

VHF FM TRANSCEIVER

TK-2140

SERVICE MANUAL

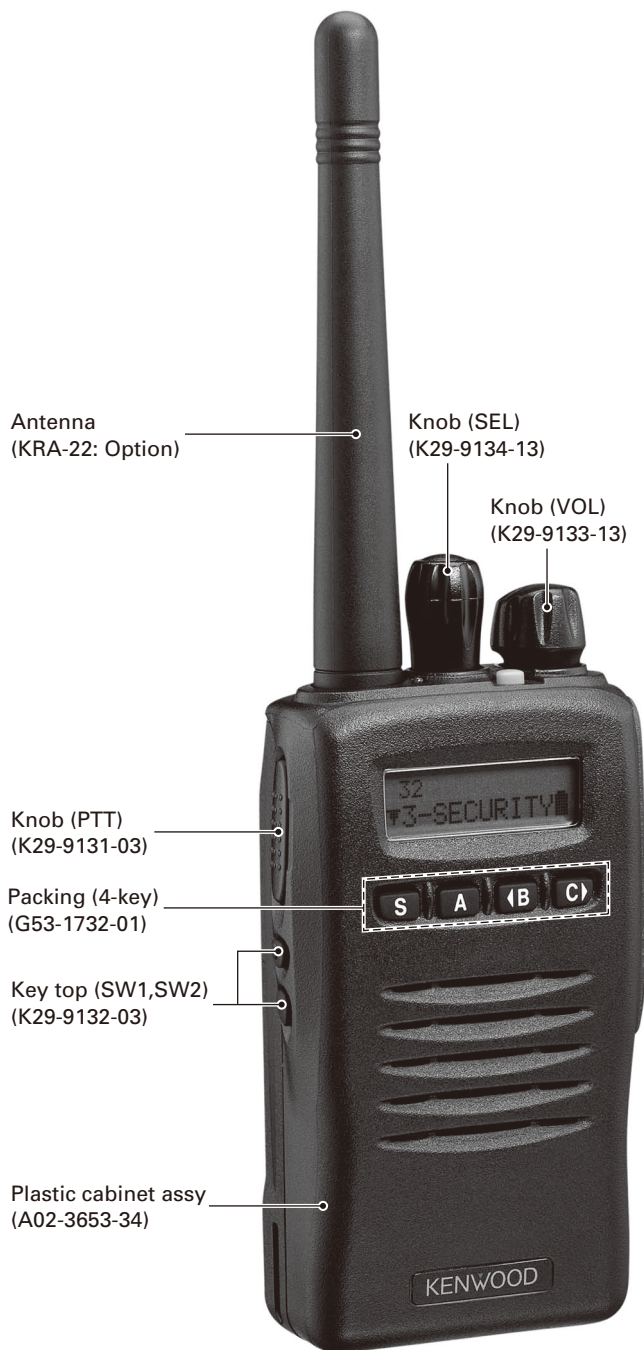
REVISED

KENWOOD

Kenwood Corporation

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This service manual has been revised due to the modification of the PLL IC.
This service manual applies to products with A8A00186 or subsequent serial number.



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**Does not come with antenna.
Antenna is available as an option.**

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



This product uses Lead Free solder.

TK-2140

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GENERAL

INTRODUCTION

SCOPE OF THIS MANUAL

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

ORDERING REPLACEMENT PARTS

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

PERSONAL SAFETY

The following precautions are recommended for personal safety:

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

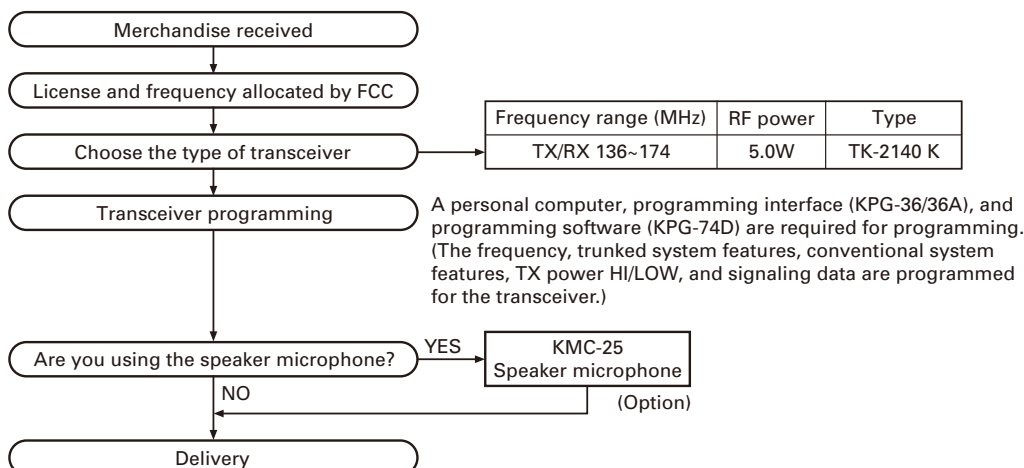
SERVICE

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

Service Manual List

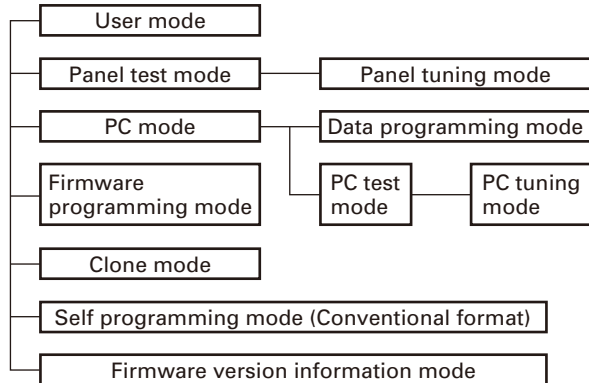
Title	Parts number	Remarks	Market code	TX-RX unit number
TK-2140 First edition	B51-8602-00	-	K	X57-6400-10 (J72-0806-09)
TK-2140 Addendum	B51-8614-00	Adds information on the Clone and Self programming mode.	K	-
TK-2140 Revised	B51-8602-10	This service manual The modification of the PLL IC.	K	X57-6400-10 (J79-0162-09)

SYSTEM SET-UP



REALIGNMENT

1. Modes



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 transceiver.
PC mode	Used for communication between the transceiver and PC.
Data programming mode	Used to read and write frequency data and other features to and from the transceiver.
PC test mode	Used to check the transceiver using the PC. This feature is included in the FPU. See panel tuning.
Firmware programming mode	Used when changing the main program of the flash memory.
Clone mode	Used to transfer programming data from one transceiver to another.
Self programming mode (Conventional format)	Frequency, signaling and features write to the transceiver.
Firmware version information mode	Firmware version number is displayed on the LCD.

2. How to Enter Each Mode

Mode	Operation
User mode	Power ON
Panel test mode	[A]+Power ON (Two seconds)
PC mode	Received commands from PC
Panel tuning mode	[Panel test mode]+[S]
Firmware programming mode	[S]+Power ON
Clone mode	[C]+Power ON (Two seconds)
Self programming mode (Conventional format)	[LAMP]+Power ON (Two seconds)
Firmware version information mode	[Side 1] + Power ON (Two seconds)

3. Panel Test Mode

Setting method refer to ADJUSTMENT.

4. Panel Tuning Mode

Setting method refer to ADJUSTMENT.

5. PC Mode

5-1. Preface

This transceiver is programmed by using a personal computer, programming interface (KPG-36/36A) and programming software (KPG-74D).

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

5-2. Connection procedure

1. Connect the transceiver 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 transceiver 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 transceiver to PC mode, then attach the interface cable.

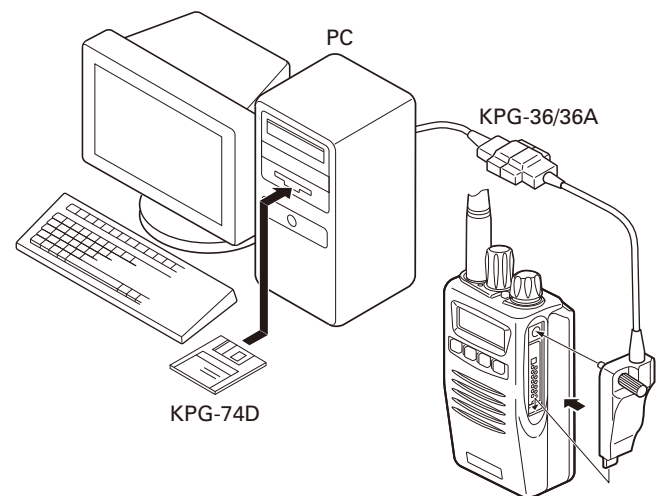


Fig. 1

REALIGNMENT

5-3. KPG-36/36A description

(PC programming interface cable: Option)

The KPG-36/36A is required to interface the transceiver to the computer. It has a circuit in its D-subconnector (KPG-36: 25-pin, KPG-36A: 9-pin) case that converts the RS-232C logic level to the TTL level.

The KPG-36/36A connects the universal connector of the transceiver to the computers RS-232C serial port.

5-4. Programming software description

The KPG-74D programming disk is supplied in 3-1/2" disk format. The software on this disk allows a user to program the transceivers via programming interface cable (KPG-36/36A).

5-5. Programming with PC

If data is transferred to the transceiver from a PC with the KPG-74D, the destination data (basic transceiver 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.

6. Firmware Programming Mode

6-1. Preface

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


6-2. Connection procedure

Connect the transceiver to the personal computer with the interface cable (KPG-36/36A). (Connection is the same as in the PC Mode.)

6-3. Programming

1. Start up the 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 transceiver power ON with the [S] switch held down.

When "PROG 57600" appears, release your finger from the switch.

5. Check the connection between the transceiver and the personal computer, and make sure that the transceiver 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 transceiver starts to receive data, the  icon is blinking.
7. If writing ends successfully, the LED on the transceiver lights and the checksum is displayed.
8. If you want to continue programming other transceivers, 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).
- When programming the firmware, it is recommend to copy the data from the floppy disk to your hard disk before update the transceiver firmware. Directly copying from the floppy disk to the transceiver may not work because the access speed is too slow.

6-4. Function

1. If you press the [Side2] switch while "PROG 57600" is displayed, the checksum is displayed. If you press the [Side2] switch again while the checksum is displayed, "PROG 57600" is redisplayed.
2. If you press the [Side1] switch 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 [Side1] 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 [Side1] switch again while "PROG 38400" is displayed, the display returns to "PROG 57600".

Note:

Normally, write in the high-speed mode.

7. Clone Mode

Programming data can be transferred from one transceiver to another by connecting them via their external universal connectors. The operation is as follows (the transmit transceiver is the master and the receive transceiver is a target).

1. Turn the source transceiver power ON with the [C] key held down. If the password is set to the transceiver, the transceiver displays "CLONE LOCK". If the "Data Password" is not set, the transceiver displays "CLONE MODE".
2. When "CLONE LOCK" is displayed, only the [Encoder] knob and [S] key can be accepted. When you enter the correct password, and "CLONE MODE" is displayed, the transceiver can be used as the cloning source. The following describes how to enter the password.
3. How to enter the password with the [Encoder] knob; If the [Encoder] knob is rotated while "CLONE LOCK" is displayed, numbers (0 to 9) are displayed flashing. When you press the [S] key, the currently selected number is determined. If you press the [S] key after entering the password in this procedure, "CLONE MODE" is displayed if the entered password is correct. If the password is incorrect, "CLONE LOCK" is redisplayed.
4. Power on the target transceiver.
5. Connect the cloning cable (No. E30-3325-05) to the universal connectors on the source and target.

REALIGNMENT

6. Press the [S] key on the source while the source displays "CLONE MODE". The data of the source is sent to the target.
While the target is receiving the data, "PROGRAM" is displayed. When cloning of data is completed, the source displays "END", and the target automatically operates in the User mode. The target can then be operated by the same program as the source.
7. The other target can be continuously cloned. When the [S] key on the source is pressed while the source displays "END", the source displays "CLONE MODE". Carry out the operation in step 4 to 6.

Note:

Only the same models can be cloned together.

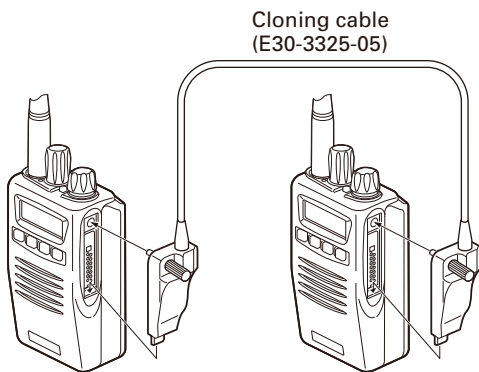


Fig. 2

8. Self Programming Mode

Write mode for frequency data and signalling etc. Mainly used by the person maintaining the user equipment.

8-1. Enter to the self programming mode

Delete R351 (Figure 3) in the TX-RX unit and turn the power switch on while pressing the [Side2] key. When enter the self programming mode, "SELF PROG" is displayed.

Note:

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

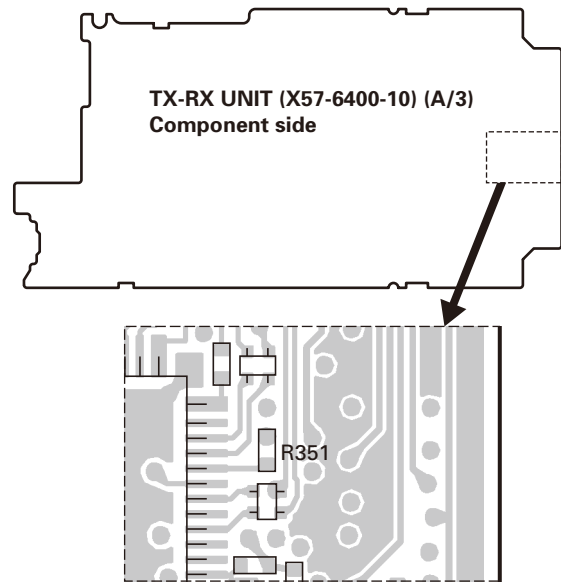


Fig. 3

8-2. Channel setting mode

This is a mode for making channel settings with the panel keys without using the FPU.

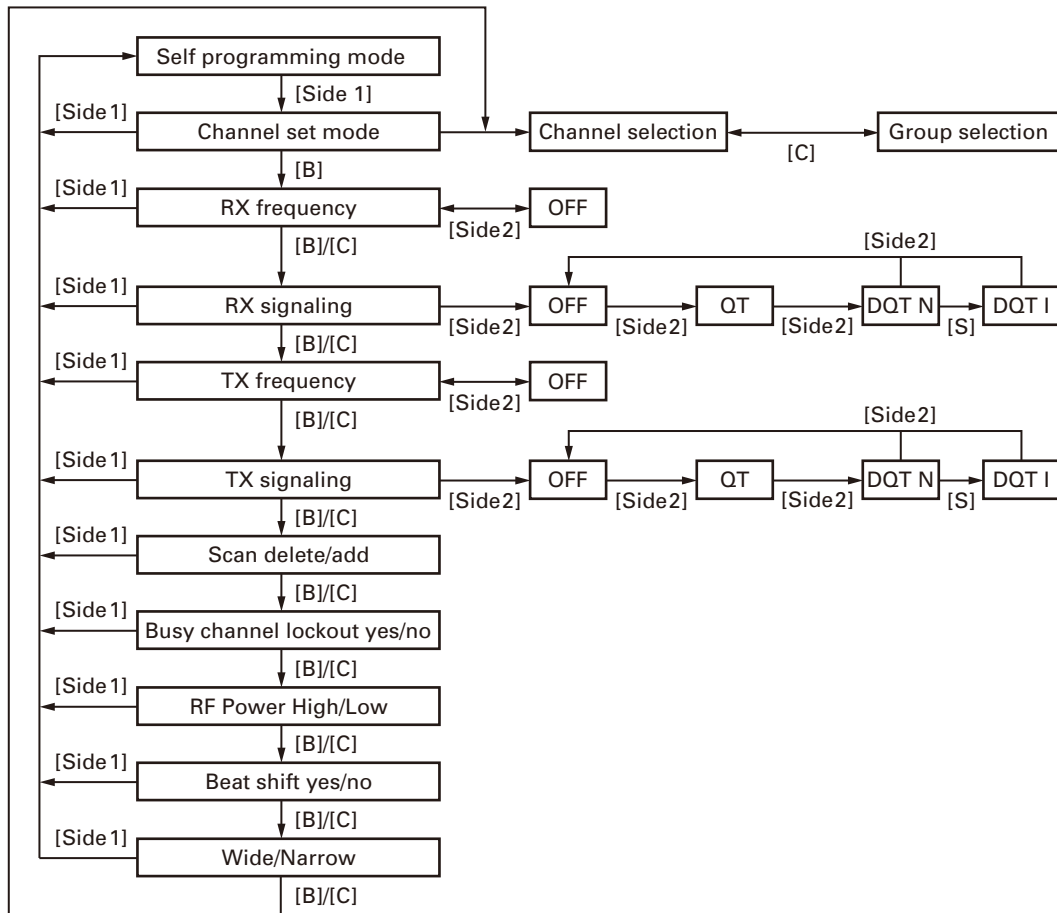
- Pressing [Side 1] key when "SELF PROG" is displayed, sets Channel Setting Mode.
- Select an item set with [C] key and change the selection with the [Encoder] knob.
- The data displayed with [B] key is stored in the memory and then proceeds to the next item. Pressing [C] key proceeds to the next item without storing it in the memory.
- Press [Side 1] key to set the display to "SELF PROG" and return to reset (default) status.

Items set in Channel Setting Mode are as follows.

Function settings	Display	Remarks
Channel select	CH or GRP	
RX Frequency	RXF	[Side 2]: Freq. On/Off switching [A]: 2.5kHz/5kHz/6.25kHz/7.5kHz/ 1MHz step switching
RX Signaling	RXS	[Side 2]: OFF/QT/DQT switching [A]: 1 step/Standard switching [S]: DQT Normal/Invert switching
TX Frequency	TXF	Key operation same as RX Frequencies
TX Signaling	TXS	Key operation same as RX Signaling
Scan Del/Add	SCN	Delete/Add
Busy Channel Lockout	BSY	YES/NO
RF Power	PWR	HIGH/LOW
Beat Shift	SFT	YES/NO
Wide/Narrow	W/N	Wide/Narrow

REALIGNMENT

■ Flow chart



8-3. Function setting mode

This is a mode for using the panel keys to make function settings without using the FPU, that operate on all channels.

- Pressing the [Side2] key when "SELF PROG" is displayed, sets the Function Setting Mode.
- Select an item set with [C] key and change the selection with the [Encoder] knob.
- Press [Side2] key to display "SELF PROG" and return to reset (default) status.

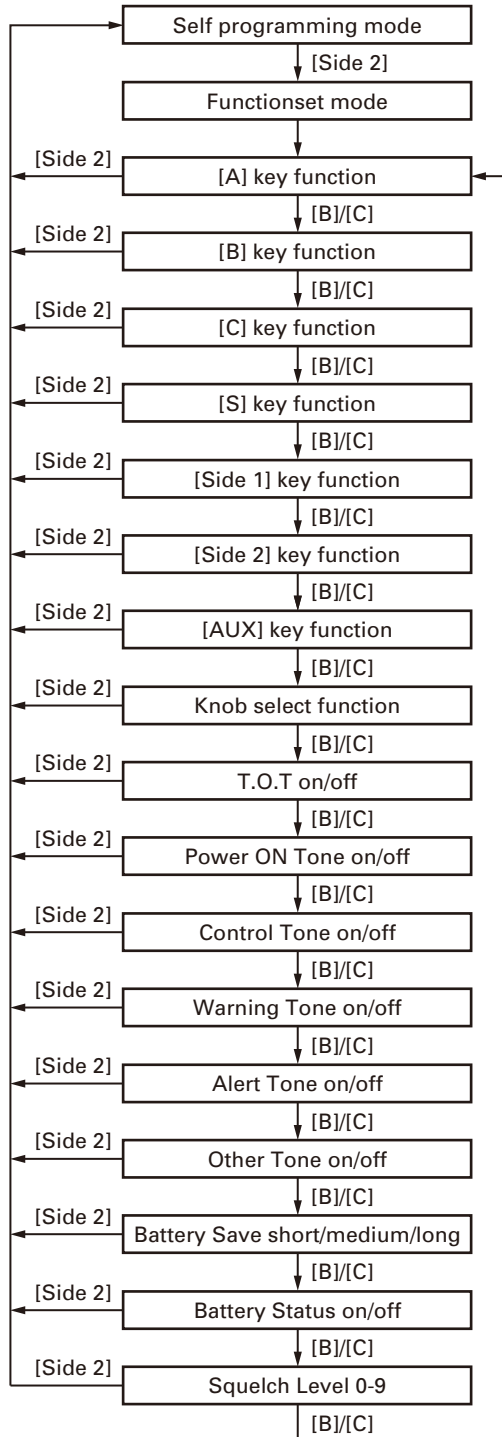
Items set in Function Set Mode are as follows.

Function settings	Display	Remarks
[A]	A	Key Function
[B]	B	Key Function
[C]	C	Key Function
[S]	S	Key Function
[Side 1]	SD1	Key Function
[Side 2]	SD2	Key Function

Function settings	Display	Remarks
[AUX]	AUX	Key Function
[KNOB]	KNB	Knob Function
T.O.T	TOT	ON/OFF at T.O.T all settings ON: TOT [60s] / Pre-Alert [10s] / Rekey Time [5s] / Reset Time [5s] OFF: TOT [600s] / Pre-Alert [Off] / Rekey Time [Off] / Reset Time [Off]
Power ON Tone	Ptn	Continuous, 1-31, OFF
Control Tone	Ctn	Continuous, 1-31, OFF
Warning Tone	Wtn	Continuous, 1-31, OFF
Alert Tone	Atn	Continuous, 1-31, OFF
Other Tone	Otn	Continuous, 1-31, OFF
Battery Save	BAT	OFF/SHORT/MEDIUM/LONG
Battery Status	BST	ON/OFF
Squelch Level	SQL	SQL 0-9

REALIGNMENT

■ Flow chart



8-4. Memory reset mode

This mode is used to clear data for functions that can be set in Self Programming Mode or to return to reset values (default).

- Pressing [S] key when "SELF PROG" is shown, sets the display to "CLEAR NO?".
- Turning the encoder alternately switches the display between "CLEAR NO?" ↔ "CLEAR YES?".
- Pressing [S] key when "CLEAR YES?" is shown, clears the data and sets the display to "ALL CLEAR".
- Pressing [S] key again, returns the display to "SELF PROG".
- Pressing [S] key when "CLEAR NO?" is shown, returns the display to "SELF PROG" without resetting the data.

CIRCUIT DESCRIPTION

1. Overview

This transceiver is VHF/FM portable transceiver designed to operate in the frequency range of 136 to 174MHz (K) and a VHF/FM band EFJ LTR™ trunked system compatible FM portable transceiver that can be programmed to operate on both LTR and conventional systems.

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.

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, L217). 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 (L210, L213).

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).

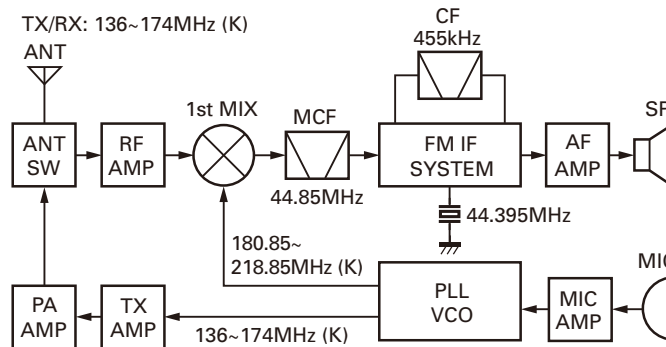


Fig. 1 Frequency configuration

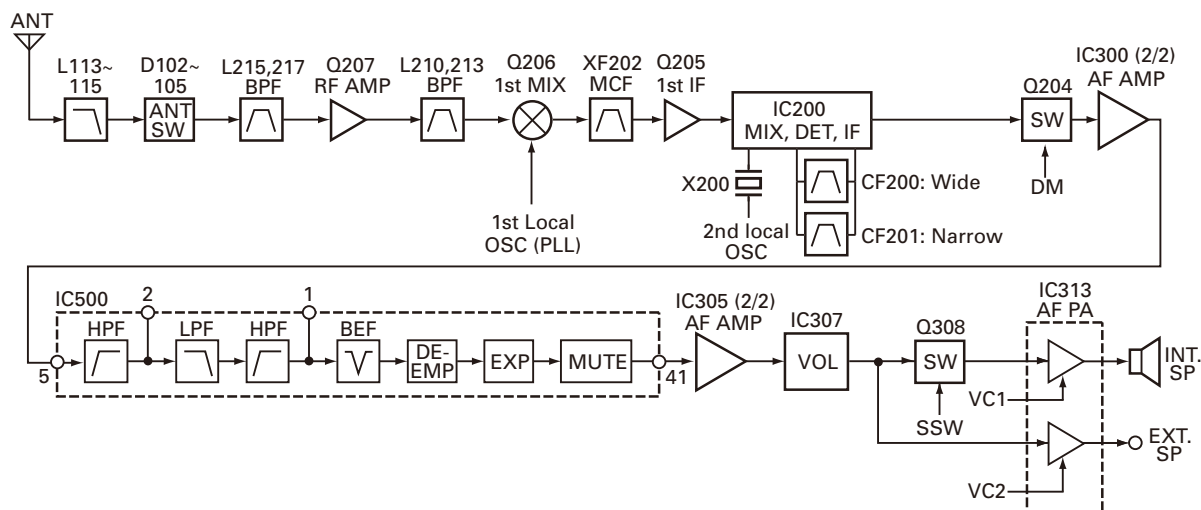


Fig. 2 Receiver section

CIRCUIT DESCRIPTION

3-2. IF unit

The first IF signal is passed through a four-pole monolithic crystal filter (XF202) 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.

3-3. Wide/Narrow switching 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.

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.

Q503 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.

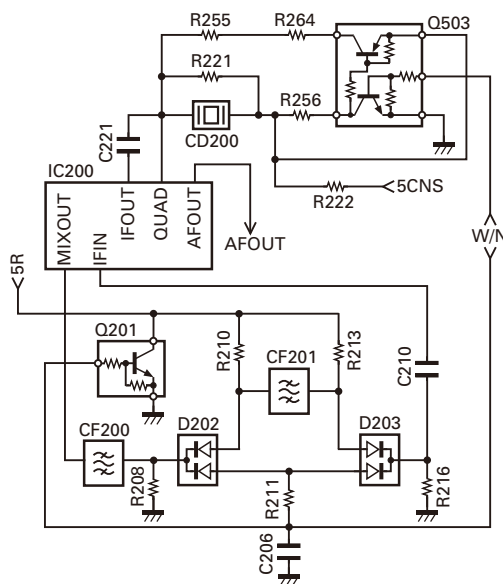


Fig. 3 Wide/Narrow changeover circuit

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 (AM1) from the shift register becomes Low in the standby and Q302, Q303 which are power supply circuit for IC313 turn off. Also, IC500 is set to the power down mode according to data from MCU, and the AF signal is muted. When the audio is output, AM1 becomes High to turn Q302, Q303 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.

AM1	SSW	VC1	VC2	SP
H	H	H	L	INT
H	L	L	H	EXT
L	H	L	L	MUTE
L	L	L	L	MUTE

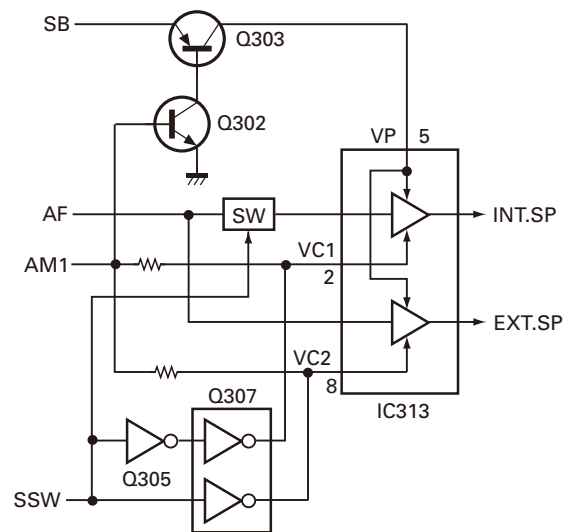


Fig. 4 Audio amplifier circuit

CIRCUIT DESCRIPTION

3-5. Squelch circuit

The output from IC200 enters FM IC again, then passed through a band-pass filter. And passed through a band-pass filter IC201 (2/2). The noise component output from IC201 (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 MCU (IC309). And IC200 outputs a DC voltage (RSSI) corresponding to the input of the IF amplifier. The MCU 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.

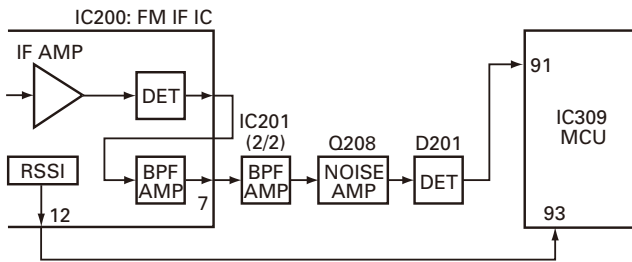


Fig. 5 Squelch circuit

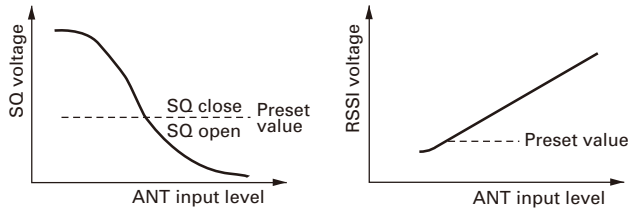


Fig. 6 Squelch and RSSI voltage vs ANT input level

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.

The signal from microphone passes through the microphone mute switch (Q502 is off in TX), the limiter circuit in D501 and amplified by IC501 (1/2), and passes 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 (Q501) 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 MCU (IC309).

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.

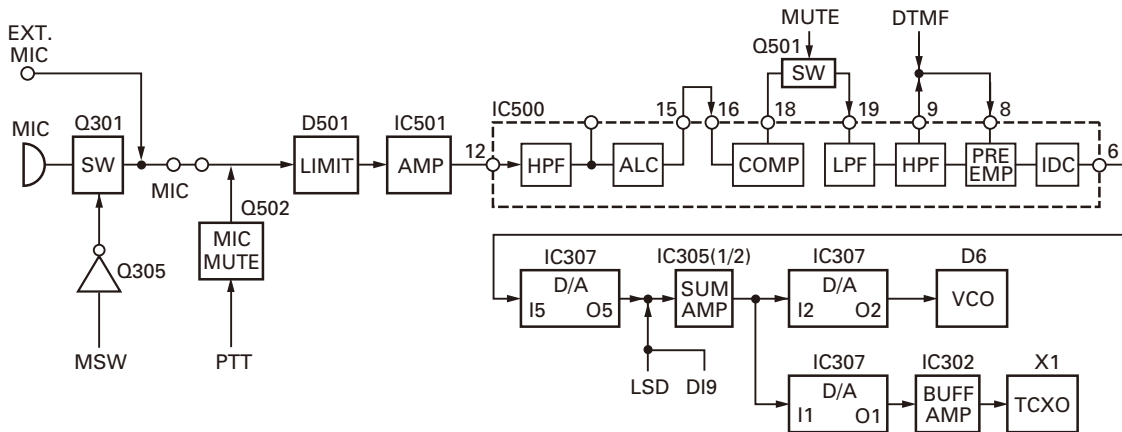


Fig. 7 Microphone amplifier

CIRCUIT DESCRIPTION

4-2. Drive and Final amplifier

The signal from the T/R switch (D101 is on) is amplified by drive amplifier (Q100 and Q101) to +15~17dBm.

The output of the drive amplifier is amplified by the RF power amplifier (Q106) to 5.0W (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 are on) and applied to the antenna terminal.

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 R125 is 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 drive amplifier and 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.

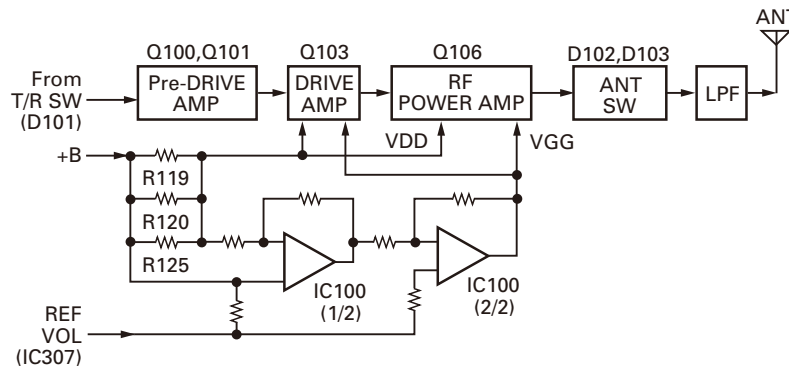


Fig. 8 Drive and final amplifier and APC circuit

5. Frequency Synthesizer Unit

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

The TCXO generates 16.8MHz. The frequency stability is 1.5ppm within the temperature range of -30 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 VCO of this transceiver consists of 2VCO and covers a dual range of the 180.85~218.85MHz and the 136~174MHz. The VCO generates 180.85~218.85MHz 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 and D3 in transmit mode and D2, D4, D9 and D10 in receive mode).

The T/R pin of IC312 goes "low" in receive mode causing Q6 and Q3 to turn off, and Q2 and Q4 turn on. The T/R pin goes "high" 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, reference divider, phase comparator and charge pump. The frequency step of the PLL circuit is 10, 12.5 or 15kHz (Channel step is 5, 6.25 or 12.5kHz). The input signal from the pins 5 and 8 of the

PLL IC is divided down to the 10, 12.5 or 15kHz 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 CV 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 MCU (IC309). The data are input to the PLL IC when the channel is changed or when transmission is changed to reception and vice versa. A PLL lock condition is always monitored by the pin 30 (UL) of the MCU. When the PLL is unlocked, the UL goes low.

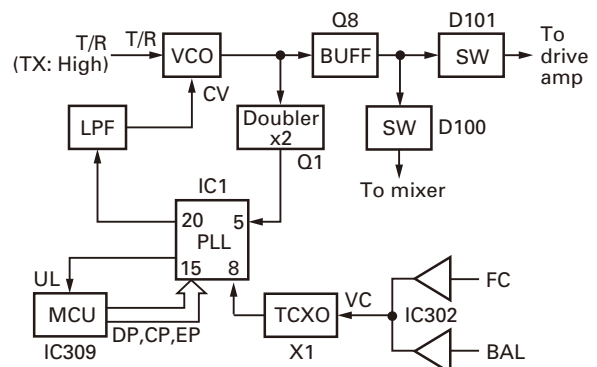


Fig. 9 PLL block diagram

CIRCUIT DESCRIPTION

6. Control Circuit

The control circuit consists of MCU (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 MCU (IC309) and a flash memory (IC308), a flash memory has a capacity of 2M bits that contains the transceiver control program for the MCU 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 holds data such as written with the FPU (KPG-74D), firmware program (User mode, Test mode, Tuning mode, etc.) This data must be rewritten when replacing the flash memory.

EEPROM

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

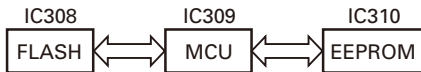


Fig. 10 Memory circuit

6-2. Low battery warning

The battery voltage is monitored by the MCU (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 (Ni-Cd, Ni-MH: approx. 5.8V, Li-ion: 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.

6-3. Battery type detection

The transceiver automatically detects the battery type, measuring the resistance between the S-terminal and + terminal on the battery pack and changes the supplied voltage to the S-terminal as below. The MCU then detects the battery type.

Resistor value	Battery type	Input voltage of S-terminal
1.8MΩ	Li-ion	0.3~1.3V
560kΩ	Ni-Cd	1.3~2.6V
220kΩ	Ni-MH	2.6~5.0V
OPEN	Battery case	0~0.3V

7. Signaling Circuit

7-1. Encode

Low-speed data (QT, DQT, LTR)

Low-speed data is output from pin 1 of the MCU. 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 MCU. 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 MCU is passed through the D/A converter (IC307) and then applied to the audio processor (IC500).

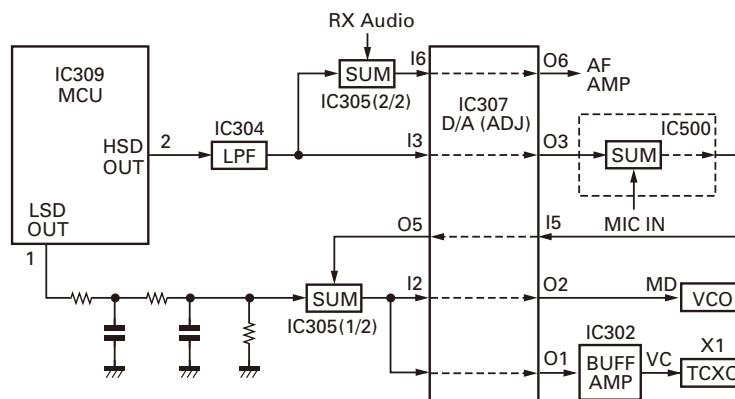


Fig. 11 Encode

CIRCUIT DESCRIPTION

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.

■ MSK (ESN)

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

7-2. Decode

■ Low-speed data (QT, DQT, LTR)

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 MCU.

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

■ High-speed data (DTMF)

The DTMF input signal from the IF IC (IC200) is amplified by IC300 (2/2) and goes to IC301, the DTMF decoder. The decoded information is then processed by the MCU. During transmission and standby, the DTMF IC is set to the power down mode when the PD terminal is High. When the line is busy, the PD terminal becomes Low, the power down mode is canceled and decoding is carried out.

■ High-speed data (2 tone)

The demodulated signal from the IF IC (IC200) is amplified by IC300 (2/2) and passes through an audio processor (IC500) and band-pass filter IC303 (1/2) and IC 201 (1/2) to remove a low-speed data. The MCU digitizes this signal, performs processing such as DC restoration, and decodes the signal.

■ MSK (ESN)

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

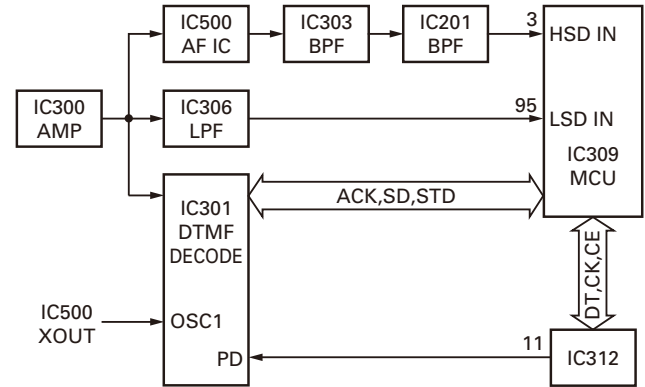


Fig. 12 Decode

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. IC401 supplies 5V (5M) to the control circuit, and IC403 supplies 5V (5C) to common circuits. IC402 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 MCU INT port also goes "LOW" level, and the MCU stops.

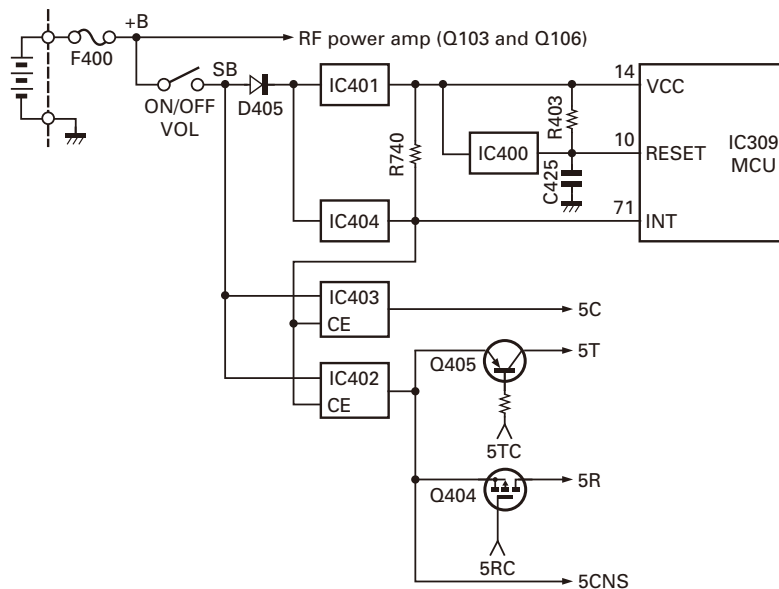


Fig. 13 Power supply circuit

SEMICONDUCTOR DATA

MCU: 30620M8A2N3GPU (TX-RX unit IC309)

Pin No.	Port Name	I/O	Function
1	LSDO	O	Low speed data output. (QT/DQT/LTR)
2	HSDO	O	High speed data output. (DTMF)
3	HSDI	I	High speed data input. (2Tone)
4	DSTB	O	D/A converter data strobe output.
5	5RC	O	RX power control. H: TX, L: RX
6	BYTE	-	+5V.
7	CNVSS	-	GND.
8	AFDAT	O	MODEM MSK encode data output.
9	AFRDT	I	MODEM MSK decode data input.
10	RESET	-	CPU reset.
11	XOUT	-	CPU clock.
12	VSS	-	GND.
13	XIN	-	CPU clock.
14	VCC	-	+5V
15	-	-	NC
16	DTSTD	I	DTMF decoder data detect input.
17	AFTRD	I	MODEM MSK encode data output timing pulse input.
18	AFRTM	I	MODEM MSK decode data input timing pulse input.
19	EEPDAT	I/O	EEPROM data input/output.
20	BEEP	O	Beep 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	MONI	I	[MON] key input.
28	LAMP	I	[LAMP] key input.
29	AUXTXD	O	External serial interface (COM1) TDX1.
30	AUXRXD	I	External serial interface (COM1) RXD1.
31	DTMDAT	I	DTMF decoder data input.
32	DTCLK	I/O	DTMF decoder clock output / PLL type detection.
33	TXD	O	Serial interface (COM0) TXD0 (to MIC connector).
34	RXD	I	Serial interface (COM0) RXD0 (to MIC connector).
35	DAT	O	Common data output.
36	CLK	O	Common clock output.

Pin No.	Port Name	I/O	Function
37	RDY	-	Can not used.
38	ALE	-	Can not used.
39	HOLD	-	Can not used.
40	HLDA	-	Can not used.
41	BLCK	-	Can not used.
42	RD	O	Flash memory RD bus.
43	BHE	-	Can not used.
44	WR	O	Flash memory WR bus.
45	SAVE	O	Battery save output.
46	SELF	I	Self programming mode enable input.
47	CS/MODE	O	LCD driver chip select output.
48	CS0	O	Flash memory chip enable.
49	A19	-	Can not used.
50~59	A18~A9	O	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	UL	I	PLL unlock 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
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 (QT/DQT/LTR).
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.

COMPONENTS DESCRIPTION

TX-RX UNIT (X57-6400-10)

Ref. No.	Use / Function	Operation / Condition
IC1	MOS IC	PLL IC
IC100	MOS IC	APC AMP
IC200	MOS IC	IF IC
IC201	MOS IC	AF AMP, Filter
IC300	MOS IC	AF AMP, Filter
IC301	MOS IC	DTMF decoder
IC302~306	MOS IC	AF AMP, Filter
IC307	MOS IC	Potential meter
IC308	ROM IC	Flash ROM
IC309	MOS IC	MCU
IC310	ROM IC	EEPROM
IC311,312	MOS IC	Shift register
IC313	BI-POLAR	AF power AMP
IC400	MOS IC	Detector
IC401	MOS IC	5M AVR
IC402	MOS IC	5CNS AVR
IC403	MOS IC	5C AVR
IC404	MOS IC	Detector
IC500	MOS IC	Base band IC
IC501	MOS IC	AF AMP, Filter
Q1	Transistor	Doubler
Q2	FET	RX VCO oscillation
Q3	FET	TX VCO oscillation
Q4	FET	VCO switch
Q5	Transistor	Buffer AMP
Q6	Transistor	VCO switch
Q7	Transistor	Ripple filter
Q8	Transistor	TX/RX common RF AMP
Q11	FET	Loop filter switch
Q100,101	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
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	Int/Ext switch

Ref. No.	Use / Function	Operation / Condition
Q306	Transistor	TX LED switch
Q307,308	FET	Int/Ext switch
Q309	Transistor	BUSY LED switch
Q310	Transistor	LCD LED AVR switch
Q311	Transistor	LCD LED AVR
Q312	Transistor	PLL selector
Q400,401	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 mute
Q503	Transistor	W/N switch
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
D9,10	Variable capacitance diode	RX VCO
D11~13	Diode	F-in filter shift switch
D100,101	Diode	TX/RX RF switch
D102~105	Diode	ANT switch
D106	Zener diode	APC protect
D200	Diode	SQL voltage charge
D201	Diode	SQL rectification
D202,203	Diode	W/N switch
D205~208	Variable capacitance diode	BPF tuning
D209	Diode	DM charge/discharge switch
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	MIC input protect

TK-2140

PARTS LIST

* New Parts. Δ indicates safety critical components.

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

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

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

L : Scandinavia

K : USA

P : Canada

Y : PX (Far East, Hawaii)

T : England

E : Europe

Y : AAFES (Europe)

X : Australia

M : Other Areas

TK-2140 (Y50-5630-10)

TX-RX UNIT (X57-6400-10)

Ref. No.	Address	New parts	Parts No.	Description	Destination
TK-2140					
1	1B	*	A02-3653-34	PLASTIC CABINET ASSY	
2	3A		A10-4063-21	CHASSIS	
3	2B	*	A22-2519-02	SUB PANEL	
5	3B		B01-0694-13	ESCUTCHEON (BELT HOOK)	
6	2C		B09-0625-03	CAP ACCESSORY	
7	3B	*	B10-2770-02	FRONT GLASS	
8	1A	*	B38-0890-15	LCD ASSY	
9	1C	*	B62-1476-30	INSTRUCTION MANUAL	
10	1C	*	B62-1883-00	INSTRUCTION MANUAL	
11	3B	*	E04-0467-05	RF COAXIAL RECEPTACLE (SMA)	
12	3B		E23-1188-04	TERMINAL (ANTENNA)	
13	3A	*	E23-1189-14	TERMINAL (BATT-)	
14	2A,3A		E37-0978-05	LEAD WIRE WITH CONNECTOR (SW2)	
15	3A	*	E37-1007-05	LEAD WIRE WITH CONNECTOR (PTT)	
16	3B		E58-0440-15	RECTANGULAR RECEPTACLE	
17	3A		E72-0413-03	BATT TERMINAL BLOCK	
19	2A	*	F10-2415-04	SHIELDING PLATE (MCU)	
20	1A	*	F10-2416-13	SHIELDING PLATE (LCD)	
21	2A	*	F10-2444-04	SHIELDING PLATE (SPEAKER)	
22	2A		F10-2463-04	SHIELDING COVER (AUDIO AMP)	
23	3A,3B	*	F15-1006-04	SHADE (CHASSIS)	
24	1A		F20-1192-04	INSULATING SHEET (LCD)	
25	3A		F20-3307-14	INSULATING SHEET	
27	1B	*	G10-1304-04	FIBROUS SHEET (CABINET)	
28	2A		G10-1324-04	FIBROUS SHEET (LCD)	
29	3A	*	G10-1377-04	FIBROUS SHEET (PTT PCB)	
31	3A	*	G11-4046-14	SHEET (PTT)	
32	1A	*	G11-4174-04	SHEET (LCD)	
33	1B		G11-4189-04	SHEET (CABINET)	
34	1A		G11-4190-04	SHEET (CABINET)	
35	1A	*	G11-4297-14	SHEET (CABINET)	
36	3A		G11-4315-14	SHEET (FINAL FET)	
37	1A	*	G11-4388-04	SHEET (LCD)	
38	3A		G13-1885-04	CUSHION (CHASSIS)	
39	2B	*	G13-2010-04	CUSHION (ECM)	
40	3A	*	G53-1547-04	PACKING (TERMINAL BLOCK)	
41	3A	*	G53-1620-04	PACKING (ANTENNA)	
42	2B	*	G53-1710-02	PACKING (TOP)	
43	2B	*	G53-1732-01	PACKING (4-KEY)	
45	2C	*	H12-3107-02	PACKING FIXTURE	
46	1D		H52-1811-02	ITEM CARTON CASE	
48	2A		J19-5430-03	HOLDER (VOL/SEL)	
49	2A		J21-8424-04	MOUNTING HARDWARE	
50	2C	*	J29-0701-15	BELT HOOK ACCESSORY	
51	1B		J30-1269-04	SPACER (VOLUME)	
52	2B		J82-0078-15	FPC (VOL/SEL)	
53	3B		J82-0079-05	FPC (UNIVERSAL)	
55	1B		K29-9131-03	KNOB (PTT)	
56	1A		K29-9132-03	KEY TOP (SW1,SW2)	
57	1B	*	K29-9133-13	KNOB (VOLUME)	

Ref. No.	Address	New parts	Parts No.	Description	Destination
58	1B	*	K29-9134-13	KNOB (SELECTOR)	
A	2C		N08-0548-24	DRESSED SCREW ACCESSORY	
B	3A	*	N09-6565-05	PAN HEAD SCREW	
C	3B	*	N14-0834-04	CIRCULAR NUT (VOL/SEL)	
D	3B		N30-2604-48	PAN HEAD MACHINE SCREW (ANT)	
E	3B		N30-3006-43	PAN HEAD MACHINE SCREW	
F	3B	*	N79-2035-48	PAN HEAD TAPTITE SCREW	
G	1A,2A		N83-2005-48	PAN HEAD TAPTITE SCREW	
60	2B		R31-0617-05	VARIABLE RESISTOR	
62	2B		S60-0415-05	ROTARY ENCODER	
64	2B	*	T07-0732-25	SPEAKER	
65	2B		T91-0630-05	MIC ELEMENT	

TX-RX UNIT (X57-6400-10)					
D309			B30-2156-05	LED (RED)	
D310			B30-2157-05	LED (YELLOW)	
C1-3			CK73HB1H102K	CHIP C	1000PF K
C4			CC73HCH1H100D	CHIP C	10PF D
C5			CK73HB1H102K	CHIP C	1000PF K
C7,8			CC73HCH1H050C	CHIP C	5.0PF C
C9			CK73HB1C103K	CHIP C	0.010UF K
C10			CC73HCH1H100D	CHIP C	10PF D
C11			CK73HB1C103K	CHIP C	0.010UF K
C12			CK73HB1H471K	CHIP C	470PF K
C13			CK73HBOJ105K	CHIP C	1.0UF K
C14			CK73HB1H471K	CHIP C	470PF K
C15			CK73HBOJ105K	CHIP C	1.0UF K
C17			CS77CA1V0R1M	CHIP TNTL	0.1UF 35WV
C20			CK73HB1H471K	CHIP C	470PF K
C21			CC73HCH1H080D	CHIP C	8.0PF D
C23			CC73HCH1H070D	CHIP C	7.0PF D
C25		*	CS77CA1V2R2M	CHIP TNTL	2.2UF 35WV
C26			CK73HB1H471K	CHIP C	470PF K
C27			CS77CA1VR22M	CHIP TNTL	0.22UF 35WV
C28			CK73HB1H471K	CHIP C	470PF K
C29			CK73HB1C103K	CHIP C	0.010UF K
C30			CK73HB1H102K	CHIP C	1000PF K
C31			CC73HCH1H100D	CHIP C	10PF D
C32			CC73HCH1H820J	CHIP C	82PF J
C33			CC73HCH1H220J	CHIP C	22PF J
C34			CC73HCH1H470J	CHIP C	47PF J
C35			CC73HCH1H100C	CHIP C	10PF C
C37			CC73GCH1H060B	CHIP C	6.0PF B
C38			CC73GCH1H100C	CHIP C	10PF C
C39			CC73GCH1H3R5B	CHIP C	3.5PF B
C40			CC73GCH1H070B	CHIP C	7.0PF B
C41			CC73GCH1H0R5B	CHIP C	0.5PF B
C42,43			CK73GB1H103J	CHIP C	0.010UF J
C44			CC73GCH1H0R5B	CHIP C	0.5PF B
C45,46			CK73HB1H102K	CHIP C	1000PF K
C47		*	CS77CA1A220M	CHIP TNTL	22UF 10WV

PARTS LIST

TX-RX UNIT (X57-6400-10)

Ref. No.	Address	New parts	Parts No.	Description	Desti-nation	Ref. No.	Address	New parts	Parts No.	Description	Desti-nation
C48			CC73HCH1H330J	CHIP C 33PF J		C161			CC73HCH1H220J	CHIP C 22PF J	
C49			CC73HCH1H150J	CHIP C 15PF J		C162			CC73HCH1H100D	CHIP C 10PF D	
C50-52			CK73HB1H102K	CHIP C 1000PF K		C170			CC73HCH1H101J	CHIP C 100PF J	
C53			CC73HCH1H100D	CHIP C 10PF D		C200			CK73HB1A224K	CHIP C 0.22UF K	
C54			CK73HB1H102K	CHIP C 1000PF K		C201			CK73HB1A104K	CHIP C 0.10UF K	
C56			CS77CP1A4R7M	CHIP TNTL 22UF 10WV		C202			CK73HB1H221K	CHIP C 220PF K	
C57			CC73GCH1H0R5B	CHIP C 0.5PF B		C203-205			CK73HB1A104K	CHIP C 0.10UF K	
C58			CK73HB0J105K	CHIP C 1.0UF K		C206			CK73HB1C103K	CHIP C 0.010UF K	
C61			CS77CA1VR22M	CHIP TNTL 0.22UF 35WV		C207			CK73HB1H471K	CHIP C 470PF K	
C62			CS77CP1A4R7M	CHIP TNTL 4.7UF 10WV		C208,209			CK73HB1H221K	CHIP C 220PF K	
C64-66			CC73HCH1H101J	CHIP C 100PF J		C210			CK73HB1A104K	CHIP C 0.10UF K	
C67			CK73HB1C223K	CHIP C 0.022UF K		C211			CK73HB1H102K	CHIP C 1000PF K	
C68			CC73HCH1H120J	CHIP C 12PF J		C212			CC73HCH1H220J	CHIP C 22PF J	
C69			CC73HCH1H070B	CHIP C 7.0PF B		C213			CC73HCH1H100D	CHIP C 10PF D	
C70			CC73HCH1H040C	CHIP C 4.0PF C		C214			CK73HB1A104K	CHIP C 0.10UF K	
C71			CC73HCH1H120J	CHIP C 12PF J		C215			C92-0773-05	CHIP TNTL 15UF 6.3WV	
C72			CK73HB1H471K	CHIP C 470PF K		C216			CK73HB1A104K	CHIP C 0.10UF K	
C73			CC73HCH1H330J	CHIP C 33PF J		C217			CK73HB1H221K	CHIP C 220PF K	
C74			CC73HCH1H180J	CHIP C 18PF J		C218			CK73HB1A104K	CHIP C 0.10UF K	
C76			CK73HB1H471K	CHIP C 470PF K		C219			CK73HB1A333K	CHIP C 0.033UF K	
C91,92			CK73HB1H102K	CHIP C 1000PF K		C220			CK73HB1A104K	CHIP C 0.10UF K	
C100-102			CK73HB1H102K	CHIP C 1000PF K		C221			CC73HCH1H680J	CHIP C 68PF J	
C103			CC73HCH1H390J	CHIP C 39PF J		C222			CK73HB1A104K	CHIP C 0.10UF K	
C104,105			CK73HB1H102K	CHIP C 1000PF K		C223			CK73HB1C103K	CHIP C 0.010UF K	
C106			CC73HCH1H390J	CHIP C 39PF J		C224		*	CS77CP1A100M	CHIP TNTL 10UF 10WV	
C108			CK73HB1A104K	CHIP C 0.10UF K		C225			CK73HB1C103K	CHIP C 0.010UF K	
C109			CK73HB1H102K	CHIP C 1000PF K		C227			CK73HB1A104K	CHIP C 0.10UF K	
C111			CK73HB1H102K	CHIP C 1000PF K		C228,229			CK73HB1C103K	CHIP C 0.010UF K	
C115			CK73HB1H102K	CHIP C 1000PF K		C230			CC73HCH1H120G	CHIP C 12PF G	
C116			CC73HCH1H101J	CHIP C 100PF J		C231			CK73HB1C103K	CHIP C 0.010UF K	
C117			CC73HCH1H270J	CHIP C 27PF J		C232			CK73HB1H102K	CHIP C 1000PF K	
C119			CK73HB1H102K	CHIP C 1000PF K		C233			CK73HB1C103K	CHIP C 0.010UF K	
C120			CC73HCH1H470J	CHIP C 47PF J		C234			CK73HB1H102K	CHIP C 1000PF K	
C123			CS77CA1A100M	CHIP TNTL 10UF 10WV		C235			CC73HCH1H150J	CHIP C 15PF J	
C124			CK73G80J105K	CHIP C 1.0UF K		C236			CC73HCH1H020C	CHIP C 2.0PF C	
C125-127			CK73HB1H102K	CHIP C 1000PF K		C238			CC73HCH1H180J	CHIP C 18PF J	
C128			CC73HCH1H101J	CHIP C 100PF J		C239			CK73HB1H102K	CHIP C 1000PF K	
C129			CK73HB1H102K	CHIP C 1000PF K		C240			CC73HCH1H1R5C	CHIP C 1.5PF C	
C130			CK73HB1C103K	CHIP C 0.010UF K		C241			CC73HCH1H090D	CHIP C 9.0PF D	
C131			CK73HB1H102K	CHIP C 1000PF K		C242			CK73HB1A104K	CHIP C 0.10UF K	
C134			CK73HB1A104K	CHIP C 0.10UF K		C243			CK73HB1H102K	CHIP C 1000PF K	
C135			CK73GB1A105K	CHIP C 1.0UF K		C244			CC73GCH1H050B	CHIP C 5.0PF B	
C136			CK73HB1H102K	CHIP C 1000PF K		C245			CK73HB1H102K	CHIP C 1000PF K	
C137			CK73HB1C103K	CHIP C 0.010UF K		C250			CK73HB1H102K	CHIP C 1000PF K	
C138			CC73GCH1H330G	CHIP C 33PF G		C251			CC73GCH1H060B	CHIP C 6.0PF B	
C139			CK73HB1H102K	CHIP C 1000PF K		C252			CC73HCH1H470J	CHIP C 47PF J	
C140			CC73HCH1H050C	CHIP C 5.0PF C		C253			CK73HB1A104K	CHIP C 0.10UF K	
C141			CC73GCH1H820J	CHIP C 82PF J		C255			CK73HB1A104K	CHIP C 0.10UF K	
C144			CK73HB1H102K	CHIP C 1000PF K		C256			CC73HCH1H470J	CHIP C 47PF J	
C145			CC73HCH1H270J	CHIP C 27PF J		C257-260			CK73HB1H102K	CHIP C 1000PF K	
C146			CK73HB1H102K	CHIP C 1000PF K		C261			CC73GCH1H4R5B	CHIP C 4.5PF B	
C147			CC73HCH1H050B	CHIP C 5.0PF B		C263			CC73HCH1H470J	CHIP C 47PF J	
C148			CC73HCH1H100D	CHIP C 10PF D		C264			CK73HB1H102K	CHIP C 1000PF K	
C149			CC73HCH1H240G	CHIP C 24PF G		C266			CK73HB1H102K	CHIP C 1000PF K	
C150			CC73HCH1H120J	CHIP C 12PF J		C267			CC73GCH1H020B	CHIP C 2.0PF B	
C151			CC73HCH1H330J	CHIP C 33PF J		C268			CC73HCH1H330J	CHIP C 33PF J	
C152			CC73HCH1H130J	CHIP C 13PF J		C269			CC73GCH1H090B	CHIP C 9.0PF B	
C153			CC73HCH1H070D	CHIP C 7.0PF D		C270			CC73HCH1H050C	CHIP C 5.0PF C	
C154			CC73HCH1H270G	CHIP C 27PF G		C271			CK73HB1A104K	CHIP C 0.10UF K	
C155			CC73GCH1H680G	CHIP C 68PF G		C272			CK73HB1C103K	CHIP C 0.010UF K	

PARTS LIST

TX-RX UNIT (X57-6400-10)

Ref. No.	Address	New parts	Parts No.	Description	Destination	Ref. No.	Address	New parts	Parts No.	Description	Destination
C275			CC73HCH1H101J	CHIP C 100PF J		C375			CC73HCH1H470J	CHIP C 47PF J	
C276			CK73HB1H102K	CHIP C 1000PF K		C382			CK73HB1A104K	CHIP C 0.10UF K	
C279,280			CK73HB1A104K	CHIP C 0.10UF K		C383,384			CC73HCH1H470J	CHIP C 47PF J	
C281,282			CK73HB1H102K	CHIP C 1000PF K		C386			CC73HCH1H470J	CHIP C 47PF J	
C283,284			CK73HB1A104K	CHIP C 0.10UF K		C388			CK73HB1H102K	CHIP C 1000PF K	
C286			CC73GCH1H010B	CHIP C 1.0PF B		C389			CC73HCH1H470J	CHIP C 47PF J	
C287,288			CK73HB1H102K	CHIP C 1000PF K		C390			CK73HB1A104K	CHIP C 0.10UF K	
C289,290			CC73GCH1H1R5B	CHIP C 1.5PF B		C391,392			CK73HB1C103K	CHIP C 0.010UF K	
C291			CK73HB1H102K	CHIP C 1000PF K		C394-398			CK73HB1A104K	CHIP C 0.10UF K	
C294			CK73GB1H102K	CHIP C 1000PF K		C399			CK73HB1C103K	CHIP C 0.010UF K	
C295			CC73HCH1H150J	CHIP C 15PF J		C400			CK73HB1H102K	CHIP C 1000PF K	
C298			CK73HB1H102K	CHIP C 1000PF K		C402-405			CK73HB1H102K	CHIP C 1000PF K	
C300		*	CS77CP1A100M	CHIP TNTL 10UF 10WV		C408			CK73HB1H102K	CHIP C 1000PF K	
C301			CK73HB1H102K	CHIP C 1000PF K		C410			CK73FB1A475K	CHIP C 4.7UF K	
C302			CK73HB1A104K	CHIP C 0.10UF K		C411			CK73GB1A105K	CHIP C 1.0UF K	
C303			CK73HB1A473K	CHIP C 0.047UF K		C413			CK73FB1A106K	CHIP C 10UF K	
C304			CC73HCH1H330J	CHIP C 33PF J		C415			CC73HCH1H101J	CHIP C 100PF J	
C305			CK73HB1C103K	CHIP C 0.010UF K		C416			CK73FB1A106K	CHIP C 10UF K	
C306-308			CK73HB1A104K	CHIP C 0.10UF K		C417			CK73GB0J105K	CHIP C 1.0UF K	
C309			CC73HCH1H101J	CHIP C 100PF J		C419			CK73HB1H102K	CHIP C 1000PF K	
C310			CK73HB1C103K	CHIP C 0.010UF K		C420			CC73HCH1H101J	CHIP C 100PF J	
C311			CC73HCH1H101J	CHIP C 100PF J		C421			CK73GB1A105K	CHIP C 1.0UF K	
C313			CC73HCH1H101J	CHIP C 100PF J		C422			CK73GB0J105K	CHIP C 1.0UF K	
C314			CK73HB1H102K	CHIP C 1000PF K		C423		*	CS77CP1A100M	CHIP TNTL 10UF 10WV	
C315		*	CS77CP1A100M	CHIP TNTL 10UF 10WV		C424			CC73HCH1H101J	CHIP C 100PF J	
C316			CK73HB1A333K	CHIP C 0.033UF K		C425			CK73HB1A104K	CHIP C 0.10UF K	
C318			CK73HB1H331K	CHIP C 330PF K		C426			CC73HCH1H101J	CHIP C 100PF J	
C319			CC73HCH1H121J	CHIP C 120PF J		C500			CK73GB1H122K	CHIP C 1200PF K	
C320			CK73HB1A104K	CHIP C 0.10UF K		C501,502			CK73HB1A104K	CHIP C 0.10UF K	
C321			CK73HB1H271K	CHIP C 270PF K		C503,504			CK73HB1C103K	CHIP C 0.010UF K	
C322			CK73HB1C103K	CHIP C 0.010UF K		C506			CK73HB1A104K	CHIP C 0.10UF K	
C323			CK73HB1H222K	CHIP C 2200PF K		C507			CK73HB1C103K	CHIP C 0.010UF K	
C324			CK73HB1A104K	CHIP C 0.10UF K		C508			CK73HB1A104K	CHIP C 0.10UF K	
C325			CK73HB1C123K	CHIP C 0.012UF K		C509-511			CK73GB1H562J	CHIP C 5600PF J	
C327			CK73HB1E103K	CHIP C 0.010UF K		C512-514			CK73GB1H272J	CHIP C 2700PF J	
C328			CK73GB1C683K	CHIP C 0.068UF K		C515			CC73HCH1H030C	CHIP C 3.0PF C	
C329			CK73GB0J105K	CHIP C 1.0UF K		C516			CC73HCH1H151J	CHIP C 150PF J	
C330			CK73HB1A104K	CHIP C 0.10UF K		C517			CK73HB1A104K	CHIP C 0.10UF K	
C331,332			CK73HB1C103K	CHIP C 0.010UF K		C518			CK73HB1A333K	CHIP C 0.033UF K	
C333			CK73HB1E472K	CHIP C 4700PF K		C519			CC73HCH1H030C	CHIP C 3.0PF C	
C334,335			CK73HB1C103K	CHIP C 0.010UF K		C520		*	CK73GB1H821J	CHIP C 820PF J	
C336,337			CC73HCH1H330J	CHIP C 33PF J		C521		*	CS77CP1A100M	CHIP TNTL 10UF 10WV	
C338			CC73HCH1H150J	CHIP C 15PF J		C522			CK73HB1A104K	CHIP C 0.10UF K	
C339-342			CK73HB1C103K	CHIP C 0.010UF K		C523,524			CK73HB1H102K	CHIP C 1000PF K	
C344		*	CS77CP1A100M	CHIP TNTL 10UF 10WV		C525			CK73HB1A104K	CHIP C 0.10UF K	
C345			CK73GB1A474K	CHIP C 0.47UF K		C526			CK73GB1H103J	CHIP C 0.010UF J	
C346,347			CC73HCH1H470J	CHIP C 47PF J		C527,528			CK73HB1A104K	CHIP C 0.10UF K	
C348			CK73GB1A474K	CHIP C 0.47UF K		C529			CK73GB1H332J	CHIP C 3300PF J	
C349			CK73HB1C153K	CHIP C 0.015UF K		C530			CK73FB0J475K	CHIP C 4.7UF K	
C350		*	CS77CP0G3R3M	CHIP TNTL 3.3UF 4.0WV		C531			CK73HB1C153K	CHIP C 0.015UF K	
C351			CC73HCH1H470J	CHIP C 47PF J		C532			CK73HB1H561K	CHIP C 560PF K	
C352-354			CK73HB1A104K	CHIP C 0.10UF K		C533			CK73HB1H102K	CHIP C 1000PF K	
C355		*	CS77CP1A100M	CHIP TNTL 10UF 10WV		C534			CC73HCH1H560J	CHIP C 56PF J	
C356			CC73HCH1H470J	CHIP C 47PF J		C535			CK73HB1A104K	CHIP C 0.10UF K	
C357,358		*	CS77CP1A100M	CHIP TNTL 10UF 10WV		C536,537			CK73FB0J475K	CHIP C 4.7UF K	
C359			CC73HCH1H470J	CHIP C 47PF J		C538			CK73HB1H471K	CHIP C 470PF K	
C362			CC73HCH1H470J	CHIP C 47PF J		C539,540			CK73HB1H102K	CHIP C 1000PF K	
C364			CC73HCH1H470J	CHIP C 47PF J		C541			CK73GB1C563K	CHIP C 0.056UF K	
C369			CC73HCH1H101J	CHIP C 100PF J		C542,543			CK73HB1H102K	CHIP C 1000PF K	
C371			CC73HCH1H470J	CHIP C 47PF J		C554-557			CK73HB1H102K	CHIP C 1000PF K	

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Ref. No.	Address	New parts	Parts No.	Description	Destination	Ref. No.	Address	New parts	Parts No.	Description	Destination
C700			CK73HB1H471K	CHIP C 470PF K		L213			L41-6878-14	SMALL FIXED INDUCTOR (68NH)	
C720			CS77CP1A4R7M	CHIP TNTL 4.7UF 10WV		L215			L41-6878-14	SMALL FIXED INDUCTOR (68NH)	
C730		*	CS77CP1C2R2M	CHIP TNTL 2.2UF 16WV		L217			L41-5678-14	SMALL FIXED INDUCTOR (56NH)	
C740			CK73HB1A104K	CHIP C 0.10UF K		L220			L40-1885-92	SMALL FIXED INDUCTOR (180NH)	
C741			CK73HB1H471K	CHIP C 470PF K		L223			L40-2785-92	SMALL FIXED INDUCTOR (270NH)	
C742-745			CK73HB1A104K	CHIP C 0.10UF K		L300-313			L92-0163-05	BEADS CORE	
TC1,2			C05-0384-05	CERAMIC TRIMMER CAP (10PF)		L314-317			L92-0408-05	CHIP FERRITE	
CN300		*	E40-6178-15	SOCKET FOR PIN ASSY		L320			L92-0163-05	BEADS CORE	
CN301,302			E40-6453-05	FLAT CABLE CONNECTOR		L400			L92-0149-05	CHIP FERRITE	
CN303-306			E40-6092-05	PIN ASSY		L500			L92-0163-05	BEADS CORE	
CN400			E40-6453-05	FLAT CABLE CONNECTOR		L710			L34-4563-05	AIR-CORE COIL	
CN500		*	E40-6179-15	PIN ASSY		L711			L41-3975-45	SMALL FIXED INDUCTOR (39NH)	
F100			F53-0287-05	FUSE		L712			L40-1085-71	SMALL FIXED INDUCTOR (100NH)	
F400			F53-0324-05	FUSE		X1	*		L77-3032-05	TCXO (16.8MHZ)	
-			G11-4050-04	SHEET		X200			L77-1760-15	CRYSTAL RESONATOR (44.395MHZ)	
CD200			L79-1834-05	TUNING COIL		X300			L77-1810-05	CRYSTAL RESONATOR (9.8304MHZ)	
CF200		*	L72-1031-05	CERAMIC FILTER		X500			L77-1708-15	CRYSTAL RESONATOR (3.579545MHZ)	
CF201			L72-0934-05	CERAMIC FILTER		XF202			L71-0530-05	MCF (44.85MHZ)	
L1			L41-4795-39	SMALL FIXED INDUCTOR (4.7UH)		CP300-313			RK75HA1J102J	CHIP-COM 1.0K J 1/16W	
L2			L40-1075-57	SMALL FIXED INDUCTOR (10.0NH)		CP314			RK75HA1J473J	CHIP-COM 47K J 1/16W	
L3			L40-3375-57	SMALL FIXED INDUCTOR (33.0NH)		CP315			RK75HA1J102J	CHIP-COM 1.0K J 1/16W	
L4			L40-2775-57	SMALL FIXED INDUCTOR (27.0NH)		CP316			RK75HA1J473J	CHIP-COM 47K J 1/16W	
L6			L40-1085-57	SMALL FIXED INDUCTOR (100NH)		CP317-320			RK75HA1J102J	CHIP-COM 1.0K J 1/16W	
L7			L92-0470-05	CHIP FERRITE		CP322			RK75HA1J102J	CHIP-COM 1.0K J 1/16W	
L8,9			L40-1001-86	SMALL FIXED INDUCTOR (10UH)		CP323,324			RK75HA1J473J	CHIP-COM 47K J 1/16W	
L13,14			L40-1001-86	SMALL FIXED INDUCTOR (10UH)		CP326,327			RK75HA1J473J	CHIP-COM 47K J 1/16W	
L15			L40-3978-67	SMALL FIXED INDUCTOR (39NH)		CP400,401			RK75HA1J473J	CHIP-COM 47K J 1/16W	
L16			L40-3378-67	SMALL FIXED INDUCTOR (33NH)		CP500,501			RK75HA1J472J	CHIP-COM 4.7K J 1/16W	
L17,18			L40-1001-86	SMALL FIXED INDUCTOR (10UH)		R2			RK73HB1J101J	CHIP R 100 J 1/16W	
L21			L40-1085-92	SMALL FIXED INDUCTOR (100NH)		R6			RK73GB2A000J	CHIP R 0.0 J 1/10W	
L22			L92-0163-05	BEADS CORE		R7			RK73HB1J000J	CHIP R 0.0 J 1/16W	
L23			L40-1085-92	SMALL FIXED INDUCTOR (100NH)		R8			RK73HB1J100J	CHIP R 10 J 1/16W	
L100			L40-8275-92	SMALL FIXED INDUCTOR (82NH)		R9			RK73HB1J470J	CHIP R 47 J 1/16W	
L101			L40-1085-92	SMALL FIXED INDUCTOR (100NH)		R10,11			RK73HB1J561J	CHIP R 560 J 1/16W	
L102			L92-0140-05	CHIP FERRITE		R14			RK73HB1J683J	CHIP R 68K J 1/16W	
L103			L41-1585-45	SMALL FIXED INDUCTOR (150NH)		R15			RK73HB1J220J	CHIP R 22 J 1/16W	
L104			L92-0149-05	CHIP FERRITE		R16,17			RK73HB1J391J	CHIP R 390 J 1/16W	
L105			L40-2775-57	SMALL FIXED INDUCTOR (27.0NH)		R18			RK73HB1J101J	CHIP R 100 J 1/16W	
L106			L41-1575-45	SMALL FIXED INDUCTOR (15NH)		R19			RK73HB1J220J	CHIP R 22 J 1/16W	
L107			L92-0149-05	CHIP FERRITE		R20			RK73HB1J104J	CHIP R 100K J 1/16W	
L108			L34-4577-05	AIR-CORE COIL		R21			RK73HB1J154J	CHIP R 150K J 1/16W	
L109			L34-4563-05	AIR-CORE COIL		R22			RK73HB1J472J	CHIP R 4.7K J 1/16W	
L110			L34-4573-05	AIR-CORE COIL		R23			RK73HB1J101J	CHIP R 100 J 1/16W	
L111			L41-2295-39	SMALL FIXED INDUCTOR (2.2UH)		R24			RK73HB1J102J	CHIP R 1.0K J 1/16W	
L112			L34-4576-05	AIR-CORE COIL		R25			RK73HB1J332J	CHIP R 3.3K J 1/16W	
L113			L34-4575-05	AIR-CORE COIL		R26			RK73HB1J103J	CHIP R 10K J 1/16W	
L114			L34-4567-05	AIR-CORE COIL		R27			RK73HB1J331J	CHIP R 330 J 1/16W	
L115			L34-4566-05	AIR-CORE COIL		R28			RK73HH1J333D	CHIP R 33K D 1/16W	
L116			L41-1092-44	SMALL FIXED INDUCTOR (1UH)		R29			RK73HH1J104D	CHIP R 100K D 1/16W	
L120			L40-5675-92	SMALL FIXED INDUCTOR (56NH)		R31			RK73HB1J470J	CHIP R 47 J 1/16W	
L201			L40-1091-86	SMALL FIXED INDUCTOR (1.0UH)		R33			RK73HB1J473J	CHIP R 47K J 1/16W	
L202			L40-1591-86	SMALL FIXED INDUCTOR (1.5UH)		R34			RK73HB1J274J	CHIP R 270K J 1/16W	
L203			L92-0163-05	BEADS CORE		R35			RK73HB1J331J	CHIP R 330 J 1/16W	
L204			L41-5685-39	SMALL FIXED INDUCTOR (0.56UH)		R36			RK73HB1J000J	CHIP R 0.0 J 1/16W	
L205,206			L40-3975-57	SMALL FIXED INDUCTOR (39.0NH)		R37			RK73HB1J223J	CHIP R 22K J 1/16W	
L207			L40-1285-92	SMALL FIXED INDUCTOR (120NH)		R40			RK73HB1J103J	CHIP R 10K J 1/16W	
L210			L41-6878-14	SMALL FIXED INDUCTOR (68NH)		R41			RK73HB1J102J	CHIP R 1.0K J 1/16W	
L212			L92-0163-05	BEADS CORE		R42			RK73HB1J154J	CHIP R 150K J 1/16W	
						R43			RK73HB1J272J	CHIP R 2.7K J 1/16W	

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Ref. No.	Address	New parts	Parts No.	Description	Destination	Ref. No.	Address	New parts	Parts No.	Description	Destination
R44			RK73HB1J330J	CHIP R 33 J 1/16W		R226			RK73HB1J221J	CHIP R 220 J 1/16W	
R45			RK73HB1J100J	CHIP R 10 J 1/16W		R227,228			RK73HB1J331J	CHIP R 330 J 1/16W	
R46,47			RK73HB1J472J	CHIP R 4.7K J 1/16W		R229			RK73HB1J472J	CHIP R 4.7K J 1/16W	
R48-50			RK73HB1J103J	CHIP R 10K J 1/16W		R230			RK73HB1J000J	CHIP R 0.0 J 1/16W	
R91,92			RK73HB1J471J	CHIP R 470 J 1/16W		R232			RK73HB1J561J	CHIP R 560 J 1/16W	
R100,101			RK73HB1J472J	CHIP R 4.7K J 1/16W		R233			RK73HB1J221J	CHIP R 220 J 1/16W	
R102			RK73HB1J563J	CHIP R 56K J 1/16W		R234-237			RK73HB1J823J	CHIP R 82K J 1/16W	
R103			RK73HB1J331J	CHIP R 330 J 1/16W		R238			RK73HB1J000J	CHIP R 0.0 J 1/16W	
R104			RK73HB1J220J	CHIP R 22 J 1/16W		R240,241			RK73HB1J105J	CHIP R 1.0M J 1/16W	
R105			RK73HB1J561J	CHIP R 560 J 1/16W		R242			RK73HB1J471J	CHIP R 470 J 1/16W	
R106			RK73HB1J272J	CHIP R 2.7K J 1/16W		R243			RK73HB1J221J	CHIP R 220 J 1/16W	
R107			RK73HB1J150J	CHIP R 15 J 1/16W		R244			RK73HB1J102J	CHIP R 1.0K J 1/16W	
R108			RK73HB1J820J	CHIP R 82 J 1/16W		R245			RK73HB1J104J	CHIP R 100K J 1/16W	
R111			RK73HB1J000J	CHIP R 0.0 J 1/16W		R246			RK73HB1J184J	CHIP R 180K J 1/16W	
R114			RK73HB1J183J	CHIP R 18K J 1/16W		R247			RK73HB1J104J	CHIP R 100K J 1/16W	
R115			RK73HB1J473J	CHIP R 47K J 1/16W		R248,249			RK73HB1J105J	CHIP R 1.0M J 1/16W	
R116			RK73HB1J470J	CHIP R 47 J 1/16W		R250			RK73HB1J102J	CHIP R 1.0K J 1/16W	
R118			RK73HB1J151J	CHIP R 150 J 1/16W		R252			RK73HB1J470J	CHIP R 47 J 1/16W	
R119,120			RK73EB2ER39K	CHIP R 0.39 K 1/4W		R253			RK73GB2A000J	CHIP R 0.0 J 1/10W	
R122			RK73HB1J103J	CHIP R 10K J 1/16W		R254			RK73HB1J000J	CHIP R 0.0 J 1/16W	
R123			RK73HB1J100J	CHIP R 10 J 1/16W		R255			RK73HH1J272D	CHIP R 2.7K D 1/16W	
R124			RK73HB1J473J	CHIP R 47K J 1/16W		R256			RK73HB1J473J	CHIP R 47K J 1/16W	
R125			RK73EB2ER39K	CHIP R 0.39 K 1/4W		R259			RK73HB1J473J	CHIP R 47K J 1/16W	
R126			RK73HB1J000J	CHIP R 0.0 J 1/16W		R260			RK73HB1J223J	CHIP R 22K J 1/16W	
R127-129			RK73HH1J154D	CHIP R 150K D 1/16W		R264			RK73HB1J181J	CHIP R 180 J 1/16W	
R131-133			RK73HH1J154D	CHIP R 150K D 1/16W		R265			RK73HB1J474J	CHIP R 470K J 1/16W	
R134			RK73HB1J103J	CHIP R 10K J 1/16W		R266			RK73HB1J272J	CHIP R 2.7K J 1/16W	
R135			RK73HB1J473J	CHIP R 47K J 1/16W		R267			RK73HB1J334J	CHIP R 330K J 1/16W	
R137			RK73HH1J105D	CHIP R 1.0M D 1/16W		R268			RK73HB1J221J	CHIP R 220 J 1/16W	
R138			RK73HB1J101J	CHIP R 100 J 1/16W		R269,270			RK73FB2B000J	CHIP R 0.0 J 1/8W	
R139			RK73HB1J222J	CHIP R 2.2K J 1/16W		R272-276			RK73HB1J000J	CHIP R 0.0 J 1/16W	
R141,142			RK73HB1J104J	CHIP R 100K J 1/16W		R300			RK73HB1J154J	CHIP R 150K J 1/16W	
R143,144			RK73HB1J271J	CHIP R 270 J 1/16W		R301			RK73HB1J104J	CHIP R 100K J 1/16W	
R145			RK73GB2A000J	CHIP R 0.0 J 1/10W		R303			RK73HB1J474J	CHIP R 470K J 1/16W	
R147			RK73HB1J680J	CHIP R 68 J 1/16W		R304			RK73HB1J394J	CHIP R 390K J 1/16W	
R148			RK73HB1J000J	CHIP R 0.0 J 1/16W		R305			RK73HB1J153J	CHIP R 15K J 1/16W	
R200			RK73HB1J224J	CHIP R 220K J 1/16W		R307			RK73HB1J103J	CHIP R 10K J 1/16W	
R201			RK73HB1J104J	CHIP R 100K J 1/16W		R308			RK73HB1J472J	CHIP R 4.7K J 1/16W	
R202			RK73HB1J153J	CHIP R 15K J 1/16W		R309			RK73HB1J000J	CHIP R 0.0 J 1/16W	
R203			RK73HH1J224D	CHIP R 220K D 1/16W		R310			RK73HB1J333J	CHIP R 33K J 1/16W	
R204			RK73HH1J824D	CHIP R 820K D 1/16W		R311			RK73HB1J154J	CHIP R 150K J 1/16W	
R205			RK73HB1J334J	CHIP R 330K J 1/16W		R312			RK73HB1J104J	CHIP R 100K J 1/16W	
R206			RK73HB1J333J	CHIP R 33K J 1/16W		R313			RK73HB1J103J	CHIP R 10K J 1/16W	
R207			RK73HB1J154J	CHIP R 150K J 1/16W		R314			RK73HB1J474J	CHIP R 470K J 1/16W	
R208			RK73HB1J472J	CHIP R 4.7K J 1/16W		R315			RK73HB1J472J	CHIP R 4.7K J 1/16W	
R209			RK73HB1J103J	CHIP R 10K J 1/16W		R316			RK73HB1J104J	CHIP R 100K J 1/16W	
R210			RK73HB1J183J	CHIP R 18K J 1/16W		R317			RK73HB1J184J	CHIP R 180K J 1/16W	
R211			RK73HB1J223J	CHIP R 22K J 1/16W		R318			RK73HB1J103J	CHIP R 10K J 1/16W	
R212			RK73HB1J472J	CHIP R 4.7K J 1/16W		R319			RK73HB1J124J	CHIP R 120K J 1/16W	
R213			RK73HB1J183J	CHIP R 18K J 1/16W		R320			RK73HB1J563J	CHIP R 56K J 1/16W	
R214			RK73HB1J334J	CHIP R 330K J 1/16W		R321			RK73HB1J823J	CHIP R 82K J 1/16W	
R215			RK73HB1J332J	CHIP R 3.3K J 1/16W		R322			RK73HB1J154J	CHIP R 150K J 1/16W	
R216			RK73HB1J472J	CHIP R 4.7K J 1/16W		R323			RK73HB1J823J	CHIP R 82K J 1/16W	
R217			RK73HB1J334J	CHIP R 330K J 1/16W		R324,325			RK73HB1J334J	CHIP R 330K J 1/16W	
R218			RK73HB1J123J	CHIP R 12K J 1/16W		R326			RK73HB1J223J	CHIP R 22K J 1/16W	
R219			RK73HB1J224J	CHIP R 220K J 1/16W		R327			RK73HB1J473J	CHIP R 47K J 1/16W	
R220			RK73HB1J332J	CHIP R 3.3K J 1/16W		R328			RK73HB1J104J	CHIP R 100K J 1/16W	
R221			RK73HH1J332D	CHIP R 3.3K D 1/16W		R329			RK73HB1J274J	CHIP R 270K J 1/16W	
R222			RK73HB1J220J	CHIP R 22 J 1/16W		R330			RK73HB1J184J	CHIP R 180K J 1/16W	
R223			RK73HB1J184J	CHIP R 180K J 1/16W		R331			RK73HB1J104J	CHIP R 100K J 1/16W	

PARTS LIST

TX-RX UNIT (X57-6400-10)

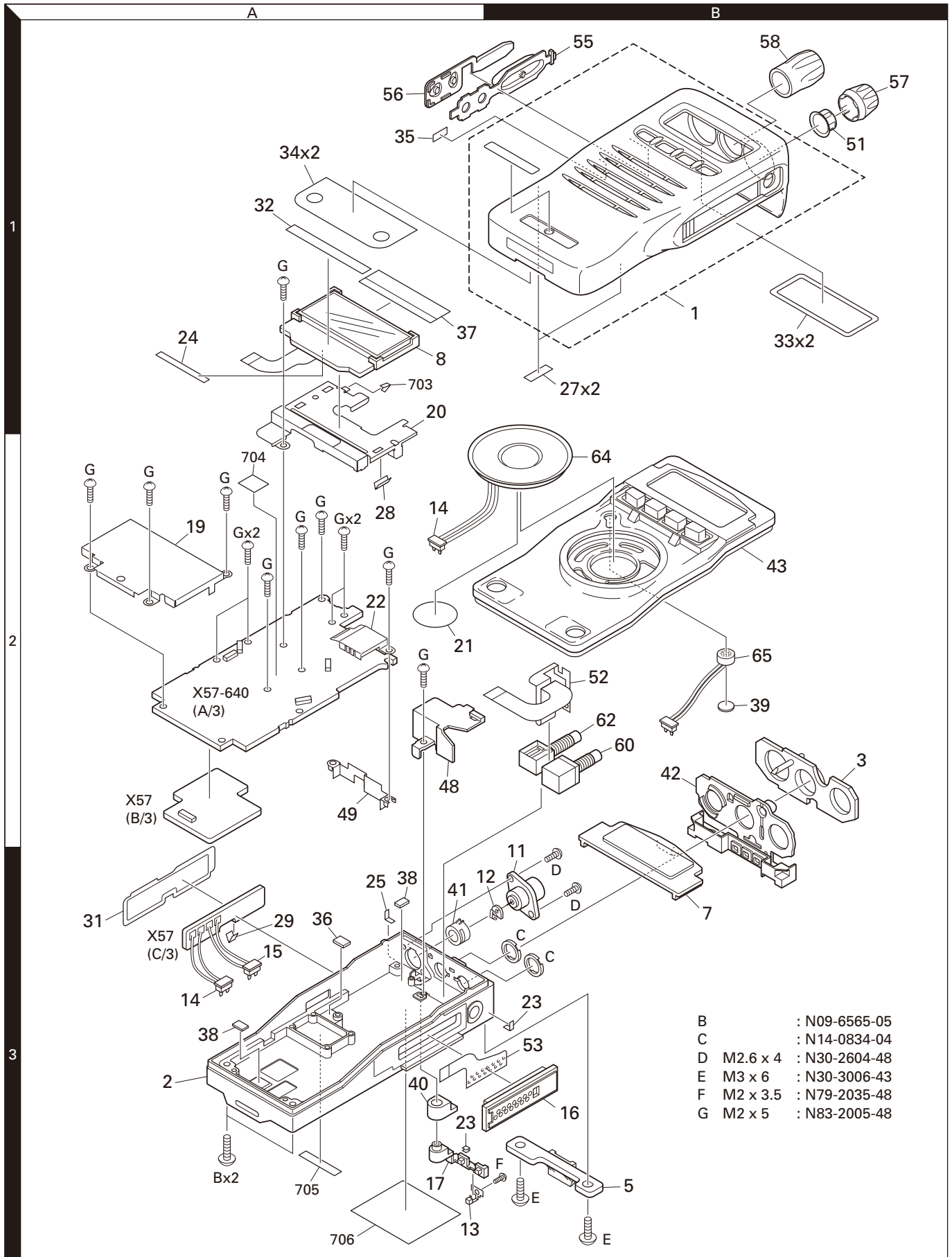
Ref. No.	Address	New parts	Parts No.	Description	Desti-nation	Ref. No.	Address	New parts	Parts No.	Description	Desti-nation
R332			RK73HB1J474J	CHIP R 470K J 1/16W		R411			RK73HB1J471J	CHIP R 470 J 1/16W	
R333			RK73HB1J473J	CHIP R 47K J 1/16W		R413			RK73HB1J105J	CHIP R 1.0M J 1/16W	
R334			RK73HB1J184J	CHIP R 180K J 1/16W		R414			RK73HB1J103J	CHIP R 10K J 1/16W	
R336-338			RK73HB1J223J	CHIP R 22K J 1/16W		R500			RK73HB1J000J	CHIP R 0.0 J 1/16W	
R339-341			RK73HB1J103J	CHIP R 10K J 1/16W		R501			RK73HH1J913D	CHIP R 91K D 1/16W	
R342			RK73HB1J223J	CHIP R 22K J 1/16W		R502			RK73HH1J683D	CHIP R 68K D 1/16W	
R343			RK73HB1J103J	CHIP R 10K J 1/16W		R503			RK73HH1J333D	CHIP R 33K D 1/16W	
R344,345			RK73HB1J000J	CHIP R 0.0 J 1/16W		R504			RK73HH1J913D	CHIP R 91K D 1/16W	
R346			RK73HB1J473J	CHIP R 47K J 1/16W		R505			RK73HB1J564J	CHIP R 560K J 1/16W	
R347			RK73HB1J102J	CHIP R 1.0K J 1/16W		R506			RK73HB1J000J	CHIP R 0.0 J 1/16W	
R348			RK73HB1J472J	CHIP R 4.7K J 1/16W		R507			RK73HH1J274D	CHIP R 270K D 1/16W	
R349,350			RK73HB1J473J	CHIP R 47K J 1/16W		R508			RK73HH1J913D	CHIP R 91K D 1/16W	
R351			RK73HB1J000J	CHIP R 0.0 J 1/16W		R509			RK73HB1J000J	CHIP R 0.0 J 1/16W	
R352,353			RK73HB1J102J	CHIP R 1.0K J 1/16W		R510			RK73HH1J682D	CHIP R 6.8K D 1/16W	
R354,355			RK73HB1J000J	CHIP R 0.0 J 1/16W		R511	*		RK73GB2A155J	CHIP R 1.5M J 1/10W	
R356			RK73HB1J473J	CHIP R 47K J 1/16W		R512			RK73HH1J683D	CHIP R 68K D 1/16W	
R357			RK73HB1J471J	CHIP R 470 J 1/16W		R513			RK73HB1J474J	CHIP R 470K J 1/16W	
R358			RK73HB1J000J	CHIP R 0.0 J 1/16W		R514			RK73HH1J682D	CHIP R 6.8K D 1/16W	
R359			RK73HB1J153J	CHIP R 15K J 1/16W		R515			RK73HB1J101J	CHIP R 100 J 1/16W	
R360			RK73HB1J182J	CHIP R 1.8K J 1/16W		R516			RK73HB1J184J	CHIP R 180K J 1/16W	
R361			RK73GB2A102J	CHIP R 1.0K J 1/10W		R517			RK73HB1J183J	CHIP R 18K J 1/16W	
R362			RK73HB1J473J	CHIP R 47K J 1/16W		R518			RK73HB1J223J	CHIP R 22K J 1/16W	
R363			RK73HB1J124J	CHIP R 120K J 1/16W		R519			RK73HB1J102J	CHIP R 1.0K J 1/16W	
R364			RK73HB1J104J	CHIP R 100K J 1/16W		R520			RK73HB1J472J	CHIP R 4.7K J 1/16W	
R365			RK73HB1J473J	CHIP R 47K J 1/16W		R521			RK73HB1J394J	CHIP R 390K J 1/16W	
R366			RK73HB1J102J	CHIP R 1.0K J 1/16W		R522			RK73HB1J333J	CHIP R 33K J 1/16W	
R367			RK73HB1J103J	CHIP R 10K J 1/16W		R523			RK73HB1J470J	CHIP R 47 J 1/16W	
R368			RK73HB1J102J	CHIP R 1.0K J 1/16W		R524			RK73HB1J224J	CHIP R 220K J 1/16W	
R369			RK73HB1J563J	CHIP R 56K J 1/16W		R525			RK73HB1J184J	CHIP R 180K J 1/16W	
R370			RK73HB1J104J	CHIP R 100K J 1/16W		R526			RK73HB1J394J	CHIP R 390K J 1/16W	
R371			RK73HB1J272J	CHIP R 2.7K J 1/16W		R527			RK73HB1J224J	CHIP R 220K J 1/16W	
R372			RK73HB1J000J	CHIP R 0.0 J 1/16W		R528			RK73HB1J220J	CHIP R 22 J 1/16W	
R373			RK73HB1J124J	CHIP R 120K J 1/16W		R529			RK73HB1J473J	CHIP R 47K J 1/16W	
R374			RK73HB1J104J	CHIP R 100K J 1/16W		R530			RK73HB1J474J	CHIP R 470K J 1/16W	
R376			RK73HB1J103J	CHIP R 10K J 1/16W		R531			RK73HB1J184J	CHIP R 180K J 1/16W	
R377			RK73HB1J104J	CHIP R 100K J 1/16W		R532,533			RK73HB1J104J	CHIP R 100K J 1/16W	
R378			RK73HB1J101J	CHIP R 100 J 1/16W		R537			RK73HB1J000J	CHIP R 0.0 J 1/16W	
R379			RK73HB1J821J	CHIP R 820 J 1/16W		R603-611			RK73HB1J471J	CHIP R 470 J 1/16W	
R380,381			RK73HB1J101J	CHIP R 100 J 1/16W		R612,613			RK73HB1J000J	CHIP R 0.0 J 1/16W	
R382			RK73HB1J103J	CHIP R 10K J 1/16W		R614,615			RK73HB1J473J	CHIP R 47K J 1/16W	
R383			RK73HB1J101J	CHIP R 100 J 1/16W		R617,618			RK73HB1J473J	CHIP R 47K J 1/16W	
R384			RK73HB1J331J	CHIP R 330 J 1/16W		R619			RK73HB1J000J	CHIP R 0.0 J 1/16W	
R385			RK73HB1J470J	CHIP R 47 J 1/16W		R620			RK73HB1J473J	CHIP R 47K J 1/16W	
R386			RK73HB1J331J	CHIP R 330 J 1/16W		R621			RK73HB1J000J	CHIP R 0.0 J 1/16W	
R388			RK73HB1J474J	CHIP R 470K J 1/16W		R623			RK73HB1J000J	CHIP R 0.0 J 1/16W	
R389			RK73HB1J472J	CHIP R 4.7K J 1/16W		R720			RK73HB1J470J	CHIP R 47 J 1/16W	
R390			RK73HB1J821J	CHIP R 820 J 1/16W		R740			RK73HB1J473J	CHIP R 47K J 1/16W	
R391,392			RK73HB1J331J	CHIP R 330 J 1/16W		R922	*		RK73FB2B104J	CHIP R 100K J 1/8W	
R393			RK73HB1J393J	CHIP R 39K J 1/16W		S600-602			S70-0457-05	TACT SWITCH	
R397,398			RK73HB1J000J	CHIP R 0.0 J 1/16W		D1			1SV325F	VARIABLE CAPACITANCE DIODE	
R400			RK73HB1J103J	CHIP R 10K J 1/16W		D2			HVC375B-E	VARIABLE CAPACITANCE DIODE	
R401,402			RK73HH1J474D	CHIP R 470K D 1/16W		D3			1SV325F	VARIABLE CAPACITANCE DIODE	
R403			RK73HB1J334J	CHIP R 330K J 1/16W		D4			HVC375B-E	VARIABLE CAPACITANCE DIODE	
R404			RK73HB1J105J	CHIP R 1.0M J 1/16W		D5			1SV278F	VARIABLE CAPACITANCE DIODE	
R405			RK73GB2A000J	CHIP R 0.0 J 1/10W		D6			MA2S111-F	DIODE	
R406			RK73HB1J103J	CHIP R 10K J 1/16W		D9,10			HVC375B-E	VARIABLE CAPACITANCE DIODE	
R407			RK73HB1J224J	CHIP R 220K J 1/16W		D11-13			HSC277	DIODE	
R408			RK73HB1J472J	CHIP R 4.7K J 1/16W		D100,101			HSC277	DIODE	
R409			RK73HB1J473J	CHIP R 47K J 1/16W		D102-105			HVC131	DIODE	
R410			RK73HB1J000J	CHIP R 0.0 J 1/16W							

PARTS LIST

TX-RX UNIT (X57-6400-10)

Ref. No.	Address	New parts	Parts No.	Description	Destination	Ref. No.	Address	New parts	Parts No.	Description	Destination
D106			HZU5CLL	ZENER DIODE		Q300			2SC4649(N,P)	TRANSISTOR	
D200			HVC131	DIODE		Q301			2SJ347F	FET	
D201			RB706F-40	DIODE		Q302			2SC4617(S)	TRANSISTOR	
D202,203			DAN235E	DIODE		Q303			2SB1132(Q,R)	TRANSISTOR	
D205-208			1SV305F	VARIABLE CAPACITANCE DIODE		Q304			2SC4617(S)	TRANSISTOR	
D209			MA2S111-F	DIODE		Q305			UPA672T-A	FET	
D301		*	KDR367E-P	DIODE		Q306			2SC4617(S)	TRANSISTOR	
D302			DA221	DIODE		Q307			UPA672T-A	FET	
D303,304			015AZ6.8F	ZENER DIODE		Q308			2SK1824-A	FET	
D305			015AZ2.4(X)F	ZENER DIODE		Q309,310			2SC4617(S)	TRANSISTOR	
D306			DA221	DIODE		Q311			2SA1362-F(Y)	TRANSISTOR	
D307			015AZ6.8F	ZENER DIODE		Q312			DTC144EE	DIGITAL TRANSISTOR	
D308			NNCD6.8G-A	ZENER DIODE		Q400			2SJ347F	FET	
D402			GN1G	DIODE		Q401			2SK1830F	FET	
D403			MA2S111-F	DIODE		Q403			DTC144EE	DIGITAL TRANSISTOR	
D405			RB521S-30	DIODE		Q404			2SJ347F	FET	
D501			RB706F-40	DIODE		Q405			KTA2015(Y)	TRANSISTOR	
IC1			ADF4111BCP7	MOS-IC		Q406			2SJ347F	FET	
IC100			TA75W01FUF	MOS-IC		Q500			DTC144EE	DIGITAL TRANSISTOR	
IC200			TA31136FNG	MOS-IC		Q501			UPA672T-A	FET	
IC201			TC75W51FK(F)	MOS-IC		Q502			2SK1830F	FET	
IC300			TC75W51FK(F)	MOS-IC		Q503			RN47A4-F	TRANSISTOR	
IC301			LC73872M	MOS-IC		TH1			ERTJ0EV104H	THERMISTOR	
IC302,303			TC75W51FK(F)	MOS-IC		TH200			ERTJ0EV104H	THERMISTOR	
IC304			TC75S51FE(F)	MOS-IC		TH300			TN10-3S154JT	THERMISTOR	
IC305,306			TC75W51FK(F)	MOS-IC							
IC307			M62364FP-F	MOS-IC							
IC308			AT29C02090TU	ROM IC							
IC309			30620M8A2N3GPU	MICRO CONTROL UNIT							
IC310			CAT24C16WI-G	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			TC35453FG6	MOS-IC							
IC501			TC75W51FK(F)	MOS-IC							
Q1			2SC5488	TRANSISTOR							
Q2,3			2SK508NV(K52)	FET							
Q4			2SJ347F	FET							
Q5			2SC5108(Y)F	TRANSISTOR							
Q6			RN47A4-F	TRANSISTOR							
Q7			2SC4617(S)	TRANSISTOR							
Q8			2SC5108(Y)F	TRANSISTOR							
Q11			SSM3K15TE(F)	FET							
Q100			2SC5108(Y)F	TRANSISTOR							
Q101			2SC4926YD	TRANSISTOR							
Q103			R001MUS1-T113	FET							
Q104,105			DTC114EE	DIGITAL TRANSISTOR							
Q106			R007MVS1BT122	FET							
Q107			2SK1824-A	FET							
Q108			DTA144EE	DIGITAL TRANSISTOR							
Q201			DTC144EE	DIGITAL TRANSISTOR							
Q203			2SK1824-A	FET							
Q204			2SK1830F	FET							
Q205			2SC4649(N,P)	TRANSISTOR							
Q206,207			3SK318	FET							
Q208			2SC4617(S)	TRANSISTOR							

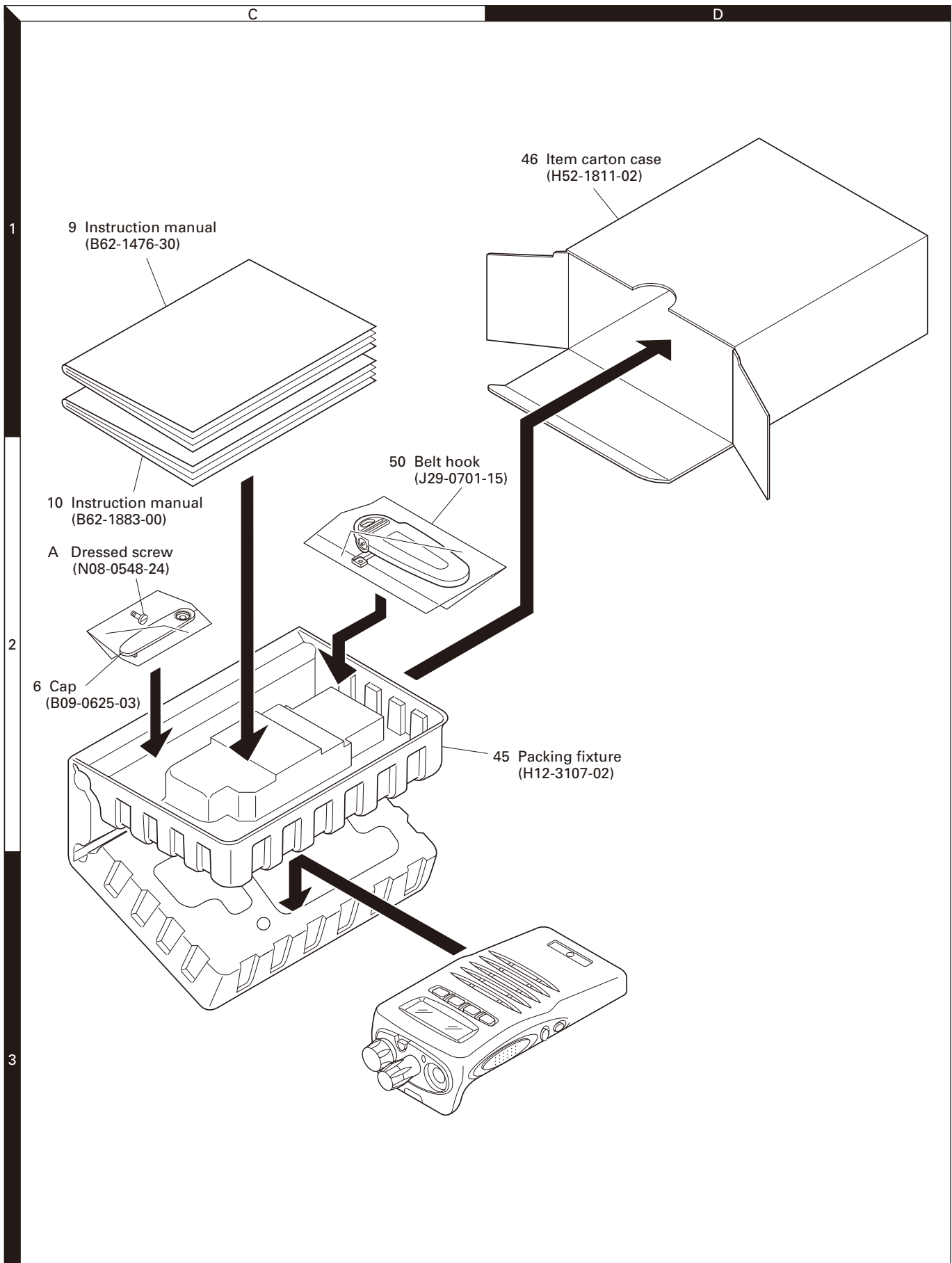
EXPLODED VIEW



- B : N09-6565-05
- C : N14-0834-04
- D M2.6 x 4 : N30-2604-48
- E M3 x 6 : N30-3006-43
- F M2 x 3.5 : N79-2035-48
- G M2 x 5 : N83-2005-48

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

PACKING



ADJUSTMENT

Test Equipment Required for Alignment

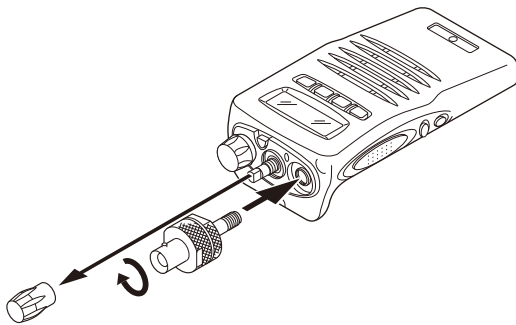
Test Equipment	Major Specifications	
1. Standard Signal Generator (SSG)	Frequency Range Modulation Output	136 to 174MHz Frequency modulation and external modulation -127dBm/0.1μV to greater than -47dBm/1mV
2. RF Power Meter	Input Impedance Operation Frequency Measurement Range	50Ω 136 to 174MHz Vicinity of 10W
3. Deviation Meter	Frequency Range	136 to 174MHz
4. Digital Volt Meter (DVM)	Measuring Range Input Impedance	10mV to 10V DC High input impedance for minimum circuit loading
5. Oscilloscope		DC through 30MHz
6. High Sensitivity Frequency Counter	Frequency Range Frequency Stability	10Hz to 1000MHz 0.2ppm or less
7. DC Ammeter		5A
8. AF Volt Meter (AF VTVM)	Frequency Range Voltage Range	50Hz to 10kHz 1mV to 10V
9. Audio Generator (AG)	Frequency Range Output	50Hz to 5kHz or more 0 to 1V
10. Distortion Meter	Capability Input Level	3% or less at 1kHz 50mV to 10Vrms
11. Spectrum Analyzer	Measuring Range	DC to 1GHz or more
12. Tracking Generator	Center frequency Output Voltage	50kHz to 600MHz 100mV or more
13. 16Ω Dummy Load		Approx. 16Ω, 3W
14. Regulated Power Supply		5V to 10V, approx. 3A Useful if ammeter equipped

■ Antenna connector adapter

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

Note:

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



■ Universal connector

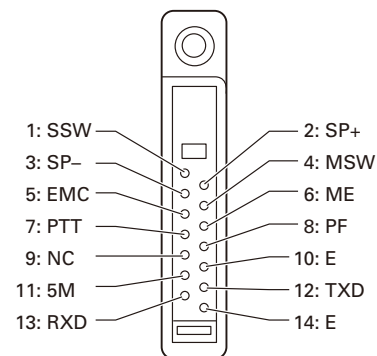
Use the interface cable (KPG-36) for PC tuning or the lead wire with plug (E30-3287-28) and screw (N08-0535-08) for panel tuning. Connect the plug to the universal connector of the transceiver and tighten the screw.

The lead wire with plug (E30-3287-28) and screw (N08-0535-08) terminals are as follows. Numbers are universal connector terminal numbers.

Caution:

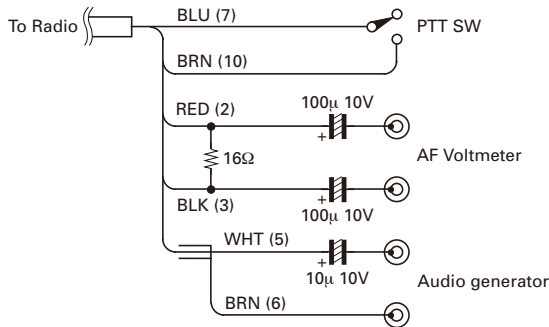
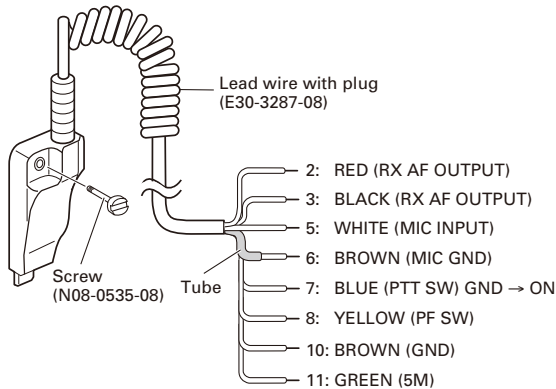
1. When connecting the plug to the universal connector of the transceiver, a short circuit may occur. To prevent this, be sure to turn the transceiver POWER switch off.
2. Since the RX AF output is a BTL output, there is a DC component. Isolate this with a capacitor or transformer as shown in the figure.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

• Universal connector



ADJUSTMENT

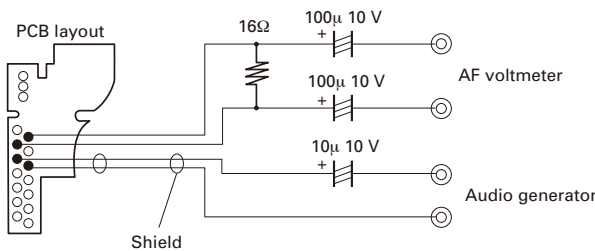
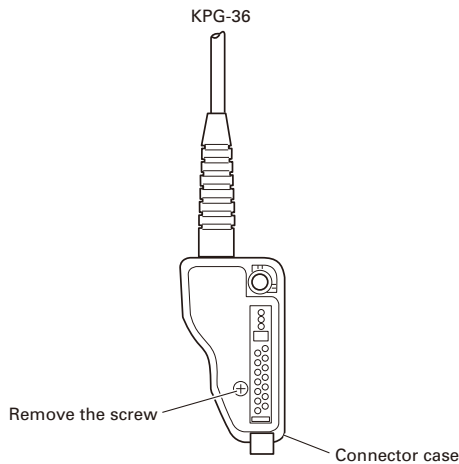
• Panel tuning



• PC tuning

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

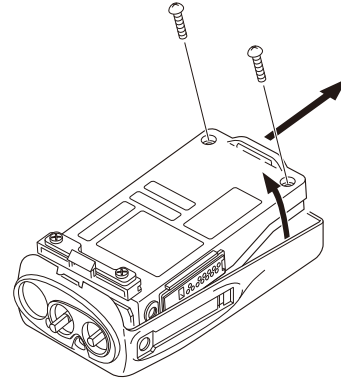
For output the wires out of the connector case, need to process the connector case.



■ Removing the front panel

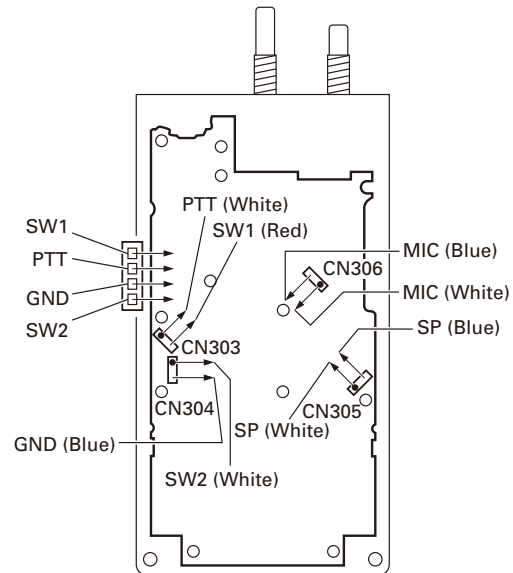
After removing the battery pack, knobs, and antenna, remove the 2 screws from the back of the transceiver.

Lift the chassis away from the bottom part gently, then pull out the chassis as shown below.



■ 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.



■ How to assemble the antenna connector and its terminal

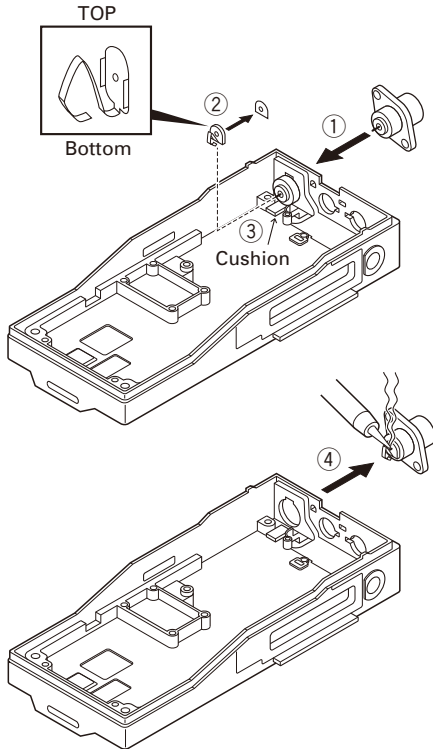
The antenna connector and its terminal are supplied as separate parts.

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.

ADJUSTMENT

- 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.



■ Repair jig (Chassis)

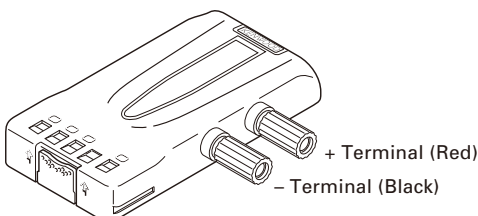
Use jig (part No.: A10-4060-04) for repairing the TK-2140. Place the TX-RX unit on the jig and fit it with screws.

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

■ Battery jig (W05-0909-00)

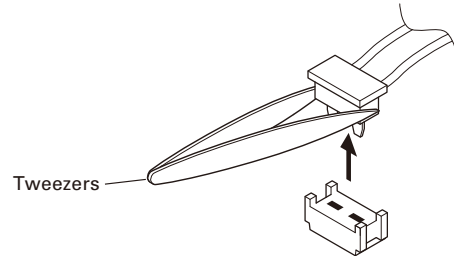
Connect the power cable properly between the battery jig installed in the transceiver and the power supply, and be sure output voltage and the power supply polarity prior to switching the power supply ON, otherwise over voltage and reverse connection may damage the transceiver, or the power supply or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

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

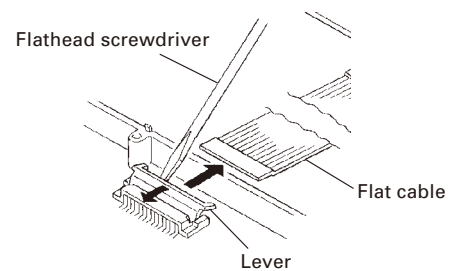


■ How to remove the cable

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



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



Panel 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 signaling 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	"FCN" appears	"FCN" not appears
[PTT]	Used when making a transmission.	Used when making a transmission.
[AUX]	Unused	Unused
[Side 1]	Monitor ON and OFF	Monitor ON and OFF
[Side 2]	Lights the lamp for five seconds. Lighting is extended for a further five seconds by pressing any key while the lamp is lit.	Changes wide and narrow
[S]	Sets to the Tuning mode	Sets to the Tuning mode
[A]	Function OFF	Function ON
[B]	Compander function ON and OFF	RF power HIGH and LOW
[C]	Beat shift ON and OFF	Changes signaling
[ENCODER]	Changes channel	Changes channel

Note: If a [S],[A],[B],[C] key is pressed during transmission, the DTMF corresponding to the key that was pressed is sent.

ADJUSTMENT

• LCD indicator

- "SCN" Unused
- "J" Lights at Compander ON.
- "LO" Lights at RF Power Low.
- "P" Unused
- "MON" Lights at monitor ON.
- "SVC" Unused
- "M" Unused

• 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

- "FCN" Appears at Function ON.
- "n" Appears at Narrow ON.

■ Frequency and signaling

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

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

• Signaling

Signaling No.	RX	TX
1	None	None
2	None	200Hz square
3	LTR data	LTR data
4	QT 67.0Hz	QT 67.0Hz
5	QT 151.4Hz	QT 151.4Hz
6	QT 210.7Hz	QT 210.7Hz
7	QT 250.3Hz	QT 250.3Hz
8	DQT D023N	DQT D023N
9	DQT D754I	DQT D754I
10	DTMF DEC, (159D)	DTMF ENC, (159D)
11	None	DTMF tone 9
12	2 tone 321.7/928.1Hz	None
13	Single tone 1200Hz	Single tone 1200Hz
14	None	MSK
15	MSK code	MSK code

Panel Tuning Mode

■ 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).

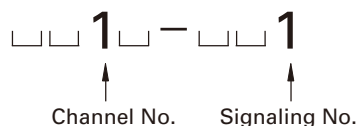
The speaker output connector must be terminated with a 16Ω dummy load and connected to an AC voltmeter and an audio distortion meter or a SINAD measurement meter at all times during tuning.

■ Transceiver tuning

(To place transceiver in tuning mode)

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

• LCD display (Test mode)



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 reference level adjustment, and use [LAMP] button to switch between Wide/Narrow.

• LCD display (Tuning mode)

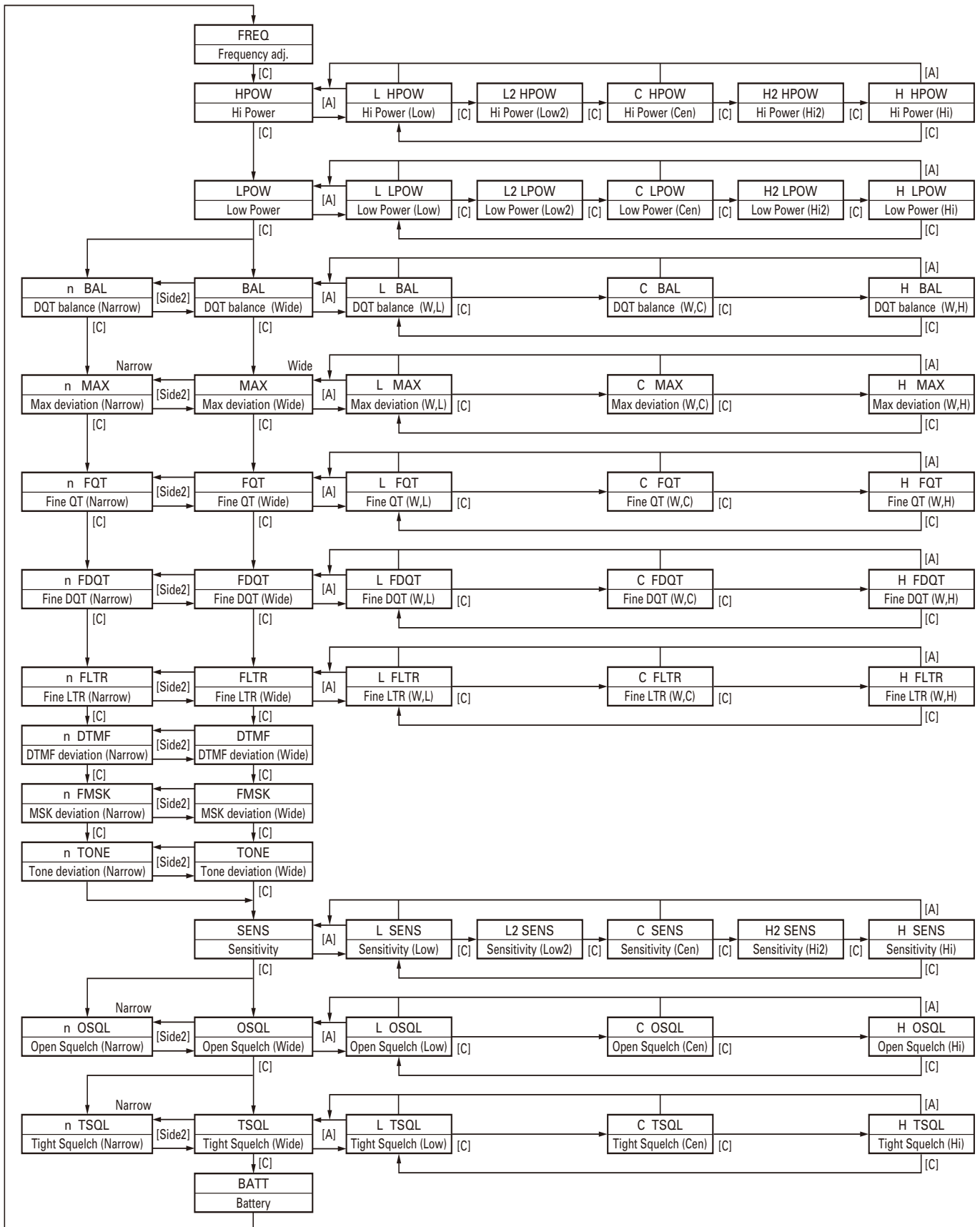


■ Panel tuning mode frequency

Tuning point	RX (MHz)	TX (MHz)
L	136.05000	136.10000
L2	146.05000	146.10000
C	155.05000	155.10000
H2	164.05000	164.10000
H	173.95000	173.90000

ADJUSTMENT

Flow chart



ADJUSTMENT


Common Section

Item	Condition	Measurement			Adjustment			Specifications / Remarks
		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	[Panel Test Mode] 1) CH-Sig: 3-1	Power meter DVM	Panel	ANT	TX-RX	TC2	3.8V	±0.1V
	2) CH-Sig: 2-1		TX-RX	CV			Check	0.6V or more
	• TX 3) CH-Sig: 3-1 PTT: ON				TX-RX	TC1	4.0V	±0.1V
	4) CH-Sig: 2-1 PTT: ON						Check	0.6V or more

Transmitter Section

Item	Condition	Measurement			Adjustment			Specifications / Remarks
		Test-equipment	Unit	Terminal	Unit	Parts	Method	
1. Frequency Adjust	1) Adj item [FREQ] Adjust [***] PTT: ON	f. counter Power meter Ammeter	Panel	ANT	Panel	Encoder knob	Center frequency ± 100Hz	Note: After replacing the TCXO (X1), align using KPG-74D.
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						4.8W	
3. Hight Power Check	[Panel Test Mode] 1) CH-Sig: 1-1 PTT: ON						Check	4.5~5.1W 2.0A or less
	2) CH-Sig: 2-1 PTT: ON							
	3) CH-Sig: 3-1 PTT: ON							
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 [B]) PTT: ON					Check	0.5~1.5W 1.2A or less	
	2) CH-Sig: 2-1 PTT: ON							
	3) CH-Sig: 3-1 PTT: ON							

ADJUSTMENT

Item	Condition	Measurement			Adjustment			Specifications / Remarks
		Test-equipment	Unit	Terminal	Unit	Parts	Method	
6. DQT Balance Adjust [Wide]	1) Adj item [BAL] Adjust [***] Deviation meter filter 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 demodu- lation waves into square waves.	
[Narrow]	3) Adj item [n BAL] Adjust [***] PTT: ON							
7. Max DEV Adjust [Wide]	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							
[Narrow]	3) Adj item [n MAX] Adjust [***] PTT: ON	1.75kHz (According to the larger +, -)						
8. MIC Sensitivity Check	[Panel Test Mode] 1) CH-Sig: 1-1 AG: 1kHz/Wide 15mV Narrow 16mV Deviation meter filter LPF: 15kHz PTT: ON					Check	Wide 2.4~3.6kHz Narrow 1.0~2.2kHz	
9. QT Deviation Adjust [Wide]	1) Adj item [FQT] Adjust [***] Deviation meter filter LPF: 3kHz HPF: OFF 2) Adj item [L FQT] → [C FQT] → [H FQT] Adjust [***] PTT: ON				Panel	Encoder knob	0.75kHz	±50Hz
[Narrow]	3) Adj item [n FQT] Adjust [***] PTT: ON	0.35kHz						
10. DQT Devition Adjust [Wide]	1) Adj item [FDQT] Adjust [***] Deviation meter filter LPF: 3kHz HPF: OFF 2) Adj item [L FDQT] → [C FDQT] → [H FDQT] Adjust [***] PTT: ON	0.75kHz						
[Narrow]	3) Adj item [n FDQT] Adjust [***] PTT: ON	0.35kHz						

ADJUSTMENT

Item	Condition	Measurement			Adjustment			Specifications / Remarks					
		Test-equipment	Unit	Terminal	Unit	Parts	Method						
11. LTR Deviation Adjust [Wide]	1) Adj item [FLTR] Adjust [***] Deviation meter filter LPF: 3kHz HPF: OFF	Power meter Deviation meter Oscilloscope AG AF VTVM	Panel	ANT Universal connector	Panel	Encoder knob	1.0kHz	±0.1kHz					
	[Narrow]						2) Adj item [n FLTR] Adjust [***] PTT: ON	0.75kHz	±50Hz				
12. DTMF Deviation Adjust [Wide]	1) Adj item [DTMF] Adjust [***] Deviation meter filter LPF: 15kHz HPF: OFF PTT: ON						2.5kHz	±0.1kHz					
	[Narrow]						2) Adj item [n DTMF] Adjust [***] PTT: ON	1.25kHz	±0.1kHz				
13. MSK Deviation Adjust [Wide]	1) Adj item [FMSK] Adjust [***] Deviation meter filter LPF: 15kHz HPF: OFF PTT: ON						3.0kHz	±0.1kHz					
	[Narrow]						2) Adj item [n FMSK] Adjust [***] PTT: ON	1.5kHz	±0.1kHz				
14. TONE Deviation Adjust [Wide]	1) Adj item [TONE] Adjust [***] Deviation meter filter LPF: 15kHz HPF: OFF PTT: ON						3.0kHz	±0.1kHz					
	[Narrow]						2) Adj item [n TONE] Adjust [***] PTT: ON	1.5kHz	±0.1kHz				
15. 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
16. BATT Detection Check	[Panel Test Mode] 1) CH-Sig: 1-1 BATT terminal voltage: 6.8V Use the battery jig (W05- 0909-00). PTT: ON										Check	No blinking of LED	
	2) BATT terminal voltage: 6.0V Use the battery jig (W05- 0909-00). PTT: ON						Blinking of LED						

ADJUSTMENT

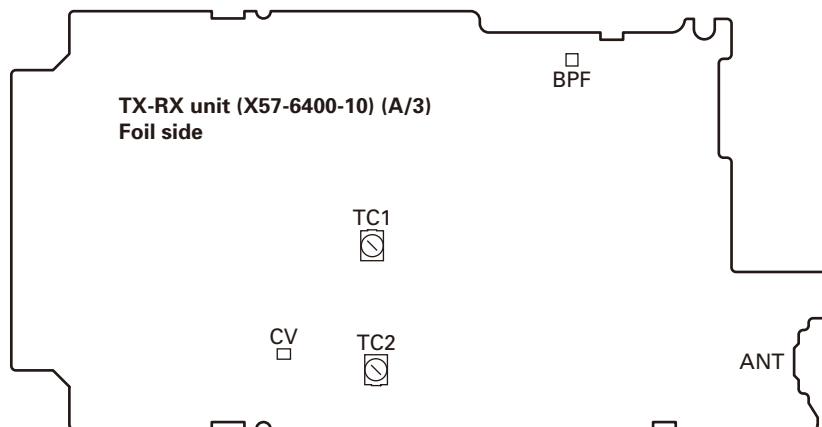
Receiver Section

Item	Condition	Measurement			Adjustment			Specifications / Remarks
		Test-equipment	Unit	Terminal	Unit	Parts	Method	
1. Sensitivity Adjust	1) Adj item [SENS] Adjust [***] 2) Adj item [L SENS] → [L2 SENS] → [C SENS] → [H2 SENS] → [H SENS] Adjust [***] SSG output: -117dBm (0.28μV) (MOD: 1kHz/±3kHz)	SSG AF VTVM Oscilloscope	Panel	ANT Universal connector	Panel	Encoder knob	Adjust for maximum SINAD.	12dB SINAD or more
		<p>REF -20.0 dBm ATT 10 dB -28.7 dBm</p> <p>10 dB/ CAL. ON</p> <p>L L2 C H2 H</p> <p>RBW 30 kHz NEG PK VBW 30kHz</p> <p>SWP 500 ms SPAN 100 MHz CENTER 155 MHz</p> <p>L: 136.05MHz L2: 146.05MHz C: 155.05MHz H2: 164.05MHz H: 173.95MHz</p>						
2. Sensitivity Check	[Panel Test Mode] 1) CH-Sig: 1-1 SSG output Wide: -117dBm (0.28μV) (MOD: 1kHz/±3kHz) Narrow: -116dBm (0.316μV) (MOD: 1kHz/±1.5kHz)						Check	12dB SINAD or more
3. Squelch Adjust (Open) [Wide]	1) Adj item [OSQL] Adjust [***] 2) Adj item [L OSQL] → [C OSQL] → [H OSQL] Adjust [***] SSG output : 12dB SINAD level				Panel	Encoder knob Squelch	Adjust to point of opening squelch.	
[Narrow]	3) Adj item [n OSQL] Adjust [***] SSG output : 12dB SINAD level							
4. Squelch Check (Open)	[Panel Test Mode] 1) CH-Sig: 1-1 SSG output : 12dB SINAD level						Check	Squelch must be opened.
	2) SSG output: OFF							Squelch must be closed.

ADJUSTMENT

Item	Condition	Measurement			Adjustment			Specifications / Remarks
		Test-equipment	Unit	Terminal	Unit	Parts	Method	
5. Squelch Adjust (Tight) [Wide]	1) Adj item [TSQL] Adjust [***] 2) Adj item [L TSQL] → [C TSQL] → [H TSQL] Adjust [***] SSG output : 12dB SINAD level + 5dB	SSG AF VTVM Oscilloscope	Panel	ANT Universal connector	Panel	Encoder knob Squelch	Adjust to point of opening squelch.	
	[Narrow]							
6. Squelch Check (Tight)	[Panel Test Mode] 1) CH-Sig: 1-1 SSG output : 12dB SINAD level + 8dB					Check	Squelch must be opened.	
	2) SSG output: OFF						Squelch must be closed.	

Adjustment Points



TERMINAL FUNCTION

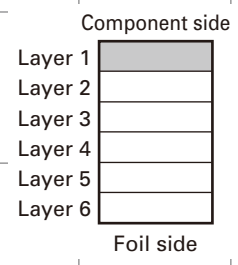
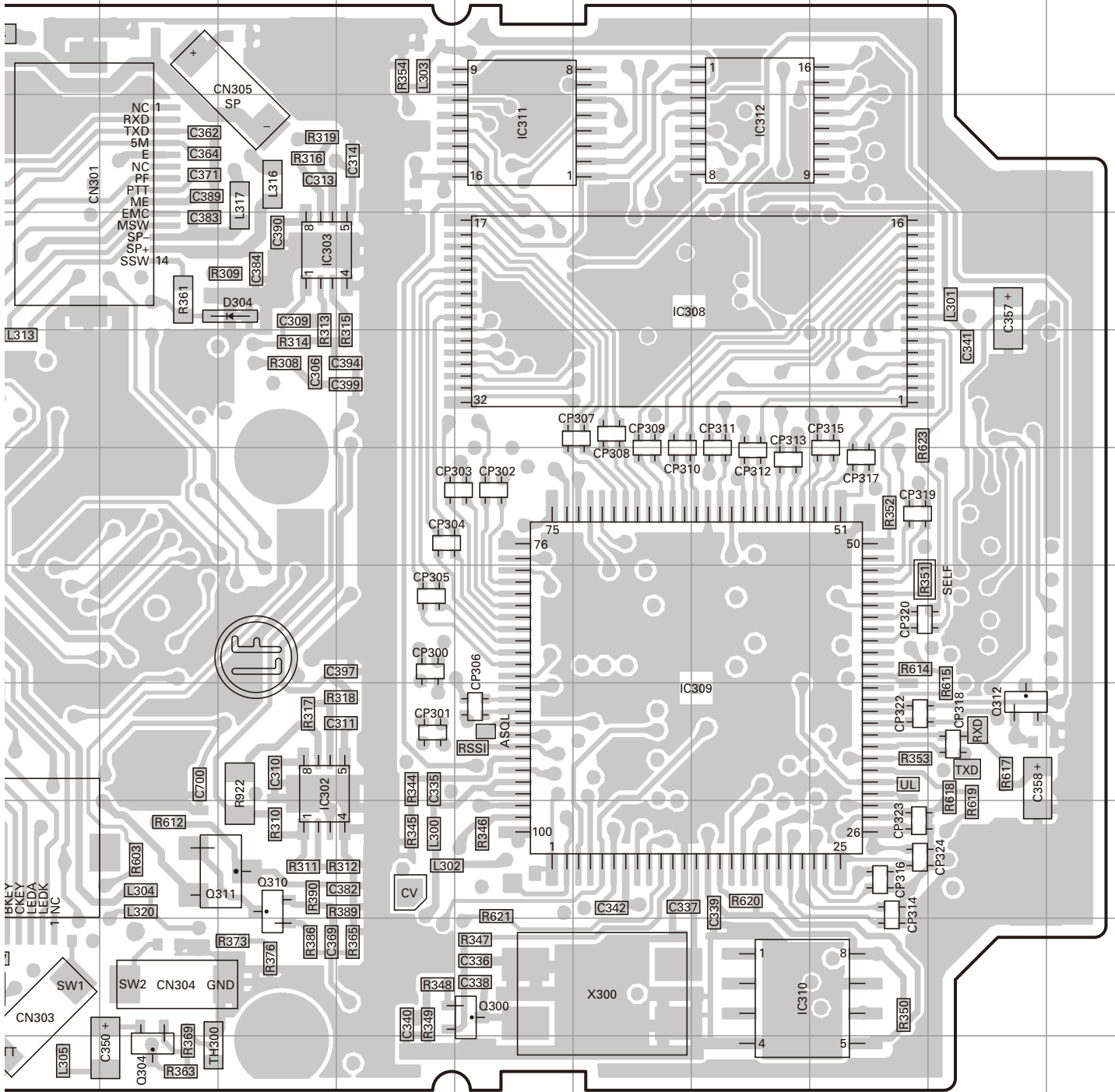
TX-RX UNIT (X57-6400-10): TX-RX section

Pin No.	Name	I/O	Function
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 output for LCD
10	SID	I	Serial data input for LCD
11	SCLK	O	Clock data output for LCD
12	CS	O	LCD chip select output
13	VCC	-	5V
14	GND	-	GND
CN303			
	PTT	I	PTT key input
	LAMP	I	Sode 1 key input
CN304			
	MON	I	Side2 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
CN400			
1	S_DET	I	Battery detect input

Pin No.	Name	I/O	Function
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, CN500			
1	XOUT	O	3.589545MHz output
2	GND	-	GND
3	AFCLR	O	MSK flame reset output
4	AFRDT	O	MSK modulation data output timing pulse input
5	AFRTM	O	MSK demodulation data output timing pulse input
6	AFTRD	O	MSK demodulation data input
7	AFMSKE	O	MSK modulation enable
8	CLK	O	Clock data input
9	AFDAT	O	MSK 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	-	MIC mute
15	5TC	-	5T control
16	5C	I	5V
17	GND	-	GND
18	MICI	-	MIC input
19	PTT	O	PTT key input
20	ME	-	MIC ground
21	ME	O	MIC ground
22	TXHSD	I	HSD output (TX)
23	GND	-	GND
24	TXAF	O	Audio output (TX)
25	RXAF1	O	Audio input (TX)
26	5RC	-	5R control
27	HSDIN	-	HSD output (RX)
28	RXAFO	-	Audio output (RX)
29	GND	-	GND
30	GND	-	GND

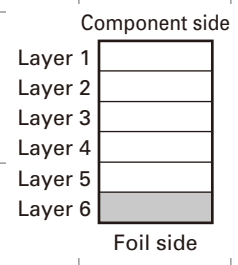
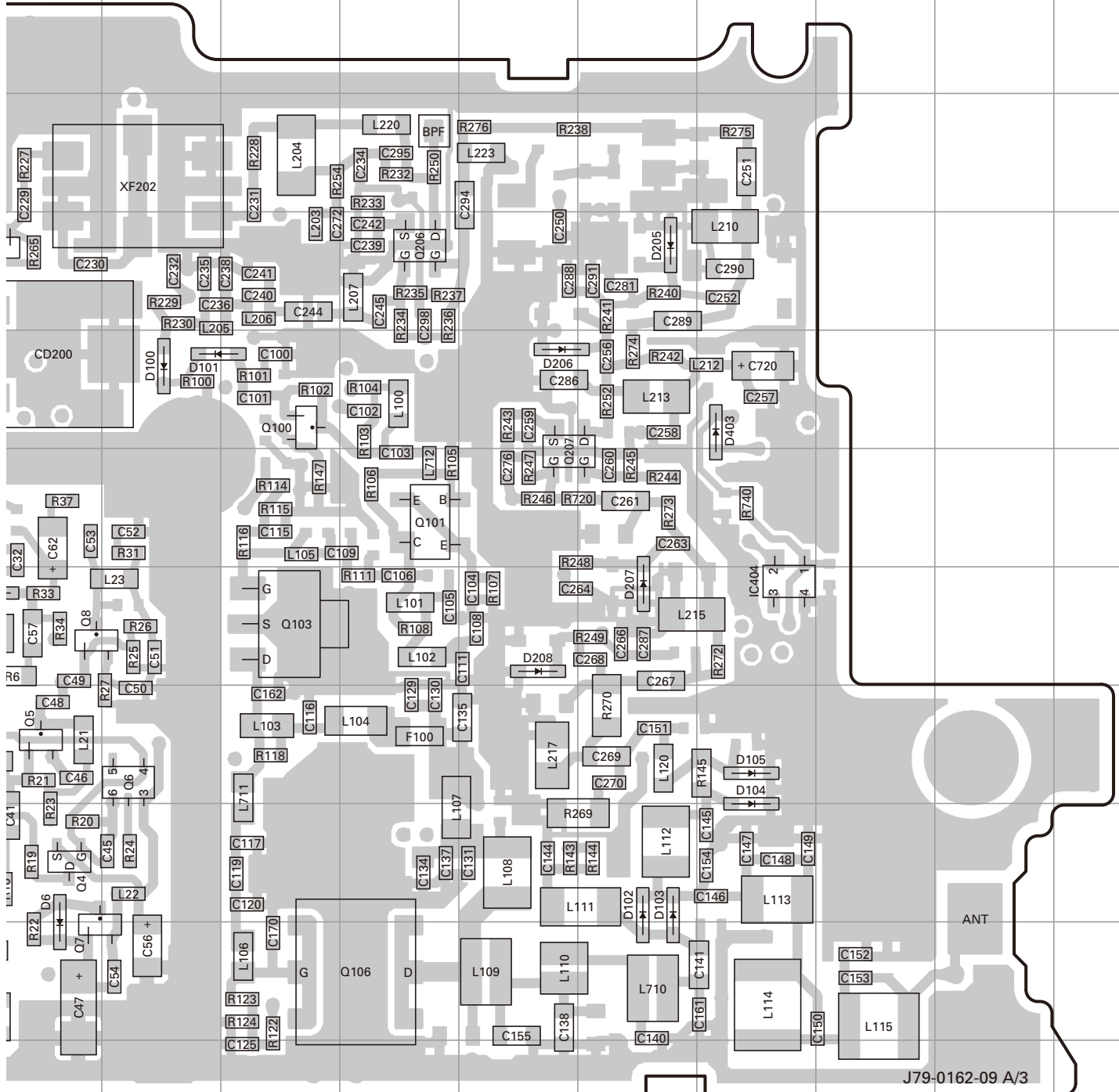
PC BOARD TK-2140

TX-RX UNIT (X57-6400-10) (A/3) Component side view (J79-0162-09 A/3)



PC BOARD TK-2140

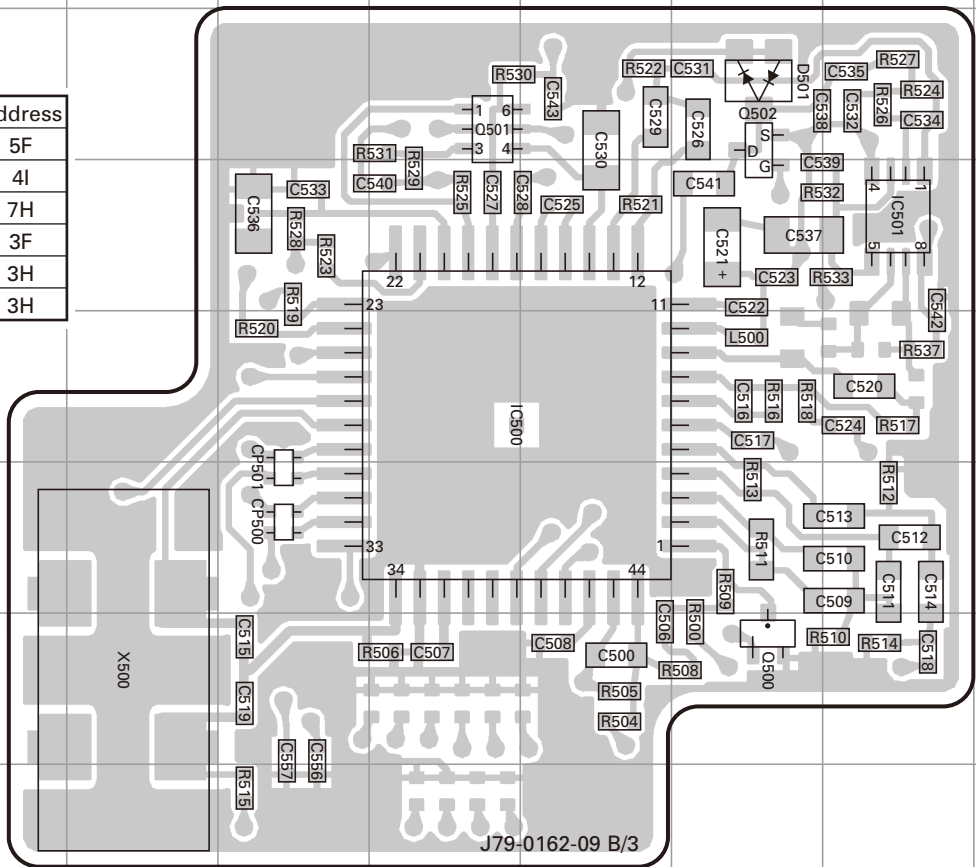
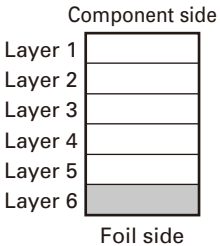
TX-RX UNIT (X57-6400-10) (A/3) Foil side view (J79-0162-09 A/3)



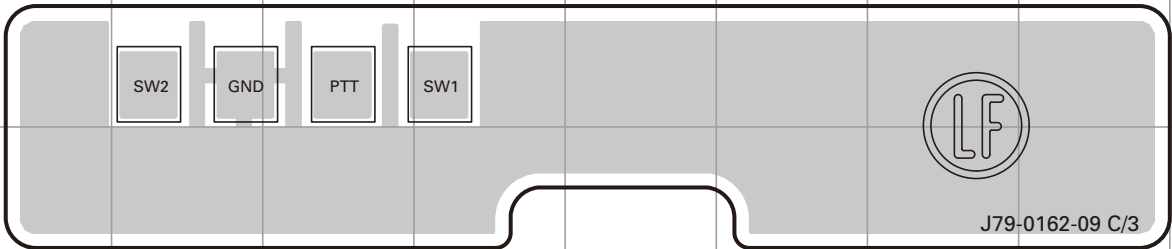
PC BOARD TK-2140

TX-RX UNIT (X57-6400-10) (B/3) Foil side view (J79-0162-09 B/3)

Ref. No.	Address
IC500	5F
IC501	4I
Q500	7H
Q501	3F
Q502	3H
D501	3H

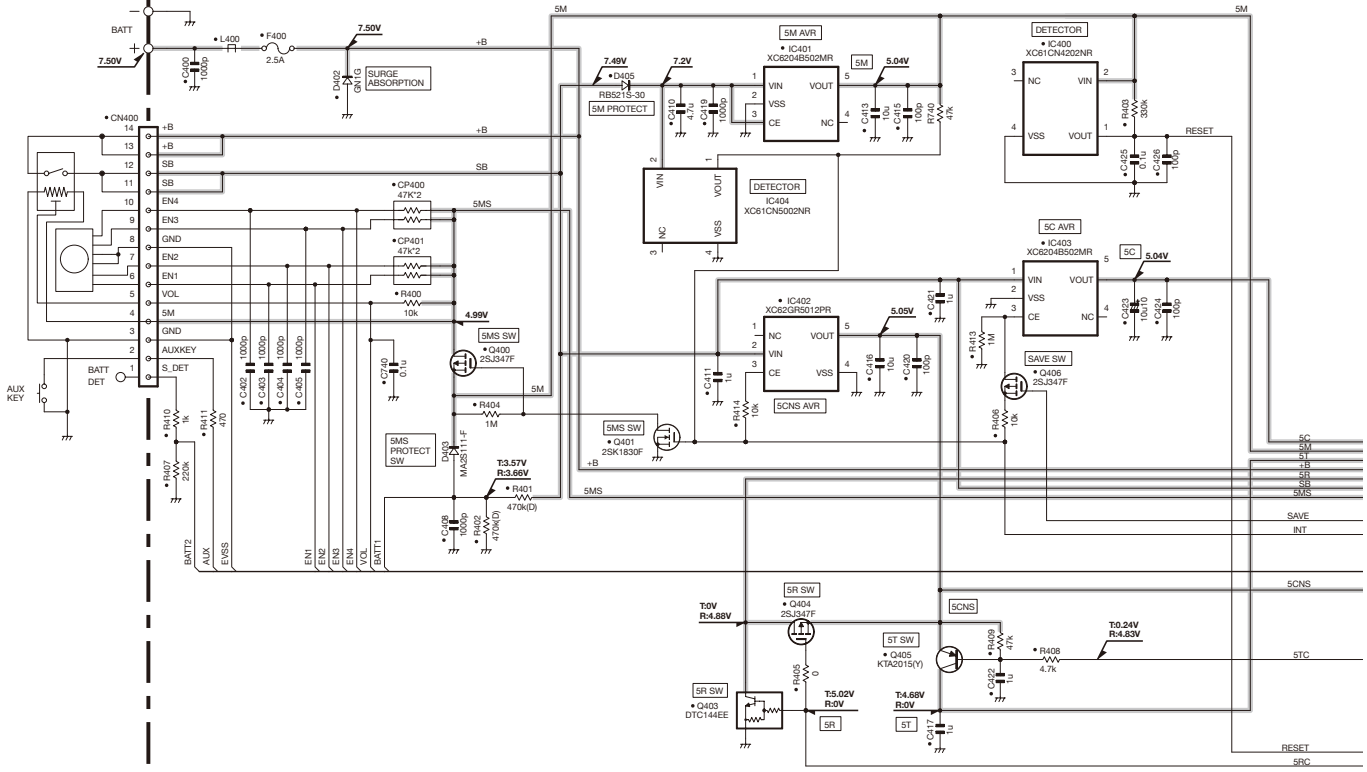


TX-RX UNIT (X57-6400-10) (C/3) Foil side view (J79-0162-09 C/3)

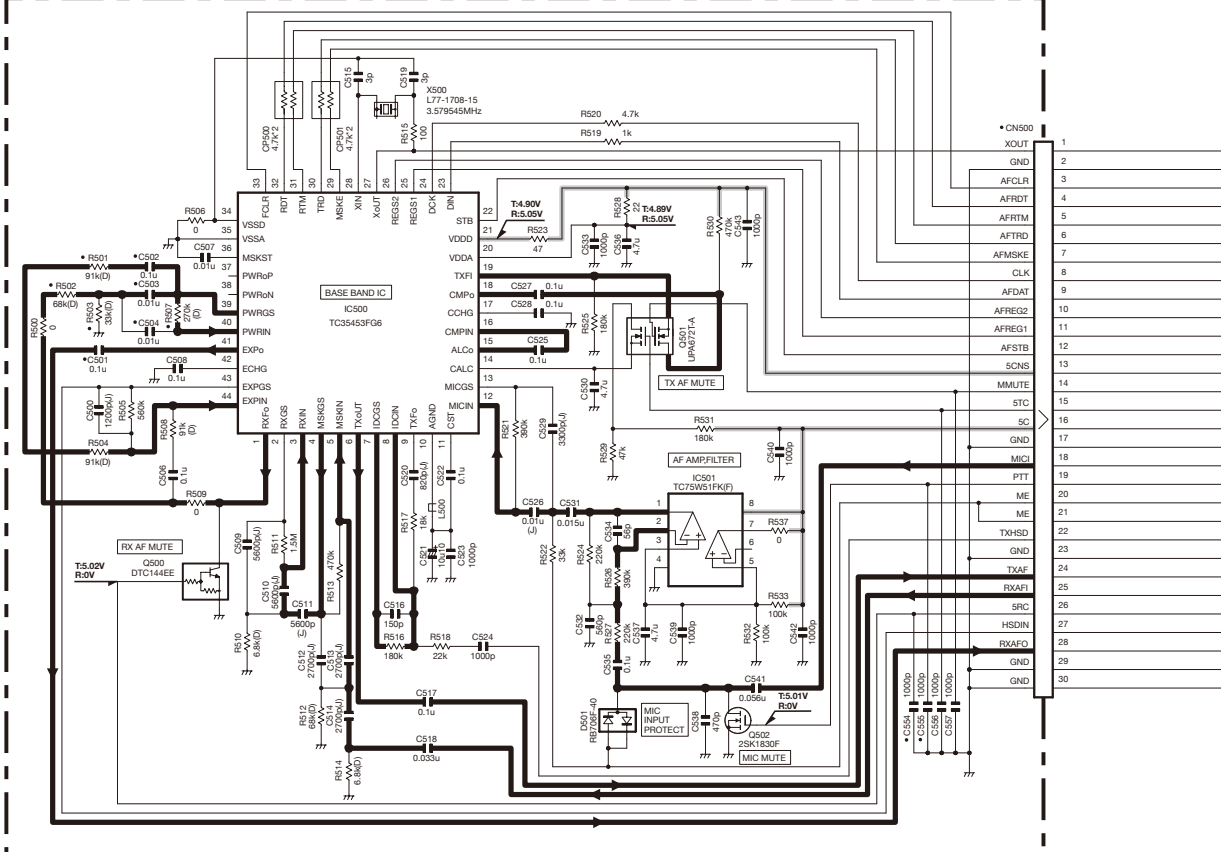


TK-2140 SCHEMATIC DIAGRAM

TX-RX UNIT (X57-6400-10) (A/3)

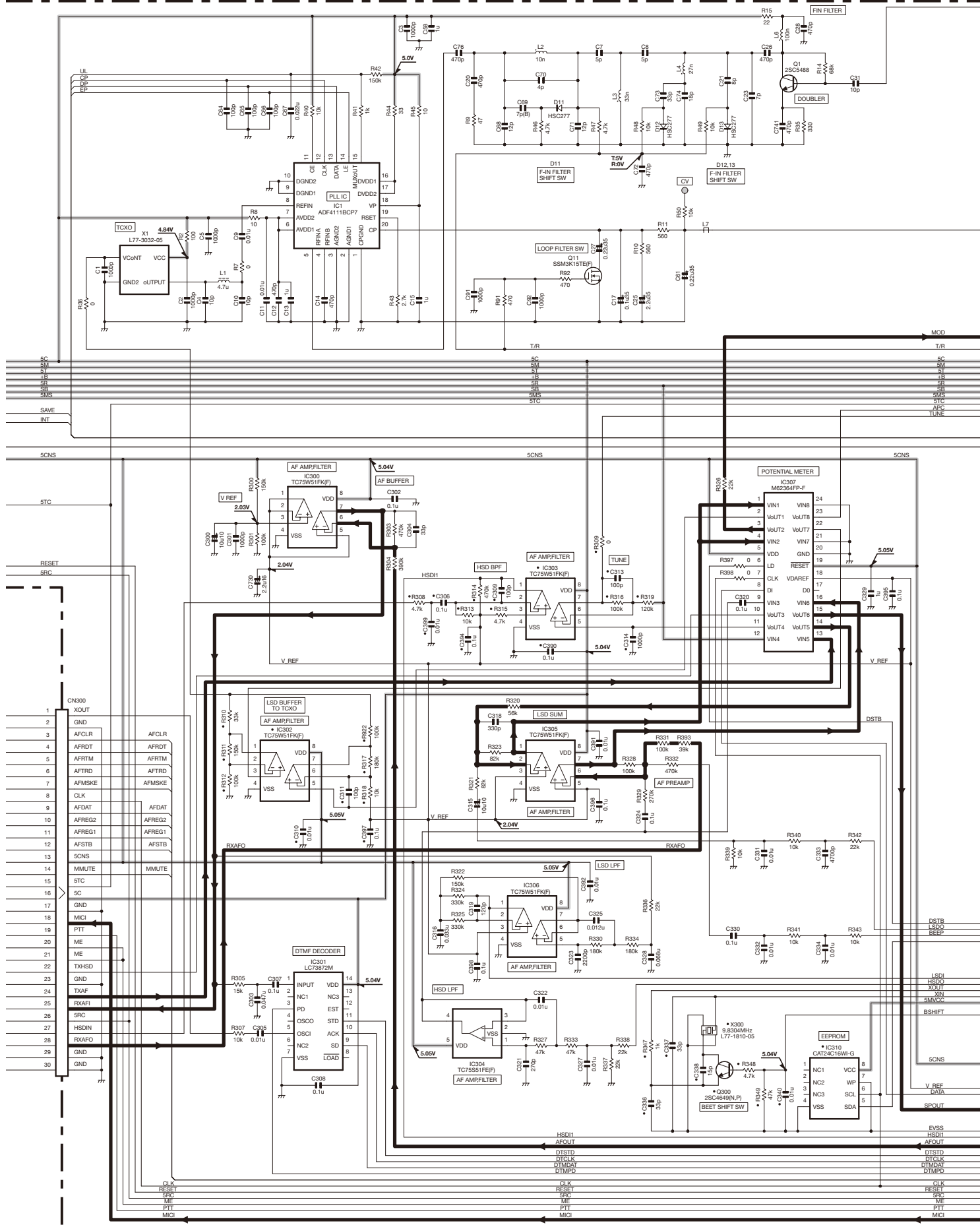


TX-RX UNIT (X57-6400-10) (B/3)



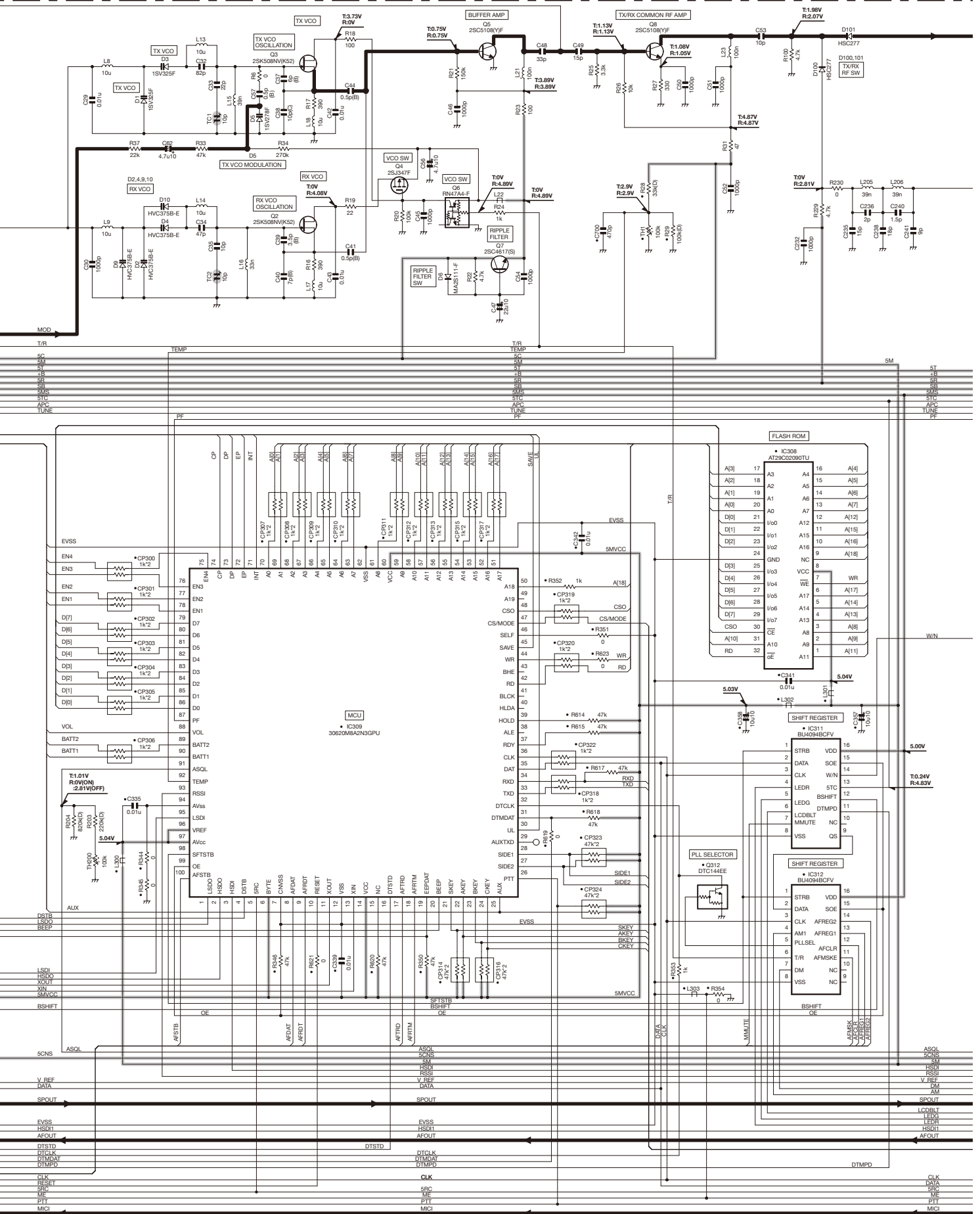
SCHEMATIC DIAGRAM TK-2140

TX-RX UNIT (X57-6400-10) (A/3)



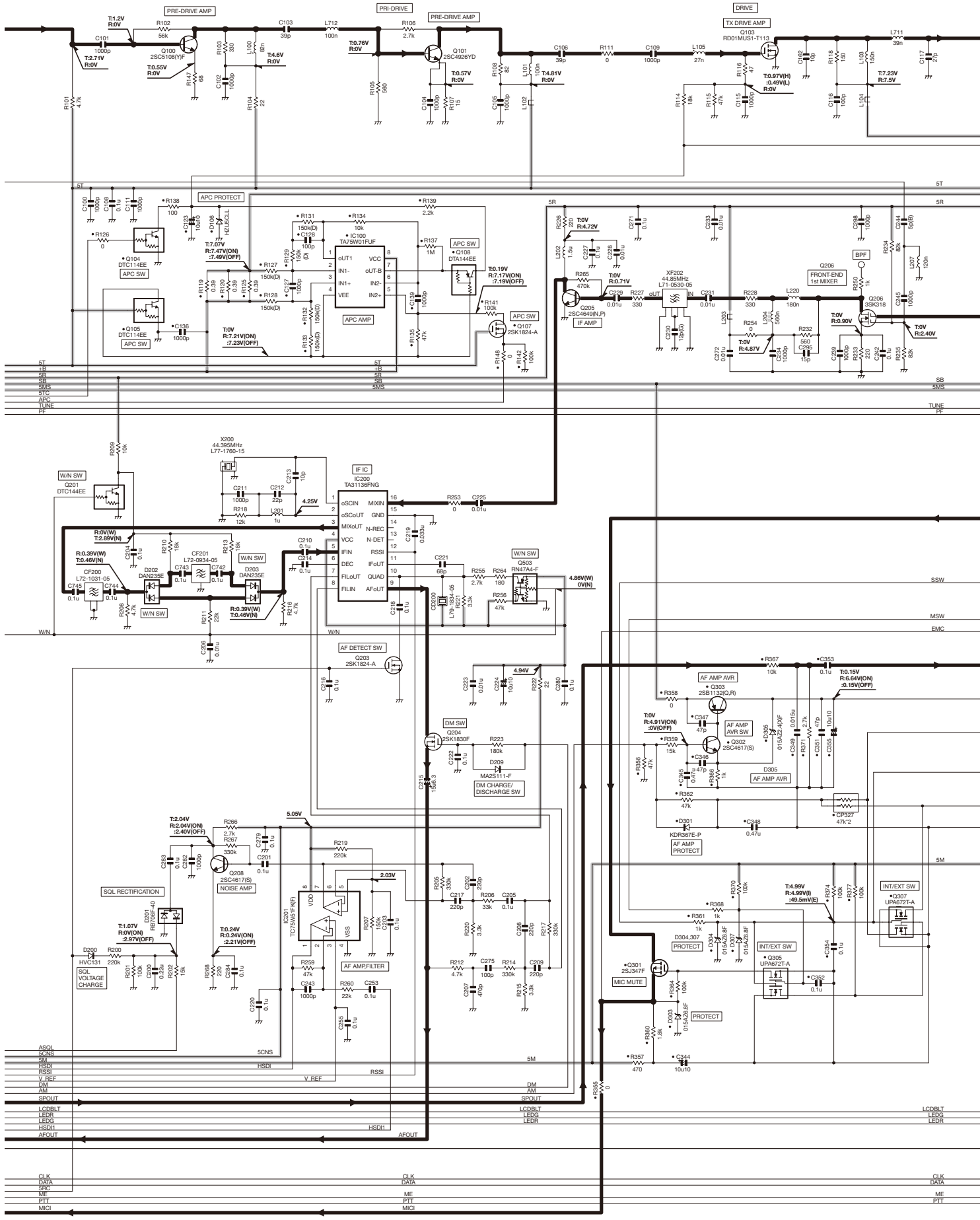
TK-2140 SCHEMATIC DIAGRAM

TX-RX UNIT (X57-6400-10) (A/3)

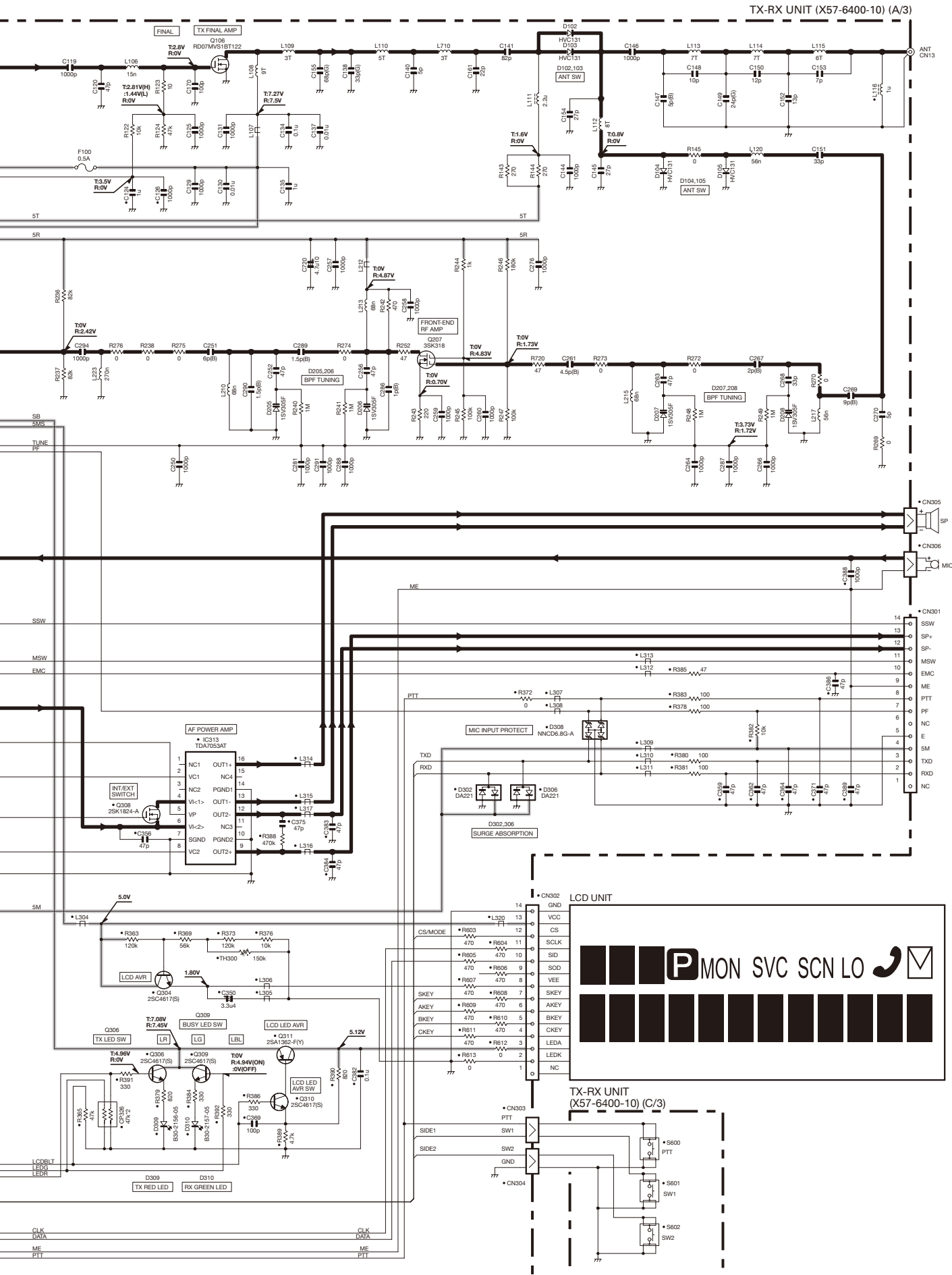


SCHEMATIC DIAGRAM TK-2140

TX-RX UNIT (X57-6400-10) (A/3)

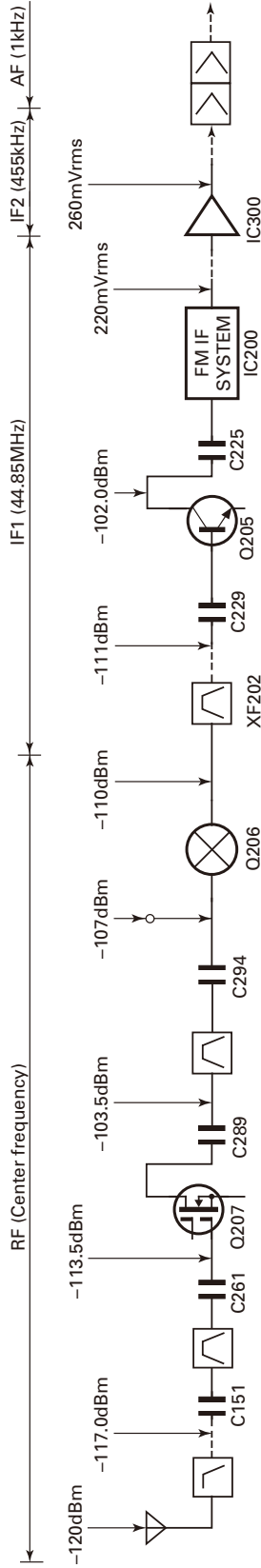


TK-2140 SCHEMATIC DIAGRAM



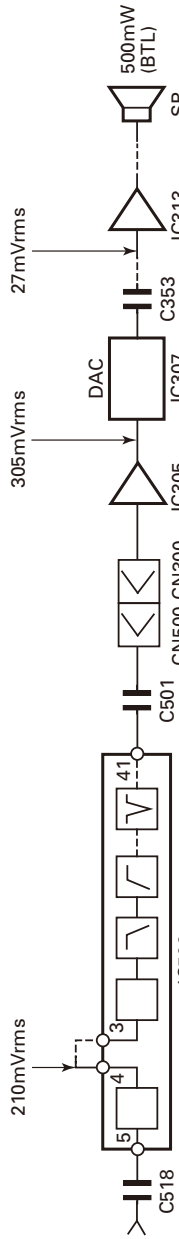
LEVEL DIAGRAM

Receiver Section

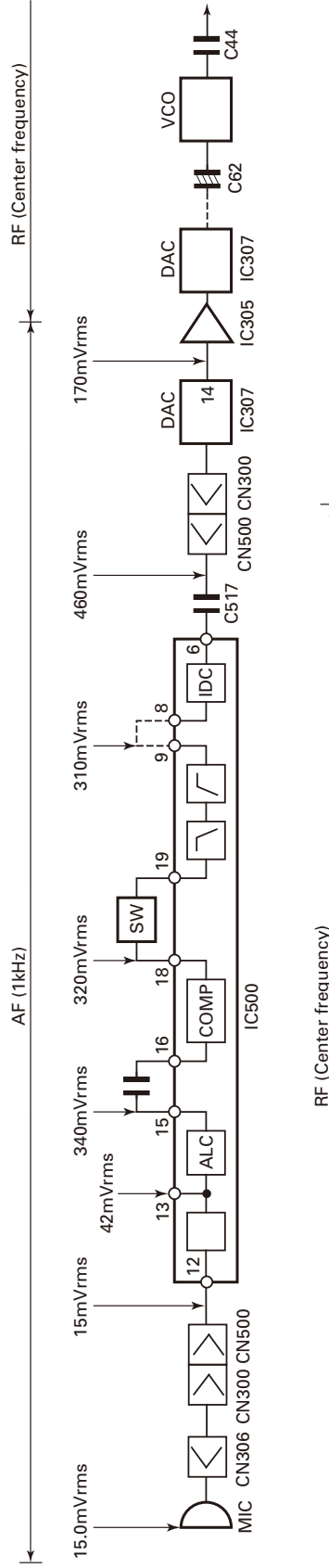


AF (1kHz)

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.)



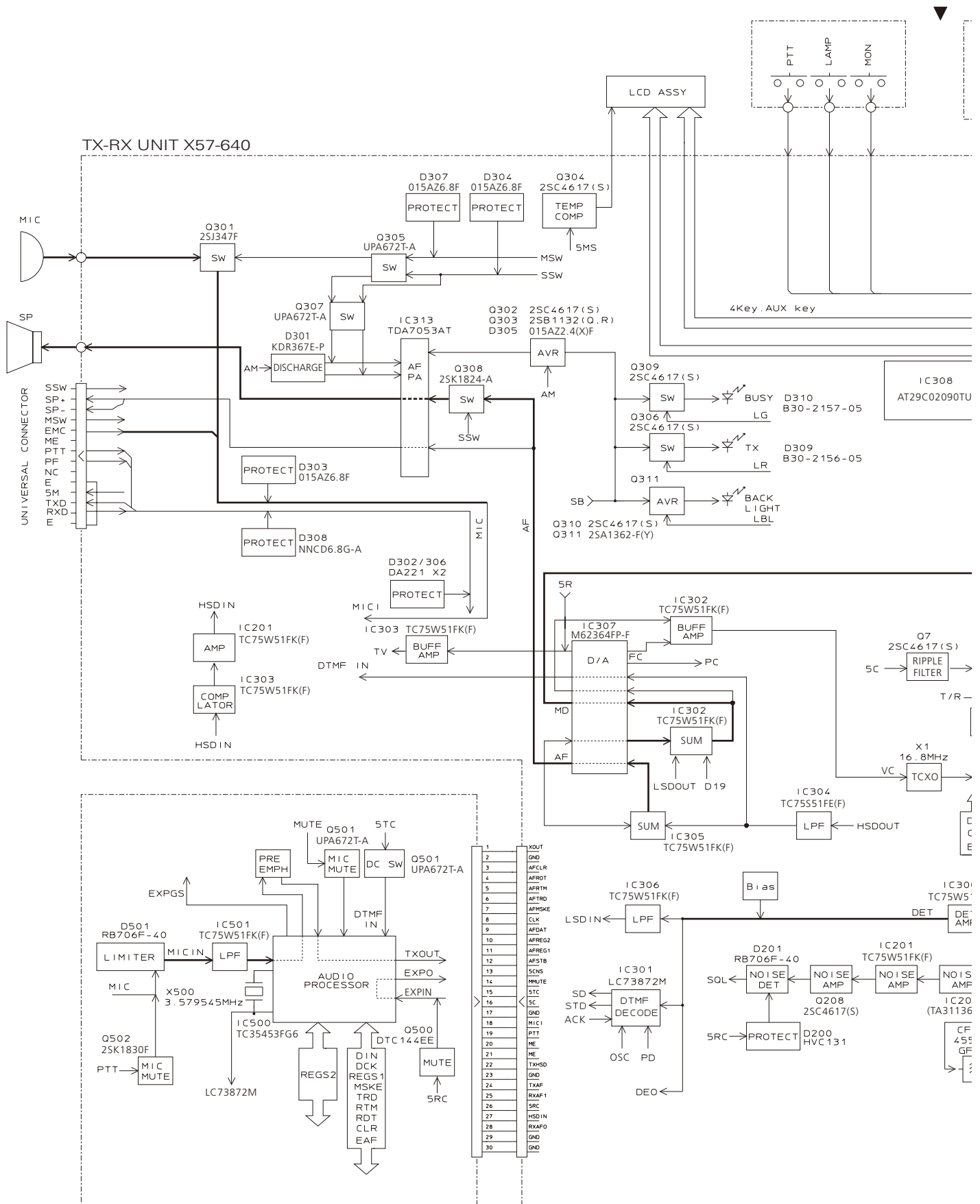
Transmitter Section



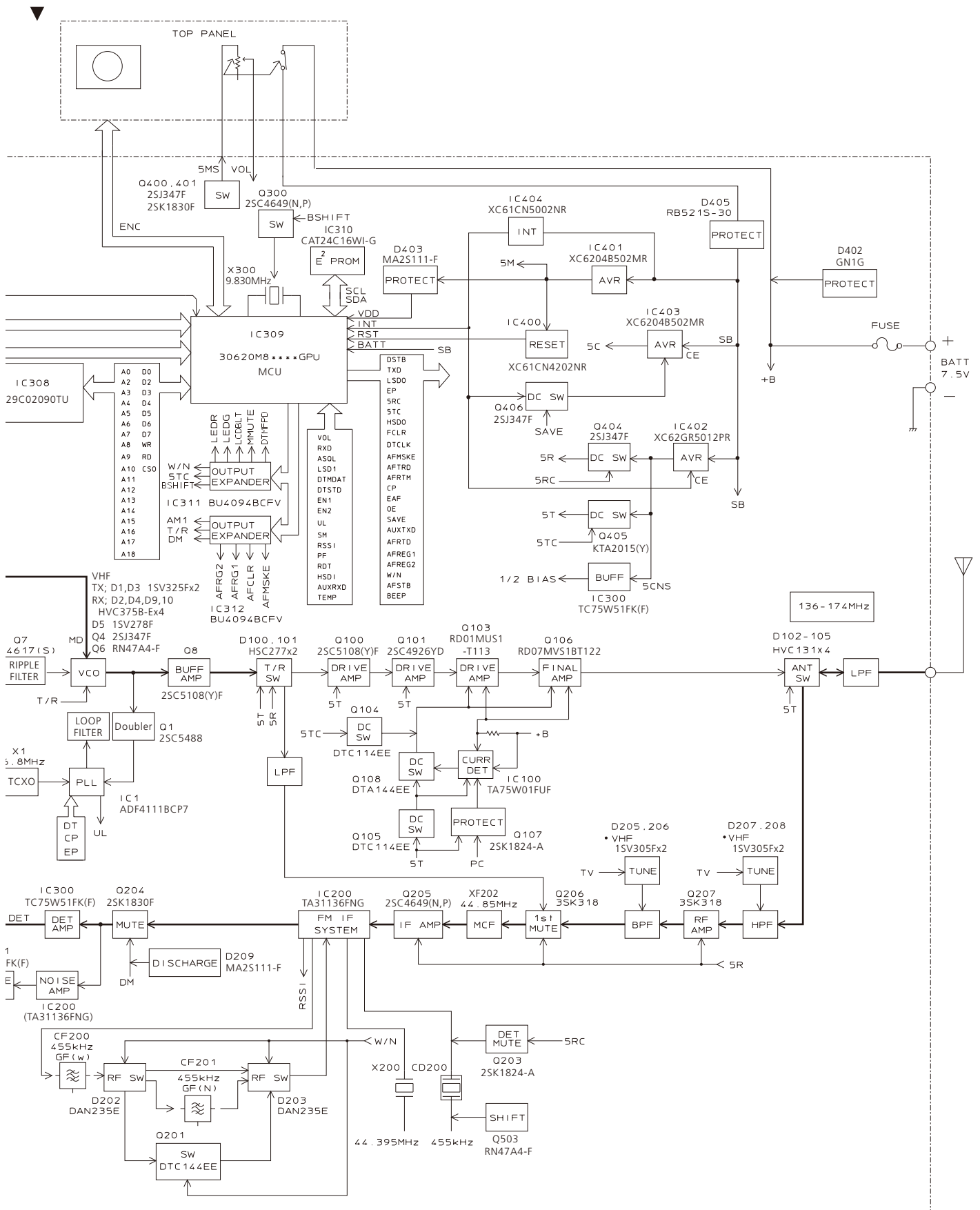
AG is set to the MIC input becomes 3kHz DEV. at 1kHz MOD. (WIDE) To make measurements in the AF section, connect the AC level meter. In the RF section, use a 1000pF coupling capacitor.

RF (Center frequency)

BLOCK DIAGRAM



BLOCK DIAGRAM



SPECIFICATIONS

General

Frequency Range	
RX, TX.....	K: 136 to 174MHz
Systems.....	Trunked Mode : Maximum 32
Groups.....	Maximum 250
Channels.....	Trunked Mode: Maximum 600 Conventional Mode: Maximum 250
Channel Spacing (Wide/Narrow).....	25kHz, 30kHz / 12.5kHz, 15kHz
Operating Voltage.....	DC 7.5V \pm 20%
Battery Life.....	About 11 hours at 5-5-90 duty cycle with KNB-35L battery About 8 hours at 5-5-90 duty cycle with KNB-25A battery About 12 hours at 5-5-90 duty cycle with KNB-26N battery
Temperature Range.....	-30°C to +60°C (-22°F to + 140°F)
Dimension and Weight	
With KNB-35L (1950mAh battery).....	4.13" (105mm) H x 2.21" (56mm) W x 1.16" (29.5mm) D, 0.66lbs (300g)

Receiver (Measurements made per TIA/EIA-603)

RF Input Impedance.....	50 Ω
Sensitivity	
12dB SINAD (Wide/Narrow).....	0.25 μ V / 0.28 μ V
Selectivity (Wide/Narrow).....	70dB / 65dB
Intermodulation (Wide/Narrow).....	70dB / 65dB
Spurious.....	70dB
Frequency Stability.....	\pm 0.00025% (-30°C to +60°C)
Channel Spread.....	38MHz: K
Audio Power Output.....	500mW at 16 Ω less than 5% distortion

Transmitter (Measurements made per TIA/EIA-603)

RF Power Output	
Hi.....	5W
Low.....	1W
RF Output Impedance.....	50 Ω
Spurious.....	70dB
Modulation (Wide/Narrow).....	16K0F3E / 11K0F3E
FM Noise (Wide/Narrow).....	45dB / 40dB
Audio Distortion.....	Less than 3%
Frequency Stability.....	\pm 0.00025% (-30°C to +60°C)
Channel Spread.....	38MHz: K

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Unit 3712-3724, Level 37, Tower one Metroplaza, 223 Hing Fong Road, Kwai Fong, N.T., Hong Kong

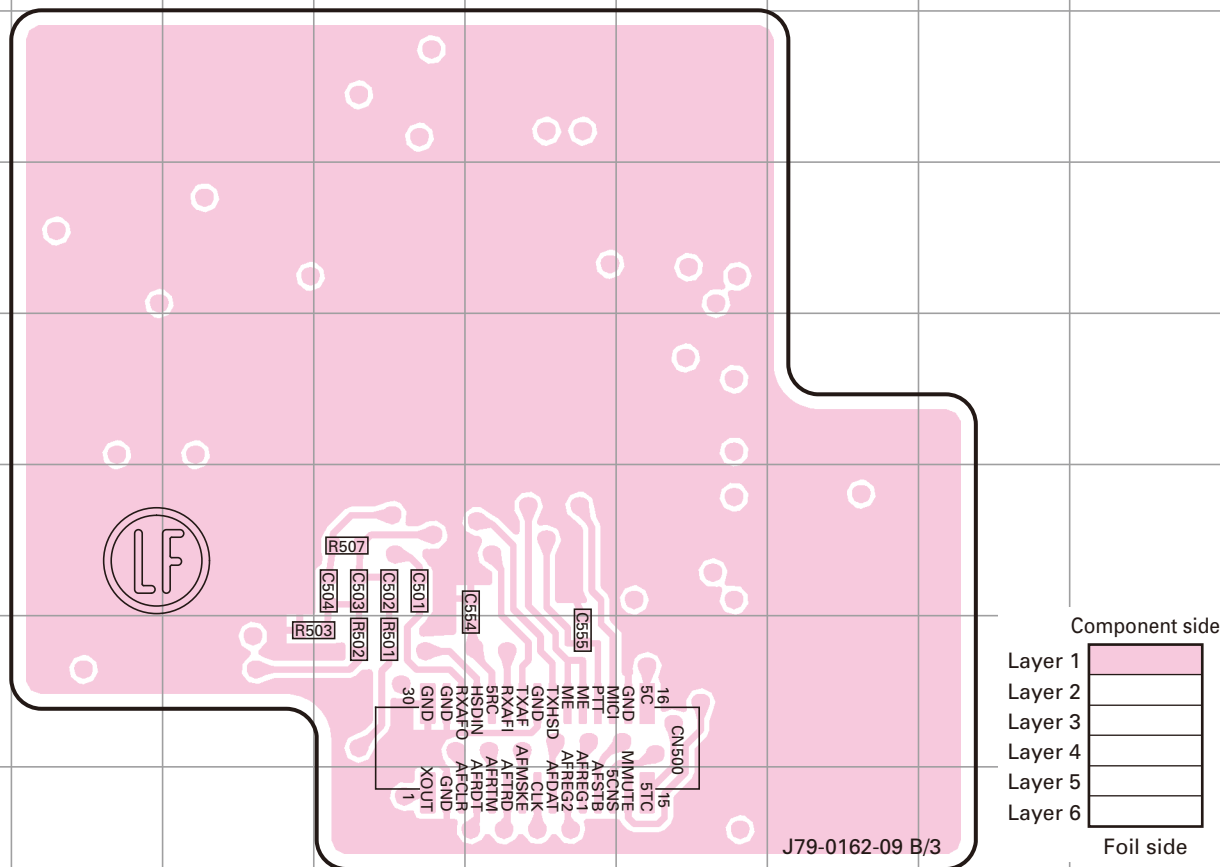
Kenwood Electronics Singapore Pte Ltd

1 Ang Mo Kio Street 63, Singapore 569110

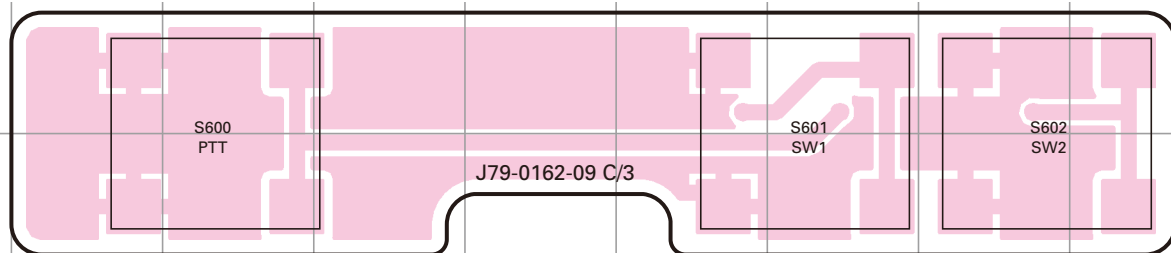


TK-2140 PC BOARD

TX-RX UNIT (X57-6400-10) (B/3) Component side view (J79-0162-09 B/3)



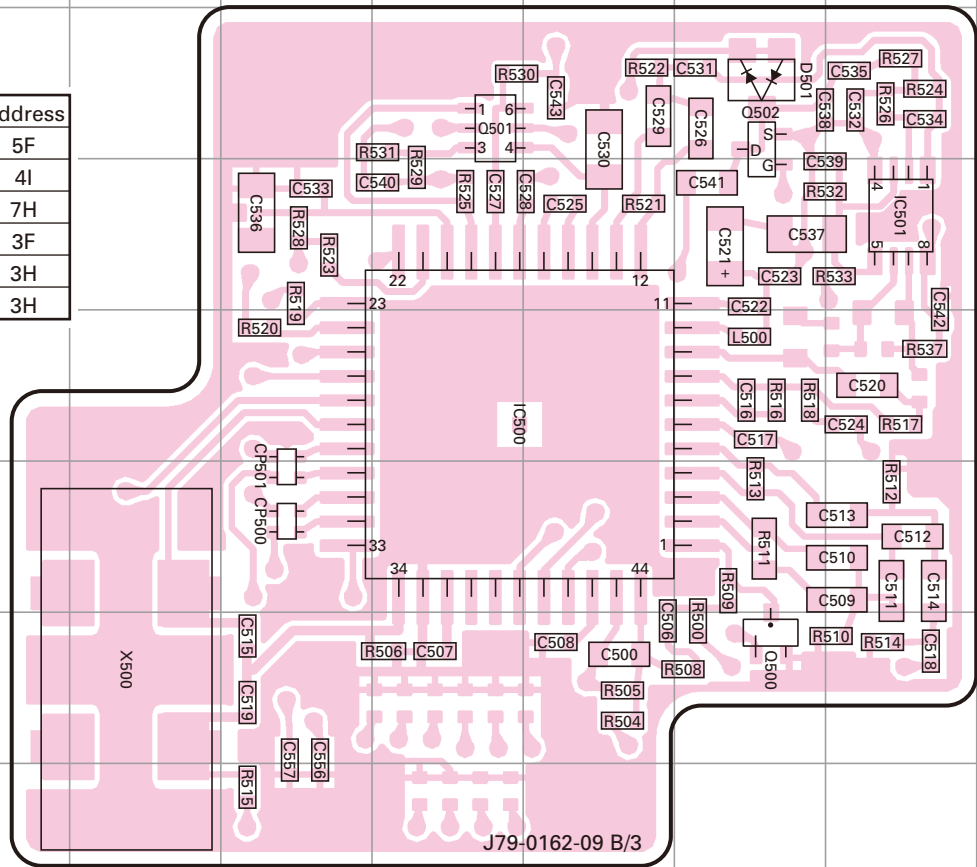
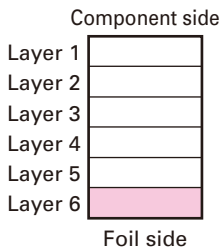
TX-RX UNIT (X57-6400-10) (C/3) Component side view (J79-0162-09 C/3)



PC BOARD TK-2140

TX-RX UNIT (X57-6400-10) (B/3) Foil side view (J79-0162-09 B/3)

Ref. No.	Address
IC500	5F
IC501	4I
Q500	7H
Q501	3F
Q502	3H
D501	3H



TX-RX UNIT (X57-6400-10) (C/3) Foil side view (J79-0162-09 C/3)

