

UHF FM TRANSCEIVER

TK-3212L

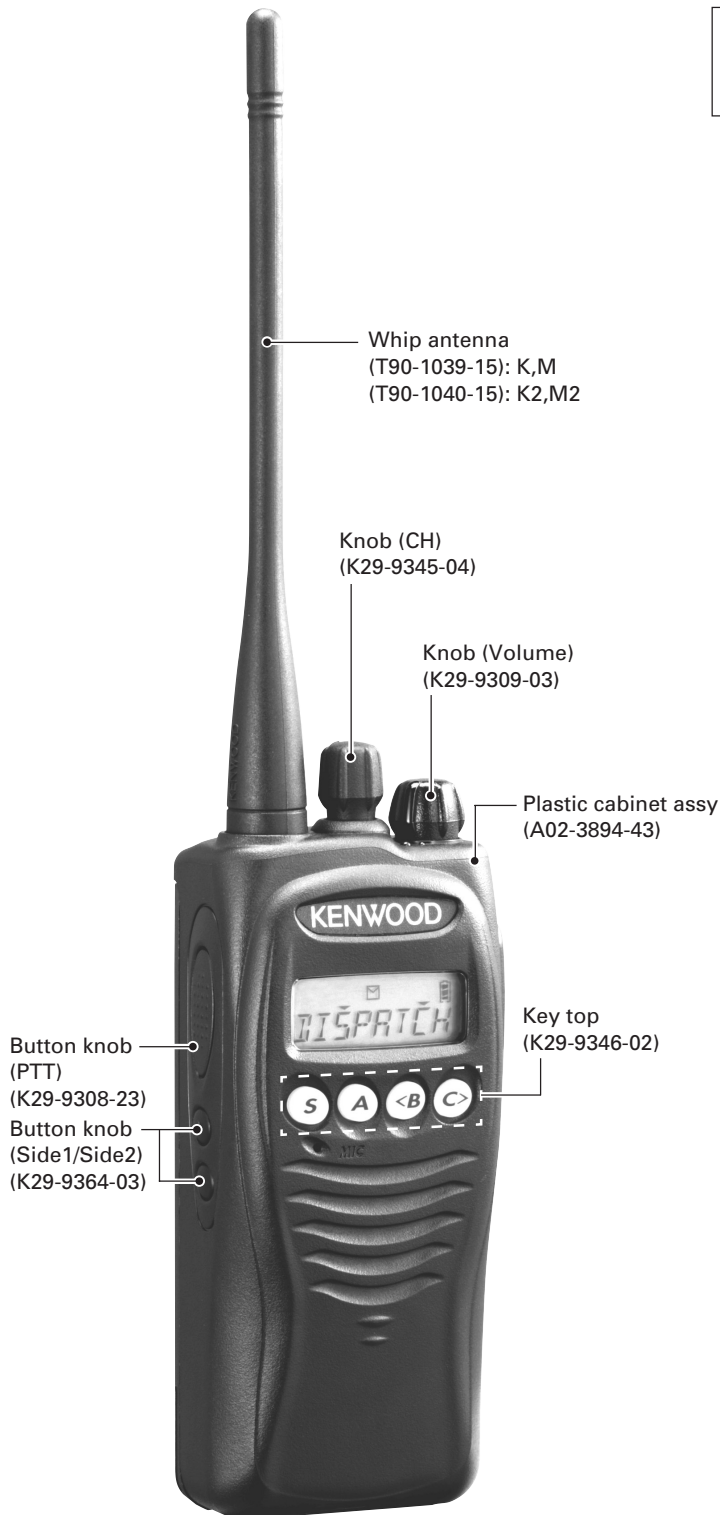
SERVICE MANUAL

KENWOOD

Kenwood Corporation

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Refer to the TK-3212/3217 service manual (B51-8716-00) for any information which has not been covered in this TK-3212L service manual.



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This product uses Lead Free solder.

GENERAL / SYSTEM SET-UP

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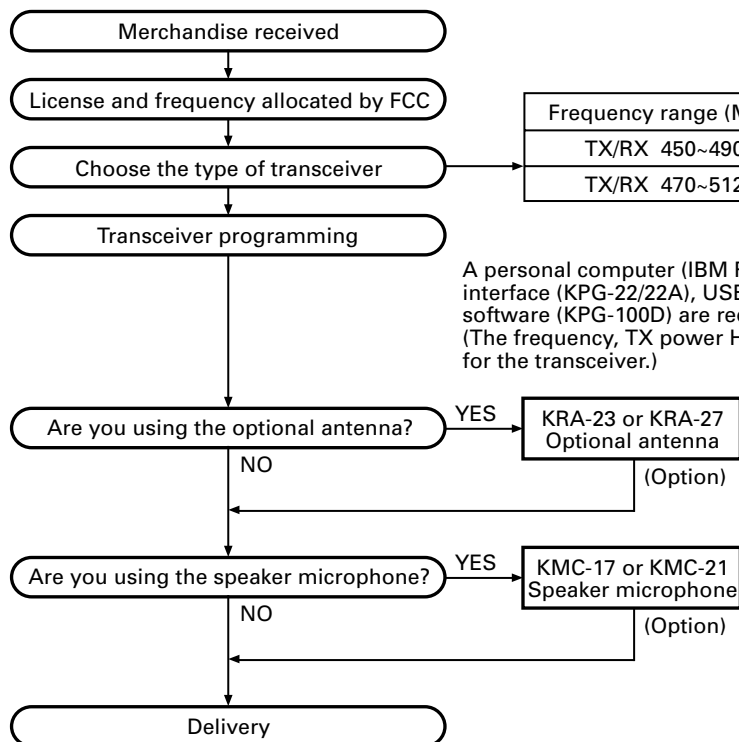
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INTRODUCTION

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.

SYSTEM SET-UP



Frequency range (MHz)	RF power	Type
TX/RX 450~490	4.0W	TK-3212L (K,M)
TX/RX 470~512	4.0W	TK-3212L (K2,M2)

A personal computer (IBM PC or compatible), programming interface (KPG-22/22A), USB adapter (KCT-53U), and programming software (KPG-100D) are required for programming. (The frequency, TX power HI/LOW, and signaling data are programmed for the transceiver.)

ORDERING REPLACEMENT PARTS

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

PERSONAL SAFETY

The following precautions are recommended for personal safety:

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

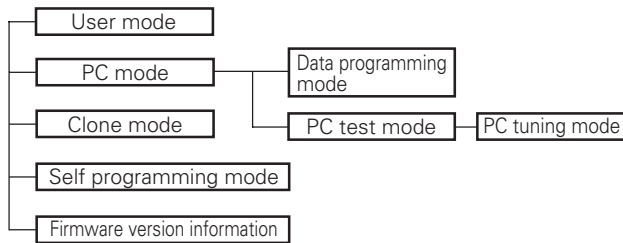
SERVICE

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

Unit		TX-RX Unit	Frequency range	Remarks
Model & destination				
TK-3212L	K, M	X57-7130-12	450~490MHz	IF1 : 38.85MHz LOC : 38.4MHz
TK-3212L	K2, M2	X57-7130-13	470~512MHz	

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 transceiver is programmed using a personal computer, a programming interface (KPG-22/22A), USB adapter (KCT-53U) 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 transceiver to the personal computer with the interface cable and USB adapter (When the interface cable is KPG-22A, the KCT-53U can be used.).

Notes:

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

2. When the POWER is switched on, user mode can be entered immediately. When the PC sends a command, the transceiver enters PC mode.

When data is 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 computer must match the model type when it is written into the EEPROM.
- Change the transceiver to PC mode, then attach the interface cable.

3-3. KPG-22/KPG-22A description (PC programming interface cable: Option)

The KPG-22/22A is required to interface the transceiver with the computer. It has a circuit in its D-sub connector (KPG-22 : 25-pin, KPG-22A : 9-pin) case that converts the RS-232C logic level to the TTL level.

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

3-4. KCT-53U description (USB adapter : Option)

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

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

3-5. Programming software KPG-100D description

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

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

REALIGNMENT

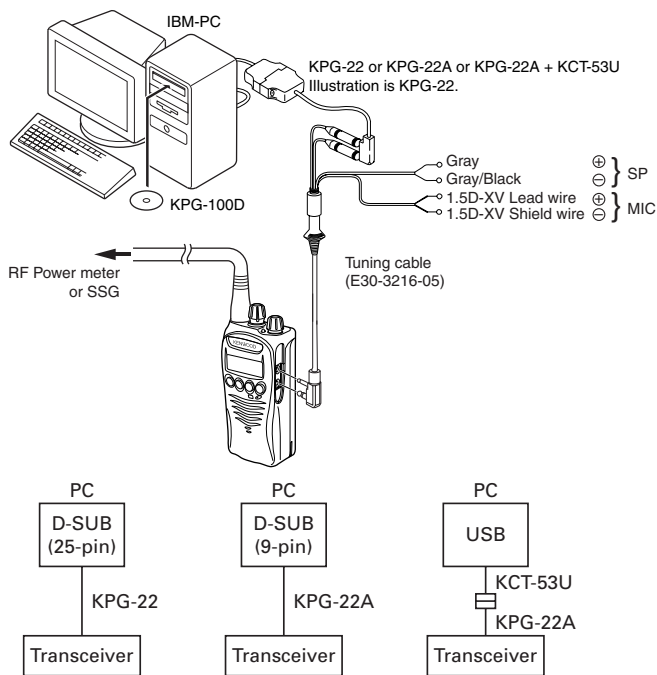


Fig. 1

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 source and clone target/s must be in Clone mode.

4-3. Operation

1. To switch the clone target/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 source 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 target/s.
7. Press the [S] key on the clone source to begin data transmission. When the clone target starts to receive data, the green LED will light and "CLONING" will appear on the LCD. The source unit will display "MASTER".
8. When the clone source finishes sending data, a "confirmation" tone will sound and "COMPLETE" will appear on the LCD. If data transmission failed while cloning, the Target unit will produce an error tone and "CLONE NG" will appear on the LCD.

9. If the cloning fails, no data will be available in the Target unit when it is returned to User mode.
10. When the cloning is successful, the Target unit's "Scan" and "Key lock" functions will return to their default values (Scan = OFF, Key lock = OFF).
11. The source will remain in clone mode after cloning. The target unit will return to user mode after a successful cloning.

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 "Source Unit" if it is unprogrammed. If the [S] key is pressed, an "error" tone will sound.
- Once a unit is set to be the Source, it cannot be a target after the data has been transmitted. This protects the data in the Source unit.
- MSK signaling is used in cloning.
- Electronic interface may cause a failure in data transfer during Wireless Clone, such as when waveforms or electromagnetics are being performed at the workbench.
- 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 source transceiver and the target transceiver with a dummy load.
- The transmit output power is automatically set to Low in Clone mode.

Cloning Frequency Table

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

REALIGNMENT

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.

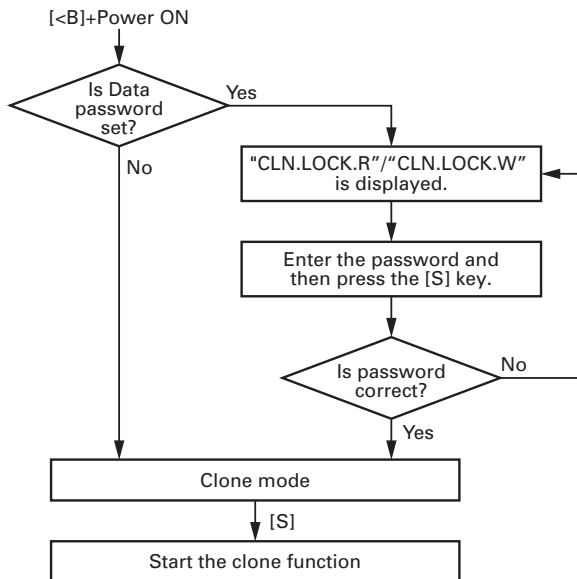
When you press the [C>] key, the currently selected number is determined.

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, "FRQTLB 1" is displayed if the entered password is correct.

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

■ Flow Chart (Source 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

REALIGNMENT

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
- Comander on/off

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

Key operation

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

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.Comander on / off	9. CMP ***	ON / OFF

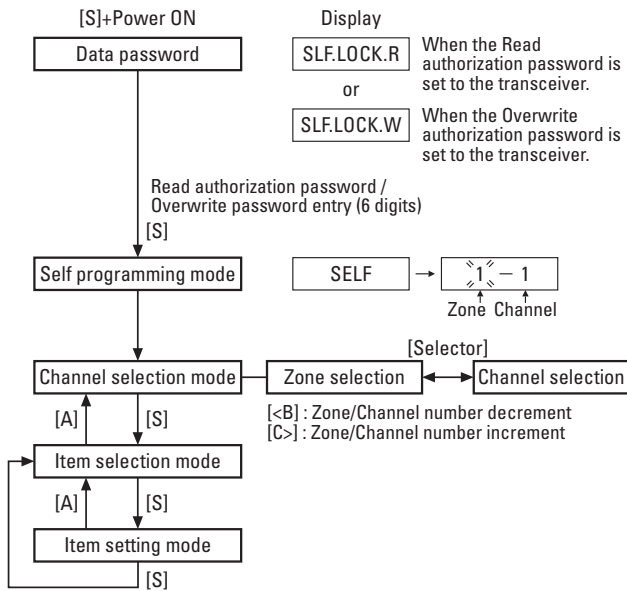
Key operation

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.

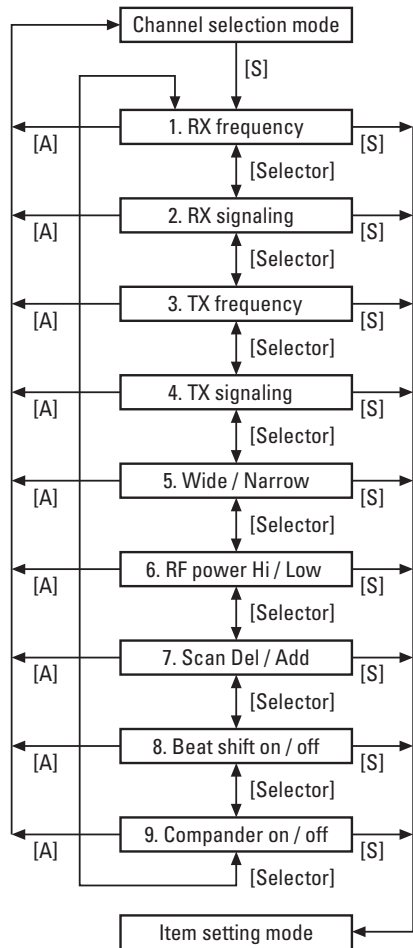
REALIGNMENT

5-6. Self Programming Mode flow chart

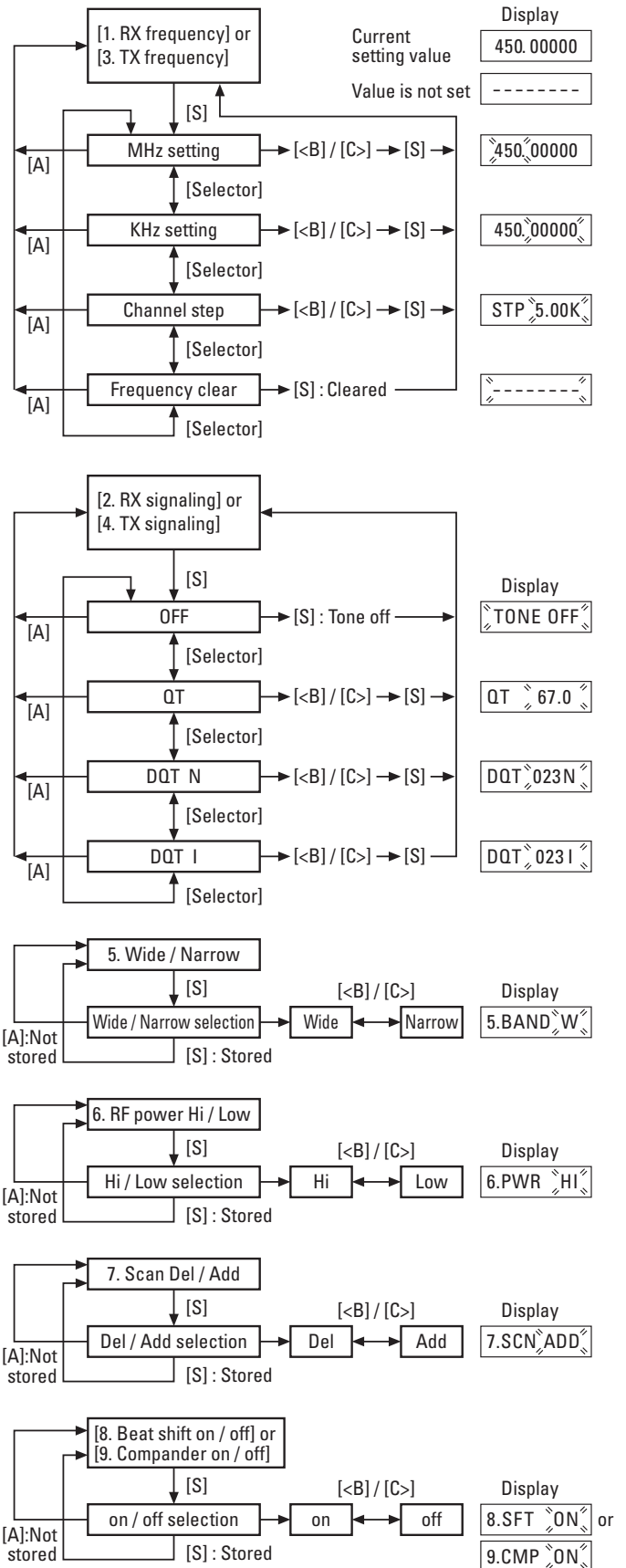
■ Channel selection mode flow chart



■ Item selection mode flow chart



■ Item setting mode flow chart



REALIGNMENT / CIRCUIT DESCRIPTION

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.

CIRCUIT DESCRIPTION

1. 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).

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.

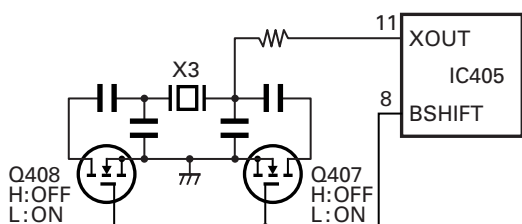


Fig. 1 Frequency shift circuit

2) Memory Circuit

Memory circuit consists of the CPU (IC405) and an EEPROM (IC406). An EEPROM has a capacity of 128k bits that contains the transceiver control program for the CPU and data such as transceiver channels and operating features.

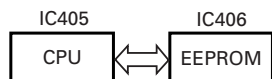


Fig. 2 Memory circuit

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	Li-ion Battery
(1)	6.2V	6.2V
(2)	5.8V	5.8V

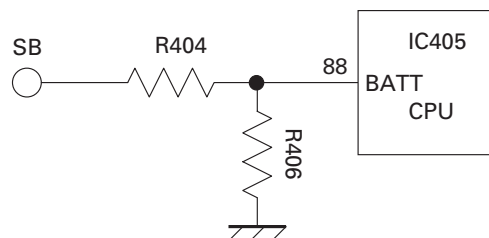


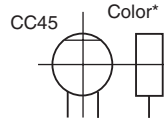
Fig. 3 Low battery warning

PARTS LIST

CAPACITORS

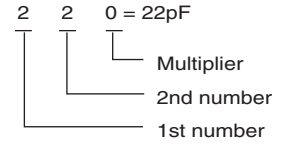
CC 45 TH 1H 220 J
 1 2 3 4 5 6

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



Capacitor value

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



Temperature coefficient

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

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

Example : CC45TH = -470 ± 60ppm/°C

Tolerance (More than 10pF)

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

(Less than 10pF)

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

Voltage rating

2nd word \ 1st word	A	B	C	D	E	F	G	H	J	K	V
0	1.0	1.25	1.6	2.0	2.5	3.15	4.0	5.0	6.3	8.0	-
1	10	12.5	16	20	25	31.5	40	50	63	80	35
2	100	125	160	200	250	315	400	500	630	800	-
3	1000	1250	1600	2000	2500	3150	4000	5000	6300	8000	-

Chip capacitors

(EX) C C 7 3 F S L 1 H 0 0 0 J
 1 2 3 4 5 6 7

(Chip)(CH,RH,UJ,SL)

(EX) C K 7 3 F F 1 H 0 0 0 Z
 1 2 3 4 5 6 7

(Chip)(B,F)

Refer to the table above.

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

Dimension (Chip capacitors)

Dimension code	L	W	T
Empty	5.6 ± 0.5	5.0 ± 0.5	Less than 2.0
A	4.5 ± 0.5	3.2 ± 0.4	Less than 2.0
B	4.5 ± 0.5	2.0 ± 0.3	Less than 2.0
C	4.5 ± 0.5	1.25 ± 0.2	Less than 1.25
D	3.2 ± 0.4	2.5 ± 0.3	Less than 1.5
E	3.0 ± 0.2	1.6 ± 0.2	Less than 1.25
F	2.0 ± 0.3	1.25 ± 0.2	Less than 1.25
G	1.6 ± 0.2	0.8 ± 0.2	Less than 1.0
H	1.0 ± 0.05	0.5 ± 0.05	0.5 ± 0.05

RESISTORS

Chip resistor (Carbon)

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

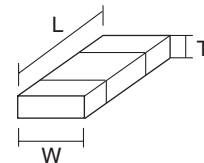
(Chip)(B,F)

Carbon resistor (Normal type)

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

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

Dimension



Dimension (Chip resistor)

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

Rating wattage

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

TK-3212L

PARTS LIST

* New Parts. △ 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-3212L (Y50-6220-XX) TX-RX UNIT (X57-7130-XX)

Ref. No.	Address	New parts	Parts No.	Description	Destination
TK-3212L					
1	1B	*	A02-3894-43	PLASTIC CABINET ASSY	
2	3A	*	A10-4078-41	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		B38-0906-25	LCD ASSY	
7	1C	*	B62-1996-00	INSTRUCTION MANUAL	
9	1B		D10-0649-03	LEVER	
10	1B		D21-0863-04	SHAFT	
11	1B		D32-0441-03	STOPPER	
12	2A		E04-0465-05	RF COAXIAL RECEPTACLE(SMA)	
13	3A		E23-1253-04	TERMINAL(BATT-)	
14	2B		E37-1158-05	PROCESSED LEAD WIRE(WHITE:SP+)	
15	2B		E37-1176-05	PROCESSED LEAD WIRE(GREEN: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		G13-2009-04	CUSHION(CHASSIS)	
25	3A		G13-2033-04	CUSHION(TERMINAL BATT-)	
26	3A		G13-2034-14	CUSHION(TERMINAL BATT-)	
27	3A	*	G13-2038-24	CUSHION(CHASSIS-CERAMIC FILTER)	
28	2A	*	G13-2039-14	CUSHION(PCB-CERAMIC FILTER)	
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	2D		H12-4221-05	PACKING FIXTURE	
43	1C		H25-0085-04	PROTECTION BAG (100/200/0.07)	
44	3D	*	H52-2194-02	ITEM CARTON CASE	
46	2C		J19-5472-03	HOLDER(SP/MIC) ACCESSORY	
50	2A		J19-5473-03	HOLDER ASSY(TERMINAL BATT+)	
51	1A		J21-8496-02	MOUNTING HARDWARE(LCD)	
52	2B		J21-8497-03	MOUNTING HARDWARE(4 KEY)	
53	2B		J21-8525-03	MOUNTING HARDWARE(VOL/ENC)	
54	2D		J29-0713-15	BELT CLIP ACCESSORY	
56	2A		J82-0107-05	FPC	
57	1A		J99-0385-04	ADHESIVE SHEET(LCD)	
59	1B		K29-9308-23	BUTTON KNOB(PTT)	
60	1B		K29-9309-03	KNOB(VOL)	
61	1B		K29-9345-04	KNOB(ENC)	
62	2B		K29-9346-02	KEY TOP	
63	1B		K29-9364-03	BUTTON KNOB(SIDE1/SIDE2)	

Ref. No.	Address	New parts	Parts No.	Description	Destination
A	2B		N14-0819-04	CIRCULAR NUT(VOL KNOB)	
B	2B		N14-0832-04	CIRCULAR NUT(CH KNOB)	
C	2A		N30-2604-48	PAN HEAD MACHINE SCREW(SMA)	
D	3A		N30-2606-48	PAN HEAD MACHINE SCREW(CHASSIS)	
E	1A,2A, 2B,3A		N83-2005-48	PAN HEAD TAPTITE SCREW(PCB)	
65	2C		N99-2046-05	SCREW SET ACCESSORY	
66	2A		R31-0661-05	VARIABLE RESISTOR(POWER SW/VOL)	
67	1B		T07-0760-25	SPEAKER	
69	3C		T90-1039-15	WHIP ANTENNA ACCESSORY	K,M
69	3C		T90-1040-15	WHIP ANTENNA ACCESSORY	K2,M2
71	2A		W02-3711-05	ENCODER	
72	1D		W08-0988-05	CHARGER ACCESSORY	
73	1D		W08-0989-05	AC ADAPTER (AC120V) ACCESSORY	K,K2
73	1D		W08-0992-05	AC ADAPTER (AC220-240V) ACCESSORY	M,M2
TX-RX UNIT (X57-7130-XX) -12: K,M -13: K2,M2					
D403			B30-2156-05	LED(REDF)	
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			CS77AAQJ100M	CHIP TNTL 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			CS77AAQJ100M	CHIP TNTL 10UF 6.3WV	
C22			CS77AA1VR33M	CHIP TNTL 0.33UF 35WV	
C24			CK73HB1H102K	CHIP C 1000PF K	
C25			CC73HCH1H020B	CHIP C 2.0PF B	
C26			CC73HCH1H300J	CHIP C 30PF J	
C27			CS77CA1C3R3M	CHIP TNTL 3.3UF 16WV	
C29			CK73HB1H471K	CHIP C 470PF K	
C32			CS77CA1V0R1M	CHIP TNTL 0.1UF 35WV	
C33 ,34			CK73HB1H102K	CHIP C 1000PF K	
C35			CC73HCH1H270J	CHIP C 27PF J	
C38			CC73HCH1H050B	CHIP C 5.0PF B	
C39			CK73GB1H332K	CHIP C 3300PF K	
C40			CC73HCH1H030B	CHIP C 3.0PF B	
C41			CK73GB1H682K	CHIP C 6800PF K	
C42			CC73HCH1H050B	CHIP C 5.0PF B	
C43			CC73HCH1H100C	CHIP C 10PF C	
C44			CK73HB1H471K	CHIP C 470PF 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
C45			CK73GB1A105K	CHIP C 1.0UF K		C136			CK73GB1A105K	CHIP C 1.0UF K	
C47			CC73HCH1H101J	CHIP C 100PF J		C138			CK73GB1H102K	CHIP C 1000PF K	
C48			CK73HB1H471K	CHIP C 470PF K		C140			CC73GCH1H101J	CHIP C 100PF J	
C49			CC73HCH1H101J	CHIP C 100PF J		C145			CC73GCH1H160J	CHIP C 16PF J	K,M
C50			CC73HCH1H100D	CHIP C 10PF D		C145			CC73GCH1H180J	CHIP C 18PF J	K2,M2
C52			CC73HCH1H110J	CHIP C 11PF J	K,M	C146			CK73GB1H102K	CHIP C 1000PF K	
C52			CC73HCH1H120J	CHIP C 12PF J	K2,M2	C148			CK73GB1H102K	CHIP C 1000PF K	
C54			CC73HCH1H090B	CHIP C 9.0PF B		C151			CC73GCH1H070B	CHIP C 7.0PF B	K2,M2
C55			CC73HCH1H110J	CHIP C 11PF J	K,M	C152			CC73GCH1H200J	CHIP C 20PF J	
C55			CC73HCH1H120J	CHIP C 12PF J	K2,M2	C154			CK73GB1H471K	CHIP C 470PF K	
C56			CC73HCH1H020B	CHIP C 2.0PF B	K,M	C156			CC73GCH1H060B	CHIP C 6.0PF B	K,M
C58			CC73HCH1H060B	CHIP C 6.0PF B	K,M	C156			CC73GCH1H3R5B	CHIP C 3.5PF B	K2,M2
C58			CC73HCH1H090B	CHIP C 9.0PF B	K2,M2	C157			CC73GCH1H040B	CHIP C 4.0PF B	K2,M2
C59, 60			CC73HCH1H010B	CHIP C 1.0PF B		C157			CC73GCH1H2R5B	CHIP C 2.5PF B	K,M
C61			CC73HCH1H030B	CHIP C 3.0PF B	K,M	C158			CC73GCH1H101J	CHIP C 100PF J	
C61			CC73HCH1H040B	CHIP C 4.0PF B	K2,M2	C159			CC73GCH1H020C	CHIP C 2.0PF C	K,M
C62			CC73HCH1H020B	CHIP C 2.0PF B		C159			CC73GCH1H030B	CHIP C 3.0PF B	K2,M2
C63			CC73HCH1H101J	CHIP C 100PF J		C160			CC73GCH1H020B	CHIP C 2.0PF B	K,M
C64			CC73HCH1H040B	CHIP C 4.0PF B	K,M	C160			CC73GCH1H1R5B	CHIP C 1.5PF B	K2,M2
C64, 65			CC73HCH1H050B	CHIP C 5.0PF B	K2,M2	C161			CC73GCH1H050B	CHIP C 5.0PF B	K,M
C65, 66			CC73HCH1H060B	CHIP C 6.0PF B	K,M	C161			CC73GCH1H060B	CHIP C 6.0PF B	K2,M2
C66			CC73HCH1H060B	CHIP C 6.0PF B	K2,M2	C163			CC73GCH1H030B	CHIP C 3.0PF B	
C67			CC73HCH1H050B	CHIP C 5.0PF B	K,M	C164			CC73GCH1H050B	CHIP C 5.0PF B	K,M
C67			CC73HCH1H070B	CHIP C 7.0PF B	K2,M2	C164			CC73GCH1H060B	CHIP C 6.0PF B	K2,M2
C68 -70			CK73HB1H471K	CHIP C 470PF K		C166			CC73GCH1HR75B	CHIP C 0.75PF B	K,M
C71, 72			CK73HB1A104K	CHIP C 0.10UF K		C166			CC73GCH1H1R5B	CHIP C 1.5PF B	K2,M2
C73, 74			CC73HCH1H0R5B	CHIP C 0.5PF B		C168			CC73GCH1H0R3B	CHIP C 0.3PF B	K2,M2
C75, 76			CK73HB1H102K	CHIP C 1000PF K		C168			CC73GCH1H010B	CHIP C 1.0PF B	K,M
C77			CK73HB1H471K	CHIP C 470PF K		C169			CC73GCH1H050B	CHIP C 5.0PF B	K,M
C78			CC73HCH1H330J	CHIP C 33PF J		C169			CC73GCH1H090B	CHIP C 9.0PF B	K2,M2
C79			CS77CP0J100M	CHIP TNL 10UF 6.3WV		C190			CK73GB1A105K	CHIP C 1.0UF K	
C80			CK73HB1H471K	CHIP C 470PF K		C191			CK73GB1H103K	CHIP C 0.010UF K	
C83			CC73HCH1H150J	CHIP C 15PF J		C201			CK73GB1A224K	CHIP C 0.22UF K	
C84 -86			CK73HB1H102K	CHIP C 1000PF K		C206			CK73HB1H102K	CHIP C 1000PF K	
C87			CC73HCH1H100D	CHIP C 10PF D		C207			CK73HB1H182K	CHIP C 1800PF K	
C90			CK73HB1H102K	CHIP C 1000PF K		C208			CK73HB1H471K	CHIP C 470PF K	
C100			CK73HB1H471K	CHIP C 470PF K		C209			CS77CP0J100M	CHIP TNL 10UF 6.3WV	
C101			CK73GB1H471K	CHIP C 470PF K		C210			CK73HB1H471K	CHIP C 470PF K	
C102			CC73GCH1H120J	CHIP C 12PF J		C211			CK73HB1C103K	CHIP C 0.010UF K	
C106			CK73HB1H471K	CHIP C 470PF K		C213			CK73HB1A104K	CHIP C 0.10UF K	
C107			CC73GCH1H060B	CHIP C 6.0PF B		C214			CC73HCH1H680J	CHIP C 68PF J	
C108			CK73HB1H471K	CHIP C 470PF K		C215			CK73HB1H102K	CHIP C 1000PF K	
C110,111			CK73GB1H471K	CHIP C 470PF K		C216			CK73GB1C104K	CHIP C 0.10UF K	
C112			CC73GCH1H070D	CHIP C 7.0PF D		C217			CK73HB1A104K	CHIP C 0.10UF K	
C113			CK73GB1C104K	CHIP C 0.10UF K		C218			CK73GB1C104K	CHIP C 0.10UF K	
C116			CC73GCH1H110J	CHIP C 11PF J		C219			CC73HCH1H330J	CHIP C 33PF J	
C119			CK73GB1H471K	CHIP C 470PF K		C220			CK73HB1H102K	CHIP C 1000PF K	
C122			CC73GCH1H330J	CHIP C 33PF J		C221			CK73GB1C104K	CHIP C 0.10UF K	
C123			CC73GCH1H330G	CHIP C 33PF G		C222			CK73HB1H102K	CHIP C 1000PF K	
C124			CC73HCH1H100D	CHIP C 10PF D		C224,225			CK73HB1C103K	CHIP C 0.010UF K	
C125			CC73GCH1H060B	CHIP C 6.0PF B		C228			CC73GCH1H100C	CHIP C 10PF C	
C126			CS77CA1C010M	CHIP TNL 1.0UF 16WV		C230			CK73HB1C103K	CHIP C 0.010UF K	
C127			CC73GCH1H200J	CHIP C 20PF J		C231			CK73GB1H103K	CHIP C 0.010UF K	
C128			CK73HB1H471K	CHIP C 470PF K		C232			CK73HB1C103K	CHIP C 0.010UF K	
C129			CK73GB1H471K	CHIP C 470PF K		C233			CC73GCH1H060B	CHIP C 6.0PF B	
C130			CK73HB1H471K	CHIP C 470PF K		C234			CK73HB1H102K	CHIP C 1000PF K	
C132			CC73GCH1H270J	CHIP C 27PF J		C236			CC73GCH1H180J	CHIP C 18PF J	
C133			CK73GB1H471K	CHIP C 470PF K		C237			CK73HB1H102K	CHIP C 1000PF K	
C134			CK73GB1H103K	CHIP C 0.010UF K		C238			CK73GB1C104K	CHIP C 0.10UF K	
C135			CK73GB1C104K	CHIP C 0.10UF K		C239			CK73GB1H102K	CHIP C 1000PF K	

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Ref. No.	Address	New parts	Parts No.	Description	Destination	Ref. No.	Address	New parts	Parts No.	Description	Destination
C240			CC73GCH1H3R5B	CHIP C 3.5PF B		C321			CK73GB1C473K	CHIP C 0.047UF K	
C241			CK73GB1H471K	CHIP C 470PF K		C322			CK73HB1C153K	CHIP C 0.015UF K	
C244			CC73GCH1H030B	CHIP C 3.0PF B	K,M	C323			CC73GCH1H820J	CHIP C 82PF J	
C245			CC73GCH1H220J	CHIP C 22PF J	K,M	C324			CC73HCH1H820J	CHIP C 82PF J	
C246			CC73GCH1H010B	CHIP C 1.0PF B	K,M	C325			CK73HB1A104K	CHIP C 0.10UF K	
C247			CK73HB1H471K	CHIP C 470PF K	K,M	C326			CK73HB1H102K	CHIP C 1000PF K	
C248			CC73GCH1H020B	CHIP C 2.0PF B	K,M	C327			CC73HCH1H101J	CHIP C 100PF J	
C249			CC73GCH1H030B	CHIP C 3.0PF B	K2,M2	C328			CK73HB1H391K	CHIP C 390PF K	
C249			CC73GCH1H050B	CHIP C 5.0PF B	K,M	C329,330			CK73GB1A105K	CHIP C 1.0UF K	
C250			CC73GCH1H180J	CHIP C 18PF J	K2,M2	C331			CK73HB1A104K	CHIP C 0.10UF K	
C250			CC73GCH1H220J	CHIP C 22PF J	K,M	C332			CK73HB1H471K	CHIP C 470PF K	
C251			CK73HB1H471K	CHIP C 470PF K		C333,334			CK73GB1C104K	CHIP C 0.10UF K	
C252			CC73GCH1H1R5B	CHIP C 1.5PF B	K2,M2	C335			CC73GCH1H221J	CHIP C 220PF J	
C252,253			CC73GCH1H020B	CHIP C 2.0PF B	K,M	C336			CK73FB1C474K	CHIP C 0.47UF K	
C253			CC73GCH1H010B	CHIP C 1.0PF B	K2,M2	C338			CC73GCH1H101J	CHIP C 100PF J	
C254			CK73HB1H471K	CHIP C 470PF K		C339			CS77AA0J100M	CHIP TNTL 10UF 6.3WV	
C255			CC73GCH1H180J	CHIP C 18PF J	K2,M2	C340			CK73GB1C104K	CHIP C 0.10UF K	
C255			CC73GCH1H220J	CHIP C 22PF J	K,M	C341			CK73GB1C473K	CHIP C 0.047UF K	
C256			CS77CP0J4R7M	CHIP TNTL 4.7UF 6.3WV		C342			CS77AA0J100M	CHIP TNTL 10UF 6.3WV	
C257			CC73GCH1H050B	CHIP C 5.0PF B	K2,M2	C343			CK73GB1C473J	CHIP C 0.047UF J	
C257			CC73GCH1H3R5B	CHIP C 3.5PF B	K,M	C344			CC73GCH1H221J	CHIP C 220PF J	
C258			CK73HB1H471K	CHIP C 470PF K		C345			CS77AB20J101M	CHIP TNTL 100UF 6.3WV	
C259			CK73GB1H471K	CHIP C 470PF K		C346			CK73GB1H102K	CHIP C 1000PF K	
C262,263			CK73HB1H471K	CHIP C 470PF K		C348			CK73HB1H471K	CHIP C 470PF K	
C265			CK73HB1H471K	CHIP C 470PF K		C350			CK73HB1H471K	CHIP C 470PF K	
C266			CK73GB1H471K	CHIP C 470PF K		C351,352			CK73HB1C103K	CHIP C 0.010UF K	
C267			CC73GCH1H3R5B	CHIP C 3.5PF B	K,M	C354			CK73HB1A104K	CHIP C 0.10UF K	
C267			CC73GCH1H4R5B	CHIP C 4.5PF B	K2,M2	C356			CK73HB1A333K	CHIP C 0.033UF K	
C268			CC73GCH1H180J	CHIP C 18PF J	K2,M2	C357			CK73HB1E472K	CHIP C 4700PF K	
C268			CC73GCH1H220J	CHIP C 22PF J	K,M	C401			CC73GCH1H471J	CHIP C 470PF J	
C269			CC73GCH1H020B	CHIP C 2.0PF B		C402			CK73HB1H102K	CHIP C 1000PF K	
C270,271			CK73HB1H471K	CHIP C 470PF K		C403			CK73GB1C104K	CHIP C 0.10UF K	
C272			CC73GCH1H020B	CHIP C 2.0PF B		C405			CC73GCH1H101J	CHIP C 100PF J	
C273			CC73GCH1H180J	CHIP C 18PF J	K2,M2	C406			CK73HB1E472K	CHIP C 4700PF K	
C273			CC73GCH1H220J	CHIP C 22PF J	K,M	C407			CK73HB1H102K	CHIP C 1000PF K	
C274			CC73GCH1H1R5B	CHIP C 1.5PF B	K2,M2	C408			CK73HB1E472K	CHIP C 4700PF K	
C274,275			CC73GCH1H020B	CHIP C 2.0PF B	K,M	C409,410			CK73GB1A105K	CHIP C 1.0UF K	
C275			CC73GCH1H2R5B	CHIP C 2.5PF B	K2,M2	C411			CK73HB1H102K	CHIP C 1000PF K	
C276			CC73GCH1H020B	CHIP C 2.0PF B	K2,M2	C415			CK73HB1H471K	CHIP C 470PF K	
C276			CC73GCH1H2R5B	CHIP C 2.5PF B	K,M	C417			CK73GB1A105K	CHIP C 1.0UF K	
C290			CC73GCH1H020B	CHIP C 2.0PF B		C418			CK73HB1E562K	CHIP C 5600PF K	
C291			CC73GCH1H060B	CHIP C 6.0PF B		C419			CK73HB1H102K	CHIP C 1000PF K	
C292			CK73HB1H471K	CHIP C 470PF K		C421			CK73GB1A105K	CHIP C 1.0UF K	
C301			CK73HB1H392K	CHIP C 3900PF K		C424			CK73HB1H471K	CHIP C 470PF K	
C302			CK73HB1H271K	CHIP C 270PF K		C426,427			CK73GB1A105K	CHIP C 1.0UF K	
C304			CK73GB1A224K	CHIP C 0.22UF K		C428,429			CK73HB1H102K	CHIP C 1000PF K	
C306			CS77AA0J4R7M	CHIP TNTL 4.7UF 6.3WV		C430			CK73GB1H103K	CHIP C 0.010UF K	
C307,308			CK73HB1A104K	CHIP C 0.10UF K		C431			CK73HB1C103K	CHIP C 0.010UF K	
C309			CC73GCH1H820J	CHIP C 82PF J		C432			CC73HCH1H050B	CHIP C 5.0PF B	
C310			CK73HB1A683K	CHIP C 0.068UF K		C433,434			CC73HCH1H030B	CHIP C 3.0PF B	
C311			CK73GB1A105K	CHIP C 1.0UF K		C435			CC73HCH1H050B	CHIP C 5.0PF B	
C312			CC73GCH1H120J	CHIP C 12PF J		C440			CC73GCH1H1R5B	CHIP C 1.5PF B	
C313			CC73GCH1H121J	CHIP C 120PF J		C443			CK73GB1A474K	CHIP C 0.47UF K	
C314			CK73HB1A104K	CHIP C 0.10UF K		C444,445			CC73GCH1H070B	CHIP C 7.0PF B	K,M
C315			CK73GB1A105K	CHIP C 1.0UF K		C445			CC73GCH1H200J	CHIP C 20PF J	K2,M2
C316			CK73GB1C104K	CHIP C 0.10UF K		C450,451			CK73HB1C103K	CHIP C 0.010UF K	
C317			CK73HB1A104K	CHIP C 0.10UF K		C452			CK73HB1H102K	CHIP C 1000PF K	
C318			CS77AA0J4R7M	CHIP TNTL 4.7UF 6.3WV		C456			CK73GB1C104K	CHIP C 0.10UF K	
C319			CC73GCH1H271J	CHIP C 270PF J		C457,458			CK73HB1H471K	CHIP C 470PF K	K2,M2
C320			CK73HB1C103K	CHIP C 0.010UF K		C901,902			CK73GB1A105K	CHIP C 1.0UF 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
TC1 ,2			C05-0245-05	CERAMIC TRIMMER CAPACITOR(10PF)		L301			L92-0140-05	CHIP FERRITE	
CN201			E23-1278-05	TERMINAL		L302			L92-0149-05	CHIP FERRITE	
CN401			E40-6363-05	FLAT CABLE CONNECTOR		L401			L92-0149-05	CHIP FERRITE	
CN402			E40-6430-05	FLAT CABLE CONNECTOR		L402-404			L92-0138-05	CHIP FERRITE	
J301			E11-0707-05	PHONE JACK(2.5/3.5)		L410			L92-0138-05	CHIP FERRITE	
F401			F53-0324-05	FUSE(2.5A)		L411			L41-1875-06	SMALL FIXED INDUCTOR(18NH)	
101	2A		J30-1288-14	SPACER(MIC ELEMENT)		X1			L77-1931-05	TCXO(12.8MHZ)	
CD201			L79-1582-05	TUNING COIL		X3			L77-1633-05	CRYSTAL RESONATOR(7.3728MHZ)	
CF201	2A		L72-0958-05	CERAMIC FILTER		XF201			L71-0619-05	MCF(38.85MHZ)	
L1			L40-4791-86	SMALL FIXED INDUCTOR(4.7UH)		CP404			RK75HA1J473J	CHIP-COM 47K J 1/16W	
L3			L40-5681-86	SMALL FIXED INDUCTOR(0.56UH)		CP405-407			RK75HA1J102J	CHIP-COM 1.0K J 1/16W	
L5			L40-5681-86	SMALL FIXED INDUCTOR(0.56UH)		R1			RK73HB1J222J	CHIP R 22K J 1/16W	
L6 ,7			L92-0138-05	CHIP FERRITE		R2			RK73HB1J103J	CHIP R 10K J 1/16W	
L8 ,9			L41-1875-06	SMALL FIXED INDUCTOR(18NH)		R3			RK73HB1J333J	CHIP R 33K J 1/16W	
L10 ,11			L41-1085-06	SMALL FIXED INDUCTOR(100NH)		R4			RK73HB1J563J	CHIP R 56K J 1/16W	
L12			L92-0138-05	CHIP FERRITE		R5			RK73HB1J104J	CHIP R 100K J 1/16W	
L13 ,14			L41-1085-06	SMALL FIXED INDUCTOR(100NH)		R6			RK73HB1J823J	CHIP R 82K J 1/16W	
L16			L40-1878-67	SMALL FIXED INDUCTOR(18NH)	K2,M2	R7			RK73HB1J101J	CHIP R 100 J 1/16W	
L16			L40-2278-67	SMALL FIXED INDUCTOR(22NH)	K,M	R8 -11			RK73HB1J000J	CHIP R 0.0 J 1/16W	
L17			L40-2278-67	SMALL FIXED INDUCTOR(22NH)	K2,M2	R12			RK73HB1J222J	CHIP R 2.2K J 1/16W	
L17			L40-2778-67	SMALL FIXED INDUCTOR(27NH)	K,M	R13			RK73GB2A000J	CHIP R 0.0 J 1/10W	
L18 ,19			L41-2285-03	SMALL FIXED INDUCTOR(220NH)		R14			RK73HB1J334J	CHIP R 330K J 1/16W	
L20 ,21			L40-3391-86	SMALL FIXED INDUCTOR(3.3UH)		R15			RK73GB2A221J	CHIP R 220 J 1/10W	
L22			L92-0138-05	CHIP FERRITE		R16			RK73GB2A561J	CHIP R 560 J 1/10W	
L23			L41-2275-06	SMALL FIXED INDUCTOR(22NH)		R17			RK73HB1J101J	CHIP R 100 J 1/16W	
L24			L92-0470-05	CHIP FERRITE		R18			RK73GB2A181J	CHIP R 180 J 1/10W	
L25			L41-2275-06	SMALL FIXED INDUCTOR(22NH)		R19			RK73GB2A122J	CHIP R 1.2K J 1/10W	
L100,101			L41-1575-06	SMALL FIXED INDUCTOR(15NH)		R20			RK73HB1J100J	CHIP R 10 J 1/16W	
L102			L92-0138-05	CHIP FERRITE		R21			RK73GB2A681J	CHIP R 680 J 1/10W	
L103,104			L40-8265-92	SMALL FIXED INDUCTOR(8.2NH)		R22			RK73GB2A000J	CHIP R 0.0 J 1/10W	
L105			L40-1575-54	SMALL FIXED INDUCTOR(15NH)		R23			RK73GB2A103J	CHIP R 10K J 1/10W	
L105			L40-2275-54	SMALL FIXED INDUCTOR(22NH)	K,M	R25			RK73HB1J222J	CHIP R 22K J 1/16W	
L106			L92-0149-05	CHIP FERRITE	K2,M2	R26			RK73HB1J103J	CHIP R 10K J 1/16W	
L107			L40-1263-92	SMALL FIXED INDUCTOR(1.2NH)		R27			RK73HB1J220J	CHIP R 22 J 1/16W	
L109			L92-0149-05	CHIP FERRITE		R30			RK73HB1J333J	CHIP R 33K J 1/16W	
L110			L40-2285-54	SMALL FIXED INDUCTOR(220NH)		R31			RK73HB1J474J	CHIP R 470K J 1/16W	
L111			L41-1092-44	SMALL FIXED INDUCTOR(1UH)		R32			RK73HB1J102J	CHIP R 1.0K J 1/16W	
L201			L40-1091-86	SMALL FIXED INDUCTOR(1.0UH)		R33			RK73HB1J154J	CHIP R 150K J 1/16W	
L202			L92-0138-05	CHIP FERRITE		R34			RK73HB1J474J	CHIP R 470K J 1/16W	
L203			L41-5685-39	SMALL FIXED INDUCTOR(0.56UH)		R35 ,36			RK73HB1J274J	CHIP R 270K J 1/16W	
L204			L40-2785-92	SMALL FIXED INDUCTOR(270NH)		R37			RK73HB1J101J	CHIP R 100 J 1/16W	
L206			L41-2775-06	SMALL FIXED INDUCTOR(27NH)	K2,M2	R38			RK73HB1J181J	CHIP R 180 J 1/16W	
L211,212			L41-8268-14	SMALL FIXED INDUCTOR(8.2NH)	K,M	R39			RK73HB1J151J	CHIP R 150 J 1/16W	
L212			L41-6868-14	SMALL FIXED INDUCTOR(6.8NH)	K2,M2	R40			RK73HB1J101J	CHIP R 100 J 1/16W	
L214			L41-6868-14	SMALL FIXED INDUCTOR(6.8NH)	K2,M2	R41			RK73HB1J154J	CHIP R 150K J 1/16W	
L214			L41-8268-14	SMALL FIXED INDUCTOR(8.2NH)	K,M	R42			RK73HB1J472J	CHIP R 4.7K J 1/16W	
L215			L41-2285-03	SMALL FIXED INDUCTOR(220NH)		R43			RK73HB1J101J	CHIP R 100 J 1/16W	
L220			L34-4602-05	AIR-CORE COIL		R46			RK73HB1J103J	CHIP R 10K J 1/16W	
L223			L34-4572-05	AIR-CORE COIL		R47			RK73HB1J220J	CHIP R 22 J 1/16W	
L224-226			L34-4564-05	AIR-CORE COIL		R48			RK73HB1J331J	CHIP R 330 J 1/16W	
L228,229			L41-6868-14	SMALL FIXED INDUCTOR(6.8NH)	K2,M2	R49			RK73HB1J222J	CHIP R 2.2K J 1/16W	
L228,229			L41-8268-14	SMALL FIXED INDUCTOR(8.2NH)	K,M	R50			RK73HB1J472J	CHIP R 4.7K J 1/16W	
L230			L41-5678-03	SMALL FIXED INDUCTOR(56NH)		R100			RK73GB2A473J	CHIP R 47K J 1/10W	
L250			L41-1875-06	SMALL FIXED INDUCTOR(18NH)		R103			RK73GB2A331J	CHIP R 330 J 1/10W	
L290			L41-3078-17	SMALL FIXED INDUCTOR(30NH)	K,M	R105			RK73GB2A220J	CHIP R 22 J 1/10W	

If a part reference number is listed in a shaded box, that part does not come with the PCB.

PARTS LIST

TX-RX UNIT (X57-7130-XX)

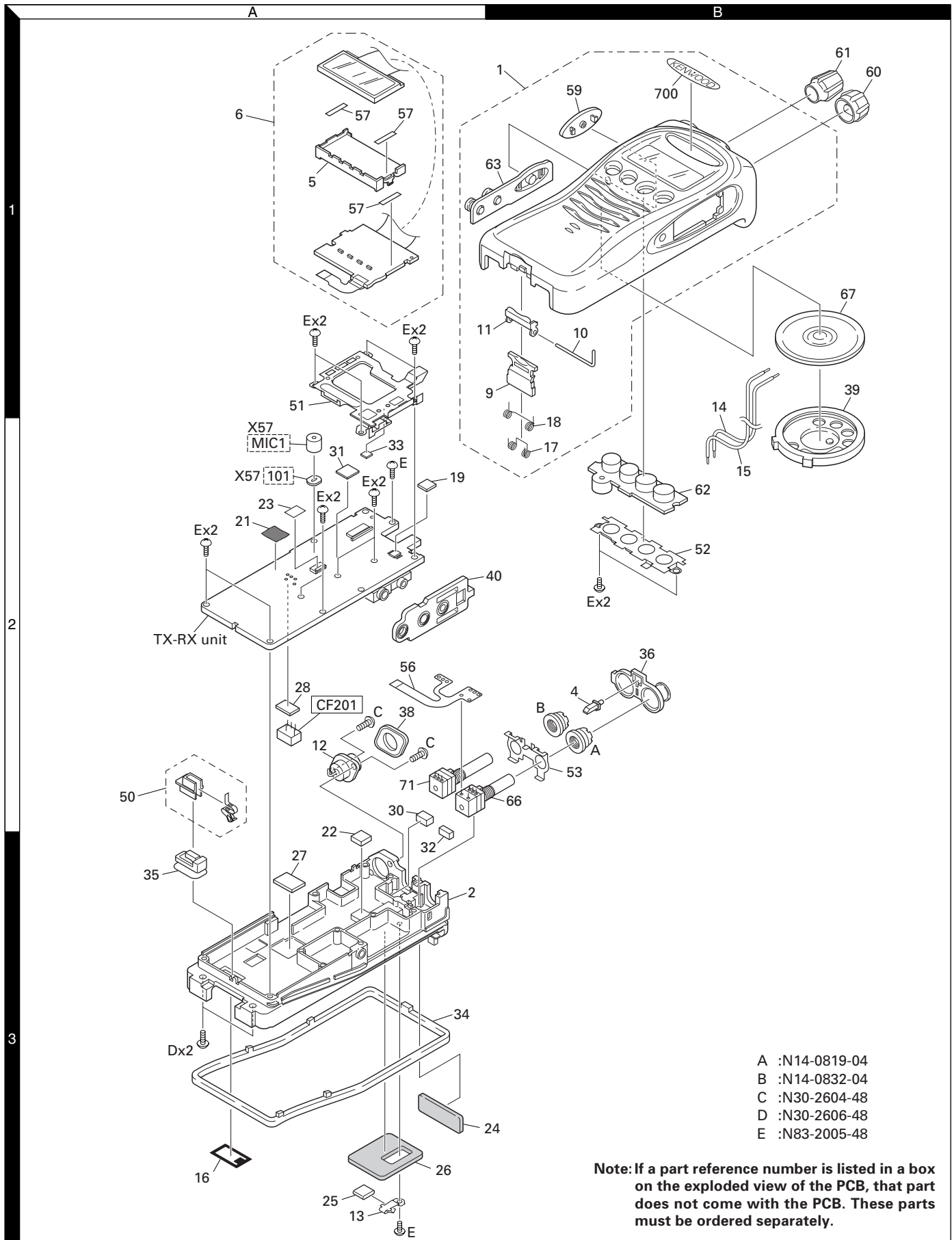
Ref. No.	Address	New parts	Parts No.	Description	Destination	Ref. No.	Address	New parts	Parts No.	Description	Destination
R110			RK73GB2A331J	CHIP R 330 J 1/10W		R311			RK73HB1J123J	CHIP R 12K J 1/16W	
R111,112			RK73GB2A000J	CHIP R 0.0 J 1/10W		R312			RK73GB2A334J	CHIP R 330K J 1/10W	
R114			RK73GB2A124J	CHIP R 120K J 1/10W		R313			RK73GB2A104J	CHIP R 100K J 1/10W	
R115			RK73GB2A103J	CHIP R 10K J 1/10W		R314			RK73GB2A272J	CHIP R 2.7K J 1/10W	
						R315			RK73GB2A334J	CHIP R 330K J 1/10W	
R116			RK73GB2A220J	CHIP R 22 J 1/10W							
R121			RK73GB2A220J	CHIP R 22 J 1/10W		R316			RK73GB2A124J	CHIP R 120K J 1/10W	
R123			RK73FB2B000J	CHIP R 0.0 J 1/8W		R317			RK73GB2A474J	CHIP R 470K J 1/10W	
R124			RK73GB2A473J	CHIP R 47K J 1/10W		R318			RK73GB2A122J	CHIP R 1.2K J 1/10W	
R126			RK73GB2A222J	CHIP R 2.2K J 1/10W		R319			RK73HB1J563J	CHIP R 56K J 1/16W	
						R320			RK73HB1J332J	CHIP R 3.3K J 1/16W	
R127-129			RK73EB2ER39K	CHIP R 0.39 K 1/4W							
R130-135			RK73GH2A154D	CHIP R 150K D 1/10W		R321			RK73HB1J224J	CHIP R 220K J 1/16W	
R137			RK73FB2B000J	CHIP R 0.0 J 1/8W		R322			RK73HB1J184J	CHIP R 180K J 1/16W	
R138			RK73GB2A105J	CHIP R 1.0M J 1/10W		R323			RK73HB1J563J	CHIP R 56K J 1/16W	
R139			RK73GB2A473J	CHIP R 47K J 1/10W		R324,325			RK73GB2A104J	CHIP R 100K J 1/10W	
						R326			RK73GB2A000J	CHIP R 0.0 J 1/10W	
R140			RK73GB2A563J	CHIP R 56K J 1/10W							
R141			RK73GB2A104J	CHIP R 100K J 1/10W		R327			RK73GB2A184J	CHIP R 180K J 1/10W	
R142			RK73GB2A000J	CHIP R 0.0 J 1/10W		R328			RK73GB2A103J	CHIP R 10K J 1/10W	
R143			RK73GB2A104J	CHIP R 100K J 1/10W		R329			RK73GB2A823J	CHIP R 82K J 1/10W	
R145			RK73GB2A000J	CHIP R 0.0 J 1/10W		R330			RK73HB1J332J	CHIP R 3.3K J 1/16W	
						R331			RK73GB2A154J	CHIP R 150K J 1/10W	
R147			RK73GB2A000J	CHIP R 0.0 J 1/10W							
R190			RK73GB2A101J	CHIP R 100 J 1/10W		R332			RK73GB2A153J	CHIP R 15K J 1/10W	
R191,192			RK73GB2A271J	CHIP R 270 J 1/10W		R334			RK73GB2A473J	CHIP R 47K J 1/10W	
R193,194			RK73GB2A473J	CHIP R 47K J 1/10W		R335			RK73GB2A222J	CHIP R 2.2K J 1/10W	
R203			RK73HB1J184J	CHIP R 180K J 1/16W		R336			RK73GB2A102J	CHIP R 1.0K J 1/10W	
						R337			RK73GB2A151J	CHIP R 150 J 1/10W	
R206			RK73GB2A100J	CHIP R 10 J 1/10W							
R207			RK73HB1J472J	CHIP R 4.7K J 1/16W		R338			RK73GB2A222J	CHIP R 2.2K J 1/10W	
R208			RK73HB1J823J	CHIP R 82K J 1/16W		R339			RK73GB2A471J	CHIP R 470 J 1/10W	
R209			RK73HB1J272J	CHIP R 2.7K J 1/16W		R340,341			RK73GB2A103J	CHIP R 10K J 1/10W	
R210,211			RK73HB1J332J	CHIP R 3.3K J 1/16W		R342			RK73GB2A101J	CHIP R 100 J 1/10W	
						R343			RK73GB2A474J	CHIP R 470K J 1/10W	
R212			RK73HB1J823J	CHIP R 82K J 1/16W							
R213			RK73HB1J392J	CHIP R 3.9K J 1/16W		R344			RK73GB2A102J	CHIP R 1.0K J 1/10W	
R215			RK73HB1J101J	CHIP R 100 J 1/16W		R345,346			RK73GB2A101J	CHIP R 100 J 1/10W	
R216			RK73HB1J124J	CHIP R 120K J 1/16W		R347			RK73GB2A104J	CHIP R 100K J 1/10W	
R217			RK73HB1J472J	CHIP R 4.7K J 1/16W		R348			RK73GB2A563J	CHIP R 56K J 1/10W	
						R349			RK73GB2A333J	CHIP R 33K J 1/10W	
R218			RK73HB1J561J	CHIP R 560 J 1/16W							
R219			RK73GB2A561J	CHIP R 560 J 1/10W		R350			RK73HB1J102J	CHIP R 1.0K J 1/16W	
R226,227			RK73GB2A102J	CHIP R 1.0K J 1/10W		R352			RK73HB1J104J	CHIP R 100K J 1/16W	
R228			RK73GB2A151J	CHIP R 150 J 1/10W		R353			RK73HB1J000J	CHIP R 0.0 J 1/16W	
R233			RK73HB1J104J	CHIP R 100K J 1/16W		R354,355			RK73HB1J103J	CHIP R 10K J 1/16W	
						R403			RK73GB2A101J	CHIP R 100 J 1/10W	
R236			RK73HB1J563J	CHIP R 56K J 1/16W							
R238			RK73HB1J104J	CHIP R 100K J 1/16W		R404			RK73HH1J474D	CHIP R 470K D 1/16W	
R239			RK73HB1J563J	CHIP R 56K J 1/16W		R405			RK73GB2A334J	CHIP R 330K J 1/10W	
R240			RK73GB2A000J	CHIP R 0.0 J 1/10W		R406			RK73HH1J474D	CHIP R 470K D 1/16W	
R241			RK73HB1J105J	CHIP R 1.0M J 1/16W	K,M	R407			RK73HB1J334J	CHIP R 330K J 1/16W	
						R408			RK73HB1J473J	CHIP R 47K J 1/16W	
R243,244			RK73HB1J105J	CHIP R 1.0M J 1/16W							
R248			RK73GB2A221J	CHIP R 220 J 1/10W		R409,410			RK73HB1J000J	CHIP R 0.0 J 1/16W	
R249			RK73GB2A220J	CHIP R 22 J 1/10W		R412			RK73HB1J473J	CHIP R 47K J 1/16W	
R251			RK73HB1J104J	CHIP R 100K J 1/16W		R413,414			RK73GB2A331J	CHIP R 330 J 1/10W	
R253			RK73HB1J104J	CHIP R 100K J 1/16W		R415,416			RK73GB2A473J	CHIP R 47K J 1/10W	
						R417-420			RK73HB1J473J	CHIP R 47K J 1/16W	
R254			RK73HB1J683J	CHIP R 68K J 1/16W							
R255			RK73GB2A000J	CHIP R 0.0 J 1/10W		R421,422			RK73HB1J102J	CHIP R 1.0K J 1/16W	
R256,257			RK73HB1J105J	CHIP R 1.0M J 1/16W		R423			RK73HB1J000J	CHIP R 0.0 J 1/16W	
R258			RK73FB2B000J	CHIP R 0.0 J 1/8W		R424,425			RK73HB1J473J	CHIP R 47K J 1/16W	
R301			RK73HB1J103J	CHIP R 10K J 1/16W		R435			RK73HB1J473J	CHIP R 47K J 1/16W	
						R436			RK73GB2A000J	CHIP R 0.0 J 1/10W	
R304			RK73HB1J273J	CHIP R 27K J 1/16W							
R305			RK73HB1J104J	CHIP R 100K J 1/16W		R437,438			RK73HB1J473J	CHIP R 47K J 1/16W	
R306			RK73HB1J102J	CHIP R 1.0K J 1/16W		R447			RK73HB1J123J	CHIP R 12K J 1/16W	
R307			RK73HB1J000J	CHIP R 0.0 J 1/16W		R449,450			RK73GB2A000J	CHIP R 0.0 J 1/10W	K2,M2
R310			RK73GB2A394J	CHIP R 390K J 1/10W		R451			RK73HB1J680J	CHIP R 68 J 1/16W	
						R452			RK73HB1J103J	CHIP R 10K J 1/16W	

PARTS LIST

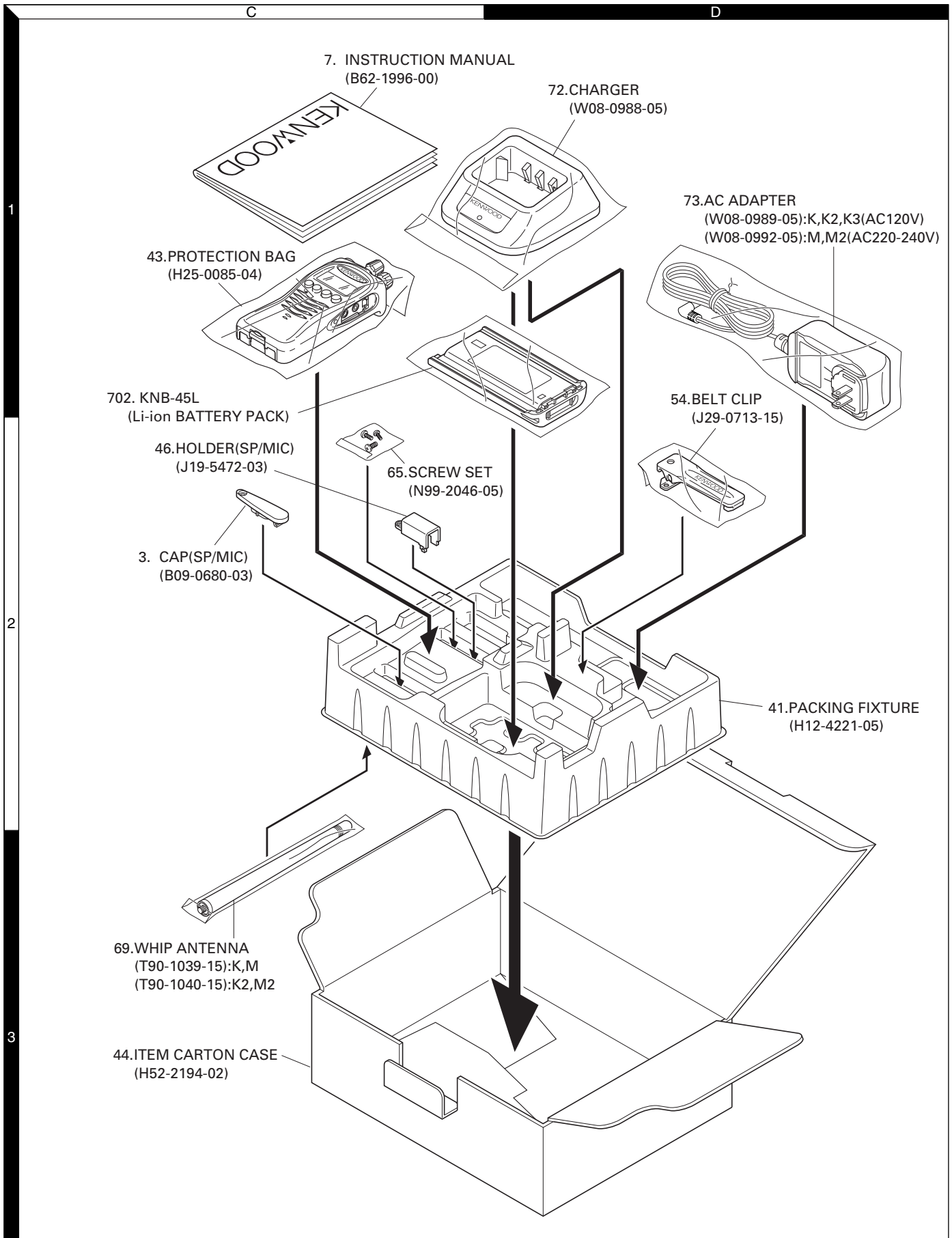
TX-RX UNIT (X57-7130-XX)

Ref. No.	Address	New parts	Parts No.	Description	Destination	Ref. No.	Address	New parts	Parts No.	Description	Destination
R453			RK73HB1J223J	CHIP R 22K J 1/16W	K2,M2	Q302			2SC4919	TRANSISTOR	
R456			RK73GB2A000J	CHIP R 0.0 J 1/10W		Q303			RT1N441U	TRANSISTOR	
R470			RK73HB1J102J	CHIP R 1.0K J 1/16W		Q304			2SA1362-F(GR)	TRANSISTOR	
R901,902			RK73GB2A472J	CHIP R 4.7K J 1/10W		Q305			RT1N441U	TRANSISTOR	
VR1			R32-0736-05	SEMI FIXED VARIABLE RESISTOR(68K)		Q306			2SK3577-A	FET	
S1 -3			S70-0414-05	TACT SWITCH		Q316			2SK3577-A	FET	
MIC1	2A		T91-0648-05	MIC ELEMENT		Q401,402			RT1N141U	TRANSISTOR	
D1			MA2S111-F	DIODE		Q403			CPH3317	FET	
D2 -9			HVC376B	VARIABLE CAPACITANCE DIODE		Q404,405			RT1P237U-T111	TRANSISTOR	
D10			1SV278F	VARIABLE CAPACITANCE DIODE		Q407,408			2SK1830F	FET	
D11			MA2S111-F	DIODE		Q901			2SK1824-A	FET	
D101			HSC277	DIODE		TH101			B57331V2104J	THERMISTOR	
D102			HZU5CLL	ZENER DIODE		TH203			B57331V2104J	THERMISTOR	
D103			HVC131	DIODE							
D104			HSC277	DIODE							
D106			HSC277	DIODE							
D122			HVC131	DIODE							
D202			HSC277	DIODE							
D203-206			HVC355B	VARIABLE CAPACITANCE DIODE	K,M						
D210			HVC355B	VARIABLE CAPACITANCE DIODE							
D301,302			RB706F-40	DIODE							
D303			DAN222	DIODE							
D401			RB521S-30	DIODE							
D402			1SR154-400	DIODE							
IC1			MB15A02PFV2E1	MOS-IC							
IC101			TA75W01FUF	MOS-IC							
IC201			TA31136FNG	MOS-IC							
IC301			AQUA-L	MOS-IC							
IC302			TA7368FG	MOS-IC							
IC401,402			XC6204B502MR	MOS-IC							
IC403			BD4840FVE	MOS-IC							
IC404			BD4845FVE	MOS-IC							
IC405		*	30620MCP422GU	MICROCONTROLLER IC							
IC406		*	AT24128N10SU27	ROM IC							
IC407			TC7W74FU-F	MOS-IC							
Q1			KTC4082	TRANSISTOR							
Q2			2SC5108(Y)F	TRANSISTOR							
Q3 ,4			2SK508NV(K52)	FET							
Q5			RT1P430U	TRANSISTOR							
Q6			2SC5108(Y)F	TRANSISTOR							
Q7			RT1P430U	TRANSISTOR							
Q8			2SC4617(S)	TRANSISTOR							
Q9			2SC4619	TRANSISTOR							
Q100			2SC4619	TRANSISTOR							
Q101			2SK3077F	FET							
Q102		*	2SK2596-E	FET							
Q103			2SK3476-F	FET							
Q104			RT1N141U	TRANSISTOR							
Q105			2SK879(Y)F	FET							
Q107			RT1N141U	TRANSISTOR							
Q108			2SK1824-A	FET							
Q109			RT1P441U	TRANSISTOR							
Q202			RT1P441U	TRANSISTOR							
Q203			2SC4649(N,P)	TRANSISTOR							
Q204,205			3SK318	FET							
Q301			RT1P141U	TRANSISTOR							

EXPLODED VIEW



PACKING



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

ADJUSTMENT

Test Equipment Required for Alignment

Test Equipment	Major Specifications	
1. Standard Signal Generator (SSG)	Frequency Range	400 to 512MHz
	Modulation	Frequency modulation and external modulation
	Output	-127dBm/0.1μV to greater than -47dBm/1mV
2. Power Meter	Input Impedance	50Ω
	Operation Frequency	400 to 512MHz
	Measurement Range	Vicinity of 10W
3. Deviation Meter	Frequency Range	400 to 512MHz
4. Digital Volt Meter (DVM)	Measuring Range	10mV to 10V DC
	Input Impedance	High input impedance for minimum circuit loading
5. Oscilloscope		DC through 30MHz
6. High Sensitivity Frequency Counter	Frequency Range	10Hz to 1000MHz
	Frequency Stability	0.2ppm or less
7. Ammeter		5A
8. AF Volt Meter (AF VTVM)	Frequency Range	50Hz to 10kHz
	Voltage Range	1mV to 10V
9. Audio Generator (AG)	Frequency Range	50Hz to 5kHz or more
	Output	0 to 1V
10. Distortion Meter	Capability	3% or less at 1kHz
	Input Level	50mV to 10Vrms
11. Spectrum Analyzer	Measuring Range	DC to 1GHz or more
12. Tracking Generator	Center frequency	50kHz to 600MHz
	Output Voltage	100mV or more
13. 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 transceiver. Place the TX-RX unit on the jig and fit it with screws.

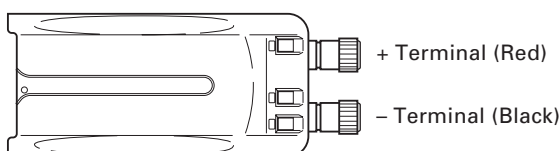
The jig facilitates the voltage check and protects the final amplifier FET when the voltage on the flow side of the TX-RX unit is checked during repairs.

3. Nut wrench

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

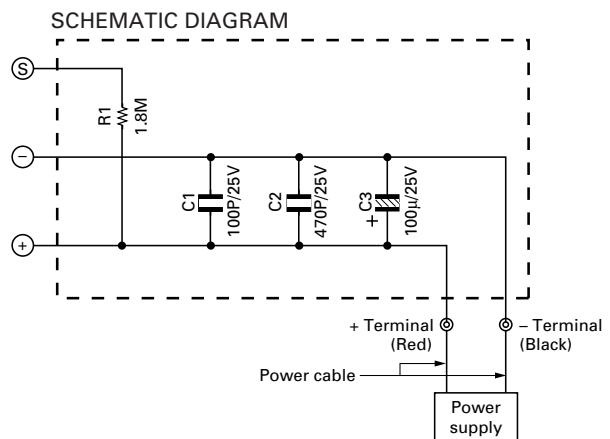
KENWOOD part No. : W05-1012-00

4. Battery Jig (W05-1011-00)



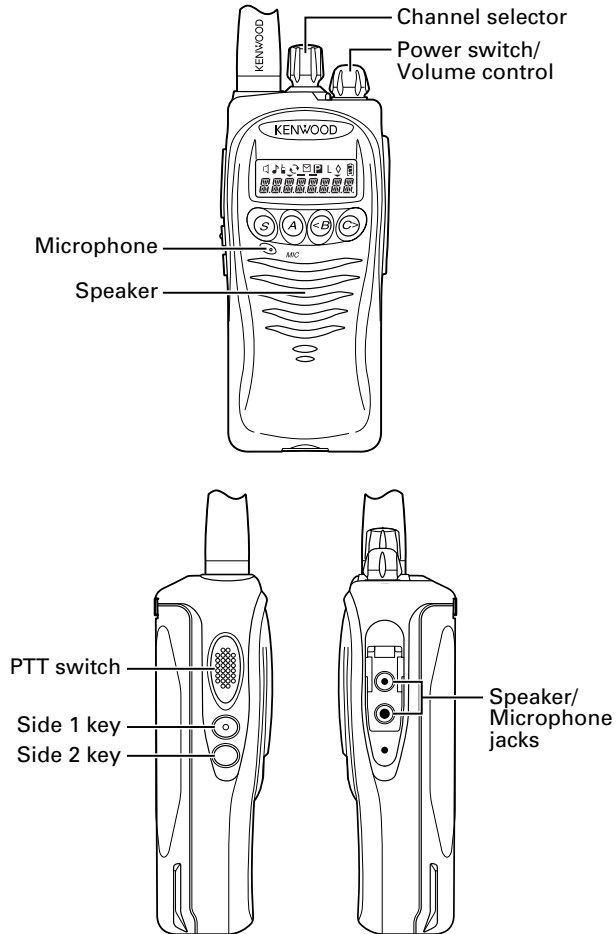
Connect the power cable properly between the battery jig installed in the transceiver and the power supply, and be sure output voltage and the power supply polarity prior to switching the power supply ON, otherwise over voltage and reverse connection may damage the transceiver, or the power supply or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



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	
	RX Frequency	TX Frequency
Low	450.050MHz	450.100MHz
Low'	460.050MHz	460.100MHz
Center	470.050MHz	470.100MHz
High'	480.050MHz	480.100MHz
High	489.950MHz	489.900MHz

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

■ 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

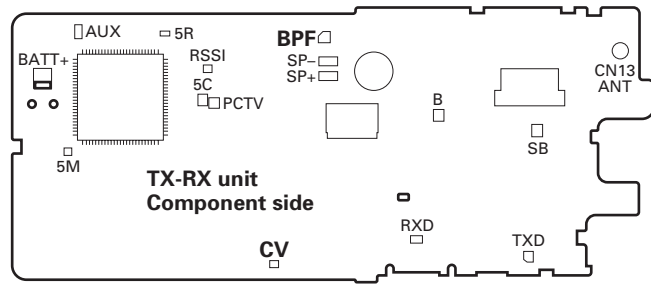
Channel No.	RX Frequency	TX Frequency
1	470.050	470.100
2	450.050	450.100
3	489.950	489.900
4	470.000	470.000
5	470.200	470.200
6	470.400	470.400

Frequency (MHz) K2, M2 type

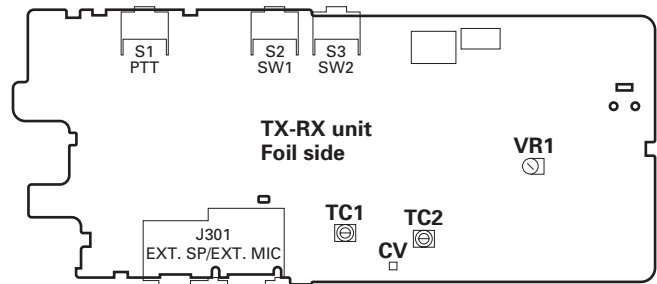
Channel No.	RX Frequency	TX Frequency
1	491.050	491.100
2	470.050	470.100
3	511.950	511.900
4	491.000	491.000
5	491.200	491.200
6	491.400	491.400

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 voltage: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 K,M 3.0V K2,M2	±0.1V
	2) CH:Low				Check	0.6V or more
3. VCO lock voltage TX	3) CH:High PTT:ON			TC1	3.1V K,M 3.0V K2,M2	±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 Center High (3 points) BATT terminal voltage:7.5V PTT:ON	Power meter Ammeter		Programming Software:KPG-100D	Low, Center :3.95W High :3.95W K,M 3.8W K2,M2	Low, Center :±0.05W High :±0.05W K,M -0W/+0.1W K2,M2 2.0 A or less
					Check	Low' :3.8~4.1W High' :3.8~4.1W K,M 3.7~4.0W K2,M2 2.0 A or less
3. High power Check	TEST CH: Low' High' BATT terminal voltage:7.5V PTT:ON					
4. Low power Adjust	TEST CH: Low Center High (3 points) BATT terminal voltage:7.5V PTT:ON			Programming Software:KPG-100D	0.95W	±0.05W 1.0 A or less

ADJUSTMENT

Item	Condition	Measurement		Adjustment		Specifications/ Remarks
		Test equipment	Terminal	Parts	Method	
5. Low power Check	TEST CH: Low' High' BATT terminal voltage:7.5V PTT:ON	Power meter Ammeter	ANT		Check	0.85~1.1W 1.0 A or less
6. VOX 1 Writing	TEST CH: Center AG:1kHz/45mV	Power meter Deviation meter	ANT SP/MIC connector	Programming Software:KPG-100D		
7. DQT balance Adjust [Wide]	TEST CH: Center Low High (3 points) LPF:3kHz HPF:OFF PTT:ON	Oscilloscope AG AF VTVM	ANT	Programming Software:KPG-100D	Make the demodulation wave into square waves.	
[Narrow]	TEST CH:Center PTT:ON					
8. Max deviation Adjust [Wide]	TEST CH: Center Low High (3 points) AG:1kHz/110mV Deviation meter filter LPF:15kHz HPF:OFF PTT:ON		ANT SP/MIC connector	Programming Software:KPG-100D	4.2kHz (According to the larger +,-)	±80Hz
[Narrow]	TEST CH: Center PTT:ON				2.2kHz (According to the larger +,-)	±80Hz
9. QT deviation Adjust [Wide]	TEST CH: Center Low High (3 points) LPF:3kHz HPF:OFF PTT:ON		ANT	Programming Software:KPG-100D	0.80kHz	±40Hz
[Narrow]	TEST CH: Center PTT:ON				0.42kHz	±40Hz
10. 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				0.38kHz	±40Hz
11. 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

ADJUSTMENT

Item	Condition	Measurement		Adjustment		Specifications/Remarks
		Test equipment	Terminal	Parts	Method	
12.MSK deviation Adjust [Wide]	TEST CH: Center Low High (3 points) LPF:15kHz HPF:OFF PTT:ON	Power meter Deviation meter Oscilloscope AG AF VTVM	ANT	Programming Software:KPG-100D	3.1kHz	±100Hz
	[Narrow]				TEST CH:Center PTT:ON	

Receiver Section

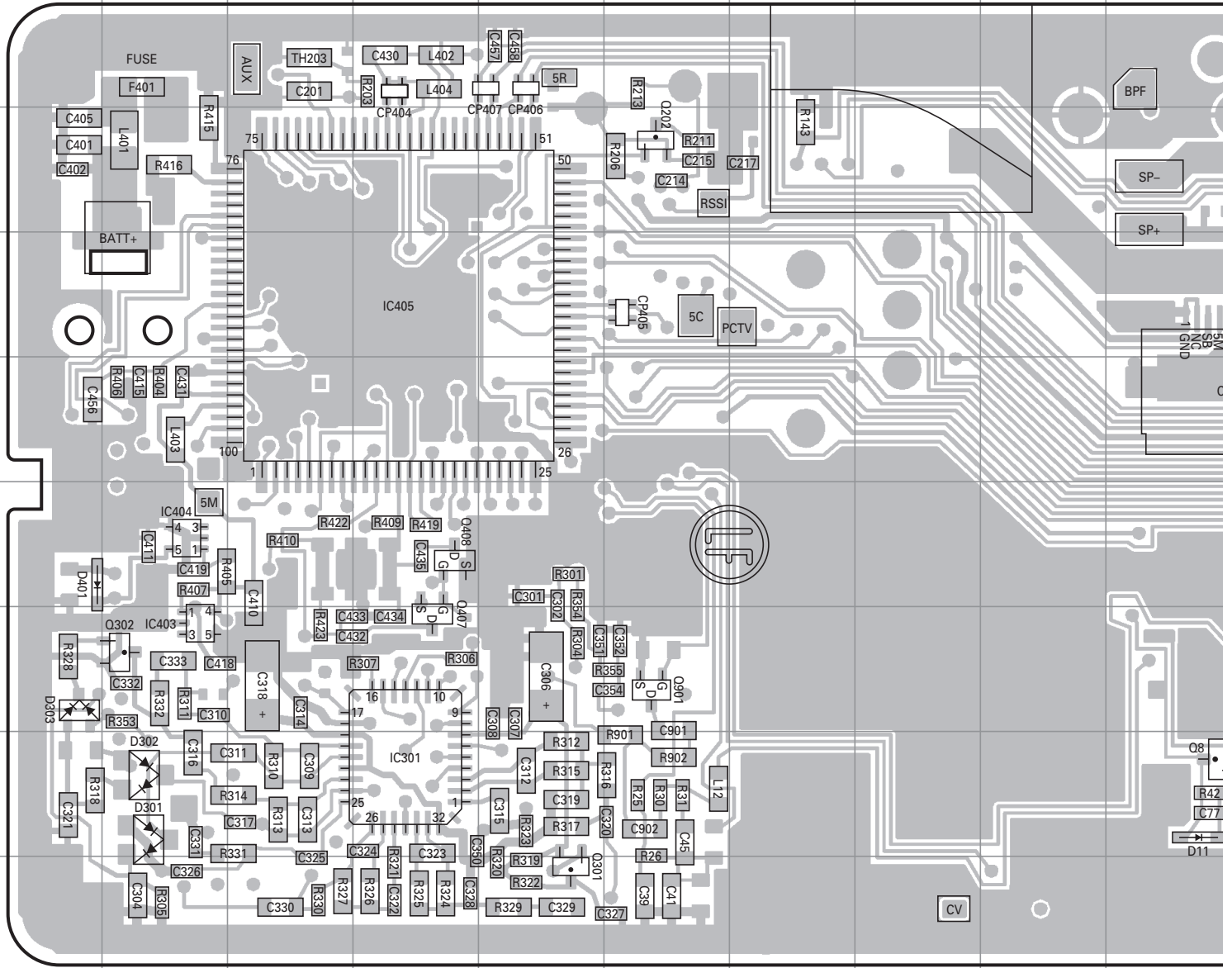
Item	Condition	Measurement		Adjustment		Specifications/Remarks
		Test equipment	Terminal	Parts	Method	
1. BPF Wave Adjust TK-3212L (K,M)	(1)Center frequency Spectrum analyzer setting Center-f : 470MHz Span : 200MHz RBW : 30kHz VBW : 30kHz ATT : 5dB	Spectrum analyzer	ANT BPF	Programming Software: KPG-100D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

ADJUSTMENT

Item	Condition	Measurement		Adjustment		Specifications/ Remarks
		Test equipment	Terminal	Parts	Method	
2.Sensitivity Check [Wide]	TEST CH: Low Center High SSG output:-117 dBm(0.3μV) SSG MOD:3.0kHz	SSG DVM Oscilloscope AF VTVM	ANT		Check	12dB SINAD or more
	[Narrow]					
3.SQL1 (Threshold) Writing [Wide]	TEST CH: Center Low High SSG output:-123 dBm(0.16μV) SSG MOD:3.0kHz			Programming Software: KPG-100D	Write	Squelch open
	[Narrow]					
4.SQL9 (Tight) Writing [Wide]	TEST CH: Center Low High SSG output:-117 dBm(0.3μV) SSG MOD:3.0kHz					
	[Narrow]					
5.BATT detection Writing	BATT terminal voltage:5.9V	DVM	ANT BATT terminal			BATT terminal voltage:5.9V

TK-3212L PC BOARD

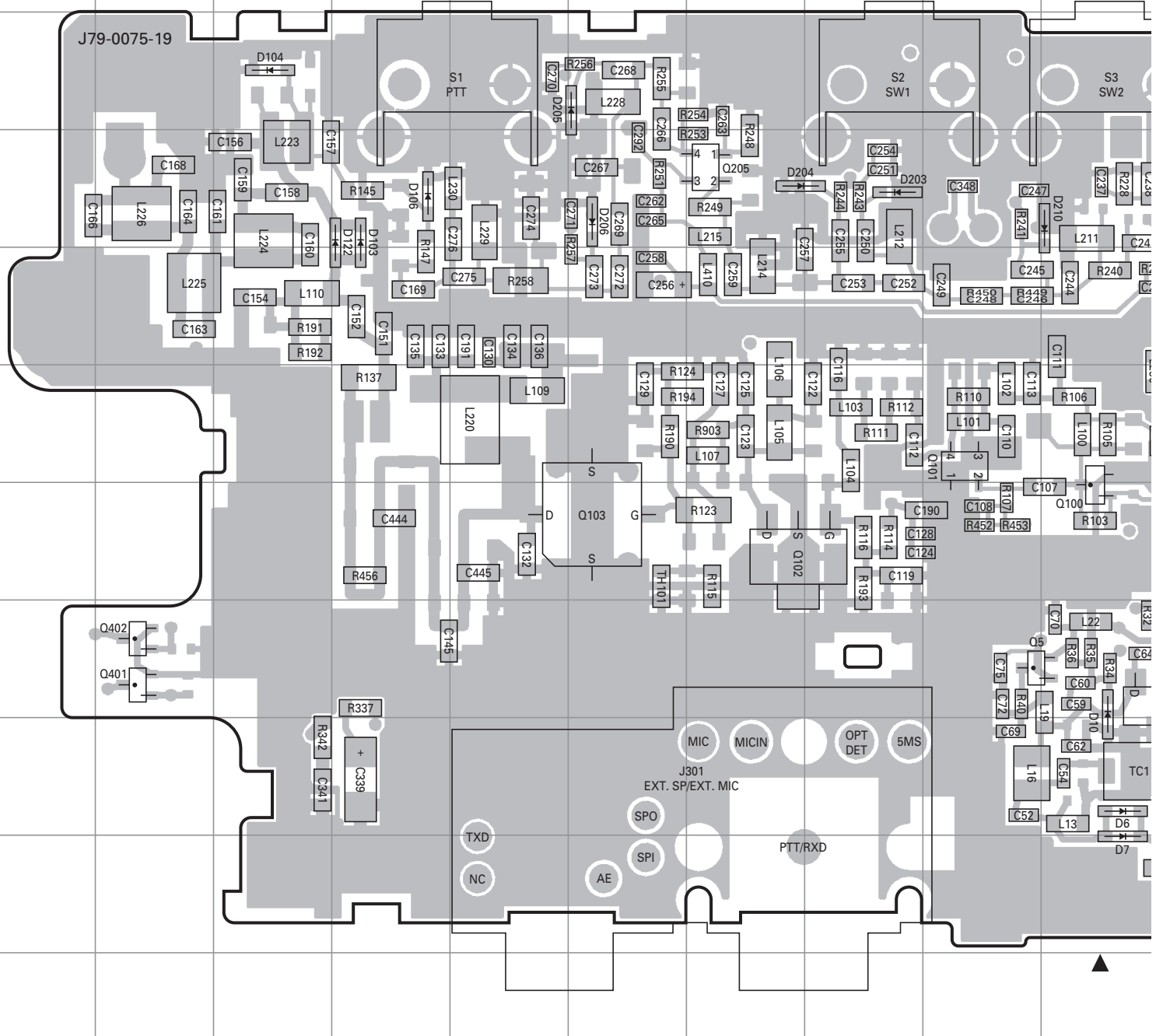
TX-RX UNIT (X57-7130-XX) -12 : K,M -13 : K2,M2
Component side view (J79-0075-19)



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-3212L PC BOARD

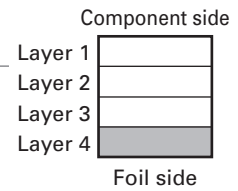
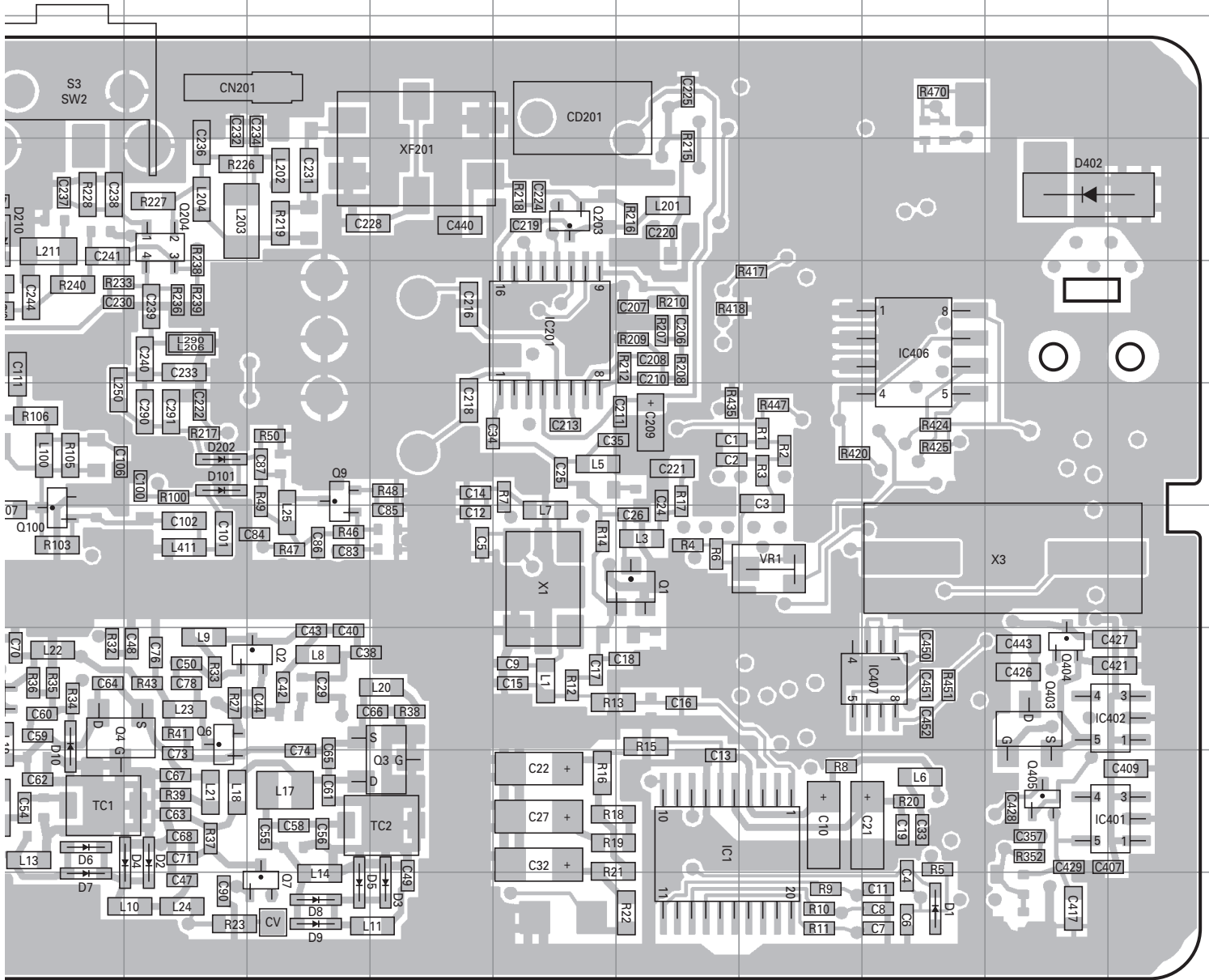
TX-RX UNIT (X57-7130-XX) -12 : K,M -13 : K2,M2
 Foil side view (J79-0075-19)



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-3212L

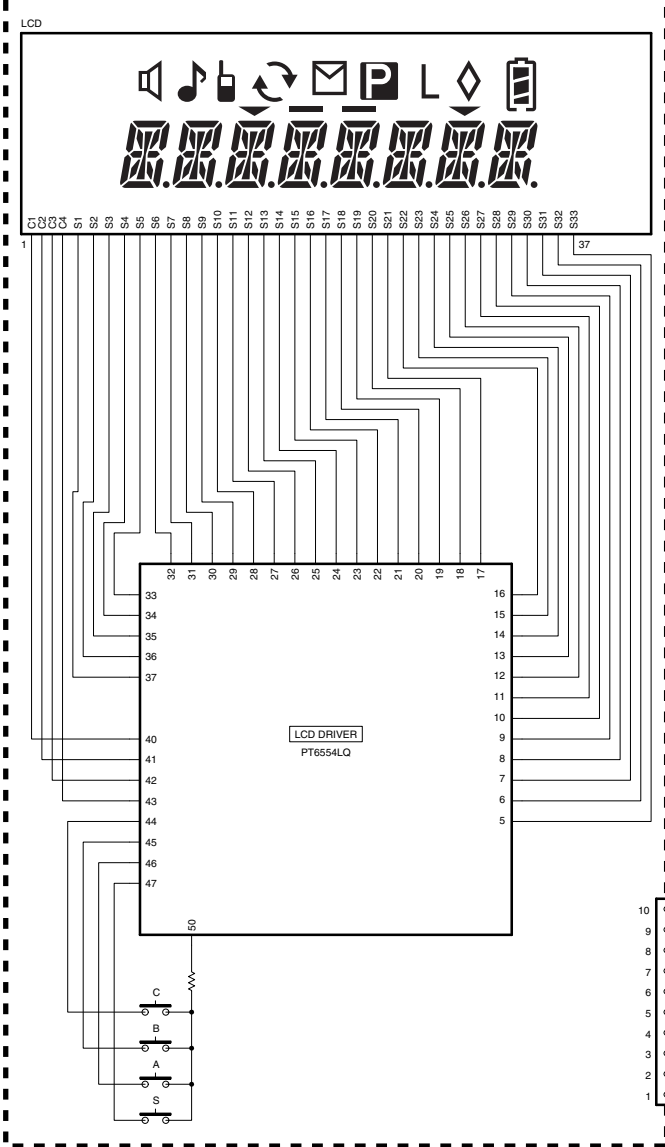
TX-RX UNIT (X57-7130-XX) -12 : K,M -13 : K2,M2
Foil side view (J79-0075-19)



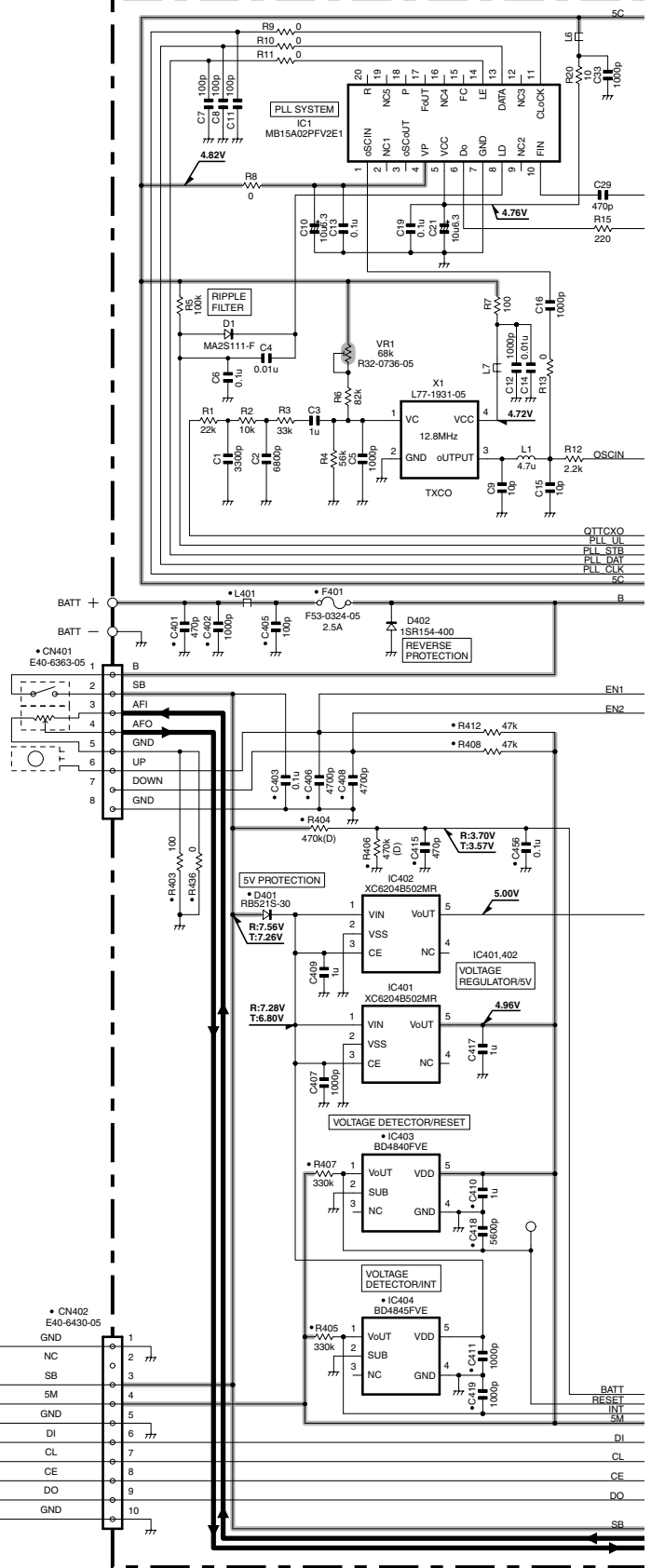
TK-3212L SCHEMATIC DIAGRAM

1
2
3
4
5
6
7

LCD ASSY (B38-0906-25)

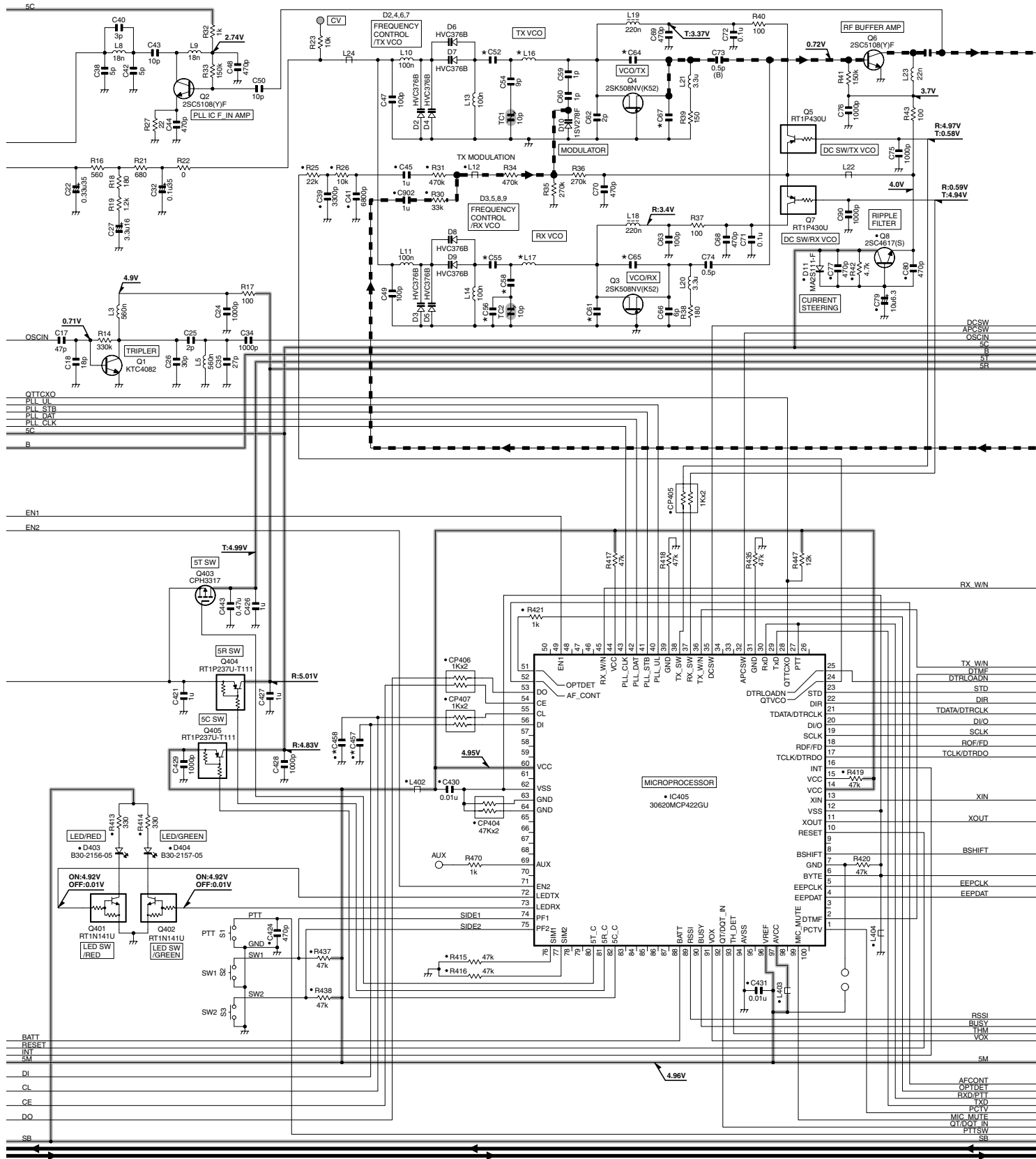


TX-RX UNIT (X57-7130-XX)



SCHEMATIC DIAGRAM TK-3212L

TX-RX UNIT (X57-7130-XX)

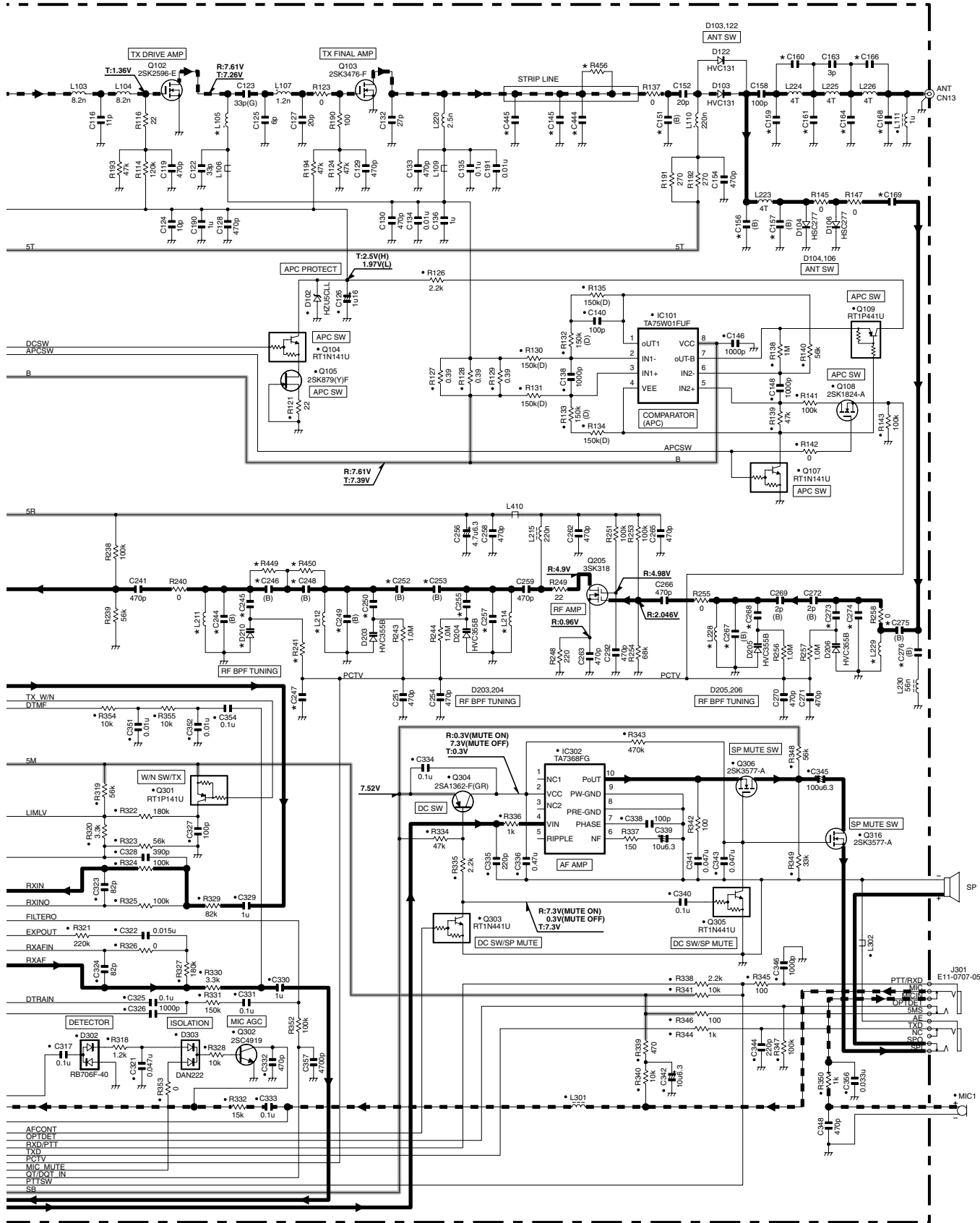


X57-7130-XX	L16	L17	C52	C55	C56	C58	C61	C64	C65	C67	C457	C458
-12	K.M	22n	27n	11p	11p	2p	6p	3p	4p	6p	5p	NO
-13	K2.M2	18n	22n	12p	12p	NO	9p	4p	5p	5p	7p	470p

SCHEMATIC DIAGRAM TK-3212L

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

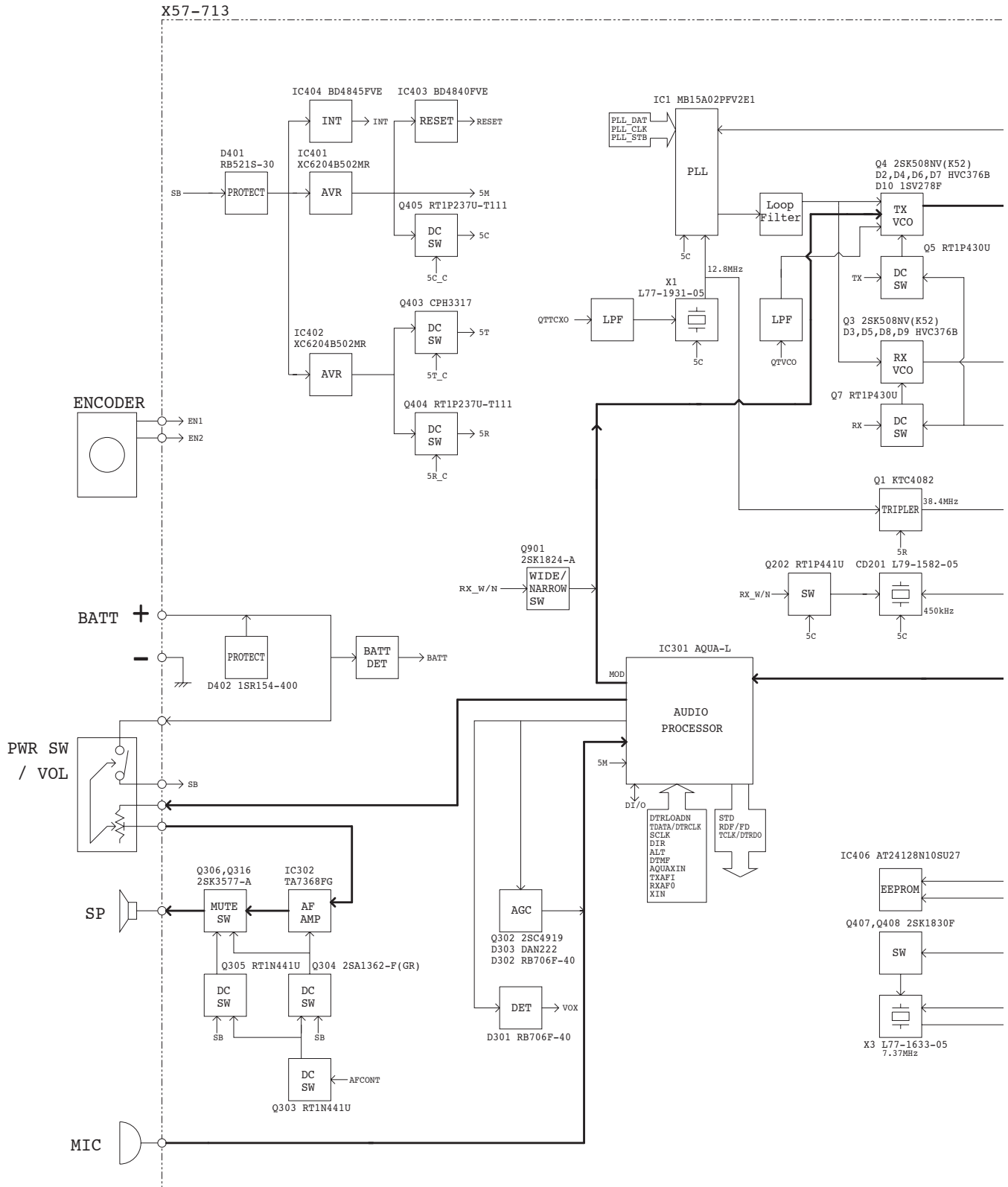
TX-RX UNIT (X57-7130-XX)



X57-7130-XX	D210	L105	L211	L212	L214	L228	L229	R241	R449	R450	R456	C145	C151	C156	C157	C159	C160	C161	C164	C166	C168	C169	
-12	K,M	HVC355B	15n	8.2n	8.2n	8.2n	8.2n	1.0M	NO	NO	NO	16p	NO	5p	2.5p	2p	2p	2p	5p	0.75p	1p	5p	5p
-13	K2,M2	NO	NO	22n	NO	6.8n	6.8n	6.8n	NO	0	0	0	18p	7p	3.5p	4p	1.5p	6p	6p	1.5p	0.3p	9p	9p

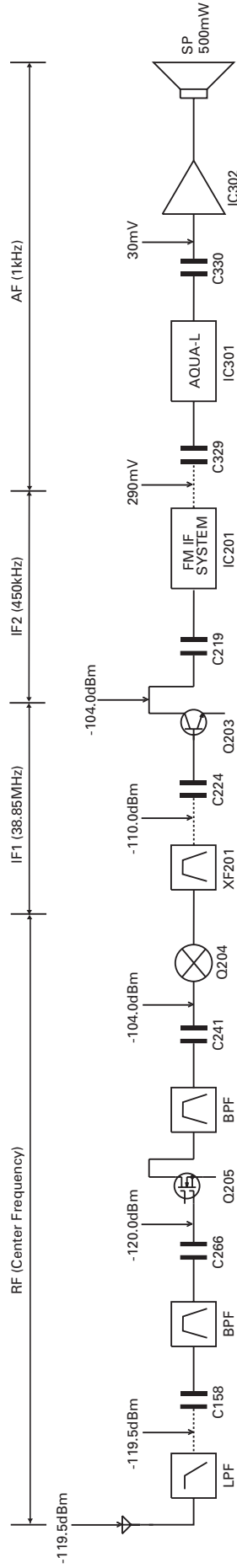
X57-7130-XX	C244	C245	C246	C247	C248	C249	C250	C252	C253	C255	C257	C267	C268	C273	C274	C275	C276	C444	C445
-12	K,M	3p	22p	1p	470p	2p	5p	22p	2p	22p	3.5p	3.5p	22p	22p	2p	2p	2.5p	7p	7p
-13	K2,M2	NO	NO	NO	NO	NO	NO	18p	1.5p	1p	18p	4.5p	18p	18p	1.5p	2.5p	2p	NO	20p

BLOCK DIAGRAM



LEVEL DIAGRAM

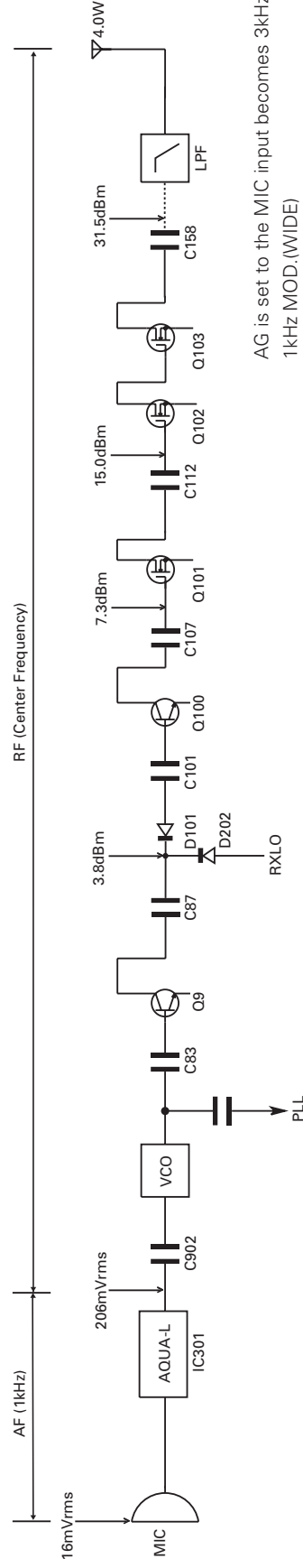
Receiver Section



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.

OPTIONAL ACCESSORIES

KSC-35 (RAPID CHARGER)

■ External View



■ Specifications

Charging time KNB-45L : Approx. 180 minutes
 Dimensions (Charger only) 86.3W x 43.2H x 100.0D (mm)
 3-3/8W x 1-45/64 x 4D (inches)
 Weight (Charger only) Approx. 90g / 0.2 lbs

KNB-45L (Li-ion BATTERY PACK)

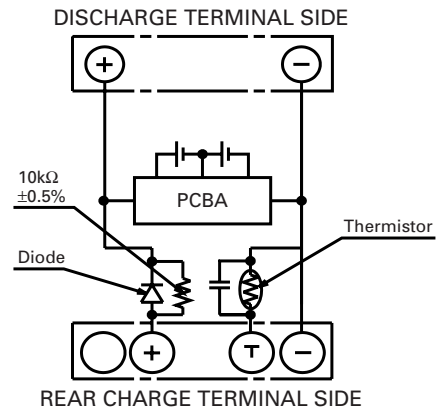
■ External View



■ Specifications

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

■ Schematic Diagram



TK-3212L

SPECIFICATIONS

General

Frequency Range	450~490MHz (K,M) 470~512MHz (K2,M2)
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-45L(2000mAh) : Approx.12 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-45L 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 (K,M) 42MHz (K2,M2)
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-45L (2000mAh 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-45L (2000mAh battery)	10.6 oz (300g)

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

Receiver (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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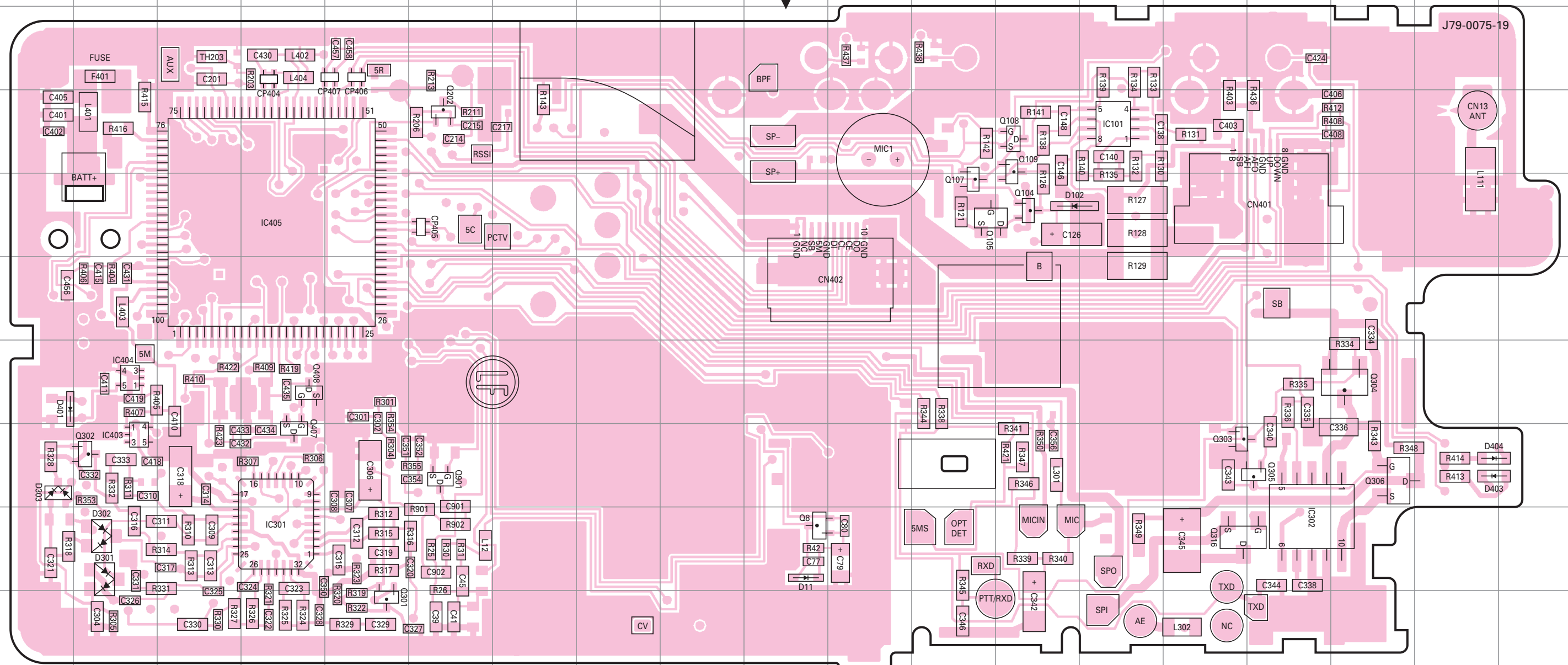


TK-3212L PC BOARD

PC BOARD TK-3212L

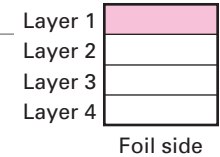
TX-RX UNIT (X57-7130-XX) -12 : K,M -13 : K2,M2
Component side view (J79-0075-19)

TX-RX UNIT (X57-7130-XX) -12 : K,M -13 : K2,M2
Component side view (J79-0075-19)



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		

Component side



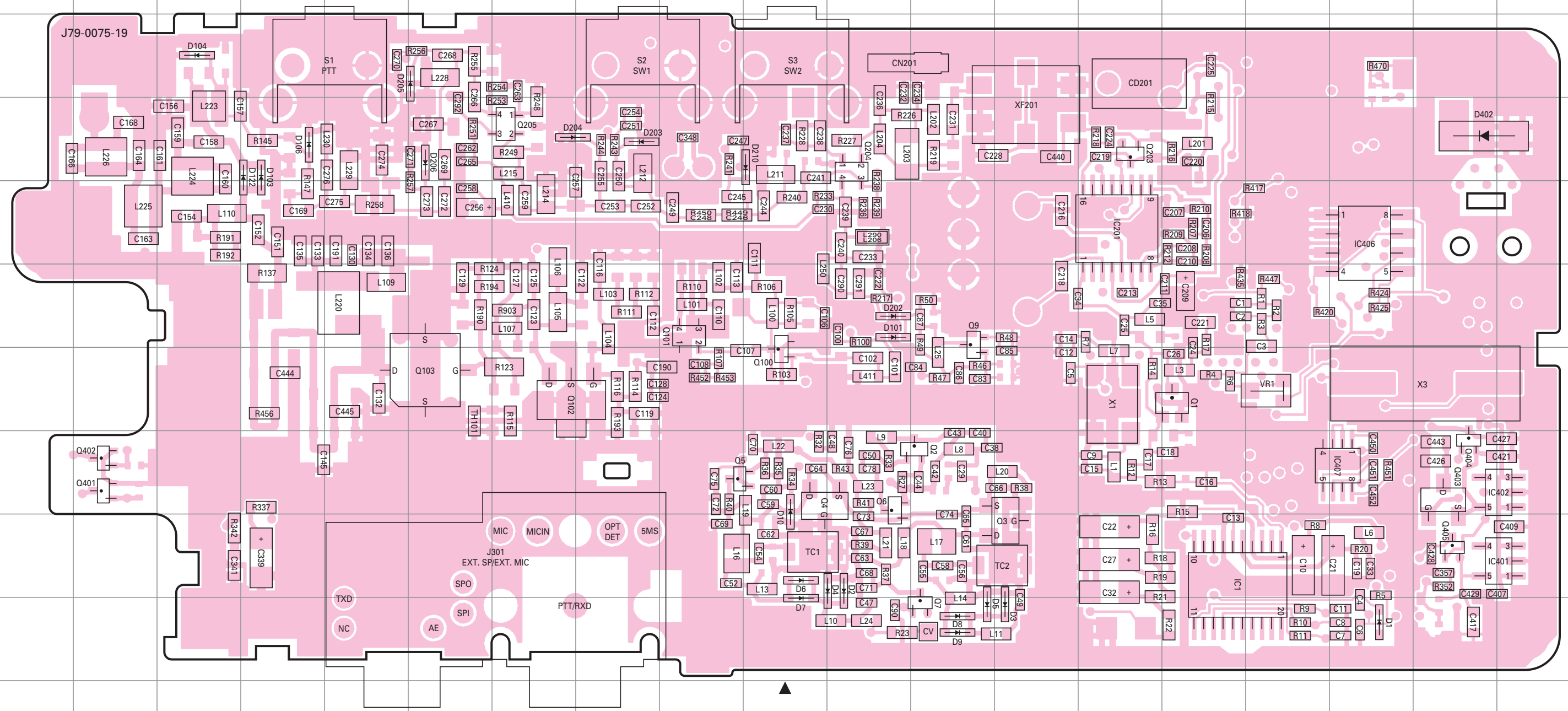
Foil side

TK-3212L PC BOARD

PC BOARD TK-3212L

TX-RX UNIT (X57-7130-XX) -12 : K,M -13 : K2,M2
Foil side view (J79-0075-19)

TX-RX UNIT (X57-7130-XX) -12 : K,M -13 : K2,M2
Foil side view (J79-0075-19)



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

