UHF FM TRANSCEIVER / UHF FM 手持机

TK-3148

SERVICE MANUAL / 维修手册

KENWOOD

Helical Antenna
(T90-1032-25)

Knob (ENC)
(K29-9134-03)

Knob (VOL)
(K29-9133-03)

Knob (PTT)
(K29-9131-03)

Key top
(SW1,SW2)
(K29-9132-03)

Cabinet assy
(A02-3653-14)

CONTENTS

TK-3148

目录

GENERAL / 概述

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.

PERSONNEL SAFETY

The following precautions are recommended for personnel 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 radio is designed for easy servicing. Refer to the schematic diagrams, printed circuit board views, and alignment procedures contained within.

引言
本手册的范围

本手册是提供给熟悉通信专业并且具有维修经验的技术人员使用的。它包括了维修该设备所需要的全部资料和现行出版日期。在出版后如果发生变动、则根据需要使用《维修通报》或《手册修订本》进行补充。

替换零件的订购

当订购替换零件或设备资料时、应注明完整的零件识别号码。所有的零件均有识别号码：元件、组件或机壳。如果不知道零件的号码、为了正确地识别、必须注明此元件所属的机壳或组件的号码、并对元件进行充分的说明。
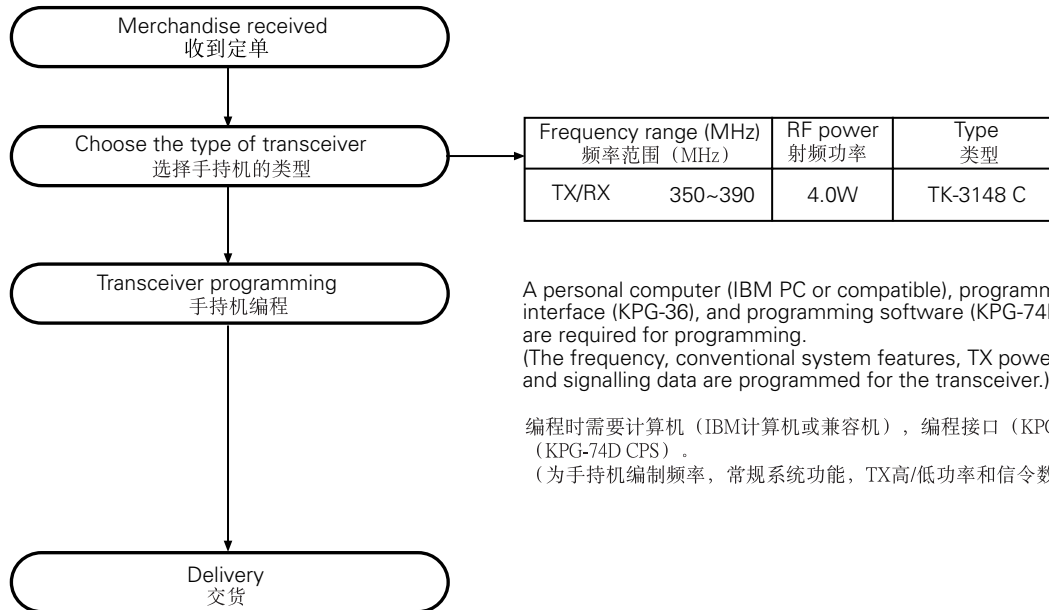
个人安全

为了个人的安全、请注意下列事项：

- 在没有认真核实所有射频插头之前或有任何一个打开的插头没有连接到相应端子上的情况下、均不要发射。
- 在电爆管附近或在易燃性气体环境中、必须关掉电源、不要操作本设备。
- 本设备只应该由有资格的技术人员来维修。

维修服务

为了便于维修本设备、建立了完整的维修服务体系、提供了包括原理图、印刷线路板图和调整步骤在内的资料供参考。

SYSTEM SET-UP / 系统体系

SYSTEM SET-UP / 系统体系

```
┌─────────────────────────┐
│  Merchandise received    │
│       收到定单           │
└─────────────────────────┘
            │
            ▼
┌─────────────────────────┐
│ Choose the type of       │────────────▶
│ transceiver              │
│   选择手持机的类型       │
└─────────────────────────┘
            │
            ▼
┌─────────────────────────┐
│ Transceiver programming  │
│      手持机编程          │
└─────────────────────────┘
            │
            ▼
┌─────────────────────────┐
│      Delivery            │
│       交货               │
└─────────────────────────┘
```

Frequency range (MHz) 频率范围（MHz）		RF power 射频功率	Type 类型
TX/RX	350~390	4.0W	TK-3148 C

A personal computer (IBM PC or compatible), programming interface (KPG-36), and programming software (KPG-74D CPS) are required for programming.
(The frequency, conventional system features, TX power HI/LOW, and signalling data are programmed for the transceiver.)

编程时需要计算机（IBM计算机或兼容机），编程接口（KPG-36）和编程软件（KPG-74D CPS）。
（为手持机编制频率，常规系统功能，TX高/低功率和信令数据。）

TK-3148

OPERATING FEATURES / 操作特性

1. Operation Features

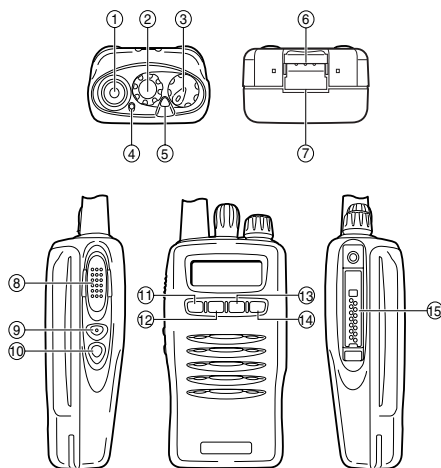The TK-3148 is a UHF FM Radio designed in both Trunking Mode and Conventional Mode.

2. Transceiver Controls and Indicators
2-1. Physical Layout

2-2. Panel controls

The key on the top and front panel is momentary-type push buttons. The functions of these keys and knob are explained below.

① **Antenna connector**
   Connect the antenna here.

② **Rotary encoder**

③ **POWER switch/ VOLUME control**
   Turn clockwise to switch ON the transceiver. Rotate to adjust the volume. Turn counterclockwise fully to switch OFF the transceiver.

④ **Transmit/ Receive indicator**

⑤ **Auxiliary (orange) key**

⑥ **Battery pack safety catch**
   Flip this catch to prevent accidentally pressing the battery pack release latch.

⑦ **Battery pack release latch**
   Pull back on this latch to release the battery pack.

⑧ **PTT (Push-To-Talk) switch**

⑨ **Side 1 key**

⑩ **Side 2 key**

⑪ **S key**

⑫ **A key**

⑬ **◄ B key**

⑭ **C ► key**

⑮ **Universal connector**
   Connect the speaker/ microphone here. Otherwise, keep the supplied cover in place.

1. 操作特性

TK-3148 是具有集群和常规双模式的 UHF 调频手持机。

2. 手持机的控制和指示
2-1. 主机外形

2-2. 控制面板

顶部和前面板上的键是触发式按键。有关这些键和旋钮的功能说明如下。

① 天线连接器
   在这里连接天线。

② 旋转编码器

③ 电源开关/音量控制器
   顺时针旋转可接通对讲机电源。旋转调整音量。逆时针旋转到底可切断对讲机电源。

④ 发射/接收指示灯

⑤ 辅助 (橙黄色) 键

⑥ 电池组保险钩
   扳上这个保险钩以防止意外按下电池组释放栓。

⑦ 电池组释放闩锁
   按下闩锁可取下电池组。

⑧ PTT (按讲) 开关

⑨ 侧面 1 键

⑩ 侧面 2 键

⑪ S 键

⑫ A 键

⑬ ◄ B 键

⑭ C ► 键

⑮ 通用接口
   在这里连接扬声器/麦克风，否则应把附带的盖板盖上。

OPERATING FEATURES / 操作特性

2-3. Key functions
Trunking mode

② **Rotary encoder**
Rotate this encoder to select your desired call address (voice calls/dialing) or status (status calls).

④ **Transmit indicator**
Lights red while transmitting.

⑤ **Auxiliary (orange) key** (default setting: **None**)
Press to activate its auxiliary function.

⑧ **PTT (Push-To-Talk) switch**
Press to transmit. Also press to initiate a call if "PTT to Initiate Call" has been programmed.

⑨ **Side 1 key** (default setting: **Clear**)
Press to activate its auxiliary function.

⑩ **Side 2 key** (default setting: **Call**)
Press to activate its auxiliary function.

⑪ **S key** (default setting: **Status/ Stack**)
Press to activate its auxiliary function.

⑫ **A key** (default setting: **Function Menu**)
Press to activate its auxiliary function.

⑬ **◄ B key** (default setting: **Conventional**)
Press to activate its auxiliary function. Also press to scroll left while viewing stack entries.

⑭ **C ► key** (default setting: **Scan**)
Press to activate its auxiliary function. Also press to scroll right while viewing stack entries.

Conventional mode

② **Rotary encoder**
Rotate this encoder to select your desired channel.

④ **Transmit/ Receive indicator**
Lights green while receiving a signal. Lights red while transmitting.

⑧ **PTT (Push-To-Talk) switch**
Press this switch, then speak into the microphone to call a station.

⑨ **Side 1 key**
Press to return to Trunking mode.

⑩ **Side 2 key**
Press to turn the monitor function ON in order to monitor your selected channel.

⑪ **S key**
Press to turn the display and keypad backlight ON. The backlight remains ON for 5 seconds.

⑫ **A key**
Press to add/delete channel(s) to/from Scan list.

⑭ **C ► key**
Press to turn Scan ON (or OFF).

2-3.键功能
集群模式

② 旋转编码器
旋转本编码器选择您所需要呼叫的地址 (语音呼叫/拨号) 或者状态代码 (用于状态呼叫)。

④ 发射指示灯
在发射中点亮红色。

⑤ 辅助 (橙黄色) 键 (初始设定: 无)
按下可开启该辅助功能 。

⑧ PTT (按讲) 开关
按下可发射。当编程了"按 PTT 开始呼叫"后，也可按下开始呼叫。

⑨ 侧面 1 键 (初始设定: 清除)
按下可开启该功能。

⑩ 侧面 2 键 (初始设定: 呼叫)
按下可开启该功能。

⑪ S 键 (初始设定: 状态/堆栈)
按下可开启该功能。

⑫ A 键 (初始设定: 功能选单)
按下可开启该功能。

⑬ ◀B 键 (初始设定: 常规)
按下可开启该功能。当观察堆栈条目时，按下可向左侧滚动。

⑭ C▶ 键 (初始设定: 扫描)
按下可开启该功能。当观察堆栈条目时，按下可向右侧滚动。

常规模式

② 旋转编码器
旋转本编码器选择您所需要的信道。

④ 接收指示灯
在接收信号时点亮绿色。在发射中点亮红色。

⑧ PTT (按讲) 开关
按下该开关，然后对着麦克风讲话呼叫其他电台。

⑨ 侧面 1 键
按下可恢复到集群模式。

⑩ 侧面 2 键
按下可接通监听功能来监听您所选择的信道。

⑪ S 键
按下可开启显示屏和键盘背景照明。背景照明将保持 5 秒钟。

⑫ A 键
按此键可向扫描序列中添加信道或从扫描序列中删除信道。

⑭ C▶ 键
按下可启动扫描 (或者停止扫描)。

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REALIGNMENT / 模式组合

2-4. Display / 显示
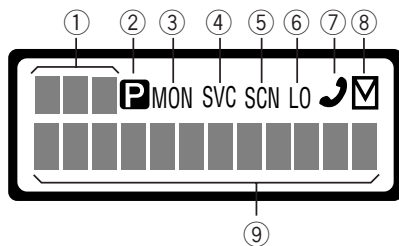
① **Sub display**

▉▉▉ displays the strength of received signals.

② **Programming indicator**

🅿 appears while in AUX A is being activated.

③ **MON (Monitor) indicator**

MON appears while you are monitoring a channel by pressing the **Side 2** key. (Conventional Mode only)

④ **SVC (Service) indicator**

SVC appears when a control channel is found. It flashes while the transceiver is searching for a control channel.

⑤ **SCN (Scan) indicator**

SCN appears while you are scanning.

⑥ **LO indicator**

This icon blinks while in battery warning, if "Always" or "Always W/beep" is selected in the battery warning settings.

⑦ **Handset indicator**

📞 flashes when you activate call diversion.

⑧ **MAIL indicator**

✉ appears while there is data in the stack. It flashes when there is new data in the stack.

⑨ **Alphanumeric display**

▉▉▉▉▉▉▉▉▉▉ displays call addresses, the call duration timer, data messages, and the current operating status of the transceiver.

① 子显示字段

▉▉▉显示接收到信号的强度。

② 显示图标

当 AUX A 被激活时显示🅿。

③ MON（监听）指示

当用户按下侧面 2 键监听某一信道时显示"MON"。（只适用于常规模式）

④ SVC（服务）指示

当找到一个控制信道时显示"SVC"。当手持机正在搜索控制信道时，此图标闪烁。

⑤ SCN（扫描）指示

当用户正在扫描时显示"SCN"。

⑥ LO 指示

如果在电池电压告警设定中选择"连续"或"连续并有提示音"，则电池电压不足时，此图标闪烁。

⑦ 呼叫转移指示

当手持机处于转移状态时，此📞闪烁。

⑧ 信箱指示

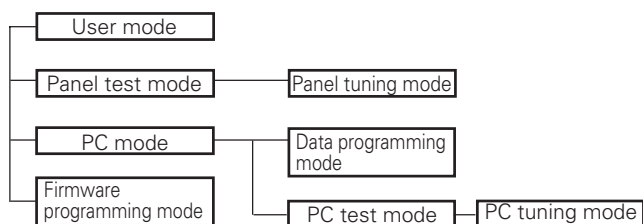当存储器堆栈中有接收信息时显示✉。当存储栈中有新信息时，此图标闪烁。

⑨ 字母数字显示字段

▉▉▉▉▉▉▉▉▉▉显示呼叫地址，呼叫过程计时器，数据信息以及手持机当前的操作状态等。

REALIGNMENT

1. Modes

模式组合

1. 模式
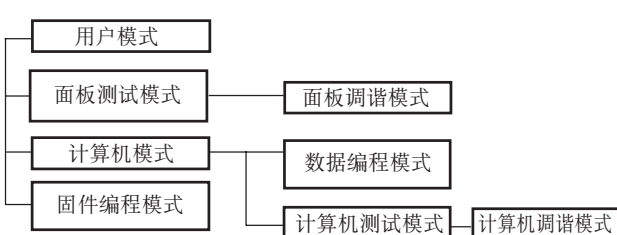
REALIGNMENT / 模式组合

Mode	Function
User mode	For normal use.
Panel test mode	Used by the dealer to check the fundamental characteristics.
Panel tuning mode	Used by the dealer to tune the radio.
PC mode	Used for communication between the radio and PC (IBM compatible).
Data program-ming mode	Used to read and write frequency data and other features to and from the radio.
PC test mode	Used to check the radio using the PC. This feature is included in the FPU. See panel tuning.
Firmware program-ming mode	Used when changing the main program of the flash memory.

模式	功能
用户模式	一般用户使用。
面板测试模式	用于经销商检查基本功能。
面板调谐模式	用于经销商调整手持机指标。
计算机模式	用于手持机与计算机（IBM 兼容机）之间的通信。
数据编程模式	用于读出和写入频率数据以及其他功能。
计算机测试模式	用于使用计算机检测。此特性包括在 FPU 内。参见面板调谐。
固件编程模式	当更新闪速存储器中的主程序时使用。

2. How to Enter Each Mode

Mode	Operation
User mode	Power ON
Panel test mode	[A]+Power ON
PC mode	Received commands from PC
Panel tuning mode	[Panel test mode]+[S]
Firmware programming mode	[S]+Power ON

2. 如何进入每一种模式

模式	操作
用户模式	接通电源
面板测试模式	[A]＋接通电源
计算机模式	从计算机接收指令
面板调谐模式	[面板测试模式]＋[S]
固件编程模式	[S]＋通电

3. Panel Test Mode

Setting method refer to ADJUSTMENT.

4. Panel Tuning Mode

Setting method refer to ADJUSTMENT.

5. PC Mode

5-1. Preface

The TK-3148 transceiver is programmed by using a personal computer, programming interface (KPG-36) and programming software (KPG-74D CPS).

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

5-2. Connection procedure

1. Connect the TK-3148 to the personal computer with the interface cable.
2. When the POWER switch on, user mode can be entered immediately. When PC sends command the radio enter PC mode, and "PROGRAM" is displayed on the LCD.
   When data transmitting from transceiver, the red LED is blinking.
   When data receiving to transceiver, the green LED is blinking.

Notes:
- The data stored in the personal computer must match model type, when it is written into the flash memory.
- Change the TK-3148 to PC mode, then attach the interface cable.

3. 面板测试模式

设定方式，参见调整。

4. 面板调谐模式

设定方式，参见调整。

5. 计算机模式

5-1．前言

TK-3148 手持机使用计算机，编程电缆（KPG-36）和编程软件（KPG-74D CPS）进行编程。

IBM 计算机或兼容机可以使用编程软件。图 1 显示 IBM 计算机编程的设置。

5-2．连接步骤

1. 使用编程电缆将 TK-3148 与计算机连接。

2. 当接通电源时，立即进入用户模式。当 PC 机发出指令使手持机进入 PC 机模式时，"PROGRAM"出现在显示器上。
   当手持机发送数据时，红色指示灯闪动。
   当手持机接收数据时，绿色指示灯闪动。

注释：
- 储存在计算机内的数据必须与写入到闪速存储器的格式相匹配。
- 将 TK-3148 改变为计算机编程模式，然后连接编程电缆。

TK-3148

REALIGNMENT / 模式组合

5-3. KPG-36 description
(PC programming interface cable: Option)

The KPG-36 is required to interface the TK-3148 to the computer. It has a circuit in its D-subconnector (25-pin) case that converts the RS-232C logic level to the TTL level.

The KPG-36 connects the universal connector of the TK-3148 to the computers RS-232C serial port.

5-4. Programming software KPG-74D CPS Description

The KPG-74D CPS is the programming software for the transceiver supplied on three 3.5" floppy disks. This software runs under MS-Windows 98/Me/2000/XP on an IBM-PC or compatible machine.

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

We recommend that install the KPG-74D CPS for example to hard disk first then use it.

5-5. Programming with IBM PC

If data is transferred to the transceiver from an IBM PC with the KPG-74D CPS, the destination data (basic radio information) for each set can be modified. Normally, it is not necessary to modify the destination data because their values are determined automatically when the frequency range (frequency type) is set.

The values should be modified only if necessary. Data can be programmed into the flash memory in RS-232C format via the universal connector.

5-3．KPG-36 说明
（PC 机编程接口电缆：选件）

TK-3148 需要通过 KPG-36 接口电缆与电脑连接。此接口电缆的 D 型连接器（25 芯）中有一个将 RS-232C 逻辑电平转换为 TTL 电平的电路。

KPG-36 将 TK-3148 的通用接口连接到电脑的 RS-232C 串口上。

5-4．编程软件 KPG-74D CPS 说明

KPG-74D CPS 是手持机的编程软件，共 3 张 3.5" 软盘。此软件的运行环境为 IBM-PC 机或兼容机的 MS-Windows 98/Me/2000/XP。

数据可以被写入到手持机或从手持机中读取数据，并且能在屏幕上进行编辑。已被编程或编辑的数据可以打印出来。也可以调整手持机的指标。

建议用户在使用之前将 KPG-74D CPS 安装到硬盘上。

5-5．使用 IBM 计算机编程

如果从使用 KPG-74D CPS 软件的 IBM 计算机将数据发送到手持机，设定的通信机型号数据（通信机的基本信息）均可被修改。由于设定频率范围（频率类型）时、型号数据就已被确定了，所以一般不需要修改型号数据。

只有在必要的情况下才修改型号数据。

RS-232C 格式的数据经由通用接口输入到通信机的闪速存储器中。

IBM-PC / IBM计算机   KPG-36

KPG-74D CPS
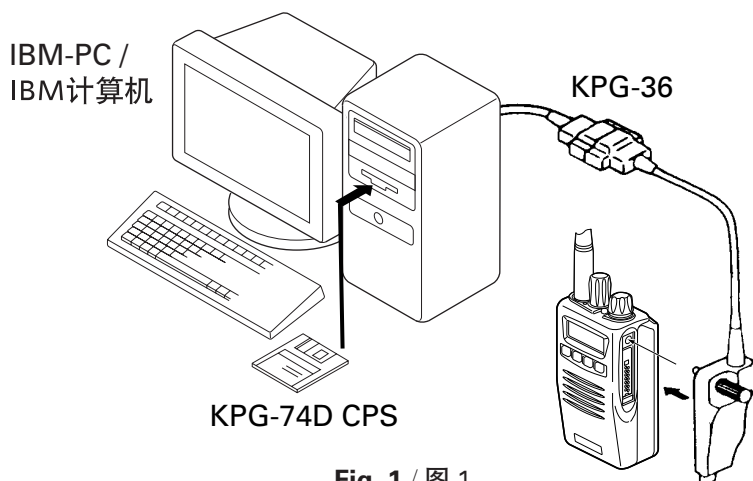
Fig. 1 / 图 1

6. Firmware Programming Mode
6-1. Preface

Flash memory is mounted on the TK-3148. This allows the TK-3148 to be upgraded when new features are released in the future. (For details on how to obtain the firmware, contact Customer Service.)

6-2. Connection procedure

Connect the TK-3148 to the personal computer (IBM PC or compatible) with the interface cable (KPG-36). (Connection is the same as in the PC Mode.)

6. 固件编程模式
6-1．前言

Flash Rom 被安装在 TK-3148 上。当将来出现新功能时，允许 TK-3148 升级。（要了解如何获得固件的详细情况，请与供应商联系。）

6-2．连接步骤

使用编程电缆（KPG-36）将 TK-3148 与计算机（IBM 计算机或兼容机）连接。（与计算机编程模式中的连接方法一样。）

REALIGNMENT / 模式组合

6-3. Programming

1. Start up the firmware programming software (Fpro.exe).
2. Set the communications speed (normally, 57600 bps) and communications port in the configuration item.
3. Set the firmware to be updated by File name item.
4. Turn the TK-3148 power ON with the [S] switch held down. When "PROG 57600" appears, release your finger from the [S] switch.
5. Check the connection between the TK-3148 and the personal computer, and make sure that the TK-3148 is in the Program mode.
6. Press write button in the window. A window opens on the display to indicate progress of writing. When the TK-3148 starts to receive data. the [P] icon is blinking.
7. If writing ends successfully. the LED on the TK-3148 lights and the checksum is displayed.
8. If you want to continue programming other TK-3148 s, repeat steps 4 to 7.

Notes:

● This mode cannot be entered if the Firmware Programming mode is set to Disable in the Programming software (KPG-74D CPS).

● When programming the firmware, it is recommend to copy the data from the floppy disk to your hard disk before update the radio firmware.
Directry copying from the floppy disk to the radio may not work because the access speed is too slow.

6-4. Function

1. If you press the [Side 1] switch (top of left side) while "PROG 57600" is displayed, the check-sum is displayed. If you press the [Side 1] switch again while the check-sum is displayed, "PROG 57600" is redisplayed.
2. If you press the [Side 2] switch (bottom of left side) while "PROG 57600" is displayed, the display changes to "PROG 19200" to indicate that the write speed is low speed (19200 bps). If you press the [Side 2] switch again while "PROG 19200" is displayed, the display changes to "PROG 38400", and the write speed becomes the middle-speed mode (38400 bps). If you press the [Side 2] switch again while "PROG 38400" is displayed, the display returns to "PROG 57600".

Note:

Normally, write in the high-speed mode.

6-3．编程

1. 启动固件编程程序（FPRO.exe）。
2. 在配置项中设定通信速率（通常为57600bps）和通信端口。
3. 在文件名称项中选定新固件的文件名。
4. 按住[S]键并接通TK-3148的电源。当"PROG57600"出现时，松开[S]键。
5. 检查TK-3148与个人电脑之间的连接是否正确，并且确认TK-3148是否处于编程模式。
6. 点击计算机程序上的写入按钮。屏幕上开启一个窗口显示写入的进程。当TK-3148开始接收数据时,[P]图标开始闪动。
7. 写入完成后，TK-3148上的指示灯发光，并且显示校验码。
8. 如果用户需要继续编程其他的TK-3148，重复步骤4到7。

注释：

● 如果在编程软件（KPG-74D CPS）中固件编程模式设定为禁用，则不能进入此模式。

● 当进行固件编程时，在用户更新通信机固件之前，建议从软盘向硬盘复制数据。
由于读取速率太低，所以直接从软盘复制到通信机可能无效。

6-4．功能

1. 当显示"PROG57600"时，如果用户按下侧面1键（位于左侧的顶部），则显示check-sum。如果显示check-sum时再次按下侧面1键，则显示"PROG57600"。
2. 当显示"PROG57600"时，如果用户按下侧面2键（位于左侧的底部），则显示变为"PROG19200"，表示写入速率为低速（19200bps）。当显示"PROG19200"时，如果用户再次按下侧面2键，则显示变为"PROG38400"，表示写入速率为中速（38400bps）。当显示"PROG38400"时，如果用户再次按下侧面2键，则显示返回到"PROG57600"。

注释：
通常在高速率模式中写入。

TK-3148

CIRCUIT DESCRIPTION / 电路说明

1. Overview

This transceiver is UHF/FM portable transceiver designed to operate in the frequency range of 350 to 390MHz (C).

2. Circuit Configuration by Frequency

The receiver is a double-conversion superheterodyne with a first intermediate frequency (IF) of 44.85MHz and a second IF of 455kHz. Incoming signals from the antenna are mixed with the local signal from the PLL to produce the first IF of 44.85MHz.

This is then mixed with the 44.395MHz second local oscillator output to produce the 455kHz second IF. This is detected to give the demodulated signal.

The transmit signal frequency is generated by the PLL VCO, and modulated by the signal from the microphone. It is then amplified and sent to the antenna.

1．综述

本手持机是在350到390MHz（C）的频率范围内工作的UHF/FM手持式设备。

2．电路的频率构成

接收部采用44.85MHz的第一中频和455kHz的第二中频的二次变频超外差方式。通过天线接收到的信号与来自于锁相环电路的本振信号混频生成44.85MHz的第一中频。

然后与44.395MHz的第二本振信号混频生成455kHz的第二中频。此频率被检测并产生解调信号。

锁相环压控振荡器生成发射信号频率，并且被来自于麦克风的信号调制。然后被放大并发送到天线。
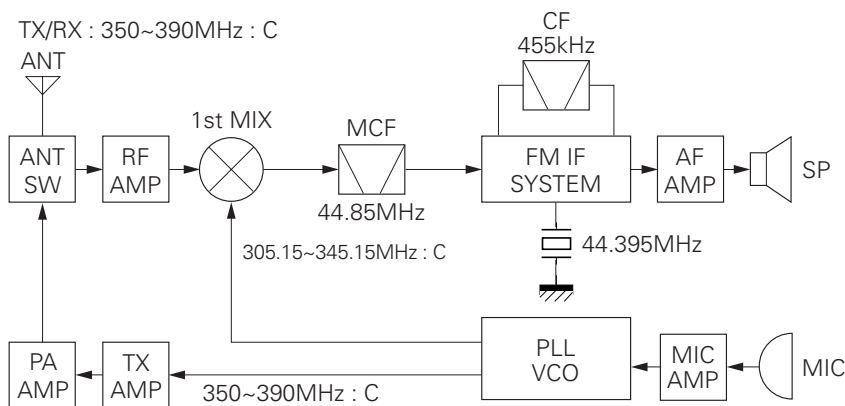
Fig. 1   Frequency configuration / 图 1　频率构成

3. Receiver System
3-1. RF unit

An incoming RF signal from the antenna terminal is passed through the antenna switch (D102, D103, D104 and D105 are off) and then the bandpass filter (L215 and L217). High pass filter HPF (L219) the 1st image response improve. And the bandpass filter is adjusted by a variable capacitor. The input voltage to the variable capacitor is regulated by the voltage output from the D/A converter (IC307). The signal is amplified by RF amplifier Q207, and passed through the bandpass filter (L209, L210 and L211). The resulting signal is applied to the first mixer (Q206), where it is mixed with the first local oscillator signal output from the frequency synthesizer to produce the first IF (44.85MHz).

3. 接收部系统
3-1. 射频单元

由天线接收到的射频信号进入天线开关（D102，D103，D104和D105 截止），然后通过带通滤波器（L215 和 L217）。高通滤波器 HPF（L219），抑制镜像信号。带通滤波器由可变电容进行调整。向可变电容输出的电压通过来自于数/模转换器（IC307）的电压输出进行调节。信号被射频放大器Q207放大，并通过带通滤波器（L209，L210 和 L211）生成的信号进入第一混频器（Q206），并且与来自于频率合成器的第一本振信号混频生成第一中频（44.85MHz）。

CIRCUIT DESCRIPTION / 电路说明

3-2. IF unit

The first IF signal is passed through a crystal filter (XF200) to remove a adjacent channel signal. The filtered first IF signal is amplified by the first IF amplifier (Q205) and then applied to the IF system IC (IC200). The IF system IC provides a second mixer, second local oscillator, limiting amplifier, quadrature detector and RSSI (Received Signal Strength Indicator). The second mixer mixes the first IF signal with the 44.395MHz of second local oscillator output (crystal unit X200) and produces the second IF signal of 455kHz.

The second IF signal is passed through the ceramic filter (CF200; Wide, CF201; Narrow) to more remove the adjacent channel signal. The filtered second IF signal is amplified by the limiting amplifier and demodulated by the quadrature detector with ceramic discriminator (CD200). The demodulated signal is routed to the audio circuit.

3-2．中频单元

第一中频信号通过晶体滤波器（XF200）消除邻道的信号。经滤波的第一中频信号被第一中频放大器（Q205）放大并进入中频系统芯片（IC200）。中频系统芯片提供第二混频器，第二本振信号，限幅放大器，正交检测器和RSSI（接收信号强度指示器）。第二混频器将第一中频信号与44.395MHz的第二本振信号输出（晶体单元X200）进行混频，并生成455kHz的第二中频信号。

第二中频信号通过陶瓷滤波器（CF200：宽，CF201：窄）继续消除相邻信道的信号。经滤波的第二中频信号被限幅放大器放大并被带有陶瓷鉴频器（CD200）的正交鉴频器进行解调。解调后的信号进入音频电路。
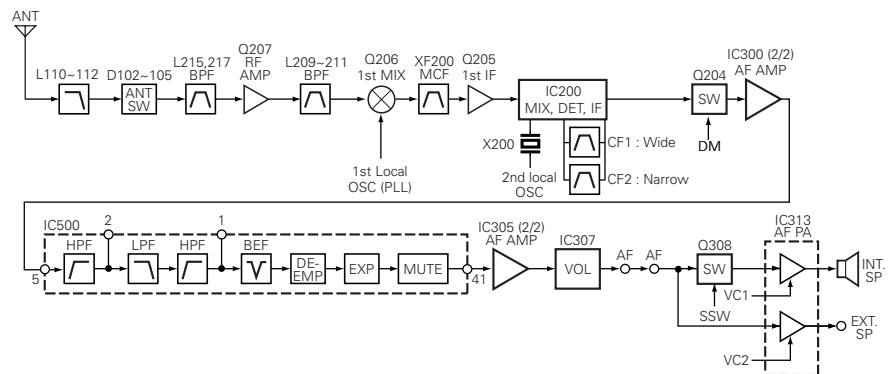
Fig. 2　Receiver section / 图 2　接受部构成

3-3. Wide/Narrow changeover circuit

Narrow and Wide settings can be made for each channel by switching the ceramic filters CF200 (Wide), CF201 (Narrow).

The WIDE (high level) and NARROW (low level) data is output from IC311 (microcomputer) pin 14.

Regardless of NARROW or WIDE band selection, signals always pass through the filter, CF200.

When the WIDE band is selected, Q201 is turned ON, then D202 and D203 are turned OFF.

So, the signal does not pass through the filter CF201. When the NARROW band is selected, Q201 is turned OFF, then D202 and D203 are turned ON. So, the signal passes through the filters, CF200 and CF201.

Q202 turns on/off with the Wide/Narrow data and the IC200 detector output level is changed to maintain a constant output level during wide or narrow signals.

3-3．宽／窄转换电路

可以通过开启陶瓷滤波器CF200（宽），CF201（窄）对每一个信道进行窄宽设定。

IC311（微电脑）的管脚14输出宽（高电平）和窄（低电平）信号。

无论选用宽还是窄带，信号都要通过滤波器CF200。

当选用WIDE带宽时，D202和D203关断。

因此，信号不通过滤波器CF201。当选用NARROW带宽时，Q201关断，D202和D203打开。因此，信号通过滤波器CF200和CF201。

Q202伴随着宽/窄数据而接通/断开，IC200检测器输出电平经常变化用来维持宽或窄信号过程中的恒定输出电平。
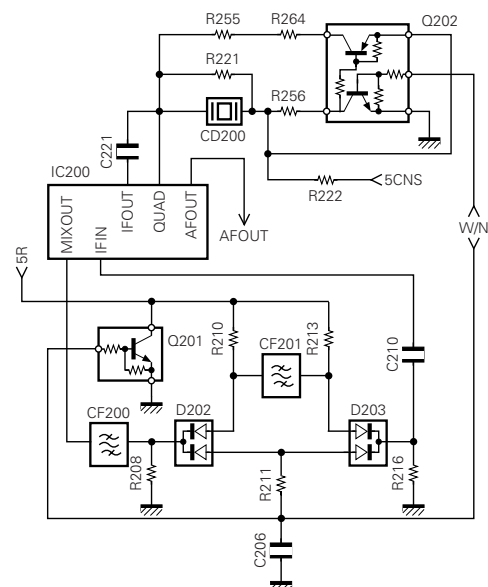
Fig. 3　Wide/Narrow changeover circuit
图 3　宽／窄转换电路

TK-3148

CIRCUIT DESCRIPTION / 电路说明

3-4. Audio amplifier circuit

The demodulated signal from IC200 goes through the mute switch (Q204) and is amplified by IC300 (2/2), high-pass filtered, low-pass filtered, high-pass filtered, band-eliminate filtered, and de-emphasized by IC500.

The signal then goes through an AF amplifier IC305 (2/2), an electronic volume control (IC307), and an AF switch (Q308 is on), and is routed to audio power amplifier (IC313), where it is amplified and output to the internal speaker.

The audio mute signal (AM) from the shift register becomes Low in the standby and Q302 and Q305 which are power supply circuit for IC313 turn off. Also, IC500 is set to the power down mode according to data from microprocessor, and the AF signal is muted. When the audio is output, AM becomes High to turn Q302 and Q305 ON, and voltage is supplied to power terminal VP of IC313. Also, IC500 is canceled out of the power down mode.

The speaker is switched by the logic of speaker switching terminal SSW on the universal connector. When SP-MIC is not attached, the logic of SSW becomes High and SW (Q308) is turned ON, and the AF signal is input to both amplifiers of IC313.

When SP-MIC is attached, SSW is connected to GND at inside of SP-MIC. For this reason, Q308 is turned OFF, and the AF signal is input only to amplifier for EXT SP of IC313.

Change of INT/EXT SP refer to Fig. 4.

AM	SSW	VC1	VC2	SP
H	H	H	L	INT
H	L	L	H	EXT
L	H	L	L	MUTE
L	L	L	L	MUTE

3-4．音频放大器电路

来自于IC200的解调信号进入静音开关（Q204），并且被IC300（2/2）放大，被IC500高通滤波，低通滤波，高通滤波，带阻滤波和去加重。

然后信号通过音频放大器IC305（2/2），电子音量控制器（IC307）和音频开关（Q308接通），并且发送到音频功率放大器（IC313），被放大后输出到内置扬声器。

来自于位移存储器的音频静音信号（AM）待机时变为低电平，给IC313供电的电路Q302和Q305断开。同时，IC500按照来自于微处理器的数据被设定为低功率模式，音频信号处于被静音状态。当输出音频时，音频静音信号变为高电平并接通Q302和Q305，并向IC313的功率端点VP提供电压。同时，IC500取消低功率模式。

扬声器被通用接口上的扬声器开关端点SSW的逻辑电路开启。当扬声器-话筒不接上时，SSW的逻辑电路变为高电平且SW（Q308）被接通，同时信号被输入到IC313的两个放大器。

当扬声器-话筒接上时，SSW与扬声器-话筒内的地线连接。因此，Q308断开，音频信号只输入到IC313的EXT SP放大器。

有关INT/EXT SP 的变化参见图4。

AM	SSW	VC1	VC2	SP
H	H	H	L	INT
H	L	L	H	EXT
L	H	L	L	静音
L	L	L	L	静音
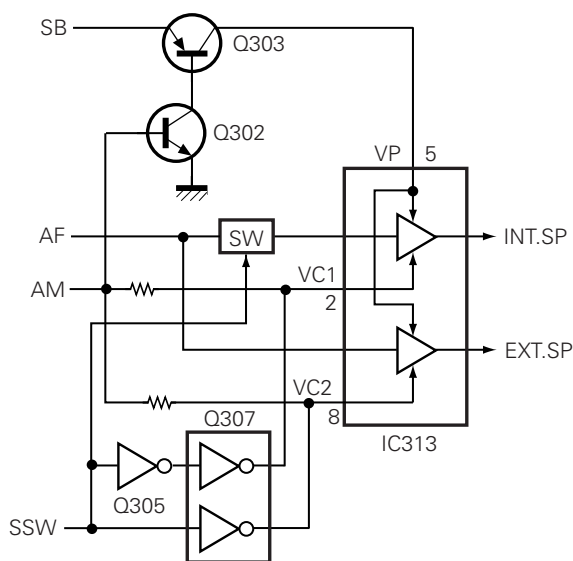
Fig. 4　Audio amplifier circuit / 图 4　音频放大器电路

CIRCUIT DESCRIPTION / 电路说明

3-5. Squelch circuit

The output from IC200 enters FM IF IC again, then passed through a band-pass filter. And passed through a band-pass filter IC202 (2/2). The modulation input. The noise component output from IC202 (2/2) is amplified by Q208 and rectified by D201 to produce a DC voltage corresponding to the noise level. The DC voltage is sent to the analog port of the CPU (IC309). And IC200 outputs a DC voltage (RSSI) corresponding to the input of the IF amplifier. The CPU reads the RSSI signal via pin 93.

IC309 determines whether to output sounds from the speaker by comparing the input voltage of pin 91 and pin 93 with the preset value.

3-5．静噪电路

IC200 的输出再次进入调频中频芯片，然后通过片上的带通滤波器。并通过带通滤波器 IC202（2/2）。调制输入。IC202（2/2）输出的噪音成分被 Q208 放大并且被 D201 整流生成一个相对应于噪音电平的直流电压。直流电压被发送到 CPU（IC309）的模拟端口。IC200 生成一个相对应于中频放大器输入的直流电压（RSSI）。CPU 通过管脚 93 读取 RSSI。

IC309 将管脚 91 和管脚 93 的输入电压与预设值进行比较后决定是否通过扬声器输出声音。
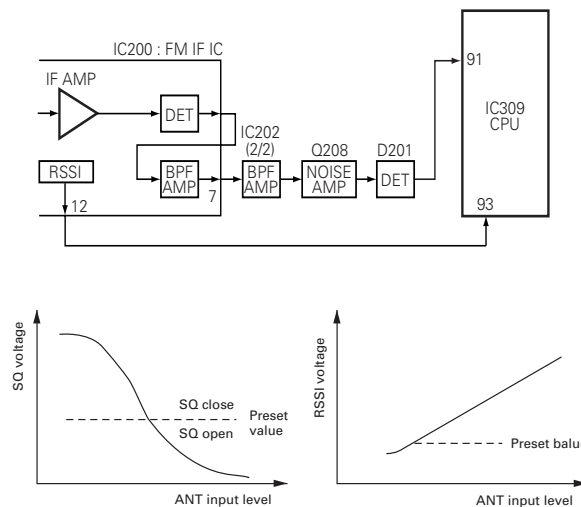
Fig. 6　Squelch and RSSI voltoge vs ANT input level /
图 6　静噪和 RSSI 电压与 ANT 输入电平

4. Transmitter System
4-1. Microphone amplifier

The signal from the internal microphone goes through the mute switch (Q301).

When the SP-MIC is not attached, the microphone switching terminal (MSW) on the universal connector becomes High, and mute switch (Q301) is turned ON. When the SP-MIC is attached, MSW is connected to GND at inside of SP-MIC. For this reason, Q301 is turned OFF, the internal microphone is muted, and only the input of the external microphone is supplied to the microphone amplifier of the TX-RX unit.

The signal from microphone passes through the limited circuit in D508 and amplified by IC501 (1/2), Microphone mute switch (Q502 is off in TX) and through the high-pass filter, the ALC circuit, the low-pass filter, the high-pass filter, and pre-emphasis/ IDC circuit in IC500 on the small board. When encoding DTMF, mute switch (Q500) is turned OFF for muting the microphone input signal.

The signal passes through the D/A converter (IC307) for the maximum deviation adjustment, and enters the summing amplifier consisting of IC305 (1/2), and is mixed with the low speed data from the CPU (IC309).

4．发射部系统
4-1．话筒放大器

来自于内置话筒的信号进入静音开关（Q301）。

当扬声器 - 话筒不接上时，通用接口上的话筒开关端点（MSW）变为高电平，静音开关（Q301）接通。当扬声器 - 话筒接上时，MSW 与扬声器 - 话筒内的地线连接。因此，Q301 断开，内置话筒静音，并且只有外置话筒的输入提供给 TX-RX 单元的话筒放大器。

来自麦克风的信号通过 D508 中的限幅电路，经过 IC501（1/2）放大、麦克风静音开关（发射时 Q502 关断），通过高通滤波器，ALC 电路，低通滤波器，高通滤波器，以及小板 IC500 上的预加重 /IDC 电路。当编码 DTMF 时，静音开关（Q500）关闭，以阻断麦克风输入信号。

信号通过数 / 模转换器（IC307）进行最大频偏调整，然后进入由 IC305（1/2）组成的总和放大器，并且与来自于 CPU（IC309）的低速率数据混合。

TK-3148

CIRCUIT DESCRIPTION / 电路说明

The output signal from the summing amplifier passes through the D/A converter (IC307) again and goes to the VCO modulation input.

The other output signal from the summing amplifier passes through the D/A converter (IC307) again for the BAL adjustment, and the buffer amplifier (IC302 (2/2)), and goes to the TCXO modulation input.

来自于加法放大器的输出信号再次通过数/模转换器（IC307）并进入 VCO 调制输入。

来自于总和放大器的其他输出信号再次通过数 / 模转换器（IC307）进行 BAL 调整，并通过缓冲放大器（IC302 2/2），然后进入 TCXO 调制输入。
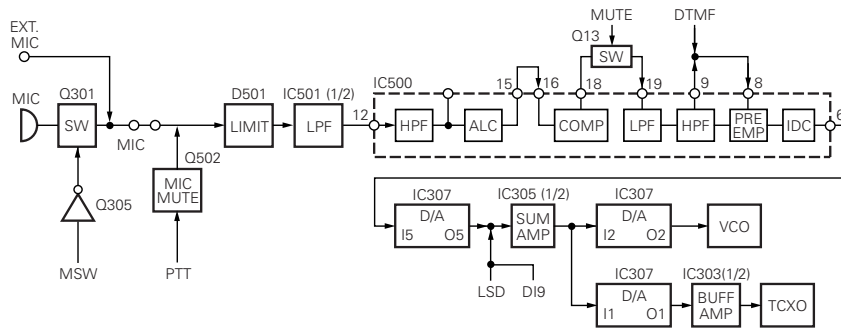
Fig. 7   Microphone amplifier / 图 7   话筒放大器

4-2. Drive and Final amplifier

The signal from the T/R switch (D101 is on) is amplified by the pre-drive (Q100 and Q101) and drive amplifier (Q103) to 50mW.

The output of the drive amplifier is amplified by the RF power amplifier (Q106) to 4.0W (1W when the power is low). The RF power amplifier is MOS FET transistor.

The output of the RF power amplifier is then passed through the harmonic filter (LPF) and antenna switch (D102, D103 is on) and applied to the antenna terminal.

4-2．驱动和末级放大器

来自于 T/R 开关（D101 接通）的信号被前置驱动（Q100 和 Q101）和驱动放大器（Q103）放大到 50mW。

驱动放大器的输出被射频功率放大器(Q106)放大到4.0W(当低功率时为1W)。射频功率放大器是 MOS FET 晶体管。然后射频功率放大器的输出通过谐波滤波器（LPF）和天线开关（D102，D103 接通）提供给天线端点。
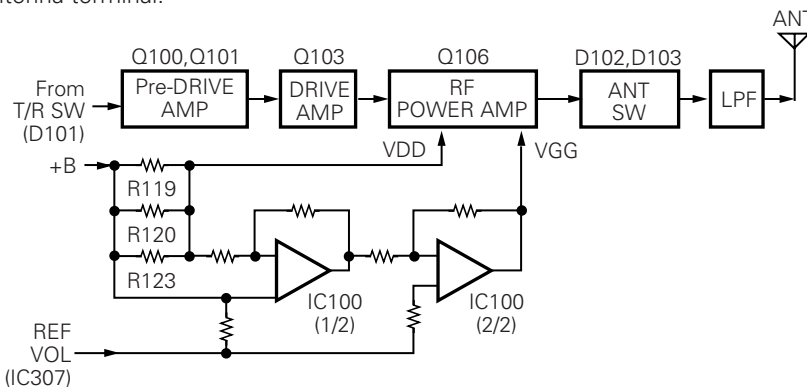
Fig. 8   Drive and final amplifier and APC circuit /
图 8   驱动和末级放大器和自动功率控制电路

4-3. APC circuit

The APC circuit always monitors the current flowing through the drive amplifier (Q103) and the RF power amplifier (Q106) and keeps a constant current.

The voltage drop at R119, R120 and R123 are caused by the current flowing through the RF power amplifier and this voltage is applied to the differential amplifier (IC100 1/2).

IC100 (2/2) compares the output voltage of IC100 (1/2) with the reference voltage from IC307, and the output of IC100 (2/2) controls the VGG of the RF power amplifier to make the both voltages to same voltage.

The change of power high/low is carried out by the change of the reference voltage. Q105, Q107 and Q108 are turned on in transmit and the APC circuit is active.

4-3．自动功率控制电路

APC 电路保持监测通过驱动放大器（Q103）和射频功率放大器（Q106）的电流，并保持其稳定。流经射频功率放大器的电流使 R119，R120 和 R123 的电压降低并且此电压提供给差分放大器（IC100 1/2）。

IC100（2/2）将 IC100（1/2）的输出电压与来自于 IC307 的参考电压进行比较，IC100（2/2）的输出控制射频功率放大器的 VGG 使两种电压保持一致。

通过改变参考电压来进行高 / 低功率的修改。发送时 Q105，Q107 和 Q108 接通并且自动功率控制电路被激活。

CIRCUIT DESCRIPTION / 电路说明

5. Frequency Synthesizer Unit

5-1. 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 2.5ppm within the temperature range of –30 to +60˚C. The frequency tuning and modulation of the TCXO are done to apply a voltage to pin 1 of the TCXO. The output of the TCXO is applied to pin 8 of the PLL IC.

The TK-3148's VCO consists of 2VCO and covers a dual range of the 305.15~445.15MHz and the 350~390MHz. The VCO generates 405.15~425.15MHz for providing to the first local signal in receive. The operating frequency is generated by Q3 in transmit mode and Q2 in receive mode.

The oscillator frequency is controlled by applying the VCO control voltage, obtained from the phase comparator (IC1) to the variable capacitor diodes (D1, D3, D7, and D8 in transmit mode and D2, D4, D9 and D10 in receive mode).

The T/R pin of IC312 goes "high" in receive mode causing Q4, Q6 and Q3 to turn off, and Q2 turn on. The T/R pin goes "low" in transmit mode.

The outputs from Q2 and Q3 are amplified by buffer amplifier (Q5) come to the amplifiers.

The PLL IC consists of a prescaler, fractional divider, reference divider, phase comparator, charge pump. This PLL IC is fractional-N type synthesizer and performs in the 40,50 or 60kHz reference signal which is eighth of the channel step (6.25kHz). The input signal from the pins 5 and 8 of the PLL IC is divided down to the 50kHz and compared at phase comparator. The pulsed output signal of the phase comparator is applied to the charge pump and transformed into DC signal in the loop filter (LPF). The DC signal is applied to the pin 1 of the VCO and locked to keep the VCO frequency constant.

PLL data is output from DP (pin 73). CP (pin 74) and EP (pin 72) of the microprocessor (IC309). The data are input to the PLL IC when the channel is changed or when transmission is changed to reception and vice versa.

5．频率合成器单元

5-1．频率合成器

频率合成器由 TCXO（X1），VCO，PLL IC（IC1）和缓冲放大器组成。

TCXO产生16.8MHz的频率。在－30到＋60℃的温度范围内，频率稳定性为2.5ppm。TCXO的频率调谐和调制是通过给TCXO的管脚1提供电压来实现的。TCXO的输出提供给PLL IC的管脚8。

TK-3148的VCO由两个VCO组成，并且控制两个范围，305.15-445.15MHz 和 350-390MHz。VCO 产生 405.15-425.15MHz 的频率提供给接收中的第一本振信号。在发送中，VCO 的管脚 3 变为低电平，VCO 产生 350-390MHz 的频率。

由Q3在发送模式下产生工作频率和Q2在接收模式下产生工作频率。

通过在可变电容二极管（发送模式下为D1、D3、D7 和D8，接收模式下为D2、D4、D9 和D10）上施加从相位比较器（IC1）获得的 VCO 控制电压来控制振荡频率。

在接收模式下 IC312 的 T/R 脚变为"高"电平，从而关断 Q4、Q6 和 Q3、打开 Q2。在发送模式下，T/R 脚变为"低"电平。来自 Q2 和 Q3 的输出经过缓冲放大器（Q5）放大后进入放大器。

PLL IC 由预标定器，分级驱动器，参考驱动器，相位比较器和负载增压组成。PLL IC 是 N 级合成器，并且以第 8 级信道（6.25kHz）频率为 40,50 或 60kHz 的参考信号运行。来自于 PLL IC 的管脚 5 和管脚 8 的输入信号被分割为 50kHz，并且在相位比较器中进行比较。相位比较器的脉冲输出信号提供给负载增压，并且被变压后进入环路滤波器（LPF）中的直流信号。直流信号提供给 VCO 的管脚 1 并被锁定，以保持 VCO 频率的稳定性。

微处理器（IC309）的 DP（管脚 73），CP（管脚 74）和 EP（管脚 72）输出 PLL 数据。当信道改变或发送变为接收和声音反转时，数据被输入到 PLL IC。
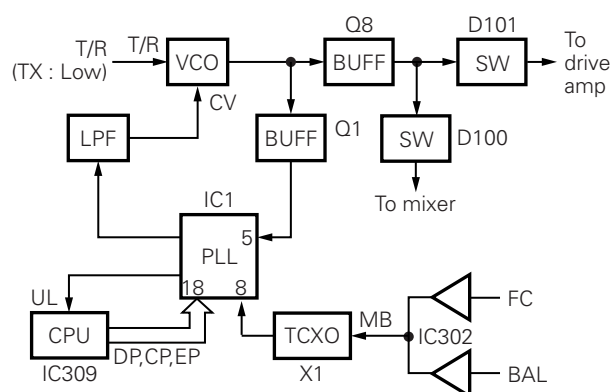
Fig. 9　PLL block diagram / 图 9　锁相环方块图

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CIRCUIT DESCRIPTION / 电路说明

6. Control Circuit

The control circuit consists of microprocessor (IC309) and its peripheral circuits. It controls the TX-RX unit and transfers data to and from the display unit. IC309 mainly performs the following;

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

6-1. Memory circuit

Memory circuit consists of the CPU (IC309) and a flash memory (IC308), a flash memory has a capacity of 4M bits that contains the transceiver control program for the CPU and data such as transceiver channels and operating features.

This program can be easily written from an external devices. Data. such as operating status, are programmed into the EEPROM (IC310).

• Flash Memory

Note : The flash memory stores the data containing the FPU (KPG-74D CPS) program, Security Number (MPT Serial Number) and firmware program (User mode, Test mode, Tuning mode, etc.).
This data must be reinstalled when replacing the flash memory.

• EEPROM

Note : The EEPROM stores tuning data (Deviation, Squelch, etc.). Realign the transceiver after replacing the EEPROM.

6．控制电路

控制电路由微处理器（IC309）和其外围电路组成。微处理器控制TX-RX单元和发送到显示单元的数据以及从显示单元发送的数据。IC309 主要执行下述功能：

1) 通过 PTT 信号输出在发射和接收之间转换。
2) 从存储器电路读取系统，组，频率和编程数据。
3) 向 PLL 发送频率编程数据。
4) 通过来自于静噪电路的直流电压控制静噪的开启 / 关闭。
5) 通过解码数据输入控制音频静音电路。
6) 发送音频和编码数据。

6-1．存储器电路

记忆电路由 CPU (IC309) 和一块闪存（IC308）组成。闪存容量4MB，载有 CPU 所需的收发机控制程序以及收发机信道、功能设置等数据。

可以方便地使用外部设备写这个程序。工作状态等数据编写在 EEPROM (IC310)中。

●闪存

注释：闪存保存的数据包括FPU（KPG-74D CPS）程序，安全码（MPT序列号）和固件编程（用户模式，测试模式，调谐模式等）。当更换闪存时，必须重新安装数据。

● EEPROM

注释：EEPROM 保存调谐数据（频偏，静噪）。
更换 EEPROM 后重新调校手持机。
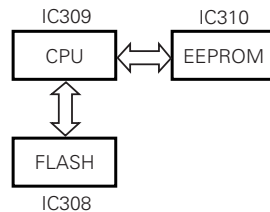
Fig. 10　Memory circuit / 图 10　存储器电路

6-2. Low battery warning

The battery voltage is monitored by the microprocessor (IC309). When the battery voltage falls below the voltage set by the Low Battery Warning adjustment, the red LED flashes to notify the operator that it is time to replace the battery. If the battery voltage falls even more (approx. 6.1V), a beep sounds and transmission is stopped.

Low battery warning	Battery condition
The red LED flashes during transmission	The battery voltage is low but the transceiver is still usable.
The red LED flashes and continuous beep sounds while PTT pressed	The battery voltage is low and the transceiver is not usable to make calls.

6-2．电池低压告警

通过微处理器（IC309）监视电池电压。当电池的电压低于通过电池低压告警调整设定的电压时，红色指示灯闪烁以提示操作者更换电池。如果电池的电压继续降低（大约6.1V），则发出beep 音并停止发送。

电池低压告警	电池状态
发射过程中红色指示灯闪烁。	电池电压降低但仍可使用手持机。
当按下 PTT 键时红色指示灯闪烁并且手持机发出连续 beep 音。	电池电压降低不能使用手持机发出呼叫。

CIRCUIT DESCRIPTION / 电路说明

7. Signalling Circuit
7-1. Encode
- **Low-speed data (QT,DQT)**

Low-speed data is output from pin 1 of the CPU. The signal passes through a low-pass CR filter, and goes to the summing amplifier (IC305 1/2). 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 (IC307) for BAL adjustment.

- **High-speed data (DTMF)**

High-speed data is output from pin 2 of the CPU. The signal passes through a low-pass filter consisting of IC304, and provides a TX DTMF tone and a RX DTMF tone TX DTMF deviation making an adjustment by microprocessor is passed through the D/A convertor (IC307), and then applied to the audio processor (IC500).

The signal is mixed with the audio signal and goes to the VCO and TCXO, the RX DTMF tone is passed a summing amplifier (IC305 2/2), the D/A converter (IC307) for audio control, audio power amplifier and then to the speaker.

- **FFSK**

ESN utilizes 1200bps FFSK signal. FFSK signal is output from pin 6 of IC500. The signal passes through the D/A converter (IC307) for the FFSK deviation adjustment. and is routed to the VCO. When encoding FFSK, the microphone input signal is muted.

7. 信令电路
7-1. 编码
- 低速率数据（QT，DQT）

CPU 的管脚 1 输出低速率数据。信号通过低通陶瓷滤波器进入总和放大器（IC305 1/2）。此信号与音频信号混合，通过数 / 模转换器（IC307）进行 BAL 调整后进入 VCO 和 TCXO（X1）调制输入。

- 高速率数据（DTMF）

CPU 的管脚 2 输出高速率数据。信号通过 IC304 组成的低通滤波器，并提供 TX DTMF 音频和 RX DTMF 音频。通过微处理器调整 TX DTMF 频偏并进入数 / 模转换器（IC307），然后提供给音频处理器（IC500）。

此信号与音频信号混合后进入 VCO 和 TCXO，RX DTMF 通过总和放大器（IC305 2/2），数 / 模转换器（IC307）进行音频控制，音频功率放大器，然后进入扬声器。

- FFSK

ESN 使用 1200bps FFSK 信号。IC500 的管脚 6 输出 FFSK 信号。此信号通过数 / 模转换器（IC307）进行 FFSK 频偏调整，然后进入 VCO。当编码 FFSK 时，话筒输入信号为静音。
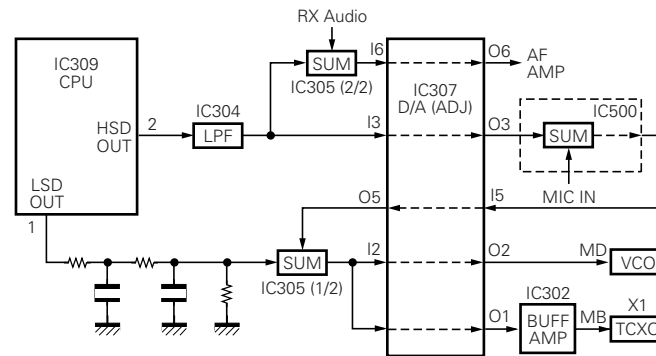
Fig. 11　Encode / 图 11　编码

7-2. Decode
- **Low-speed data (QT,DQT)**

The demodulated signal from the IF IC (IC200) is amplified by IC300 (2/2) and passes through a low-pass filter (IC306) to remove audio components. The signal is input to pin 95 of the CPU.

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

7-2. 解码
- 低速率数据（QT，DQT）

来自于中频芯片（IC200）的已解调的信号被 IC300（2/2）放大，然后通过低通滤波器（IC306）消除音频成分。此信号被输入到 CPU 的管脚 95。

CPU 使信号数字化，执行诸如直流恢复和解码信号这样的步骤。

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CIRCUIT DESCRIPTION / 电路说明

- **FFSK**

The FFSK input signal from the IF IC is amplified by IC300 (1/ 2) and goes to pin 5 of IC500. The signal is demodulated by FFSK demodulator in IC500. The demodulated data goes to the CPU for processing.

- FFSK

来自于中频芯片的FFSK输入信号被IC300（1/2）放大，然后进入IC500的管脚5。此信号被IC500中的FFSK解调器解调。已解调的数据进入CPU执行操作。
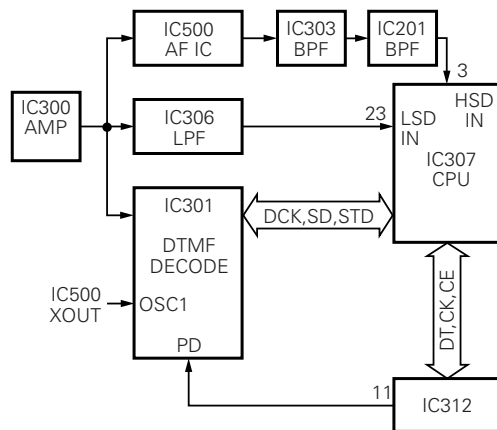
Fig. 12　Decode / 图 12　解码

8. Power Supply Circuit

Battery +B is supplied via a 3A fuse from the battery terminal connected to the TX-RX unit. After passing through the power switch, power supply (SB) is applied to the three AVRs. IC5 supplies 5V (5M) to the control circuit, and IC9 supplies 5V (5C) to common circuits. IC6 supplies to the TX circuit, the RX circuit and common circuits of needless save mode. During transmission, 5TC becomes Low and Q405 is turned ON to supply 5V (5T) to the TX circuit. During reception, 5RC becomes Low and Q404 is turned ON to supply 5V (5R) to the RX Circuit.

The power supply voltage monitor IC (IC404) monitors power supply voltage (SB). If the voltage falls (less than 5V), the VOUT port goes "LOW" level, the CPU INT port also goes "LOW" level, and the CPU stops.

8．电源电路

经由来自于连接到TX-RX单元的电池端点的3A保险丝提供电池＋B。通过电源开关后，电源（SB）向3个AVRs提供电压。IC5向控制电路提供5V（5M）电压，IC9向共用电路提供5V（5C）电压。IC6向TX电路，RX电路和共用电路的保存模式提供电压。在发送过程中，5TC变为低电平，且Q405接通并向TX电路提供5V（5T）电压。在接收过程中，5RC变为低电平，且Q404接通并向RX电路提供5V（5R）电压。

电源电压监测IC（IC404）监测电源电压（SB）。如果电压下降（低于5V），则VOUT端口变为"低"电平，CPU INT端口也变为"低"电平，CPU停止运行。
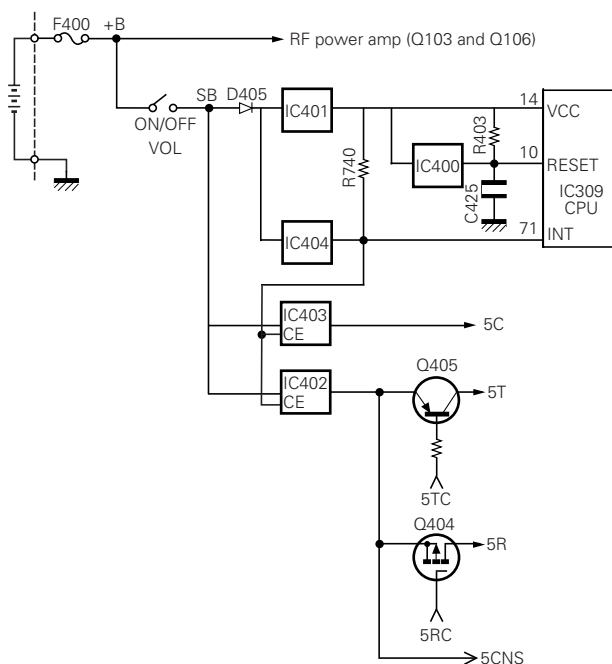
Fig. 13　Power supply circuit / 图 13　电源电路

SEMICONDUCTOR DATA / 半导体数据

Microprocesser : 30620M8A-2N3GP
(TX-RX UNIT : IC309)

■ **Pin function**

Pin No.	Port Name	I/O	Function
1	LSDO	O	Low speed data output.
2	HSDO	O	High speed data output.
3	HSDI	I	High speed data input.
4	DSTB	O	D/A converter data strobe output.
5	5RC	O	RX power control. H: TX L: RX
6	BYTE	-	+5V.
7	CNV$_{SS}$	-	GND.
8	AFDAT	O	MODEM MSK encode data output.
9	AFRDT	I	MODEM MSK decode data input.
10	RESET	-	Key scan IC reset output.
11	XOUT	-	CPU clock.
12	VSS	-	GND.
13	XIN	-	CPU clock.
14	V$_{CC}$	-	+5V.
15	-	-	NC (Non connect).
16	DTSTD	I	DTMF decode IC data detect input.
17	AFTRD	I	FFSK modulation data output timing pulse input.
18	AFRTM	I	FFSK demodulation data input timing pulse input.
19	EEPDAT	I/O	EEPROM data output.
20	BEEP	O	Beep data output.
21	SKEY	I	[S] Key input.
22	AKEY	I	[A] Key input.
23	BKEY	I	[B] Key input.
24	CKEY	I	[C] Key input.
25	AUX	I	[AUX] Key input.
26	PTT	I	[PTT] Key input.
27	SIDE2	I	[SIDE2] Key input.
28	SIDE1	I	[SIDE1] Key input.
29	AUXTXD	I	NC (Non connect).
30	UL	I	PLL unlock detect input.
31	DTMDAT	I	DTMF decode IC data detect input.
32	DTCLK	O	DTMF decode IC clock output.
33	TXD	O	External serial interface (COM0) TXD0 (To microphone connector).
34	RXD	I	External serial interface (COM0) RXD0 (To microphone connector).
35	DAT	O	Common data output
36	CLK	O	Common clock output.
37	RDY	-	Not used.
38	ALE	-	Not used.
39	HOLD	-	Not used.
40	HLDA	-	Not used.
41	BLCK	-	Not used.
42	RD	O	Flash memory RD bus.
43	BHE	-	Not used.
44	WR	O	Flash memory WR bus.
45	SAVE	O	Battery save output.
46	SELF	I	NC (Non connect).
47	CS/MODE	O	LCD driver chip select output.
48	CS0	O	Flash memory chip enable.
49	A19	-	Not used.

微处理器：30620M8A-2N3GP
（TX-RX 单元：IC309）

■ **管脚功能**

管脚号	端口名称	输入/输出	管脚功能
1	LSDO	输出	低速率数据输出。
2	HSDO	输出	高速率数据输出。
3	HSDI	输入	高速率数据输入。
4	DSTB	输出	D/A 转换器数据选通输出。
5	5RC	输出	接收供电控制。 H: 发射 L: 接收
6	BYTE	-	+ 5V。
7	CNV$_{SS}$	-	接地。
8	AFDAT	输出	MODEM MSK 编码数据输出。
9	AFRDT	输入	MODEM MSK 译码数据输入。
10	RESET	-	按键扫描 IC 复位输出。
11	XOUT	-	CPU 时钟。
12	VSS	-	接地。
13	XIN	-	CPU 时钟。
14	V$_{CC}$	-	+ 5V。
15	-	-	NC (无连接)。
16	DTSTD	输入	DTMF 解码 IC 数据检测输入。
17	AFTRD	输入	FFSK 调制数据输出计时脉冲输入。
18	AFRTM	输入	FFSK 调制数据输入计时脉冲输入。
19	EEPDAT	输入/输出	EEPROM 数据输出。
20	BEEP	输出	beep 数据输出。
21	SKEY	输入	[S] 按键输入。
22	AKEY	输入	[A] 按键输入。
23	BKEY	输入	[B] 按键输入。
24	CKEY	输入	[C] 按键输入。
25	AUX	输入	[AUX] 按键输入。
26	PTT	输入	[PTT] 按键输入。
27	SIDE2	输入	[侧面 2] 按键输入。
28	SIDE1	输入	[侧面 1] 按键输入。
29	AUXTXD	输入	NC (无连接)。
30	UL	输入	PLL 失锁检测输入。
31	DTMDAT	输入	DTMF 解码 IC 数据检测输入。
32	DTCLK	输出	DTMF 解码芯片时钟输出。
33	TXD	输出	外部串行接口。(COM0) TXD0 (麦克风接口)。
34	RXD	输入	外部串行接口。(COM0) RXD0 (麦克风接口)。
35	DAT	输出	公共数据输出。
36	CLK	输出	共用时钟输出。
37	RDY	-	不使用。
38	ALE	-	不使用。
39	HOLD	-	不使用。
40	HLDA	-	不使用。
41	BLCK	-	不使用。
42	RD	输出	闪速存储器 RD 总线。
43	BHE	-	不使用。
44	WR	输出	闪速存储器 WR 总线。
45	SAVE	输出	电池省电模式输出。
46	SELF	输入	NC (无连接)。
47	CS/MODE	输出	LCD 驱动程序芯片选择输出。
48	CS0	输出	闪存芯片有效。
49	A19	-	不使用。

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SEMICONDUCTOR DATA / 半导体数据

Pin No.	Port Name	I/O	Function
50~59	A18~A9	-	Flash memory address bus.
60	Vcc	-	+5V.
61	A8	O	Flash memory address bus.
62	VSS	-	GND.
63~70	A7~A0	O	Flash memory address bus.
71	INT	I	Voltage detect input.
72	EP	O	PLL IC Data strobe output.
73	DP	O	PLL IC Data output.
74	CP	O	PLL IC Clock output.
75~78	EN4~1	I	Rotary SW input 4~1.
79~86	D7~D0	I	Flash memory data bus.
87	PF	I	SP-Mic PF switch input.
88	VOL	I	Volume level input.
89	BATT2	I	Battery distinction input.
90	BATT1	I	Battery voltage input.
91	ASQL	I	Squelch level input.
92	TEMP	I	Thermistor input.
93	RSSI	I	Received signal strength indicator input (RSSI).
94	AVSS	-	GND.
95	LSDI	I	Low speed data input.
96	VREF	-	+5V.
97	AVCC	-	+5V.
98	SFTSTB1	O	Shift register Data strobe output.
99	OE	O	Shift register output enable output.
100	AFSTB	O	MODEM data strobe output.

管脚号	端口名称	输入 / 输出	管脚功能
50~59	A18~A9	-	闪存地址总线。
60	Vcc	-	+ 5V。
61	A8	输出	闪存地址总线。
62	VSS	-	接地。
63-70	A7-A0	输出	闪存地址总线。
71	INT	输入	电压检测输入。
72	EP	输出	PLL 芯片数据选通输出。
73	DP	输出	PLL IC 数据输出。
74	CP	输出	PLL IC 时钟输出。
75~78	EN4~1	输入	旋转开关输入 4~1.
79~86	D7~D0	输入	闪存数据总线。
87	PF	输入	扬声器 - 麦克风编程功能开关输入。
88	VOL	输入	音量电平输入。
89	BATT2	输入	电池差异输入。
90	BATT1	输入	电池电压输入。
91	ASQL	输入	静噪电路电平输入。
92	TEMP	输入	热敏电阻输入。
93	RSSI	输入	接收到的信号强度指示 输入（RSSI）。
94	AVSS	-	接地。
95	LSDI	输入	低速率数据输入 。
96	VREF	-	+ 5V。
97	AVCC	-	+ 5V。
98	SFTSTB1	输出	位移寄存器数据选通输出。
99	OE	输出	移位寄存器输出启用输出。
100	AFSTB	输出	MODEM 数据选通输出。

COMPONENTS DESCRIPTION / 元件说明

TX-RX UNIT (X57-6413-10)

Ref. No.	Use/Function	Operation/Condition
IC1	IC	PLL IC
IC100	IC	APC AMP
IC200	IC	IF IC
IC201	IC	AF AMP Filter
IC300	IC	AF AMP Filter
IC302	IC	AF AMP Filter
IC303	IC	AF AMP Filter
IC304	IC	AF AMP Filter
IC305	IC	AF AMP Filter
IC306	IC	AF AMP Filter
IC307	IC	Potential Meter
IC308	IC	Flash Memory
IC309	IC	Microprocessor
IC310	IC	EEPROM
IC311,312	IC	Shift Registor
IC313	IC	AF Power AMP
IC400	IC	Detector
IC401	IC	5M AVR(Automatic Voltage Regulator)
IC402	IC	5CNS AVR(Automatic Voltage Regulator)
IC403	IC	5C AVR(Automatic Voltage Regulator)
IC404	IC	Detector
IC500	IC	Base Band
IC501	IC	AF AMP Filter
Q1	TRANSISTOR	Fin RF AMP
Q2	FET	RX VCO oscilstion
Q3	FET	TX VCO oscilstion
Q4	FET	VCO switch
Q5	TRANSISTOR	Buffer AMP
Q6	TRANSISTOR	VCO switch
Q7	TRANSISTOR	Ripple filter
Q8	TRANSISTOR	TX/RX common RF AMP
Q100	TRANSISTOR	Pre-drive AMP
Q101	TRANSISTOR	Pre-drive AMP
Q103	FET	TX Drive AMP
Q104,105	TRANSISTOR	APC Switch
Q106	FET	TX Final AMP
Q107	FET	APC Switch
Q108	TRANSISTOR	APC Switch
Q201	TRANSISTOR	W/N Switch
Q202	TRANSISTOR	W/N Switch
Q203	FET	AF detect switch
Q204	FET	DM switch
Q205	TRANSISTOR	IF AMP
Q206	FET	Front-end 1st mixer
Q207	FET	Front-end RF AMP
Q208	TRANSISTOR	Noise AMP
Q300	TRANSISTOR	Beet shift Switch
Q301	FET	Mic mute
Q302	TRANSISTOR	AF AMP AVR switch
Q303	TRANSISTOR	AF AMP AVR
Q304	TRANSISTOR	LCD AVR
Q305	FET	Internal / External. switch

TX-RX 单元（X57-6413-10）

Ref. No.	使用／功能	操作／状态
IC1	IC	PLL IC
IC100	IC	自动功率控制放大器
IC200	IC	中频 IC
IC201	IC	音频放大器滤波器
IC300	IC	音频放大器滤波器
IC302	IC	音频放大器滤波器
IC303	IC	音频放大器滤波器
IC304	IC	音频放大器滤波器
IC305	IC	音频放大器滤波器
IC306	IC	音频放大器滤波器
IC307	IC	电位计
IC308	IC	闪速存储器
IC309	IC	微处理器
IC310	IC	EEPROM
IC311,312	IC	移位寄存器
IC313	IC	音频功率放大器
IC400	IC	探测器
IC401	IC	5M 自动调压器
IC402	IC	5CNS 自动调压器
IC403	IC	5C 自动调压器
IC404	IC	探测器
IC500	IC	基带 IC
IC501	IC	音频放大器滤波器
Q1	晶体管	Fin 射频放大
Q2	场效应管	接收 VCO 振荡
Q3	场效应管	发射 VCO 振荡
Q4	场效应管	VCO 开关
Q5	晶体管	缓冲放大器
Q6	晶体管	VCO 开关
Q7	晶体管	脉动滤波器
Q8	晶体管	发射／接收公用射频放大
Q100	晶体管	前驱动放大器
Q101	晶体管	前驱动放大器
Q103	场效应管	发射驱动放大器
Q104,105	晶体管	自动功率控制开关
Q106	场效应管	发射最终放大器
Q107	场效应管	自动功率控制开关
Q108	晶体管	自动功率控制开关
Q201	晶体管	宽／窄开关
Q202	晶体管	宽／窄开关
Q203	场效应管	音频检测开关
Q204	场效应管	DM 开关
Q205	晶体管	中频放大器
Q206	场效应管	前端第一混频器
Q207	场效应管	前端射频放大
Q208	晶体管	噪音放大器
Q300	晶体管	Beet 偏移开关
Q301	场效应管	麦克风静音
Q302	晶体管	音频放大自动调压器开关
Q303	晶体管	音频放大自动调压器
Q304	晶体管	LCD 自动调压器
Q305	场效应管	内／外．开关

TK-3148

COMPONENTS DESCRIPTION / 元件说明

Ref. No.	Use/Function	Operation/Condition
Q306	TRANSISTOR	TX LED switch
Q307	FET	Internal / External. switch
Q308	FET	Internal / External. switch
Q309	TRANSISTOR	BUSY LED switch
Q310	TRANSISTOR	LCD LED AVR switch
Q311	TRANSISTOR	LCD LED AVR
Q400	FET	5MS switch
Q401	FET	5MS switch
Q403	TRANSISTOR	5R Switch
Q404	FET	5R Switch
Q405	TRANSISTOR	5T switch
Q406	FET	SAVE switch
Q500	TRANSISTOR	RX AF mute
Q501	FET	TX AF mute
Q502	FET	Mic mutte
D1	VARIABLE CAPACITANCE DIODE	TX VCO
D2	VARIABLE CAPACITANCE DIODE	RX VCO
D3	VARIABLE CAPACITANCE DIODE	TX VCO
D4	VARIABLE CAPACITANCE DIODE	RX VCO
D5	VARIABLE CAPACITANCE DIODE	TX VCO modulation
D6	DIODE	Ripple filter switch
D7,8	VARIABLE CAPACITANCE DIODE	TX VCO
D9,10	VARIABLE CAPACITANCE DIODE	RX VCO
D100,101	DIODE	TX/RX RF switch
D102-105	DIODE	ANT switch
D106	ZENER DIODE	APC protect
D200	DIODE	SQL (Squelch) voltage charge
D201	DIODE	SQL rectification
D202,203	DIODE	W/N Switch
D204-208	VARIABLE CAPACITANCE DIODE	BPF (Band pass filter) Tuning
D209	DIODE	DM Charge/discharge switch
D300	DIODE	AF AMP bias
D301	DIODE	AF AMP protect
D302	DIODE	Surge absorption
D303,304	ZENER DIODE	Protect
D305	ZENER DIODE	AF AMP AVR
D306	DIODE	Surge absorption
D307	ZENER DIODE	Protect
D308	ZENER DIODE	Mic input protect
D309	LED	TX red LED
D310	LED	RX green LED
D402	DIODE	Surge absorption
D403	DIODE	5MS protect switch
D405	DIODE	5M protect
D501	DIODE	Mis input protect

Ref. No.	使用／功能	操作／状态
Q306	晶体管	发射发光二极管开关
Q307	场效应管	内／外 . 开关
Q308	场效应管	内／外 . 开关
Q309	晶体管	BUSY LED 开关
Q310	晶体管	LCD LED AVR 开关
Q311	晶体管	LCD LED AVR
Q400	场效应管	5MS 开关
Q401	场效应管	5MS 开关
Q403	晶体管	5R 开关
Q404	场效应管	5R 开关
Q405	晶体管	5T 开关
Q406	场效应管	SAVE 开关
Q500	晶体管	接收音频静音开关
Q501	场效应管	发射音频静音开关
Q502	场效应管	麦克风静音
D1	可变电容二极管	发射 VCO
D2	可变电容二极管	接收 VCO
D3	可变电容二极管	发射 VCO
D4	可变电容二极管	接收 VCO
D5	可变电容二极管	发射 VCO 调制
D6	二极管	脉动滤波器开关
D7,8	可变电容二极管	发射 VCO
D9,10	可变电容二极管	接收 VCO
D100,101	二极管	发射／接收射频开关
D102-105	二极管	天线开关
D106	齐纳二极管	自动功率控制保护
D200	二极管	SQL (抑制) 电压充电
D201	二极管	SQL 整流
D202,203	二极管	宽／窄开关
D204-208	可变电容二极管	BPF (带通滤波器) 调谐
D209	二极管	DM 充电／放电开关
D300	二极管	音频放大器偏置
D301	二极管	音频放大器保护
D302	二极管	浪涌吸收
D303,304	齐纳二极管	保护
D305	齐纳二极管	音频放大自动调压器
D306	二极管	浪涌吸收
D307	齐纳二极管	保护
D308	齐纳二极管	麦克风输入保护
D309	发光二极管	发射红发光二极管
D310	发光二极管	接收绿发光二极管
D402	二极管	浪涌吸收
D403	二极管	5MS 保护开关
D405	二极管	5M 保护
D501	二极管	麦克风输入保护

PARTS LIST / 零件表

CAPACITORS

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

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

CC45   Color*
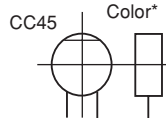
· Capacitor value

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

2 2 0 = 22pF
— Multiplier
— 2nd number
— 1st number
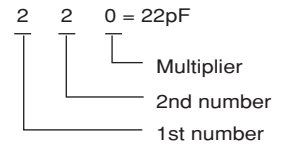
· Temperature coefficient

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

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

Example : CC45TH = -470 ± 60ppm/℃

· 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 / -40	+80 / -20	+100 / -0	More than 10μF -10 ~ +50	
										Less than 4.7μF -10 ~ +75	

(Less than 10pF)

Gode	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	3150	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 capacitors)

Dimension 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	3.0 ±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 K 7 3 E B 2 B 0 0 0 J
1   2   3   4   5   6   7

(Chip)(B,F)

· Carbon resistor (Nomal 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
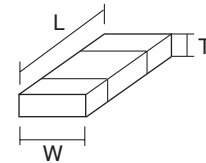
Dimension

Dimension (Chip resistor)

Dimension 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-3148

PARTS LIST / 零件表

* 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
Y: AAFES (Europe)   **X**: Australia   **M**: Other Areas
C: China

TK-3148
TX-RX UNIT (X57-6413-01)

Ref. No.	Address	New parts	Parts No.	Description	Destination
			TK-3148		
1	1B	*	A02-3653-14	CABINET ASSY	
2	3A	*	A10-4063-01	CHASSIS	
5	3B	*	B01-0694-03	ESCUTCHEON(BELT HOOK)	
6	2C		B09-0625-03	CAP ACCESSORY	
7	2B		B10-2700-12	FRONT GLASS	
8	1A		B38-0859-05	LCD ASSY	
9	2C		B62-1756-00	INSTRUCTION MANUAL	
10	3A		B72-2189-04	MODEL NAME PLATE	
13	3B		E04-0436-05	RF COAXIAL RECEPTACLE(SMA)	
14	3B		E23-1188-04	TERMINAL(ANT)	
15	3B		E23-1189-04	TERMINAL(BATT)	
16	2A,3B		E37-0978-05	LEAD WIRE WITH CONNECTOR(SW2,SP)	
17	3A		E37-1007-05	LEAD WIRE WITH CONNECTOR(SW1,PTT)	
18	3B		E58-0440-05	SQUARE SOCKET(SP/MIC)	
19	3A		E72-0413-03	TERMINAL BLOCK(BATT)	
20	2A		F10-2415-04	SHIELDING PLATE(CPU)	
21	1A		F10-2416-13	SHIELDING PLATE(LCD)	
22	2A		F10-2444-04	SHIELDING PLATE(SP)	
23	2A		F10-2463-04	SHIELDING PLATE(PCB)	
24	3A,3B		F15-1006-04	SHIELDING PLATE(CHASSIS)	
25	1A		F20-1192-04	INSULATING SHEET(LCD)	
26	1B		G10-1304-04	FIBROUS SHEET(CABINET)	
27	3A		G11-2622-04	SHEET(CHASSIS)	
28	3A		G11-4046-14	SHEET(PTT)	
29	2A		G11-4050-04	SHEET(TXCO)	
30	1A		G11-4089-04	SHEET(LCD)	
31	3A		G11-4090-04	SHEET(FINAL FET)	
32	1A		G11-4174-04	SHEET(LCD)	
33	2A	*	G11-4188-04	SHEET(A/3PCB,SHIELDING PLATE(LCD))	
34	1B	*	G11-4189-04	SHEET(UPPER SIDE OF CABINET)	
35	1A	*	G11-4190-04	SHEET(LOWER SIDE OF CABINET)	
36	3B		G11-4296-04	SHEET(FRONT GLASS)	
37	3B		G11-4297-04	SHEET(FRONT GLASS AND CHASSIS)	
38	3A		G13-1885-04	CUSHION(CHASSIS)	
39	2B		G13-2010-04	CUSHION(ECM)	
40	2B		G53-1540-32	PACKING(4 KEYS)	
41	3A		G53-1547-04	PACKING(TERMINAL BLOCK)	
42	3B	*	G53-1560-02	PACKING(TOP)	
43	3B	*	G53-1620-04	PACKING(RECEPTACLE)	
44	1D		H52-2007-02	ITEM CARTON CASE	
45	2A		J19-5430-03	HOLDER(VOL/ENC)	
46	2A		J21-8423-04	HARDWARE FIXTURE(SUB PCB)	
47	2A		J21-8424-04	HARDWARE FIXTURE(CHASSIS)	
48	2C	*	J29-0701-05	BELT HOOK ACCESSORY	
49	1B		J30-1269-04	SPACER(VOL)	
50	2B		J82-0078-05	FPC(VOL/ENC)	
51	3B		J82-0079-05	FPC(UNIVERSAL)	
55	1B		K29-9131-03	KNOB(PTT)	
56	1A		K29-9132-03	KEY TOP(SW1,SW2)	
57	1B		K29-9133-03	KNOB(VOL)	
58	1B		K29-9134-03	KNOB(ENC)	
A	2C		N08-0548-04	DRESSED SCREW ACCESSORY	
B	3B		N14-0809-04	CIRCULAR NUT(VOL,ENC)	
C	3B		N30-2604-46	PAN HEAD MACHINE SCREW(ANT)	

Ref. No.	Address	New parts	Parts No.	Description			Destination
D	3A		N30-2608-46	PAN HEAD MACHINE SCREW(CABINET)			
E	3B		N30-3006-45	PAN HEAD MACHINE SCREW(ESCUTHEON)			
F	3B		N79-2035-46	PAN HEAD TAPTITE SCREW(TERMINAL)			
G	1A,2A		N83-2005-46	PAN HEAD TAPTITE SCREW(UNIT)			
60	2B		R31-0617-05	VARIABLE RESISTOR(POWER SW/VOL)			
61	2B		S60-0415-05	ROTARY SWITCH(ENCODER)			
62	2B		T07-0732-15	SPEAKER			
63	2D		T90-1032-25	HELICAL ANTENNA			
64	2B		T91-0630-05	MIC ELEMENT			
			TX-RX UNIT (X57-6413-01)				
D309			B30-2156-05	LED(RED)			
D310			B30-2157-05	LED(YELLOW)			
C1			CK73HB1H471K	CHIP C	470PF	K	
C2			CK73HB1H102K	CHIP C	1000PF	K	
C4			CC73HCH1H100D	CHIP C	10PF	D	
C5			CK73HB1H471K	CHIP C	470PF	K	
C8			CK73HB1H102K	CHIP C	1000PF	K	
C9			CC73HCH1H100D	CHIP C	10PF	D	
C10			CK73HB1H471K	CHIP C	470PF	K	
C11			C92-0713-05	CHIP-TAN	10UF	6.3WV	
C12-14			CK73HB1H471K	CHIP C	470PF	K	
C16			C92-0521-05	CHIP-TAN	0.47UF	20WV	
C17,18			CK73HB1A104K	CHIP C	0.10UF	K	
C19			CK73HB1H102K	CHIP C	1000PF	K	
C20			CC73HCH1H070D	CHIP C	7.0PF	D	
C22			CC73HCH1H040C	CHIP C	4.0PF	C	
C23			CC73HCH1H070D	CHIP C	7.0PF	D	
C25			CC73HCH1H100D	CHIP C	10PF	D	
C27			CK73HB1H471K	CHIP C	470PF	K	
C28			CC73HCH1H101J	CHIP C	100PF	J	
C29			CK73HB1H102K	CHIP C	1000PF	K	
C30			CC73HCH1H100D	CHIP C	10PF	D	
C31			CC73HCH1H090B	CHIP C	9.0PF	B	
C32			CC73HCH1H060D	CHIP C	6.0PF	D	
C33			CC73HCH1H220J	CHIP C	22PF	J	
C34			CC73HCH1H090D	CHIP C	9.0PF	D	
C35			CC73HCH1H010B	CHIP C	1.0PF	B	
C36			CC73GCH1H040B	CHIP C	4.0PF	B	
C37			CC73GCH1H010B	CHIP C	1.0PF	B	
C38			CC73GCH1H030B	CHIP C	3.0PF	B	
C39			CK73HB1H471K	CHIP C	470PF	K	
C40			CC73GCH1H020B	CHIP C	2.0PF	B	
C41			CC73GCH1H030B	CHIP C	3.0PF	B	
C42			CC73GCH1H040B	CHIP C	4.0PF	B	
C43			CC73GCH1H0R5B	CHIP C	0.5PF	B	
C44			CC73GCH1H030B	CHIP C	3.0PF	B	
C45			CK73HB1H471K	CHIP C	470PF	K	
C46			CC73HCH1H101J	CHIP C	100PF	J	
C47			CC73GCH1H0R5B	CHIP C	0.5PF	B	
C48,49			CK73HB1H102K	CHIP C	1000PF	K	
C50			C92-0712-05	CHIP-TAN	22UF	6.3WV	
C51			CC73HCH1H090D	CHIP C	9.0PF	D	
C52			CK73HB1H102K	CHIP C	1000PF	K	
C53			CC73HCH1H330J	CHIP C	33PF	J	
C54-56			CK73HB1H471K	CHIP C	470PF	K	
C57			CC73HCH1H1R5B	CHIP C	1.5PF	B	
C58			CC73GCH1H010B	CHIP C	1.0PF	B	

PARTS LIST / 零件表

TX-RX UNIT (X57-6413-01)

Ref. No.	Address	New parts	Parts No.	Description			Destination
C60			CK73HB1H102K	CHIP C	1000PF	K	
C64			CK73HB1H471K	CHIP C	470PF	K	
C66			CC73HCH1H0R5C	CHIP C	0.5PF	C	
C67			C92-0001-05	CHIP-C	0.1UF	35WV	
C68			C92-0714-05	CHIP-TAN	4.7UF	6.3WV	
C100-102			CK73HB1H471K	CHIP C	470PF	K	
C103			CC73HCH1H080D	CHIP C	8.0PF	D	
C104,105			CK73HB1H471K	CHIP C	470PF	K	
C106			CC73HCH1H080D	CHIP C	8.0PF	D	
C108			CK73HB1A104K	CHIP C	0.10UF	K	
C109			CC73HCH1H080D	CHIP C	8.0PF	D	
C110			CC73HCH1H130J	CHIP C	13PF	J	
C111			CK73HB1H471K	CHIP C	470PF	K	
C115			CK73HB1H471K	CHIP C	470PF	K	
C116			CC73HCH1H330J	CHIP C	33PF	J	
C119			CC73GCH1H300G	CHIP C	30PF	G	
C121			CC73GCH1H360G	CHIP C	36PF	G	
C122			CK73HB1H471K	CHIP C	470PF	K	
C123			C92-0565-05	CHIP-TAN	6.8UF	10WV	
C124			CK73GB0J105K	CHIP C	1.0UF	K	
C125			CK73HB1H102K	CHIP C	1000PF	K	
C126,127			CK73HB1H471K	CHIP C	470PF	K	
C128			CC73HCH1H101J	CHIP C	100PF	J	
C129,130			CK73HB1H471K	CHIP C	470PF	K	
C131			CC73GCH1H270G	CHIP C	27PF	G	
C132			CK73HB1C103K	CHIP C	0.010UF	K	
C133		*	CK73GB1A105K	CHIP C	1.0UF	K	
C134			CK73HB1A104K	CHIP C	0.10UF	K	
C135			CC73GCH1H200G	CHIP C	20PF	G	
C136			CK73HB1H471K	CHIP C	470PF	K	
C137			CK73HB1C103K	CHIP C	0.010UF	K	
C139			CK73HB1H471K	CHIP C	470PF	K	
C141			CC73GCH1H240G	CHIP C	24PF	G	
C144			CC73GCH1H100C	CHIP C	10PF	C	
C146			CC73GCH1H390J	CHIP C	39PF	J	
C147			CK73HB1H471K	CHIP C	470PF	K	
C148			CC73HCH1H050C	CHIP C	5.0PF	C	
C149			CK73HB1H471K	CHIP C	470PF	K	
C150			CC73HCH1H010C	CHIP C	1.0PF	C	
C151			CC73HCH1H020C	CHIP C	2.0PF	C	
C152			CC73HCH1H100D	CHIP C	10PF	D	
C153			CC73GCH1H030C	CHIP C	3.0PF	C	
C154			CC73HCH1H120J	CHIP C	12PF	J	
C155			CC73HCH1H100D	CHIP C	10PF	D	
C156,157			CC73HCH1H040C	CHIP C	4.0PF	C	
C158			CC73HCH1H100C	CHIP C	10PF	C	
C160			CK73HB1H102K	CHIP C	1000PF	K	
C164			CC73GCH1H330G	CHIP C	33PF	G	
C200			CK73GB1A224K	CHIP C	0.22UF	K	
C201			CK73HB1A104K	CHIP C	0.10UF	K	
C202			CC73HCH1H121J	CHIP C	120PF	J	
C203-205			CK73HB1A104K	CHIP C	0.10UF	K	
C206			CK73HB1C103K	CHIP C	0.010UF	K	
C207			CK73HB1H471K	CHIP C	470PF	K	
C208,209			CC73HCH1H121J	CHIP C	120PF	J	
C210			CK73HB1A104K	CHIP C	0.10UF	K	
C211			CK73HB1H102K	CHIP C	1000PF	K	
C212			CC73HCH1H220J	CHIP C	22PF	J	
C213			CC73HCH1H100D	CHIP C	10PF	D	
C214			CK73HB1A104K	CHIP C	0.10UF	K	
C215			C92-0773-05	CHIP-TAN	15UF	6.3WV	
C216			CK73HB1A104K	CHIP C	0.10UF	K	
C217			CC73HCH1H121J	CHIP C	120PF	J	
C218			CK73HB1A104K	CHIP C	0.10UF	K	
C219			CK73HB1A333K	CHIP C	0.033UF	K	

Ref. No.	Address	New parts	Parts No.	Description			Destination
C220			CK73HB1A104K	CHIP C	0.10UF	K	
C221			CC73HCH1H680J	CHIP C	68PF	J	
C222			CK73HB1A104K	CHIP C	0.10UF	K	
C223			CK73HB1C103K	CHIP C	0.010UF	K	
C224			C92-0713-05	CHIP-TAN	10UF	6.3WV	
C225			CK73HB1C103K	CHIP C	0.010UF	K	
C227			CK73HB1A104K	CHIP C	0.10UF	K	
C228,229			CK73HB1C103K	CHIP C	0.010UF	K	
C230			CC73HCH1H100D	CHIP C	10PF	D	
C231			CK73HB1C103K	CHIP C	0.010UF	K	
C232			CK73HB1H471K	CHIP C	470PF	K	
C233			CK73HB1C103K	CHIP C	0.010UF	K	
C234			CK73HB1H471K	CHIP C	470PF	K	
C235			CC73HCH1H080D	CHIP C	8.0PF	D	
C236			CC73HCH1H020C	CHIP C	2.0PF	C	
C237			CC73HCH1H180J	CHIP C	18PF	J	
C238			CC73HCH1H120J	CHIP C	12PF	J	
C239			CK73HB1H471K	CHIP C	470PF	K	
C240			CC73HCH1H010C	CHIP C	1.0PF	C	
C241			CC73HCH1H080D	CHIP C	8.0PF	D	
C242			CK73HB1A104K	CHIP C	0.10UF	K	
C243			CK73HB1H102K	CHIP C	1000PF	K	
C244			CC73GCH1H040B	CHIP C	4.0PF	B	
C245			CK73HB1H471K	CHIP C	470PF	K	
C248			CC73HCH1H330J	CHIP C	33PF	J	
C249			CC73HCH1H020C	CHIP C	2.0PF	C	
C250			CK73HB1H471K	CHIP C	470PF	K	
C251			CC73GCH1H020B	CHIP C	2.0PF	B	
C252			CC73HCH1H101J	CHIP C	100PF	J	
C253			CK73HB1A104K	CHIP C	0.10UF	K	
C255			CK73HB1A104K	CHIP C	0.10UF	K	
C256			CC73HCH1H101J	CHIP C	100PF	J	
C257-260			CK73HB1H471K	CHIP C	470PF	K	
C261			CC73GCH1H120G	CHIP C	12PF	G	
C263			CC73HCH1H180J	CHIP C	18PF	J	
C264			CK73HB1H471K	CHIP C	470PF	K	
C267			CC73GCH1H060B	CHIP C	6.0PF	B	
C269			CC73GCH1H040B	CHIP C	4.0PF	B	
C270			CC73HCH1H030C	CHIP C	3.0PF	C	
C275			CC73HCH1H101J	CHIP C	100PF	J	
C276			CK73HB1H471K	CHIP C	470PF	K	
C277			CC73GCH1H020B	CHIP C	2.0PF	B	
C278-280			CK73HB1A104K	CHIP C	0.10UF	K	
C281			CK73HB1H471K	CHIP C	470PF	K	
C282			CK73HB1H102K	CHIP C	1000PF	K	
C283,284			CK73HB1A104K	CHIP C	0.10UF	K	
C285			CC73GCH1H050B	CHIP C	5.0PF	B	
C286			CC73GCH1H070B	CHIP C	7.0PF	B	
C288			CK73HB1H471K	CHIP C	470PF	K	
C289			CC73GCH1H010B	CHIP C	1.0PF	B	
C290			CC73GCH1H050B	CHIP C	5.0PF	B	
C292			CC73HCH1H020C	CHIP C	2.0PF	C	
C293			CC73GCH1H010B	CHIP C	1.0PF	B	
C294			CC73GCH1H560J	CHIP C	56PF	J	
C295			CK73HB1H471K	CHIP C	470PF	K	
C298			CK73HB1H471K	CHIP C	470PF	K	
C300			C92-0713-05	CHIP-TAN	10UF	6.3WV	
C301			CK73HB1H471K	CHIP C	470PF	K	
C302			CK73HB1A104K	CHIP C	0.10UF	K	
C304			CC73HCH1H330J	CHIP C	33PF	J	
C306			CK73HB1A104K	CHIP C	0.10UF	K	
C308			CK73HB1A104K	CHIP C	0.10UF	K	
C309			CC73HCH1H101J	CHIP C	100PF	J	
C310			CK73HB1C103K	CHIP C	0.010UF	K	
C311			CC73HCH1H101J	CHIP C	100PF	J	

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Ref. No.	Address	New parts	Parts No.	Description			Destination
C312			C92-0713-05	CHIP-TAN	10UF	6.3WV	
C313			CC73HCH1H101J	CHIP C	100PF	J	
C314			CK73HB1H471K	CHIP C	470PF	K	
C315			C92-0713-05	CHIP-TAN	10UF	6.3WV	
C316			CK73HB1A333K	CHIP C	0.033UF	K	
C318			CK73HB1H221K	CHIP C	220PF	K	
C319			CC73HCH1H121J	CHIP C	120PF	J	
C320			CK73HB1A104K	CHIP C	0.10UF	K	
C321			CK73HB1H271K	CHIP C	270PF	K	
C322			CK73HB1C103K	CHIP C	0.010UF	K	
C323			CK73HB1H222K	CHIP C	2200PF	K	
C324			CK73HB1A104K	CHIP C	0.10UF	K	
C325			CK73HB1C123K	CHIP C	0.012UF	K	
C327			CK73GB1H103K	CHIP C	0.010UF	K	
C328			CK73GB1C683K	CHIP C	0.068UF	K	
C329			CK73GB0J105K	CHIP C	1.0UF	K	
C330			CK73HB1A104K	CHIP C	0.10UF	K	
C331			CK73HB1C223K	CHIP C	0.022UF	K	
C332-335			CK73HB1C103K	CHIP C	0.010UF	K	
C336,337			CC73HCH1H330J	CHIP C	33PF	J	
C338			CC73HCH1H120J	CHIP C	12PF	J	
C339-342			CK73HB1C103K	CHIP C	0.010UF	K	
C344			C92-0713-05	CHIP-TAN	10UF	6.3WV	
C345			CK73GB1A474K	CHIP C	0.47UF	K	
C346			CC73HCH1H470J	CHIP C	47PF	J	
C347			CK73HB1C103K	CHIP C	0.010UF	K	
C348			CK73GB1A474K	CHIP C	0.47UF	K	
C349			CK73HB1C153K	CHIP C	0.015UF	K	
C350			C92-0647-05	CHIP-TAN	3.3UF	6.3WV	
C351			CK73HB1C103K	CHIP C	0.010UF	K	
C352-354			CK73HB1A104K	CHIP C	0.10UF	K	
C355			C92-0628-05	CHIP-TAN	10UF	10WV	
C356			CC73HCH1H470J	CHIP C	47PF	J	
C357,358			C92-0712-05	CHIP-TAN	22UF	6.3WV	
C359			CC73HCH1H470J	CHIP C	47PF	J	
C362			CC73HCH1H470J	CHIP C	47PF	J	
C364			CC73HCH1H470J	CHIP C	47PF	J	
C369			CC73HCH1H101J	CHIP C	100PF	J	
C371			CC73HCH1H470J	CHIP C	47PF	J	
C375			CC73HCH1H470J	CHIP C	47PF	J	
C382			CK73HB1A104K	CHIP C	0.10UF	K	
C383,384			CK73HB1H102K	CHIP C	1000PF	K	
C386			CC73HCH1H470J	CHIP C	47PF	J	
C388			CK73HB1H102K	CHIP C	1000PF	K	
C389			CC73HCH1H470J	CHIP C	47PF	J	
C390			CK73HB1A104K	CHIP C	0.10UF	K	
C391,392			CK73HB1C103K	CHIP C	0.010UF	K	
C394-398			CK73HB1A104K	CHIP C	0.10UF	K	
C399			CK73HB1C103K	CHIP C	0.010UF	K	
C400			CK73HB1H471K	CHIP C	470PF	K	
C402-405			CK73HB1H102K	CHIP C	1000PF	K	
C408			CK73HB1H102K	CHIP C	1000PF	K	
C410			CK73FB1A475K	CHIP C	4.7UF	K	
C411		*	CK73GB1A105K	CHIP C	1.0UF	K	
C413			C92-0713-05	CHIP-TAN	10UF	6.3WV	
C415			CC73HCH1H101J	CHIP C	100PF	J	
C416			C92-0713-05	CHIP-TAN	10UF	6.3WV	
C417			CK73GB0J105K	CHIP C	1.0UF	K	
C419			CK73HB1H102K	CHIP C	1000PF	K	
C420			CC73HCH1H101J	CHIP C	100PF	J	
C421		*	CK73GB1A105K	CHIP C	1.0UF	K	
C423			CK73FB0J106K	CHIP C	10UF	K	
C424			CC73HCH1H101J	CHIP C	100PF	J	
C425			CK73HB1A104K	CHIP C	0.10UF	K	
C426			CC73HCH1H101J	CHIP C	100PF	J	
C500			CK73GB1H122K	CHIP C	1200PF	K	
C501,502			CK73HB1A104K	CHIP C	0.10UF	K	
C503,504			CK73HB1C103K	CHIP C	0.010UF	K	
C506			CK73HB1A104K	CHIP C	0.10UF	K	
C507			CK73HB1C103K	CHIP C	0.010UF	K	
C508			CK73HB1A104K	CHIP C	0.10UF	K	
C509-511			CK73GB1H562J	CHIP C	5600PF	J	
C512,513			CK73GB1H332J	CHIP C	3300PF	J	
C514			CK73GB1H272J	CHIP C	2700PF	J	
C515			CC73HCH1H030C	CHIP C	3.0PF	C	
C516			CC73HCH1H151J	CHIP C	150PF	J	
C517			CK73HB1A104K	CHIP C	0.10UF	K	
C518			CK73HB1A333K	CHIP C	0.033UF	K	
C519			CC73HCH1H030C	CHIP C	3.0PF	C	
C520			CK73GB1H152J	CHIP C	1500PF	J	
C521			C92-0713-05	CHIP-TAN	10UF	6.3WV	
C522			CK73HB1A104K	CHIP C	0.10UF	K	
C523,524			CK73HB1H102K	CHIP C	1000PF	K	
C525			CK73HB1A104K	CHIP C	0.10UF	K	
C526			CK73GB1H562J	CHIP C	5600PF	J	
C527,528			CK73HB1A104K	CHIP C	0.10UF	K	
C529			CK73GB1H562J	CHIP C	5600PF	J	
C530			CK73FB0J475K	CHIP C	4.7UF	K	
C531			CK73HB1C153K	CHIP C	0.015UF	K	
C532			CK73HB1H561K	CHIP C	560PF	K	
C533			CK73HB1H102K	CHIP C	1000PF	K	
C534			CC73HCH1H560J	CHIP C	56PF	J	
C535			CK73HB1A104K	CHIP C	0.10UF	K	
C536,537			CK73FB0J475K	CHIP C	4.7UF	K	
C538			CK73HB1H471K	CHIP C	470PF	K	
C539,540			CK73HB1H102K	CHIP C	1000PF	K	
C541			CK73GB1C563K	CHIP C	0.056UF	K	
C542,543			CK73HB1H102K	CHIP C	1000PF	K	
C554-557			CK73HB1H102K	CHIP C	1000PF	K	
C700			CC73GCH1H0R5B	CHIP C	0.5PF	B	
C702			CK73HB1H471K	CHIP C	470PF	K	
C720			C92-0714-05	CHIP-TAN	4.7UF	6.3WV	
C730		*	CS77SJ0J2R2M	CHIP-TAN	2.2UF	6.3WV	
C730			C92-0800-05	CHIP-TAN	2.2UF	6.3WV	
C731			CC73HCH1H101J	CHIP C	100PF	J	
C740			CK73HB1A104K	CHIP C	0.10UF	K	
C741		*	C92-0802-05	CHIP-TAN	6.8UF	6.3WV	
C910,911			CK73HB1H102K	CHIP C	1000PF	K	
TC1,2			C05-0384-05	CERAMIC TRIMMER CAP(10P)			
CN300			E40-6178-05	PIN ASSY SOCKET			
CN301,302			E40-5856-05	FLAT CABLE CONNECTOR			
CN303-306			E40-6092-05	PIN ASSY			
CN400			E40-5856-05	FLAT CABLE CONNECTOR			
CN500			E40-6179-05	PIN ASSY			
F400			F53-0190-05	FUSE			
CD200			L79-1834-05	TUNING COIL			
CF200			L72-0962-05	CERAMIC FILTER			
CF201			L72-0934-05	CERAMIC FILTER			
L1			L40-4795-85	SMALL FIXED INDUCTOR(4.7UH)			
L3,4			L92-0163-05	BEADS CORE			
L5			L40-1575-92	SMALL FIXED INDUCTOR(15NH)			
L6			L40-3975-92	SMALL FIXED INDUCTOR(39NH)			
L7			L92-0163-05	BEADS CORE			
L8			L40-1085-92	SMALL FIXED INDUCTOR(100NH)			
L9			L92-0163-05	BEADS CORE			
L10-12			L40-1085-92	SMALL FIXED INDUCTOR(100NH)			
L15			L40-3978-67	SMALL FIXED INDUCTOR(39NH)			
L16			L40-4778-67	SMALL FIXED INDUCTOR(47NH)			
L17,18			L41-2285-03	SMALL FIXED INDUCTOR			

PARTS LIST / 零件表

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Ref. No.	Address	New parts	Parts No.	Description				Destination
L19,20			L40-3391-86	SMALL FIXED INDUCTOR(3.3UH)				
L21			L40-2775-92	SMALL FIXED INDUCTOR(27NH)				
L22			L92-0163-05	BEADS CORE				
L23			L40-8275-92	SMALL FIXED INDUCTOR(82NH)				
L100			L40-1875-92	SMALL FIXED INDUCTOR(18NH)				
L101			L40-3375-92	SMALL FIXED INDUCTOR(33NH)				
L102			L92-0162-05	BEADS CORE				
L103			L40-1575-54	SMALL FIXED INDUCTOR(15NH)				
L104			L92-0149-05	FERRITE CHIP				
L106			L34-4603-05	AIR-CORE COIL				
L107			L92-0149-05	FERRITE CHIP				
L108			L40-2285-54	SMALL FIXED INDUCTOR(220NH)				
L109			L34-4574-05	AIR-CORE COIL				
L110-112			L34-4564-05	AIR-CORE COIL				
L113			L40-1092-81	SMALL FIXED INDUCTOR				
L114,115			L40-8265-57	SMALL FIXED INDUCTOR(8.2NH)				
L116			L40-1863-92	SMALL FIXED INDUCTOR(1.8NH)				
L199			L41-2769-16	SMALL FIXED INDUCTOR				
L201,202			L40-1091-86	SMALL FIXED INDUCTOR(1.0UH)				
L203			L92-0163-05	BEADS CORE				
L204			L40-5685-85	SMALL FIXED INDUCTOR(0.56UH)				
L205,206			L40-2275-57	SMALL FIXED INDUCTOR(22.0NH)				
L207			L40-3375-92	SMALL FIXED INDUCTOR(33NH)				
L209			L41-1578-14	SMALL FIXED INDUCTOR				
L210,211			L41-1278-14	SMALL FIXED INDUCTOR				
L212			L92-0163-05	BEADS CORE				
L213			L41-2285-03	SMALL FIXED INDUCTOR				
L215			L41-1578-14	SMALL FIXED INDUCTOR				
L217			L41-1278-14	SMALL FIXED INDUCTOR				
L219			L41-3978-03	SMALL FIXED INDUCTOR				
L300-313			L92-0163-05	BEADS CORE				
L314-317			L92-0408-05	FERRITE CHIP				
L320			L92-0163-05	BEADS CORE				
L400			L92-0149-05	FERRITE CHIP				
L500			L92-0163-05	BEADS CORE				
L701			L40-2785-92	SMALL FIXED INDUCTOR(270NH)				
L710			L41-6869-16	SMALL FIXED INDUCTOR				
L730			L92-0163-05	BEADS CORE				
L904			L92-0419-05	FERRITE CHIP				
X1			L77-1871-05	TCXO(16.8MHZ)				
X200			L77-1760-15	CRYSTAL RESONATOR(44.395MHZ)				
X300			L77-1810-05	CRYSTAL RESONATOR(9.8304MHZ)				
X500			L77-1708-05	CRYSTAL RESONATOR(3.579545MHZ)				
XF200			L71-0530-05	MCF(44.85MHZ)				
CP1,2			RK75HA1J102J	CHIP-COM	1.0K	J	1/16W	
CP300-313			RK75HA1J102J	CHIP-COM	1.0K	J	1/16W	
CP314			RK75HA1J473J	CHIP-COM	47K	J	1/16W	
CP315			RK75HA1J102J	CHIP-COM	1.0K	J	1/16W	
CP316			RK75HA1J473J	CHIP-COM	47K	J	1/16W	
CP317-320			RK75HA1J102J	CHIP-COM	1.0K	J	1/16W	
CP322			RK75HA1J102J	CHIP-COM	1.0K	J	1/16W	
CP323,324			RK75HA1J473J	CHIP-COM	47K	J	1/16W	
CP326,327			RK75HA1J473J	CHIP-COM	47K	J	1/16W	
CP400,401			RK75HA1J473J	CHIP-COM	47K	J	1/16W	
CP500,501			RK75HA1J472J	CHIP-COM	4.7K	J	1/16W	
R1			RK73HB1J101J	CHIP R	100	J	1/16W	
R3			RK73HB1J151J	CHIP R	150	J	1/16W	
R4			RK73HB1J822J	CHIP R	8.2K	J	1/16W	
R5			RK73HB1J333J	CHIP R	33K	J	1/16W	
R6			RK73HB1J560J	CHIP R	56	J	1/16W	
R7			RK73HB1J332J	CHIP R	3.3K	J	1/16W	
R8			RK73HB1J102J	CHIP R	1.0K	J	1/16W	
R9			R92-1368-05	CHIP R	0 OHM			
R10			RK73HB1J102J	CHIP R	1.0K	J	1/16W	

Ref. No.	Address	New parts	Parts No.	Description				Destination
R11			RK73HB1J154J	CHIP R	150K	J	1/16W	
R13-15			RK73HB1J473J	CHIP R	47K	J	1/16W	
R16			RK73HB1J181J	CHIP R	180	J	1/16W	
R17			RK73HB1J101J	CHIP R	100	J	1/16W	
R18			RK73HB1J151J	CHIP R	150	J	1/16W	
R19			RK73HB1J101J	CHIP R	100	J	1/16W	
R20			RK73HB1J104J	CHIP R	100K	J	1/16W	
R21			RK73HB1J154J	CHIP R	150K	J	1/16W	
R22			RK73HB1J472J	CHIP R	4.7K	J	1/16W	
R23			RK73HB1J101J	CHIP R	100	J	1/16W	
R24			RK73HB1J102J	CHIP R	1.0K	J	1/16W	
R25			RK73HB1J682J	CHIP R	6.8K	J	1/16W	
R26			RK73HB1J103J	CHIP R	10K	J	1/16W	
R27			RK73HB1J331J	CHIP R	330	J	1/16W	
R28			RK73HH1J333D	CHIP R	33K	D	1/16W	
R29			RK73HH1J104D	CHIP R	100K	D	1/16W	
R31			RK73HB1J470J	CHIP R	47	J	1/16W	
R32-35			R92-1368-05	CHIP R	0 OHM			
R100,101			RK73HB1J472J	CHIP R	4.7K	J	1/16W	
R102			RK73HB1J473J	CHIP R	47K	J	1/16W	
R103			RK73HB1J331J	CHIP R	330	J	1/16W	
R104			RK73HB1J220J	CHIP R	22	J	1/16W	
R105			RK73HB1J681J	CHIP R	680	J	1/16W	
R106			RK73HB1J152J	CHIP R	1.5K	J	1/16W	
R107			RK73HB1J390J	CHIP R	39	J	1/16W	
R108,109			RK73HB1J331J	CHIP R	330	J	1/16W	
R111			RK73HB1J180J	CHIP R	18	J	1/16W	
R112			RK73HB1J331J	CHIP R	330	J	1/16W	
R114			RK73HB1J104J	CHIP R	100K	J	1/16W	
R115			RK73HB1J473J	CHIP R	47K	J	1/16W	
R116			RK73HB1J220J	CHIP R	22	J	1/16W	
R119,120			RK73EB2ER39K	CHIP R	0.39	K	1/4W	
R121			RK73HB1J223J	CHIP R	22K	J	1/16W	
R123			RK73EB2ER39K	CHIP R	0.39	K	1/4W	
R124			R92-1368-05	CHIP R	0 OHM			
R125			RK73GB1J101J	CHIP R	100	J	1/16W	
R126			RK73HB1J473J	CHIP R	47K	J	1/16W	
R127-129			RK73HH1J154D	CHIP R	150K	D	1/16W	
R131-133			RK73HH1J154D	CHIP R	150K	D	1/16W	
R134			RK73HB1J103J	CHIP R	10K	J	1/16W	
R136			RK73HB1J473J	CHIP R	47K	J	1/16W	
R138			R92-1368-05	CHIP R	0 OHM			
R139			RK73HH1J105D	CHIP R	1.0M	D	1/16W	
R140			RK73HB1J102J	CHIP R	1.0K	J	1/16W	
R142,143			RK73HB1J104J	CHIP R	100K	J	1/16W	
R145,146			RK73HB1J271J	CHIP R	270	J	1/16W	
R147			R92-1252-05	CHIP R	0 OHM	J	1/16W	
R149			R92-1368-05	CHIP R	0 OHM			
R151,152			R92-1368-05	CHIP R	0 OHM			
R200			RK73HB1J224J	CHIP R	220K	J	1/16W	
R201			RK73HB1J104J	CHIP R	100K	J	1/16W	
R202			RK73HB1J153J	CHIP R	15K	J	1/16W	
R203			RK73HH1J224D	CHIP R	220K	D	1/16W	
R204			RK73HH1J824D	CHIP R	820K	D	1/16W	
R205			RK73HB1J564J	CHIP R	560K	J	1/16W	
R206			RK73HB1J823J	CHIP R	82K	J	1/16W	
R207			RK73HB1J154J	CHIP R	150K	J	1/16W	
R208			RK73HB1J472J	CHIP R	4.7K	J	1/16W	
R209			RK73HB1J103J	CHIP R	10K	J	1/16W	
R210			RK73HB1J123J	CHIP R	12K	J	1/16W	
R211			RK73HB1J223J	CHIP R	22K	J	1/16W	
R212			RK73HB1J472J	CHIP R	4.7K	J	1/16W	
R213			RK73HB1J123J	CHIP R	12K	J	1/16W	
R214			RK73HB1J823J	CHIP R	82K	J	1/16W	
R215			RK73HB1J222J	CHIP R	2.2K	J	1/16W	

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PARTS LIST / 零件表

TX-RX UNIT (X57-6413-01)

Ref. No.	Address	New parts	Parts No.	Description				Destination
R216			RK73HB1J472J	CHIP R	4.7K	J	1/16W	
R217			RK73HB1J564J	CHIP R	560K	J	1/16W	
R218			RK73HB1J123J	CHIP R	12K	J	1/16W	
R219			RK73HB1J224J	CHIP R	220K	J	1/16W	
R220			RK73HB1J222J	CHIP R	2.2K	J	1/16W	
R221		*	RK73HH1J332D	CHIP R	3.3K	D	1/16W	
R222			RK73HB1J220J	CHIP R	22	J	1/16W	
R223			RK73HB1J184J	CHIP R	180K	J	1/16W	
R226			RK73HB1J221J	CHIP R	220	J	1/16W	
R227,228			RK73HB1J331J	CHIP R	330	J	1/16W	
R229			RK73HB1J472J	CHIP R	4.7K	J	1/16W	
R230			R92-1368-05	CHIP R	0 OHM			
R232			RK73HB1J102J	CHIP R	1.0K	J	1/16W	
R233			RK73HB1J151J	CHIP R	150	J	1/16W	
R234			RK73HB1J104J	CHIP R	100K	J	1/16W	
R235			RK73HB1J563J	CHIP R	56K	J	1/16W	
R236			RK73HB1J104J	CHIP R	100K	J	1/16W	
R237			RK73HB1J563J	CHIP R	56K	J	1/16W	
R238			R92-1368-05	CHIP R	0 OHM			
R239-241			RK73HB1J105J	CHIP R	1.0M	J	1/16W	
R243			RK73HB1J221J	CHIP R	220	J	1/16W	
R244			RK73HB1J104J	CHIP R	100K	J	1/16W	
R246			RK73HB1J104J	CHIP R	100K	J	1/16W	
R247			RK73HB1J683J	CHIP R	68K	J	1/16W	
R248			RK73HB1J105J	CHIP R	1.0M	J	1/16W	
R250			RK73HB1J102J	CHIP R	1.0K	J	1/16W	
R252			RK73HB1J470J	CHIP R	47	J	1/16W	
R253			R92-1252-05	CHIP R	0 OHM	J	1/16W	
R254			RK73HB1J470J	CHIP R	47	J	1/16W	
R255			RK73HH1J272D	CHIP R	2.7K	D	1/16W	
R256			RK73HB1J473J	CHIP R	47K	J	1/16W	
R259			RK73HB1J473J	CHIP R	47K	J	1/16W	
R260			RK73HB1J223J	CHIP R	22K	J	1/16W	
R264			RK73HB1J181J	CHIP R	180	J	1/16W	
R265			RK73HB1J334J	CHIP R	330K	J	1/16W	
R266			RK73HB1J272J	CHIP R	2.7K	J	1/16W	
R267			RK73HB1J334J	CHIP R	330K	J	1/16W	
R268			RK73HB1J221J	CHIP R	220	J	1/16W	
R270			R92-0670-05	CHIP R	0 OHM			
R273			R92-1368-05	CHIP R	0 OHM			
R276			R92-1368-05	CHIP R	0 OHM			
R300			RK73HB1J154J	CHIP R	150K	J	1/16W	
R301			RK73HB1J104J	CHIP R	100K	J	1/16W	
R302			RK73HB1J393J	CHIP R	39K	J	1/16W	
R303			RK73HB1J474J	CHIP R	470K	J	1/16W	
R304			RK73HB1J394J	CHIP R	390K	J	1/16W	
R308			RK73HB1J472J	CHIP R	4.7K	J	1/16W	
R309			R92-1368-05	CHIP R	0 OHM			
R310			RK73HB1J473J	CHIP R	47K	J	1/16W	
R311			RK73HB1J154J	CHIP R	150K	J	1/16W	
R312			RK73HB1J104J	CHIP R	100K	J	1/16W	
R313			RK73HB1J103J	CHIP R	10K	J	1/16W	
R314			RK73HB1J474J	CHIP R	470K	J	1/16W	
R315			RK73HB1J472J	CHIP R	4.7K	J	1/16W	
R316			RK73HB1J104J	CHIP R	100K	J	1/16W	
R317			RK73HB1J184J	CHIP R	180K	J	1/16W	
R318			RK73HB1J104J	CHIP R	100K	J	1/16W	
R319			RK73HB1J473J	CHIP R	47K	J	1/16W	
R320			RK73HB1J563J	CHIP R	56K	J	1/16W	
R321			RK73HB1J823J	CHIP R	82K	J	1/16W	
R322			RK73HB1J154J	CHIP R	150K	J	1/16W	
R323			RK73HB1J823J	CHIP R	82K	J	1/16W	
R324,325			RK73HB1J334J	CHIP R	330K	J	1/16W	
R326			R92-1368-05	CHIP R	0 OHM			
R327			RK73HB1J473J	CHIP R	47K	J	1/16W	
R328			RK73HB1J104J	CHIP R	100K	J	1/16W	
R329			RK73HB1J274J	CHIP R	270K	J	1/16W	
R330			RK73HB1J184J	CHIP R	180K	J	1/16W	
R331			RK73HB1J124J	CHIP R	120K	J	1/16W	
R332			RK73HB1J474J	CHIP R	470K	J	1/16W	
R333			RK73HB1J473J	CHIP R	47K	J	1/16W	
R334			RK73HB1J184J	CHIP R	180K	J	1/16W	
R336-338			RK73HB1J223J	CHIP R	22K	J	1/16W	
R339-341			RK73HB1J103J	CHIP R	10K	J	1/16W	
R342			RK73HB1J223J	CHIP R	22K	J	1/16W	
R343			RK73HB1J103J	CHIP R	10K	J	1/16W	
R344,345			R92-1368-05	CHIP R	0 OHM			
R346			RK73HB1J473J	CHIP R	47K	J	1/16W	
R347			RK73HB1J561J	CHIP R	560	J	1/16W	
R348			RK73HB1J472J	CHIP R	4.7K	J	1/16W	
R349,350			RK73HB1J473J	CHIP R	47K	J	1/16W	
R352,353			RK73HB1J102J	CHIP R	1.0K	J	1/16W	
R354			R92-1368-05	CHIP R	0 OHM			
R356			RK73HB1J473J	CHIP R	47K	J	1/16W	
R357			RK73HB1J471J	CHIP R	470	J	1/16W	
R359			RK73HB1J153J	CHIP R	15K	J	1/16W	
R360			RK73HB1J182J	CHIP R	1.8K	J	1/16W	
R361			RK73GB1J102J	CHIP R	1.0K	J	1/16W	
R362			RK73HB1J473J	CHIP R	47K	J	1/16W	
R363			RK73HB1J124J	CHIP R	120K	J	1/16W	
R364			RK73HB1J104J	CHIP R	100K	J	1/16W	
R365			RK73HB1J473J	CHIP R	47K	J	1/16W	
R366			RK73HB1J102J	CHIP R	1.0K	J	1/16W	
R367			RK73HB1J123J	CHIP R	12K	J	1/16W	
R368			RK73HB1J102J	CHIP R	1.0K	J	1/16W	
R369			RK73HB1J563J	CHIP R	56K	J	1/16W	
R370			RK73HB1J104J	CHIP R	100K	J	1/16W	
R371			RK73HB1J332J	CHIP R	3.3K	J	1/16W	
R372			R92-1368-05	CHIP R	0 OHM			
R373			RK73HB1J124J	CHIP R	120K	J	1/16W	
R374			RK73HB1J104J	CHIP R	100K	J	1/16W	
R376			RK73HB1J103J	CHIP R	10K	J	1/16W	
R377			RK73HB1J104J	CHIP R	100K	J	1/16W	
R378			RK73HB1J101J	CHIP R	100	J	1/16W	
R379			RK73HB1J821J	CHIP R	820	J	1/16W	
R380,381			RK73HB1J101J	CHIP R	100	J	1/16W	
R382			RK73HB1J103J	CHIP R	10K	J	1/16W	
R383			RK73HB1J101J	CHIP R	100	J	1/16W	
R384			RK73HB1J331J	CHIP R	330	J	1/16W	
R385			RK73HB1J470J	CHIP R	47	J	1/16W	
R386			RK73HB1J331J	CHIP R	330	J	1/16W	
R388			RK73HB1J474J	CHIP R	470K	J	1/16W	
R389			RK73HB1J472J	CHIP R	4.7K	J	1/16W	
R390			RK73HB1J821J	CHIP R	820	J	1/16W	
R391,392			RK73HB1J331J	CHIP R	330	J	1/16W	
R393			R92-1368-05	CHIP R	0 OHM			
R397,398			R92-1368-05	CHIP R	0 OHM			
R400			RK73HB1J103J	CHIP R	10K	J	1/16W	
R401,402			RK73HH1J474D	CHIP R	470K	D	1/16W	
R403			RK73HB1J334J	CHIP R	330K	J	1/16W	
R404			RK73HB1J105J	CHIP R	1.0M	J	1/16W	
R405			R92-1252-05	CHIP R	0 OHM	J	1/16W	
R406			RK73HB1J103J	CHIP R	10K	J	1/16W	
R407			RK73HB1J224J	CHIP R	220K	J	1/16W	
R408			RK73HB1J472J	CHIP R	4.7K	J	1/16W	
R409			RK73HB1J473J	CHIP R	47K	J	1/16W	
R410			RK73HB1J102J	CHIP R	1.0K	J	1/16W	
R411			RK73HB1J471J	CHIP R	470	J	1/16W	
R413			RK73HB1J105J	CHIP R	1.0M	J	1/16W	
R414			RK73HB1J103J	CHIP R	10K	J	1/16W	

PARTS LIST / 零件表

TX-RX UNIT (X57-6413-01)

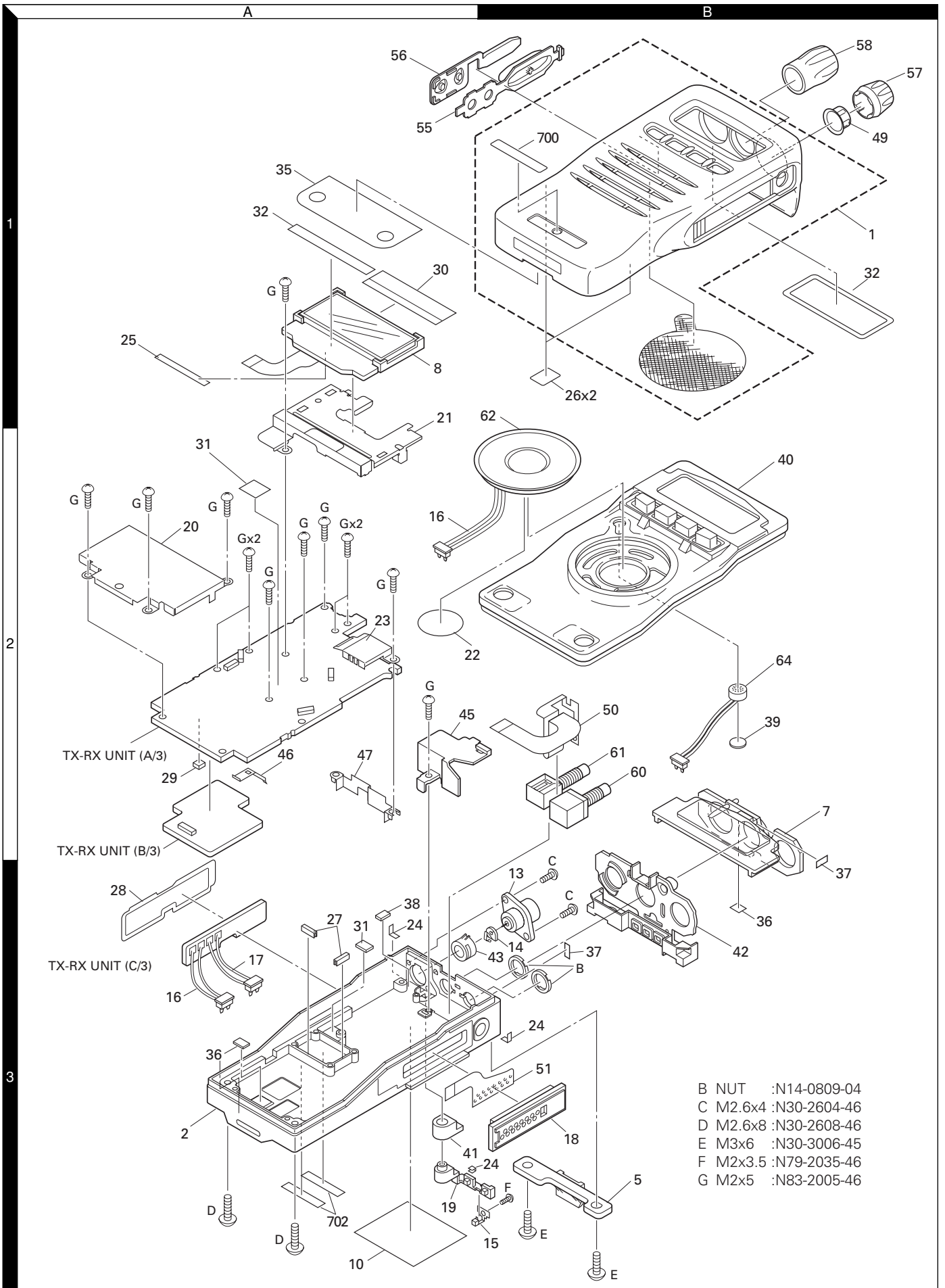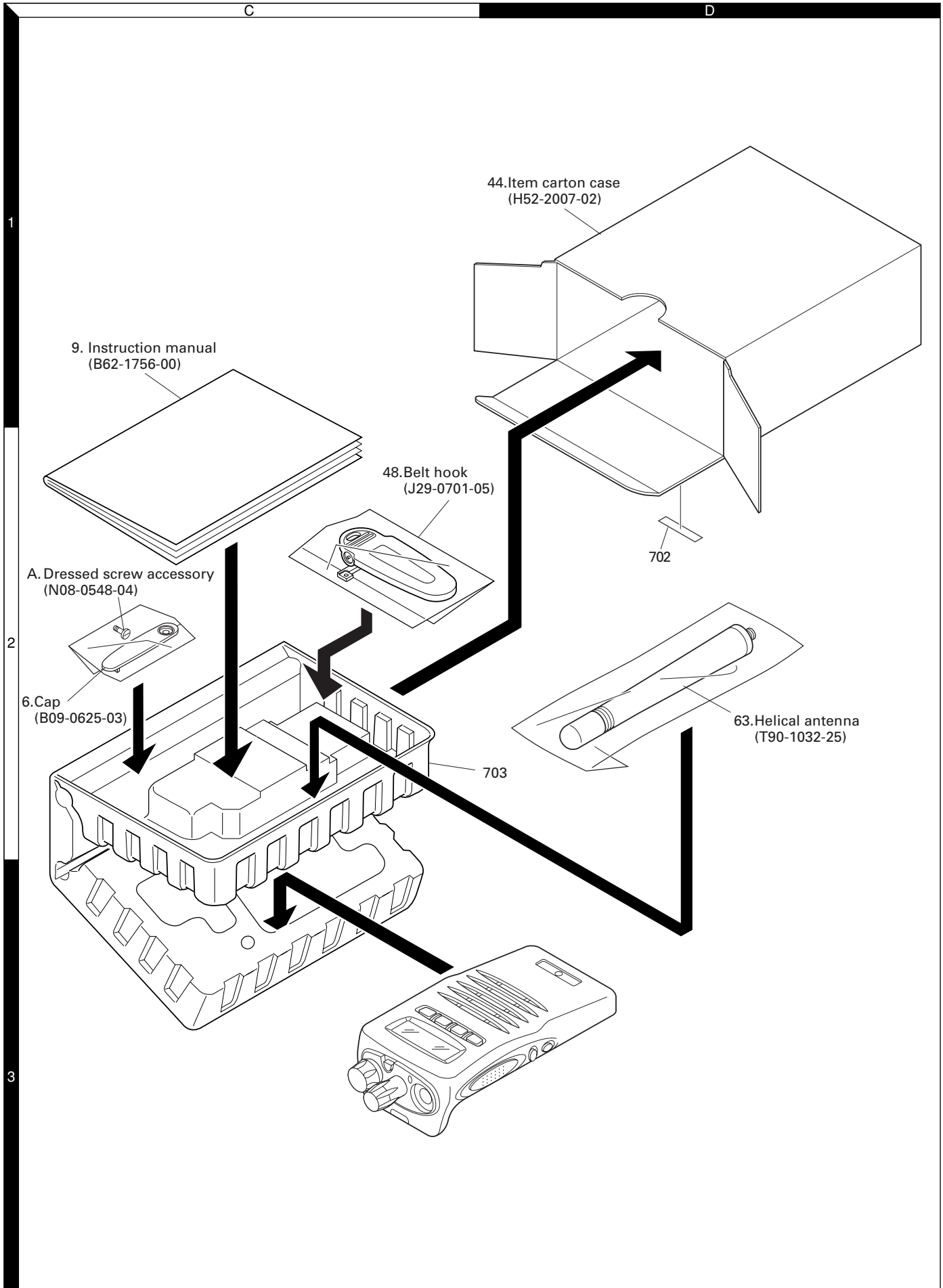| Ref. No.	Address	New parts	Parts No.	Description	Destination
R500			R92-1368-05	CHIP R 0 OHM	
R501			RK73HH1J913D	CHIP R 91K D 1/16W	
R502			RK73HH1J683D	CHIP R 68K D 1/16W	
R503			RK73HH1J333D	CHIP R 33K D 1/16W	
R504			RK73HH1J913D	CHIP R 91K D 1/16W	
R505			RK73HB1J564J	CHIP R 560K J 1/16W	
R506			R92-1368-05	CHIP R 0 OHM	
R507			RK73HH1J274D	CHIP R 270K D 1/16W	
R508			RK73HH1J913D	CHIP R 91K D 1/16W	
R509			R92-1368-05	CHIP R 0 OHM	
R510			RK73HH1J682D	CHIP R 6.8K D 1/16W	
R511			RK73GB1J155J	CHIP R 1.5M J 1/16W	
R512			RK73HH1J683D	CHIP R 68K D 1/16W	
R513			RK73HB1J474J	CHIP R 470K J 1/16W	
R514			RK73HH1J682D	CHIP R 6.8K D 1/16W	
R515			RK73HB1J101J	CHIP R 100 J 1/16W	
R516			RK73HB1J184J	CHIP R 180K J 1/16W	
R517			RK73HB1J103J	CHIP R 10K J 1/16W	
R518			RK73HB1J223J	CHIP R 22K J 1/16W	
R519			RK73HB1J102J	CHIP R 1.0K J 1/16W	
R520			RK73HB1J472J	CHIP R 4.7K J 1/16W	
R521			RK73HB1J474J	CHIP R 470K J 1/16W	
R522			RK73HB1J273J	CHIP R 27K J 1/16W	
R523			RK73HB1J470J	CHIP R 47 J 1/16W	
R524			RK73HB1J224J	CHIP R 220K J 1/16W	
R525			RK73HB1J184J	CHIP R 180K J 1/16W	
R526			RK73HB1J394J	CHIP R 390K J 1/16W	
R527			RK73HB1J224J	CHIP R 220K J 1/16W	
R528			RK73HB1J220J	CHIP R 22 J 1/16W	
R529			RK73HB1J473J	CHIP R 47K J 1/16W	
R530			RK73HB1J474J	CHIP R 470K J 1/16W	
R531			RK73HB1J184J	CHIP R 180K J 1/16W	
R532,533			RK73HB1J104J	CHIP R 100K J 1/16W	
R537			R92-1368-05	CHIP R 0 OHM	
R603-611			RK73HB1J471J	CHIP R 470 J 1/16W	
R612,613			R92-1368-05	CHIP R 0 OHM	
R614,615			RK73HB1J473J	CHIP R 47K J 1/16W	
R617,618			RK73HB1J473J	CHIP R 47K J 1/16W	
R620			RK73HB1J473J	CHIP R 47K J 1/16W	
R621			R92-1368-05	CHIP R 0 OHM	
R623			R92-1368-05	CHIP R 0 OHM	
R701			R92-1368-05	CHIP R 0 OHM	
R740			RK73HB1J473J	CHIP R 47K J 1/16W	
R741			R92-1252-05	CHIP R 0 OHM J 1/16W	
S600-602			S70-0457-05	TACT SWITCH	
D1-4			HVC376B	VARIABLE CAPACITANCE DIODE	
D5			1SV278	VARIABLE CAPACITANCE DIODE	
D6			MA2S111	DIODE	
D7-10			HVC376B	VARIABLE CAPACITANCE DIODE	
D100,101			HSC277	DIODE	
D102,103			HVC131	DIODE	
D104,105			HVC133	DIODE	
D106			HZU5CLL	ZENER DIODE	
D200			HVC131	DIODE	
D201			RB706F-40	DIODE	
D202,203			DAN235E	DIODE	
D204-207			HVC355B	VARIABLE CAPACITANCE DIODE	
D209			MA2S111	DIODE	
D300			RB706F-40	DIODE	
D301			1SS373	DIODE	
D302			DA221	DIODE	
D303,304			015AZ6.8	ZENER DIODE	
D305			015AZ2.4-X	ZENER DIODE	
D306			DA221	DIODE	
D307			015AZ6.8	ZENER DIODE	
D308			NNCD6.8G	ZENER DIODE	
D402			1SR154-400	DIODE	
D403			MA2S111	DIODE	
D405			RB521S-30	DIODE	
D501			RB706F-40	DIODE	
IC1		*	CD8468	MOS IC	
IC1			SA7025DK	MOS IC	
IC100			TA75W01FU	MOS IC	
IC200			TA31136FN	MOS IC	
IC201			TC75W51FU	MOS IC	
IC300			TC75W51FU	MOS IC	
IC302,303			TC75W51FU	MOS IC	
IC304			TC75S51F	MOS IC	
IC305,306			TC75W51FU	MOS IC	
IC307			M62364FP	MOS IC	
IC308			AT29C040A-90TI	ROM IC	
IC308			W29C020C90	SRAM IC	
IC309			30620M8A-2N3GP	MPU	
IC310			AT24C16N10SI18	ROM IC	
IC311,312			BU4094BCFV	MOS IC	
IC313			TDA7053AT	BI-POLAR IC	
IC400			XC61CN4202NR	MOS IC	
IC401		*	XC6204B502MR	MOS IC	
IC402			XC62GR5012PR	MOS IC	
IC403		*	XC6204B502MR	MOS IC	
IC404			XC61CN5002NR	MOS IC	
IC500			TC35453F	MOS IC	
IC501			TC75W51FU	MOS IC	
Q1			2SC5108(Y)	TRANSISTOR	
Q2,3			2SK508NV(K52)	FET	
Q4			2SJ347	FET	
Q5			2SC5108(Y)	TRANSISTOR	
Q6			RN47A4	TRANSISTOR	
Q7			2SC4617(S)	TRANSISTOR	
Q8			2SC5108(Y)	TRANSISTOR	
Q100			2SC5108(Y)	TRANSISTOR	
Q101			2SC5192	TRANSISTOR	
Q103			2SK2596	FET	
Q104,105			DTC114EE	DIGITAL TRANSISTOR	
Q106			2SK3476	FET	
Q107			2SK1824	FET	
Q108			DTA144EE	DIGITAL TRANSISTOR	
Q201			DTC144EE	DIGITAL TRANSISTOR	
Q202			RN47A4	TRANSISTOR	
Q203			2SK1824	FET	
Q204			2SK1830	FET	
Q205			2SC4649(N,P)	TRANSISTOR	
Q206,207			3SK318	FET	
Q208			2SC4617(S)	TRANSISTOR	
Q300			2SC4649(N,P)	TRANSISTOR	
Q301			2SJ347	FET	
Q302			2SC4617(S)	TRANSISTOR	
Q303			2SB1132(Q,R)	TRANSISTOR	
Q304			2SC4617(S)	TRANSISTOR	
Q305			UPA672T	FET	
Q306			2SC4617(S)	TRANSISTOR	
Q307			UPA672T	FET	
Q308			2SK1824	FET	
Q309,310			2SC4617(S)	TRANSISTOR	
Q311			2SA1362(Y)	TRANSISTOR	
Q400			2SJ347	FET	
Q401			2SK1830	FET	
Q403			DTC144EE	DIGITAL TRANSISTOR	
Q404			2SJ347	FET	

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PARTS LIST / 零件表

TX-RX UNIT (X57-6413-01)

Ref. No.	Address	New parts	Parts No.	Description	Destination	Ref. No.	Address	New parts	Parts No.	Description	Destination
Q405			KTA2015(Y)	TRANSISTOR							
Q406			2SJ347	FET							
Q500			DTC144EE	DIGITAL TRANSISTOR							
Q501			UPA672T	FET							
Q502			2SK1830	FET							
TH1			ERTJ0EV104H	THERMISTOR							
TH200			ERTJ0EV104H	THERMISTOR							
TH300			TN10-3S154JT	THERMISTOR							

EXPLODED VIEW / 部件分解图

B NUT   :N14-0809-04
C M2.6x4 :N30-2604-46
D M2.6x8 :N30-2608-46
E M3x6   :N30-3006-45
F M2x3.5 :N79-2035-46
G M2x5   :N83-2005-46

TX-RX UNIT (A/3)
TX-RX UNIT (B/3)
TX-RX UNIT (C/3)

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PACKING / 包装

44.Item carton case
(H52-2007-02)

9. Instruction manual
(B62-1756-00)

48.Belt hook
(J29-0701-05)

A.Dressed screw accessory
(N08-0548-04)

6.Cap
(B09-0625-03)

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63.Helical antenna
(T90-1032-25)

ADJUSTMENT / 调整

Test Equipment Required for Alignment

	Test Equipment		Major Specifications
1.	Standard Signal Generator (SSG)	Frequency Range	350 to 400MHz
		Modulation	Frequency modulation and external modulation.
		Output	-127dBm/0.1μV to greater than -47dBm/1mV
2.	Power Meter	Input Impedance	50Ω.
		Operation Frequency	350 to 400MHz or more.
		Measurement Range	Vicinity of 10W
3.	Deviation Meter	Frequency Range	350 to 400MHz.
4.	Digital Volt Meter (DVM)	Measuring Range	10mV to 10V DC
		Input Impedance	High input impedance for minimum circuit loading.
5.	Oscilloscope		DC through 30MHz.
6.	High Sensitivity Frequency Counter	Frequency Range	10Hz to 1000MHz.
		Frequency Stability	0.2ppm or less.
7.	Ammeter		5A.
8.	AF Volt Meter (AF VTVM)	Frequency Range	50Hz to 10kHz.
		Voltage Range	1mV to 10V.
9.	Audio Generator (AG)	Frequency Range	50Hz to 5kHz or more.
		Output	0 to 1V.
10.	Distortion Meter	Capability	3% or less at 1kHz.
		Input Level	50mV to 10Vrms.
11.	Spectrum Analyzer	Measuring Range	DC to 1GHz or more.
12.	Tracking Generator	Center frequency	50kHz to 600MHz
		Output Voltage	100mV or more
13.	16Ω Dummy Load		Approx. 16Ω, 3W.
14.	Regulated Power Supply		5V to 10V, approx. 5A
			Useful if ammeter equipped.

所需的用于调整的测试设备

	测试设备		主要规格
1.	标准信号发生器 (SSG)	频率范围	350 到 400MHz
		调制	调频和外部调制
		输出	-127dBm/0.1 μ V 到大于 -47dBm/1mV
2.	功率计	输入阻抗	50 Ω
		操作频率	350 到 400MHz 或更高
		测量范围	10W 左右
3.	频偏仪	频率范围	350 到 400MHz
4.	数字电压表（DVM）	测量范围	直流 10mV 到 10V
		输入阻抗	为最小电路负载高输入阻抗
5.	示波器		直流到 30MHz
6.	高灵敏度频率计数器	频率范围	10Hz 到 1000MHz
		频率稳定性	0.2ppm 或更低
7.	电流表		5A.
8.	音频电压表（AF VTVM）	频率范围	50Hz 到 10kHz
		电压范围	1mV 到 10V
9.	音频发生器	频率范围	50Hz 到 5kHz 或更高
		输出	0 到 1V
10.	失真测试仪	能力	在 1kHz 时 3％ 或更低
		输入电平	50mV 到 10Vrms
11.	频谱分析仪	测量范围	直流到 1GHz 或更高
12.	轨迹发生器	中心频率	50kHz 到 600MHz
		输出电压	100mV 或更高
13.	16 Ω假负载		大约 16 Ω，3W
14.	可调电源		5V 到 10V，大约 5A
			配备了电流表时更好

TK-3148

ADJUSTMENT / 调整

■ The following parts are required for adjustment

1. Antenna connector adapter

The antenna connector of this radio 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.)

Note

When the antenna connector adapter touches the knob, draw out the knob to mount the connector.

2. Universal connector

Use the interface cable (KPG-36) for PC tuning or the lead wire with plug (E30-3287-18) and screw (N08-0535-08) for panel tuning. Connect the plug to the universal connector of the radio and tighten the screw.

The lead wire with plug (E30-3287-18) and screw (N08-0535-08) terminals are as follows. Numbers are universal connector terminal numbers.

Caution

1. When connecting the plug to the universal connector of the radio, a short circuit may occur. To provent this, be sure to turn the radio POWER switch off.
2. Since the RX AF output is a BTL output, there is a DC component. Isolate this with a capacitor or transformer as shown in the figure.
3. Do not connct an instrument between red or black and GND.

• Universal connector

■ 下面是调整时所需的部件

1. 天线接口转换头

此手持机的天线接口使用 SMA 终端。

使用天线接口转换头[SMA（f）- BNC（f）或 SMA（f）- N（f）]进行转换。（转换头不作为可选件提供，因此请购买商用转换头。）
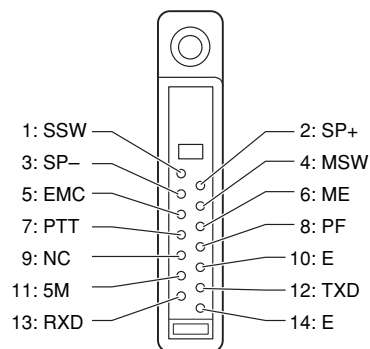
注释

当天线接口转换头接触到其他旋钮时·拔出该旋钮并安装转换头。

2. 通用接口

使用接口电缆（KPG-36）进行PC机调谐或使用带有插头（E30-3287-18）和螺钉（N08-0535-08）的引线进行面板调谐。

带有插头（E30-3287-18）和螺钉（N08-0535-08）的引线端点如下所示。号码是通用接口端子号码。

注意事项

1. 将插头与手持机通用接口连接时，可能发生短路。为了避免出现这种情况，一定要关闭手持机的电源开关。
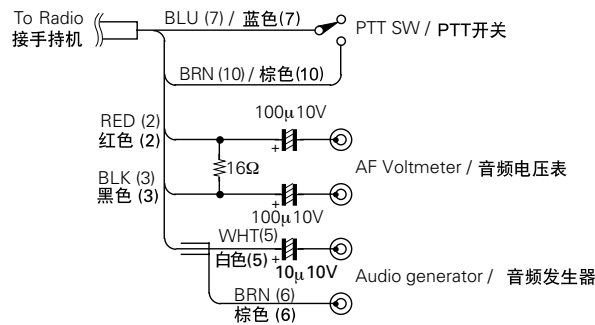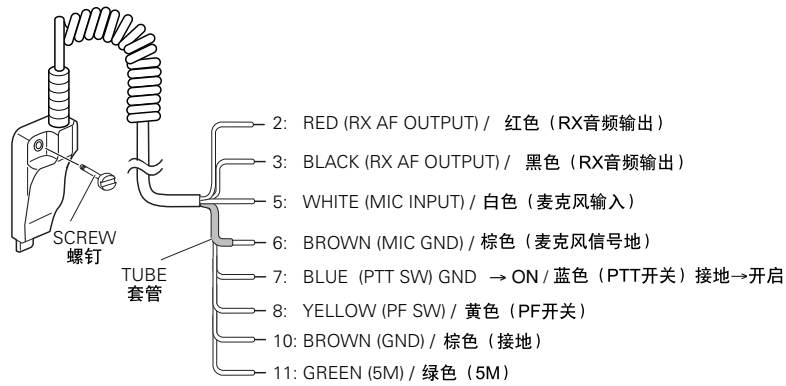2. 由于 RX 音频输出是 BTL 输出，所以有一个直流分量。如图所示，用电容或变压器将其隔离。
3. 在红色或黑色与接地之间不要连接仪器设备。

• 通用接口


```
1: SSW          2: SP+
3: SP–          4: MSW
5: EMC          6: ME
7: PTT          8: PF
9: NC          10: E
11: 5M         12: TXD
13: RXD        14: E
```

ADJUSTMENT / 调整

- **Panel tuning**

2: RED (RX AF OUTPUT) / 红色（RX音频输出）

3: BLACK (RX AF OUTPUT) / 黑色（RX音频输出）

5: WHITE (MIC INPUT) / 白色（麦克风输入）

6: BROWN (MIC GND) / 棕色（麦克风信号地）

7: BLUE (PTT SW) GND → ON / 蓝色（PTT开关）接地→开启

8: YELLOW (PF SW) / 黄色（PF开关）

10: BROWN (GND) / 棕色（接地）

11: GREEN (5M) / 绿色（5M）

SCREW
螺钉

TUBE
套管

To Radio
接手持机

BLU (7) / 蓝色(7)

PTT SW / PTT开关

BRN (10) / 棕色(10)

RED (2)
红色 (2)

100μ10V

BLK (3)
黑色 (3)

16Ω

AF Voltmeter / 音频电压表

100μ10V

WHT(5)
白色(5)

10μ10V

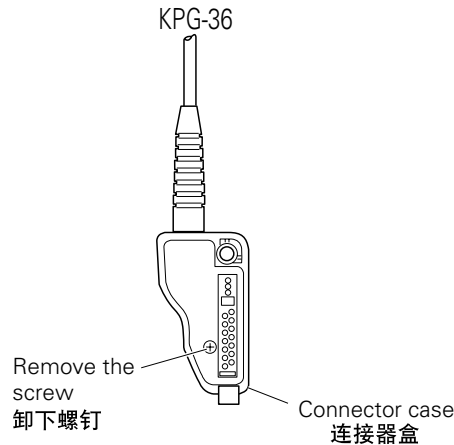Audio generator / 音频发生器

BRN (6)
棕色 (6)

- **PC tuning**

  Connect the wires to the PCB in the connector case of interface cable.

  For output the wires out of the connector case, need to process the connector case.

- PC 机调谐

  将电线连接到接口电缆连接器的 PCB 板上。

  要从连接器上拉出电线，需要取下连接器盒。

KPG-36

Remove the screw
卸下螺钉

Connector case
连接器盒

PCB layout
PCB布局

16 Ω

100 μ 10 V

100 μ 10 V

AF voltmeter / 音频电压表

10 μ 10 V

Audio generator / 音频发生器

Shield
屏蔽线

TK-3148
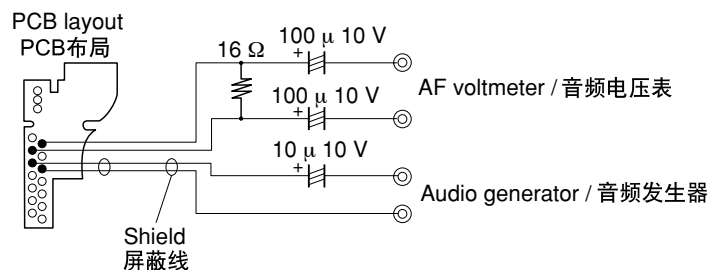
ADJUSTMENT / 调整

■ **Removing the front panel**

After removing the battery pack, knobs, and antenna, remove the 2 screws from the back of the transceiver. Lift the chassis away from the bottom part gently, then pull out the chassis as shown below.

■ 拆下前面板

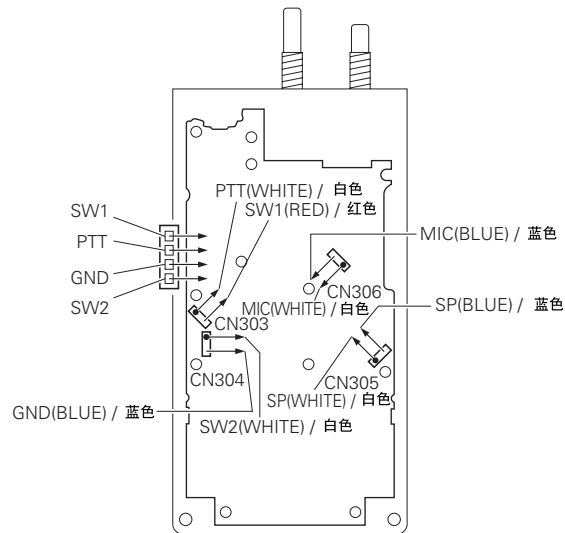拆下电池组、旋钮、天线之后，拆下收发机背面的两个螺钉。轻轻从底部抬起底盘，然后按下图所示拔出底盘。
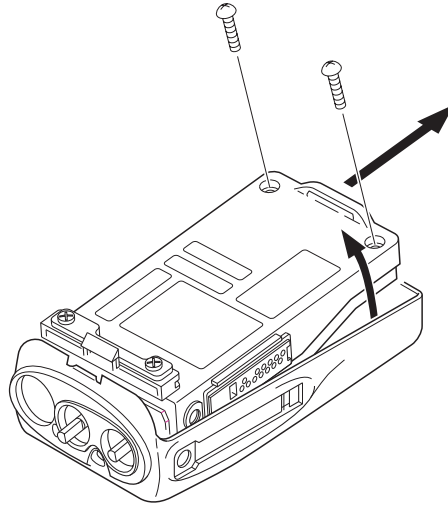
■ **Connecting the PTT, MIC, SP, and SW2 cables**

When connecting the PTT, MIC, SP and SW2 2-wire cables, ensure that the color of each cable mates as shown in the following diagram.

■ 连接 PTT、MIC、SP 和 SW2 电缆

在连接 PTT、MIC、SP 和 SW2 双线电缆时，确保各电缆的颜色匹配如下图所示。

ADJUSTMENT / 调整

■ **How to assemble the antenna connector and its terminal.**

The antenna connector and its terminal are supplied as separate parts.

When replacing the antenna connector and/ or terminal, assemble the parts prior to the replacement.

1. Mount the antenna connector onto the chassis ①.
• Double-sided adhesive tape is attached to the terminal; peel off the tape cover ②.
• Attach the terminal to the antenna connector as shown below.
• Slide the antenna terminal along the adhesive cushion on the chassis so that the adhesive part on the terminal is firmly attached to the antenna connector ③.

2. Remove the antenna connector from the chassis with its terminal attached, then solder the center part of antenna connector to its terminal ④.
Do not use excessive solder on terminal.

■ 如何组装天线连接器及其端子

天线连接器及其端子是单独提供的部件。当更换天线连接器和／或端子时，在换上前先将其组装起来。

1. 把天线连接器安装到底盘 ① 上。
• 在端子上贴上双面胶，揭掉双面胶覆层 ②。
• 按下图所示把端子安装到天线连接器上。
• 延底盘上的胶粘垫滑动天线端子，使端子上的胶粘部分牢固地与天线连接器 ③ 粘接在一起。

2. 把天线连同连接在上面的端子从底盘上拆下，然后把天线连接器的中心部分焊接到端子 ④ 上。
注意端子上不要使用过多焊料。

TOP / 顶部

Bottom / 底部

cushion
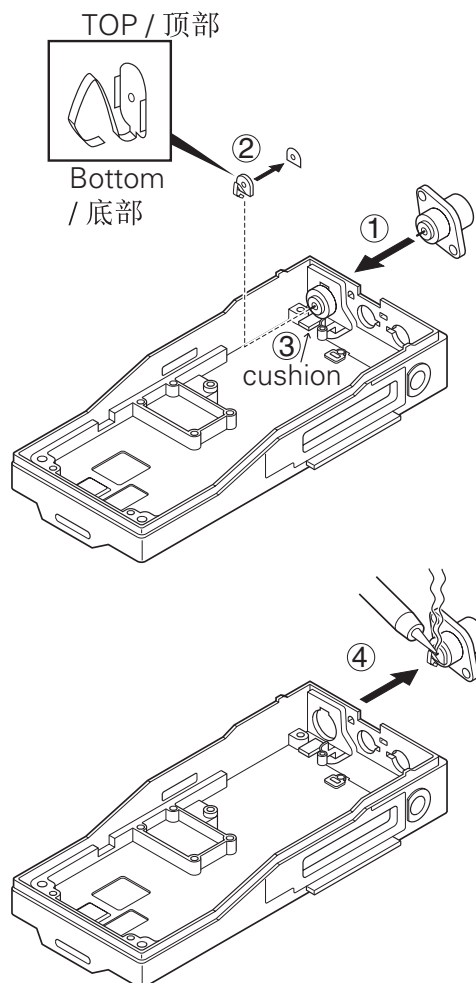
TK-3148

ADJUSTMENT / 调整

Repair Jig (Chassis)

Use jig (part No.: A-10-4060-04) for repairing the TK-3148. Place the TX-RX unit on the jig and fit it with screws.

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

Battery Jig (W05-0909-00)

+ Terminal (Red)
＋极端子(红色)

− Terminal (Black)
−极端子(黑色)

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.

How to Remove the Cable

1. Gently draw out both sides of the connector lever uniformly in the direction of the arrow with tweezers.
   (CN303, CN304, CN305, CN306)
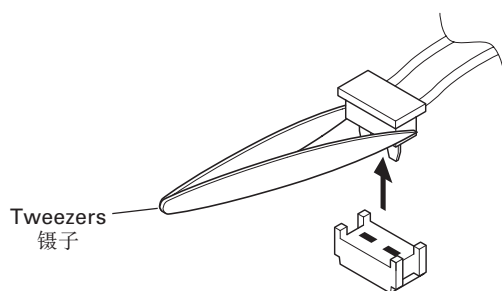
Tweezers
镊子

2. Gently rise up the connector lever in the direction of the arrow with a fine regular screwdriver or tweezers.
   (CN301, CN302, CN400)

Regular screwdriver
常用的改锥

Flat cable
扁平电缆

Lever
推杆
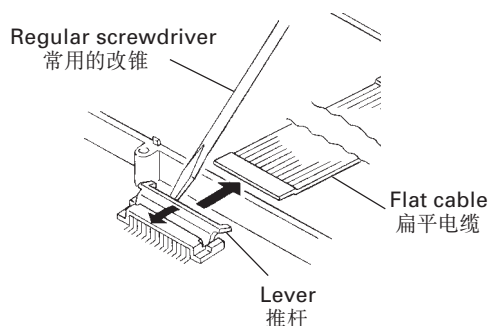
维修机架（机壳）

使用机壳（A-10-4060-04）维修 TK-3148。将 TX-RX 单元放置在机壳上，并且拧上螺钉。

在维修过程中，当需要在 TX-RX 单元的电路板上检测到电压时，机壳可以方便地进行电压检测，并且保护模块。

电池夹具（W05-0909-00）

在安装了电池夹具的无线电收发机和电源之间连接电源电缆，并确认输出电压和两极接通后电源是否确实接通，否则过高电压和电极连接颠倒都有可能损坏无线电收发机或电源或都被损坏。

注: 当使用电池夹具时，你必须测试电池夹具的两个电极的电压。否则当无线电收发机收发信时，在电源和电池夹具之间的电缆线上会发生微小的电压降。

如何取下电缆

1. 按照箭头所示的方向，用镊子均匀地将连接器推杆的两侧橇开。
   （CN303, CN304, CN305, CN306）

2. 使用常用的小型改锥，按照箭头所示的方向小心地抬起连接器的推杆。
   （CN301, CN302, CN400）

ADJUSTMENT / 调整

Test Mode

■ Test mode operating features

This transceiver has a test mode. ***To enter test mode, press [A] key and turn power on. Hold [A] key until test channel No. and test signalling No. appears on LCD.*** Test mode can be inhibited by programming. To exit test mode, switch the power on again. The following functions are available in test mode.

- **Controls**

Controls	"FNC" appears	"FNC" not appears
[Side 1]	Release FNC	Monitor ON and OFF.
[Side 2]	Lamp ON/OFF	Wide/Narrow
[S]	FFSK 1200bps and 2400bps	Sets to the Tuning mode.
[A]	Release FNC	FNC ON.
[B]	Compander function ON and OFF.	RF power HIGH and LOW.
[C]	Beat shift ON and OFF	Changes signalling.
[ENCODER]	Release FNC	Changes channel.

- **LCD indicator**

"SCN"	Unused
"ﭏ"	Lights at Compander ON.
"LO"	Lights at RF Power Low.
"P"	Unused
"MON"	Lights at moniter ON.
"SVC"	Unlock
"✉"	Lights at FFSK 2400bps.
"W"	Wide/Narrow

- **LED indicator**

Red LED	Lights during transmission. Blinks at the low battery voltage warning.
Green LED	Lights when there is a carrier.

- **Sub LCD indicator**

"FNC"　　　　appears at Function ON.

■ Frequency and signalling

The set 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) (C type)

Channel No.	RX frequency	TX frequency
1	370.05	370.10
2	350.05	350.10
3	389.95	389.90
4	370.00	370.00
5	370.20	370.20
6	370.40	370.40
7 ~ 16	——	——

测试模式

■ 测试模式操作特性

手持机具有测试模式。**要进入测试模式，需要按[A]健，然后接通电源开关。按住[A]键直到测试信道号码和信令号码出现在显示器上为止。**测试模式可以通过编程禁止使用。要退出测试模式，需要再次接通电源开关。下述功能在测试模式中有效。

- 控制

控制	显示"FNC"	不显示"FNC"
[侧面 1]	释放 FNC	开启和关闭监听
[侧面 2]	开启 / 关闭指示灯	宽 / 窄
[S]	FFSK1200bps 和 2400bps	设定为调谐模式
[A]	释放 FNC	开启 FNC
[B]	开启和关闭语音压扩器	射频功率高和低
[C]	开启和关闭 Beat shift	改变信令
[ENCODER]	释放 FNC	改变信道

- LCD 显示

"SCN"	不用
"ﭏ"	语音压扩器开启时点亮
"LO"	射频功率为低时点亮
"P"	不用
"MON"	开启监听时点亮
"SVC"	失锁
"✉"	FFSK 为 2400bps 时点亮
"W"	宽 / 窄带

- 发光二极管指示灯

红色发光二极管　发射时发光。电池低压告警时闪动。

绿色发光二极管　有载波时发光。

- 子显示器指示灯

"FNC"　开启功能时显示。

■ 频率和信令

下述表格中频率的设定可以被调整。需要时，可以按照调整步骤重新设定这些频率，从而获得用户实际操作需要的频率。

频率（MHz）（C 型）

信道号码	RX 频率	TX 频率
1	370.05	370.10
2	350.05	350.10
3	389.95	389.90
4	370.00	370.00
5	370.20	370.20
6	370.40	370.40
7 – 16	——	——

TK-3148

ADJUSTMENT / 调整

Note

You must adjust the frequencies in all channels as shown above, even though the channel frequencies in the 3 row are below the specifications of the TK-3148.

Signalling

Signalling No.	RX	TX
1	None	None
2	None	100Hz Square wave
3	QT 67.0Hz	QT 67.0Hz
4	QT 151.4Hz	QT 151.4Hz
5	QT 210.7Hz	QT 210.7Hz
6	QT 250.3Hz	QT 250.3Hz
7	DQT 023N	DQT 023N
8	DQT 754I	DQT 754I
9	None	DTMF tone 9
10	None	Single Tone 1200Hz (HSD OUT)
11	None	Single Tone 1200Hz (MODEM OUT)
12	None	Single Tone 1800Hz (MODEM OUT)
13	None	FFSK(PN pattern)
14	FFSK(CODE)	FFSK(CODE)

- **Preparations for tuning the transceiver**

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

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

  The speaker output connector must be terminated with a 16Ω dummy load and connected to an AC voltmeter and an audio distortion meter or a SINAD measurement meter at all times during tuning.

- **Transceiver tuning**

  (To place transceiver in tuning mode)

  Channel appears on LCD. Set channel according to tuning requirements.

LCD display (Test mode)

⊔⊔1⊔－⊔⊔1

channel No.   Signalling No.

Press [S], now in tuning mode. Use [◄ B] button to write tuning data through tuning modes, and channel selector knob to adjust tuning requirements (1 to 256 appears on LCD).

Use [C ►] button to select the adjustment item through tuning modes. Use [A] button to adjust 3 or 5 point tuning. And use [Side 2] button to switch between Wide/Narrow.

注释

用户必须调整上述所有信道中的频率，即使第3行的信道频率低于 TK-3148 的规格。

信令

信令号码	RX	TX
1	无	无
2	无	100Hz 方形波
3	QT67.0Hz	QT67.0Hz
4	QT151.4Hz	QT151.4Hz
5	QT210.7Hz	QT210.7Hz
6	QT250.3Hz	QT250.3Hz
7	DQT023N	DQT023N
8	DQT754I	DQT754I
9	无	DTMF 音频 9
10	无	单音 1200Hz（HSD 输出）
11	无	单音 1200Hz（调制解调器输出）
12	无	单音 1800Hz（调制解调器输出）
13	无	FFSK（PN 形式）
14	FFSK（代码）	FFSK（代码）

- **调整手持机的准备**

  在进行调整手持机之前，将主机与电源连接。

  无论何时调整发射部分，主机必须连接到合适的假负载（或功率仪）。

  在整个调整过程中，扬声器输出必须经过16Ω假负载并被连接到一个交流电压表和一个音频失真测试仪或一个SINAD测量仪。

- **手持机调整**

  （将手持机置于调整模式）

  信令显示在 LCD 上。按照调整所需设定信令。

LCD 显示（测试模式）

⊔⊔1⊔－⊔⊔1

信道号码   信令号码
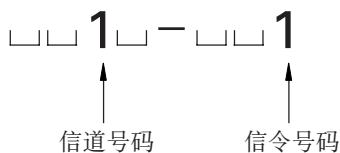
按[S]键进入调谐模式。使用[◄B]键通过调谐模式写入调谐数据，信道选择器按钮调整调谐要求（1 到 256 出现在显示器上）。

使用[C►]键通过调谐模式选择调整的项目。使用[A]键调整3或5点调谐。并使用 [侧面 2] 按钮在宽／窄之间切换。

ADJUSTMENT / 调整

LCD display (Tuning mode)

LCD 显示（调谐模式）

FREQ ⎵⎵⎵1

FREQ ⎵⎵⎵1

Adjustment item   Adjustment (1~256)

调整项目   调整（1~256）

Panel Tuning Mode (C Type)

TEST Ch	RX frequency (MHz)	TX frequency (MHz)
L	350.05	350.1
L2	360.05	360.1
C	370.05	370.1
H2	380.05	380.1
H	389.95	389.9

面板调谐模式（C 型）

测试信道	RX 频率（MHz）	TX 频率（MHz）
L	350.05	350.1
L2	360.05	360.1
C	370.05	370.1
H2	380.05	380.1
H	389.95	389.9

Note

You must adjust the frequencies in all test channels as shown above, even though the test channel frequencies in the H row are below the specifications of the TK-3148.

注释

用户必须调整上述所有测试信道中的频率，即使第 H 行的测试信道频率超出 TK-3148 的规格。

■ Panel Tuning Mode / 面板调谐模式

TK-3148

ADJUSTMENT

Common Section

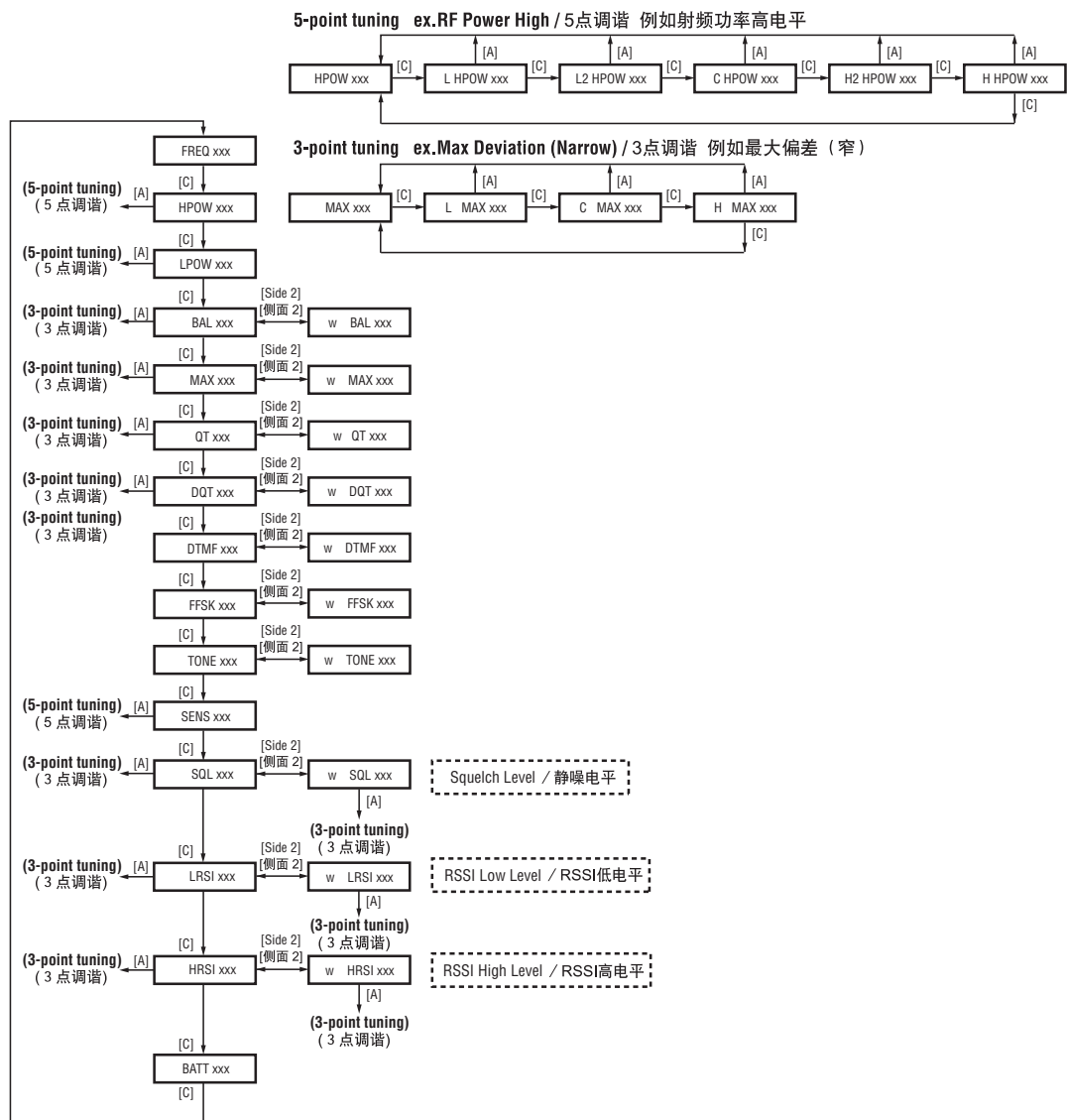| Item	Condition	Measurement			Adjustment			Specifications/ Remark
		Test equipment	Unit	Terminal	Unit	Parts	Method	
1. Setting	1) BATT terminal voltage:7.5V 2) SSG Standard modulation [Wide] MOD:1kHz, DEV:3kHz [Narrow] MOD:1kHz, DEV:1.5kHz							
2. VCO lock voltage RX TX	**[Panel Test Mode]** 1) CH-Sig:2-1 2) CH-Sig:3-1 3) CH-Sig:2-1 PTT:ON 4) CH-Sig:3-1 PTT:ON	Power meter DVM	Panel TX-RX	ANT CV	TX-RX	TC2 TC1	4.0V Check 4.0V Check	±0.1V 0.6V or more ±0.1V 0.6V or more

Transmitter Section [Panel Tuning Mode except when Panel TEST Mode is specified.]

Item	Condition	Measurement			Adjustment			Specifications/ Remark
		Test equipment	Unit	Terminal	Unit	Parts	Method	
1. Frequency Adjust	1) Adj item [FREQ] Adjust [∗∗∗] PTT:ON	Freq. Counter Power meter Am meter	Panel	ANT	Panel	Encoder knob	Center frequency ± 100Hz (Note:) After replacing the TCXO (X1), align using KPG-74D CPS	
2. Hight Power Adjust	1) Adj item [HPOW] Adjust [∗∗∗] 2) Adj item [L HPOW] → [L2 HPOW] → [C HPOW] → [H2 HPOW] → [H HPOW] Adjust [∗∗∗] PTT:ON					Encoder knob	4.0W	±0.1W 1.9A or less
3. Hight Power Check	**[Panel Test Mode]** 1) CH-Sig:1-1 PTT:ON 2) CH-Sig:2-1 PTT:ON 3) CH-Sig:3-1 PTT:ON						Check	3.7~4.3W 1.9A or less
4. Low Power Adjust	1) Adj item [LPOW] Adjust [∗∗∗] 2) Adj item [L LPOW] → [L2 LPOW] → [C LPOW] → [H2 LPOW] → [H LPOW] Adjust [∗∗∗] PTT:ON				Panel	Encoder knob	1.0W	±0.05W 1.0A or less
5. Low Power Check	**[Panel Test Mode]** 1) CH-Sig:1-1 Set low power (Push [C]) PTT:ON 2) CH-Sig:2-1 PTT:ON 3) CH-Sig:3-1 PTT:ON						Check	0.5~1.5W 1.0A or less

调整

公用部分

项目	条件	测量			调整			规格 / 备注
		测试设备	单元	终端	单元	部件	方法	
1. 设定	1) 电池终端 电压：7.5V 2)SSG 标准 调制 [宽带]MOD:1kHz DEV:3kHz [窄带]MOD:1kHz DEV:1.5kHz							
2. 压控振荡器电压 RX TX	[面板测试模式] 1) CH-Sig:2-1 2) CH-Sig:3-1 3) CH-Sig:2-1 PTT:开启 4) CH-Sig:3-1 PTT:开启	功率仪 DVM	面板 TX-RX	ANT CV（CN14）	TX-RX	TC2 TC1 检查	4.0V 检查 4.0V 	± 0.1V 0.6V 或更高 ± 0.1V 0.6V 或更高

发射部分 ［面板调谐模式除非面板测试模式已被指定］

项目	条件	测量			调整			规格 / 备注
		测试设备	单元	终端	单元	部件	方法	
1. 频率 调整	1) 调整项目[FREQ] 调整[＊＊＊] PTT:开启	频率计 功率仪 电流表	面板	ANT	面板	编码旋钮		中心频率 ± 100HZ (注释:) 更换 TCXO（X1）之后, 使用 KPG-74D CPS 进行调整。
2. 高功率 调整	1) 调整项目[HPOW] 调整[＊＊＊] 2) 调整项目 [L HPOW] → [L2 HPOW] → [C HPOW] → [H2 HPOW] → [H HPOW] 调整[＊＊＊] PTT:开启					编码旋钮	4.0W	± 0.1W 1.9A 或更低
3. 高功率 检查	[面板测试模式] 1) CH-Sig:1-1 PTT:开启 2) CH-Sig:2-1 PTT:开启 3) CH-Sig:3-1 PTT:开启						检查	3.7~4.3W 1.9A 或更低
4. 低功率 调整	1) 调整项目[LPOW] 调整[＊＊＊] 2) 调整项目 [L LPOW] → [L2 LPOW] → [C LPOW] → [H2 LPOW] → [H LPOW] 调整[＊＊＊] PTT:开启				面板	编码旋钮	1.0W	± 0.05W 1.0A 或更低
5. 低功率 检查	[面板测试模式] 1) CH-Sig:1-1 设定低功率（按[C]键） PTT:开启 2) CH-Sig:2-1 PTT:开启 3) CH-Sig:3-1 PTT:开启						检查	0.5~1.5W 1.0A 或更低

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ADJUSTMENT

Transmitter Section [Panel Tuning Mode except when Panel TEST Mode is specified.]

Item	Condition	Measurement			Adjustment			Specifications/ Remark
		Test equipment	Unit	Terminal	Unit	Parts	Method	
6. DQT Balance Adjust [Narrow]	1) Adj item [BAL] Adjust [∗∗∗] LPF:3kHz HPF:OFF 2) Adj item [L BAL] → [C BAL] → [H BAL] Adjust [∗∗∗] PTT:ON	Power meter Deviation meter Oscilloscope AG AF VTVM	Panel	ANT Universal connector	Panel	Encoder knob	Make the demodulation waves into square waves	
[Wide]	3) Adj item [w BAL] Adjust [∗∗∗] PTT:ON							
7. Max DEV Adjust [Narrow]	1) Adj item [MAX] Adjust [∗∗∗] AG:1kHz / 150mV Deviation meter filter LPF:15kHz HPF:OFF 2) Adj item [L MAX] → [C MAX] → [H MAX] Adjust [∗∗∗] PTT:ON						1.85kHz (According to the larger+,-)	±50Hz
[Wide]	3) Adj item [w MAX] Adjust [∗∗∗] PTT:ON						4.20kHz (According to the larger+,-)	
8. MIC Sensitivity Check	**[Panel Test Mode]** 1) CH-Sig: 1-1 AG:1kHz / Narrow 15mV Wide 12mV LPF:15kHz PTT:ON						Check	Narrow 1.0~2.2kHz Wide 2.4~3.6kHz
9. QT Deviation Adjust [Narrow]	1) Adj item [QT] Adjust [∗∗∗] LPF:3kHz HPF:OFF 2) Adj item [L QT] → [C QT] → [H QT] Adjust [∗∗∗] PTT:ON		Panel	ANT Universal connector	Panel	Encoder knob	0.35kHz	±50Hz
[Wide]	3) Adj item [w QT] Adjust [∗∗∗] PTT:ON						0.75kHz	
10. DQT Devition Adjust [Narrow]	1) Adj item [DQT] Adjust [∗∗∗] LPF:3kHz HPF:OFF 2) Adj item [L DQT] → [C DQT] → [H DQT] Adjust [∗∗∗] PTT:ON						0.35kHz	
[Wide]	3) Adj item [w DQT] Adjust [∗∗∗] PTT:ON						0.75kHz	

调整

发射部分［面板调谐模式除非面板测试模式已被指定］

项目	条件	测量			调整			规格 / 备注
		测试设备	单元	终端	单元	部件	方法	
6. DQT 平衡调整 [窄]	1）调整项目[BAL] 调整[＊＊＊] 　LPF:3kHz 　HPF:关闭 2）调整项目 [L BAL] → [C BAL] → [H BAL] 调整[＊＊＊] PTT:开启	功率仪 偏差仪 示波器 AG AF VTVM	面板	ANT 通用接口	面板	编码旋钮	使调整波形为方形波。	⊓⊔
[宽]	3）调整项目[w BAL] 调整[＊＊＊] PTT:开启							
7. 最大 DEV 调整 [窄]	1）调整项目[MAX] 调整[＊＊＊] AG:1kHz/150mV 频偏仪滤波器 　LPF:15kHz 　HPF:关闭 2）调整项目 [L MAX] → [C MAX] → [H MAX] 调整[＊＊＊] PTT:开启						1.85kHz （按照较大 +,-)	± 50Hz
[宽]	3）调整项目[w MAX] 调整[＊＊＊] PTT:开启						4.20kHz （按照较大 +,-)	
8. 话筒灵敏度检查	[面板测试模式] 1）CH-Sig:1-1 AG:1kHz/ 窄 15mV 　　　　 宽 12mV 　LPF:15kHz PTT:开启						检查	窄 1.0~2.2kHz 宽 2.4~3.6kHz
9. QT 频偏调整 [窄]	1）调整项目[QT] 调整[＊＊＊] 　LPF:3kHz 　HPF:关闭 2）调整项目 [L QT] → [C QT] → [H QT] 调整[＊＊＊] PTT:开启	面板		ANT 通用接口	面板	编码旋钮	0.35kHz	± 50Hz
[宽]	3）调整项目[w QT] 调整[＊＊＊] PTT:开启						0.75kHz	
10. DQT 频偏调整 [窄]	1）调整项目[DQT] 调整[＊＊＊] 　LPF:3kHz 　HPF:关闭 2）调整项目 [L DQT] → [C DQT] → [H DQT] 调整[＊＊＊] PTT:开启						0.35kHz	
[宽]	3）调整项目[w DQT] 调整[＊＊＊] PTT:开启						0.75kHz	

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ADJUSTMENT

Transmitter Section [Panel Tuning Mode except when Panel TEST Mode is specified.]

Item	Condition	Measurement			Adjustment			Specifications/ Remark
		Test equipment	Unit	Terminal	Unit	Parts	Method	
11. DTMF Deviation Adjust [Narrow]	1) Adj item [DTMF] Adjust [∗∗∗] LPF:15kHz HPF:OFF PTT:ON	Power meter Deviation meter Oscilloscope AG AF VTVM	Panel	ANT Universal connector	Panel	Encoder knob	1.25kHz	±0.1kHz
[Wide]	2) Adj item [w DTMF] Adjust [∗∗∗] PTT:ON						2.5kHz	±0.1kHz
12.FFSK Deviation Adjust [Narrow]	1) Adj item [FFSK] Adjust [∗∗∗] LPF:15kHz HPF:OFF PTT:ON						1.5kHz	±0.1kHz
[Wide]	2) Adj item [w FFSK] Adjust [∗∗∗] PTT:ON						3.0kHz	±0.1kHz
13.TONE Deviation Adjust [Narrow]	1) Adj item [TONE] Adjust [∗∗∗] LPF:15kHz HPF:OFF PTT:ON						1.5kHz	±0.1kHz
[Wide]	2) Adj item [w TONE] Adjust [∗∗∗] PTT:ON						3.0kHz	±0.1kHz
14.BATT Detection Writing	1) Adj item [BATT] Adjust [∗∗∗] PTT:ON	Power meter DVM		ANT BATT terminal			After pressing the PTT switch, confirm that one predeter-mined numeric in the range of 1 to 256 appears and then press the [B] key. That number will be stored in memory	BATT terminal voltage:6.2V
15.BATT Detection Check	**[Panel Test Mode]** 1) CH-Sig:1-1 BATT terminal voltage:6.5V PTT:ON						Check	No blinking of LED
	2) BATT terminal voltage:5.7V PTT:ON							Blinking of LED

调整

发射部分［面板调谐模式除非面板测试模式已被指定］

项目	条件	测量			调整			规格／备注
		测试设备	单元	终端	单元	部件	方法	
11.DTMF 频偏 调整 [窄]	1）调整项目[DTMF] 调整[＊＊＊] 　　LPF:15kHz 　　HPF:关闭 　　PTT:开启	功率仪 偏差仪 示波器 AG AF VTVM	面板	ANT 通用接口	面板	编码旋钮	1.25kHz	± 0.1kHz
[宽]	2）调整项目[w DTMF] 调整[＊＊＊] 　　PTT:开启						2.5kHz	± 0.1kHz
12.FFSK 频偏 调整 [窄]	1）调整项目[FFSK] 调整[＊＊＊] 　　LPF:15kHz 　　HPF:关闭 　　PTT:开启						1.5kHz	± 0.1kHz
[宽]	2）调整项目[w FFSK] 调整[＊＊＊] 　　PTT:开启						3.0kHz	± 0.1kHz
13.TONE 频偏 调整 [窄]	1）调整项目[TONE] 调整[＊＊＊] 　　LPF:15kHz 　　HPF:关闭 　　PTT:开启						1.5kHz	± 0.1kHz
[宽]	2）调整项目[w TONE] 调整[＊＊＊] 　　PTT:开启						3.0kHz	± 0.1kHz
14.电池 检测 写入	1）调整项目[BATT] 调整[＊＊＊] 　　PTT:开启	功率仪 DVM		ANT 电池 终端			按下 PTT 开关 后，确认一个1 到 256 内的预 定数字出现， 然后按 [B]键。 此数字将储存 在存储器中。	电池终端 电压：6.2V
15.电池 检测 检查	[面板测试模式] 1）CH-Sig:1-1 　　电池终端电压：6.5V 　　PTT：开启						检查	LED 不闪烁
	2）电池终端电压：5.7V 　　PTT：开启							LED 闪烁

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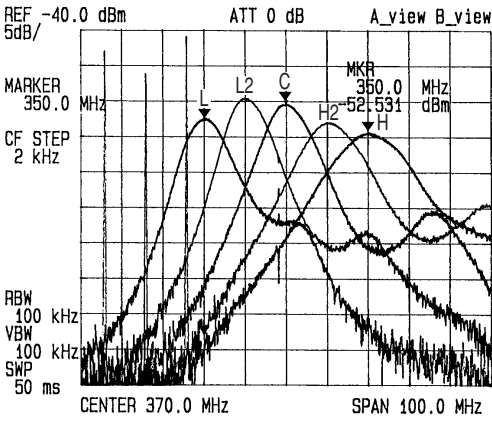# ADJUSTMENT

Receiver Section [Panel Tuning Mode except when Panel TEST Mode is specified.]

Item	Condition	Measurement			Adjustment			Specifications/ Remark
		Test equipment	Unit	Terminal	Unit	Parts	Method	

1. Sensitivity Adjust (BPF characteristic)	1) Adj item [SENS]
	  Adjust [∗∗∗]
	
	2) Low-edge frequency
	  Adj item
	  [L SENS] → [L2 SENS] →
	  [C SENS] → [H2 SENS] →
	  [H SENS]
	  Spe-Ana setting
	   Center·f : 370MHz
	   Span : 100MHz
	   RBW : 100kHz
	   VBW : 1kHz
	   REF level : –40dBm
	   ATT : 0dB
	  Tra-G setting
	   Input level: –40dBm
		Tracking generator
		
		Spectrum analyzer
			Panel
			
			TX-RX
				ANT
				
				BPF
				Need couple capacitor (1000PF)
					Panel	Encoder knob	**Adjustment**
							fo=f L, f L2, f C, f H2, f H
							  Adjust point frequency
							Refer to the Panel Tuning Mode frequency table on page 43.	

2. Sensitivity Check	**[Panel Test Mode]**
	1) CH-Sig:1-1
	  SSG OUT
	  Wide: -117dBm(0.28μV)
	  (MOD:1kHz / ±3kHz)
	  Narrow: -116dBm(0.316μV)
	  (MOD:1kHz / ±1.5kHz)
		SSG
		AF VTVM
		Oscilloscope
			Panel	ANT
				Universal connector
							Check	12dB SINAD or more

3. Squelch (Preset) Adjust [Narrow]	1) Adj item [SQL]
	  Adjust [∗∗∗]
	  SSG OUT:
	  12dB SINAD level
	2) Adj item
	  [L SQL] → [C SQL] → [H SQL]
	  Adjust [∗∗∗]
						Encoder knob squelch	Adjust to point of opening	

[Wide]	3) Adj item [w SQL]
	  Adjust [∗∗∗]
	  12dB SINAD level
	4) Adj item
	  [wL SQL] → [wC SQL] → [wH SQL]
	  Adjust [∗∗∗]							

REF –40.0 dBm 5dB/ ATT 0 dB A_view B_view

MARKER 350.0 MHz

CF STEP 2 kHz

MKR 350.0 MHz –52.531 dBm

RBW 100 kHz
VBW 100 kHz
SWP 50 ms

CENTER 370.0 MHz   SPAN 100.0 MHz

Band Pass Filter Characteristic (C)

调整

接收部分［面板调谐模式除非面板测试模式已被指定］

项目	条件	测量			调整			规格 / 备注
		测试设备	单元	终端	单元	部件	方法	
1. 灵敏度调整（BPF 特性）	1）调整项目[SENS] 调整[＊＊＊] 2）低边频率 调整项目 [L SENS] → [L2 SENS] → [C SENS] → [H2 SENS] → [H SENS] Spe-Ana 设定 　Center-f：370MHz 　Span：100MHz 　RBW：100kHz 　VBW：1kHz 　REF 电平：–40dBm 　ATT：0dB Tra-G 设定 　Input 电平：–40dBm	轨迹发生器 频谱分析仪	面板 TX-RX	ANT BPF 需要耦合 电容 （1000PF）	面板	编码旋钮	调整 fo=f L, f L2, f C, f H2, f H 调整点频率。参阅第 43 页上 的面板调谐模式频率表。	

REF –40.0 dBm 　ATT 0 dB 　A_view B_view
5dB/

MARKER
350.0 MHz
CF STEP
2 kHz
　L2 C MKR 350.0 MHz
　L H2 –52.531 dBm
　H

RBW
100 kHz
VBW
100 kHz
SWP
50 ms

CENTER 370.0 MHz 　　SPAN 100.0 MHz

带电滤波器特性（C）

项目	条件	测量			调整			规格 / 备注
2. 灵敏度检查	[面板测试模式] 1）CH-Sig：1-1 标准信号发生器输出 　宽：–117dBm（0.28μV） 　（MOD：1kHz/ ± 3kHz） 　窄：–116dBm（0.316μV） 　（MOD：1kHz/ ± 1.5kHz）	SSG AF VTVM 示波器	面板	ANT 通用接口			检查	12dB SINAD 或更高
3. 静噪抑制电路（Preset）调整 [窄] [宽]	1）调整项目[SQL] 调整[＊＊＊] 标准信号发生器输出 12dB SINAD 电平 2）调整项目 [L SQL] → [C SQL] → [H SQL] 调整[＊＊＊] 3）调整项目[w SQL] 调整[＊＊＊] 12dB SINAD 电平 4）调整项目 [wL SQL] → [wC SQL] → [wH SQL] 调整[＊＊＊]					编码旋钮	调整到打开 噪音抑制电 路点。	

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ADJUSTMENT

Receiver Section [Panel Tuning Mode except when Panel TEST Mode is specified.]

Item	Condition	Measurement			Adjustment			Specifications/ Remark
		Test equipment	Unit	Terminal	Unit	Parts	Method	
4. RSSI (Low) Adjust [Narrow]	1) Adj item [LRSI] Adjust [∗∗∗] SSG OUT: 12dB SINAD level	SSG AF VTVM Oscilloscope	Panel	ANT Universal connector		Encoder knob	After input signal from SSG, press [B] key. That numeric will be stored in memory	
	2) Adj item [L LRSI] → [C LRSI] → [H LRSI] Adjust [∗∗∗]							
[Wide]	3) Adj item [w LRSI] Adjust [∗∗∗] 12dB SINAD level							
	4) Adj item [wL LRSI] → [wC LRSI] → [wH LRSI] Adjust [∗∗∗]							
5. Squelch (Preset) Check	**[Panel Test Mode]** 1) CH-Sig:1-1 SSG OUT: 12dB SINAD level						Check	Squelch must be opened
	2) SSG OUT:OFF							Squelch must be closed.
6. RSSI (High) Adjust [Narrow]	1) Adj item [HRSI] Adjust [∗∗∗] SSG OUT: −70dBm(70.7µV)						After input signal from SSG, press [B] key. That numeric be stored in memory	
	2) Adj item [L HRSL] → [C HRSL] → [H HRSL] Adjust [∗∗∗]							
[Wide]	3) Adj item [wL HRSL] → [wC HRSL] → [wH HRSL] Adjust [∗∗∗]							

Adjustment points
  TX-RX unit (X57-6413-01)
  component side view

BPF

TC1

CV   TC2

ANT

调整
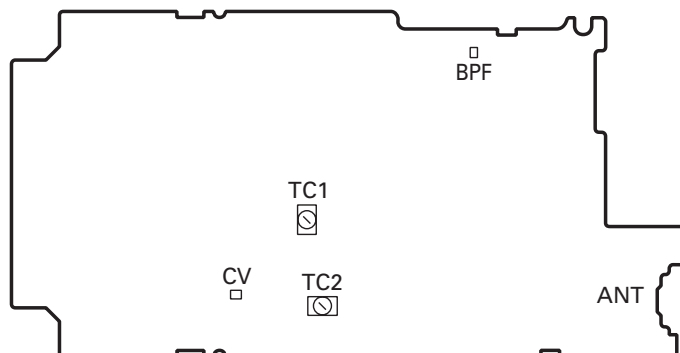
接收部分［面板调谐模式除非面板测试模式已被指定］

项目	条件	测量			调整			规格 / 备注
		测试设备	单元	终端	单元	部件	方法	
4. RSSI （低） 调整 [窄]	1）调整项目[LRSI] 调整[＊＊＊] 标准信号发生器输出 12dB SINAD 电平	SSG AF VTVM 示波器	面板	ANT 通用接口		编码旋钮	从 SSG 输入 信号后，按 [B]键，此数 值将被保存 在存储器中。	
	2）调整项目 [L LRSI] → [C LRSI] → [H LRSI] 调整[＊＊＊]							
[宽]	3）调整项目[w LRSI] 调整[＊＊＊] 12dB SINAD 电平							
	4）调整项目 [wL LRSI] → [wC LRSI] → [wH LRSI] 调整[＊＊＊]							
5. 静噪抑制电路 （Preset） 检查	[面板测试模式] 1）CH-Sig:1-1 标准信号发生器输出 12dB SINAD 电平					检查		静噪必须被打开。
	2）标准信号发生器输出：关闭							静噪必须被关闭。
6. RSSI （高） 调整 [窄]	1）调整项目[HRSI] 调整[＊＊＊] 标准信号发生器输出 -70dBm(70.7μV)						从 SSG 输入 信号后，按 [B]键，此数 值将被保存 在存储器中。	
	2）调整项目 [L HRSL] → [C HRSL] → [H HRSL] 调整[＊＊＊]							
[宽]	3）调整项目 [wL HRSL] → [wC HRSL] → [wH HRSL] 调整[＊＊＊]							

调整点
TX-RX UNIT (X57-6413-01)
元件侧视图

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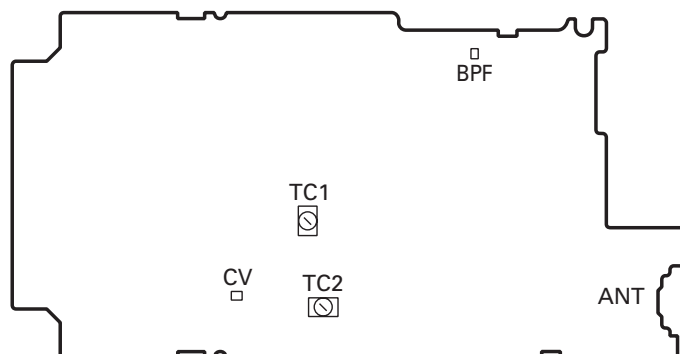
TERMINAL FUNCTION / 端子功能

CN No.	Pin No.	Name	I/O	Function
TX-RX UNIT (X57-6413-01): TX-RX section				
CN301	1	NC	-	Not used
	2	RXD	I	Serial data input
	3	TXD	O	Serial data output
	4	5M	O	5V output
	5	E	-	GND
	6	NC	-	Not used
	7	PF	I	Programmable function key input
	8	PTT	I	External PTT input
	9	ME	-	External microphone ground
	10	ENC	I	External microphone input
	11	MSW	I	EXT/INT MIC switch input
	12	SP-	O	BTL output – for external
	13	SP+	O	BTL output + for external
	14	SSW	I	EXT/INT speaker switch input
CN302	1	NC	-	Not used
	2	LEDK	I	Backlight LED control
	3	LEDA	O	Backlight LED control
	4	CKEY	I	C key input
	5	BKEY	I	B key input
	6	AKEY	I	A key input
	7	SKEY	I	S key input
	8	VEE	-	GND
	9	SDO	O	Serial data outpuut for LCD driver
	10	SID	I	Serial data input for LCD driver
	11	SCLK	O	Clock data output for LCD driver
	12	CS	O	LCD driver chip select output
	13	VCC	-	5V
	14	GND	-	GND
CN303		PTT	I	PTT key input
		LAMP	I	Side 1 key input
CN304		MON	I	Side 2 key input
		GND	-	GND
CN305		SP+	O	BTL output + for internal
		SP-	O	BTL output - for internal
CN306		EMC+	O	Internal microphone input
		EMC-	-	Internal microphone ground

CN 号码	管脚 号码	名称	输入 / 输出	功能
TX-RX 单元（X57-6413-01）：TX-RX 部分				
CN301	1	NC	−	不使用
	2	RXD	输入	串行数据输入
	3	TXD	输出	串行数据输出
	4	5M	输出	5V 输出
	5	E	−	接地
	6	NC	−	不使用
	7	PF	输入	可编程功能键输入
	8	PTT	输入	外置 PTT 输入
	9	ME	−	外置麦克风信号地
	10	ENC	输入	外置麦克风输入
	11	MSW	输入	外置 / 内置麦克风开关输入
	12	SP-	输出	用于外置的 BTL 输出 –
	13	SP+	输出	用于外置的 BTL 输出 +
	14	SSW	输入	外置 / 内置扬声器开关输入
CN302	1	NC	−	不使用
	2	LEDK	输入	背景灯光 LED 控制
	3	LEDA	输出	背景灯光 LED 控制
	4	CKEY	输入	C 按键输入
	5	BKEY	输入	B 按键输入
	6	AKEY	输入	A 按键输入
	7	SKEY	输入	S 按键输入
	8	VEE	−	接地
	9	SDO	输出	显示器驱动器的串行数据输出
	10	SID	输入	显示器驱动器的串行数据输入
	11	SCLK	输出	显示器驱动器的时钟数据输出
	12	CS	输出	显示器驱动器芯片选择输出
	13	VCC	−	5V
	14	GND	−	接地
CN303		PTT	输入	PTT 按键输入
		LAMP	输入	侧面 1 按键输入
CN304		MON	输入	侧面 2 按键输入
		GND	−	接地
CN305		SP+	输出	用于内置的 BTL 输出 +
		SP-	输出	用于内置的 BTL 输出 –
CN306		EMC+	输出	内部麦克风输入。
		EMC-	−	内部麦克风接地

TERMINAL FUNCTION / 端子功能

CN No.	Pin No.	Name	I/O	Function
CN400	1	S_DET	I	Battery detect input
	2	AUXKEY	I	AUX key input
	3	GND	-	GND
	4	5M	-	5V
	5	VOL	I	Volume level input for audio control
	6	CH1	I	Encoder pulse input
	7	CH2	I	Encoder pulse input
	8	GND	-	GND
	9	CH3	I	Encoder pulse input
	10	CH4	I	Encoder pulse input
	11	SB	I	Power input after passing through the fuse
	12	SB	I	Power input after passing through the fuse
	13	+B	O	Power output after power switch
	14	+B	O	Power output after power switch
CN300, 500	1	XOUT	O	3.589545MHz output
	2	GND	-	GND
	3	AFCLR	O	FFSK flame reset output
	4	AFRDT	O	FFSK modulation data output timing pulse input
	5	AFRTM	O	FFSK demodulation data output timing pulse input
	6	AFTRD	O	FFSK demodulation data input
	7	AFMSKE	O	FFSK modulation enable
	8	CLK		Clock data input
	9	AFDAT	O	FFSK data output
	10	AFREG2	O	AF IC register switching data output 2
	11	AFREG1	O	AF IC register switching data output 1
	12	AFSTB	O	AF IC data strobe output
	13	5CNS	-	5V
	14	MMUTE	O	MIC mute
	15	5TC	-	5T control
	16	5C	-	5V
	17	GND	-	GND
	18	MICI	I	MIC signal input
	19	PTT	I	PTT key input
	20	ME	-	MIC ground
	21	ME	-	MIC ground
	22	TXHSD	O	HSD output (TX)
	23	GND	-	GND
	24	TXAF	O	Audio output (TX)
	25	RXAF1	I	Audio input (TX)
	26	5RC	-	5R control
	27	HSDIN	O	HSD output (RX)
	28	RXAFO	O	Audio output (RX)
	29	GND	-	GND
	30	GND	-	GND

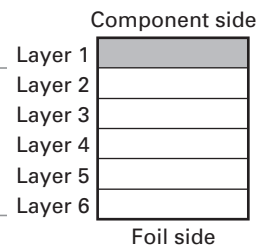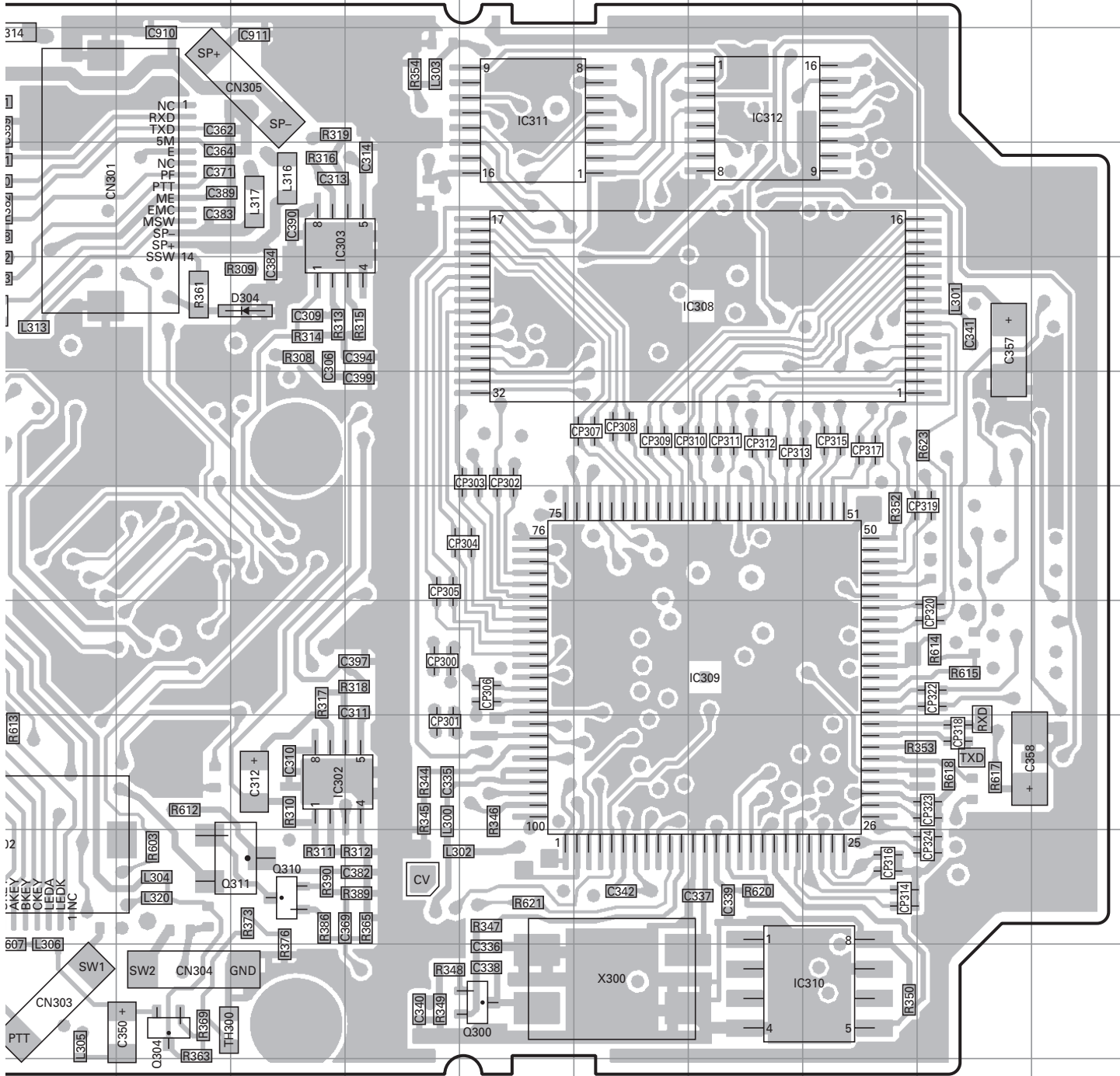| CN 号码	管脚 号码	名称	输入 / 输出	功能
CN400	1	S_DET	输入	电池检测输入
	2	AUXKEY	输入	AUX 按键输入
	3	GND	－	接地
	4	5M	－	5V
	5	VOL	输入	用于音频控制的音量电平输入
	6	CH1	输入	编码器脉冲输入
	7	CH2	输入	编码器脉冲输入
	8	GND	－	接地
	9	CH3	输入	编码器脉冲输入
	10	CH4	输入	编码器脉冲输入
	11	SB	输入	通过保险丝后输入电源
	12	SB	输入	通过保险丝后输入电源
	13	+B	输出	接通电源开关后输出电源
	14	+B	输出	接通电源开关后输出电源
CN300, 500	1	XOUT	输出	3.589545MHz 输出
	2	GND	－	接地
	3	AFCLR	输出	FFSK 火焰复位输出
	4	AFRDT	输出	FFSK 调制数据输出计时脉冲输入
	5	AFRTM	输出	FFSK 调制数据输出计时脉冲输入
	6	AFTRD	输出	FFSK 解调数据输入
	7	AFMSKE	输出	FFSK 调制启用
	8	CLK		时钟数据输入
	9	AFDAT	输出	FFSK 数据输出
	10	AFREG2	输出	AF IC 寄存器交换数据输出 2
	11	AFREG1	输出	AF IC 寄存器交换数据输出 1
	12	AFSTB	输出	AF IC 数据选通输出
	13	5CNS	－	5V
	14	MMUTE	输出	麦克风静音
	15	5TC	－	5T 控制
	16	5C	－	5V
	17	GND	－	接地
	18	MICI	输入	麦克风信号输入
	19	PTT	输入	PTT 按键输入
	20	ME	－	麦克风信号地
	21	ME	－	麦克风信号地
	22	TXHSD	输出	HSD 输出（发射）
	23	GND	－	接地
	24	TXAF	输出	音频输出（发射）
	25	RXAF1	输入	音频输入（发射）
	26	5RC	－	5R 控制
	27	HSDIN	输出	HSD 输出（接收）
	28	RXAFO	输出	音频输出（接收）
	29	GND	－	接地
	30	GND	－	接地

TX-RX UNIT (X57-6413-01) (A/3) Component side view (J72-0807-29 A/3)

Ref. No.	Address	Ref. No.	Address	Ref. No.	Address	Ref. No.	Address	Ref. No.	Address
IC100	7G	IC401	6D	Q303	6E	Q401	5H	D305	7F
IC302	9L	IC402	10D	Q304	11K	Q403	11E	D306	4I
IC303	4L	IC403	6G	Q305	4H	Q404	10E	D307	5G
IC308	5P	Q104	8H	Q306	10C	Q405	10F	D308	5I
IC309	8P	Q105	8H	Q307	4G	Q406	6G	D309	9A
IC310	11Q	Q107	7H	Q308	4D	D106	7I	D310	9A
IC311	3N	Q108	7G	Q309	10C	D301	7E	D402	11C
IC312	3P	Q300	11N	Q310	11L	D302	3I	D405	7D
IC313	4E	Q301	5H	Q311	11L	D303	4H		
IC400	5I	Q302	7F	Q400	6D	D304	5L		

J K L M N O P Q R S

TX-RX UNIT (X57-6413-01) (A/3) Component side view (J72-0807-29 A/3)

C910 C911

SP+

CN305

SP−

NC 1
RXD
TXD
5M
E
NC
PF
PTT
ME
EMC
MSW
SP−
SP+
SSW 14

CN301

C362
C364
C371
C389
C383

R319
R316
C313
C314

L316
L317
C390
C384

R354 L303

IC311
9 8
16 1

1 16
IC312
8 9

R309
R361
D304

IC303
8 5
1 4

C309
R314 R313 R315
R308 C306 C394
C306 C399

17 16

IC308

L301
C341
C357 +

32 1

L313

CP307 CP308 CP309 CP310 CP311 CP312 CP313 CP315 CP317 R623

CP303 CP302

R352 CP319

CP304

75 51
76 50

CP305

CP320
R614
R615

CP300

CP306

IC309

CP322
CP318 RXD
TXD
C358 +

CP301

R353 R618
R617

C397
R317 R318
C311

C312 + C310
IC302
8
1 4

R345 R344 C335
L300
R346

CP323
CP324 CP316
CP314

R310

100
1 25
26

R612
R603

Q311 Q310
L304
L320

R311 R312
R390 C382
R386 C369 R365
R373
R376
R389

L302

CV

R621
C342 C337 C339 R620

C336

1 8

SW1
CN303
PTT
L305
C350 +
Q304
R363
R369
TH300

SW2 CN304 GND

R347
R348 C338
R340 R349
Q300

X300

IC310

4 5

R350

▲

Component side

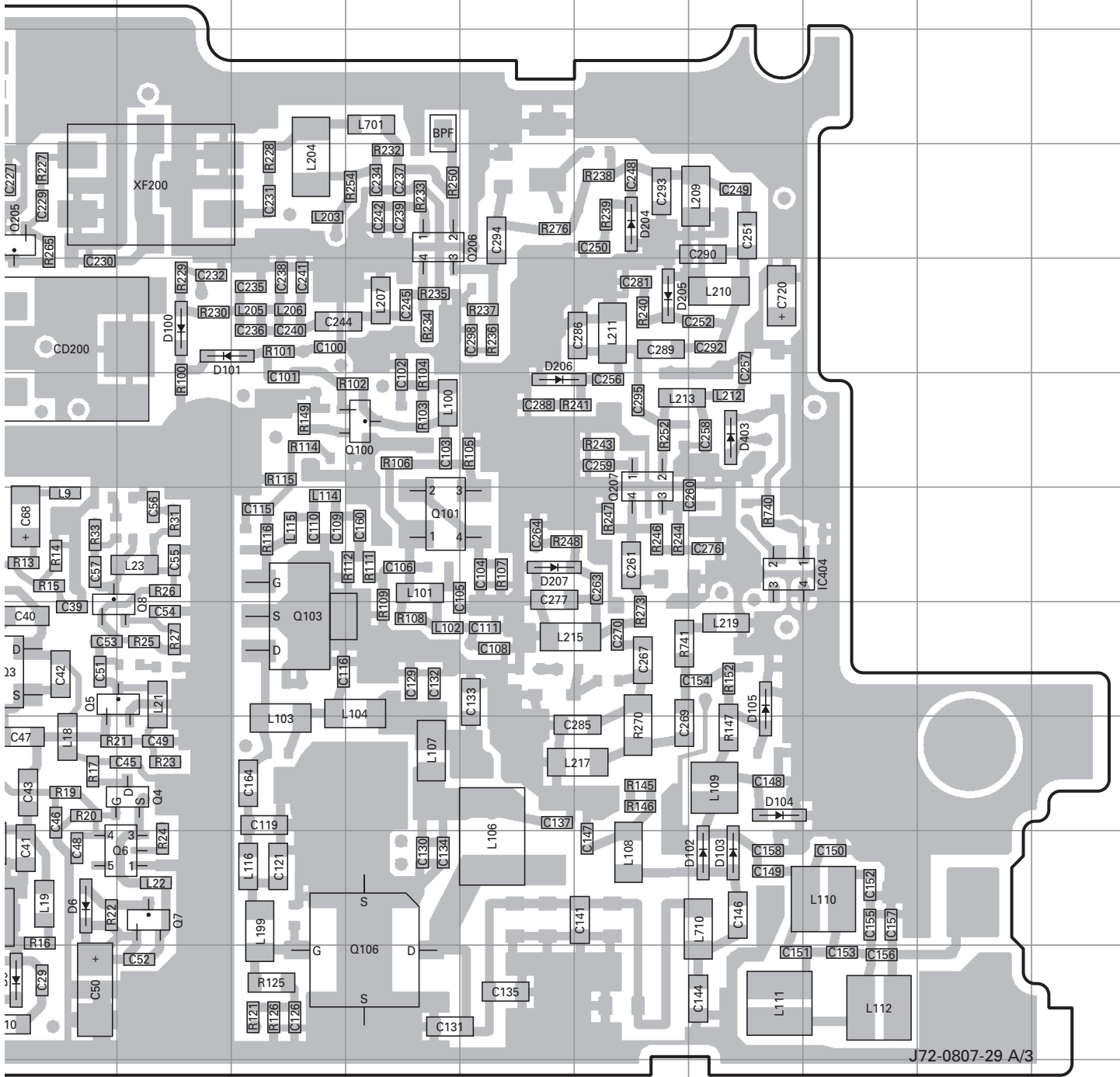| Layer 1	
Layer 2	
Layer 3	
Layer 4	
Layer 5	
Layer 6	

Foil side

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TK-3148 PC BOARD / PC 板视图

TX-RX UNIT (X57-6413-01) (A/3) Foil side view (J72-0807-29 A/3)

Ref. No.	Address	Ref. No.	Address	Ref. No.	Address	Ref. No.	Address	Ref. No.	Address	Ref. No.	Address
IC1	9F	Q2	10I	Q106	11M	D2	11I	D101	5K	D205	5O
IC200	5H	Q3	8J	Q201	5D	D3	7H	D102	10P	D206	6N
IC201	7E	Q4	9K	Q202	5I	D4	11I	D103	10P	D207	7N
IC300	8D	Q5	8K	Q203	5G	D5	7I	D104	9P	D209	6H
IC304	9D	Q6	10K	Q204	5H	D6	10J	D105	8P	D300	7D
IC305	6B	Q7	10K	Q205	4J	D7	8H	D200	8D	D403	6P
IC306	11E	Q8	8J	Q206	4M	D8	7H	D201	7D		
IC307	4C	Q100	6M	Q207	6O	D9	11J	D202	5E		
IC404	7P	Q101	7M	Q208	6D	D10	11I	D203	5E		
Q1	8G	Q103	8L	D1	8H	D100	5K	D204	4O		

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TX-RX UNIT (X57-6413-01) (A/3) Foil side view (J72-0807-29 A/3)

J72-0807-29 A/3

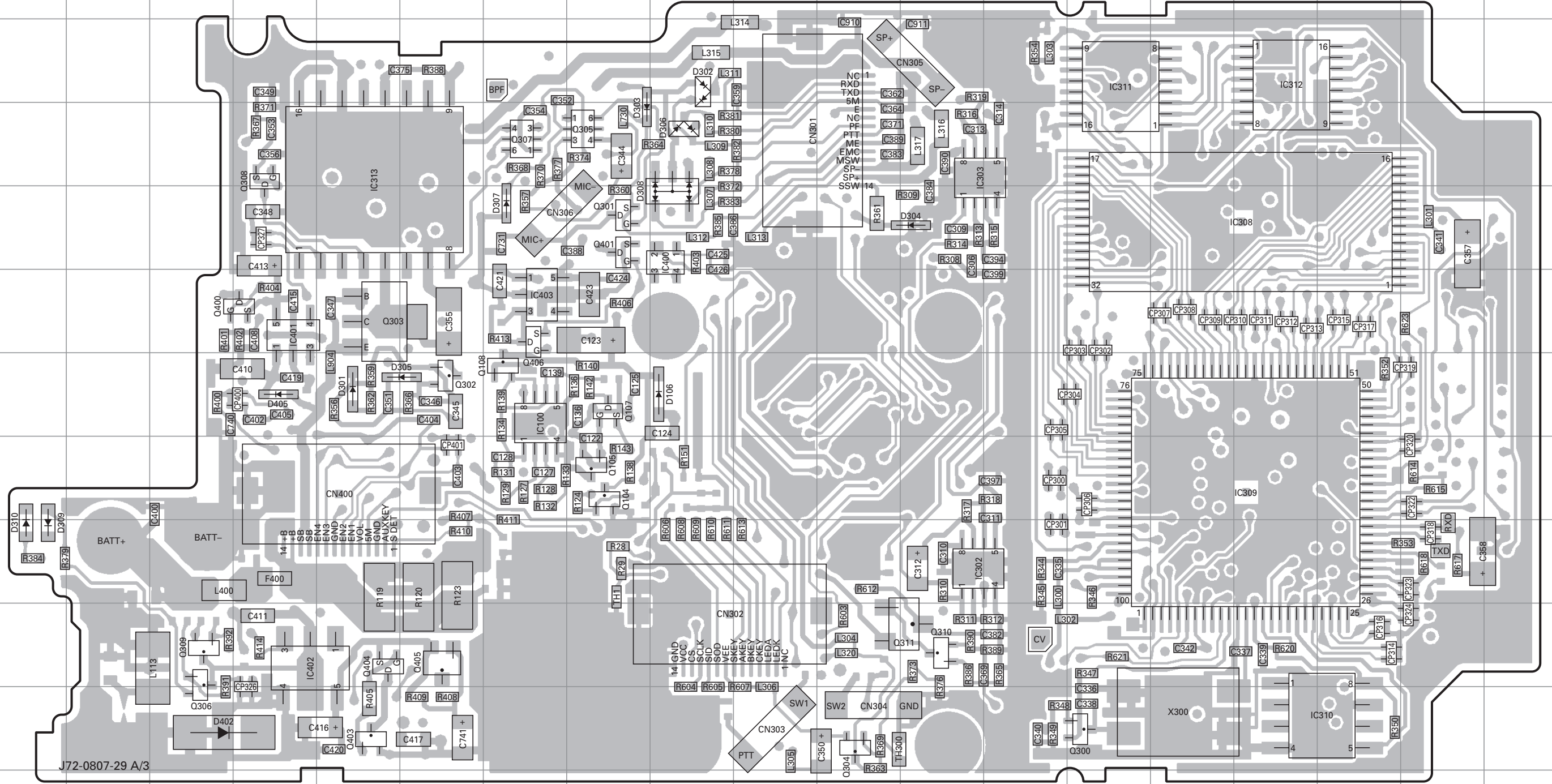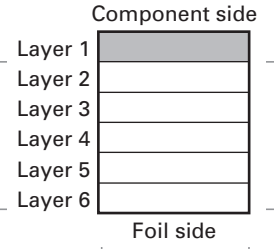|	Component side
Layer 1	
Layer 2	
Layer 3	
Layer 4	
Layer 5	
Layer 6	
	Foil side

57

TX-RX UNIT (X57-6413-01) (A/3) Component side view (J72-0807-29 A/3)   TX-RX UNIT (X57-6413-01) (A/3) Component side view (J72-0807-29 A/3)
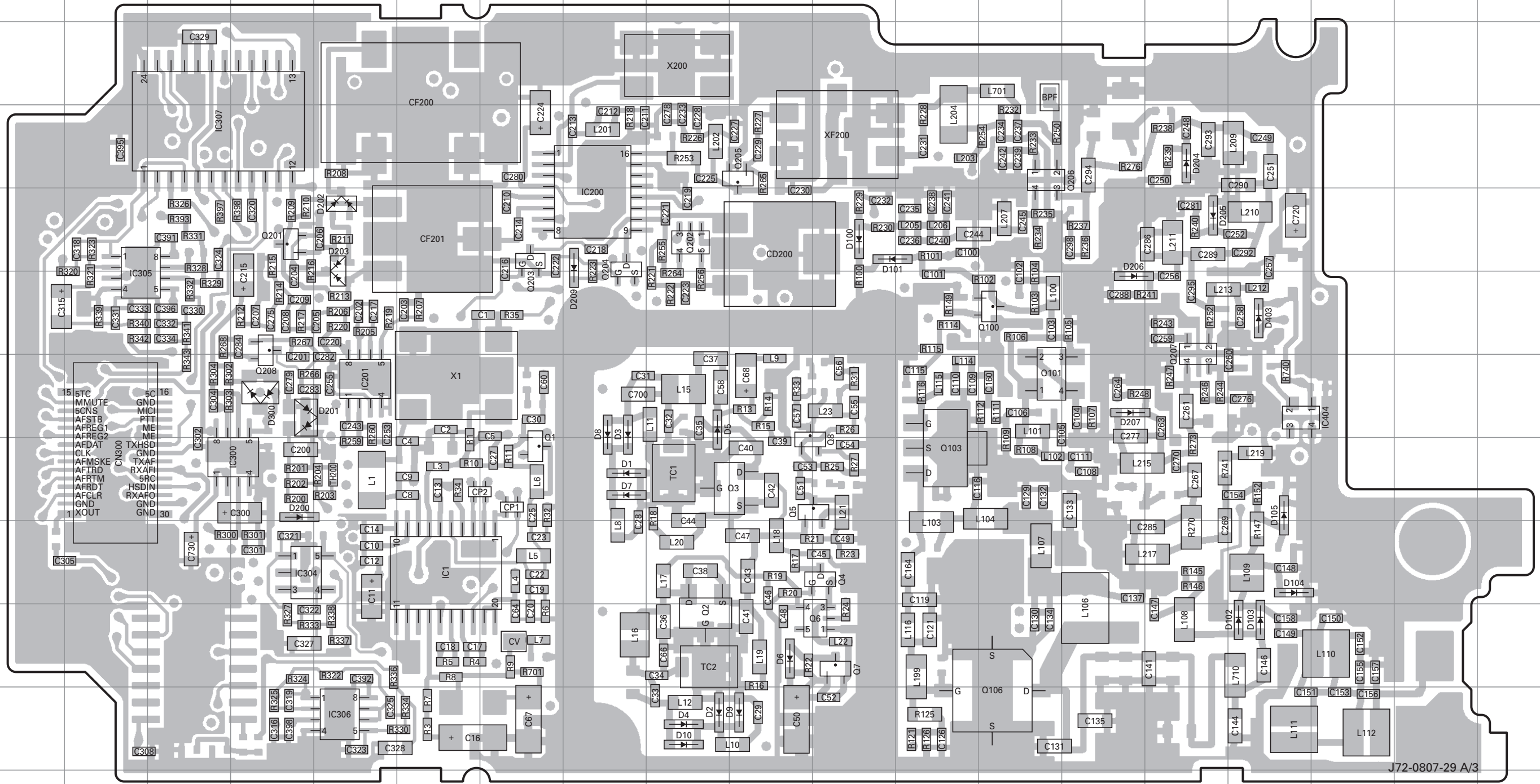
J72-0807-29 A/3

Ref. No.	Address	Ref. No.	Address	Ref. No.	Address	Ref. No.	Address	Ref. No.	Address
IC100	7G	IC401	6D	Q303	6E	Q401	5H	D305	7F
IC302	9L	IC402	10D	Q304	11K	Q403	11E	D306	4I
IC303	4L	IC403	6G	Q305	4H	Q404	10E	D307	5G
IC308	5P	Q104	8H	Q306	10C	Q405	10F	D308	5I
IC309	8P	Q105	8H	Q307	4G	Q406	6G	D309	9A
IC310	11Q	Q107	7H	Q308	4D	D106	7I	D310	9A
IC311	3N	Q108	7G	Q309	10C	D301	7E	D402	11C
IC312	3P	Q300	11N	Q310	11L	D302	3I	D405	7D
IC313	4E	Q301	5H	Q311	11L	D303	4H		
IC400	5I	Q302	7F	Q400	6D	D304	5L		

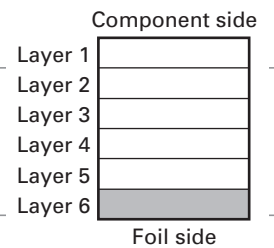Component side

Layer 1
Layer 2
Layer 3
Layer 4
Layer 5
Layer 6

Foil side

TX-RX UNIT (X57-6413-01) (A/3) Foil side view (J72-0807-29 A/3)

TX-RX UNIT (X57-6413-01) (A/3) Foil side view (J72-0807-29 A/3)

J72-0807-29 A/3
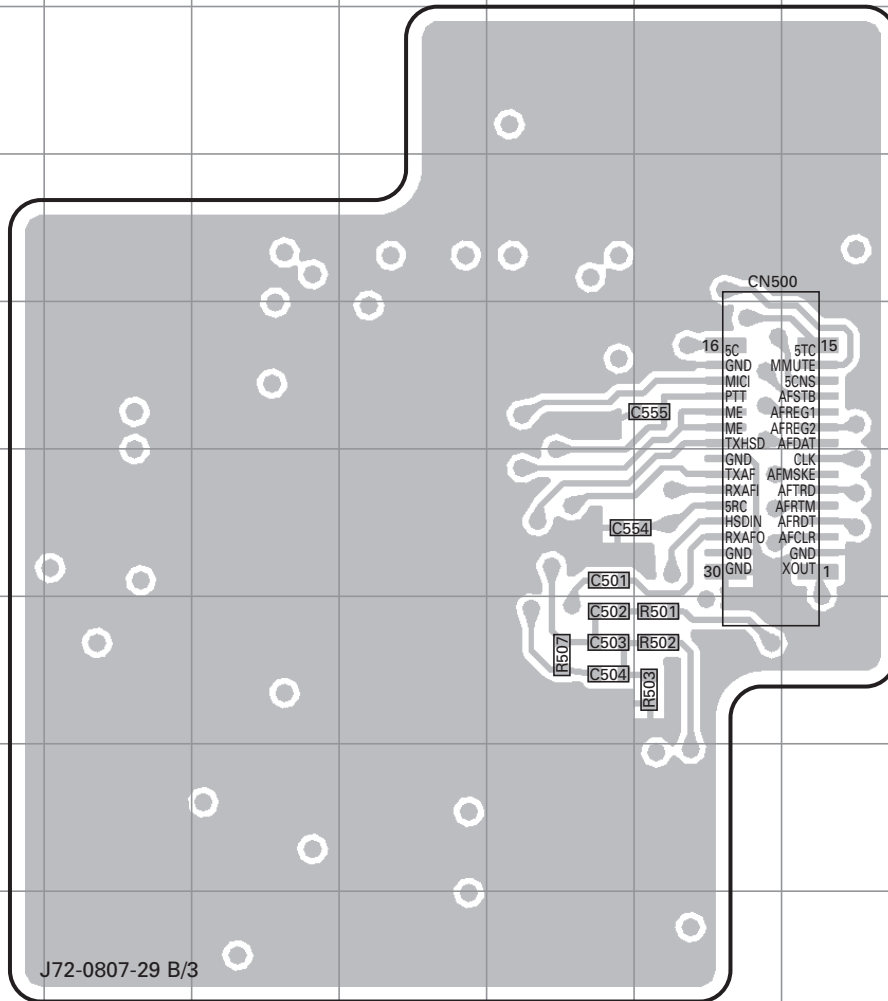
Ref. No.	Address	Ref. No.	Address	Ref. No.	Address	Ref. No.	Address	Ref. No.	Address	Ref. No.	Address
IC1	9F	Q2	10I	Q106	11M	D2	11I	D101	5K	D205	5O
IC200	5H	Q3	8J	Q201	5D	D3	7H	D102	10P	D206	6N
IC201	7E	Q4	9K	Q202	5I	D4	11I	D103	10P	D207	7N
IC300	8D	Q5	8K	Q203	5G	D5	7I	D104	9P	D209	6H
IC304	9D	Q6	10K	Q204	5H	D6	10J	D105	8P	D300	7D
IC305	6B	Q7	10K	Q205	4J	D7	8H	D200	8D	D403	6P
IC306	11E	Q8	8J	Q206	4M	D8	7H	D201	7D		
IC307	4C	Q100	6M	Q207	6O	D9	11J	D202	5E		
IC404	7P	Q101	7M	Q208	6D	D10	11I	D203	5E		
Q1	8G	Q103	8L	D1	8H	D100	5K	D204	4O		

Component side
Layer 1
Layer 2
Layer 3
Layer 4
Layer 5
Layer 6
Foil side

TK-3148 PC BOARD / PC 板视图

TX-RX UNIT (X57-6413-01) (B/3) Component side view (J72-0807-29 B/3)

CN500

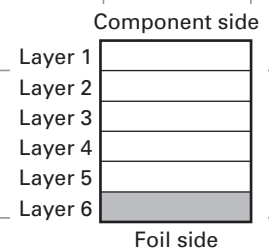| 16 | 5C | 5TC | 15 |
	GND	MMUTE	
	MICI	5CNS	
	PTT	AFSTB	
	ME	AFREG1	
	ME	AFREG2	
	TXHSD	AFDAT	
	GND	CLK	
	TXAF	AFMSKE	
	RXAFI	AFTRD	
	5RC	AFRTM	
	HSDIN	AFRDT	
	RXAFO	AFCLR	
	GND	GND	
30	GND	XOUT	1

C555
C554
C501
C502 R501
C503 R502
C504
R507
R503

J72-0807-29 B/3

TX-RX UNIT (X57-6413-01) (C/3) Component side view (J72-0807-29 C/3)

J72-0807-29 C/3

S600
PTT

S601
SW1

S602
SW2

Component side	
Layer 1	
Layer 2	
Layer 3	
Layer 4	
Layer 5	
Layer 6	
Foil side	

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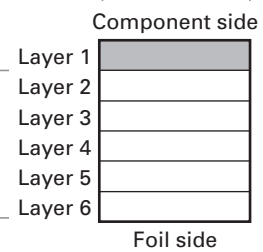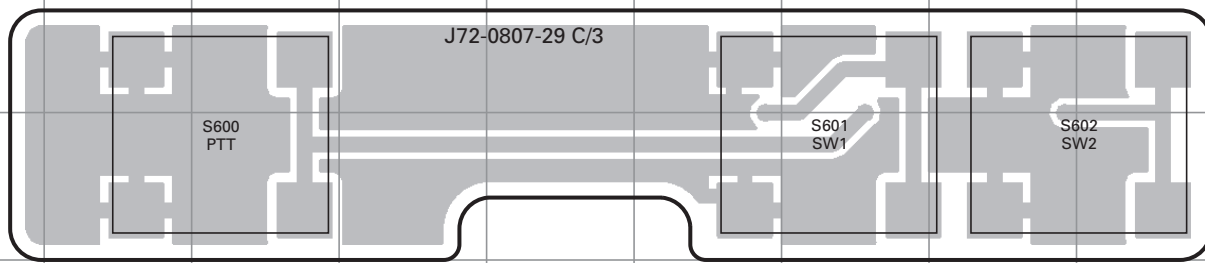
TX-RX UNIT (X57-6413-01) (B/3) Foil side view (J72-0807-29 B/3)

J72-0807-29 B/3

X500

R515 C519 C515

C557

C556

CP500 CP501

R520

C536

R519

R528 R533

R523

R506

C507

33
34

23
22

R540 R531

R529

R525

C527

4 3
Q501
6 1

R530

C528

IC500

C525

C543

C530

C702

C508

R504 R505 C500

R521

R522 C531

C529

R508

C506

R500

C541

C526

Q500 R509

C516

L500 C522

D501

R511 R513

C517

R516

C523

Q502
G
D
S

C537

R532 C539

C538

C532 C535

R510 C509 C510 C513

R518

R524

R533

R514 C511 C512 R512

R517 C520

5

4

R526

IC501

R534 R524 R527

C518 C514

R537 C542

8

1

Ref. No.	Address
IC500	7E
IC501	9F
Q500	8C
Q501	6G
Q502	8G
D501	8G

TX-RX UNIT (X57-6413-01) (C/3) Foil side view (J72-0807-29 C/3)

SW2 GND PTT SW1

J72-0807-29 C/3

Component side

Layer 1
Layer 2
Layer 3
Layer 4
Layer 5
Layer 6

Foil side

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TK-3148 SCHEMATIC DIAGRAM / 原理图

TX-RX UNIT (X57-6413-01)

TK-3148 SCHEMATIC DIAGRAM / 原理图

TX-RX UNIT (X57-6413-01)

BUFFER AMP
TX/RX COMMON RF AMP
TX/RX RF SWITCH
PRE-DRIVE AMP
PRE-DRIVE AMP
RIPPLE FILTER
VCO SWITCH
RIPPLE FILTER SWITCH

FLASH ROM
• IC308
AT29C040A-90TI
or W29C020C90

MPU
• IC309
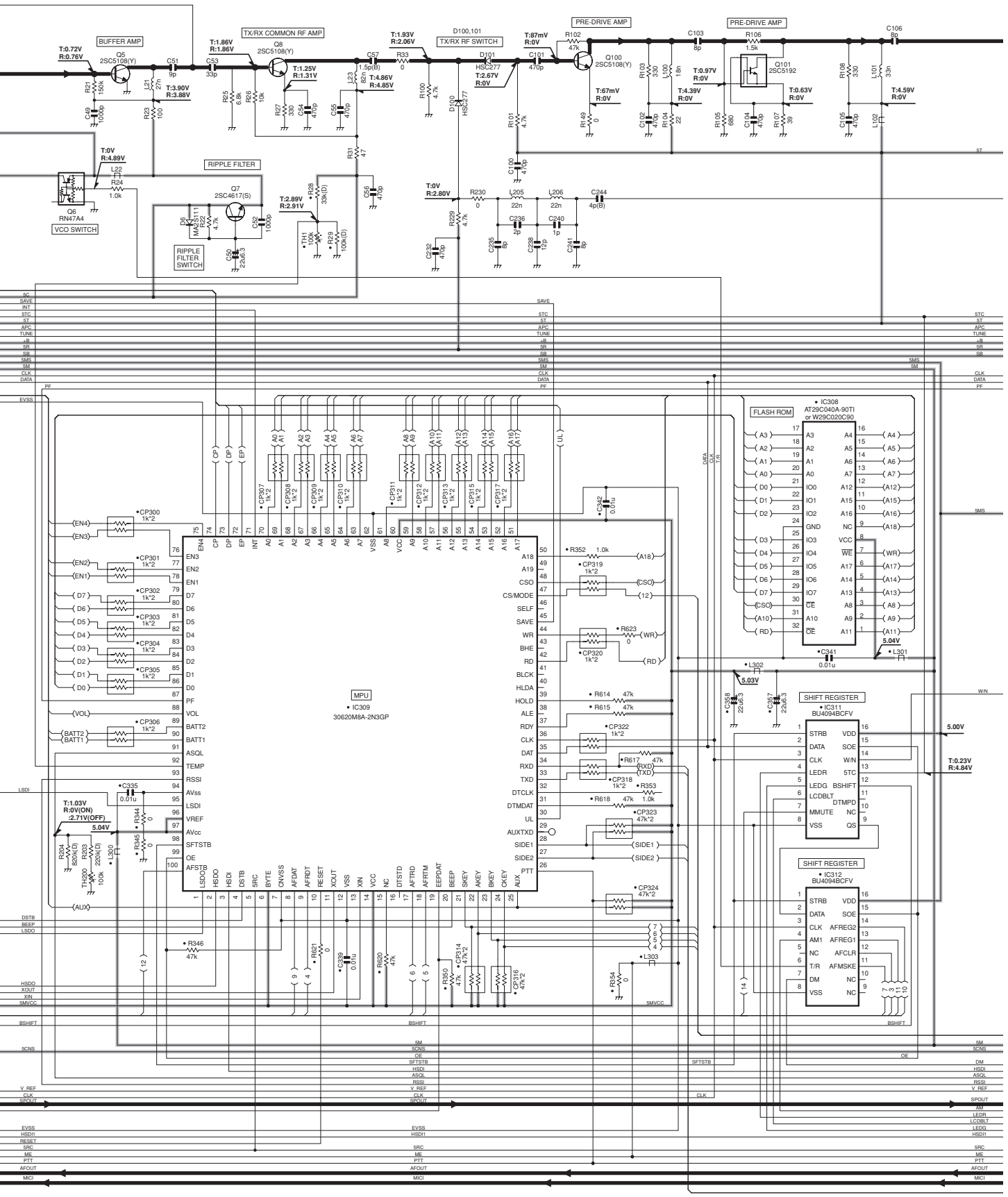30620M8A-2N3GP

SHIFT REGISTER
• IC311
BU4094BCFV

SHIFT REGISTER
• IC312
BU4094BCFV
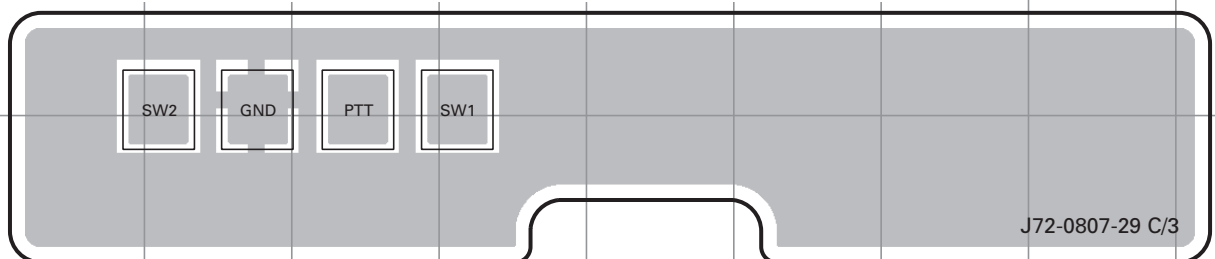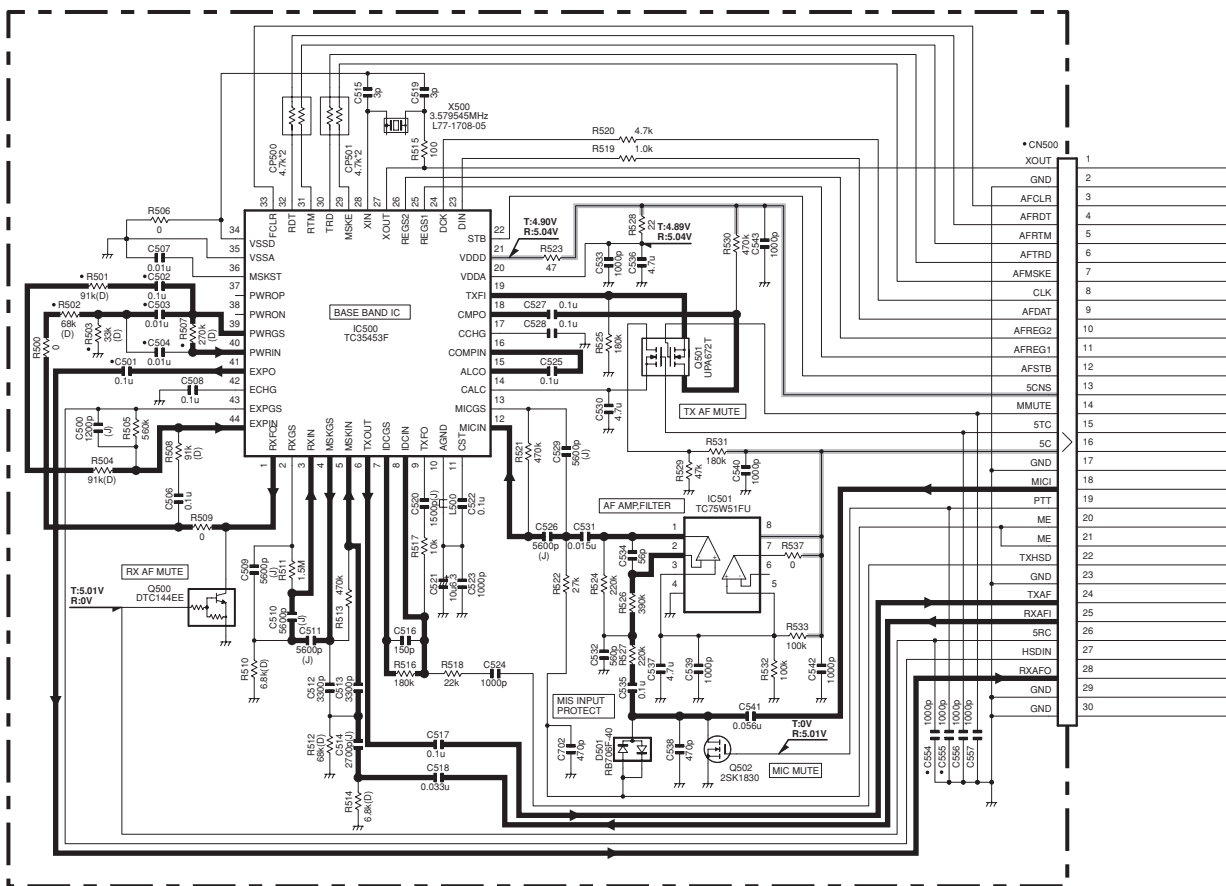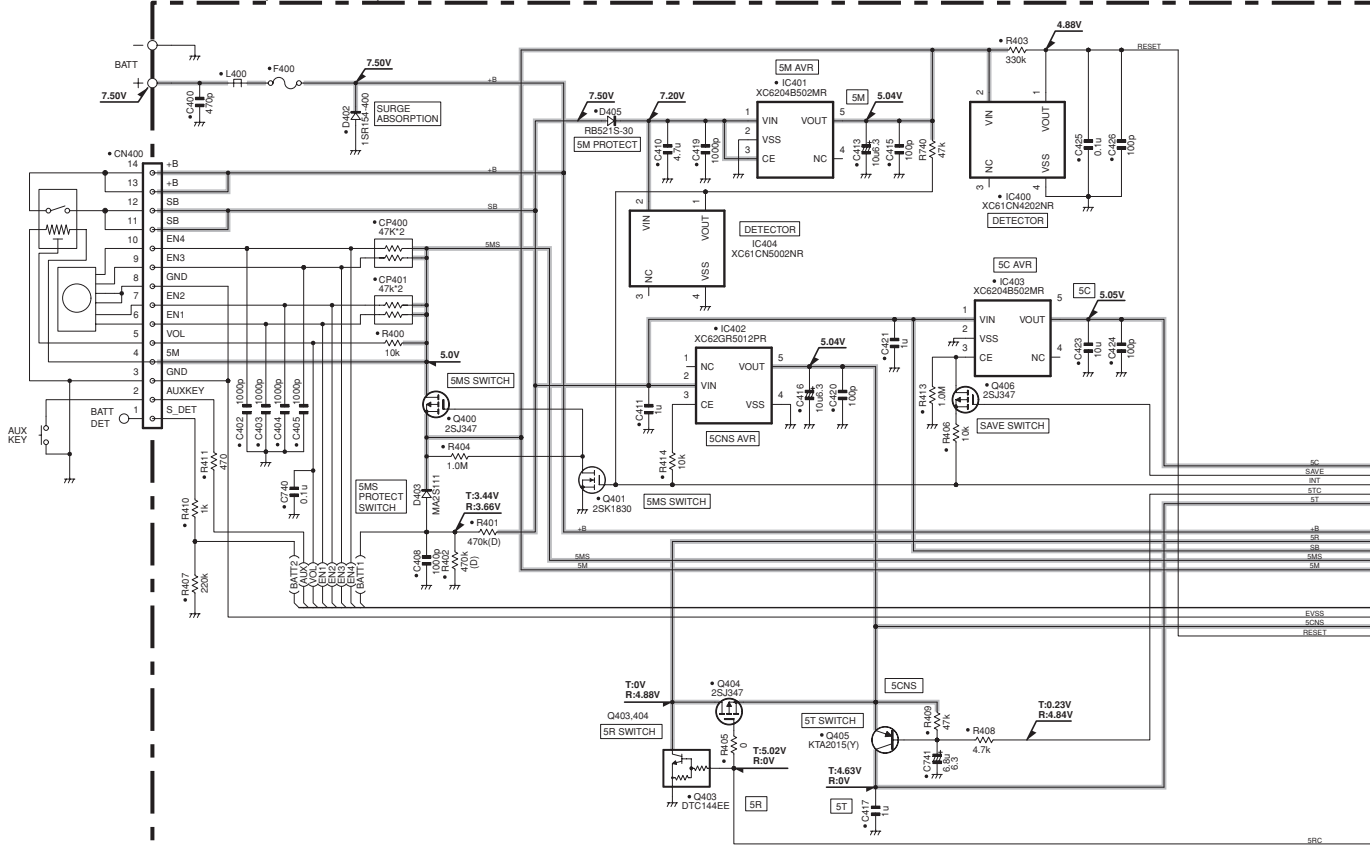
SCHEMATIC DIAGRAM / 原理图 TK-3148

TX-RX UNIT (X57-6413-01)

TK-3148 SCHEMATIC DIAGRAM / 原理图

TX-RX UNIT (X57-6413-01)

LCD UNIT

P MON SVC SCN LO
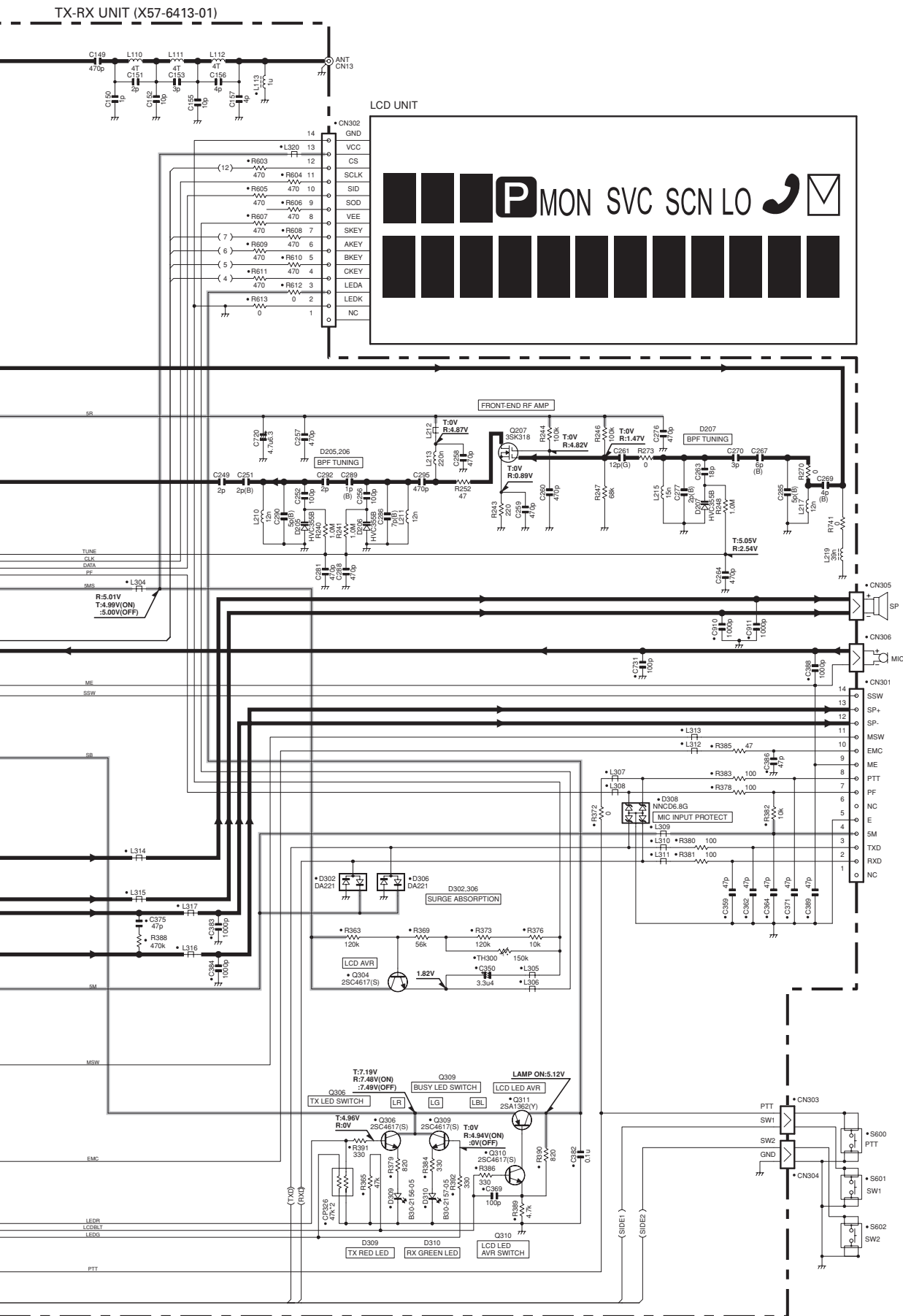
FRONT-END RF AMP

BPF TUNING

MIC INPUT PROTECT

SURGE ABSORPTION

LCD AVR

TX LED SWITCH

BUSY LED SWITCH

LCD LED AVR

TX RED LED

RX GREEN LED

LCD LED AVR SWITCH
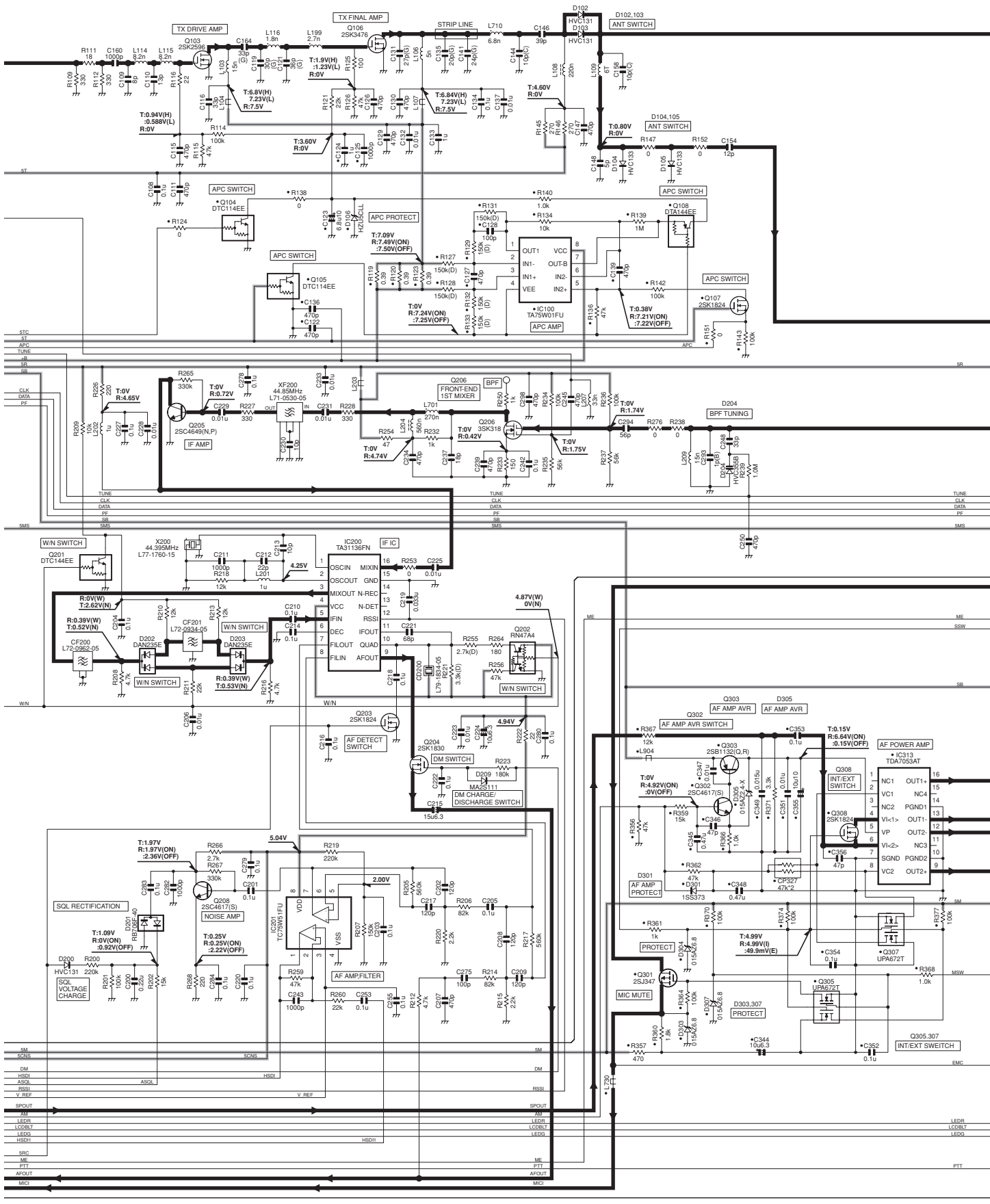
Note : The components marked with a dot (●) are parts of layer1.

TK-RX UNIT (X57-6413-01)

LCD UNIT

P MON SVC SCN LO
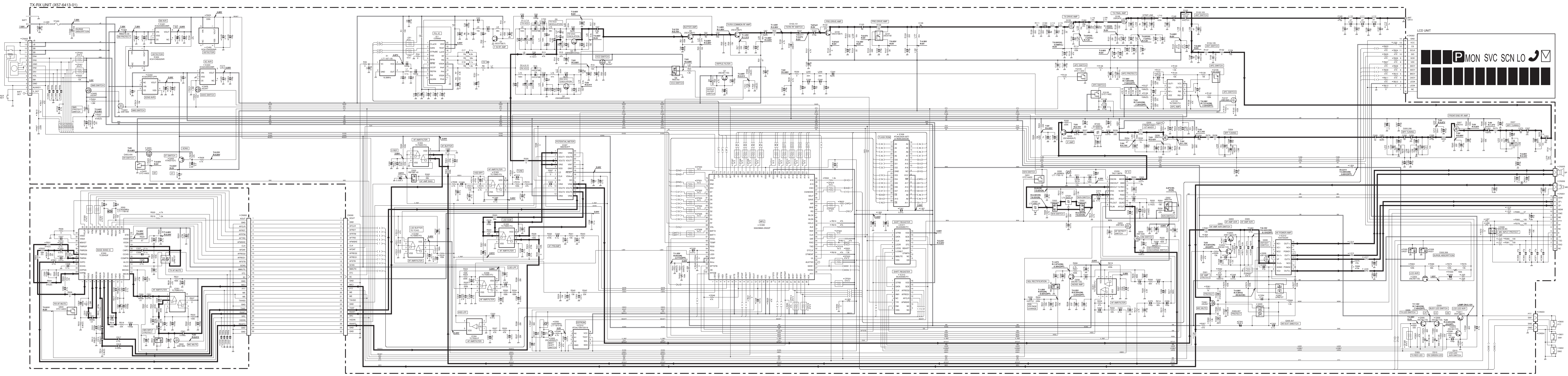
Note : The components marked with a dot (●) are parts of layer1.

LEVEL DIAGRAM / 电平图

RX

RF (Center frequency) | IF1 (44.85MHz) | IF2 (455kHz) | AF (1kHz)

−120dBm

−120.1dBm
−118dBm
−104.0dBm
−107dBm
−113.0dBm
−119.0dBm
−105.0dBm
220mVrms
260mVrms

C154
C261 Q207
C295
C294
IC206
XF200
C229
Q205
C225
IC200 FM IF SYSTEM
IC300

AF (1kHz)

215mVrms
300mVrms
27mVrms
500mW (BTL)

IC500
4
3
41
C520
C501 CN500 CN300
IC305
DAC IC307
C353
IC313
SP
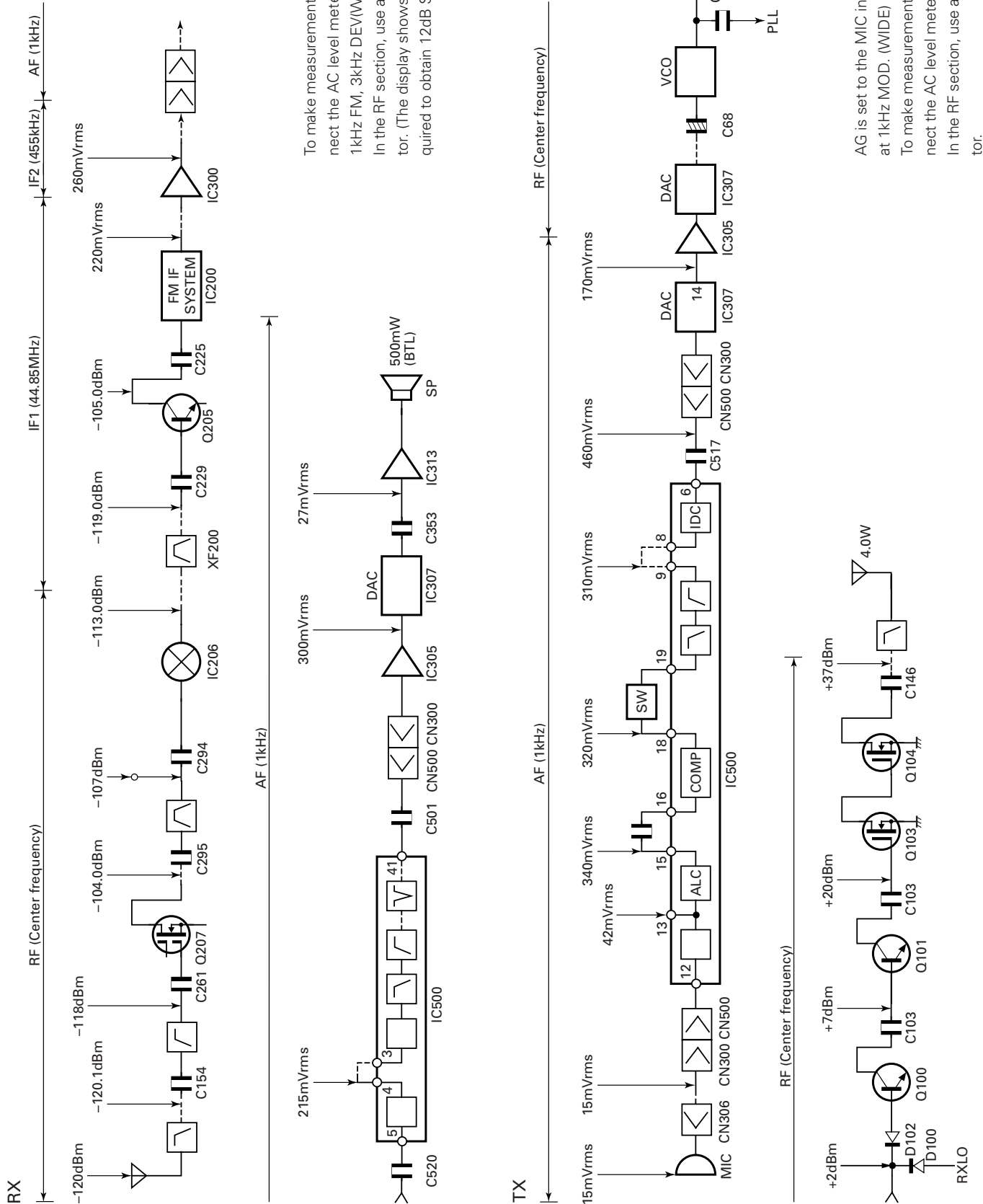
To make measurements in the AF section, connect the AC level meter. (ANT input : -53dBm, 1kHz FM, 3kHz DEV(WIDE).)
In the RF section, use a 1000pF coupling capacitor. (The display shows the SSG input value required to obtain 12dB SINAD.)

TX

AF (1kHz) | RF (Center frequency)

15mVrms
15mVrms
42mVrms
340mVrms
320mVrms
310mVrms
460mVrms
170mVrms

MIC CN300 CN500
IC500
12
13
15
16
18
19
9
8
6
ALC
COMP
SW
IDC
CN500 CN300
C517
DAC 14 IC307
DAC IC305
IC307
C68
VCO
C47
Q5
C51
PLL

RF (Center frequency)

+2dBm
+7dBm
+20dBm
+37dBm
4.0W

RXLO
D100
D102
Q100
C103
Q101
C103
C103
Q103
Q104
C146

AG is set to the MIC input becomes 3kHz DEV. at 1kHz MOD. (WIDE)
To make measurements in the AF section, connect the AC level meter.
In the RF section, use a 1000pF coupling capacitor.

TK-3148
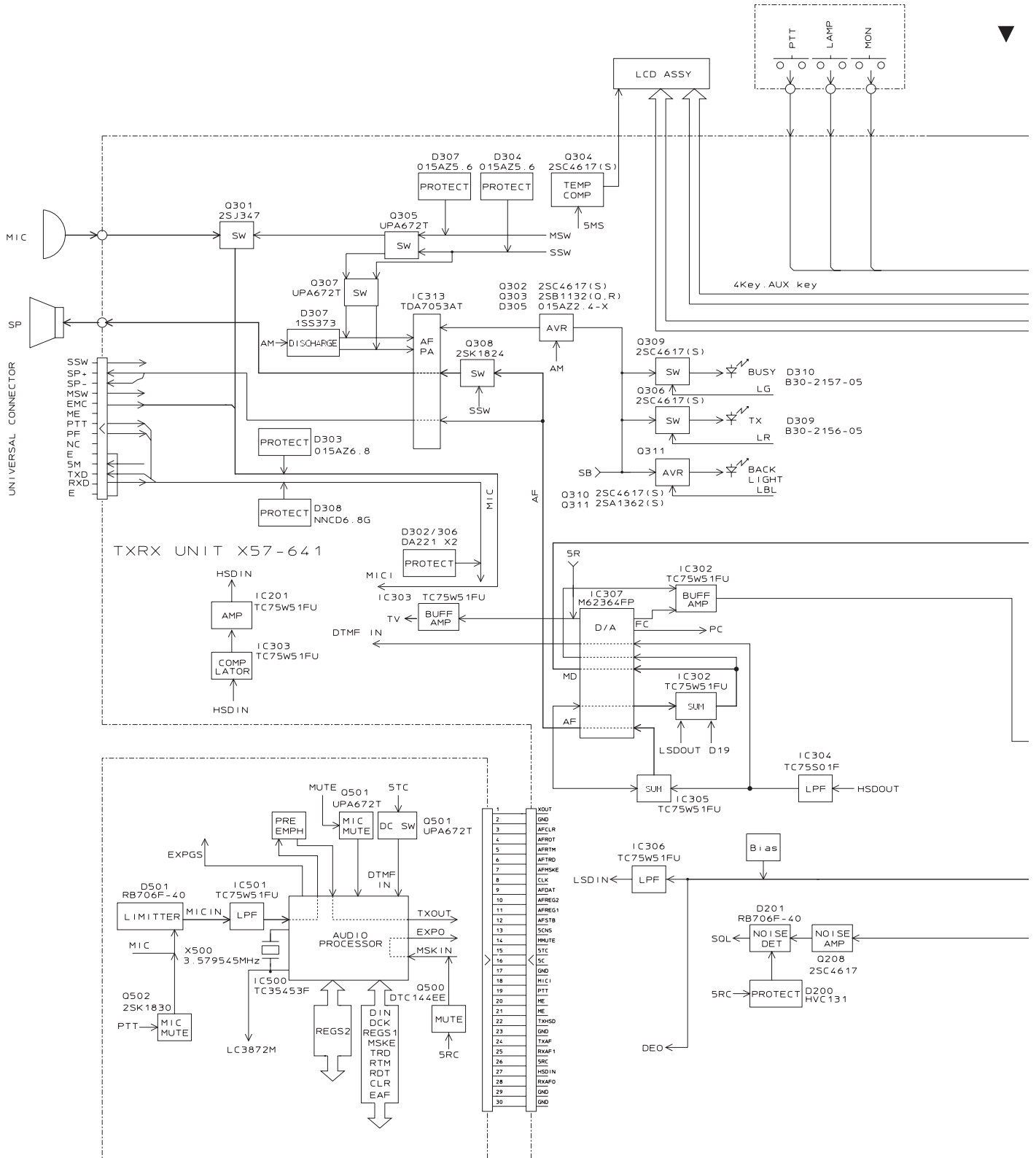
BLOCK DIAGRAM / 方块图

BLOCK DIAGRAM / 方块图
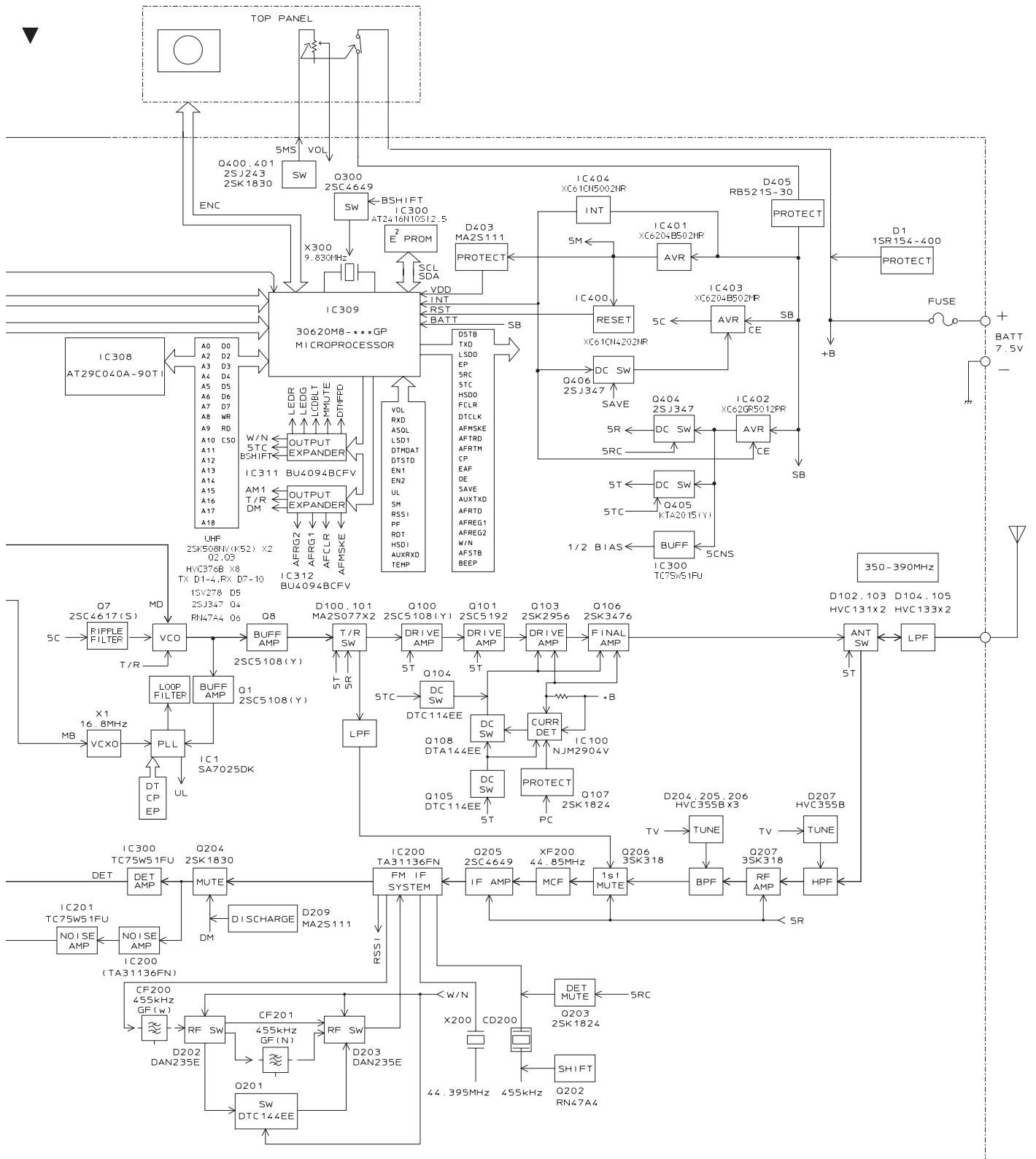
TK-3148

KSC-25 / KNB-24L

KSC-25

Battery Charger

KNB-24L

**Li-ion Battery Pack
1400mAh**

TK-3148

SPECIFICATIONS

General

Frequency Range
RX, TX .... 350 to 390MHz
Channel Spacing 6.25kHz/12.5kHz/25kHz
Battery Voltage .... DC 7.5V ±20%
Battery Life .... More than 9 hours at 4W (5-5-90 duty cycle with KNB-24L battery)
Temprature Range .... –30˚C to +60˚C (–22˚F to + 140˚F)
Dimension and Weight
  With KNB-24L (1400mAh battery) .... 105 (4.13) H x 56 (2.21) W x 29.5 (1.16) D mm (inch)   0.66lbs (300g)
  (Dimensions not including protrusions, weight includes antenna and belt hook)

Receiver (Measurements made per TIA/EIA-603)

RF Input Impedance 50Ω
Sensitivity
  12dB SINAD .... 0.28μV (Narrow)/0.25μV (Wide)
Selectivity .... 65dB (Narrow)/70dB (Wide)
Intermodulation .... 62dB (Narrow)/70dB (Wide)
Spurious (Except for IF 1/2) 70dB
Frequency Stability .... ±0.00025% (–30˚C to +60˚C)
Channel Spread 40MHz
Audio Power Output .... 500mW at 16Ω less than 5% distortion

Transmitter (Measurements made per TIA/EIA-603)

RF Power Output
  Hi 4W
  Low 1W
RF Output Impedance 50Ω
Spurious .... –70dB
Modulation .... ±2.5kHz (Narrow)/±5.0kHz (Wide)
FM Noise .... –40dB (Narrow)/–45dB (Wide)
Audio Distortion .... Less than 3%
Frequency Stability .... ±0.00025% (–30˚C to +60˚C)
Channel Spread 40MHz

TK-3148

规格

概述

频率范围
RX ,TX .... 350～390MHz
信道间距 6.25kHz/12.5kHz/25kHz
电池电压 .... 直流 7.5V ± 20%
电池寿命 .... 4W 时长于 9 个小时（使用 KNB-24L 电池 5-5-90 工作周期）
温度范围 .... -30℃到＋60℃（-22°F 到＋140°F）
尺寸和重量
　带有 KNB-24L（1400mAh 电池）............................... 105（4.13）高×56（2.21）宽×29.5（1.16）长 mm（英寸）
　（尺寸大小不包括突出部分，重量包括天线和皮带夹子）0.66lbs（300g）

接收部（以每 TIA/EIA-603 进行测量）

射频输入阻抗 50Ω
灵敏度
　12dB SINAD .... 0.28μV（窄）/0.25μV（宽）
选择性 .... 65dB（窄）/70dB（宽）
互调 .... 62dB（窄）/70dB（宽）
假信号响应（不包括中频 1/2）................................... 70dB
频率稳定性 .... ± 0.00025%（-30℃到＋60℃）
信道频率扩展 40MHz
音频功率输出 .... 16Ω 时为 500mW, 失真小于 5%

发射部（以每 TIA/EIA-603 进行测量）

射频功率输出
　高 4W
　低 1W
射频输出阻抗 50Ω
寄生 .... -70dB
调制 .... ± 2.5kHz（窄）/± 5.0kHz（宽）
频率调制噪音 .... -40dB（窄）/-45dB（宽）
音频失真 .... 低于 3%
频率稳定性 .... ± 0.00025%（-30℃到＋60℃）
信道频率扩展 40MHz