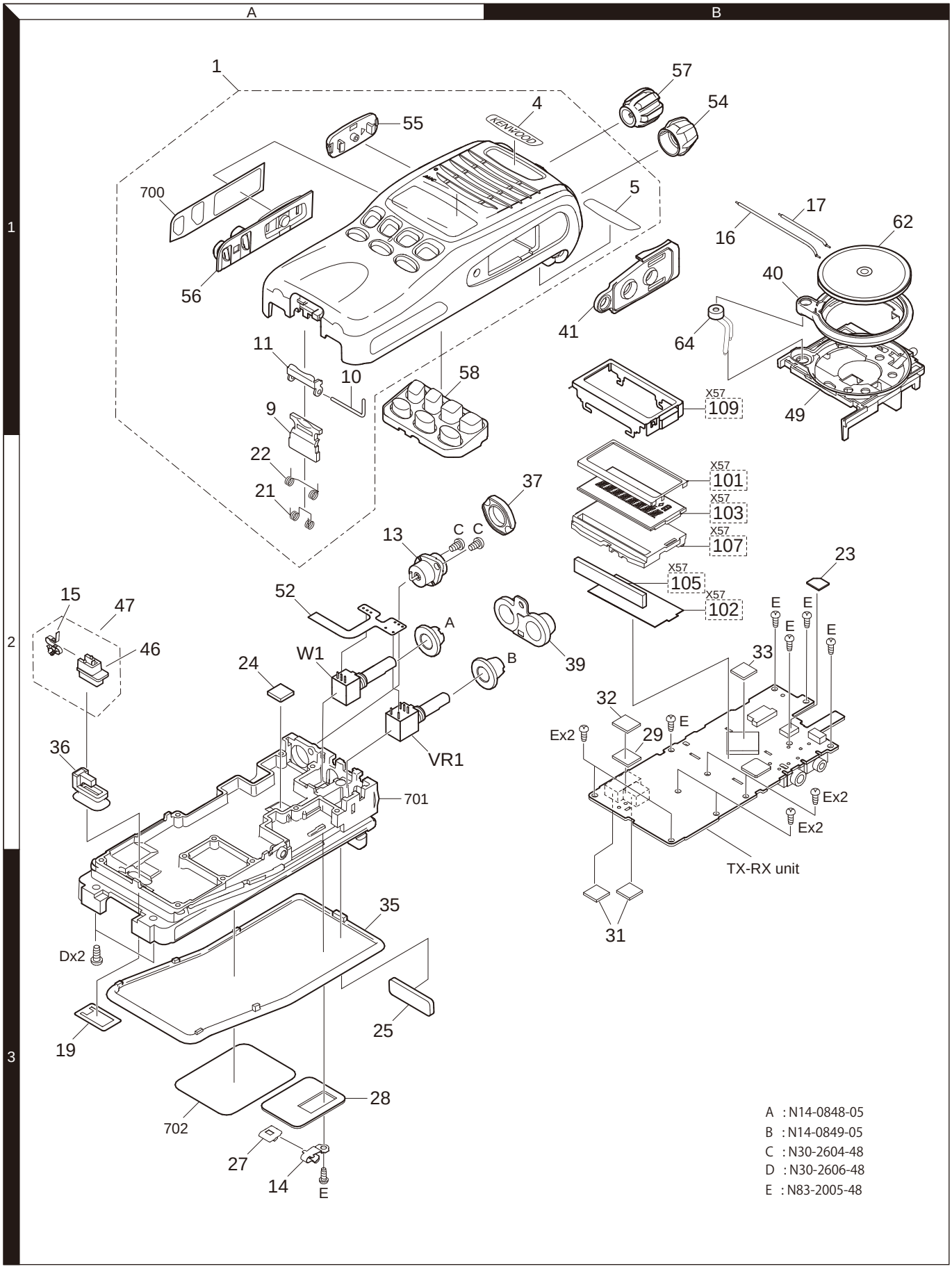
# PARTS LIST

**TX-RX UNIT (X57-7892-71)**

| Ref. No. | Address | New parts | Parts No. | Description | Desti-nation |
|---|---|---|---|---|---|
| D203,204 | | | RN142S | DIODE | |
| D301 | | | UDZW5.1(B) | ZENER DIODE | |
| D401,402 | | | KDS121E-P | DIODE | |
| D403-405 | | | HVC350B | VARIABLE CAPACITANCE DIODE | |
| D407,408 | | | HVC350B | VARIABLE CAPACITANCE DIODE | |
| D409 | | | JDV2S07FS | VARIABLE CAPACITANCE DIODE | |
| D802 | | | RB521S-30 | DIODE | |
| D803 | | | GN1G | DIODE | |
| D806 | | | RKZ5.1B2KG | ZENER DIODE | |
| D807-809 | | | KDR731 | DIODE | |
| D810 | | | MC2850 | DIODE | |
| D817 | | | MA2S111-F | DIODE | |
| D829-832 | | | 1SS388F | DIODE | |
| IC1 | | | AK1541 | MOS-IC | |
| IC2 | | | BD7542FVM | MOS-IC | |
| IC301 | | | NJM2904RB1-ZB | BI-POLAR IC | |
| IC401 | | | NJM2591V | BI-POLAR IC | |
| IC402 | | | NJU7108 | MOS-IC | |
| IC801 | | | XC6209B502P-G | MOS-IC | |
| IC802 | | | XC6209B502M-G | MOS-IC | |
| IC803 | | | XC6209B502P-G | MOS-IC | |
| IC804 | | | XC6209B332M-G | MOS-IC | |
| IC805 | | | XC61CN4502M-G | MOS-IC | |
| IC806 | | | XC6209B332M-G | MOS-IC | |
| IC807 | | | XC6120N302N-G | MOS-IC | |
| IC808 | | | NJM2904RB1-ZB | BI-POLAR IC | |
| IC810 | | | EX25512ATA00A | ROM IC | |
| IC811 | | | HA1630D03MM | MOS-IC | |
| IC812 | | | CD686AQ3 | MOS-IC | |
| IC815 | | | TA7368FG | MOS-IC | |
| IC817 | | | TC75S51FE(F) | MOS-IC | |
| IC820 | | | F363BEDFEKDLB | MCU | |
| IC821 | | | NJU6434 | MOS-IC | |
| Q2 | | | 2SC5636 | TRANSISTOR | |
| Q3 | | | KTC4075E(Y,GR) | TRANSISTOR | |
| Q4 | | | MCH3914(8)-H | FET | |
| Q5 | | | MCH3914(7)-H | FET | |
| Q6 | | | SSM6L05FU-F | FET | |
| Q7 | | | SSM3J05FU-F | FET | |
| Q8 ,9 | | | 2SC5636 | TRANSISTOR | |
| Q11 | | | SSM3J05FU-F | FET | |
| Q12 | | | 2SK1830F | FET | |
| Q201 | | | 2SC5636 | TRANSISTOR | |
| Q203 | | | 2SC5455-A | TRANSISTOR | |
| Q204 | | | RFM01U7P | FET | |
| Q205 | | | RD07MUS2BT112 | FET | |
| Q301 | | | RT1N140U-T111 | TRANSISTOR | |
| Q303 | | | 2SK1830F | FET | |
| Q304 | | | RT1N141U-T111 | TRANSISTOR | |
| Q305 | | | 2SK1824-A | FET | |
| Q306 | | | RT1P441U-T111 | TRANSISTOR | |
| Q401 | | | RT1N441U-T111 | TRANSISTOR | |
| Q403 | | | KTC4080E-P | TRANSISTOR | |
| Q404 | | | RT1P441U-T111 | TRANSISTOR | |
| Q405 | | | KTC4080E-P | TRANSISTOR | |
| Q406 | | | 3SK318 | FET | |
| Q407 | | | 3SK293-F | FET | |
| Q801 | | | UPA672T-A | FET | |
| Q802,803 | | | SSM6L05FU-F | FET | |

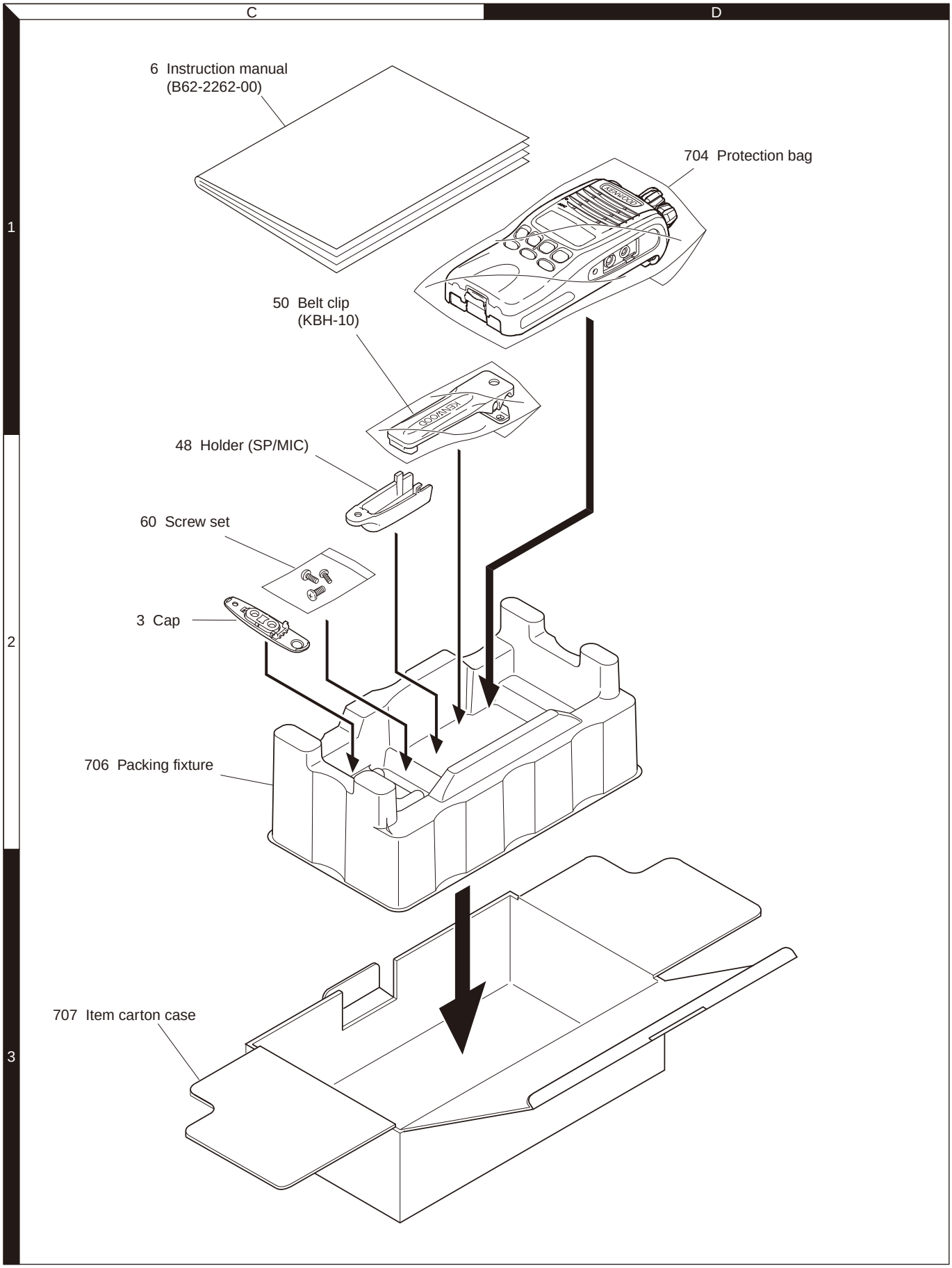
| Ref. No. | Address | New parts | Parts No. | Description | Desti-nation |
|---|---|---|---|---|---|
| Q804 | | | SSM3J05FU-F | FET | |
| Q805 | | | 2SK1830F | FET | |
| Q806 | | | 2SC4919-S | TRANSISTOR | |
| Q809 | | | KTC4075E(Y,GR) | TRANSISTOR | |
| Q810 | | | 2SC4116(GR)F | TRANSISTOR | |
| Q811 | | | 2SA1586(Y,GR)F | TRANSISTOR | |
| Q813 | | | RT1N141U-T111 | TRANSISTOR | |
| Q814 | | | 2SB1694 | TRANSISTOR | |
| Q815,816 | | | UPA672T-A | FET | |
| Q817 | | | RT1N441U-T111 | TRANSISTOR | |
| Q818,819 | | | 2SK3577-A | FET | |
| Q820 | | | 2SC4617(S) | TRANSISTOR | |
| Q821 | | | 2SB1694 | TRANSISTOR | |
| Q822 | | | RT1N141U-T111 | TRANSISTOR | |
| TH201 | | | ERTJ0EV104J | THERMISTOR(100K) | |
| TH401 | | | NCP18WM224J0S | THERMISTOR(220K) | |

# EXPLODED VIEW




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

# 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<br>Modulation<br>Output | Operational frequency range of the transceiver<br>Frequency modulation and external modulation<br>–127dBm/0.1µV to greater than –47dBm/1mV |
| 2. RF Power Meter | Input Impedance<br>Operation Frequency<br>Measurement Range | 50Ω<br>Operational frequency range of the transceiver<br>Vicinity of 10W |
| 3. Deviation Meter | Frequency Range | Operational frequency range of the transceiver |
| 4. Digital Volt Meter (DVM) | Measuring Range<br>Input Impedance | 10mV to 10V DC<br>High input impedance for minimum circuit loading |
| 5. Oscilloscope | | DC through 30MHz |
| 6. High Sensitivity Frequency Counter | Frequency Range<br>Frequency Stability | 10Hz to 1000MHz<br>0.2ppm or less |
| 7. DC Ammeter | | 5A |
| 8. AF Volt Meter (AF VTVM) | Frequency Range<br>Voltage Range | 50Hz to 10kHz<br>1mV to 10V |
| 9. Audio Generator (AG) | Frequency Range<br>Output | 50Hz to 5kHz or more<br>0 to 1V |
| 10. Distortion Meter | Capability<br>Input Level | 3% or less at 1kHz<br>50mV to 10Vrms |
| 11. Spectrum Analyzer | Measuring Range | DC to 1GHz or more |
| 12. Tracking Generator | Center frequency<br>Output Voltage | 50kHz to 600MHz<br>100mV or more |
| 13. 8Ω Dummy Load | | Approx. 8Ω, 3W |
| 14. Regulated Power Supply | | 5V to 10V, approx. 3A<br>Useful if ammeter equipped |

### ■ Antenna connector adapter

The antenna connector of this transceiver uses an SMA terminal.

Use an antenna connector adapter [SMA(f) – BNC(f) or SMA(f) – N(f)] for adjustment. (The adapter is not provided as an option, so buy a commercially-available one.)

### ■ Repair Jig (Chassis)

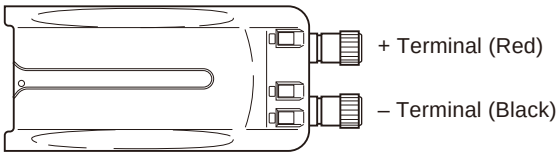
Use jig (part No.: A10-4215-03) for repairing the transceiver. Place the TX-RX unit on the jig and fit it with screws.

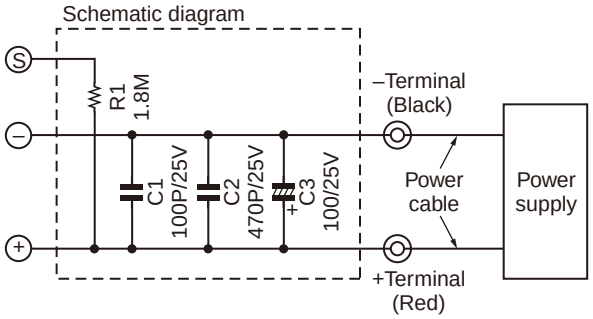
The jig facilitates the voltage check and protects the final amplifier FET when the voltage on the flow side of the TX-RX unit is checked during repairs.

### ■ Battery Jig (W05-1011-00)

Connect the power cable properly between the battery jig installed in the transceiver and the power supply, and be sure output voltage and the power supply polarity prior to switching the power supply ON, otherwise over voltage and reverse connection may damage the transceiver, or the power supply or both.

**Note:** When using the battery jig, you must measure the voltage at the terminals of the battery jig. Otherwise, a slight voltage drop may occur within the power cable, between the power supply and the battery jig, especially while the transceiver transmits.



# ADJUSTMENT

## Frequency and Signaling

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

### ■ Frequency (MHz)

| Channel No. | RX Frequency | TX Frequency |
|---|---|---|
| 1 | 435.05000 | 435.10000 |
| 2 | 400.05000 | 400.10000 |
| 3 | 469.95000 | 469.90000 |
| 4 | 435.00000 | 435.00000 |
| 5 | 435.20000 | 435.20000 |
| 6 | 435.40000 | 435.40000 |
| 7~16 | - | - |

### ■ Signaling

| Signaling No. | RX (Decode) | TX (Encode) |
|---|---|---|
| 1 | None | None |
| 2 | None | 100Hz Square Wave |
| 3 | QT 67.0Hz | QT 67.0Hz |
| 4 | QT 151.4Hz | QT 151.4Hz |
| 5 | QT 210.7Hz | QT 210.7Hz |
| 6 | QT 254.1Hz | QT 254.1Hz |
| 7 | DQT D023N | DQT D023N |
| 8 | DQT D754I | DQT D754I |
| 9 | DTMF (Code: 159D) | DTMF (Code: 159D) |
| 10 | None | DTMF (Code: 9) |
| 11 | None | MSK (1010) |
| 12 | FleetSync (100~1000) | FleetSync (100~1000) |
| 13 | None | Single Tone (1000Hz) |
| 14 | 5-tone (CCIR 12345) | 5-tone (CCIR 12345) |
| 15 | None | DTMF Tone (1477Hz) |
| 16 | Single Tone (979.9Hz) | Single Tone (979.9Hz) |
| 17 | None | MSK PN9 |
| 18 | None | DTMF (Code: 3) |
| 19 | Single Tone: 1200Hz | Single Tone: 1200Hz |

## Preparations for Tuning the Transceiver

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

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

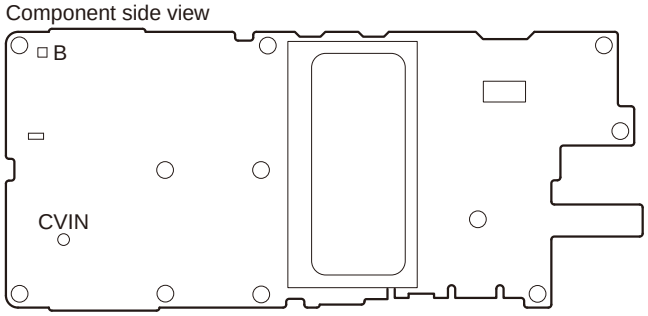
The speaker output connector must be terminated with a 8Ω dummy load and connected to an AC voltmeter and an audio distortion meter or a SINAD measurement meter at all times during tuning.

### ■ Adjustment frequency (MHz)

| TEST CH | RX | TX |
|---|---|---|
| Low | 400.05000 | 400.10000 |
| Low' | 417.55000 | 417.50000 |
| Center | 435.05000 | 435.10000 |
| High' | 452.55000 | 452.50000 |
| High | 469.95000 | 469.90000 |

## Adjustment Points

TX-RX UNIT
Component side view




**Note:** "CVIN" VCO Lock voltage.

# ADJUSTMENT

## Common Section

| Item | Condition | Measurement | | | Adjustment | | | Specifications / Remarks |
|---|---|---|---|---|---|---|---|---|
| | | Test-equipment | Unit | Terminal | Unit | Parts | Method | |
| 1. Setting | 1) BATT terminal votage: 7.5V<br>2) SSG standard modulation<br>[Wide 5k]<br>MOD: 1kHz, DEV: 3kHz<br>[Narrow]<br>MOD: 1kHz, DEV: 1.5kHz | | | | | | | |
| 2. Receive Assist Voltage | 1) (Auto tuning)<br>*__Note__ | Power meter | TX-RX | ANT | TX-RX | FPU | | (4.0V±0.1V) |
| | 2) CH: Low | DVM | | CVIN | | | Check | 0.6V or more |
| 3. Transmit Assist Voltage | 1) (Auto tuning)<br>*__Note__ | | | | TX-RX | FPU | | (4.0V±0.1V) |
| | 2) CH: Low<br>PTT: ON | | | | | | Check | 0.6V or more |

**Note:** At test mode, click [Tune Assist Voltage] button in test mode dialog box, then start automatic adjustment of Receive/Transmit assist voltage.

## Transmitter Section

| Item | Condition | Measurement | | | Adjustment | | | Specifications / Remarks |
|---|---|---|---|---|---|---|---|---|
| | | Test-equipment | Unit | Terminal | Unit | Parts | Method | |
| 1. Frequency | 1) TEST CH: Center<br>PTT: ON | f. counter | | ANT | TX-RX | FPU | 435.100MHz | ±50Hz |
| 2. High Transmit Power | 1) TEST CH: Low, Low', Center, High', High (5 points)<br>BATT terminal voltage: 7.5V<br>PTT: ON | Power meter<br>Ammeter | | | | FPU | 5.0W | ±0.1W<br>2.0A or less |
| 3. Low Transmit Power | 1) TEST CH: Low, Low', Center, High', High (5 points)<br>BATT terminal voltage: 7.5V<br>PTT: ON | | | | | | 1.0W | ±0.1W<br>1.0A or less |
| 4. DQT Balance [Wide 5k] 1 | 1) TEST CH: Low, Low', Center, High', High (5 points)<br>Deviation meter filter<br>LPF: 3kHz<br>HPF: OFF<br>PTT: ON | Power meter<br>Deviation meter<br>Oscilloscope | | ANT | | | Make the demodulation wave into square waves. |  |
| 5. Maximum Deviation [Wide 5k] | 1) TEST CH: Center, Low, Low', High, High' (5 points)<br>Deviation meter filter<br>LPF: 15kHz<br>HPF: OFF<br>PTT: ON | | | | | | 4.4kHz (According to the larger +, –) | ±80Hz<br><br>**Note:**<br>FPU AUTO INPUT<br>1kHz/150mV |

# ADJUSTMENT

| Item | Condition | Measurement | | | Adjustment | | | Specifications / Remarks |
|---|---|---|---|---|---|---|---|---|
| | | Test-equipment | Unit | Terminal | Unit | Parts | Method | |
| 6. DQT Deviation [Wide 5k] | 1) TEST CH: 1<br>Deviation meter filter<br>LPF: 3kHz<br>HPF: OFF<br>PTT: ON | Power meter<br>Deviation meter<br>Oscilloscope | | ANT | | FPU | 0.75kHz | ±40Hz |
| 7. QT Deviation [Wide 5k] | 1) TEST CH: 1<br>Deviation meter filter<br>LPF: 3kHz<br>HPF: OFF<br>PTT: ON | | | | | | 0.75kHz | ±40Hz |
| 8. DTMF Deviation [Wide 5k] | 1) TEST CH: 1<br>Deviation meter filter<br>LPF: 15kHz<br>HPF: OFF<br>PTT: ON | | | | | | 3.0kHz | ±100Hz |
| 9. MSK Deviation [Wide 5k] | 1) TEST CH: 1<br>Deviation meter filter<br>LPF: 15kHz<br>HPF: OFF<br>PTT: ON | | | | | | 3.0kHz | ±100Hz |

**Note:** Regarding deviation alignment item, wide 4k and narrow value is calculated from wide 5k alignment value.

## Receiver Section

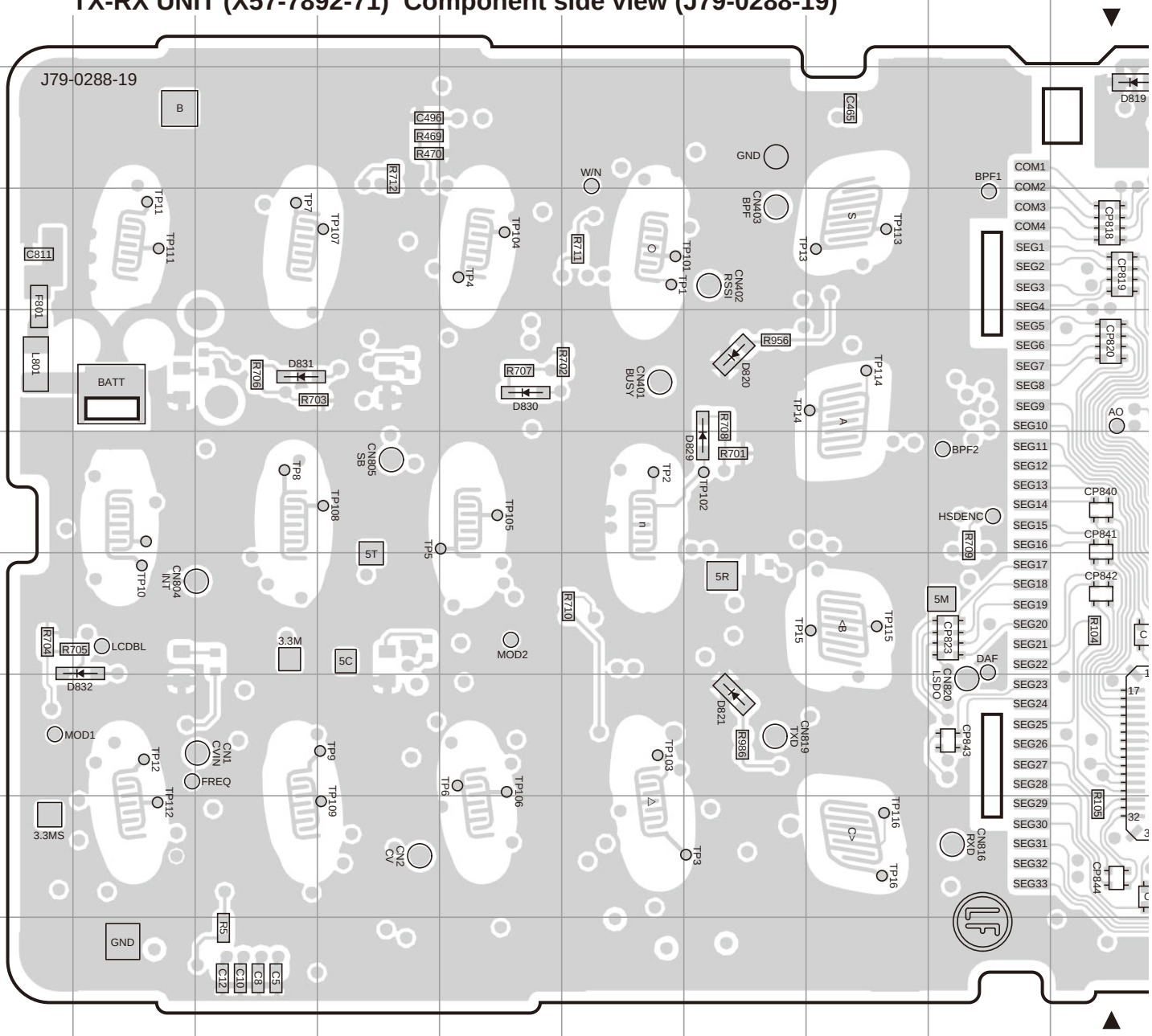
| Item | Condition | Measurement | | | Adjustment | | | Specifications / Remarks |
|---|---|---|---|---|---|---|---|---|
| | | Test-equipment | Unit | Terminal | Unit | Parts | Method | |
| 1. Sensitivity (Semiauto-matic) | 1) TEST CH: Low, Center, High (3 points)<br>SSG otuput : –90dBm (7.08µV)<br>SSG MOD: 3.0kHz | SSG<br>DVM<br>Oscilloscope | | ANT | | FPU | Press [Start]<br>(Auto tuning) | |

# ADJUSTMENT

| Item | Condition | Measurement | | | Adjustment | | | Specifications / Remarks |
|---|---|---|---|---|---|---|---|---|
| | | Test-equipment | Unit | Terminal | Unit | Parts | Method | |
| 2. Open Squelch [Wide 5k] | 1) TEST CH: Low, Center, High (3 points)<br>SSG otuput: –117dBm (0.32µV)<br>SSG MOD: 3.0kHz | SSG<br>DVM<br>Oscilloscope | | ANT | | FPU | Press [Start]<br>(Auto tuning) | |
| [Narrow] | 2) TEST CH: Low, Center, High (3 points)<br>SSG otuput: –117dBm (0.32µV)<br>SSG MOD: 1.5kHz | | | | | | | |
| 3. Tight Squelch [Wide 5k] | 1) TEST CH: Low, Center, High (3 points)<br>SSG otuput: –114dBm (0.44µV)<br>SSG MOD: 3.0kHz | | | | | | | |
| [Narrow] | 2) TEST CH: Low, Center, High (3 points)<br>SSG otuput: –114dBm (0.44µV)<br>SSG MOD: 1.5kHz | | | | | | | |
| 4. Low RSSI [Wide 5k] | 1) TEST CH: Center, Low, High (3 points)<br>SSG otuput: –120dBm (0.22µV)<br>SSG MOD: 3.0kHz | | | | | | | |
| [Narrow] | 2) TEST CH: Center, Low, High (3 points)<br>SSG otuput: –120dBm (0.22µV)<br>SSG MOD: 1.5kHz | | | | | | | |
| 5. High RSSI [Wide 5k] | 1) TEST CH: Center, Low, High (3 points)<br>SSG otuput: –80dBm (22.4µV)<br>SSG MOD: 3.0kHz | | | | | | | |
| [Narrow] | 2) TEST CH: Center, Low, High (3 points)<br>SSG otuput: –80dBm (22.4µV)<br>SSG MOD: 1.5kHz | | | | | | | |

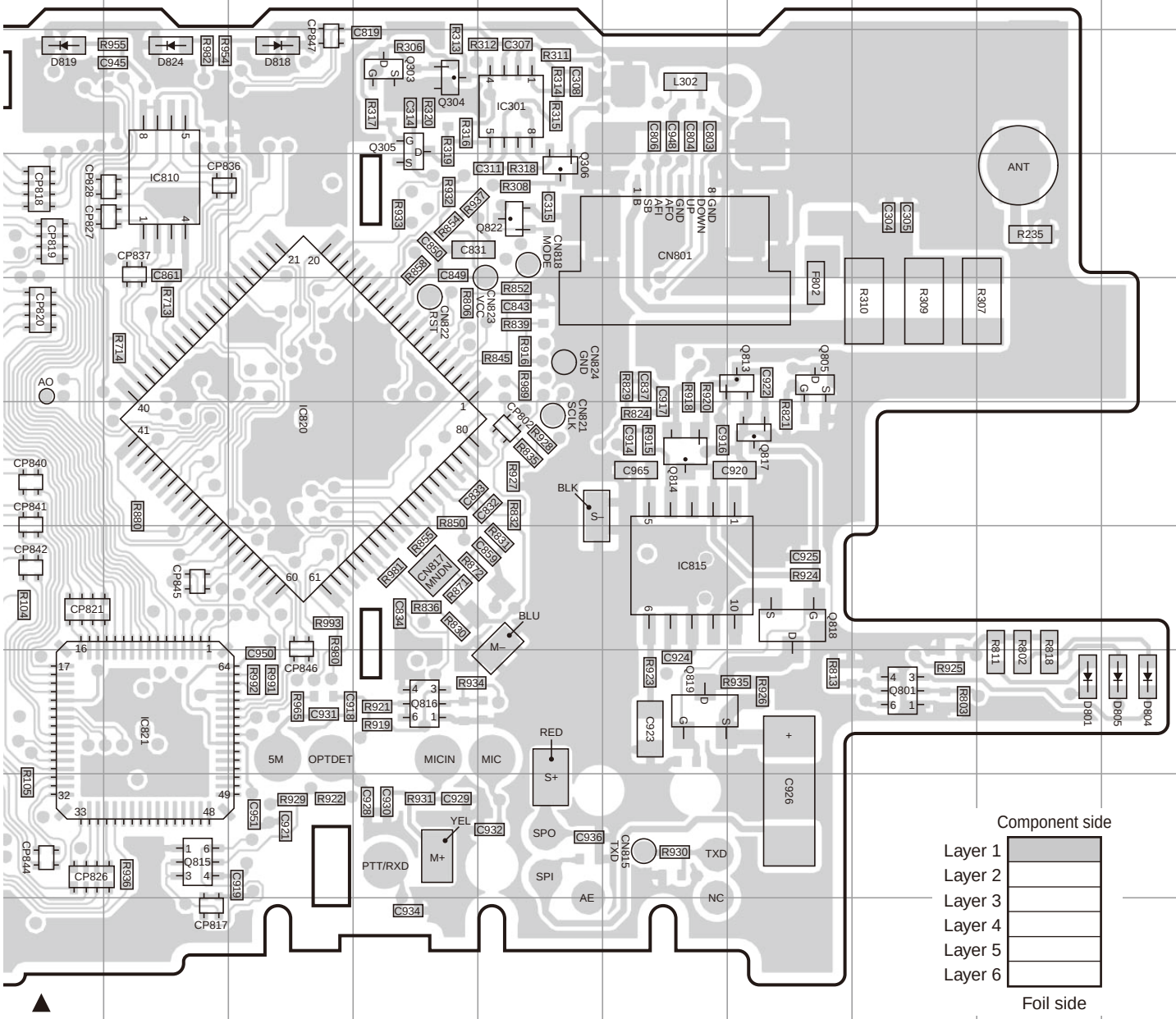
# TK-3312 PC BOARD

## TX-RX UNIT (X57-7892-71) Component side view (J79-0288-19)




| Ref. No. | Address | Ref. No. | Address | Ref. No. | Address | Ref. No. | Address |
|---|---|---|---|---|---|---|---|
| IC301 | 3N | Q306 | 4N | Q818 | 7P | D820 | 5G |
| IC810 | 4K | Q801 | 8Q | Q819 | 8O | D821 | 8G |
| IC815 | 7O | Q805 | 5P | Q822 | 4N | D824 | 3K |
| IC820 | 6L | Q813 | 5P | D801 | 8R | D829 | 6G |
| IC821 | 8K | Q814 | 6O | D804 | 8S | D830 | 5E |
| Q303 | 3M | Q815 | 9K | D805 | 8S | D831 | 5C |
| Q304 | 3M | Q816 | 8M | D818 | 3L | D832 | 8B |
| Q305 | 3M | Q817 | 6P | D819 | 3J | | |

## TX-RX UNIT (X57-7892-71) Component side view (J79-0288-19)



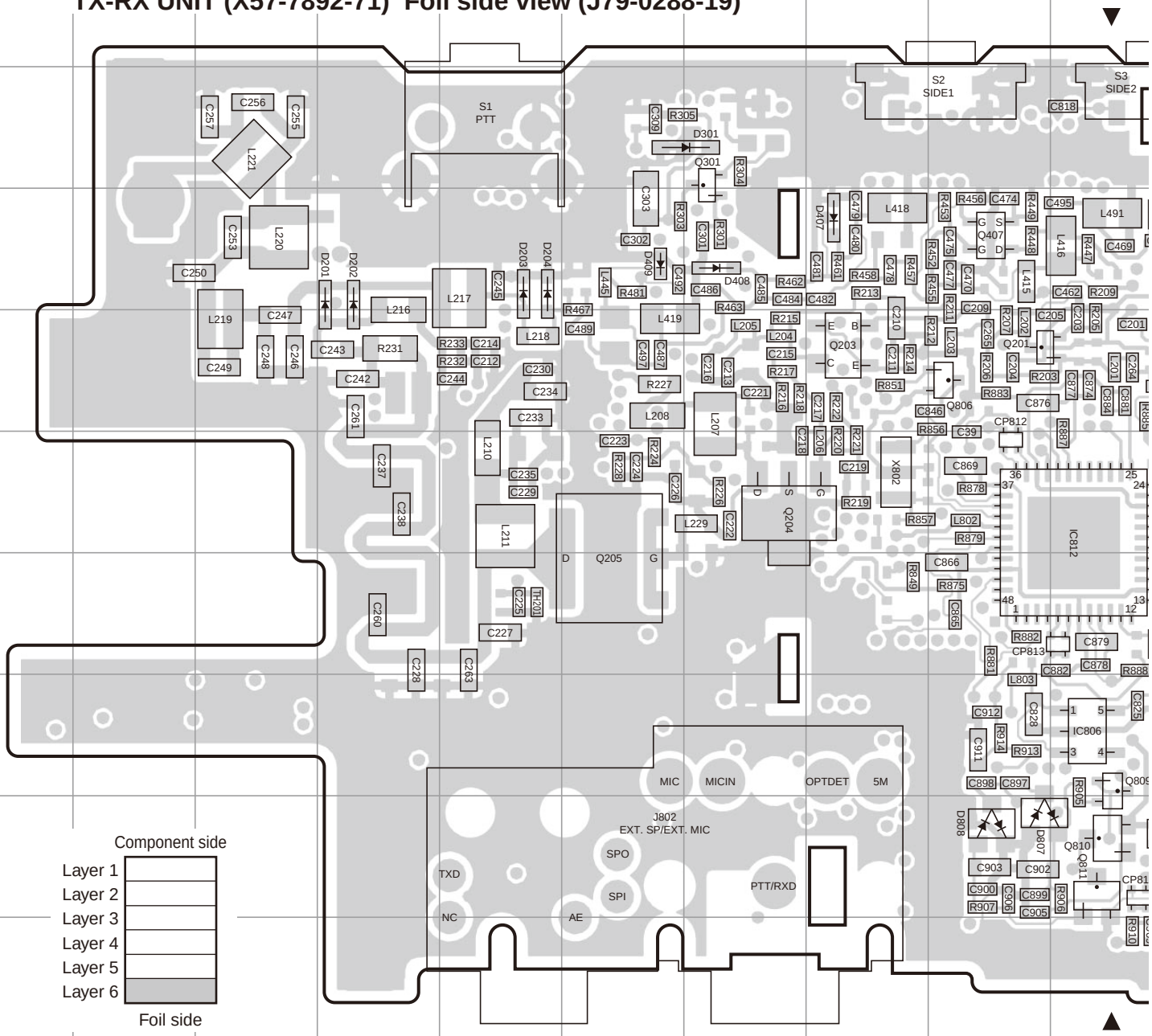

Component side

| | |
|---|---|
| Layer 1 | |
| Layer 2 | |
| Layer 3 | |
| Layer 4 | |
| Layer 5 | |
| Layer 6 | |

Foil side

# TK-3312 PC BOARD

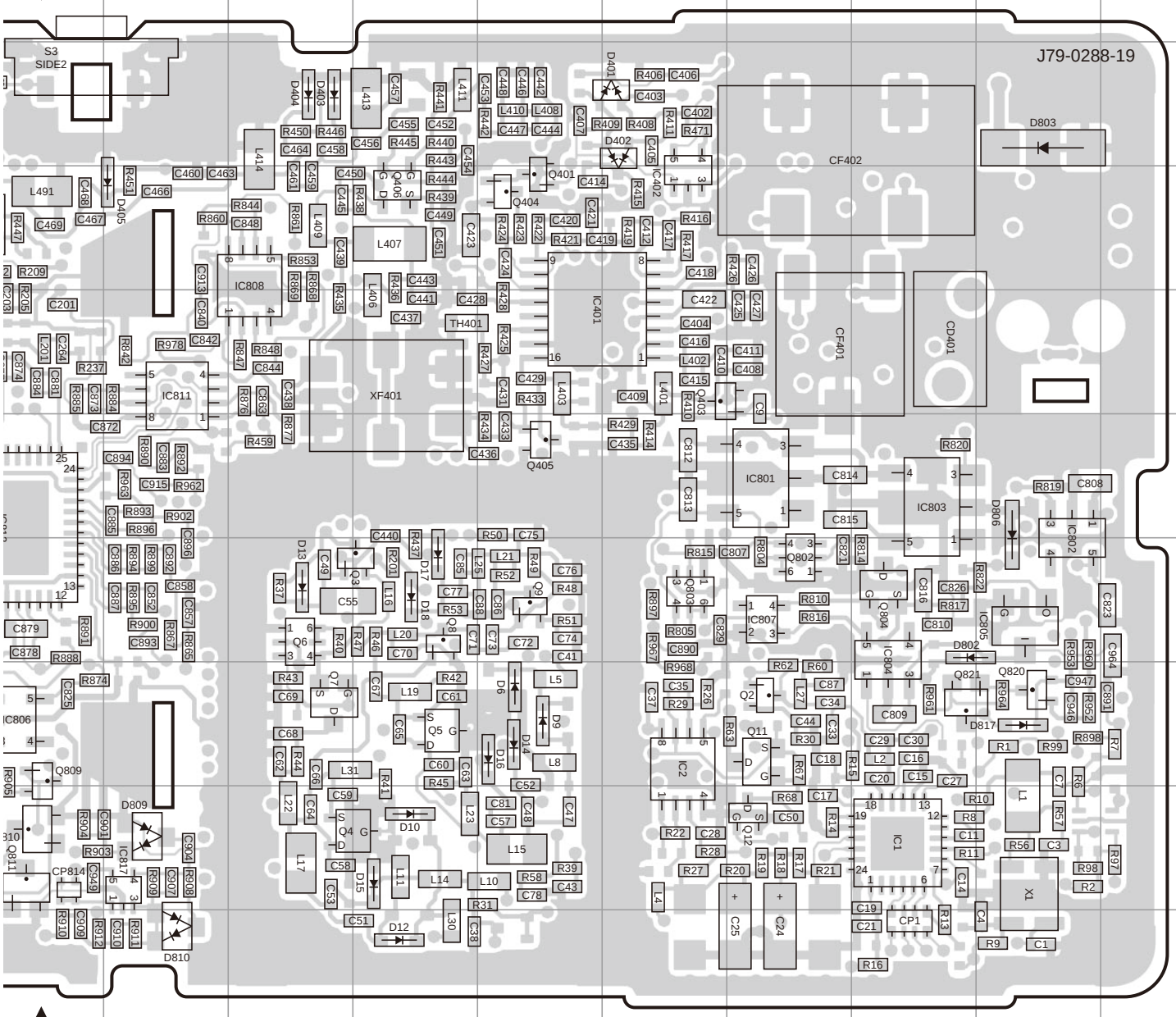
## TX-RX UNIT (X57-7892-71) Foil side view (J79-0288-19)




| Ref. No. | Address | Ref. No. | Address | Ref. No. | Address | Ref. No. | Address | Ref. No. | Address | Ref. No. | Address | Ref. No. | Address | Ref. N |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| IC1 | 9Q | IC807 | 7P | Q7 | 8L | Q401 | 4N | Q809 | 8J | D14 | 8N | D401 | 3O | D806 |
| IC2 | 8O | IC808 | 4L | Q8 | 7M | Q403 | 5O | Q810 | 9J | D15 | 9M | D402 | 3O | D807 |
| IC401 | 5N | IC811 | 5K | Q9 | 7N | Q404 | 4N | Q811 | 9J | D16 | 8N | D403 | 3L | D808 |
| IC402 | 4O | IC812 | 6J | Q11 | 8P | Q405 | 6N | Q820 | 8R | D17 | 7M | D404 | 3L | D809 |
| IC801 | 6P | IC817 | 9K | Q12 | 9P | Q406 | 4M | Q821 | 8Q | D18 | 7M | D405 | 4K | D810 |
| IC802 | 7R | Q2 | 8P | Q201 | 5I | Q407 | 4I | D6 | 8N | D201 | 4D | D407 | 4H | D817 |
| IC803 | 6Q | Q3 | 7M | Q203 | 5H | Q802 | 7P | D9 | 8N | D202 | 4D | D408 | 4G | |
| IC804 | 7Q | Q4 | 9L | Q204 | 6G | Q803 | 7O | D10 | 9M | D203 | 4E | D409 | 4F | |
| IC805 | 7R | Q5 | 8M | Q205 | 7F | Q804 | 7Q | D12 | 10M | D204 | 4E | D802 | 7Q | |
| IC806 | 8J | Q6 | 7L | Q301 | 3G | Q806 | 5I | D13 | 7L | D301 | 3G | D803 | 3R | |

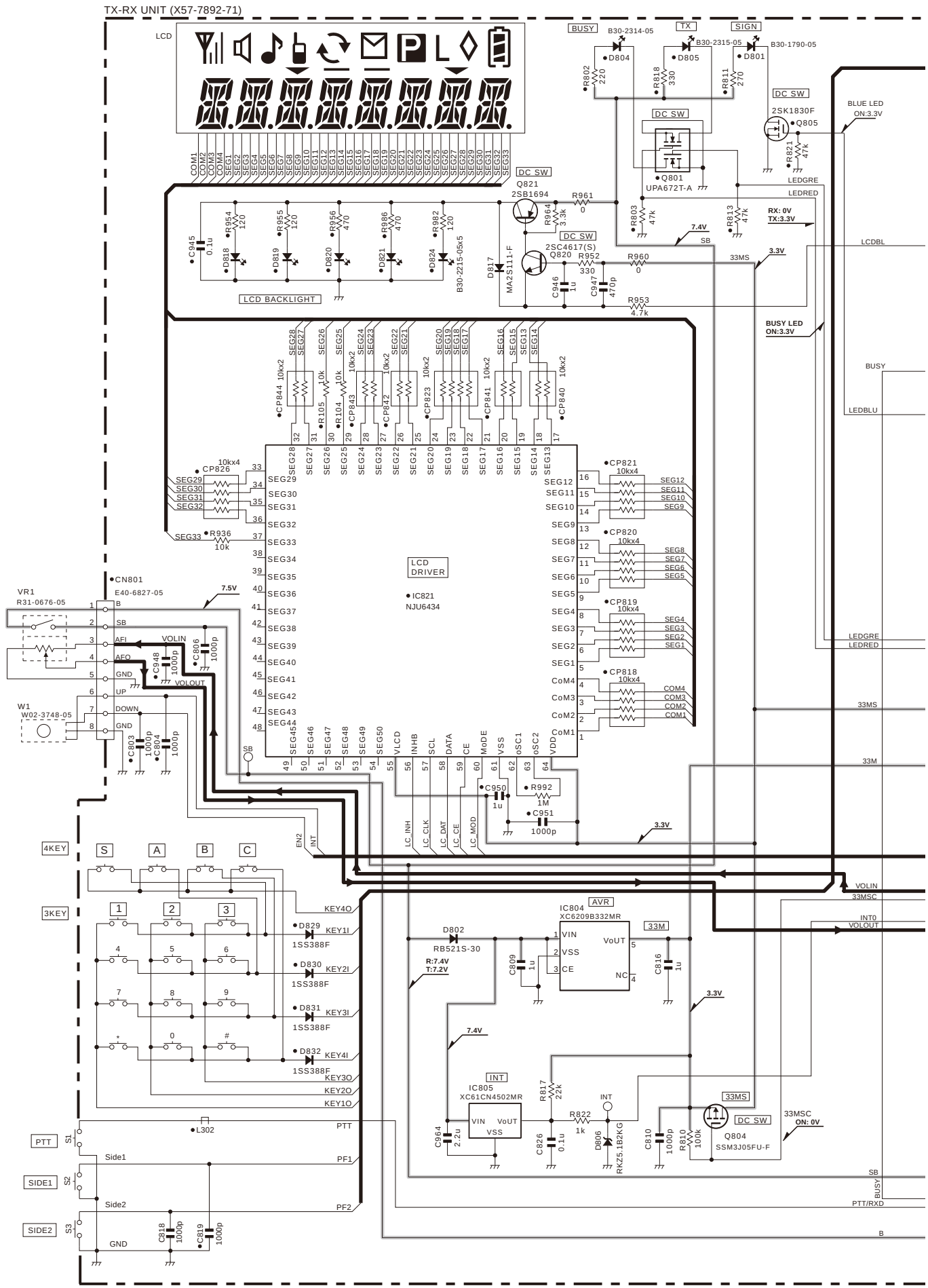
# PC BOARD TK-3312

## TX-RX UNIT (X57-7892-71) Foil side view (J79-0288-19)



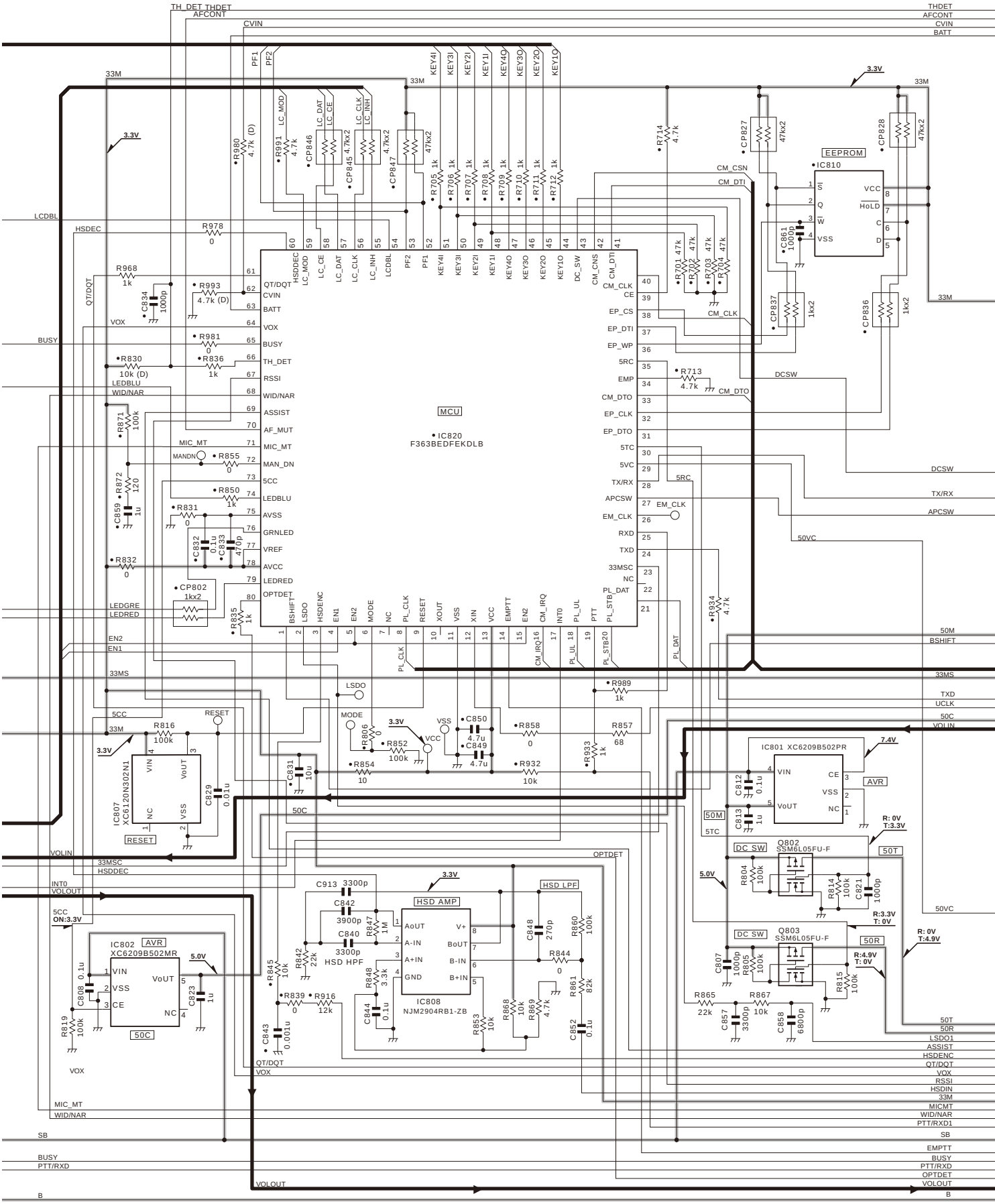

| ss | Ref. No. | Address |
|---|---|---|
| | D806 | 6R |
| | D807 | 9I |
| | D808 | 9I |
| | D809 | 9K |
| | D810 | 10K |
| | D817 | 8R |
| | | |
| | | |
| | | |
| | | |

# TK-3312 SCHEMATIC DIAGRAM



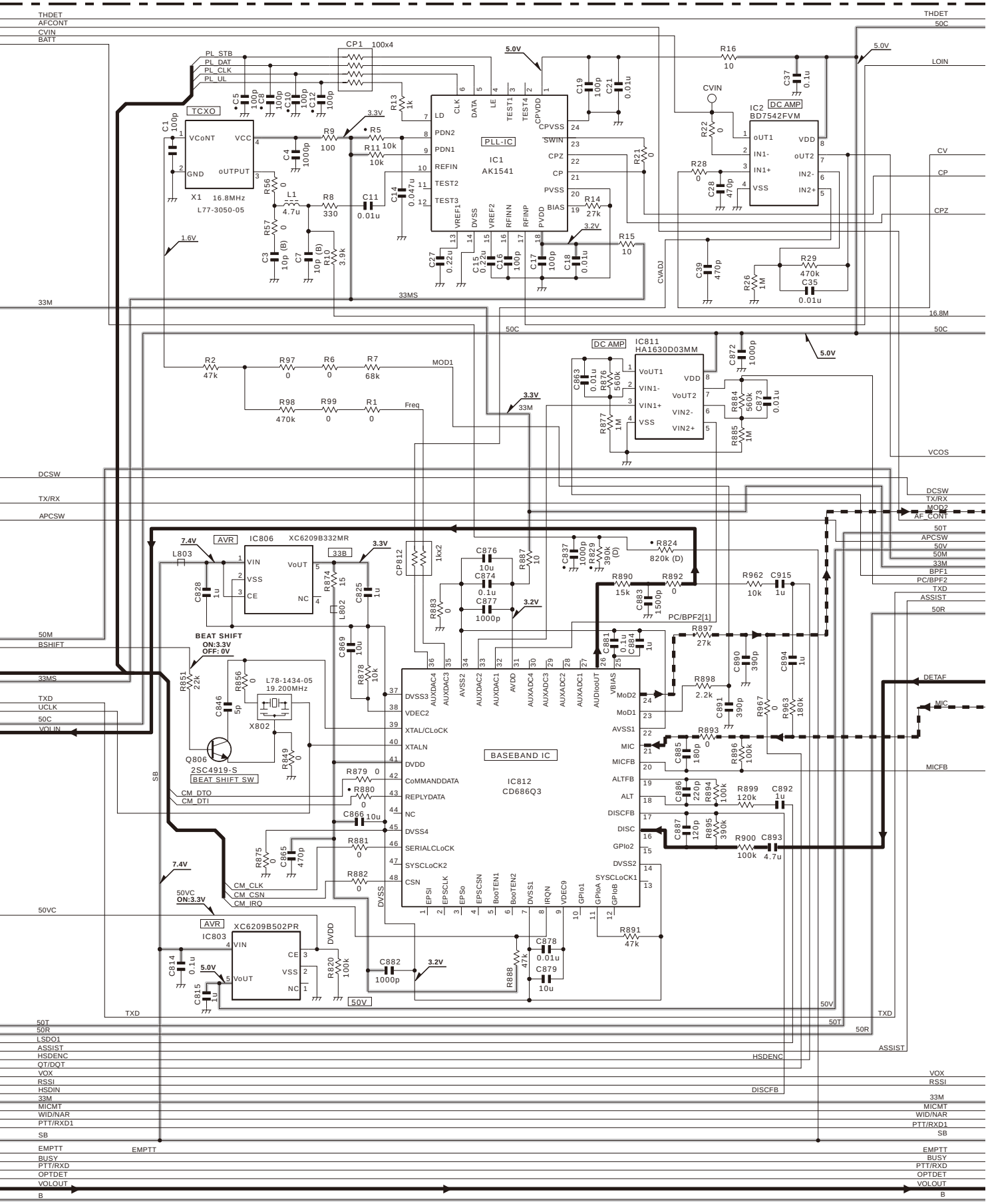
# SCHEMATIC DIAGRAM TK-3312

TX-RX UNIT (X57-7892-71)



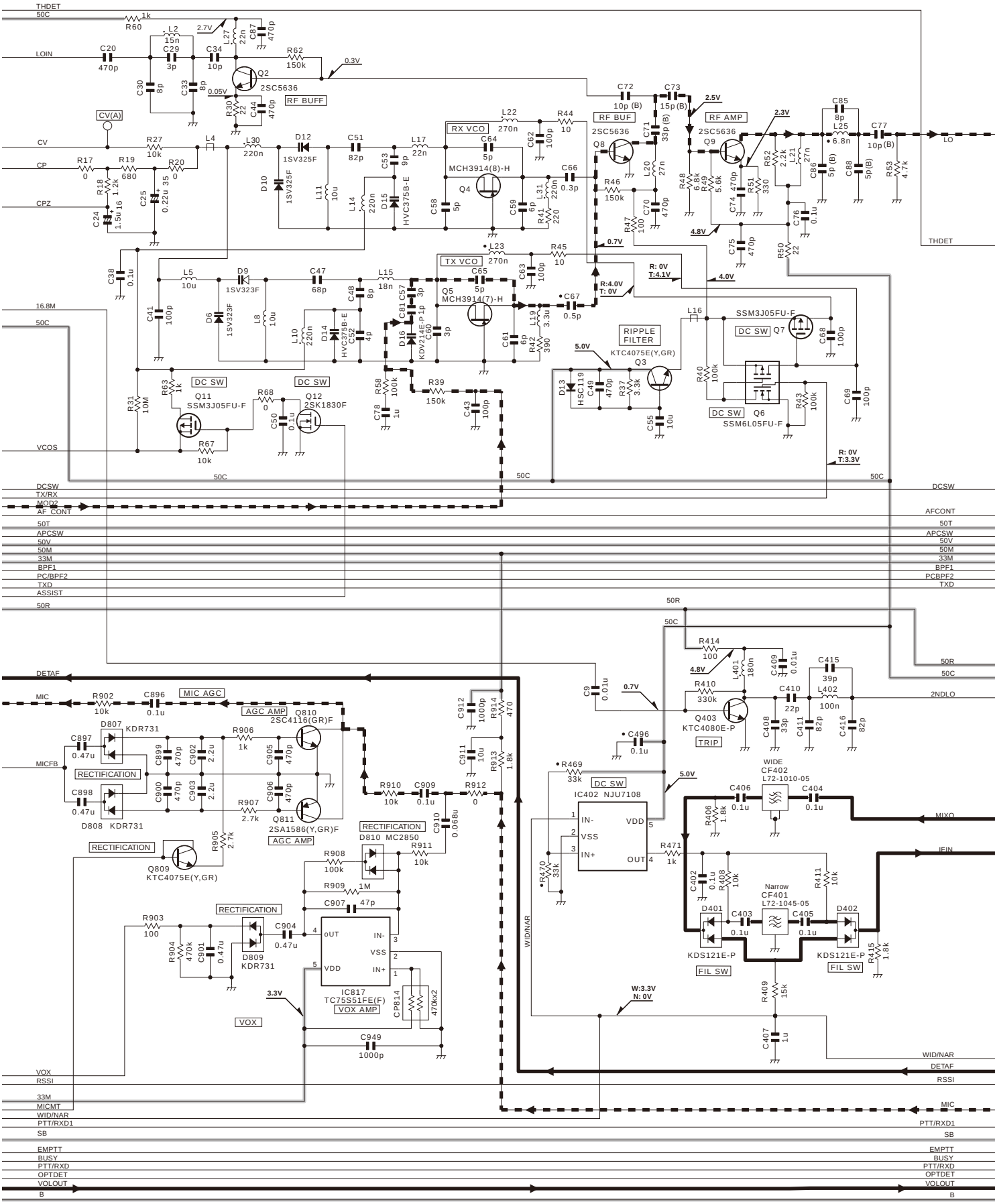
# TK-3312 SCHEMATIC DIAGRAM

TX-RX UNIT (X57-7892-71)



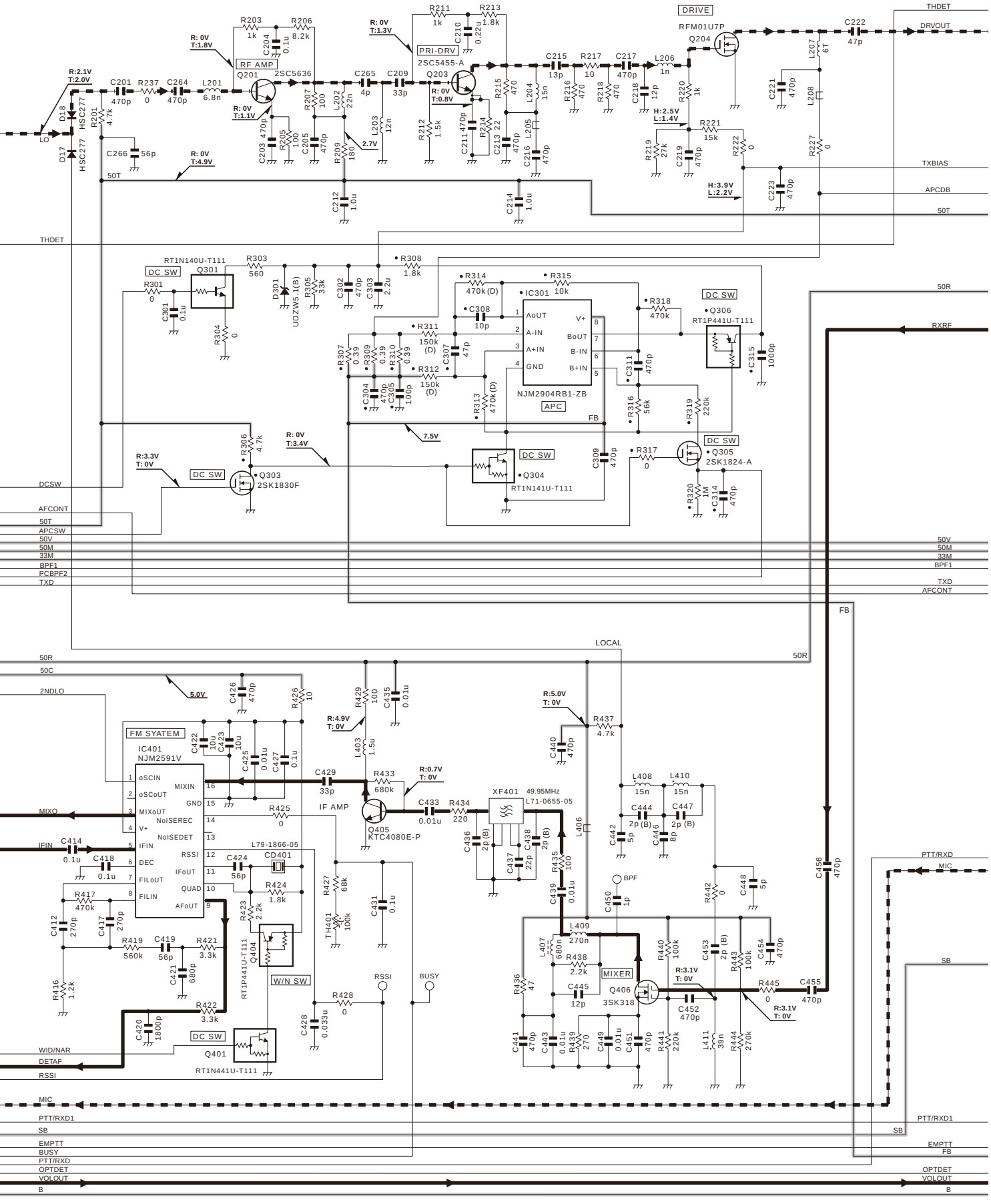
# SCHEMATIC DIAGRAM TK-3312

TX-RX UNIT (X57-7892-71)



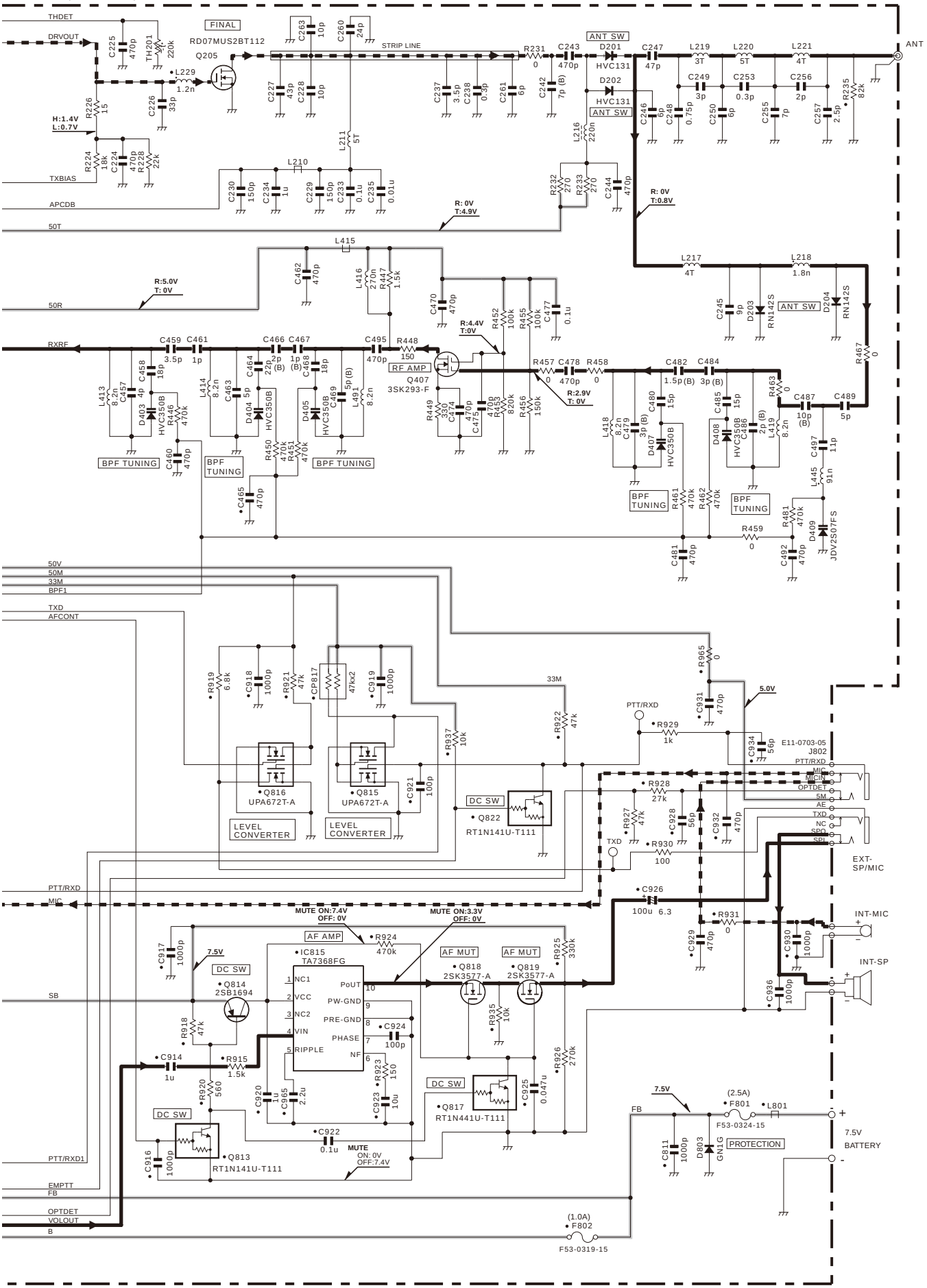
# TK-3312 SCHEMATIC DIAGRAM

TX-RX UNIT (X57-7892-71)



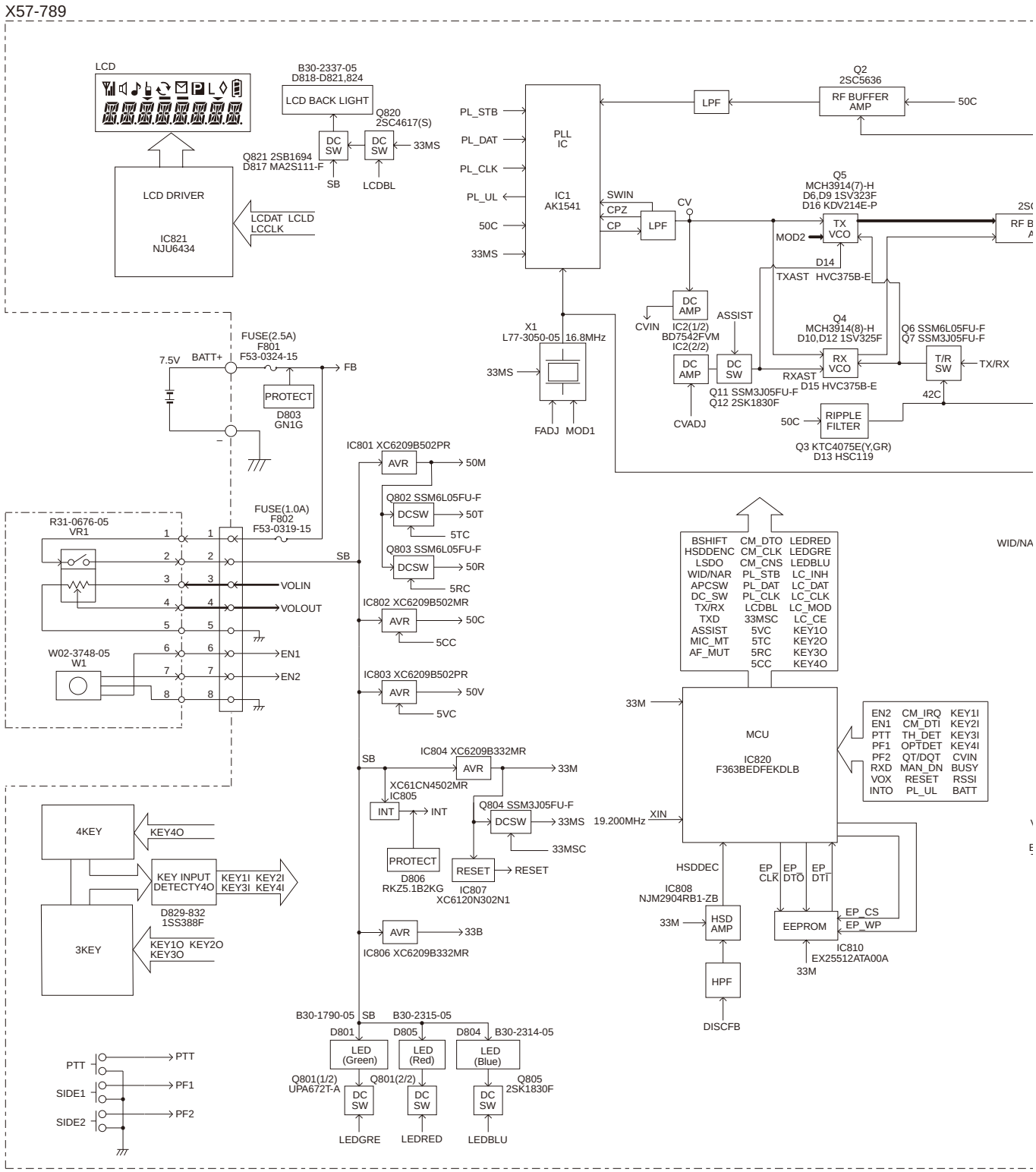
# SCHEMATIC DIAGRAM TK-3312

TX-RX UNIT (X57-7892-71)

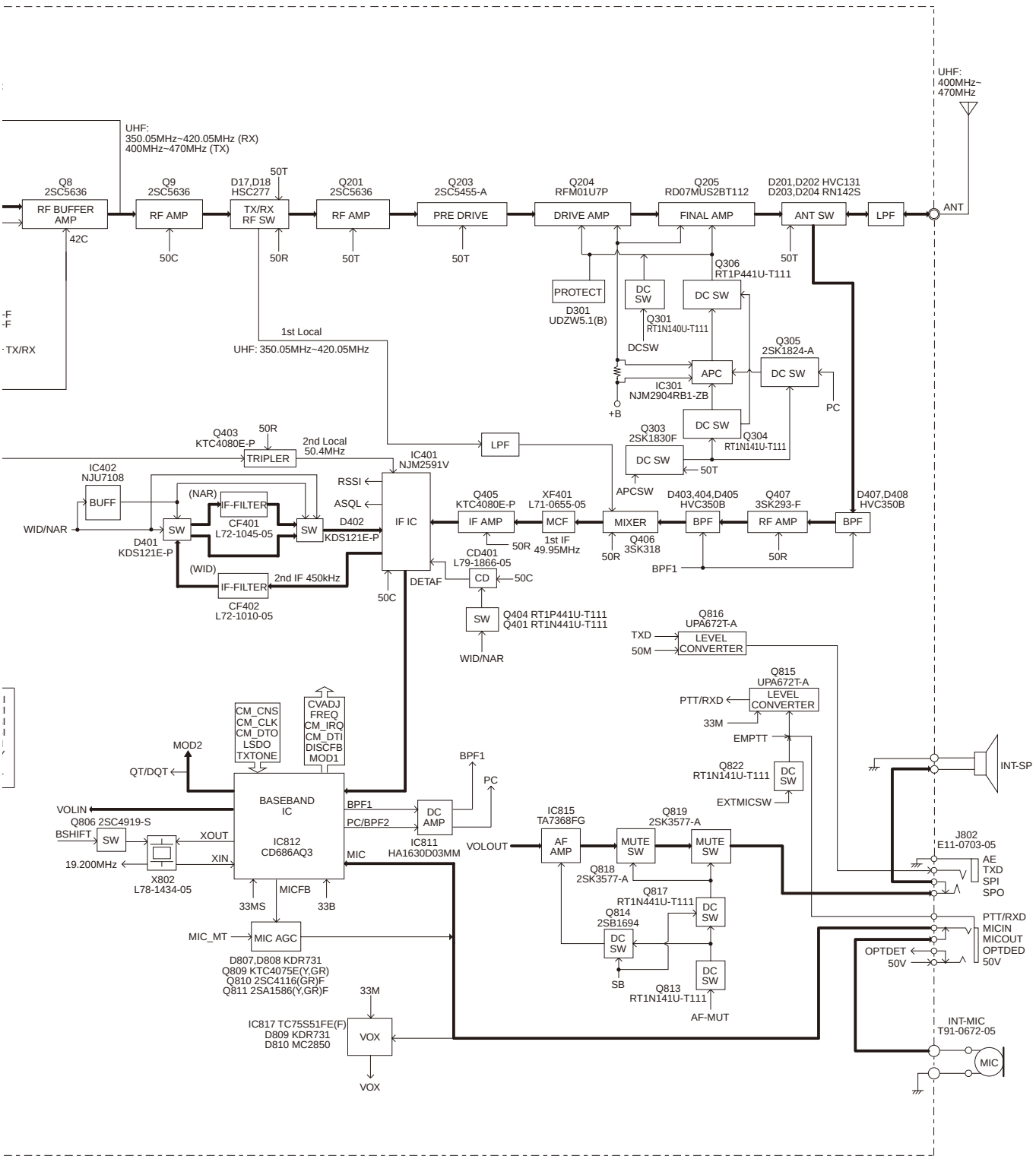



**Note : The components marked with a dot (•) are parts of layer 1.**

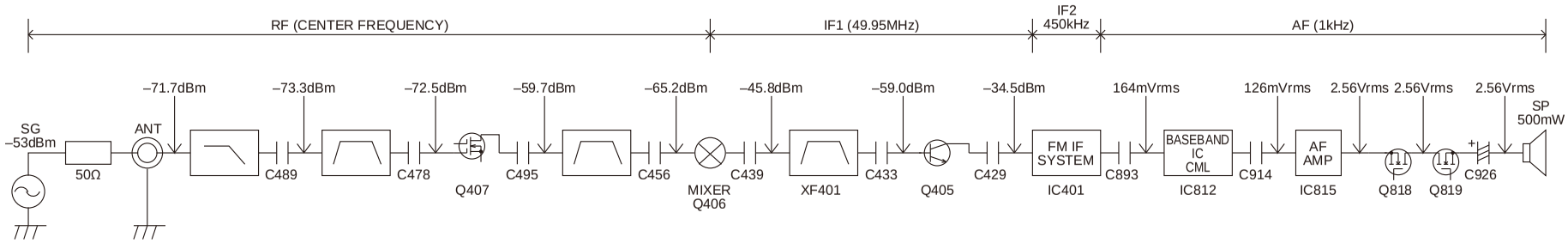
# BLOCK DIAGRAM



# BLOCK DIAGRAM

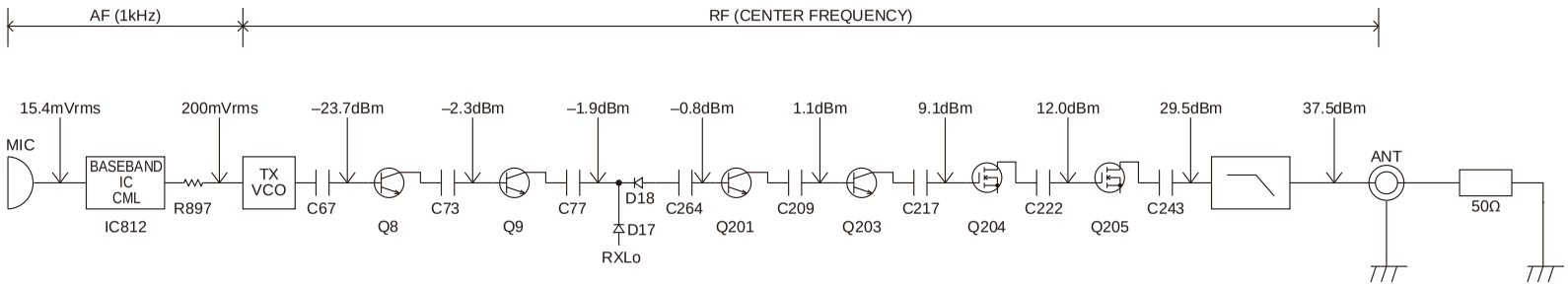


## Receiver Section




To make measurements in the AF section, connect the AC level meter.
(ANT input: –53dBm,1kHz FM, 1.5kHz Dev (Narrow)).
In the RF section, use a high impedance probe. (ANT input: –53dBm, MOD off).

## Transmitter Section




AG is set to the MIC input becomes 1.5kHz Dev, At 1kHz MOD. (Narrow)
To make measurements in the AF section,connect the AC level meter.
In the RF section, use a 1000pF coupling capacitor.

# OPTIONAL ACCESSORIES

## KNB-29N (Ni-MH Battery Pack)

■ **External View**

■ **Specifications**

Voltage.....7.2V (1.2V x 6)
Battery capacity.....1500mAh

## KNB-53N (Ni-MH Battery Pack)

■ **External View**

■ **Specifications**

Voltage.....7.2V (1.2V x 6)
Battery capacity.....1400mAh

## KNB-45L (Li-ion Battery Pack)

■ **External View**

■ **Specifications**

Voltage.....7.4V (3.7V x 2)
Battery capacity.....2000mAh

## KMC-48GPS (GPS Speaker Microphone)

■ **External View**


■ **Specifications**

Operating temperature range .....–30°C ~ +60°C
Microphone impedance ..... 2.2 kΩ (max)
Speaker impedance.....16 Ω ± 15 % at 1.2 kHz

# TK-3312

# SPECIFICATIONS

**GENERAL**

| | |
|---|---|
| Frequency Range | 400~470MHz |
| Number of Channels | 128 |
| Channel Spacing | 25kHz (Wide) 20kHz (Wide 4k) 12.5kHz (Narrow) |
| Operating Voltage | 7.5 V DC±20% |
| Battery Life | More than 12 hours at 5 watts (5-5-90 duty cycle, save off) With KNB-45L battery |
| Operating Temperature Range | –30°C to +60°C |
| Frequency Stability | ±2.5ppm (–30°C to +60°C) |
| Channel Frequency Spread | 70MHz |
| Dimensions and Weight (Dimensions not included) | |
| Radio Only | 54 W x 122 H x 21 D mm 180g |
| With KNB-45L (2000mAh battery) | 54 W x 122 H x 33.7 D mm 300g |

**RECEIVER (Measurements made per EN Standards)**

| | |
|---|---|
| Sensitivity | |
| EIA 12dB SINAD | 0.25µV (Wide/Wide 4k) 0.28µV (Narrow) |
| EN 20dB SINAD | –3dBµV (0.35µV) (Wide/Wide 4k) –2dBµV (0.40µV) (Narrow) |
| Adjacent Channel Selectivity | 70dB (Wide/Wide 4k) 62dB (Narrow) |
| Intermodulation | 67dB |
| Spurious Response Rejection | 70dB |
| Audio Distortion | Less than 5% |
| Audio Output | 500mW at 8Ω |

**TRANSMITTER (Measurements made per EN Standards)**

| | |
|---|---|
| RF Output Power | 5W/1W |
| Spurious Emission | –36dBm ≤ 1GHz –30dBm > 1GHz |
| FM Noise (EIA) | 45dB (Wide/Wide 4k) 40dB (Narrow) |
| Microphone Impedance | 1.8kΩ |
| Modulation Distortion | Less than 3% |
| Modulation | 16K0F3E, 14K0F3E, 14K0F2D, 12K0F2D, 8K50F3E, 7K50F2D |

Analog measurements made per EN standards or TIA/EIA 603 and specifi cations shown are typical.
Kenwood reserves the right to change specifi cations without prior notice or obligation.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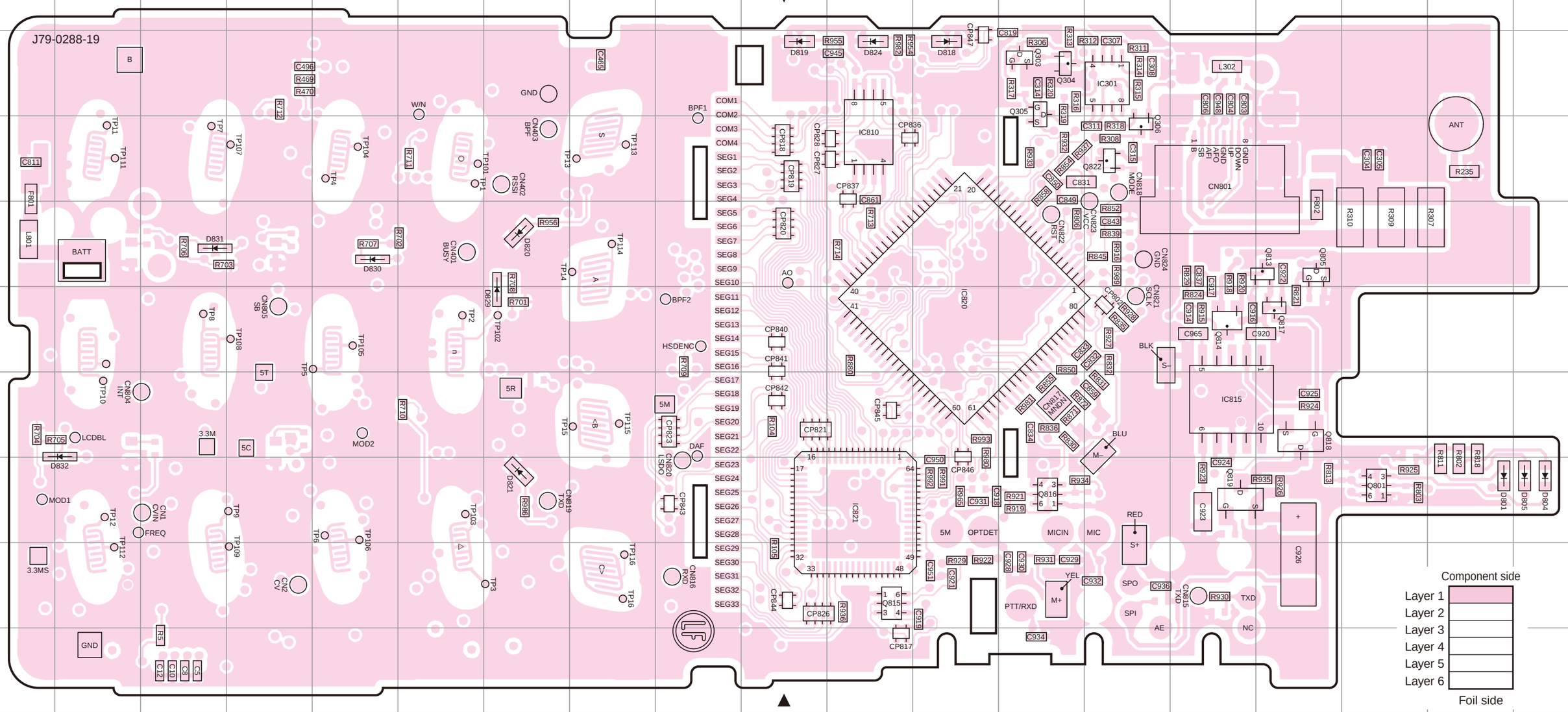
# TK-3312 PC BOARD

PC BOARD TK-3312

## TX-RX UNIT (X57-7892-71) Component side view (J79-0288-19)

TX-RX UNIT (X57-7892-71) Component side view (J79-0288-19)



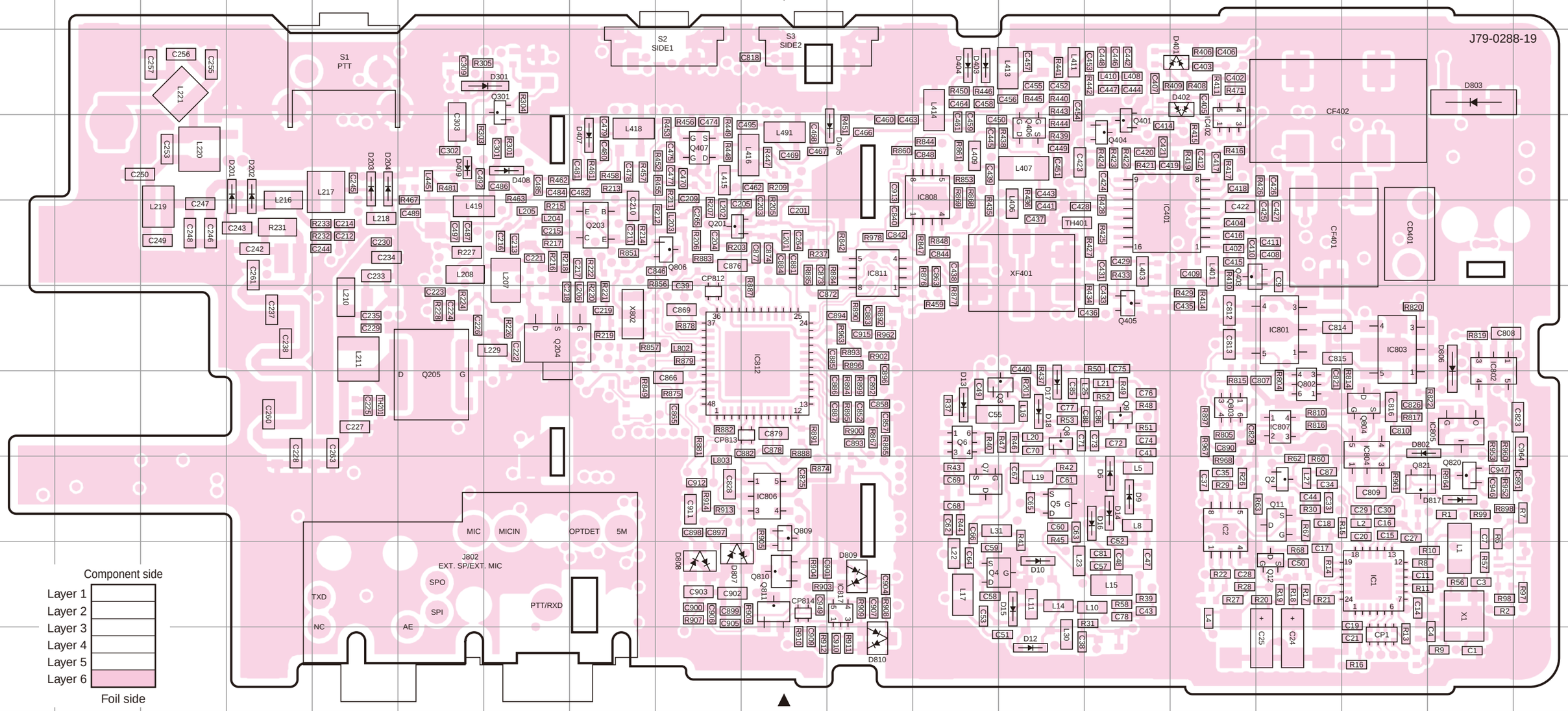

| Ref. No. | Address | Ref. No. | Address | Ref. No. | Address | Ref. No. | Address |
|---|---|---|---|---|---|---|---|
| IC301 | 3N | Q306 | 4N | Q818 | 7P | D820 | 5G |
| IC810 | 4K | Q801 | 8Q | Q819 | 8O | D821 | 8G |
| IC815 | 7O | Q805 | 5P | Q822 | 4N | D824 | 3K |
| IC820 | 6L | Q813 | 5P | D801 | 8R | D829 | 6G |
| IC821 | 8K | Q814 | 6O | D804 | 8S | D830 | 5E |
| Q303 | 3M | Q815 | 9K | D805 | 8S | D831 | 5C |
| Q304 | 3M | Q816 | 8M | D818 | 3L | D832 | 8B |
| Q305 | 3M | Q817 | 6P | D819 | 3J | | |

# TK-3312 PC BOARD

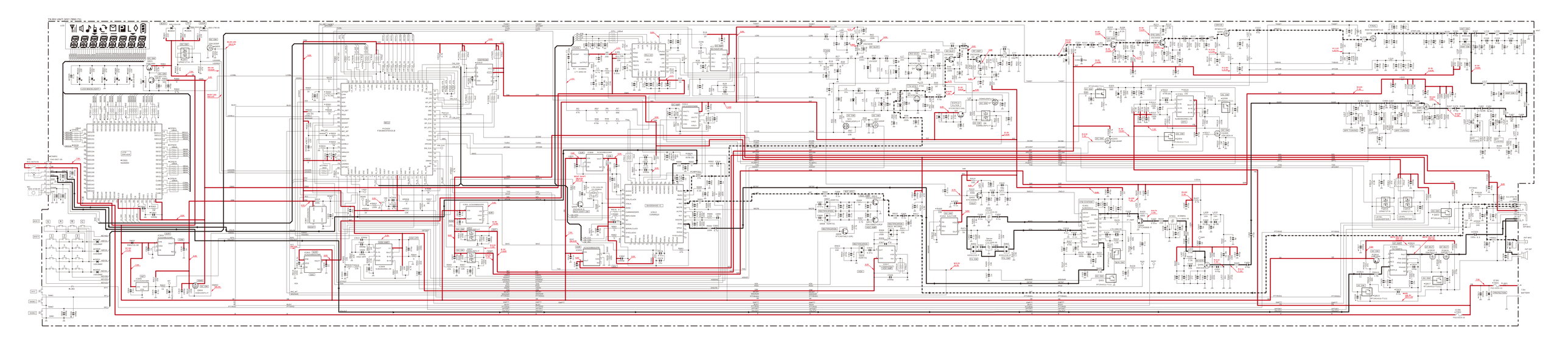
PC BOARD TK-3312

## TX-RX UNIT (X57-7892-71) Foil side view (J79-0288-19)

TX-RX UNIT (X57-7892-71) Foil side view (J79-0288-19)




| Ref. No. | Address | Ref. No. | Address | Ref. No. | Address | Ref. No. | Address | Ref. No. | Address | Ref. No. | Address | Ref. No. | Address | Ref. No. | Address |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| IC1 | 9Q | IC807 | 7P | Q7 | 8L | Q401 | 4N | Q809 | 8J | D14 | 8N | D401 | 3O | D806 | 6R |
| IC2 | 8O | IC808 | 4L | Q8 | 7M | Q403 | 5O | Q810 | 9J | D15 | 9M | D402 | 3O | D807 | 9I |
| IC401 | 5N | IC811 | 5K | Q9 | 7N | Q404 | 4N | Q811 | 9J | D16 | 8N | D403 | 3L | D808 | 9I |
| IC402 | 4O | IC812 | 6J | Q11 | 8P | Q405 | 6N | Q820 | 8R | D17 | 7M | D404 | 3L | D809 | 9K |
| IC801 | 6P | IC817 | 9K | Q12 | 9P | Q406 | 4M | Q821 | 8Q | D18 | 7M | D405 | 4K | D810 | 10K |
| IC802 | 7R | Q2 | 8P | Q201 | 5I | Q407 | 4I | D6 | 8N | D201 | 4D | D407 | 4H | D817 | 8R |
| IC803 | 6Q | Q3 | 7M | Q203 | 5H | Q802 | 7P | D9 | 8N | D202 | 4D | D408 | 4G | | |
| IC804 | 7Q | Q4 | 9L | Q204 | 6G | Q803 | 7O | D10 | 9M | D203 | 4E | D409 | 4F | | |
| IC805 | 7R | Q5 | 8M | Q205 | 7F | Q804 | 7Q | D12 | 10M | D204 | 4E | D802 | 7Q | | |
| IC806 | 8J | Q6 | 7L | Q301 | 3G | Q806 | 5I | D13 | 7L | D301 | 3G | D803 | 3R | | |



X57-789

LCD
LCD DRIVER
IC821
NJU6434
LCDAT LCLD
LCCLK
B30-2337-05
D818-D821,824
LCD BACK LIGHT
Q820
2SC4617(S)
DC SW
DC SW
33MS
Q821 2SB1694
D817 MA2S111-F
SB
LCDBL

PL_STB
PL_DAT
PL_CLK
PL_UL
50C
33MS
PLL IC
IC1
AK1541
SWIN
CPZ
CP
LPF
CV
Q2
2SC5636
RF BUFFER AMP
50C
LPF
Q5
MCH3914(7)-H
D6,D9 1SV323F
D16 KDV214E-P
TX VCO
MOD2
D14
TXAST HVC375B-E
Q8
2SC5636
RF BUFFER AMP
42C
UHF:
350.05MHz~420.05MHz (RX)
400MHz~470MHz (TX)
Q9
2SC5636
RF AMP
50C
D17,D18
HSC277
TX/RX RF SW
50R
50T
Q201
2SC5636
RF AMP
50T
Q203
2SC5455-A
PRE DRIVE
50T
Q204
RFM01U7P
DRIVE AMP
Q205
RD07MUS2BT112
FINAL AMP
D201,D202 HVC131
D203,D204 RN142S
ANT SW
LPF
ANT
UHF:
400MHz~
470MHz

X1
L77-3050-05 16.8MHz
33MS
FADJ MOD1
DC AMP
CVIN
IC2(1/2)
BD7542FVM
IC2(2/2)
ASSIST
DC AMP
DC SW
Q11 SSM3J05FU-F
Q12 2SK1830F
Q4
MCH3914(8)-H
D10,D12 1SV325F
RX VCO
RXAST
D15 HVC375B-E
Q6 SSM6L05FU-F
Q7 SSM3J05FU-F
T/R SW
TX/RX
42C
50C
RIPPLE FILTER
CVADJ
Q3 KTC4075E(Y,GR)
D13 HSC119

1st Local
UHF: 350.05MHz~420.05MHz
PROTECT
D301
UDZW5.1(B)
DC SW
Q301
RT1N140U-T111
DCSW
Q306
RT1P441U-T111
50T
+B
IC301
NJM2904RB1-ZB
APC
Q305
2SK1824-A
DC SW
PC
DC SW
Q303
2SK1830F
Q304
RT1N141U-T111
DC SW
50T
APCSW

FUSE(2.5A)
F801
F53-0324-15
7.5V
BATT+
FB
PROTECT
D803
GN1G
FUSE(1.0A)
F802
F53-0319-15
SB
R31-0676-05
VR1
VOLIN
VOLOUT
W02-3748-05
W1
EN1
EN2

IC801 XC6209B502PR
AVR
50M
Q802 SSM6L05FU-F
DCSW
50T
5TC
Q803 SSM6L05FU-F
DCSW
50R
5RC
IC802 XC6209B502MR
AVR
50C
5CC
IC803 XC6209B502PR
AVR
50V
5VC
IC804 XC6209B332MR
AVR
33M
XC61CN4502MR
IC805
INT
INT
Q804 SSM3J05FU-F
DCSW
33MS
33MSC
PROTECT
D806
RKZ5.1B2KG
RESET
RESET
IC807
XC6120N302N1
AVR
33B
IC806 XC6209B332MR

4KEY
KEY4O
KEY INPUT DETECTY4O
KEY1I KEY2I
KEY3I KEY4I
D829-832
1SS388F
3KEY
KEY1O KEY2O
KEY3O

PTT
SIDE1
SIDE2
PTT
PF1
PF2

B30-1790-05 SB
B30-2315-05
B30-2314-05
D801
D805
D804
LED (Green)
LED (Red)
LED (Blue)
Q801(1/2)
UPA672T-A
Q801(2/2)
Q805
2SK1830F
DC SW
LEDGRE
LEDRED
LEDBLU

| | | |
|---|---|---|
| BSHIFT | CM_DTO | LEDRED |
| HSDDENC | CM_CLK | LEDGRE |
| LSDO | CM_CNS | LEDBLU |
| WID/NAR | PL_STB | LC_INH |
| APCSW | PL_DAT | LC_DAT |
| DC_SW | PL_CLK | LC_CLK |
| TX/RX | LCDBL | LC_MOD |
| TXD | 33MSC | LC_CE |
| ASSIST | 5VC | KEY1O |
| MIC_MT | 5TC | KEY2O |
| AF_MUT | 5RC | KEY3O |
| | 5CC | KEY4O |

33M
MCU
IC820
F363BEDFEKDLB
19.200MHz
XIN
HSDDEC
IC808
NJM2904RB1-ZB
33M
HSD AMP
HPF
DISCFB
EP CLK
EP DTO
EP DTI
EEPROM
IC810
EX25512ATA00A
33M
EP_CS
EP_WP

| | | |
|---|---|---|
| EN2 | CM_IRQ | KEY1I |
| EN1 | CM_DTI | KEY2I |
| PTT | TH_DET | KEY3I |
| PF1 | OPTDET | KEY4I |
| PF2 | QT/DQT | CVIN |
| RXD | MAN_DN | BUSY |
| VOX | RESET | RSSI |
| INTO | PL_UL | BATT |

Q403
KTC4080E-P
50R
TRIPLER
2nd Local
50.4MHz
IC402
NJU7108
BUFF
WID/NAR
(NAR)
IF-FILTER
CF401
L72-1045-05
SW
D401
KDS121E-P
(WID)
IF-FILTER
CF402
L72-1010-05
SW
D402
KDS121E-P
IC401
NJM2591V
RSSI
ASQL
IF IC
DETAF
50C
LPF
Q405
KTC4080E-P
IF AMP
50R
CD401
L79-1866-05
CD
50C
XF401
L71-0655-05
MCF
1st IF
49.95MHz
MIXER
Q406
3SK318
50R
D403,404,D405
HVC350B
BPF
BPF1
Q407
3SK293-F
RF AMP
50R
D407,D408
HVC350B
BPF
SW
Q404 RT1P441U-T111
Q401 RT1N441U-T111
WID/NAR

Q816
UPA672T-A
TXD
50M
LEVEL CONVERTER
Q815
UPA672T-A
PTT/RXD
LEVEL CONVERTER
33M
EMPTT
Q822
RT1N141U-T111
DC SW
EXTMICSW
INT-SP

CM_CNS
CM_CLK
CM_DTO
LSDO
TXTONE
CVADJ
FREQ
CM_IRQ
CM_DTI
DISCFB
MOD1
MOD2
QT/DQT
BASEBAND IC
IC812
CD686AQ3
VOLIN
Q806 2SC4919-S
BSHIFT
SW
19.200MHz
XOUT
XIN
X802
L78-1434-05
33MS
MICFB
33B
MIC_MT
MIC AGC
D807,D808 KDR731
Q809 KTC4075E(Y,GR)
Q810 2SC4116(GR)F
Q811 2SA1586(Y,GR)F
IC817 TC75S51FE(F)
D809 KDR731
D810 MC2850
33M
VOX
VOX
BPF1
PC
BPF1
PC/BPF2
DC AMP
IC811
HA1630D03MM
MIC
VOLOUT
IC815
TA7368FG
AF AMP
Q819
2SK3577-A
MUTE SW
MUTE SW
Q818
2SK3577-A
Q817
RT1N441U-T111
DC SW
Q814
2SB1694
DC SW
DC SW
SB
Q813
RT1N141U-T111
AF-MUT
J802
E11-0703-05
AE
TXD
SPI
SPO
PTT/RXD
MICIN
MICOUT
OPTDED
50V
OPTDET
50V
INT-MIC
T91-0672-05
MIC