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TK-3212/3217

SERVICE MANUAL

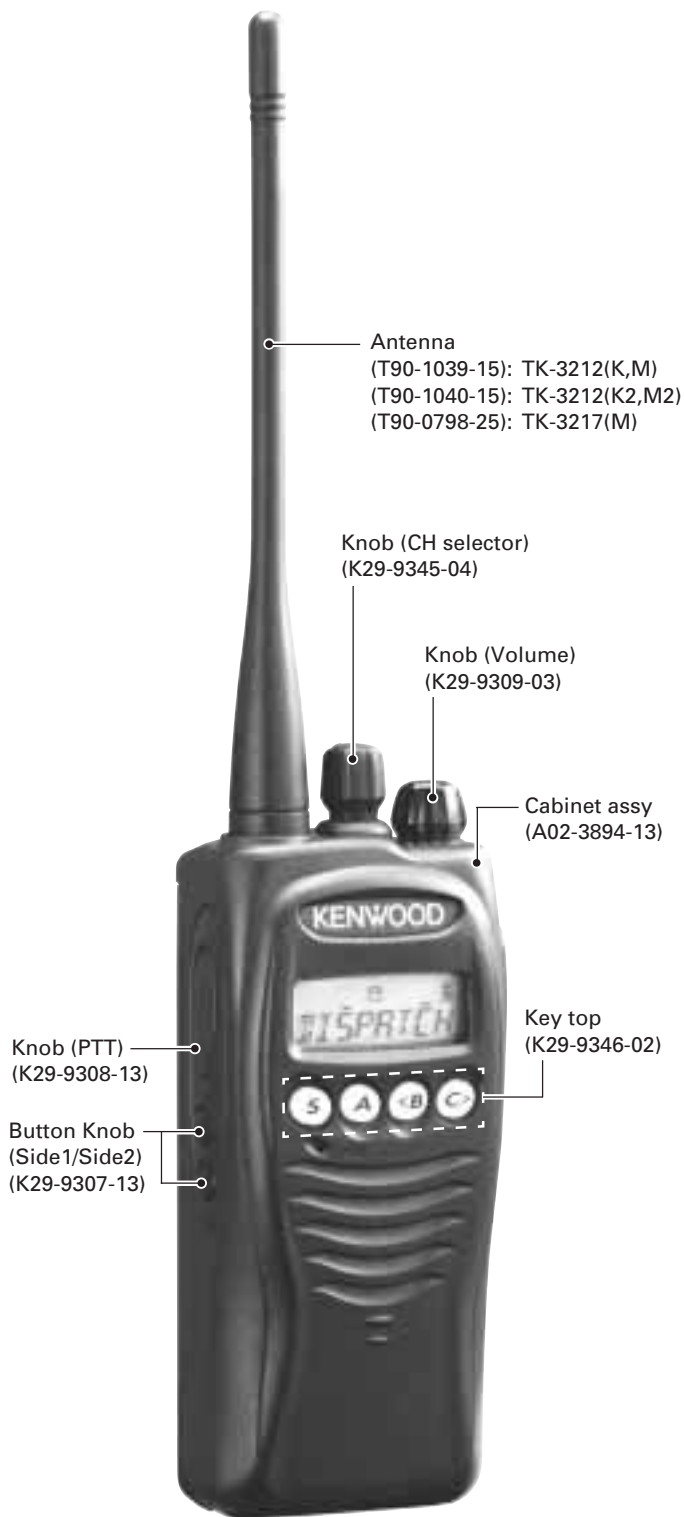


Photo is TK-3212.

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TK-3212/3217

GENERAL / SYSTEM SET-UP

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.

Unit		TX-RX Unit	Frequency range	Remarks
Model & destination				
TK-3212	K,M	X57-7130-10	450~490MHz	IF1 : 38.85MHz LOC : 38.4MHz
TK-3212	K2, M2	X57-7130-11	470~512MHz	
TK-3217	M	X57-7130-21	440~480MHz	

PERSONAL SAFETY

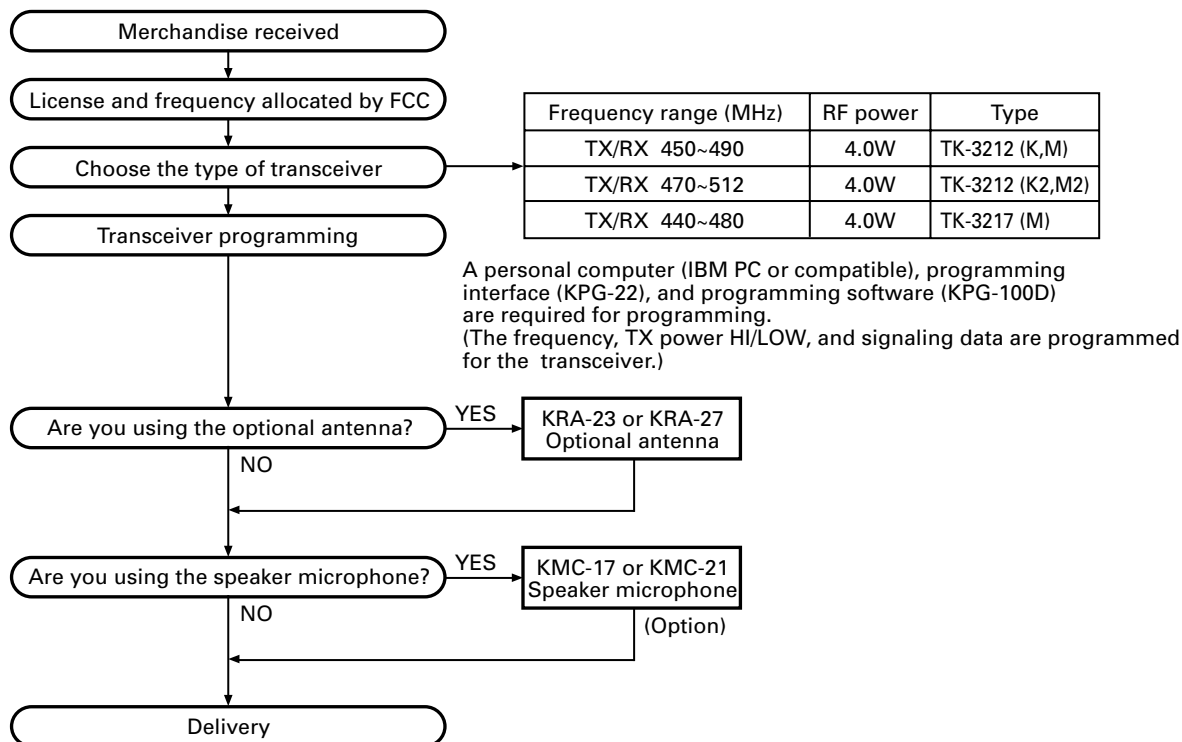
The following precautions are recommended for personal safety:

- 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

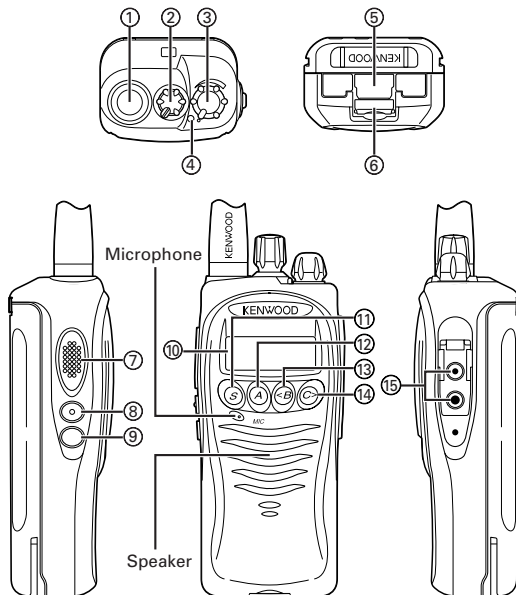
This transceiver is designed for easy servicing. Refer to the schematic diagrams, printed circuit board views, and alignment procedures contained within.

SYSTEM SET-UP



OPERATING FEATURES

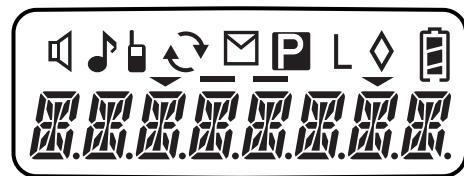
1. Controls and Functions



- ① Antenna connector
Connect an antenna here.
- ② Selector
Your dealer can program the selector as either Zone Up/Down (default setting) or Channel Up/Down. Rotate the selector to select a zone or channel.
- ③ Power switch/ Volume control
Turn clockwise to switch ON the transceiver. Rotate to adjust the volume. Turn counterclockwise fully to switch OFF the transceiver.
- ④ Transmit/ Busy/ Call indicator
This LED lights red while transmitting and green while receiving a call. The LED flashes orange while receiving an encoded call (i.e. Code Squelch, etc.) and red when the battery power is low while transmitting.
- ⑤ Release Latch
Press the release latch to unlock and remove the battery pack.
- ⑥ Safety Catch
Lock this catch to avoid accidentally pressing the release latch and removing the battery pack.
- ⑦ PTT (Push-to-Talk) switch
Press this switch, then speak into the microphone to call a station.
- ⑧ Side 1 key
Press to activate its programmable function. The default setting is Squelch Off Momentary.
- ⑨ Side 2 key
Press to activate its programmable function. The default setting is Lamp.
- ⑩ Display
Refer to the display.
- ⑪ S key
Press to activate its programmable function. The default setting is None (no function).

- ⑫ A key
Press to activate its programmable function. The default setting is None (no function).
- ⑬ <B key
Press to activate its programmable function. The default setting is Channel Down.
- ⑭ C> key
Press to activate its programmable function. The default setting is Channel Up.
- ⑮ Speaker/ Microphone jacks
Connect an optional speaker/ microphone or headset here. Otherwise, keep the supplied cap in place.

2. Display

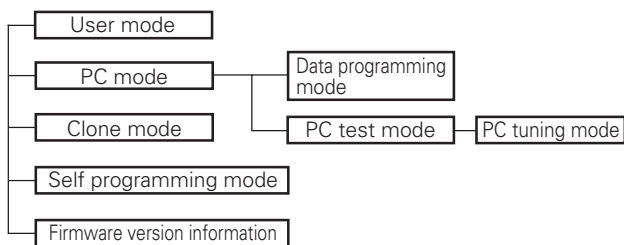


Indicator	Description
	Appears when the key programmed as Monitor or Squelch Off is pressed.
	Appears when you receive a Code Squelch call or transmit using Code Squelch.
	Appears while using the Talk Around function.
	The selected zone is added to the scanning sequence.
	Appears while scanning.
	Appears while using the VOX function
	Appears when a message is stored in the transceiver stack memory. Appears and blinks when a new message has arrived.
	The selected channel is set as a Priority channel.
	Appears while using low transmit power on the selected channel.
	The selected channel is added to the scanning sequence.
	Appears when the Scrambler function has been activated.
	Displays the current battery status (full/ sufficient/ low/ requires charging).
	Displays the currently selected zone and channel number or the channel name. Also displays FleetSync messages.

REALIGNMENT

REALIGNMENT

1. Modes



Mode	Function
User mode	For normal use.
PC mode	Used for communication between the transceiver and PC (IBM compatible).
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.
Clone mode	Used to transfer programming data from one transceiver to another.
Self programming mode	You can program the frequency, signaling and other functions using only the transceiver.
Firmware version information	Used to confirm the internal firmware version.

2. How to Enter Each Mode

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

3. PC Mode

3-1. Preface

The TK-3212/3217 transceivers are programmed using a personal computer, a programming interface (KPG-22) and programming software (KPG-100D).

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

3-2. Connection procedure

1. Connect the TK-3212/3217 to the personal computer with the interface cable.
2. When the POWER is switched on, user mode can be entered immediately. When the PC sends a command, the transceiver enters PC mode. In the PC mode, "PROGRAM" is displayed on the LCD.

When data is transmitting from the transceiver, the red LED lights.

When data is received by the transceiver, the green LED lights.

Notes:

- The data stored in the personal computer must match the model type when it is written into the EEPROM.
- Change the TK-3212/3217 to PC mode, then attach the interface cable.

3-3. KPG-22 description

(PC programming interface cable: Option)

The KPG-22 is required to interface the TK-3212/3217 with the computer. It has a circuit in its D-subconnector (25-pin) case that converts the RS-232C logic level to the TTL level.

The KPG-22 connects the SP/MIC connector of the TK-3212/3217 to the computer's RS-232C serial port.

3-4. Programming software description

KPG-100D is the programming software for TK-3212/3217 supplied on a CD-ROM. This software runs under Windows 98, ME, Windows 2000 or XP on an IBM-PC or compatible machine.

The data can be input to or read from TK-3212/3217 and edited on the screen. The programmed or edited data can be printed out. It is also possible to tune the transceiver.

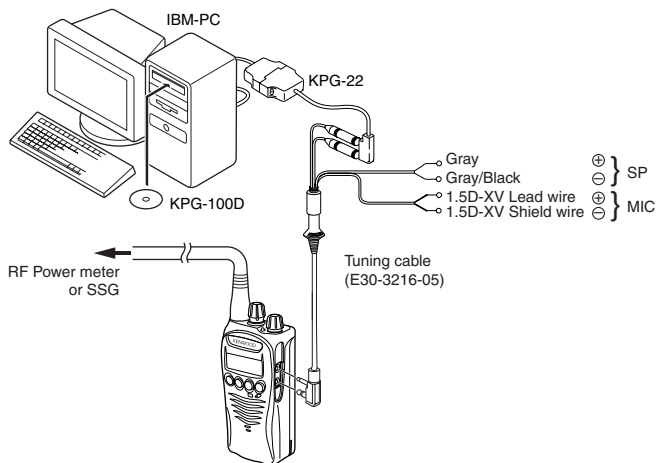


Fig. 1

4. Clone Mode

4-1. Outline

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

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

4-2. Example

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

The clone master and clone slave/s must be in Clone mode.

REALIGNMENT

4-3. Operation

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

Notes:

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

Cloning Frequency Table

MODEL	TK-3212		TK-3217
Type	K, M	K2, M2	M
Operating Clone Frequency Frequency (MHz) Table	450~490	470~512	440~480
1	450.000	470.000	440.000
2	452.000	472.000	442.000
3	454.000	474.000	446.000
4	456.000	476.000	448.000
5	458.000	478.000	450.000
6	460.000	480.000	452.000
7	462.000	482.000	454.000
8	464.000	484.000	456.000
9	466.000	486.000	458.000
10	468.000	488.000	460.000
11	470.000	490.000	462.000
12	472.000	492.000	464.000
13	474.000	494.000	466.000
14	476.000	496.000	468.000
15	478.000	498.000	470.000
16	480.000	500.000	472.000
17	482.000	502.000	474.000
18	484.000	504.000	476.000
19	486.000	506.000	478.000
20	488.000	508.000	480.000

4-4. Adding the Data Password

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

The following describes how to enter the password.

1. Press and hold the [S] key for 2 seconds while turning the transceiver power on.
2. "CLN.LOCK.R" (When the Read authorization password is set to the transceiver.) / "CLN.LOCK.W" (When the Overwrite password is set to the transceiver.) is displayed on the LCD.
3. If the [selector] knob is rotated while "CLN.LOCK.R" / "CLN.LOCK.W" is displayed, the number (0 to 9) flashes on the LCD.

When you press the [C>] key, the currently selected number is determined.

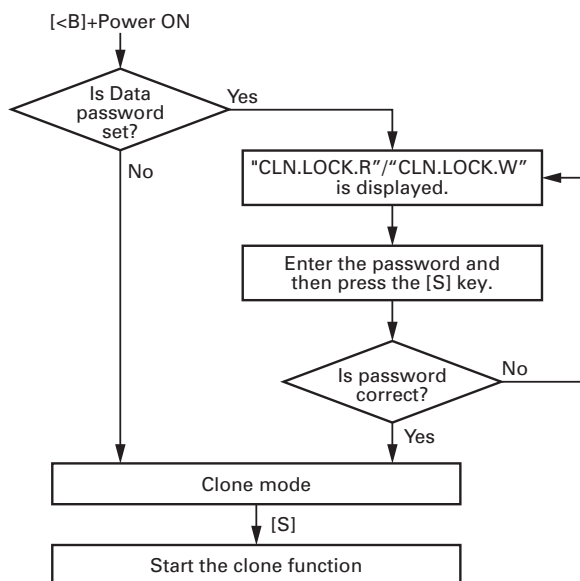
If you press the [A] key, the least digit of the password is deleted.

If you press the [S] key after entering the password in this procedure, "FRQTBL 1" is displayed if the entered password is correct.

If the password is incorrect, "CLN.LOCK.R" / "CLN.LOCK.W" is redisplayed.

REALIGNMENT

■ Flow Chart (Master transceiver)



5. Self Programming Mode

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

5-1. Enter to the Self Programming Mode

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

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

Note :

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

5-2. Adding the Data Password

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

The following describes how to enter the password.

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

If you press the [A] key, the least digit of the password is deleted.

If you press the [S] key after entering the password in this procedure, "SELF" is displayed if the entered password is correct.

If the password is incorrect, "SLF.LOCK.R"/ "SLF.LOCK.W" is redisplayed.

5-3. Channel Selection Mode

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

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

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

The setup item for channel selection mode is as follows.

Setup item	Display	Remarks
Select	⋄***⋄ - ***	Zone: 1~128
Zone/Channel	*** - ⋄***⋄	Channel: 1~128

Key operation

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

Note :

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

5-4. Item Selection Mode

In this mode, the following items can be selected.

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

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

REALIGNMENT

Key operation

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

5-5. Item Setting Mode

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

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

The setup items for item setting mode are as follows.

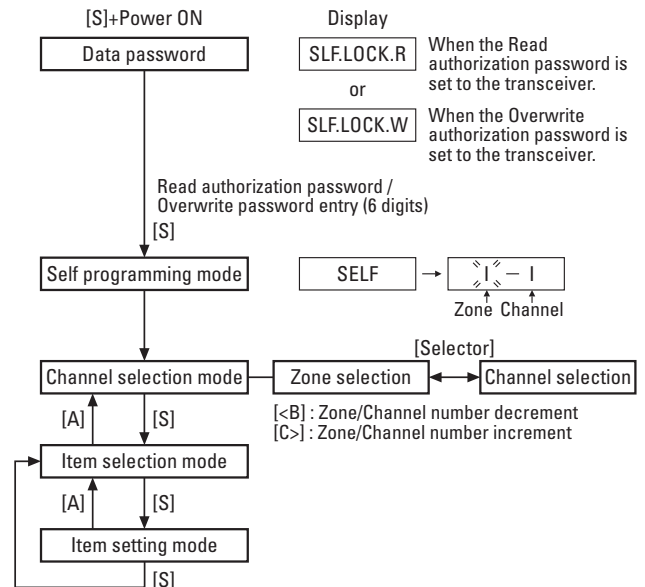
Setup item	Display	Remarks
1.RX frequency	1. RX FREQ→ ***.*****	Receive frequency 327.00000~550.00000MHz
2.RX signaling	2. RX SIG→ TONE OFF/ QT **.* / DQT***N/ DQT***I	Receive QT/DQT
3.TX frequency	3. TX FREQ→ ***.*****	Transmit frequency 327.00000~550.00000MHz
4.TX signaling	4. TX SIG→ TONE OFF/ QT **.* / DQT***N/ DQT***I	Transmit QT/DQT
5. Wide / Narrow	5. BAND *	W / N
6.RF power Hi / Low	6. PWR ***	HI / LOW
7.Scan Del / Add	7. SCN ***	DEL / ADD
8.Beat shift on / off	8. SFT ***	ON / OFF
9.Compander on / off	9. CMP ***	ON / OFF

Key operation

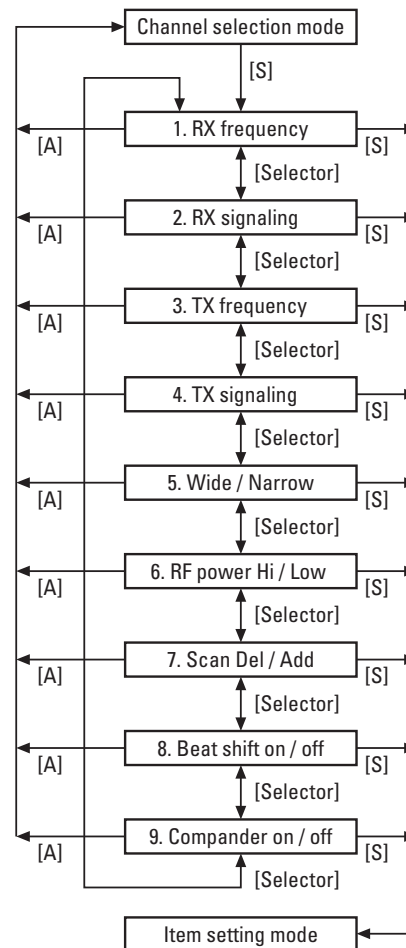
Key	Key Function
[Selector]	Changing the selection item (RX/ TX frequency and RX/ TX signaling only)
[Side1]	No action
[Side2]	No action
[S]	<ul style="list-style-type: none"> Store the current settings and return to the Item Selection mode. A MHz digit of the frequency blinks. (RX/ TX frequency only) The icon of the current signaling configuration blinks. (RX/ TX signaling only)
[A]	Abort the current settings and return to the Item Selection mode without backup.
[<B]	Toggle/ Decrease the blinking value.
[C>]	Toggle/ Increase the blinking value.

5-6. Self Programming Mode flow chart

■ Channel selection mode flow chart

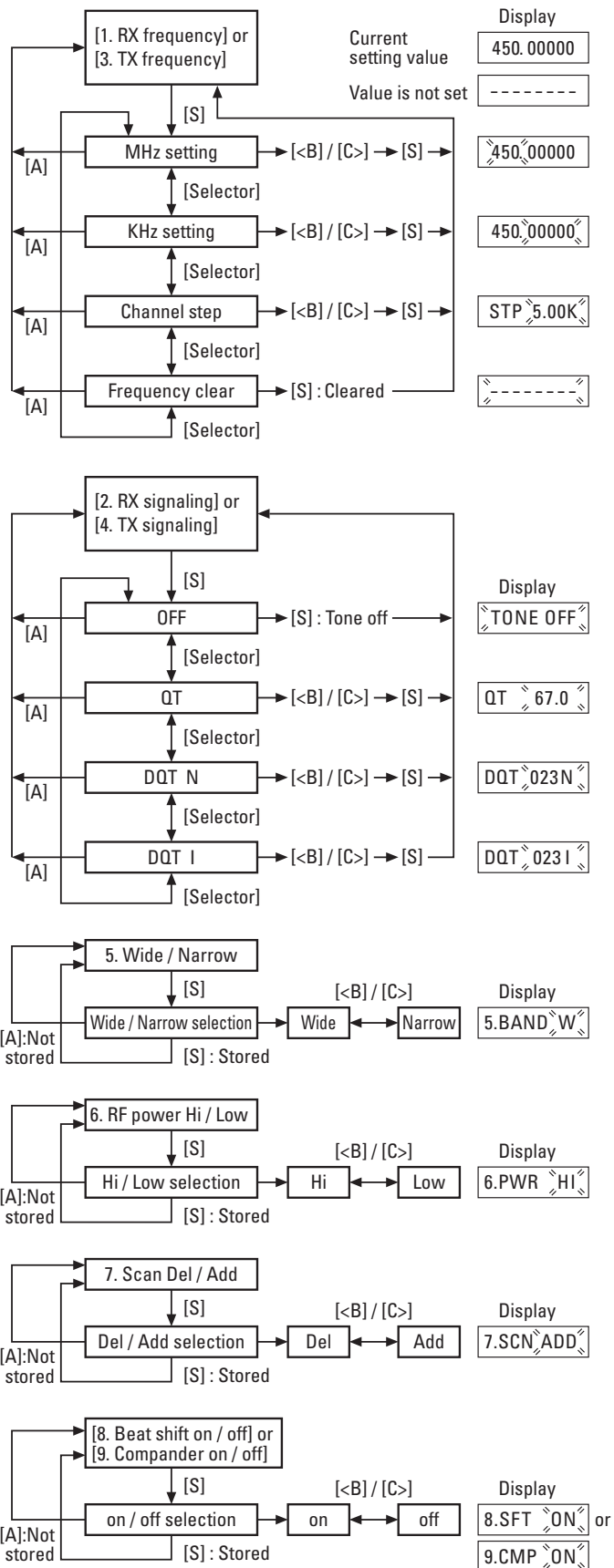


■ Item selection mode flow chart



REALIGNMENT

Item setting mode flow chart



6. Firmware Version Information

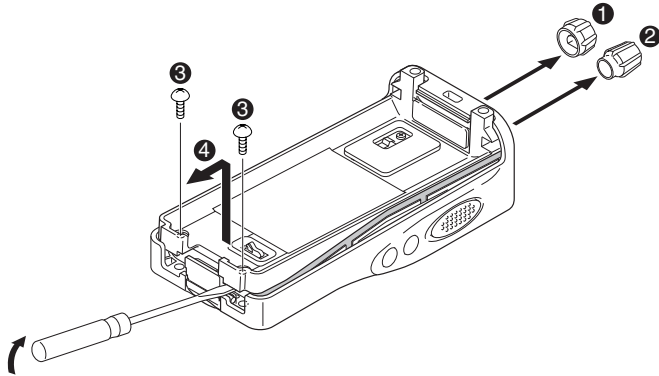
Turn the transceiver ON with the [Side1] and [Side2] keys held down. Then, the version is displayed during holding the [Side1] and [Side2] keys.

DISASSEMBLY FOR REPAIR

Disassembly Procedure

■ Removing the case assembly from the chassis.

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

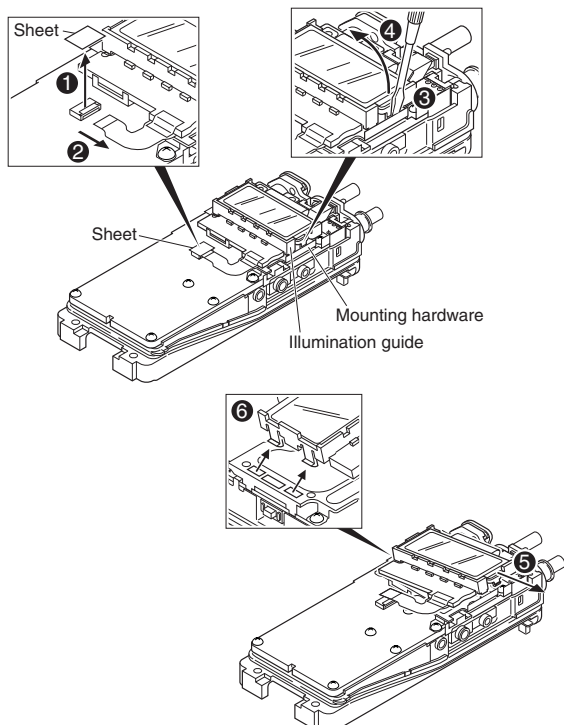


■ Removing the LCD ASSY from the mounting hardware

1. Remove the sheet attached to the flat cable connector ①.
2. Remove the FPC from the flat cable connector ②.

Note: Be careful not to forget to attach the sheet after the LCD ASSY is reassembled.

3. Insert a flat-head screwdriver on the right side of the illumination guide ③, then lever the screwdriver to remove the right side of the illumination guide from the mounting hardware ④.
4. Slide the LCD ASSY ⑤ to the right so that the two tabs on the left side of the illumination guide are removed from the mounting hardware ⑥.

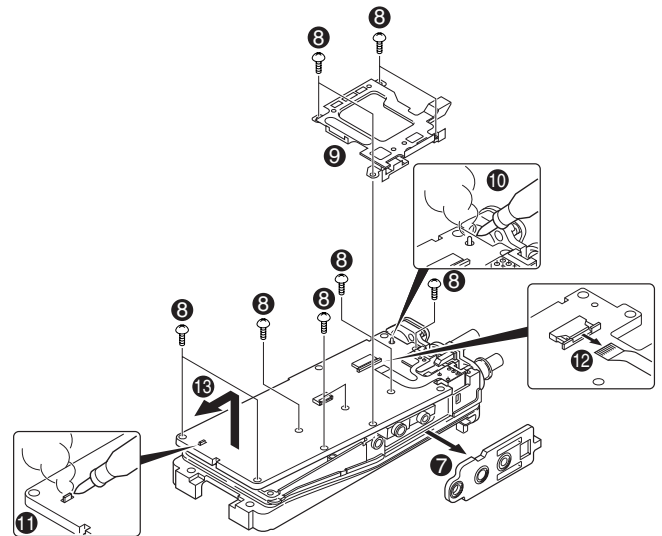


■ Removing the TX-RX unit from the chassis.

1. Remove the packing ⑦ from the SP / MIC jack of the TX-RX unit.
2. Remove the eleven screws ⑧ fixing the TX-RX unit.
3. Remove the mounting hardware ⑨ of the SP / MIC.
4. Remove the solder of the antenna terminal with a soldering iron ⑩.
5. Remove the solder of the positive terminal with a soldering iron ⑪.

Note: You can remove the TX-RX unit from the chassis without removing the solder at the positive terminal. However, in this case, you can not attach the packing (G53-1605-03) that is on the positive terminal to the chassis in assembling. So, it is advisable to remove the solder on the positive terminal first.

6. Remove the FPC from the flat cable connector ⑫.
7. Lift and remove the TX-RX unit from the chassis ⑬.

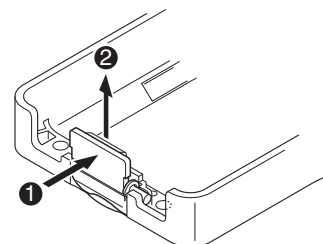


■ Removing the battery release lever from the case assembly.

1. Press the upper part of the lever toward the inside of the case assembly. One side of the shaft will be removed ①.
2. Lift and remove the battery release lever from the case assembly ②.

Note: Scratch and widen the glue hole if there is difficulty in removing the other end of the shaft.

No glue is required when you reassemble the battery release lever.



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DISASSEMBLY FOR REPAIR

Precautions for Reassembly

■ Attaching the battery release lever to the case assembly.

1. Insert one side of the shaft into the hole at the lever fitting section on the case assembly ①.

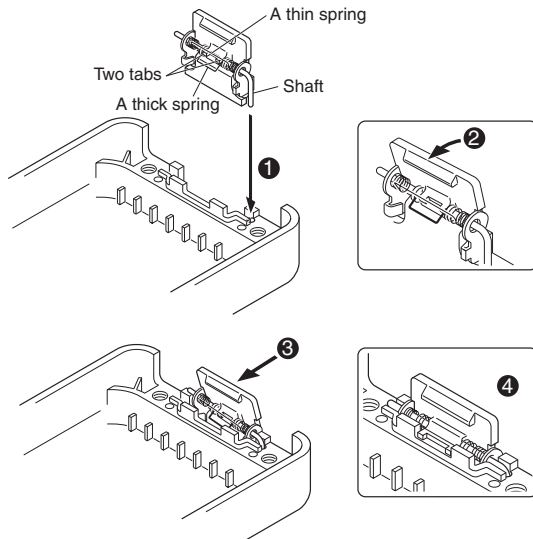
Note: The thin spring (G01-4543-04) should be positioned above the two tabs of the lever.

2. Tilt the battery release lever slightly forward ②, so that the thick spring (G01-4542-04) is positioned below the case surface.

3. With the thick spring positioned below the case surface, attach the other side of the shaft to the case assembly by pressing the battery release lever ③ until it snaps into place ④.

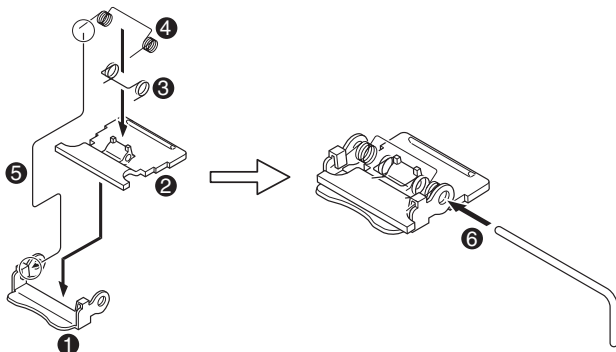
Note: Be careful not to tilt the battery release lever too forward.

If the battery release lever is pushed in this state where the two tabs come below the case surface, there is a possibility of damaging the two tabs.



■ Assembling the battery release lever

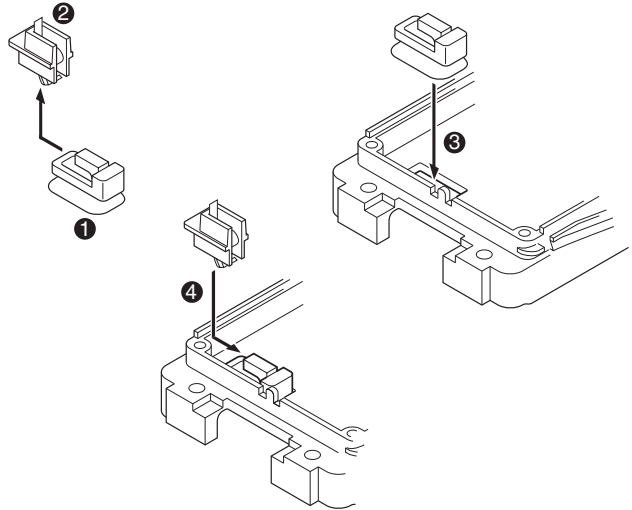
1. Place the lever ② onto the stopper ①.
2. Place the thick spring ③ onto the lever.
3. Hook the right and left ends of the thin spring ④ onto the tabs of the stopper, then place the thin spring onto the lever ⑤.
4. Slide the shaft through the hole of the stopper and lever ⑥.



■ Attaching the positive terminal to the chassis.

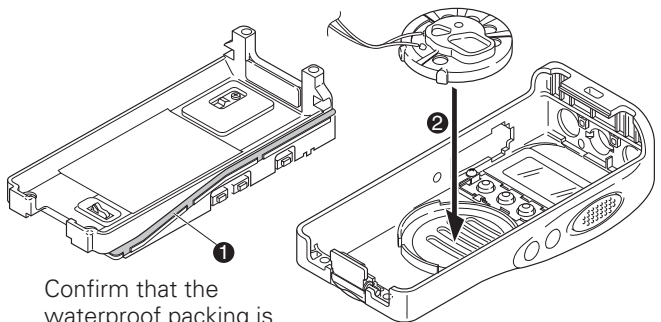
Always attach the positive terminal to the chassis, using the following procedures, before mounting the TX-RX unit onto the chassis.

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



■ Mounting the chassis to the case assembly.

1. Confirm that the waterproof packing attached to the circumference of the chassis is securely inserted in the groove of the chassis ①.
2. Attach the speaker to the speaker recess of the case assembly ②. Make sure the speaker is securely inserted.



Confirm that the waterproof packing is securely inserted in the groove of the chassis.

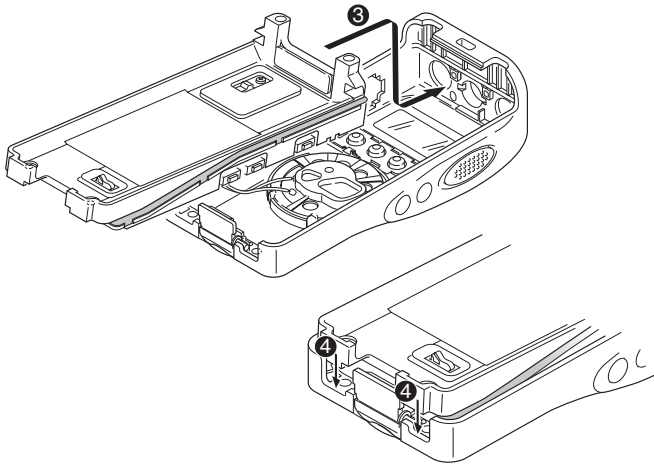
3. Insert the upper part of the chassis into the case assembly ③.

Note: Take care that the speaker lead wire is not caught by the microphone element.

4. Press the chassis ④ and the case assembly together to attach them.

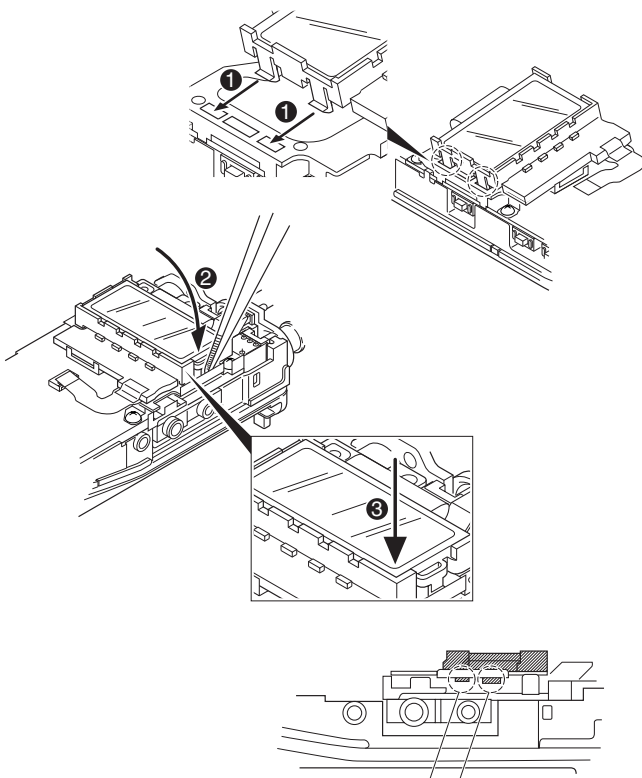
DISASSEMBLY FOR REPAIR

Note: If the packing of the SP / MIC does not come to the correct position after attaching the chassis to the case assembly, reposition the packing with your fingers.



■ LCD ASSY Installation Procedure

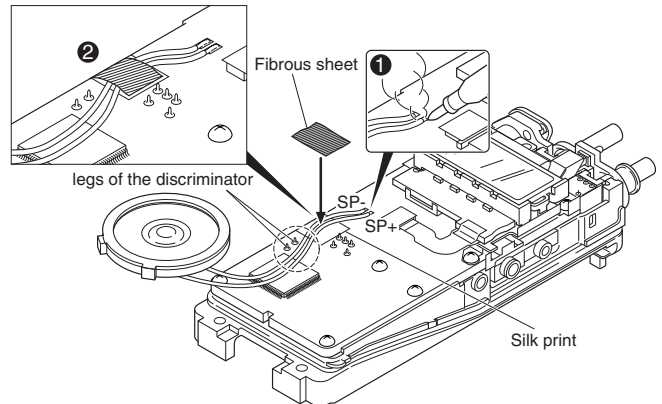
1. Insert the two tabs on the left side of the illumination guide into the matching slots of the mounting hardware ①.
2. Insert the tab on the right side of the illumination guide into the mounting hardware using a pair of tweezers ②, then press the illumination guide down until it snaps into place ③.
3. Ensure that the tab of the illumination guide is fully inserted into the mounting hardware.



Ensure that the tab of the illumination guide is fully inserted into the mounting hardware.

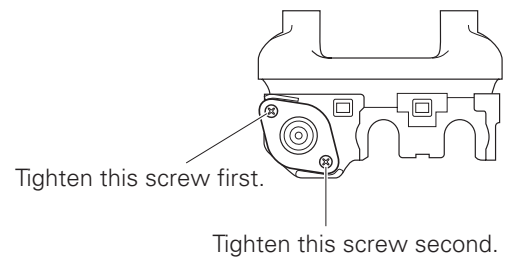
■ Connecting the speaker wires to the TX-RX unit

1. To connect the speaker wires, solder them to the speaker terminals of the TX-RX unit ①.
2. Align the speaker wires as shown in figure, making sure to avoid the legs of the discriminator ②.
3. Attach the fibrous sheet to the speaker wires as shown by the silk print on the TX-RX unit ②.



■ Attaching the antenna receptacle to the chassis.

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

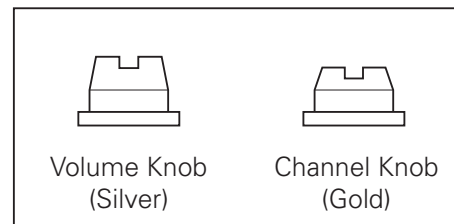


■ The nuts of the volume knob and channel knob

Note that the shapes, colors and heights of nuts of the volume knob and channel knob are different from one another. (The nut of volume knob is silver, and the nut of channel knob is gold)

Use the following jig when removing the nuts of the volume knob and channel knob.

- Jig (Part No. : W05-1012-00)



CIRCUIT DESCRIPTION

1. Frequency Configuration

The receiver utilizes double conversion. The first IF is 38.85 MHz and the second IF is 450 kHz. The first local oscillator signal is supplied from the PLL circuit.

The PLL circuit in the transmitter generates the necessary frequencies. Fig. 1 shows the frequencies.

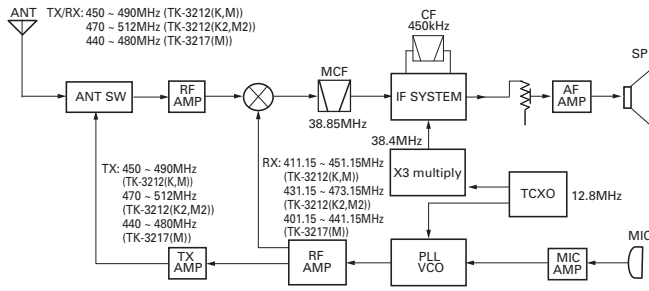


Fig. 1 Frequency configuration

2. Receiver

The frequency configuration of the receiver is shown in Fig. 2.

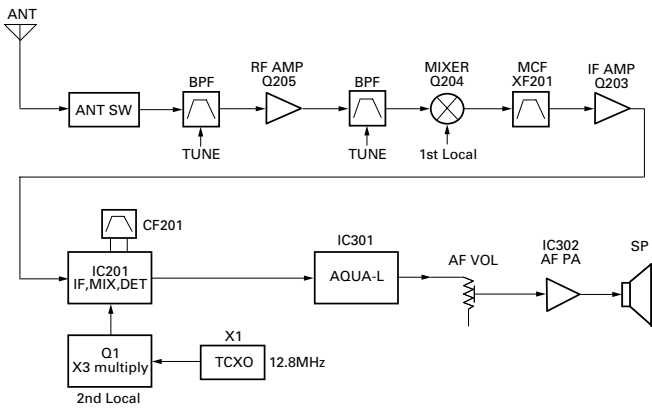


Fig. 2 Receiver section

1) Front End (RF AMP)

The signal coming from the antenna passes through the transmit/receive switching diode circuit, (D103,D104,D106 and D122) passes through a BPF (L229 and L228), and is amplified by the RF amplifier (Q205).

The resulting signal passes through a BPF (L214,L212 and L211) and goes to the mixer. These BPFs are adjusted by variable capacitors (D203,D204,D205,D206 and D210). The input voltage to the variable capacitor is regulated by voltage output from the microprocessor (IC405).

2) First Mixer

The signal from the front end is mixed with the first local oscillator signal generated in the PLL circuit by Q1 to produce a first IF frequency of 38.85 MHz.

The resulting signal passes through the XF201 MCF to cut the adjacent spurious and provide the optimum characteristics, such as adjacent frequency selectivity.

3) IF Amplifier Circuit

The first IF signal is passed through a four-pole monolithic crystal filter (XF201) to remove the adjacent channel signal. The filtered first IF signal is amplified by the first IF amplifier (Q203) and then applied to the IF system IC (IC201). 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 38.4MHz of the second local oscillator output (TCXO X1) and produces the second IF signal of 450kHz.

The second IF signal is passed through the ceramic filter (CF201) to remove the adjacent channel signal. The filtered second IF signal is amplified by the limiting amplifier and demodulated by the quadrature detector with the ceramic discriminator (CD201). The demodulated signal is routed to the audio circuit.

4) Wide/Narrow Switching Circuit

Narrow and Wide settings can be made for each channel by switching the demodulation level.

The WIDE (low level) and NARROW (high level) data is output from IC405, pin 45.

When a WIDE (low level) data is received, Q202 turn on. When a NARROW (high level) data is received, Q202 turn off.

Q202 turns off/on with the Wide/Narrow data and the IC201 detector output level is switched to maintain a constant output level during wide or narrow signals.

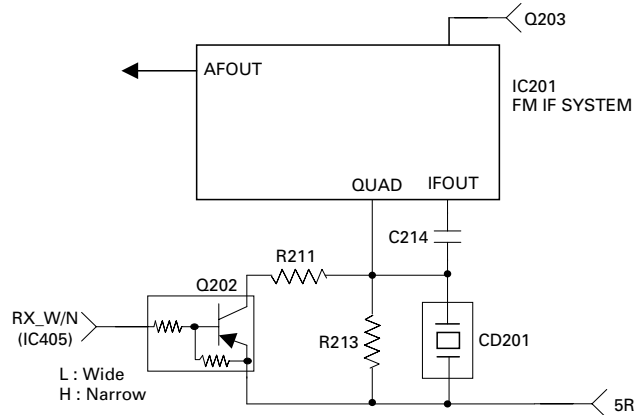


Fig. 3 Wide/Narrow switching circuit

5) Audio Amplifier Circuit

The demodulated signal from IC201 goes to AF amplifier through IC301.

The signal then goes through an AF volume control, and is routed to an audio power amplifier (IC302) where it is amplified and output to the speaker.

CIRCUIT DESCRIPTION

6) Squelch

Part of the AF signal from the IC enters the FM IC (IC201) again, and the noise component is amplified and rectified by a filter and an amplifier to produce a DC voltage corresponding to the noise level.

The DC signal from the FM IC goes to the analog port of the microprocessor (IC405). IC405 determines whether to output sounds from the speaker by checking whether the input voltage is higher or lower than the preset value.

To output sounds from the speaker, IC405 sends a high signal to the SP MUTE line and turns IC302 on through Q303, Q304, Q305, Q306 and Q316. (See Fig. 4)

7) Receive Signaling

(1) QT/DQT

The output signal from FM IC (IC201) enters the microprocessor (IC405) through IC301. IC405 determines whether the QT or DQT matches the preset value, and controls the SP MUTE and the speaker output sounds according to the squelch results.

(2) MSK (Fleet Sync)

The MSK input signal from the FM IC goes to pin 31 of IC 301. The signal is demodulated by MSK demodulator in IC 301. The demodulated data goes to the CPU for processing.

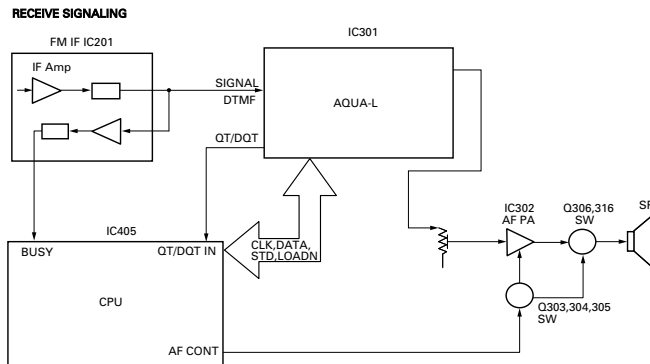


Fig. 4 AF amplifier and squelch

(3) DTMF

The DTMF input signal from the FM IC (IC201) goes to IC301, the DTMF decoder. The decoded information is then processed by the CPU.

3. PLL Frequency Synthesizer

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

1) PLL

The frequency step of the PLL circuit is 2.5 or 5kHz.

A 12.8MHz reference oscillator signal is divided at IC1 by a fixed counter to produce oscillator (VCO) output signal which is buffer amplified by Q2 then divided in IC1 by a programmable counter. The divided signal is compared in

phase with the 5 or 6.25kHz reference signal from the phase comparator in IC1. The output signal from the phase comparator is filtered through a low-pass filter and passed to the VCO to control the oscillator frequency. (See Fig. 5)

2) VCO

The operating frequency is generated by Q4 in transmit mode and Q3 in receive mode. The oscillator frequency is controlled by applying the VCO control voltage, obtained from the phase comparator, to the varactor diodes (D4 and D7 in transmit mode and D5 and D9 in receive mode). The RX pin is set high in receive mode causing Q5 turn on.

The TX pin is set high in transmit mode. The outputs from Q3 and Q4 are amplified by Q6 and sent to the RF amplifiers.

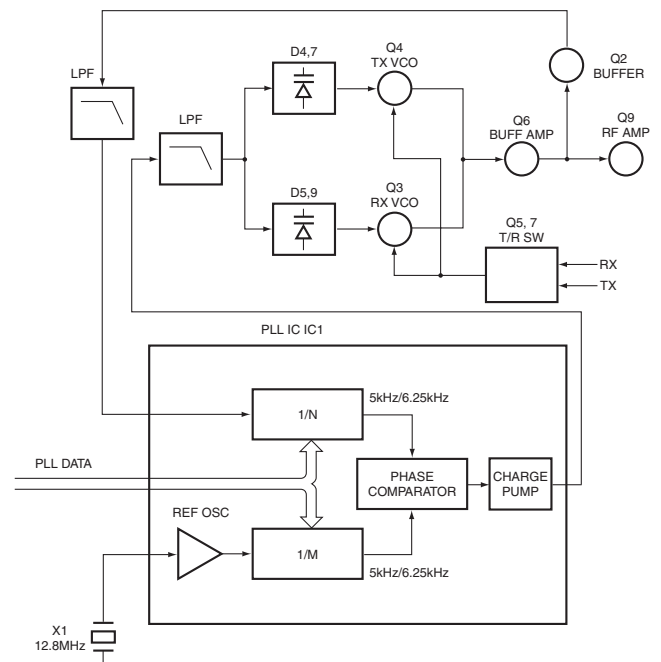


Fig. 5 PLL circuit

3) Unlock Detector

If a pulse signal appears at the LD pin of IC1, an unlock condition occurs, and the DC voltage obtained from C4, R5, and D1 causes the voltage applied to the microprocessor to go low. When the microprocessor detects this condition, the transmitter is disabled, ignoring the push-to-talk switch input signal.

CIRCUIT DESCRIPTION

4. Transmitter System

1) Microphone Amplifier

The signal from the microphone passes through IC301. When encoding DTMF, it is turned OFF for muting the microphone input signal by IC301.

The signal passes through the Audio processor (IC301) for the maximum deviation adjustment, and goes to the VCO modulation input.

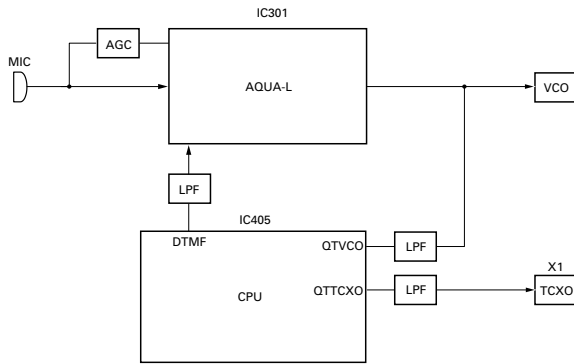


Fig. 6 Microphone amplifier

2) Drive and Final Amplifier

The signal from the T/R switch (D101 is on) is amplified by the pre-drive (Q101) and drive amplifier (Q102) to 50mW. The output of the drive amplifier is amplified by the RF power amplifier (Q103) to 4.0W (1W when the power is low). The RF power amplifier consists of two MOS FET stages. The output of the RF power amplifier is then passed through the harmonic filter (LPF) and antenna switch (D103 and D122) and applied to the antenna terminal.

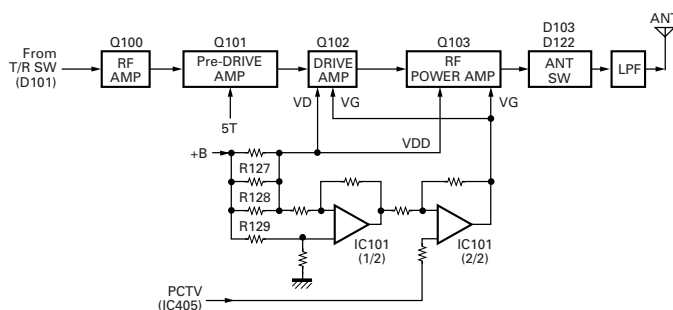


Fig. 7 Drive and final amplifier and APC circuit

3) APC Circuit

The APC circuit always monitors the current flowing through the RF power amplifier (Q103) and keeps a constant current. The voltage drop at R127, R128 and R129 is caused by the current flowing through the RF power amplifier and this voltage is applied to the differential amplifier IC101(1/2). IC101(2/2) compares the output voltage of IC101(1/2) with the reference voltage from IC405. The output of IC101(2/2) controls the VG of the RF power amplifier and Drive amplifier

to make both voltages the same.

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

4) Encode Signalling

(1) QT/DQT

QT,DQT data of the QTTCXO Line is output from pin 28 of the CPU. The signal passes through a low-pass CR filter and goes to the TCXO(X1).

The QT,DQT data of the QTVCO Line is output from pin 24 of the CPU. The signal passes through a low pass CR filter, mixes with the audio signal, and goes to the VCO modulation input. TX deviation is adjusted by the CPU.

(2) DTMF

High-speed data is output from pin 2 of the CPU. The signal passes through a low-pass CR filter, and provides a TX and SP out tone, and is then applied to the audio processor (IC301). The signal is mixed with the audio signal and goes to the VCO.

TX deviation is adjusted by the CPU.

(3) MSK (Fleet Sync)

Fleet Sync utilizes 1200bps and 2400bps MSK signal is output from pin 6 of IC301. And is routed to the VCO. When encoding MSK, the microphone input signal is muted.

5. Power Supply

There are four 5V power supplies 5M,5C,5R, and 5T. 5M for microprocessor is always output while the power is on. 5M is always output, but turns off when the power is turned off to prevent malfunction of the microprocessor.

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

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

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

6. Control Circuit

The control circuit consists of a microprocessor (IC405) and its peripheral circuits. It controls the TX-RX unit and transfers data to the Display unit. IC405 mainly performs the following:

- (1) Switching between transmission and reception by the 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 the decode data input.
- (6) Transmitting tone and encode data.

1) Frequency Shift Circuit

The microprocessor (IC405) operates at a clock of 7.3728MHz. This oscillator has a circuit that shifts the frequency by BEAT SHIFT SW (Q407, Q408).

CIRCUIT DESCRIPTION

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

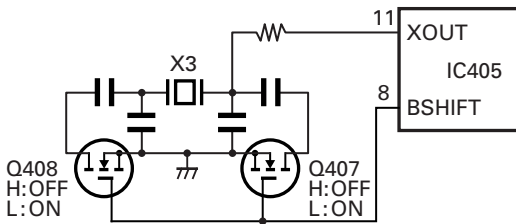


Fig. 8 Frequency shift circuit

2) Memory Circuit

Memory circuit consists of the CPU (IC405) and an EEPROM (IC406). An EEPROM has a capacity of 64k bits that contains the transceiver control program for the CPU and data such as transceiver channels and operating features.

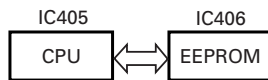


Fig. 9 Memory circuit

3) Low Battery Warning

The battery voltage is checked by the microprocessor. The transceiver generates a warning tone when the battery voltage falls below the warning voltage (2) shown in the table.

- (1) The red LED blinks when the battery voltage falls below the voltage (1) shown in the table during transmission. Transmission is still allowed.

Note:

The transceiver checks the battery voltage during reception even when, in the FPU, the Battery Warning status function is set to "While Transmitting" (default setting). However, the LED does not blink during reception. The red LED blinks during transmission. The transceiver is still usable.

- (2) The transceiver immediately stops transmission when the battery voltage falls below the voltage (2) shown in the table. A warning tone sounds while the PTT switch is pressed.

	Ni-MH Battery
(1)	6.2[V]
(2)	5.8[V]

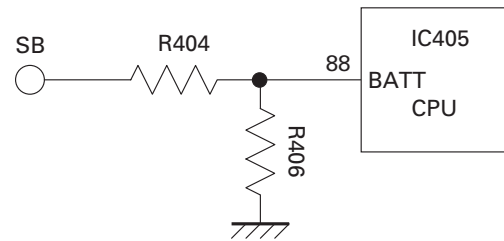


Fig. 10 Low battery warning

7. Control System

LCD, Keys and channel selector circuit.

The signal from keys and channel selector input to microprocessor directly as shown in fig. 11.

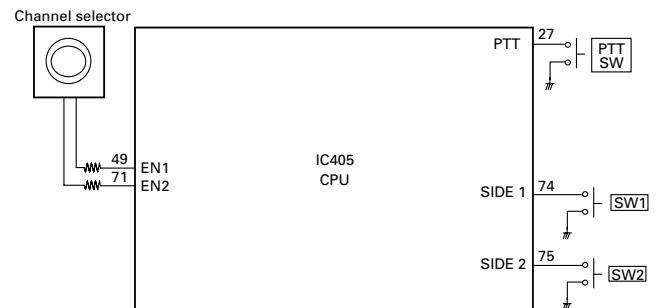


Fig. 11 Control system

SEMICONDUCTOR DATA

Microprocessor : 30620MCP-A00GP (TX-RX UNIT : IC405)

■ Pin function

Pin No.	Port Name	I/O	Function
1	PCTV	O	APC/BPF control data output
2	DTMF	O	DTMF/ Beep output
3	NC	-	NC
4	EEPDAT	I/O	EEPROM data input/output
5	EEPCLK	O	EEPROM clock output
6	BYTE	-	GND
7	GND	-	GND
8	BSHIFT	O	Beat shift switch
9	NC	-	NC
10	RESET	I	CPU reset
11	XOUT	O	CPU clock (7.3728MHz)
12	VSS	-	GND
13	XIN	I	CPU clock (7.3728MHz)
14-15	VCC	-	+5V
16	INT	I	Battery voltage monitor input
17	TCLK/DTRDO	I	Base band IC data input
18	RDF/FD	I	Base band IC data input
19	SCLK	O	Base band IC clock output
20	D I/O	I/O	Base band IC data input / output
21	TDATA/DTRCLK	O	Base band IC data output
22	DIR	O	Base band IC data output
23	STD	I	Base band IC data input
24	QT VCO	O	QT/DQT output
25	DTRLOADN	O	Base band IC data output
26	NC	-	NC
27	PTT	I	PTT switch input
28	QT TCXO	O	QT/DQT output
29	TXD	O	Serial data (FPU/FLASH)
30	RXD	I	Serial data (FPU/FLASH)
31	GND	-	GND
32	APCSW	O	APC switch
33-34	NC	-	NC
35	DCSW	O	APC voltage discharge switch
36	TX_W/N	O	TX Wide/Narrow switch
37	RX_SW	O	RX VCO switch
38	TX_SW	O	TX VCO switch
39	GND	-	GND
40	PLL_UL	I	PLL unlock detect input
41	PLL_STB	O	PLL strobe output
42	PLL_DAT	O	PLL data output
43	PLL_CLK	O	PLL clock output
44	VCC	-	+5V
45	RX_W/N	O	RX Wide/Narrow switch

Pin No.	Port Name	I/O	Function
46-48	NC	-	NC
49	EN1	I	Channel selector input
50	NC	-	NC
51	OPTDET	I	Headset input detect
52	AF_CONT	O	Speaker mute
53	DO	O	LCD driver
54	CE	O	LCD driver
55	CL	O	LCD driver
56	DI	I	LCD driver
57-59	NC	-	NC
60	VCC	-	+5V
61	NC	-	NC
62	VSS	-	GND
63-64	GND	-	GND
65-68	NC	-	NC
69	AUX	O	Reserved
70	NC	-	NC
71	EN2	I	Channel selector input
72	LEDTX	O	Red LED lights control output
73	LEDRX	O	Green LED lights control output
74	PF1	I	SIDE1 key input
75	PF2	I	SIDE2 key input
76	SIM1	-	GND
77	SIM2	-	GND
78-79	NC	-	NC
80	5T_C	O	5T control output
81	5R_C	O	5R control output
82	5C_C	O	5C control output
83-87	NC	-	NC
88	BATT	I	Battery voltage input
89	RSSI	I	Received Signal Strength Indicator input
90	BUSY	I	Busy level input
91	VOX	I	VOX level input
92	QT/DQT_IN	I	QT/DQT input
93	TH_DET	I	Thermistor input
94	AVSS	-	GND
95	NC	-	NC
96	VREF	-	+5V
97	AVCC	-	+5V
98	NC	-	NC
99	MIC_MUTE	O	MIC mute
100	NC	-	NC

COMPONENTS DESCRIPTION / TERMINAL FUNCTION

TX-RX UNIT (X57-7130-XX)

Ref. No.	Part name	Description
IC1	IC	PLL system
IC101	IC	Comparator (APC)
IC201	IC	FM IF system
IC301	IC	Audio processor
IC302	IC	AF AMP
IC401,402	IC	Voltage regulator/ 5V
IC403	IC	Voltage detector / Reset
IC404	IC	Voltage detector / INT
IC405	IC	Microprocessor
IC406	IC	EEPROM
IC407	IC	Frequency divider
Q1	Transistor	Tripler
Q2	Transistor	PLL IC f_in AMP
Q3	FET	VCO / RX
Q4	FET	VCO / TX
Q5	Transistor	DC switch / TX VCO
Q6	Transistor	RF buffer AMP
Q7	Transistor	DC switch / RX VCO
Q8	Transistor	Ripple filter
Q9	Transistor	RF AMP
Q100	Transistor	RF AMP
Q101	FET	RF AMP
Q102	FET	TX drive AMP
Q103	FET	TX final AMP
Q104	Transistor	APC switch
Q105	FET	APC switch
Q107	Transistor	APC switch
Q108	FET	APC switch
Q109	Transistor	APC switch
Q202	Transistor	W/N switch / RX
Q203	Transistor	IF AMP
Q204	FET	Mixer
Q205	FET	RF AMP
Q301	Transistor	W/N switch / TX
Q302	Transistor	MIC AGC
Q303	Transistor	DC switch / SP mute
Q304	Transistor	DC switch
Q305	Transistor	DC switch / SP mute
Q306	FET	SP mute switch
Q316	FET	SP mute switch
Q401	Transistor	LED switch / Red
Q402	Transistor	LED switch / Green
Q403	FET	5T switch
Q404	Transistor	5R switch
Q405	Transistor	5C switch
Q407,408	FET	Beat shift switch
Q901	FET	W/N switch / TX

Ref. No.	Part name	Description
D1	Diode	Ripple filter
D2	Varicap	Frequency control / TX VCO
D3	Varicap	Frequency control / RX VCO
D4	Varicap	Frequency control / TX VCO
D5	Varicap	Frequency control / RX VCO
D6,7	Varicap	Frequency control / TX VCO
D8,9	Varicap	Frequency control / RX VCO
D10	Varicap	Modulator
D11	Diode	Current steering
D101	Diode	TX/RX RF switch
D102	Zener diode	APC protect
D103,104	Diode	ANT switch
D106	Diode	ANT switch
D122	Diode	ANT switch
D202	Diode	TX/RX RF switch
D203-206	Varicap	RF BPF tuning
D210	Varicap	RF BPF tuning
D301,302	Diode	Detector
D303	Diode	Isolation
D401	Diode	5V protection
D402	Diode	Reverse protection
D403	LED	LED/ Red
D404	LED	LED/ Green

TERMINAL FUNCTION

■ CN401

Pin No.	Name	I/O	Function
1	B	I	B (Battery Voltage)
2	SB	O	Switched B
3	AFI	I	Audio input
4	AFO	O	Audio output
5	GND	-	GND
6	UP	I	Encoder pulse input
7	DOWN	I	Encoder pulse input
8	GND	-	GND

■ CN402

Pin No.	Name	I/O	Function
1	GND	-	GND
2	NC	-	No connection
3	SB	O	Switched B
4	5M	-	Power supply
5	GND	-	GND
6	DI	I	Transfer data
7	CL	I	Synchronization clock
8	CE	I	Chip enable
9	DO	O	Output data
10	GND	-	GND

TK-3212/3217

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-3212/3217 (Y50-5980-XX) TX-RX UNIT (X57-7130-XX)

Ref. No.	Address	New parts	Parts No.	Description	Destination
TK-3212/3217					
1	1B	*	A02-3894-13	PLASTIC CABINET ASSY	
2	3A	*	A10-4078-31	CHASSIS	
3	2C		B09-0680-03	CAP(SP/MIC) ACCESSORY	
4	2B		B11-1817-04	ILLUMINATION GUIDE(TX/RX)	
5	1A	*	B11-1830-03	ILLUMINATION GUIDE(LCD)	
6	1A	*	B38-0906-15	LCD ASSY	
7	1C	*	B62-1817-00	INSTRUCTION MANUAL(ENG/SPA/FR)	AK,AM,AK2
7	1C	*	B62-1817-00	INSTRUCTION MANUAL(ENG/SPA/FR)	AM2
7	1C	*	B62-1818-00	INSTRUCTION MANUAL(KOREAN)	BM
9	1B		D10-0649-03	LEVER	
10	1B		D21-0863-04	SHAFT	
11	1B		D32-0441-03	STOPPER	
12	2A		E04-0451-05	RF COAXIAL RECEPTACLE(SMA)	
13	3A		E23-1253-04	TERMINAL(BATT-)	
-			E37-0781-05	PROCESSED LEAD WIRE(PCB)	
14	2B		E37-1158-05	PROCESSED LEAD WIRE(SP+)	
15	2B		E37-1176-05	PROCESSED LEAD WIRE(SP-)	
16	3A		F20-3353-14	INSULATING SHEET(CHASSIS BATT+)	
17	2B		G01-4542-04	COIL SPRING(LEVER)	
18	2B		G01-4543-04	COIL SPRING(STOPPER)	
19	2A		G10-1330-04	FIBROUS SHEET(IC302:AUDIO IC)	
21	2A	*	G10-1348-04	FIBROUS SHEET(SP WIRE)	
22	3A		G11-4283-04	RUBBER SHEET(Q103:FINAL FET)	
23	2A	*	G11-4359-04	SHEET(FPC CONNECTOR)	
24	3A		G13-2033-04	CUSHION(TERMINAL BATT-)	
25	3A		G13-2034-14	CUSHION(TERMINAL BATT-)	
27	3A		G13-2038-14	CUSHION(CHASSIS-CERAMIC FILTER)	
28	2A		G13-2039-04	CUSHION(PCB-CERAMIC FILTER)	
29	3A		G13-2045-04	CUSHION(CHASSIS)	
30	2A	*	G13-2053-04	CUSHION(CHASSIS,ENC)	
31	2A	*	G13-2074-04	CUSHION(PCB)	
32	3A	*	G13-2088-04	CUSHION(CHASSIS,VOL)	
33	2A	*	G13-2107-04	CUSHION(MOUNTING HARDWARE)	
34	3A		G53-1604-03	PACKING(CHASSIS)	
35	3A		G53-1605-03	PACKING(TERMINAL BATT+)	
36	2B		G53-1606-13	PACKING(VOL/ENC/LED)	
38	2A		G53-1610-04	PACKING(SMA)	
39	2B	*	G53-1660-03	PACKING(SP)	
40	2A	*	G53-1661-03	PACKING(SP/MIC)	
41	2C	*	H12-3179-05	PACKING FIXTURE	
42	1D		H13-2109-03	CARTON BOARD	
43	1C		H25-0085-04	PROTECTION BAG (100/200/0.07)	
44	3C	*	H52-2071-02	ITEM CARTON CASE	AK,AM,AK2
44	3C	*	H52-2071-02	ITEM CARTON CASE	AM2
44	3C	*	H52-2072-02	ITEM CARTON CASE	BM
46	2C		J19-5472-03	HOLDER(SP/MIC) ACCESSORY	
50	2A		J19-5473-03	HOLDER ASSY(TERMINAL BATT+)	
51	2B		J21-8477-04	MOUNTING HARDWARE(VOL/ENC)	
52	1A	*	J21-8496-02	MOUNTING HARDWARE(LCD)	
53	2B	*	J21-8497-03	MOUNTING HARDWARE(4 KEY)	
54	2C		J29-0713-05	BELT CLIP ACCESSORY	
55	1C		J69-0352-05	HANDSTRAP ACCESSORY	BM
56	2A	*	J82-0107-05	FPC	

Ref. No.	Address	New parts	Parts No.	Description	Destination
57	1A	*	J99-0385-04	ADHESIVE SHEET(LCD)	
58	1B		K29-9307-13	BUTTON KNOB(SIDE1/SIDE2)	
59	1B		K29-9308-13	BUTTON KNOB(PTT)	
60	1B		K29-9309-03	KNOB(VOL)	
61	1B	*	K29-9345-04	KNOB(ENC)	
62	2B	*	K29-9346-02	KEY TOP	
A	2B		N14-0819-04	CIRCULAR NUT(VOL KNOB)	
B	2B		N14-0820-04	CIRCULAR NUT(CH KNOB)	
C	2A		N30-2604-46	PAN HEAD MACHINE SCREW(SMA)	
D	3A		N30-2606-46	PAN HEAD MACHINE SCREW(CHASSIS)	
E	1A,2A,2B,3A		N83-2005-46	PAN HEAD TAPTITE SCREW(PCB)	
65	1C		N99-2043-05	SCREW SET ACCESSORY	
66	2A		R31-0653-05	VARIABLE RESISTOR(POWER SW/VOL)	
67	1B		T07-0369-05	SPEAKER	
68	1C		T90-0798-25	HELICAL ANTENNA ACCESSORY	BM
69	1C		T90-1039-15	WHIP ANTENNA ACCESSORY	AK,AM
69	1C		T90-1040-15	WHIP ANTENNA ACCESSORY	AK2,AM2
71	2A	*	W02-3684-05	ENCODER	
72	2D		W08-0969-05	CHARGER ACCESSORY	
73	1D		W08-0970-05	AC ADAPTER(AC120V) ACCESSORY	AK,AK2
73	1D		W08-0971-05	AC ADAPTER(AC230V) ACCESSORY	AM,AM2
TX-RX UNIT (X57-7130-XX) -10: TK-3212 (K,M) -11: TK-3212 (K2,M2) -21: TK-3217 (M)					
D403			B30-2156-05	LED(RED)	
D404			B30-2157-05	LED(YELLOW)	
C1			CK73HB1H332K	CHIP C 3300PF K	
C2			CK73HB1C682K	CHIP C 6800PF K	
C3			CK73GB1A105K	CHIP C 1.0UF K	
C4			CK73HB1C103K	CHIP C 0.010UF K	
C5			CK73HB1H102K	CHIP C 1000PF K	
C6			CK73HB1A104K	CHIP C 0.10UF K	
C7 ,8			CC73HCH1H101J	CHIP C 100PF J	
C9			CC73HCH1H100D	CHIP C 10PF D	
C10			C92-0560-05	CHIP-TAN 10UF 6.3WV	
C11			CC73HCH1H101J	CHIP C 100PF J	
C12			CK73HB1H102K	CHIP C 1000PF K	
C13			CK73HB1A104K	CHIP C 0.10UF K	
C14			CK73HB1C103K	CHIP C 0.010UF K	
C15			CC73HCH1H100D	CHIP C 10PF D	
C16			CK73HB1H102K	CHIP C 1000PF K	
C17			CC73HCH1H470J	CHIP C 47PF J	
C18			CC73HCH1H180J	CHIP C 18PF J	
C19			CK73HB1A104K	CHIP C 0.10UF K	
C21			C92-0560-05	CHIP-TAN 10UF 6.3WV	
C22			C92-0502-05	CHIP-TAN 0.33UF 35WV	
C24			CK73HB1H102K	CHIP C 1000PF K	
C25			CC73HCH1H020B	CHIP C 2.0PF B	
C26			CC73HCH1H300J	CHIP C 30PF J	
C27			C92-0697-05	CHIP-TAN 3.3UF 16WV	
C29			CK73HB1H471K	CHIP C 470PF K	
C32			C92-0001-05	CHIP-TAN 0.1UF 35WV	
C33 ,34			CK73HB1H102K	CHIP C 1000PF K	

PARTS LIST

TX-RX UNIT (X57-7130-XX)

Ref. No.	Address	New parts	Parts No.	Description	Destination	Ref. No.	Address	New parts	Parts No.	Description	Destination
C35			CC73HCH1H270J	CHIP C 27PF J		C123			CC73GCH1H330G	CHIP C 33PF G	
C38			CC73HCH1H050B	CHIP C 5.0PF B		C124			CC73HCH1H100D	CHIP C 10PF D	
C39			CK73GB1H332K	CHIP C 3300PF K		C125			CC73GCH1H060B	CHIP C 6.0PF B	
C40			CC73HCH1H030B	CHIP C 3.0PF B		C126			C92-0004-05	CHIP-TAN 1.0UF 16WV	
C41			CK73GB1H682K	CHIP C 6800PF K		C127			CC73GCH1H200J	CHIP C 20PF J	
C42			CC73HCH1H050B	CHIP C 5.0PF B		C128			CK73HB1H471K	CHIP C 470PF K	
C43			CC73HCH1H100C	CHIP C 10PF C		C129			CK73GB1H471K	CHIP C 470PF K	
C44			CK73HB1H471K	CHIP C 470PF K		C130			CK73HB1H471K	CHIP C 470PF K	
C45			CK73GB1A105K	CHIP C 1.0UF K		C132			CC73GCH1H240J	CHIP C 24PF J	BM
C47			CC73HCH1H101J	CHIP C 100PF J		C132			CC73GCH1H270J	CHIP C 27PF J	AK,AM,AK2
C48			CK73HB1H471K	CHIP C 470PF K		C132			CC73GCH1H270J	CHIP C 27PF J	AM2
C49			CC73HCH1H101J	CHIP C 100PF J		C133			CK73GB1H471K	CHIP C 470PF K	
C50			CC73HCH1H100D	CHIP C 10PF D		C134			CK73GB1H103K	CHIP C 0.010UF K	
C52			CC73HCH1H110J	CHIP C 11PF J	AK,AM	C135			CK73GB1C104K	CHIP C 0.10UF K	
C52			CC73HCH1H120J	CHIP C 12PF J	AK2,AM2,BM	C136			CK73GB1A105K	CHIP C 1.0UF K	
C54			CC73HCH1H060B	CHIP C 6.0PF B	BM	C138			CK73GB1H102K	CHIP C 1000PF K	
C54			CC73HCH1H090B	CHIP C 9.0PF B	AK,AM,AK2	C140			CC73GCH1H101J	CHIP C 100PF J	
C54			CC73HCH1H090B	CHIP C 9.0PF B	AM2	C142			CC73GCH1H070B	CHIP C 7.0PF B	BM
C55			CC73HCH1H110J	CHIP C 11PF J	AK,AM	C145			CC73GCH1H160J	CHIP C 16PF J	AK,AM
C55			CC73HCH1H120J	CHIP C 12PF J	AK2,AM2,BM	C145			CC73GCH1H180J	CHIP C 18PF J	AK2,AM2,BM
C56			CC73HCH1H020B	CHIP C 2.0PF B	AK,AM	C146			CK73GB1H102K	CHIP C 1000PF K	
C58			CC73HCH1H060B	CHIP C 6.0PF B	AK,AM,BM	C148			CK73GB1H102K	CHIP C 1000PF K	
C58			CC73HCH1H090B	CHIP C 9.0PF B	AK2,AM2	C151			CC73GCH1H070B	CHIP C 7.0PF B	AK2,AM2
C59 .60			CC73HCH1H010B	CHIP C 1.0PF B		C152			CC73GCH1H200J	CHIP C 20PF J	
C61			CC73HCH1H030B	CHIP C 3.0PF B	AK,AM,BM	C154			CK73GB1H471K	CHIP C 470PF K	
C61			CC73HCH1H040B	CHIP C 4.0PF B	AK2,AM2	C156			CC73GCH1H040B	CHIP C 4.0PF B	BM
C62			CC73HCH1H020B	CHIP C 2.0PF B		C156			CC73GCH1H060B	CHIP C 6.0PF B	AK,AM
C63			CC73HCH1H101J	CHIP C 100PF J		C156			CC73GCH1H3R5B	CHIP C 3.5PF B	AK2,AM2
C64			CC73HCH1H040B	CHIP C 4.0PF B	AK,AM	C157			CC73GCH1H010B	CHIP C 1.0PF B	BM
C64			CC73HCH1H050B	CHIP C 5.0PF B	BM	C157			CC73GCH1H040B	CHIP C 4.0PF B	AK2,AM2
C64 .65			CC73HCH1H050B	CHIP C 5.0PF B	AK2,AM2	C157			CC73GCH1H2R5B	CHIP C 2.5PF B	AK,AM
C65 .66			CC73HCH1H060B	CHIP C 6.0PF B	AK,AM	C158			CC73GCH1H101J	CHIP C 100PF J	
C65 .66			CC73HCH1H070B	CHIP C 7.0PF B	BM	C159			CC73GCH1H020C	CHIP C 2.0PF C	AK,AM,BM
C66			CC73HCH1H060B	CHIP C 6.0PF B	AK2,AM2	C159			CC73GCH1H030B	CHIP C 3.0PF B	AK2,AM2
C67			CC73HCH1H050B	CHIP C 5.0PF B	AK,AM,BM	C160			CC73GCH1H020B	CHIP C 2.0PF B	AK,AM,BM
C67			CC73HCH1H070B	CHIP C 7.0PF B	AK2,AM2	C160			CC73GCH1H1R5B	CHIP C 1.5PF B	AK2,AM2
C68 -70			CK73HB1H471K	CHIP C 470PF K		C161			CC73GCH1H050B	CHIP C 5.0PF B	AK,AM,BM
C71 .72			CK73HB1A104K	CHIP C 0.10UF K		C161			CC73GCH1H060B	CHIP C 6.0PF B	AK2,AM2
C73 .74			CC73HCH1H0R5B	CHIP C 0.5PF B		C163			CC73GCH1H030B	CHIP C 3.0PF B	
C75 .76			CK73HB1H102K	CHIP C 1000PF K		C164			CC73GCH1H050B	CHIP C 5.0PF B	AK,AM,BM
C77			CK73HB1H471K	CHIP C 470PF K		C164			CC73GCH1H060B	CHIP C 6.0PF B	AK2,AM2
C78			CC73HCH1H330J	CHIP C 33PF J		C166			CC73GCH1HR75B	CHIP C 0.75PF B	AK,AM,BM
C79			C92-0713-05	CHIP-TAN 10UF 6.3WV		C166			CC73GCH1H1R5B	CHIP C 1.5PF B	AK2,AM2
C80			CK73HB1H471K	CHIP C 470PF K		C168			CC73GCH1H0R3B	CHIP C 0.3PF B	AK2,AM2
C83			CC73HCH1H150J	CHIP C 15PF J		C169			CC73GCH1H050B	CHIP C 5.0PF B	AK,AM
C84 -86			CK73HB1H102K	CHIP C 1000PF K		C169			CC73GCH1H060B	CHIP C 6.0PF B	BM
C87			CC73HCH1H100D	CHIP C 10PF D		C169			CC73GCH1H090B	CHIP C 9.0PF B	AK2,AM2
C90			CK73HB1H102K	CHIP C 1000PF K		C190			CK73GB1A105K	CHIP C 1.0UF K	
C100			CK73HB1H471K	CHIP C 470PF K		C191			CK73GB1H103K	CHIP C 0.010UF K	
C101			CK73GB1H471K	CHIP C 470PF K		C201			CK73GB1A224K	CHIP C 0.22UF K	
C102			CC73GCH1H120J	CHIP C 12PF J		C206			CK73HB1H102K	CHIP C 1000PF K	
C106			CK73HB1H471K	CHIP C 470PF K		C207			CK73HB1H182K	CHIP C 1800PF K	
C107			CC73GCH1H060B	CHIP C 6.0PF B		C208			CK73HB1H471K	CHIP C 470PF K	
C108			CK73HB1H471K	CHIP C 470PF K		C209			C92-0713-05	CHIP-TAN 10UF 6.3WV	
C110,111			CK73GB1H471K	CHIP C 470PF K		C210			CK73HB1H471K	CHIP C 470PF K	
C112			CC73GCH1H070D	CHIP C 7.0PF D		C211			CK73HB1C103K	CHIP C 0.010UF K	
C113			CK73GB1C104K	CHIP C 0.10UF K		C213			CK73HB1A104K	CHIP C 0.10UF K	
C116			CC73GCH1H110J	CHIP C 11PF J		C214			CC73HCH1H680J	CHIP C 68PF J	
C119			CK73GB1H471K	CHIP C 470PF K		C215			CK73HB1H102K	CHIP C 1000PF K	
C122			CC73GCH1H330J	CHIP C 33PF J		C216			CK73GB1C104K	CHIP C 0.10UF K	

AK : TK-3212 (K) AK2 : TK-3212 (K2) AM : TK-3212 (M) AM2 : TK-3212 (M2)
BM : TK-3217 (M)

PARTS LIST

TX-RX UNIT (X57-7130-XX)

Ref. No.	Address	New parts	Parts No.	Description	Destination	Ref. No.	Address	New parts	Parts No.	Description	Destination
C217			CK73HB1A104K	CHIP C 0.10UF K		C275			CC73GCH1H030B	CHIP C 3.0PF B	BM
C218			CK73GB1C104K	CHIP C 0.10UF K		C275			CC73GCH1H2R5B	CHIP C 2.5PF B	AK2,AM2
C219			CC73HCH1H330J	CHIP C 33PF J		C276			CC73GCH1H020B	CHIP C 2.0PF B	AK2,AM2
C220			CK73HB1H102K	CHIP C 1000PF K		C276			CC73GCH1H040B	CHIP C 4.0PF B	BM
C221			CK73GB1C104K	CHIP C 0.10UF K		C276			CC73GCH1H2R5B	CHIP C 2.5PF B	AK,AM
C222			CK73HB1H102K	CHIP C 1000PF K		C290			CC73GCH1H020B	CHIP C 2.0PF B	
C224,225			CK73HB1C103K	CHIP C 0.010UF K		C291			CC73GCH1H060B	CHIP C 6.0PF B	
C228			CC73GCH1H100C	CHIP C 10PF C		C292			CK73HB1H471K	CHIP C 470PF K	
C230			CK73HB1C103K	CHIP C 0.010UF K		C293			CC73GCH1H070B	CHIP C 7.0PF B	BM
C231			CK73GB1H103K	CHIP C 0.010UF K		C301			CK73HB1H392K	CHIP C 3900PF K	
C232			CK73HB1C103K	CHIP C 0.010UF K		C302			CK73HB1H271K	CHIP C 270PF K	
C233			CC73GCH1H060B	CHIP C 6.0PF B		C304			CK73GB1A224K	CHIP C 0.22UF K	
C234			CK73HB1H102K	CHIP C 1000PF K		C306			C92-0507-05	CHIP-TAN 4.7UF 6.3WV	
C236			CC73GCH1H180J	CHIP C 18PF J		C307,308			CK73HB1A104K	CHIP C 0.10UF K	
C237			CK73HB1H102K	CHIP C 1000PF K		C309			CC73GCH1H820J	CHIP C 82PF J	
C238			CK73GB1C104K	CHIP C 0.10UF K		C310			CK73HB1A683K	CHIP C 0.068UF K	
C239			CK73GB1H102K	CHIP C 1000PF K		C311			CK73GB1A105K	CHIP C 1.0UF K	
C240			CC73GCH1H3R5B	CHIP C 3.5PF B		C312			CC73GCH1H120J	CHIP C 12PF J	
C241			CK73GB1H471K	CHIP C 470PF K		C313			CC73GCH1H121J	CHIP C 120PF J	
C244			CC73GCH1H030B	CHIP C 3.0PF B	AK,AM	C314			CK73HB1A104K	CHIP C 0.10UF K	
C245			CC73GCH1H220J	CHIP C 22PF J	AK,AM	C315			CK73GB1A105K	CHIP C 1.0UF K	
C246			CC73GCH1H010B	CHIP C 1.0PF B	AK,AM	C316			CK73GB1C104K	CHIP C 0.10UF K	
C247			CK73HB1H471K	CHIP C 470PF K	AK,AM,BM	C317			CK73HB1A104K	CHIP C 0.10UF K	
C248			CC73GCH1H020B	CHIP C 2.0PF B	AK,AM	C318			C92-0507-05	CHIP-TAN 4.7UF 6.3WV	
C249			CC73GCH1H030B	CHIP C 3.0PF B	AK2,AM2	C319			CC73GCH1H271J	CHIP C 270PF J	
C249			CC73GCH1H050B	CHIP C 5.0PF B	AK,AM	C320			CK73HB1C103K	CHIP C 0.010UF K	
C249			CC73GCH1H2R5B	CHIP C 2.5PF B	BM	C321			CK73GB1H103K	CHIP C 0.010UF K	
C250			CC73GCH1H180J	CHIP C 18PF J	AK2,AM2	C322			CK73HB1C153K	CHIP C 0.015UF K	
C250			CC73GCH1H220J	CHIP C 22PF J	AK,AM,BM	C323			CC73GCH1H820J	CHIP C 82PF J	
C251			CK73HB1H471K	CHIP C 470PF K		C324			CC73HCH1H820J	CHIP C 82PF J	
C252			CC73GCH1H010B	CHIP C 1.0PF B	BM	C325			CK73HB1A104K	CHIP C 0.10UF K	
C252			CC73GCH1H1R5B	CHIP C 1.5PF B	AK2,AM2	C326			CK73HB1H102K	CHIP C 1000PF K	
C252,253			CC73GCH1H020B	CHIP C 2.0PF B	AK,AM	C327			CC73HCH1H101J	CHIP C 100PF J	
C253			CC73GCH1H010B	CHIP C 1.0PF B	AK2,AM2	C328			CK73HB1H391K	CHIP C 390PF K	
C253			CC73GCH1H1R5B	CHIP C 1.5PF B	BM	C329,330			CK73GB1A105K	CHIP C 1.0UF K	
C254			CK73HB1H471K	CHIP C 470PF K		C331			CK73HB1A104K	CHIP C 0.10UF K	
C255			CC73GCH1H180J	CHIP C 18PF J	AK2,AM2	C332			CK73HB1H471K	CHIP C 470PF K	
C255			CC73GCH1H220J	CHIP C 22PF J	AK,AM,BM	C333,334			CK73GB1C104K	CHIP C 0.10UF K	
C256			C92-0714-05	CHIP-TAN 4.7UF 6.3WV		C335			CC73GCH1H221J	CHIP C 220PF J	
C257			CC73GCH1H050B	CHIP C 5.0PF B	AK2,AM2	C336			CK73FB1C474K	CHIP C 0.47UF K	
C257			CC73GCH1H3R5B	CHIP C 3.5PF B	AK,AM	C338			CC73GCH1H101J	CHIP C 100PF J	
C257			CC73GCH1H4R5B	CHIP C 4.5PF B	BM	C339			C92-0560-05	CHIP-TAN 10UF 6.3WV	
C258			CK73HB1H471K	CHIP C 470PF K		C340			CK73GB1C104K	CHIP C 0.10UF K	
C259			CK73GB1H471K	CHIP C 470PF K		C341			CK73GB1C473K	CHIP C 0.047UF K	
C262,263			CK73HB1H471K	CHIP C 470PF K		C342			C92-0560-05	CHIP-TAN 10UF 6.3WV	
C265			CK73HB1H471K	CHIP C 470PF K		C343			CK73GB1C473J	CHIP C 0.047UF J	
C266			CK73GB1H471K	CHIP C 470PF K		C344			CC73GCH1H221J	CHIP C 220PF J	
C267			CC73GCH1H040B	CHIP C 4.0PF B	BM	C345			C92-0786-05	TANTAL 100UF 6.3WV	
C267			CC73GCH1H3R5B	CHIP C 3.5PF B	AK,AM	C346			CK73GB1H102K	CHIP C 1000PF K	
C267			CC73GCH1H4R5B	CHIP C 4.5PF B	AK2,AM2	C348			CK73HB1H471K	CHIP C 470PF K	
C268			CC73GCH1H180J	CHIP C 18PF J	AK2,AM2	C350			CK73HB1H471K	CHIP C 470PF K	
C268			CC73GCH1H220J	CHIP C 22PF J	AK,AM,BM	C351,352			CK73HB1C103K	CHIP C 0.010UF K	
C269			CC73GCH1H020B	CHIP C 2.0PF B		C354			CK73HB1A104K	CHIP C 0.10UF K	
C270,271			CK73HB1H471K	CHIP C 470PF K		C356			CK73HB1A333K	CHIP C 0.033UF K	
C272			CC73GCH1H020B	CHIP C 2.0PF B		C357			CK73HB1E472K	CHIP C 4700PF K	
C273			CC73GCH1H180J	CHIP C 18PF J	AK2,AM2	C401			CC73GCH1H471J	CHIP C 470PF J	
C273			CC73GCH1H220J	CHIP C 22PF J	AK,AM,BM	C402			CK73HB1H102K	CHIP C 1000PF K	
C274			CC73GCH1H010B	CHIP C 1.0PF B	BM	C403			CK73GB1C104K	CHIP C 0.10UF K	
C274			CC73GCH1H1R5B	CHIP C 1.5PF B	AK2,AM2	C405			CC73GCH1H101J	CHIP C 100PF J	
C274,275			CC73GCH1H020B	CHIP C 2.0PF B	AK,AM	C406			CK73HB1E472K	CHIP C 4700PF K	

PARTS LIST

TX-RX UNIT (X57-7130-XX)

Ref. No.	Address	New parts	Parts No.	Description	Destination	Ref. No.	Address	New parts	Parts No.	Description	Destination
C407			CK73HB1H102K	CHIP C 1000PF K		L110			L40-2285-54	SMALL FIXED INDUCTOR(220NH)	
C408			CK73HB1E472K	CHIP C 4700PF K		L111			L40-1092-81	SMALL FIXED INDUCTOR	
C409,410			CK73GB1A105K	CHIP C 1.0UF K		L201			L40-1091-37	SMALL FIXED INDUCTOR(1.000UH)	
C411			CK73HB1H102K	CHIP C 1000PF K		L202			L92-0138-05	CHIP FERRITE	
C415			CK73HB1H471K	CHIP C 470PF K		L203			L40-5685-85	SMALL FIXED INDUCTOR(0.56UH)	
C417			CK73GB1A105K	CHIP C 1.0UF K		L204			L40-2785-92	SMALL FIXED INDUCTOR(270NH)	
C418			CK73HB1E562K	CHIP C 5600PF K		L206	*		L41-2775-38	SMALL FIXED INDUCTOR(27NH)	AK2,AM2
C419			CK73HB1H102K	CHIP C 1000PF K		L211,212			L41-8268-14	SMALL FIXED INDUCTOR(8.2NH)	AK,AM
C421			CK73GB1A105K	CHIP C 1.0UF K		L212			L41-6868-14	SMALL FIXED INDUCTOR(8.8NH)	AK2,AM2
C424			CK73HB1H471K	CHIP C 470PF K		L212			L41-8268-14	SMALL FIXED INDUCTOR(8.2NH)	BM
C426,427			CK73GB1A105K	CHIP C 1.0UF K		L214			L41-6868-14	SMALL FIXED INDUCTOR(6.8NH)	AK2,AM2
C428,429			CK73HB1C102K	CHIP C 1000PF K		L214			L41-8268-14	SMALL FIXED INDUCTOR(8.2NH)	AK,AM,BM
C430			CK73GB1H103K	CHIP C 0.010UF K		L215			L41-2285-03	SMALL FIXED INDUCTOR(220NH)	
C431			CK73HB1C103K	CHIP C 0.010UF K		L220			L34-4602-05	AIR-CORE COIL	
C432			CC73HCH1H050B	CHIP C 5.0PF B		L223			L34-4572-05	AIR-CORE COIL	
C433,434			CC73HCH1H030B	CHIP C 3.0PF B		L224-226			L34-4564-05	AIR-CORE COIL	
C435			CC73HCH1H050B	CHIP C 5.0PF B		L228,229			L41-6868-14	SMALL FIXED INDUCTOR(6.8NH)	AK2,AM2
C440			CC73GCH1H1R5B	CHIP C 1.5PF B		L228,229			L41-8268-14	SMALL FIXED INDUCTOR(8.2NH)	AK,AM,BM
C443			CK73GB1A474K	CHIP C 0.47UF K		L230			L41-3978-03	SMALL FIXED INDUCTOR(39NH)	BM
C444,445			CC73GCH1H070B	CHIP C 7.0PF B	AK,AM	L230			L41-5678-03	SMALL FIXED INDUCTOR(56NH)	AK,AM,AK2
C445			CC73GCH1H200J	CHIP C 20PF J	AK2,AM2	L230			L41-5678-03	SMALL FIXED INDUCTOR(56NH)	AM2
C450,451			CK73HB1C103K	CHIP C 0.010UF K		L250			L41-1875-38	SMALL FIXED INDUCTOR(18NH)	
C452			CK73HB1H102K	CHIP C 1000PF K		L290			L41-3078-17	SMALL FIXED INDUCTOR(30NH)	AK,AM,BM
C456			CK73GB1C104K	CHIP C 0.10UF K		L301			L92-0140-05	CHIP FERRITE	
C901,902			CK73GB1A105K	CHIP C 1.0UF K		L302			L92-0149-05	CHIP FERRITE	
TC1 ,2			C05-0245-05	CERAMIC TRIMMER CAPACITOR(10PF)		L401			L92-0149-05	CHIP FERRITE	
CN201			E23-1081-05	TERMINAL		L402-404			L92-0138-05	CHIP FERRITE	
CN401		*	E40-6363-05	FLAT CABLE CONNECTOR		L410			L92-0138-05	CHIP FERRITE	
CN402		*	E40-6430-05	FLAT CABLE CONNECTOR		L411			L41-1875-38	SMALL FIXED INDUCTOR(18NH)	
J301			E11-0457-05	PHONE JACK(2.5/3.5)		X1			L77-1931-05	TCXO(12.8MHZ)	
F401		*	F53-0324-05	FUSE(2.5A)		X3			L77-1633-05	CRYSTAL RESONATOR(7.3728MHZ)	
101	2A	*	J30-1288-14	SPACER		XF201			L71-0619-05	MCF(38.85MHZ)	
CD201			L79-1582-05	TUNING COIL		CP404			RK75HA1J473J	CHIP-COM 47K J 1/16W	
CF201	2A		L72-0973-05	CERAMIC FILTER		CP405-407			RK75HA1J102J	CHIP-COM 1.0K J 1/16W	
L1			L40-4791-37	SMALL FIXED INDUCTOR(4.700UH)		R1			RK73HB1J223J	CHIP R 22K J 1/16W	
L3			L40-5681-86	SMALL FIXED INDUCTOR(0.56UH)		R2			RK73HB1J103J	CHIP R 10K J 1/16W	
L5			L40-5681-86	SMALL FIXED INDUCTOR(0.56UH)		R3			RK73HB1J333J	CHIP R 33K J 1/16W	
L6 ,7			L92-0138-05	CHIP FERRITE		R4			RK73HB1J563J	CHIP R 56K J 1/16W	
L8 ,9			L41-1875-38	SMALL FIXED INDUCTOR(18NH)		R5			RK73HB1J104J	CHIP R 100K J 1/16W	
L10 ,11			L41-1085-38	SMALL FIXED INDUCTOR(100NH)		R6			RK73HB1J823J	CHIP R 82K J 1/16W	
L12			L92-0138-05	CHIP FERRITE		R7			RK73HB1J101J	CHIP R 100 J 1/16W	
L13 ,14			L41-1085-38	SMALL FIXED INDUCTOR(100NH)		R8 -11			R92-1368-05	CHIP R 0 OHM	
L16			L40-1878-67	SMALL FIXED INDUCTOR(18NH)	AK2,AM2	R12			RK73HB1J222J	CHIP R 2.2K J 1/16W	
L16			L40-2278-67	SMALL FIXED INDUCTOR(22NH)	AK,AM,BM	R13			R92-1252-05	CHIP R 0 OHM J 1/16W	
L17			L40-2278-67	SMALL FIXED INDUCTOR(22NH)	AK2,AM2	R14			RK73HB1J334J	CHIP R 330K J 1/16W	
L17			L40-2278-67	SMALL FIXED INDUCTOR(27NH)	AK,AM,BM	R15			RK73GB1J221J	CHIP R 220 J 1/16W	
L18 ,19			L41-2285-03	SMALL FIXED INDUCTOR(220N)		R16			RK73GB1J561J	CHIP R 560 J 1/16W	
L20 ,21			L40-3391-86	SMALL FIXED INDUCTOR(3.3UH)		R17			RK73HB1J101J	CHIP R 100 J 1/16W	
L22			L92-0138-05	CHIP FERRITE		R18			RK73GB1J181J	CHIP R 180 J 1/16W	
L23			L41-2275-38	SMALL FIXED INDUCTOR(22NH)		R19			RK73GB1J122J	CHIP R 1.2K J 1/16W	
L24			L92-0141-05	CHIP FERRITE		R20			RK73HB1J100J	CHIP R 10 J 1/16W	
L25			L41-2275-38	SMALL FIXED INDUCTOR(22NH)		R21			RK73GB1J681J	CHIP R 680 J 1/16W	
L100,101			L41-1575-38	SMALL FIXED INDUCTOR(15NH)		R22			R92-1252-05	CHIP R 0 OHM J 1/16W	
L102			L92-0138-05	CHIP FERRITE		R23			RK73GB1J103J	CHIP R 10K J 1/16W	
L103,104		*	L41-8265-38	SMALL FIXED INDUCTOR(8.2NH)		R25			RK73HB1J223J	CHIP R 22K J 1/16W	
L105			L40-1575-54	SMALL FIXED INDUCTOR(15NH)	AK,AM,BM	R26			RK73HB1J103J	CHIP R 10K J 1/16W	
L105			L40-2275-54	SMALL FIXED INDUCTOR(22NH)	AK2,AM2	R27			RK73HB1J220J	CHIP R 22 J 1/16W	
L106			L92-0149-05	CHIP FERRITE		R30			RK73HB1J333J	CHIP R 33K J 1/16W	
L107			L40-1263-92	SMALL FIXED INDUCTOR(1.2NH)		R31			RK73HB1J474J	CHIP R 470K J 1/16W	
L109			L92-0149-05	CHIP FERRITE		R32			RK73HB1J102J	CHIP R 1.0K J 1/16W	

AK : TK-3212 (K) AK2 : TK-3212 (K2) AM : TK-3212 (M) AM2 : TK-3212 (M2)
BM : TK-3217 (M)

PARTS LIST

TX-RX UNIT (X57-7130-XX)

Ref. No.	Address	New parts	Parts No.	Description	Destination	Ref. No.	Address	New parts	Parts No.	Description	Destination
R33			RK73HB1J154J	CHIP R 150K J 1/16W		R219			RK73GB1J561J	CHIP R 560 J 1/16W	
R34			RK73HB1J474J	CHIP R 470K J 1/16W		R226,227			RK73GB1J102J	CHIP R 1.0K J 1/16W	
R35_36			RK73HB1J274J	CHIP R 270K J 1/16W		R228			RK73GB1J151J	CHIP R 150 J 1/16W	
R37			RK73HB1J101J	CHIP R 100 J 1/16W		R233			RK73HB1J104J	CHIP R 100K J 1/16W	
R38			RK73HB1J181J	CHIP R 180 J 1/16W		R236			RK73HB1J563J	CHIP R 56K J 1/16W	
R39			RK73HB1J151J	CHIP R 150 J 1/16W	AK,AM,AK2	R238			RK73HB1J104J	CHIP R 100K J 1/16W	
R39			RK73HB1J151J	CHIP R 150 J 1/16W	AM2	R239			RK73HB1J563J	CHIP R 56K J 1/16W	
R39_40			RK73HB1J151J	CHIP R 150 J 1/16W	BM	R240			R92-1252-05	CHIP R 0 OHM J 1/16W	
R40			RK73HB1J101J	CHIP R 100 J 1/16W	AK,AM,AK2	R241			RK73HB1J105J	CHIP R 1.0M J 1/16W	AK,AM,BM
R40			RK73HB1J101J	CHIP R 100 J 1/16W	AM2	R243,244			RK73HB1J105J	CHIP R 1.0M J 1/16W	
R41			RK73HB1J154J	CHIP R 150K J 1/16W		R248			RK73GB1J221J	CHIP R 220 J 1/16W	
R42			RK73HB1J103J	CHIP R 10K J 1/16W	BM	R249			RK73GB1J220J	CHIP R 22 J 1/16W	
R42			RK73HB1J472J	CHIP R 4.7K J 1/16W	AK,AM,AK2	R251			RK73HB1J104J	CHIP R 100K J 1/16W	
R42			RK73HB1J472J	CHIP R 4.7K J 1/16W	AM2	R253			RK73HB1J104J	CHIP R 100K J 1/16W	
R43			RK73HB1J101J	CHIP R 100 J 1/16W		R254			RK73HB1J683J	CHIP R 68K J 1/16W	
R46			RK73HB1J103J	CHIP R 10K J 1/16W		R255			R92-1252-05	CHIP R 0 OHM J 1/16W	
R47			RK73HB1J220J	CHIP R 22 J 1/16W		R256,257			RK73HB1J105J	CHIP R 1.0M J 1/16W	
R48			RK73HB1J331J	CHIP R 330 J 1/16W		R258			R92-0670-05	CHIP R 0 OHM	
R49			RK73HB1J222J	CHIP R 2.2K J 1/16W		R301			RK73HB1J103J	CHIP R 10K J 1/16W	
R50			RK73HB1J472J	CHIP R 4.7K J 1/16W		R304			RK73HB1J273J	CHIP R 27K J 1/16W	
R100			RK73HB1J472J	CHIP R 4.7K J 1/16W		R305			RK73HB1J104J	CHIP R 100K J 1/16W	
R103			RK73GB1J473J	CHIP R 47K J 1/16W		R306			RK73HB1J102J	CHIP R 1.0K J 1/16W	
R105			RK73GB1J331J	CHIP R 330 J 1/16W		R307			R92-1368-05	CHIP R 0 OHM	
R106			RK73GB1J220J	CHIP R 22 J 1/16W		R310			RK73GB1J394J	CHIP R 390K J 1/16W	
R107			RK73HB1J101J	CHIP R 100 J 1/16W		R311			RK73HB1J123J	CHIP R 12K J 1/16W	
R110			RK73GB1J331J	CHIP R 330 J 1/16W		R312			RK73GB1J334J	CHIP R 330K J 1/16W	
R111,112			R92-1252-05	CHIP R 0 OHM J 1/16W		R313			RK73GB1J104J	CHIP R 100K J 1/16W	
R114			RK73GB1J124J	CHIP R 120K J 1/16W		R314			RK73GB1J103J	CHIP R 10K J 1/16W	
R115			RK73GB1J103J	CHIP R 10K J 1/16W		R315			RK73GB1J334J	CHIP R 330K J 1/16W	
R116			RK73GB1J220J	CHIP R 22 J 1/16W		R316			RK73GB1J124J	CHIP R 120K J 1/16W	
R121			RK73GB1J220J	CHIP R 22 J 1/16W		R317			RK73GB1J474J	CHIP R 470K J 1/16W	
R123			R92-0670-05	CHIP R 0 OHM		R318			RK73GB1J122J	CHIP R 1.2K J 1/16W	
R124			RK73GB1J473J	CHIP R 47K J 1/16W		R319			RK73HB1J563J	CHIP R 56K J 1/16W	
R126			RK73GB1J222J	CHIP R 2.2K J 1/16W		R320			RK73HB1J332J	CHIP R 3.3K J 1/16W	
R127-129			RK73EB2ER39K	CHIP R 0.39 K 1/4W		R321			RK73HB1J224J	CHIP R 220K J 1/16W	
R130-135			RK73GH1J154D	CHIP R 150K D 1/16W		R322			RK73HB1J184J	CHIP R 180K J 1/16W	
R137			R92-0670-05	CHIP R 0 OHM		R323			RK73HB1J563J	CHIP R 56K J 1/16W	
R138			RK73GB1J105J	CHIP R 1.0M J 1/16W		R324,325			RK73GB1J104J	CHIP R 100K J 1/16W	
R139			RK73GB1J473J	CHIP R 47K J 1/16W		R326			R92-1252-05	CHIP R 0 OHM J 1/16W	
R140			RK73GB1J563J	CHIP R 56K J 1/16W		R327			RK73GB1J184J	CHIP R 180K J 1/16W	
R141			RK73GB1J104J	CHIP R 100K J 1/16W		R328			RK73GB1J103J	CHIP R 10K J 1/16W	
R142			R92-1252-05	CHIP R 0 OHM J 1/16W		R329			RK73GB1J823J	CHIP R 82K J 1/16W	
R143			RK73GB1J104J	CHIP R 100K J 1/16W		R330			RK73HB1J332J	CHIP R 3.3K J 1/16W	
R145			R92-1252-05	CHIP R 0 OHM J 1/16W		R331			RK73GB1J154J	CHIP R 150K J 1/16W	
R147			R92-1252-05	CHIP R 0 OHM J 1/16W		R332			RK73GB1J153J	CHIP R 15K J 1/16W	
R190			RK73GB1J101J	CHIP R 100 J 1/16W		R334			RK73GB1J473J	CHIP R 47K J 1/16W	
R191,192			RK73GB1J271J	CHIP R 270 J 1/16W		R335			RK73GB1J222J	CHIP R 2.2K J 1/16W	
R193,194			RK73GB1J473J	CHIP R 47K J 1/16W		R336			RK73GB1J102J	CHIP R 1.0K J 1/16W	
R203			RK73HB1J184J	CHIP R 180K J 1/16W		R337			RK73GB1J151J	CHIP R 150 J 1/16W	
R206			RK73GB1J100J	CHIP R 10 J 1/16W		R338			RK73GB1J222J	CHIP R 2.2K J 1/16W	
R207			RK73HB1J472J	CHIP R 4.7K J 1/16W		R339			RK73GB1J471J	CHIP R 470 J 1/16W	
R208			RK73HB1J823J	CHIP R 82K J 1/16W		R340			RK73GB1J182J	CHIP R 1.8K J 1/16W	
R209			RK73HB1J272J	CHIP R 2.7K J 1/16W		R341			RK73GB1J103J	CHIP R 10K J 1/16W	
R210,211			RK73HB1J332J	CHIP R 3.3K J 1/16W		R342			RK73GB1J101J	CHIP R 100 J 1/16W	
R212			RK73HB1J823J	CHIP R 82K J 1/16W		R343			RK73GB1J474J	CHIP R 470K J 1/16W	
R213			RK73HB1J392J	CHIP R 3.9K J 1/16W		R344			RK73GB1J102J	CHIP R 1.0K J 1/16W	
R215			RK73HB1J101J	CHIP R 100 J 1/16W		R345,346			RK73GB1J101J	CHIP R 100 J 1/16W	
R216			RK73HB1J124J	CHIP R 120K J 1/16W		R347			RK73GB1J104J	CHIP R 100K J 1/16W	
R217			RK73HB1J472J	CHIP R 4.7K J 1/16W		R348			RK73GB1J563J	CHIP R 56K J 1/16W	
R218			RK73HB1J561J	CHIP R 560 J 1/16W		R349			RK73GB1J333J	CHIP R 33K J 1/16W	

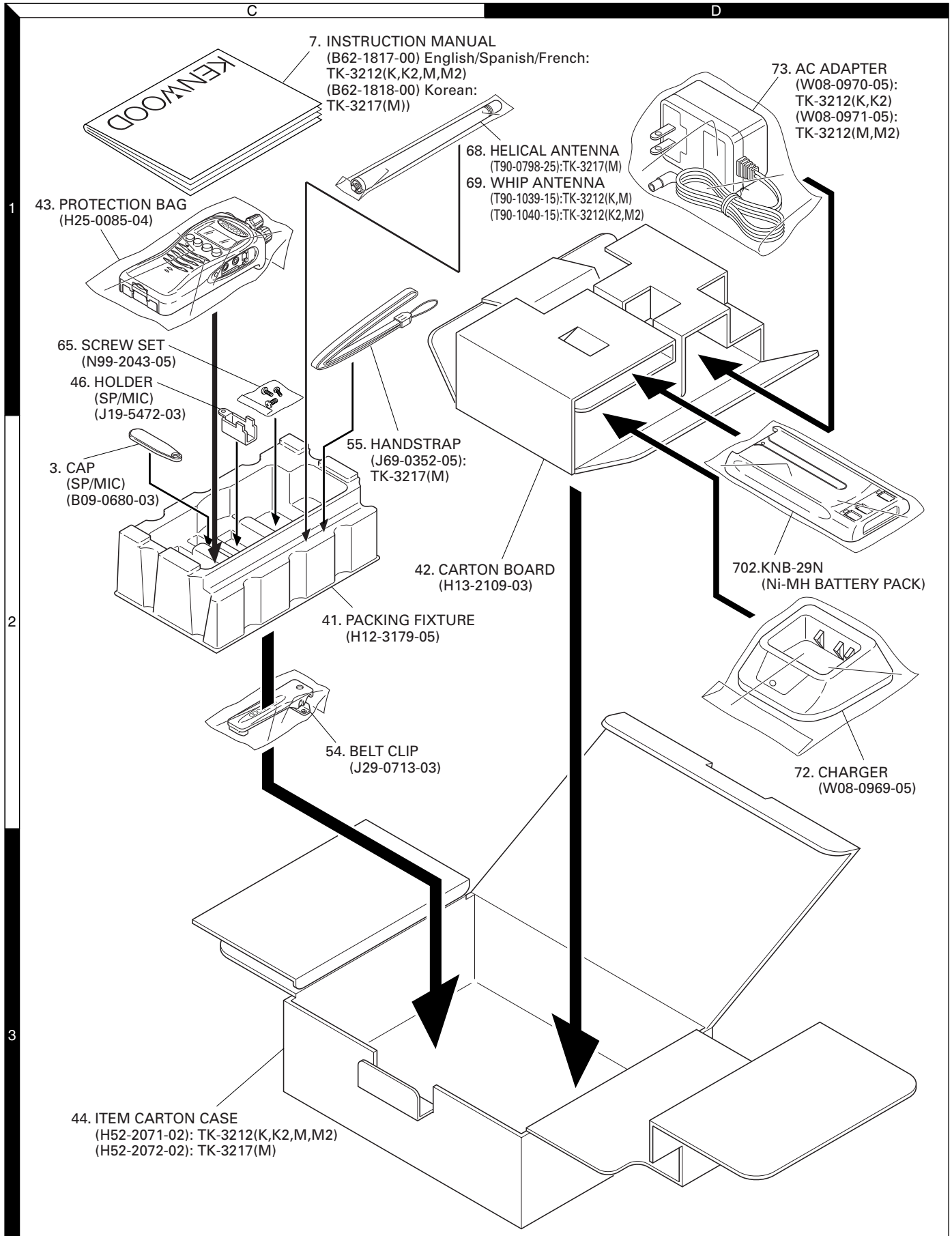
PARTS LIST

TX-RX UNIT (X57-7130-XX)

Ref. No.	Address	New parts	Parts No.	Description	Destination	Ref. No.	Address	New parts	Parts No.	Description	Destination
R350			RK73HB1J102J	CHIP R 1.0K J 1/16W		Q1			KTC4082	TRANSISTOR	
R352			RK73HB1J104J	CHIP R 100K J 1/16W		Q2			2SC5108(Y)	TRANSISTOR	
R353			R92-1368-05	CHIP R 0 OHM		Q3 ,4			2SK508NV(K52)	FET	
R354,355			RK73HB1J103J	CHIP R 10K J 1/16W		Q5			RT1P430U	TRANSISTOR	
R403			RK73GB1J101J	CHIP R 100 J 1/16W		Q6			2SC5108(Y)	TRANSISTOR	
R404			RK73HH1J474D	CHIP R 470K D 1/16W		Q7			RT1P430U	TRANSISTOR	
R405			RK73GB1J334J	CHIP R 330K J 1/16W		Q8			2SC4617(S)	TRANSISTOR	
R406			RK73HH1J474D	CHIP R 470K D 1/16W		Q9			2SC4619	TRANSISTOR	
R407			RK73HB1J334J	CHIP R 330K J 1/16W		Q100			2SC4619	TRANSISTOR	
R408			RK73HB1J473J	CHIP R 47K J 1/16W		Q101			2SK3077	FET	
R409,410			R92-1368-05	CHIP R 0 OHM		Q102			2SK2596	FET	
R412			RK73HB1J473J	CHIP R 47K J 1/16W		Q103			2SK3476	FET	
R413,414			RK73GB1J331J	CHIP R 330 J 1/16W		Q104			RT1N141U	TRANSISTOR	
R415,416			RK73GB1J473J	CHIP R 47K J 1/16W		Q105			2SK879(Y)	FET	
R417-420			RK73HB1J473J	CHIP R 47K J 1/16W		Q107			RT1N141U	TRANSISTOR	
R421,422			RK73HB1J102J	CHIP R 1.0K J 1/16W		Q108			2SK1824	FET	
R423			R92-1368-05	CHIP R 0 OHM		Q109			RT1P441U	TRANSISTOR	
R424,425			RK73HB1J473J	CHIP R 47K J 1/16W		Q202			RT1P441U	TRANSISTOR	
R435			RK73HB1J473J	CHIP R 47K J 1/16W		Q203			2SC4649(N,P)	TRANSISTOR	
R436			R92-1252-05	CHIP R 0 OHM J 1/16W		Q204,205			3SK318	FET	
R437,438			RK73HB1J473J	CHIP R 47K J 1/16W		Q301			RT1P141U	TRANSISTOR	
R447			RK73HB1J123J	CHIP R 12K J 1/16W	AK2,AM2,BM	Q302			2SC4919	TRANSISTOR	
R449,450			R92-1252-05	CHIP R 0 OHM J 1/16W		Q303			RT1N441U	TRANSISTOR	
R451			RK73HB1J680J	CHIP R 68 J 1/16W		Q304			2SA1362(GR)	TRANSISTOR	
R452			RK73HB1J103J	CHIP R 10K J 1/16W		Q305			RT1N441U	TRANSISTOR	
R453			RK73HB1J223J	CHIP R 22K J 1/16W		Q306			CPH3413	FET	
R456			R92-1252-05	CHIP R 0 OHM J 1/16W	AK2,AM2	Q316			CPH3413	FET	
R470			RK73HB1J102J	CHIP R 1.0K J 1/16W		Q401,402			RT1N141U	TRANSISTOR	
R901,902			RK73GB1J472J	CHIP R 4.7K J 1/16W		Q403			CPH3317	FET	
VR1			R12-7491-05	TRIMMING POT.(68K)		Q404,405			RT1P237U	TRANSISTOR	
S1 -3	2A	*	S70-0414-05	TACT SWITCH		Q407,408			2SK1830	FET	
MIC1			T91-0648-05	MIC ELEMENT		Q901			2SK1824	FET	
D1			MA2S111	DIODE		TH101			B57331V2104J	THERMISTOR	
D2 -9			HVC376B	VARIABLE CAPACITANCE DIODE		TH203			B57331V2104J	THERMISTOR	
D10			1SV278	VARIABLE CAPACITANCE DIODE							
D11			MA2S111	DIODE							
D101			HSC277	DIODE							
D102			HZU5CLL	ZENER DIODE							
D103			HVC131	DIODE							
D104			HSC277	DIODE							
D106			HSC277	DIODE							
D122			HVC131	DIODE							
D202			HSC277	DIODE							
D203-206			HVC355B	VARIABLE CAPACITANCE DIODE							
D210			HVC355B	VARIABLE CAPACITANCE DIODE	AK,AM,BM						
D301,302			RB706F-40	DIODE							
D303			DAN222	DIODE							
D401			RB521S-30	DIODE							
D402			1SR154-400	DIODE							
IC1			MB15A02	MOS-IC							
IC101			TA75W01FU	MOS-IC							
IC201			TA31136FN	MOS-IC							
IC301			AQUA-L	MOS-IC							
IC302			TA7368F	MOS-IC							
IC401,402			XC6204B502MR	MOS-IC							
IC403			BD4840FVE	MOS-IC							
IC404			BD4845FVE	MOS-IC							
IC405		*	30620MCP-A00GP	MICROPROCESSOR IC							
IC406			AT24128N10SI27	ROM IC							
IC407			TC7W74FU	MOS-IC							

AK : TK-3212 (K) AK2 : TK-3212 (K2) AM : TK-3212 (M) AM2 : TK-3212 (M2)
 BM : TK-3217 (M)

PACKING



ADJUSTMENT

Test Equipment Required for Alignment

Test Equipment	Major Specifications	
1. Standard Signal Generator (SSG)	Frequency Range Modulation Output	400 to 512MHz Frequency modulation and external modulation -127dBm/0.1μV to greater than -47dBm/1mV
2. Power Meter	Input Impedance Operation Frequency Measurement Range	50Ω 400 to 512MHz Vicinity of 10W
3. Deviation Meter	Frequency Range	400 to 512MHz
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. 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. 8Ω Dummy Load		Approx. 8Ω, 3W
14. Regulated Power Supply		5V to 10V, approx. 3A Useful if ammeter equipped

■ The following parts are required for adjustment

1. 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.)

2. Repair Jig (Chassis)

Use jig (part No.: A10-4086-03) for repairing the TK-3212/3217. Place the TX-RX unit on the jig and fit it with screws.

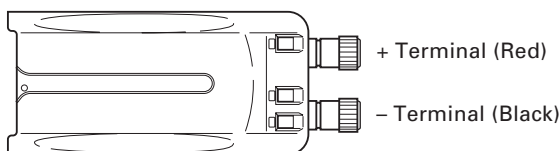
The jig facilitates the voltage check and protects the final amplifier FET when the voltage on the flow side of the TX-RX unit is checked during repairs.

3. Nut wrench

In order to turn the volume nut and the channel selector nut, use a recommendation tool.

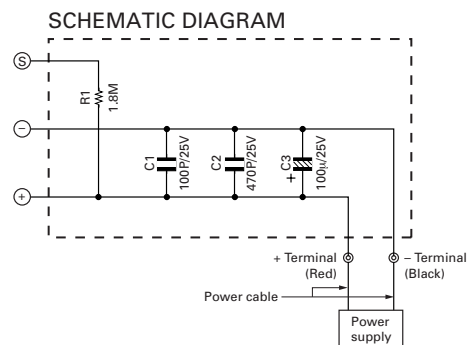
KENWOOD part No. : W05-1012-00

4. Battery Jig (W05-1011-00)



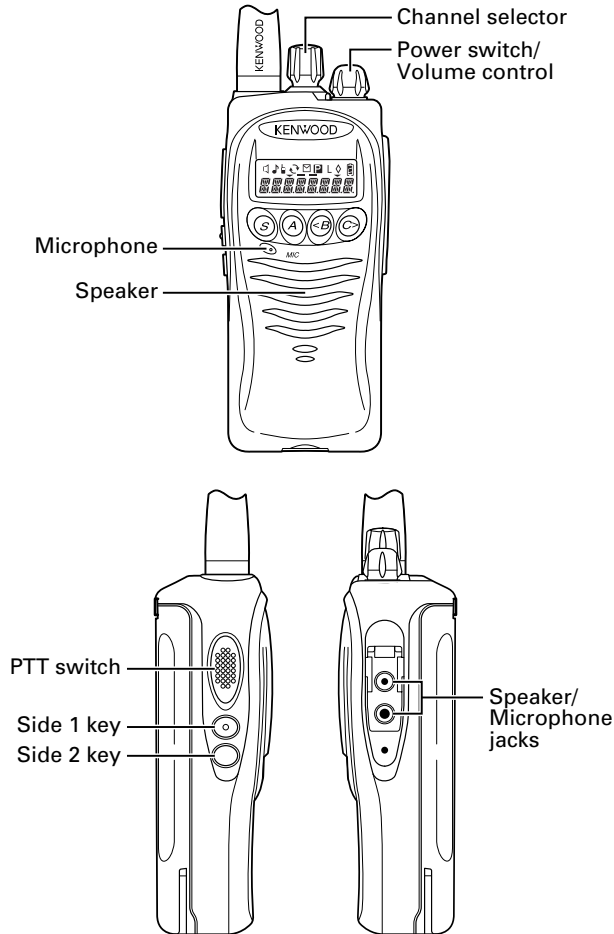
Connect the power cable properly between the battery jig installed in the transceiver and the power supply, and be sure output voltage and the power supply polarity prior to switching the power supply ON, otherwise over voltage and reverse connection may damage the transceiver, or the power supply or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

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



ADJUSTMENT

Controls



■ Frequency and signaling

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

Frequency (MHz) K, M type (TK-3212)

Channel No.	RX Frequency	TX Frequency
1	470.050	470.100
2	450.050	450.100
3	489.950	489.900
4	470.000	470.000
5	470.200	470.200
6	470.400	470.400

Frequency (MHz) K2, M2 type (TK-3212)

Channel No.	RX Frequency	TX Frequency
1	491.050	491.100
2	470.050	470.100
3	511.950	511.900
4	491.000	491.000
5	491.200	491.200
6	491.400	491.400

Frequency (MHz) M type (TK-3217)

Channel No.	RX Frequency	TX Frequency
1	460.050	460.100
2	440.050	440.100
3	479.950	479.900
4	460.000	460.000
5	460.200	460.200
6	460.400	460.400

Signaling

Signaling No.	RX	TX
1	None	None
2	None	100Hz Square Wave
3	QT 67.0Hz	QT 67.0Hz
4	QT 151.4Hz	QT 151.4Hz
5	QT 250.3Hz	QT 250.3Hz
6	DQT D023N	DQT D023N
7	DQT D754I	DQT D754I
8	DTMF 159D	DTMF 159D
9	None	DTMF tone 9
10	None	MSK

■ Preparations for tuning the transceiver

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

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

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

Adjustment Frequency

TEST CH	K, M type (TK-3212)	
	RX Frequency	TX Frequency
Center	470.050MHz	470.100MHz
Low	450.050MHz	450.100MHz
High	489.950MHz	489.900MHz
Low'	460.050MHz	460.100MHz
High'	480.050MHz	480.100MHz

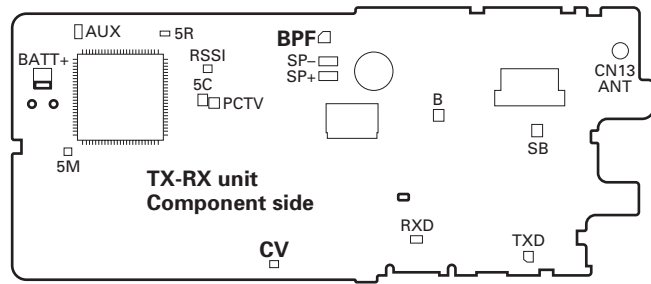
TEST CH	K2, M2 type (TK-3212)	
	RX Frequency	TX Frequency
Center	491.050MHz	491.100MHz
Low	470.050MHz	470.100MHz
High	511.950MHz	511.900MHz
Low'	480.550MHz	480.600MHz
High'	501.550MHz	501.600MHz

TEST CH	M type (TK-3217)	
	RX Frequency	TX Frequency
Center	460.050MHz	460.100MHz
Low	440.050MHz	440.100MHz
High	479.950MHz	479.900MHz
Low'	450.050MHz	450.100MHz
High'	470.050MHz	470.100MHz

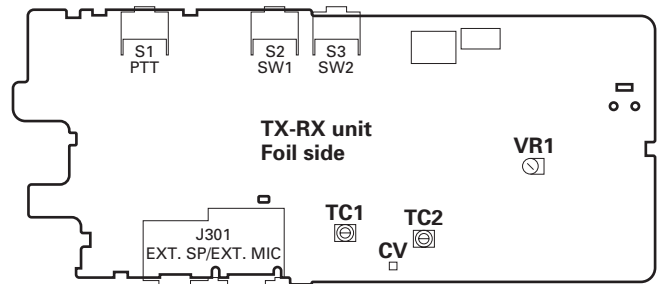
TK-3212/3217

ADJUSTMENT

Adjustment Points



BPF : Band-pass wave form test point
 CV : VCO lock voltage adjustment terminal



VR1 : Frequency adjustment
 TC1 : Transmit VCO lock voltage adjustment
 TC2 : Receive VCO lock voltage adjustment
 CV : VCO lock voltage adjustment terminal


Common Section

Item	Condition	Measurement		Adjustment		Specifications/ Remarks
		Test equipment	Terminal	Parts	Method	
1.Setting	1) BATT terminal vorage:7.5V 2) SSG standard modulation [Wide] MOD:1kHz,DEV:3kHz [Narrow] MOD:1kHz,DEV:1.5kHz					
2.VCO lock voltage RX	1) CH:High	Power meter DVM	ANT CV	TC2	3.4V(TK-3212(K,M)) 3.0V(TK-3212(K2,M2) TK-3217(M))	±0.1V
	2) CH:Low				Check	0.6V or more
3.VCO lock voltage TX	3) CH:High PTT:ON			TC1	3.1V(TK-3212(K,M)) 3.0V(TK-3212(K2,M2) TK-3217(M))	±0.1V
	4) CH:Low PTT:ON				Check	0.6V or more

Transmitter Section

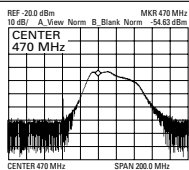
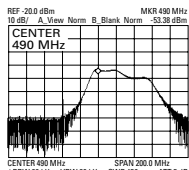
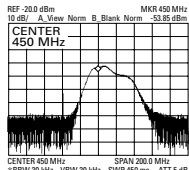
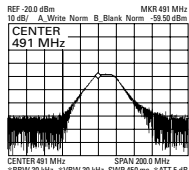
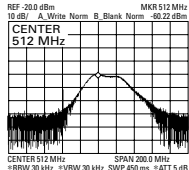
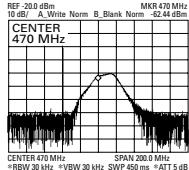
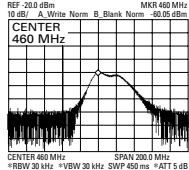
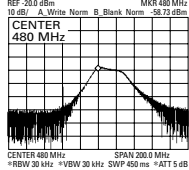
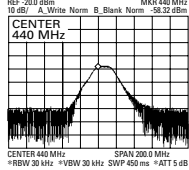
Item	Condition	Measurement		Adjustment		Specifications/ Remarks
		Test equipment	Terminal	Parts	Method	
1.Frequency Adjust	1) CH:High 2) PTT:ON	Frequency counter	ANT	VR1	High frequency ±50Hz	Note: After replacing the TCXO(X1) align frequency.
2.High power Adjust	TEST CH: Low Low' Center High' High (5 points) BATT terminal voltage:7.5V PTT:ON	Power meter Ammeter		Programming Software:KPG-100D	4.0W	±0.1W 1.9 A or less
					1.05W	±0.1W 0.9 A or less
3.Low power Adjust	TEST CH: Low Low' Center High' High (5 points) BATT terminal voltage:7.5V PTT:ON					

ADJUSTMENT

Item	Condition	Measurement		Adjustment		Specifications/ Remarks		
		Test equipment	Terminal	Parts	Method			
4. Max deviation Adjust [Wide]	TEST CH: Center Low High (3 points) AG:1kHz/150mV Deviation meter filter LPF:15kHz HPF:OFF PTT:ON	Power meter Deviation meter Oscilloscope AG AF VTVM	ANT SP/MIC connector	Programming Software:KPG-100D	4.2kHz (According to the lager +,-)	±80Hz		
	[Narrow]				TEST CH: Center PTT:ON		2.2kHz (According to the lager +,-)	±80Hz
5. VOX 1 Writing	TEST CH: Center AG:1kHz/45mV							
6. VOX 10 Writing	TEST CH: Center AG:1kHz/3.0mV							
7. DQT Balance Adjust [Wide]	TEST CH: Center Low High (3 points) LPF:3kHz HPF:OFF PTT:ON				ANT	Programming Software:KPG-100D	Make the demodulation wave into square waves	
	[Narrow]			TEST CH:Center PTT:ON				
8. QT Deviation Adjust [Wide]	TEST CH: Center Low High (3 points) LPF:3kHz HPF:OFF PTT:ON						0.75kHz	±40Hz
	[Narrow]			TEST CH: Center PTT:ON			0.35kHz	±40Hz
9. DQT Deviation Adjust [Wide]	TEST CH: Center Low High (3 points) LPF:3kHz HPF:OFF PTT:ON						0.75kHz	±40Hz
	[Narrow]			TEST CH:Center PTT:ON			0.35kHz	±40Hz
10. DTMF Deviation Adjust [Wide]	TEST CH:Center LPF:15kHz HPF:OFF PTT:ON						3.0kHz	±100Hz
	[Narrow]	TEST CH:Center PTT:ON			1.5kHz	±100Hz		
11. MSK Deviation Adjust [Wide]	TEST CH: Center Low High (3 points) LPF:15kHz HPF:OFF PTT:ON				3.1kHz	±100Hz		
	[Narrow]	TEST CH:Center PTT:ON			1.5kHz	±100Hz		

ADJUSTMENT

Receiver Section

Item	Condition	Measurement		Adjustment		Specifications/ Remarks
		Test equipment	Terminal	Parts	Method	
1. BPF Wave Adjust TK-3212 (K,M)	(1)Center frequency Spectrum analyzer setting Center-f : 470MHz Span : 200MHz RBW : 30kHz VBW : 30kHz ATT : 5dB (2)High-edge frequency Spectrum analyzer setting Center-f : 490MHz (3)Low-edge frequency Spectrum analyzer setting Center-f : 450MHz	Spectrum analyzer	ANT BPF	Programming Software: KPG-100D	Adjust the waveform as shown to the right.	  
TK-3212 (K2,M2)	(1)Center frequency Spectrum analyzer setting Center-f : 491MHz Span : 200MHz RBW : 30kHz VBW : 30kHz ATT : 5dB (2)High-edge frequency Spectrum analyzer setting Center-f : 512MHz (3)Low-edge frequency Spectrum analyzer setting Center-f : 470MHz					  
TK-3217 (M)	(1)Center frequency Spectrum analyzer setting Center-f : 460MHz Span : 200MHz RBW : 30kHz VBW : 30kHz ATT : 5dB (2)High-edge frequency Spectrum analyzer setting Center-f : 480MHz (3)Low-edge frequency Spectrum analyzer setting Center-f : 440MHz					  

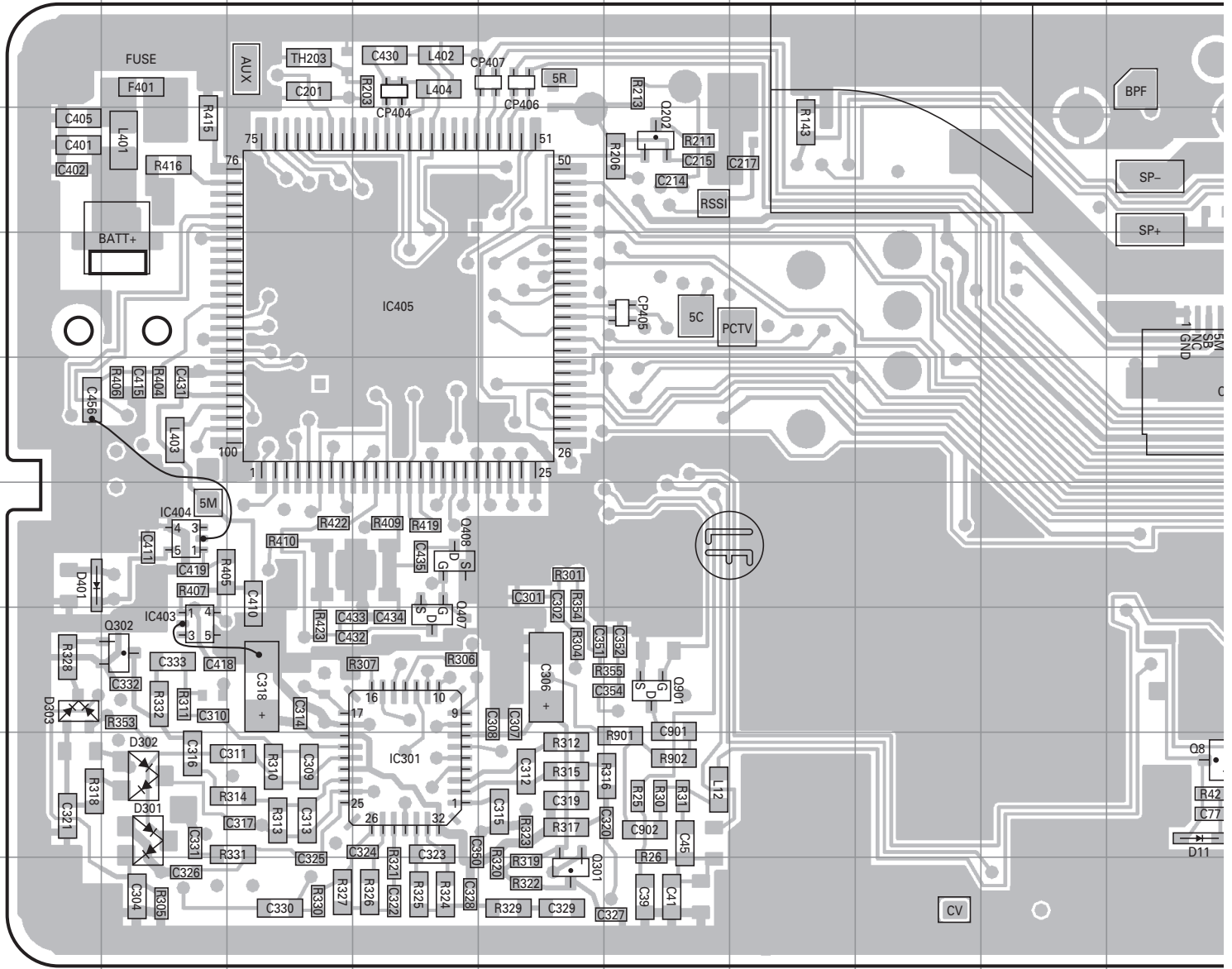
ADJUSTMENT

Item	Condition	Measurement		Adjustment		Specifications/ Remarks
		Test equipment	Terminal	Parts	Method	
2.Sensitivity check [Wide]	TEST CH: Low Center High SSG otuput:-117 dBm(0.3μV) SSG MOD:3.0kHz	SSG DVM Oscilloscope AF VTVM	ANT		Check	12dB SINAD or more
[Narrow]	TEST CH:Center SSG otuput:-115 dBm(0.4μV) SSG MOD:1.5kHz					
3.SQL1 (Threshold) writing [Wide]	TEST CH: Center Low High SSG otuput:-123 dBm(0.16μV) SSG MOD:3.0kHz			Programming Software: KPG-100D	Write	Squelch open
[Narrow]	TEST CH: Center SSG otuput:-122 dBm(0.18μV) SSG MOD:1.5kHz					
4.SQL9 (Tight) writing [Wide]	TEST CH: Center Low High SSG otuput:-117 dBm(0.3μV) SSG MOD:3.0kHz					
[Narrow]	TEST CH: Center SSG otuput:-116 dBm(0.35μV) SSG MOD:1.5kHz					
5.BATT Detection Writing	BATT terminal voltage:5.75V	DVM	ANT BATT terminal		Write	BATT terminal voltage:5.75V

TK-3212/3217 PC BOARD

TX-RX UNIT (X57-7130-XX) Component side view (J72-0968-09)

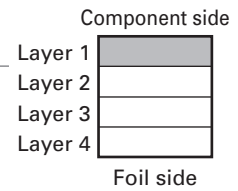
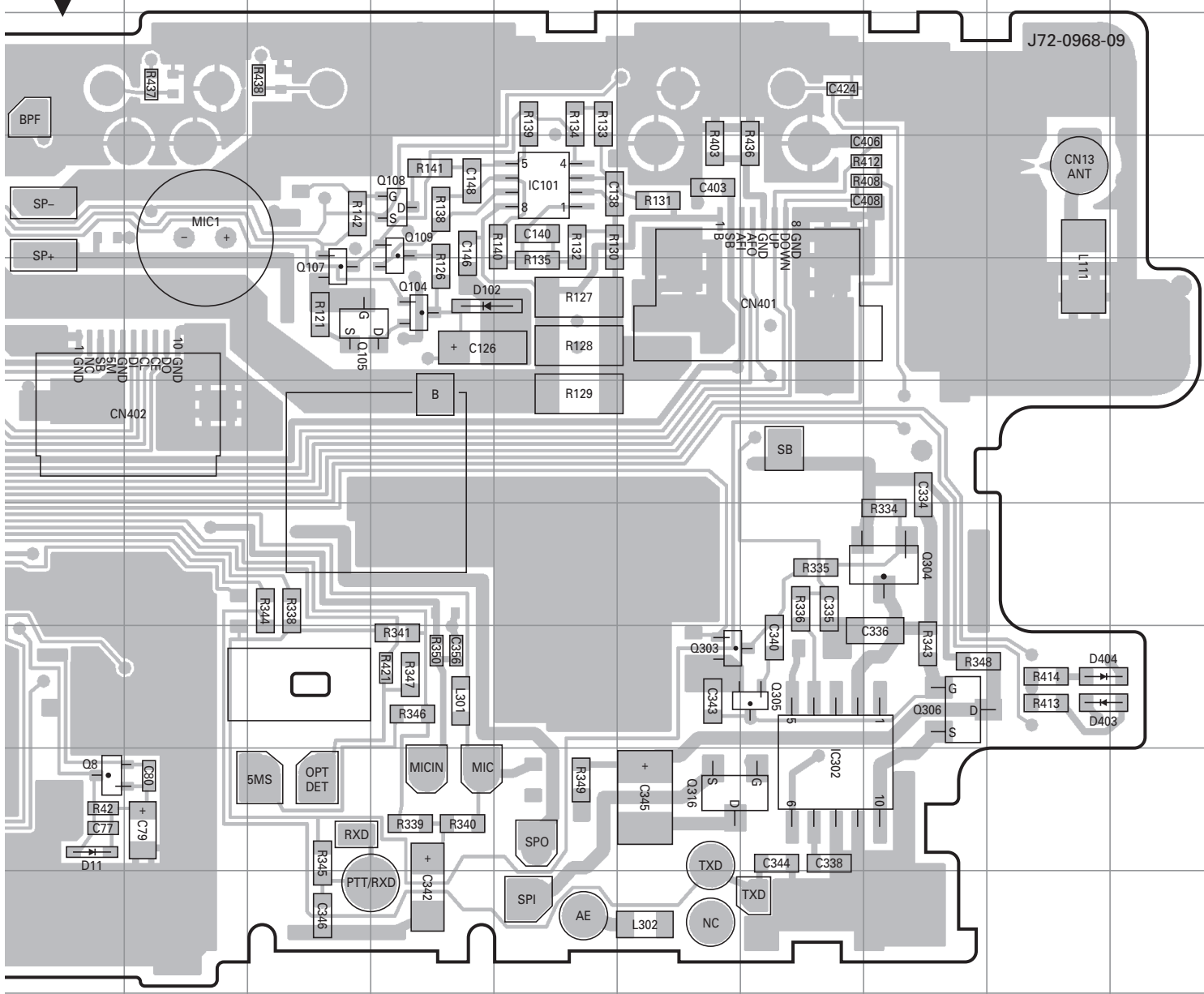
-10 : TK-3212 (K,M) -11 : TK-3212 (K2,M2) -21 : TK-3217 (M)



Ref. No.	Address	Ref. No.	Address	Ref. No.	Address	Ref. No.	Address
IC101	4N	Q105	5L	Q304	7Q	D102	5M
IC301	9D	Q107	5L	Q305	8P	D301	9B
IC302	9P	Q108	4M	Q306	8Q	D302	9B
IC403	8B	Q109	4M	Q316	9O	D303	8A
IC404	7B	Q202	4F	Q407	8D	D401	7A
IC405	5D	Q301	10E	Q408	7D	D403	8R
Q8	9J	Q302	8B	Q901	8F	D404	8R
Q104	5M	Q303	8O	D11	9J		

PC BOARD TK-3212/3217

TX-RX UNIT (X57-7130-XX) Component side view (J72-0968-09)
-10 : TK-3212 (K,M) -11 : TK-3212 (K2,M2) -21 : TK-3217 (M)

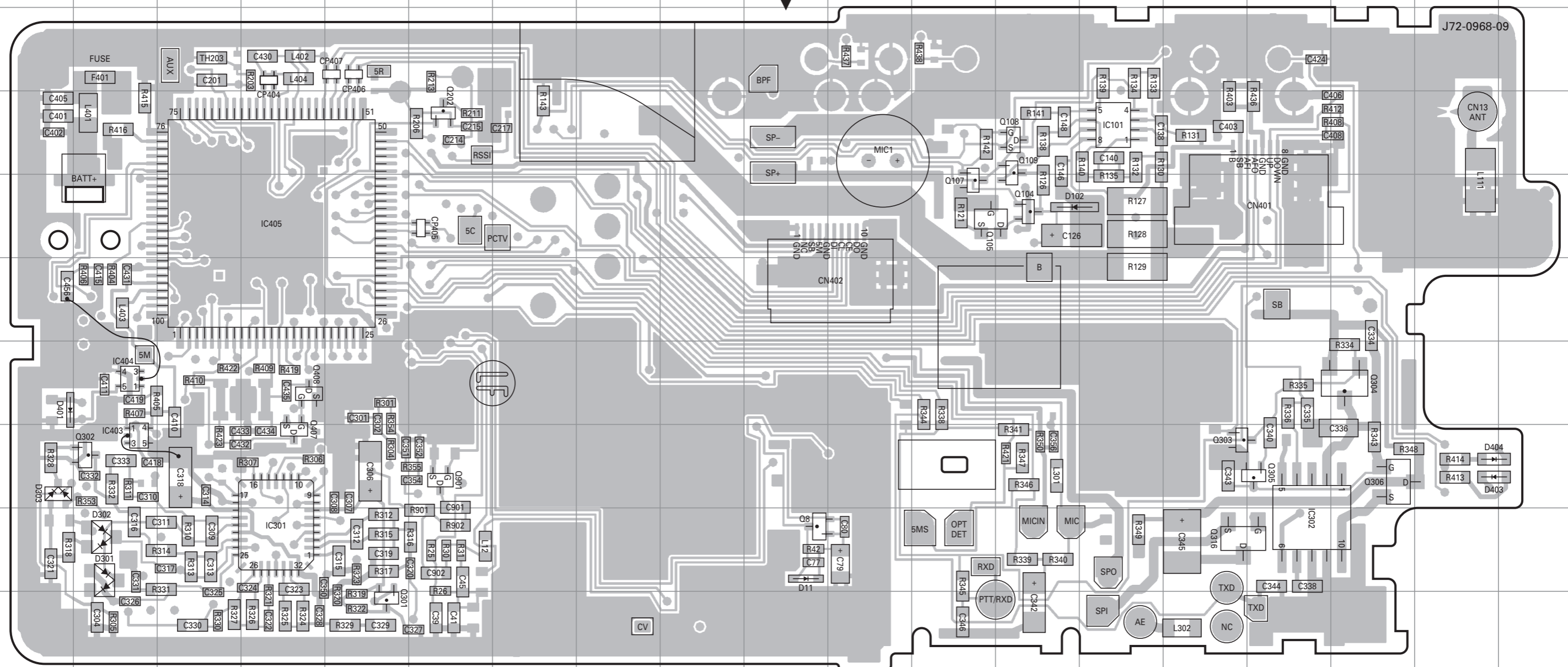


TK-3212/3217 PC BOARD

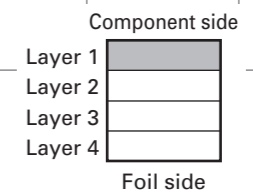
PC BOARD TK-3212/3217

TX-RX UNIT (X57-7130-XX) Component side view (J72-0968-09)
 -10 : TK-3212 (K,M) -11 : TK-3212 (K2,M2) -21 : TK-3217 (M)

TX-RX UNIT (X57-7130-XX) Component side view (J72-0968-09)
 -10 : TK-3212 (K,M) -11 : TK-3212 (K2,M2) -21 : TK-3217 (M)



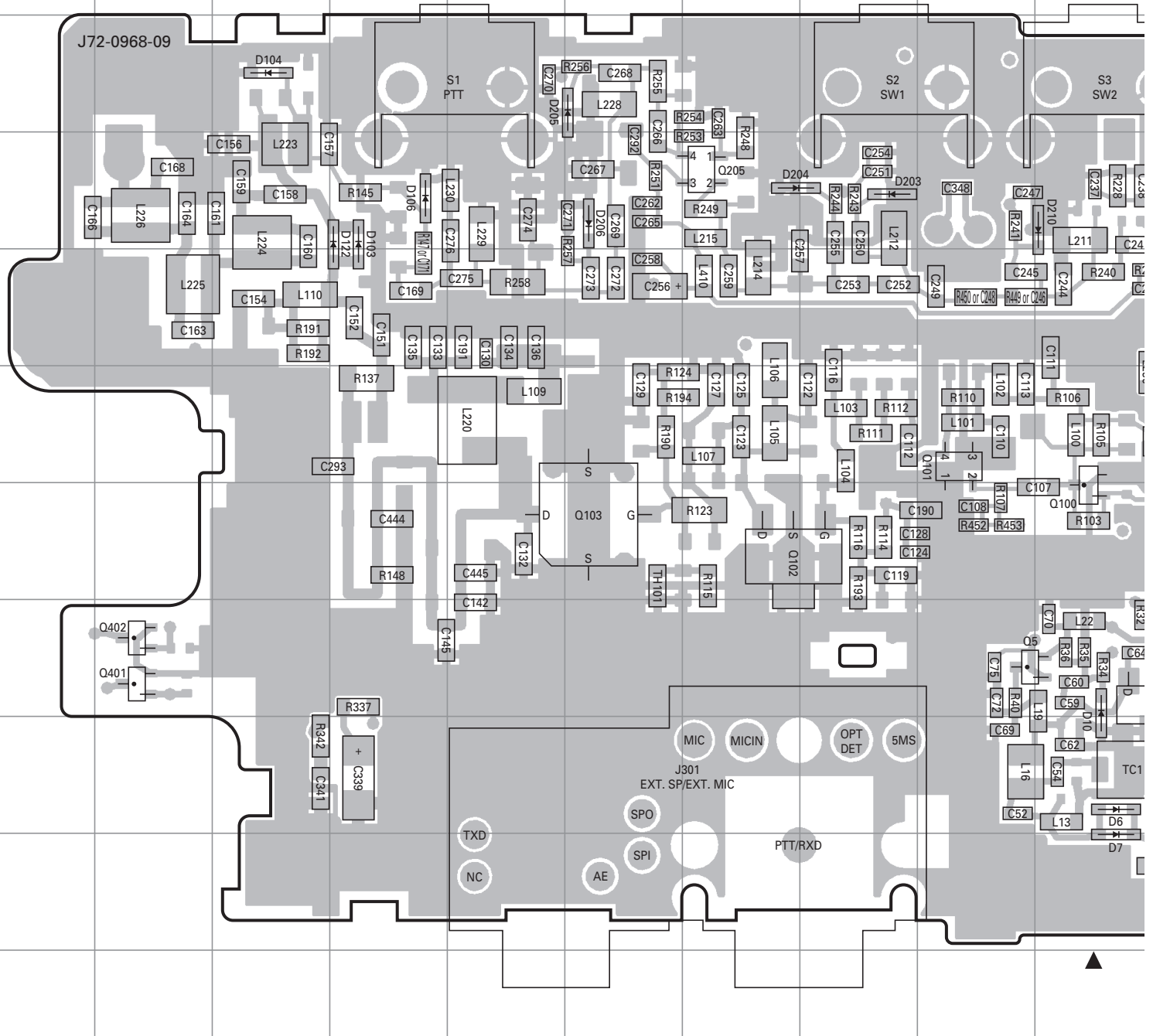
Ref. No.	Address	Ref. No.	Address	Ref. No.	Address	Ref. No.	Address
IC101	4N	Q105	5L	Q304	7Q	D102	5M
IC301	9D	Q107	5L	Q305	8P	D301	9B
IC302	9P	Q108	4M	Q306	8Q	D302	9B
IC403	8B	Q109	4M	Q316	9O	D303	8A
IC404	7B	Q202	4F	Q407	8D	D401	7A
IC405	5D	Q301	10E	Q408	7D	D403	8R
Q8	9J	Q302	8B	Q901	8F	D404	8R
Q104	5M	Q303	8O	D11	9J		



TK-3212/3217 PC BOARD

TX-RX UNIT (X57-7130-XX) Foil side view (J72-0968-09)

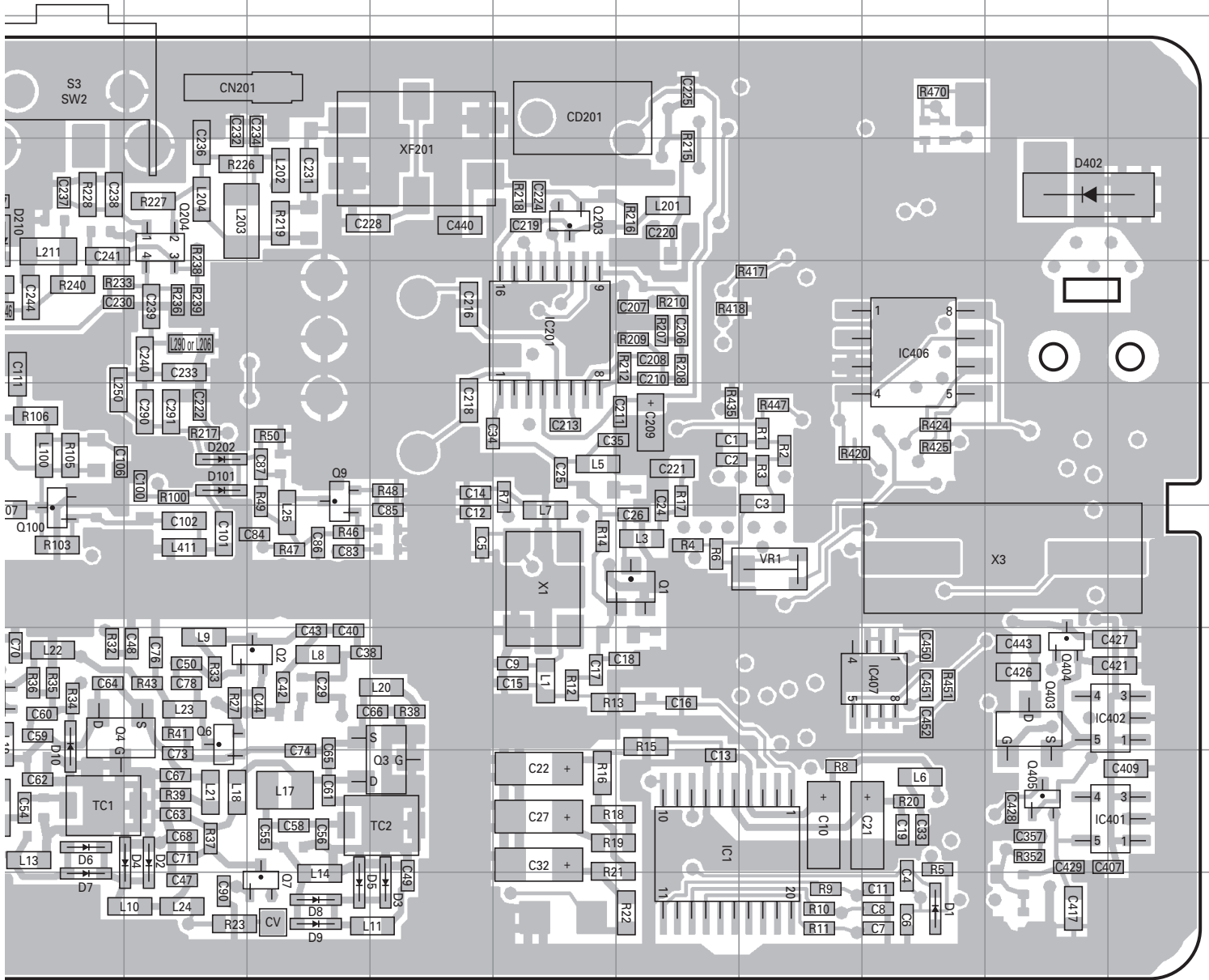
-10 : TK-3212 (K,M) -11 : TK-3212 (K2,M2) -21 : TK-3217 (M)



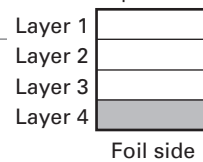
Ref. No.	Address	Ref. No.	Address	Ref. No.	Address	Ref. No.	Address	Ref. No.	Address	Ref. No.	Address
IC1	9O	Q3	9M	Q102	7G	Q404	8R	D7	10J	D122	4D
IC201	5N	Q4	8J	Q103	7F	Q405	9R	D8	10L	D202	6K
IC401	9S	Q5	8I	Q203	4N	D1	10Q	D9	10L	D203	4H
IC402	8S	Q6	8K	Q204	4K	D2	9K	D10	8J	D204	4G
IC406	5Q	Q7	10L	Q205	4G	D3	10M	D101	6K	D205	3F
IC407	8Q	Q9	6L	Q401	8B	D4	9K	D103	4D	D206	4F
Q1	7O	Q100	7J	Q402	8B	D5	10L	D104	3C	D210	4J
Q2	8L	Q101	6I	Q403	8R	D6	9J	D106	4D	D402	4R

PC BOARD TK-3212/3217

TX-RX UNIT (X57-7130-XX) Foil side view (J72-0968-09)
-10 : TK-3212 (K,M) -11 : TK-3212 (K2,M2) -21 : TK-3217 (M)



Component side

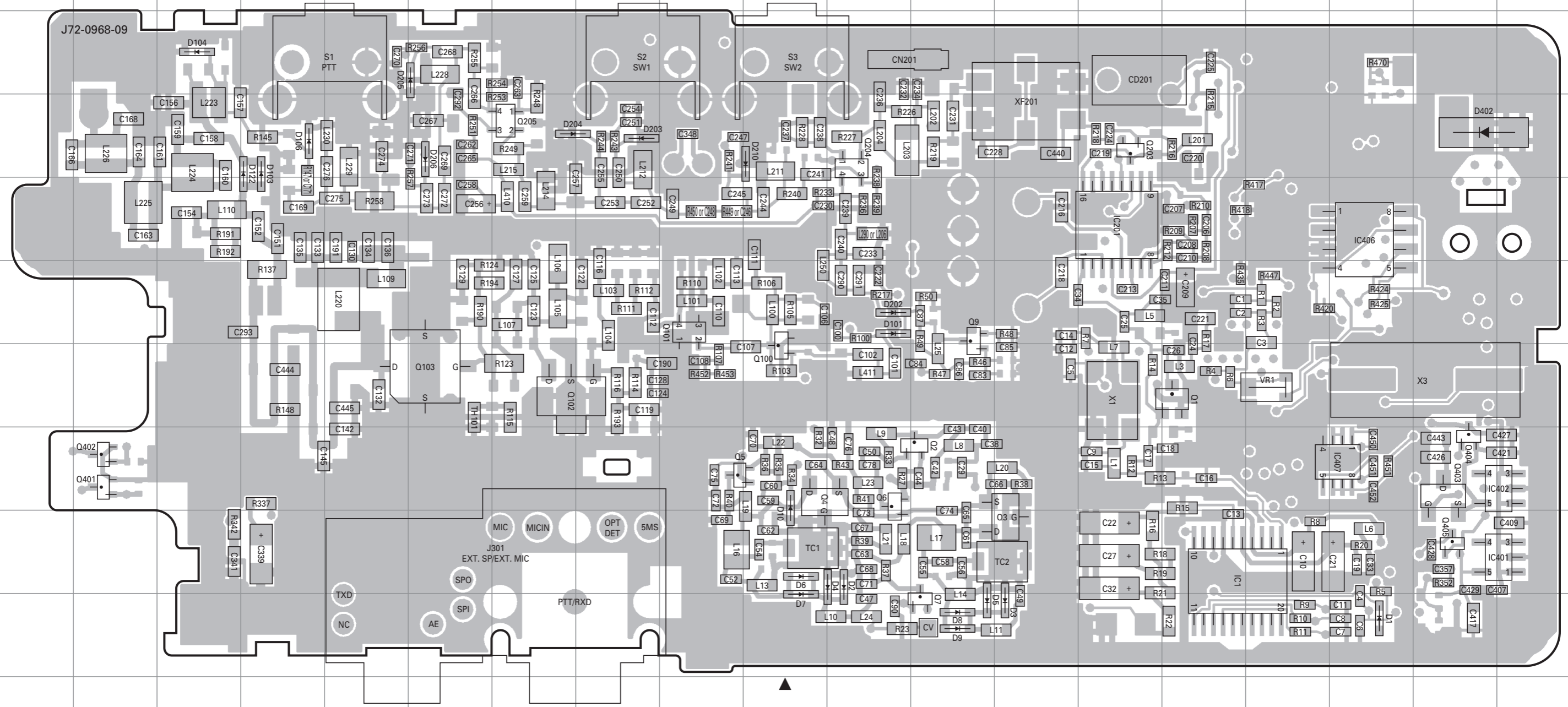


TK-3212/3217 PC BOARD

PC BOARD TK-3212/3217

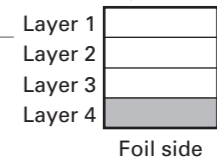
TX-RX UNIT (X57-7130-XX) Foil side view (J72-0968-09)
 -10 : TK-3212 (K,M) -11 : TK-3212 (K2,M2) -21 : TK-3217 (M)

TX-RX UNIT (X57-7130-XX) Foil side view (J72-0968-09)
 -10 : TK-3212 (K,M) -11 : TK-3212 (K2,M2) -21 : TK-3217 (M)



Ref. No.	Address	Ref. No.	Address	Ref. No.	Address	Ref. No.	Address	Ref. No.	Address	Ref. No.	Address
IC1	9O	Q3	9M	Q102	7G	Q404	8R	D7	10J	D122	4D
IC201	5N	Q4	8J	Q103	7F	Q405	9R	D8	10L	D202	6K
IC401	9S	Q5	8I	Q203	4N	D1	10Q	D9	10L	D203	4H
IC402	8S	Q6	8K	Q204	4K	D2	9K	D10	8J	D204	4G
IC406	5Q	Q7	10L	Q205	4G	D3	10M	D101	6K	D205	3F
IC407	8Q	Q9	6L	Q401	8B	D4	9K	D103	4D	D206	4F
Q1	7O	Q100	7J	Q402	8B	D5	10L	D104	3C	D210	4J
Q2	8L	Q101	6I	Q403	8R	D6	9J	D106	4D	D402	4R

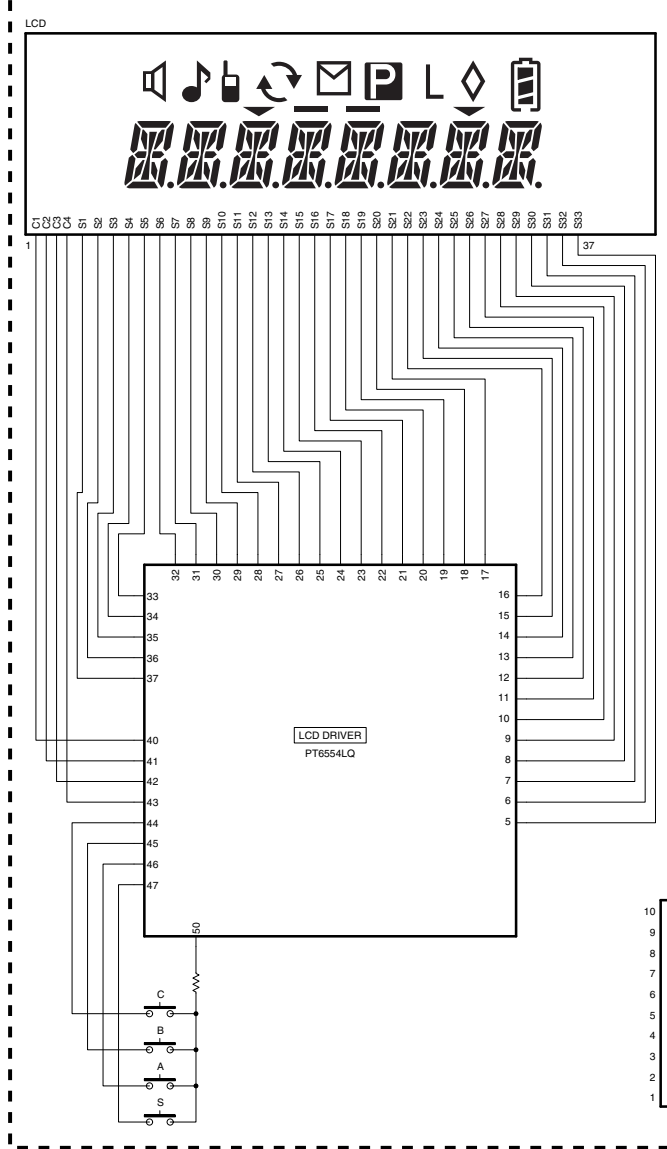
Component side



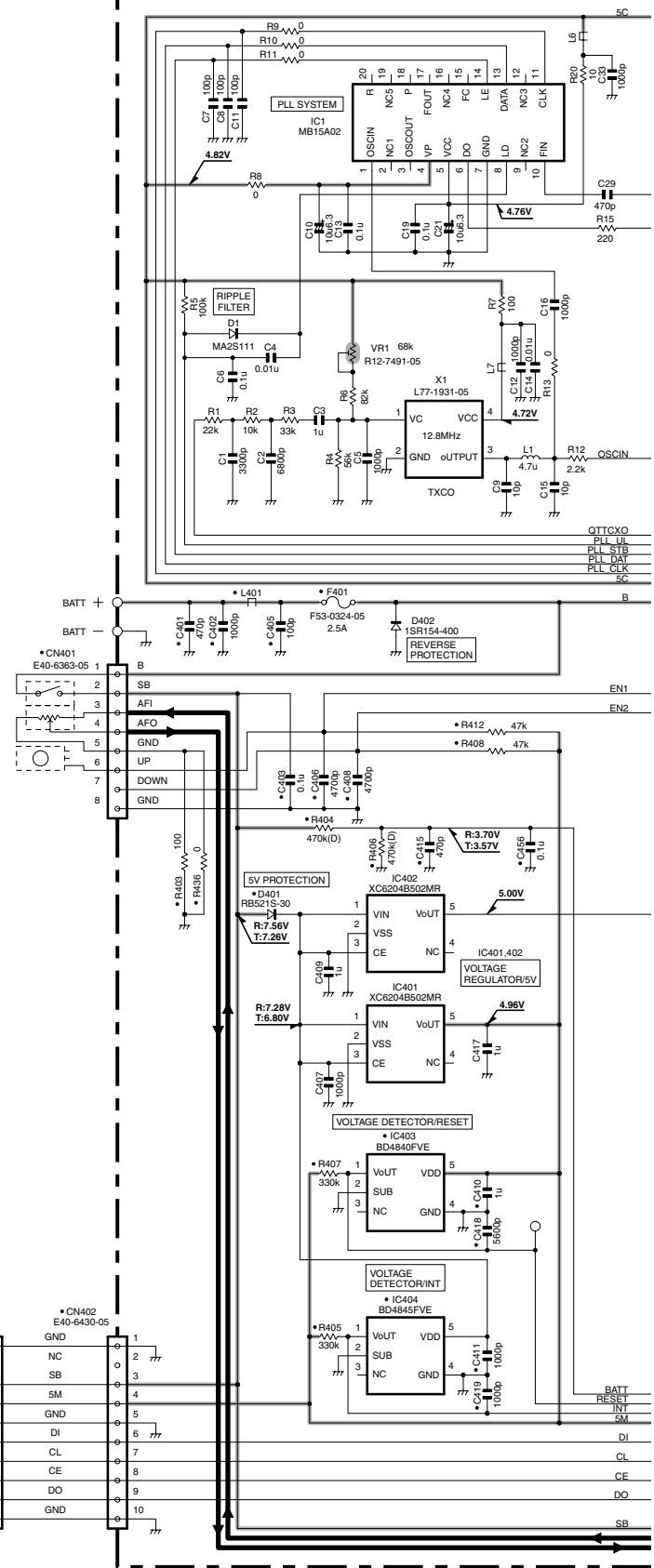
TK-3212/3217 SCHEMATIC DIAGRAM

1
2
3
4
5
6
7

LCD ASSY (B38-0906-15)

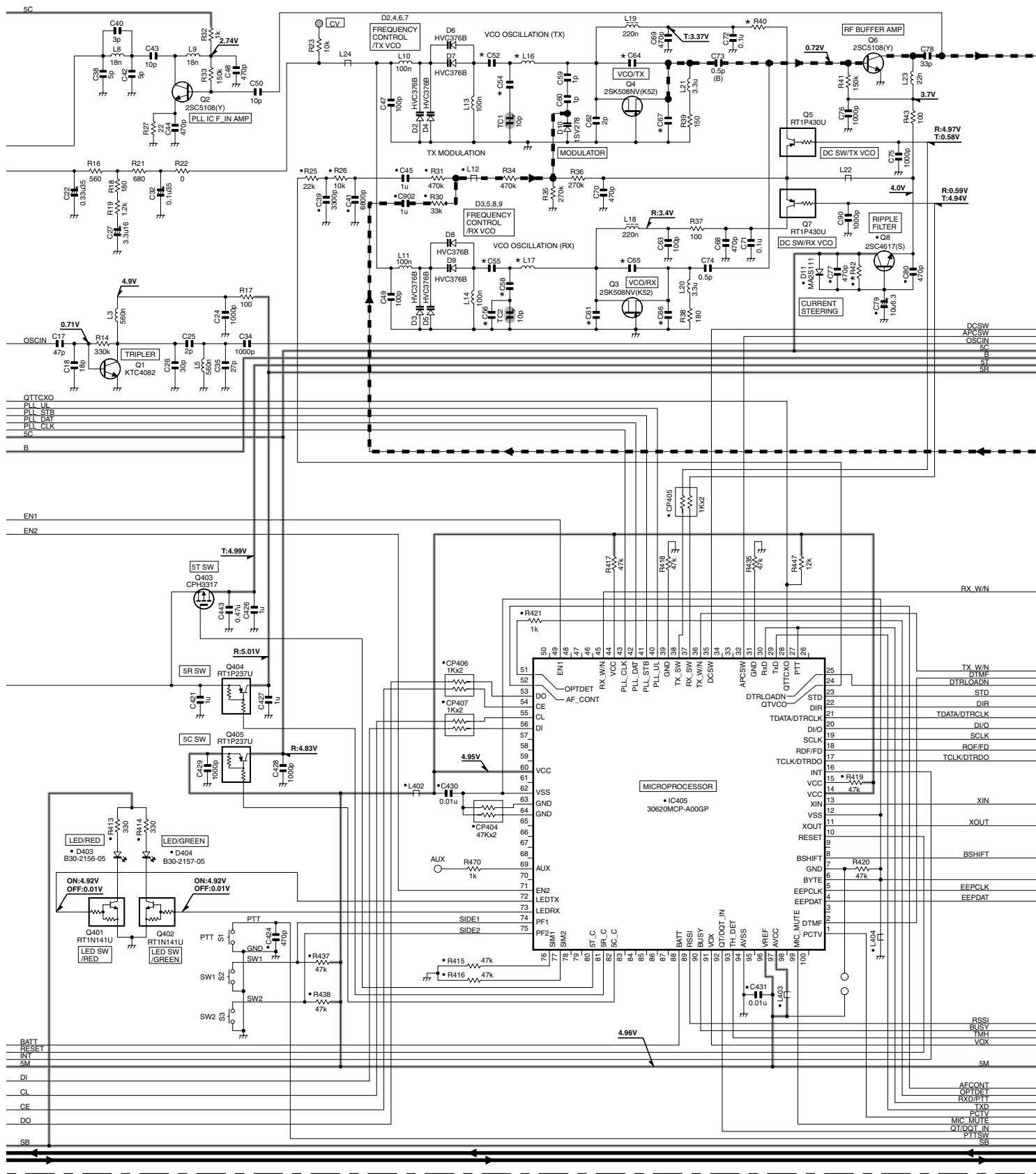


TX-RX UNIT (X57-7130-XX)



SCHEMATIC DIAGRAM TK-3212/3217

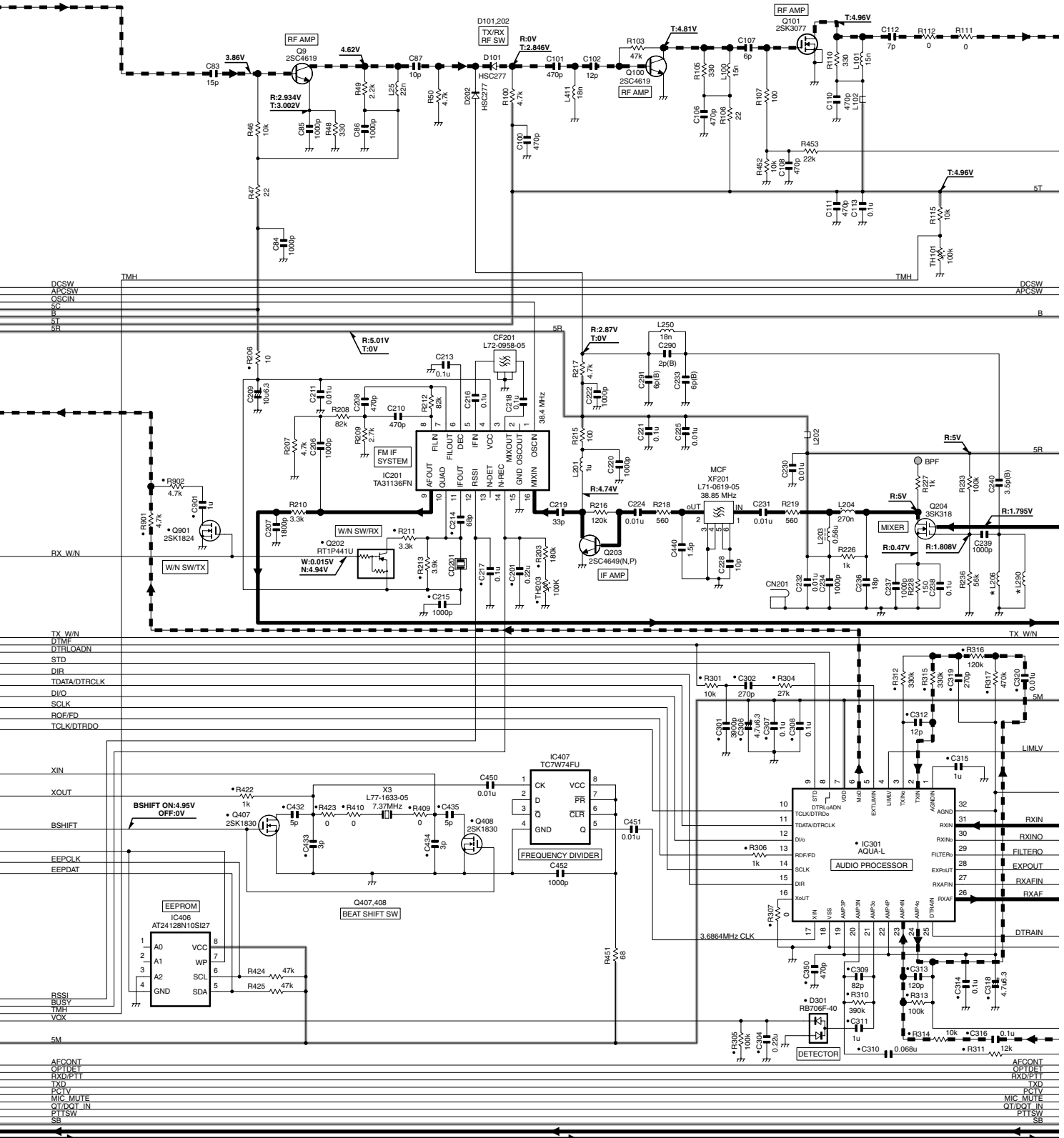
TX-RX UNIT (X57-7130-XX)



X57-7130-XX	L16	L17	R40	R42	C52	C54	C55	C56	C58	C61	C64	C65	C66	C67
-10 TK-3212	K,M	22n	27n	100	4.7k	11p	2p	6p	3p	4p	6p	6p	6p	5p
-11 TK-3212	K2,M2	18n	22n	100	4.7k	12p	9p	12p	NO	9p	4p	5p	5p	6p
-21 TK-3217	M	22n	27n	150	10k	12p	8p	12p	NO	6p	3p	5p	7p	5p

TK-3212/3217 SCHEMATIC DIAGRAM

TX-RX UNIT (X57-7130-XX)

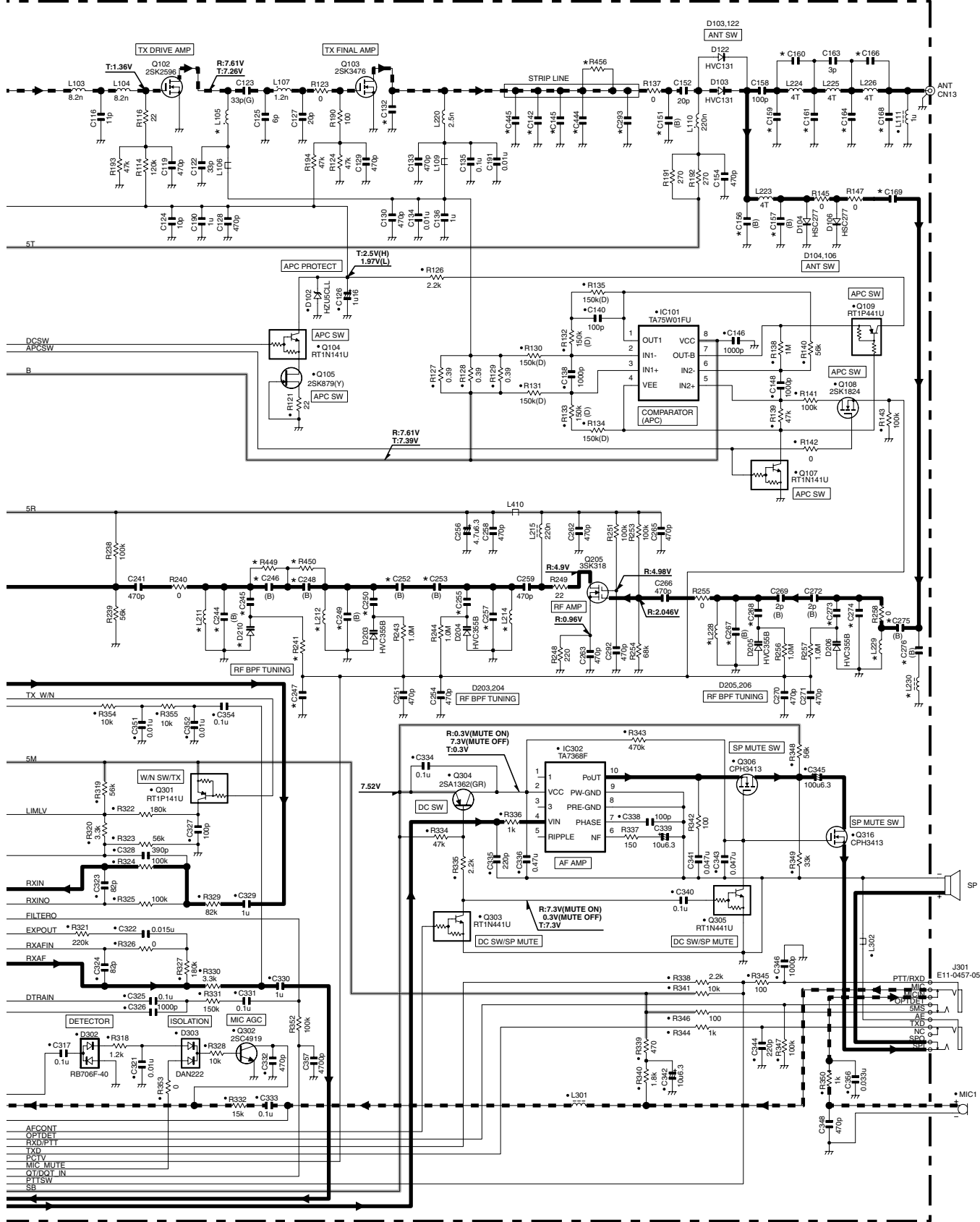


	X57-7130-XX	L206	L290
-10	TK-3212	K.M	NO 30n
-11	TK-3212	K2.M2	27n NO
-21	TK-3217	M	NO 30n

SCHEMATIC DIAGRAM TK-3212/3217

TX-RX UNIT (X57-7130-XX)

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

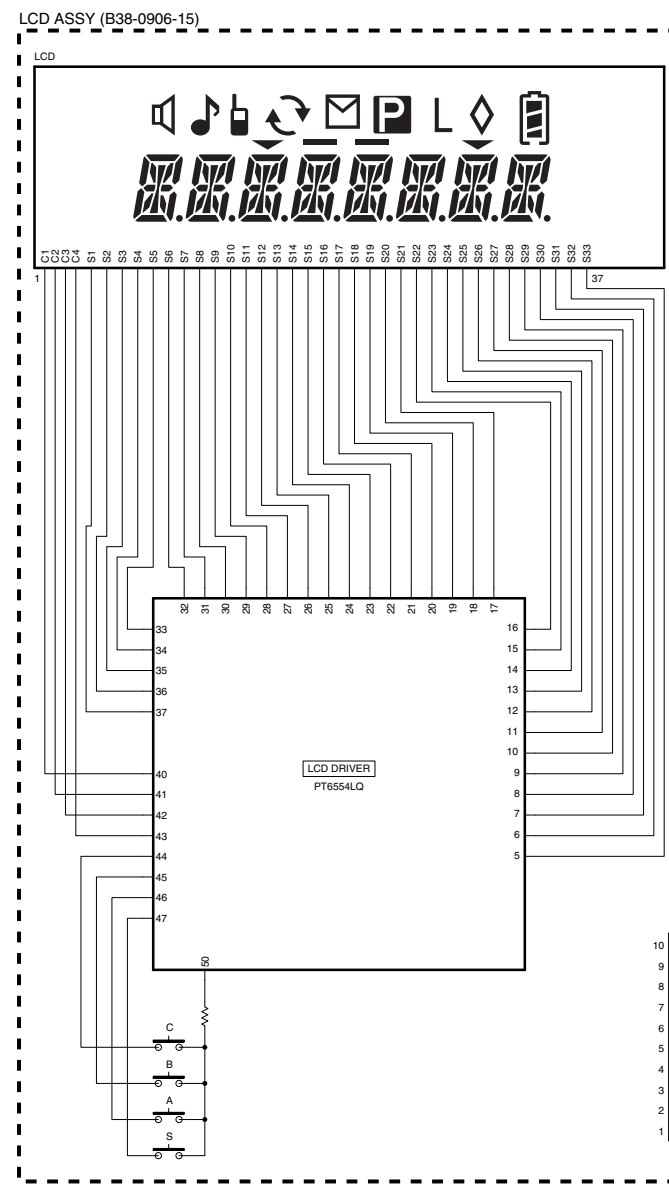
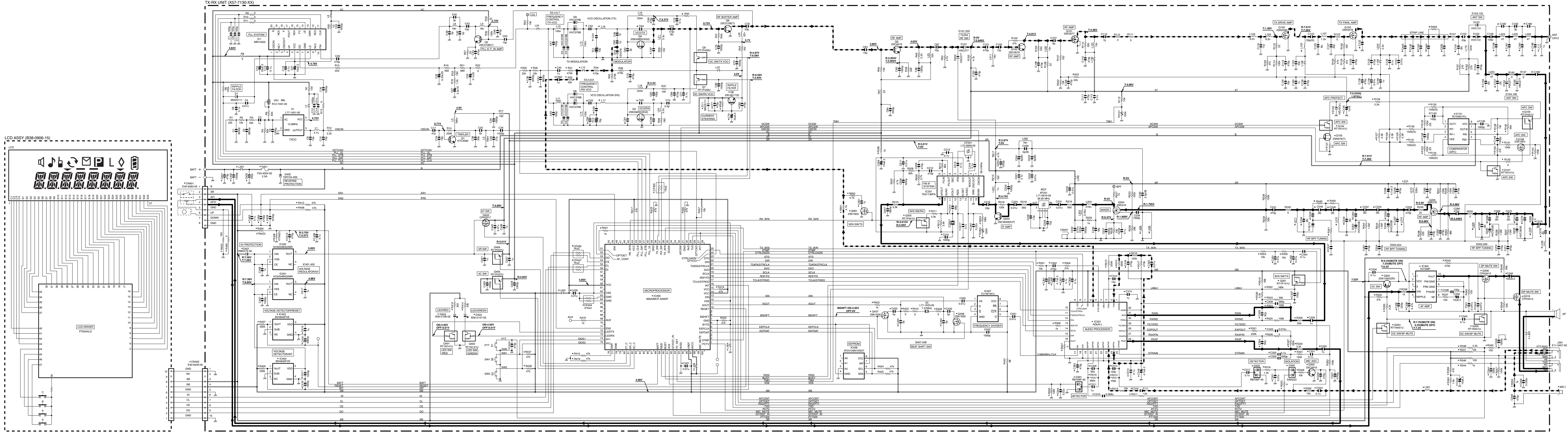


X57-7130-XX	D210	L105	L211	L212	L214	L228	L229	L230	R241	R449	R450	R456	R457	C142	C145	C151	C156	C157	C159	C160	C161	C164	C166	C168	C169
-10 TK-3212	K.M	HVC355B	15n	8.2n	8.2n	8.2n	56n	1.0M	NO	NO	NO	27p	NO	15p	NO	5p	2.5p	2p	2p	2p	5p	5p	0.75p	NO	5p
-11 TK-3212	K2.M2	NO	NO	22n	NO	6.8n	6.8n	6.8n	56n	NO	0	0	0	27p	NO	15p	NO	4p	3p	1.5p	6p	5p	1.5p	0.3p	9p
-21 TK-3217	M	HVC355B	15n	NO	8.2n	8.2n	8.2n	39n	1.0M	0	0	NO	24p	7p	18p	NO	4p	2p	2p	2p	5p	5p	0.75p	NO	6p

X57-7130-XX	C244	C245	C246	C248	C249	C250	C252	C253	C255	C257	C267	C268	C273	C274	C275	C276	C293	C444	C445
-10 TK-3212	K.M	3p	22p	1p	470p	2p	2p	22p	3.5p	3.5p	22p	22p	2p	2p	2.5p	NO	7p	7p	NO
-11 TK-3212	K2.M2	NO	NO	NO	NO	18p	NO	1p	18p	5p	18p	18p	1.5p	2.5p	2p	NO	NO	NO	20p
-21 TK-3217	M	NO	NO	NO	470p	NO	2.5p	22p	1p	1.5p	22p	22p	1p	3p	4p	7p	NO	NO	NO

TK-3212/3217 SCHEMATIC DIAGRAM

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



X57-130-XX	L16	L17	R40	R42	C52	C54	C55	C56	C58	C61	C64	C66	C68	C67
-10 TK-3212	K.M	22n	27k	10k	4.7k	11p	2p	5p	3p	5p	5p	5p	5p	5p
-11 TK-3212	K2.M2	18n	22n	10k	4.7k	12p	5p	12p	5p	5p	5p	5p	5p	5p
-21 TK-3217	M	22n	27k	10k	10k	12p	5p	12p	5p	5p	5p	5p	5p	5p

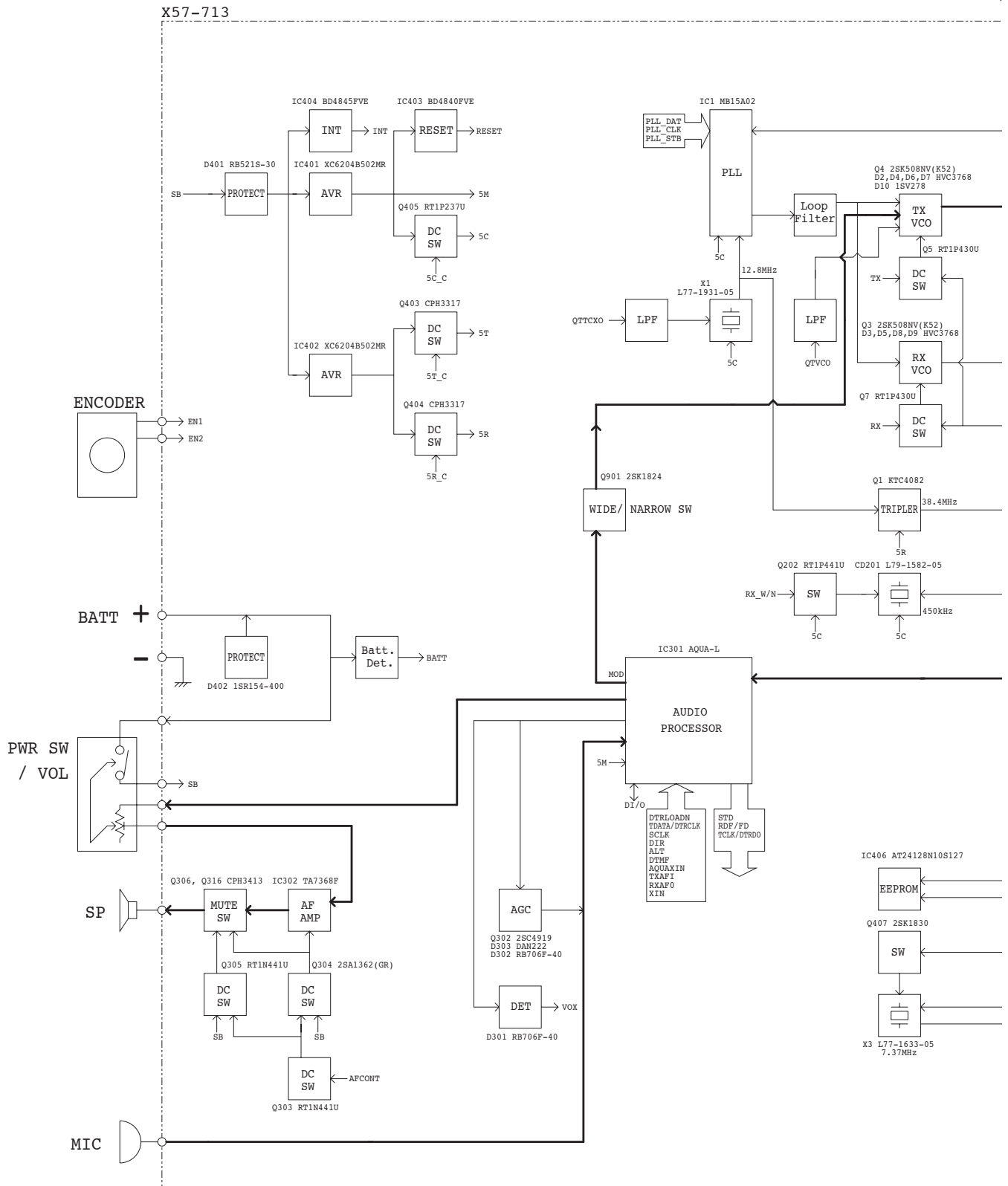
X57-130-XX	L296	L299
-10 TK-3212	K.M	27n
-11 TK-3212	K2.M2	27n
-21 TK-3217	M	30n

X57-130-XX	D010	L105	L211	L212	L214	L228	L229	L230	R441	R448	R450	R456	C132	C142	C145	C151	C156	C157	C159	C160	C161	C164	C166	C168	C169
-10 TK-3212	K.M	HVC355B	15n	8.2n	8.2n	8.2n	8.2n	1.0M	10M	NO	NO	27p	NO	10p	NO	6p	2.5p	2p	2p	2p	5p	5p	0.75p	NO	5p
-11 TK-3212	K2.M2	NO	22n	NO	8.2n	8.2n	8.2n	8.2n	1.0M	NO	NO	27p	NO	10p	NO	6p	3.5p	4.5p	2p	2p	5p	5p	1.5p	10.5p	5p
-21 TK-3217	M	HVC355B	15n	NO	8.2n	8.2n	8.2n	1.0M	NO	NO	24p	7p	18p	NO	4p	1p	2p	2p	2p	2p	5p	5p	0.75p	NO	5p

X57-130-XX	C244	C245	C246	C247	C248	C249	C252	C253	C255	C257	C267	C268	C273	C274	C275	C276	C393	C444	C445					
-10 TK-3212	K.M	3p	22p	1p	470p	2p	5p	22p	2p	2p	22p	3.5p	3.5p	22p	22p	2p	2.5p	NO	7p	7p				
-11 TK-3212	K2.M2	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	1.5p	18p	1.5p	2p	2p	NO	NO	NO
-21 TK-3217	M	NO	NO	NO	470p	NO	2.5p	22p	1p	1.5p	22p	4.5p	4p	22p	22p	1p	3p	4p	7p	NO	NO	NO	NO	NO

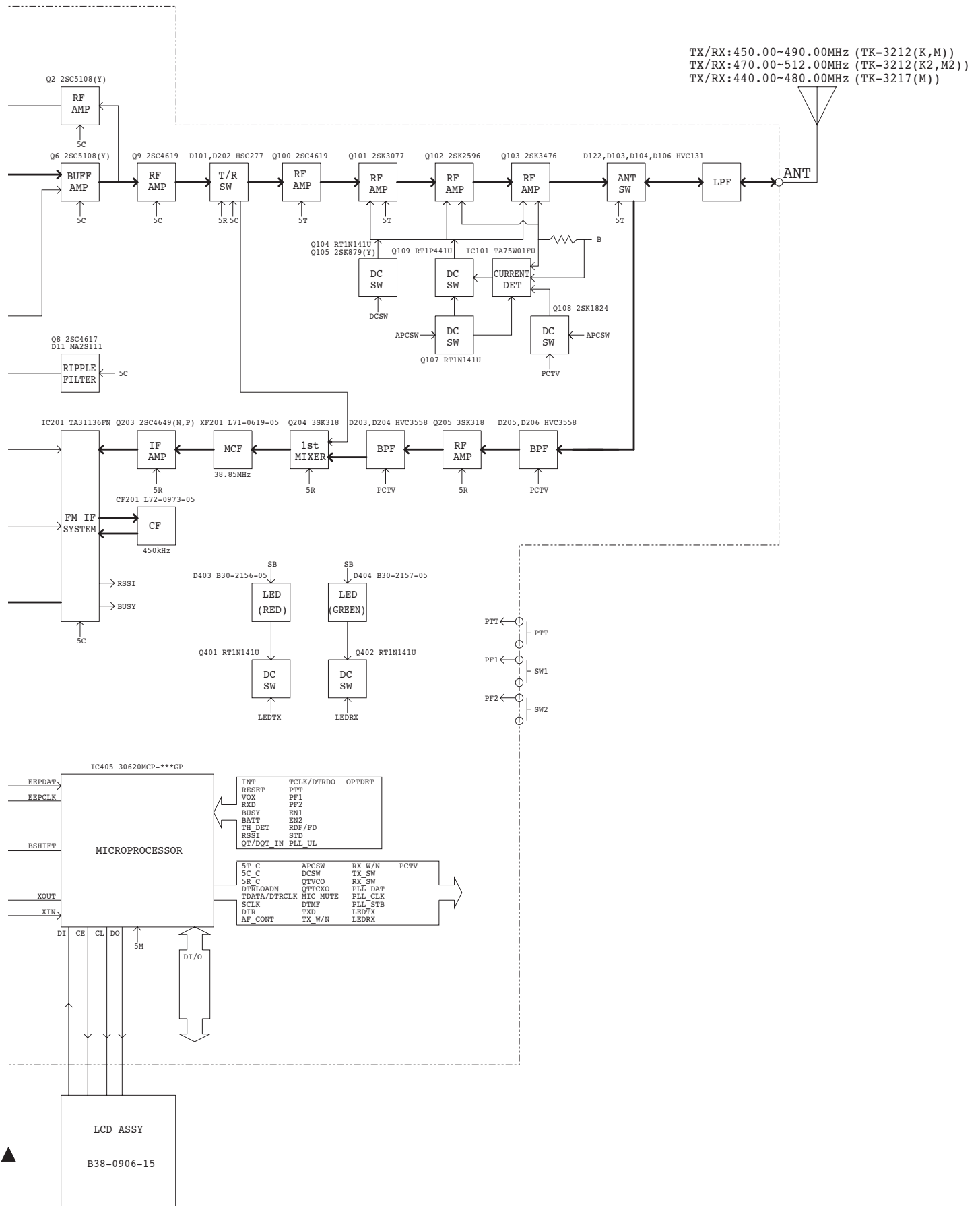
TK-3212/3217

BLOCK DIAGRAM



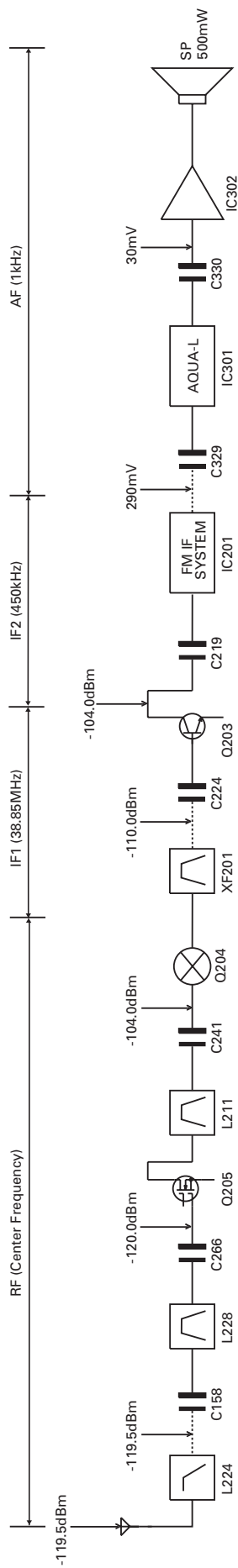
TK-3212/3217

BLOCK DIAGRAM



LEVEL DIAGRAM

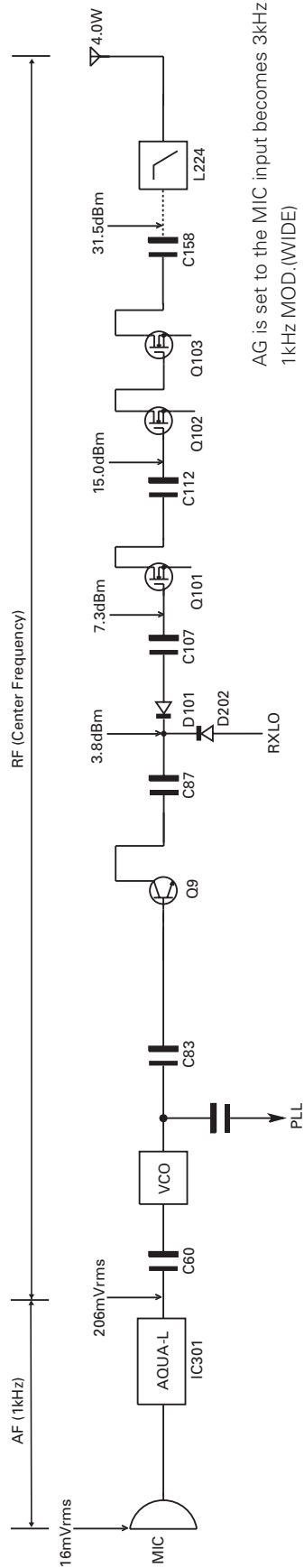
Receiver Section



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 1000pF coupling capacitor. (The display shows the SSG input value required to obtain 12dB SINAD without local level.)

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 1000pF coupling capacitor.

TK-3212/3217

KSC-31 / KNB-29N / KBH-10

KSC-31 (RAPID CHARGER)

■ External View



■ Specifications

Charging current..... 850mA \pm 5%
Charging time KNB-29N : Approx.180 minutes
Dimensions (Charger only) 86.3W x 46.2H x 100.0D (mm)
3-3/8W x 1-7/8H x 4D (inches)
Weight (Charger only) Approx.100g / 0.22 lbs

KNB-29N (Ni-MH BATTERY PACK)

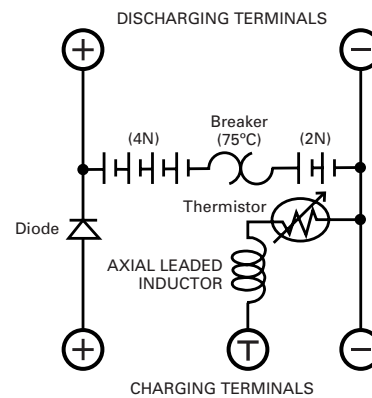
■ External View



■ Specifications

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

■ Schematic Diagram



KBH-10 (BELT CLIP)

■ External View



TK-3212/3217

SPECIFICATIONS

General

Frequency Range	450~490MHz (TK-3212(K,M)) 470~512MHz (TK-3212(K2,M2)) 440~480MHz (TK-3217(M))
Number of Channels	Zone : Max.128 per Radio Channel : Max.128 per Zone
Channel Spacing	25kHz (Wide) 12.5kHz (Narrow)
Battery Voltage	7.5 V DC \pm 20%
Battery Life (5-5-90 duty cycle, during high power, Battery Saver off) ...	KNB-29N(1500mAh) : Approx.10 hours
Operating Temperature Range	-22°F to +140°F (-30°C to +60°C) (+14°F to +140°F (-10°C to +60°C) when KNB-29N in use)
Frequency Stability	\pm 2.5ppm (-22°F to +140°F / -30°C to +60°C)
Antenna Impedance	50 Ω
Channel Frequency Spread	40MHz (TK-3212(K,M)) 42MHz (TK-3212(K2,M2)) 40MHz (TK-3217(M))
Dimensions (W x H x D) (Projections not included, Min/Max)	
Radio Only	54 x 122 x 21.1 mm / 57 x 124.5 x 30.1 mm 2-1/8 x 4-13/16 x 13/16 in. / 2-1/4 x 4-7/8 x 1-3/16 in.
With KNB-29N (1500mAh battery)	54 x 122 x 33 mm / 57 x 124.5 x 42 mm 2-1/8 x 4-13/16 x 1-5/16 in. / 2-1/4 x 4-7/8 x 1-5/8 in.
Weight (net)	
Radio Only	6.3 oz (180g)
With KNB-29N (1500mAh battery)	13.4 oz (380g)

Receiver (Measurements made per TIA/EIA-603)

Selectivity (12dB SINAD)	0.25 μ V (Wide)/0.28 μ V (Narrow)
Selectivity	70dB (Wide)/60dB (Narrow)
Intermodulation	65dB (Wide)/60dB (Narrow)
Spurious Response	65dB
Audio Output (8 Ω)	500mW with less than 10% distortion

Transmitter (Measurements made per TIA/EIA-603)

RF Output Power	4W/1W
Spurious Response	65dB
Type of Emission	16K0F3E (Wide)/11K0F3E (Narrow)
FM Hum and Noise	45dB (Wide)/40dB (Narrow)
Audio Distortion	Less than 5%

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