UHF FM TRANSCEIVER

TK-3201

SERVICE MANUAL

KENWOOD

B51-8696-00 (S) 493

CONTENTS

GENERAL

INTRODUCTION

SCOPE OF THIS MANUAL

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

ORDERING REPLACEMENT PARTS

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

PERSONAL SAFETY

The following precautions are recommended for personal safety:

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

SERVICE

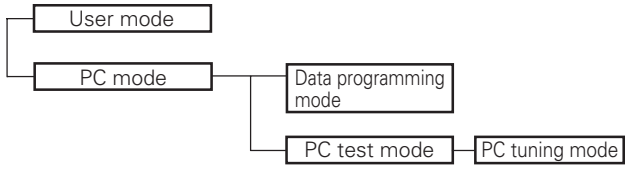
This radio is designed for easy servicing. Refer to the schematic diagrams, printed circuit board views, and alignment procedures contained within.

TK-3201

Destination	Number of CH	Frequency No. / Frequency / Signalling			RF power output
E, T	16 channel	CH1	446.00625MHz	94.8Hz	0.5W
		CH2	446.09375MHz	88.5Hz	
		CH3	446.03125MHz	103.5Hz	
		CH4	446.06875MHz	79.7Hz	
		CH5	446.04375MHz	118.8Hz	
		CH6	446.01875MHz	123.0Hz	
		CH7	446.08125MHz	127.3Hz	
		CH8	446.05625MHz	85.4Hz	
		CH9	446.00625MHz	107.2Hz	
		CH10	446.09375MHz	110.9Hz	
		CH11	446.03125MHz	114.8Hz	
		CH12	446.06875MHz	82.5Hz	
		CH13	446.04375MHz	132N	
		CH14	446.01875MHz	155N	
		CH15	446.05625MHz	134N	
		CH16	446.08125MHz	243N	

REALIGNMENT

1. Modes

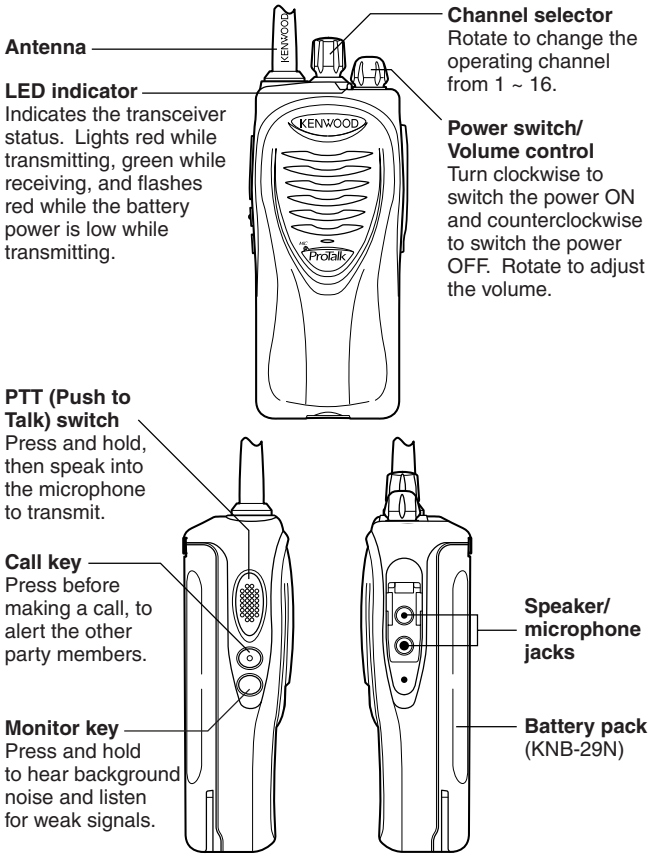


Mode	Function
User mode	For normal use.
PC mode	Used for communication between the radio and PC (IBM compatible).
Data programming mode	Used to read and write frequency data and other features to and from the radio.
PC test mode	Used to check the radio using the PC. This feature is included in the KPG-90D.

2. How to Enter Each Mode

Mode	Operation
User mode	Power ON
PC mode	Received commands from PC

3. Getting Acquainted



4. PC Mode

4-1. Preface

The TK-3201 transceiver is programmed using a personal computer, a programming interface (KPG-22) and programming software (KPG-90D).

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

4-2. Connection procedure

1. Connect the TK-3201 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 radio 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 personal computer must match the model type when it is written into the EEPROM.
- Change the TK-3201 to PC mode, then attach the interface cable.

4-3. KPG-22 description (PC programming interface cable: Option)

The KPG-22 is required to interface the TK-3201 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-3201 to the computer's RS-232C serial port.

4-4. Programming software description

KPG-90D is the programming software for TK-3201 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-3201 and edited on the screen. The programmed or edited data can be printed out. It is also possible to tune the transceiver.

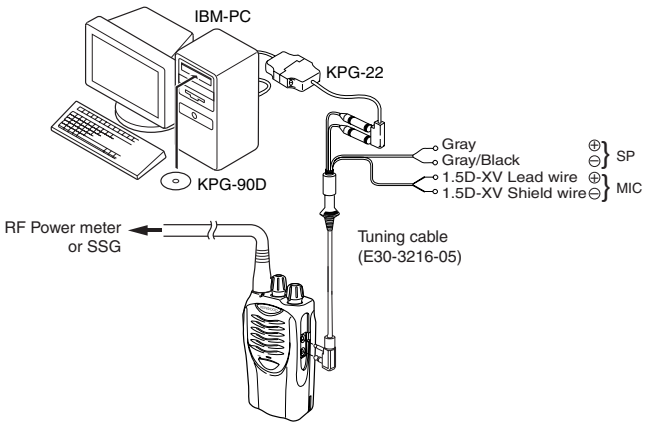
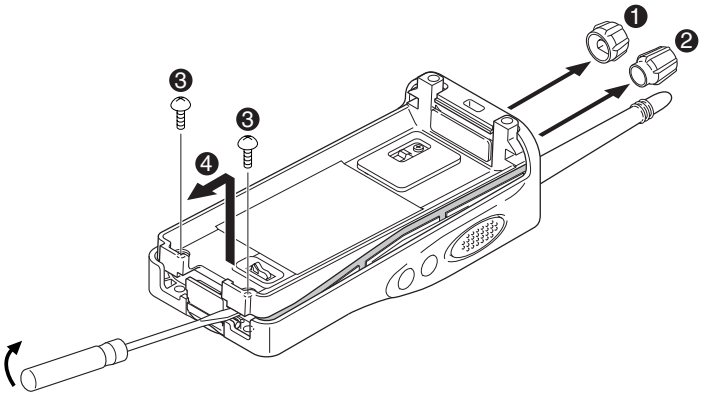


Fig. 1

DISASSEMBLY FOR REPAIR

■ Removing the case assembly from the chassis.

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

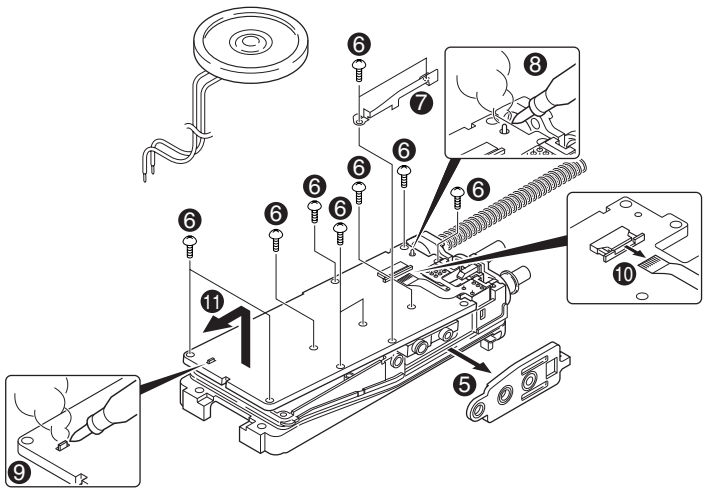


■ Removing the TX-RX unit from the chassis.

1. Remove the packing ❺ from the SP / MIC jack of the TX-RX unit.
2. Remove the eleven screws ❻ fixing the TX-RX unit.
3. Remove the fixing bracket ❼ of the SP / MIC.
4. Remove the solder of the antenna terminal with a soldering iron ❽.
5. Remove the solder of the positive terminal with a soldering iron ❾.

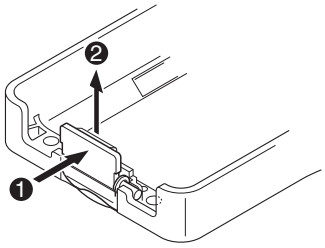
Note: You can remove the TX-RX unit from the chassis without removing the solder at the positive terminal. However, in this case, you can not attach the packing (G53-1605-03) that is on the positive terminal to the chassis in assembling. So, it is advisable to remove the solder on the positive terminal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

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



■ 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 ❶.
2. Lift and remove the battery release lever from the case assembly ❷.



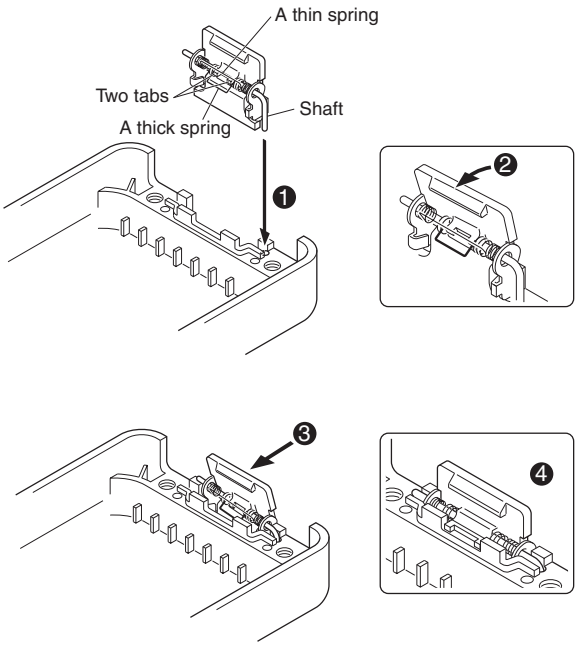
■ Attaching the battery release lever to the case assembly.

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

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

2. Tilt the battery release lever slightly forward ❷, 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 ❸ until it snaps into place ❹.

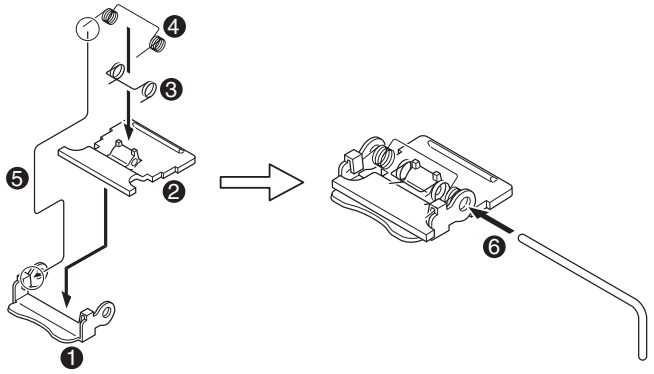
Caution : Be careful not to tilt the battery release lever too forward.
If the battery release lever is pushed in this state where the two tabs come below the case surface, there is a possibility of damaging the two tabs.



DISASSEMBLY FOR REPAIR

■ Assembling the battery release lever

1. Place the lever ❷ onto the stopper ❶.
2. Place the thick spring ❸ onto the lever.
3. Hook the right and left ends of the thin spring ❹ onto the tabs of the stopper, then place the thin spring onto the lever ❺.
4. Slide the shaft through the hole of the stopper and lever ❻.

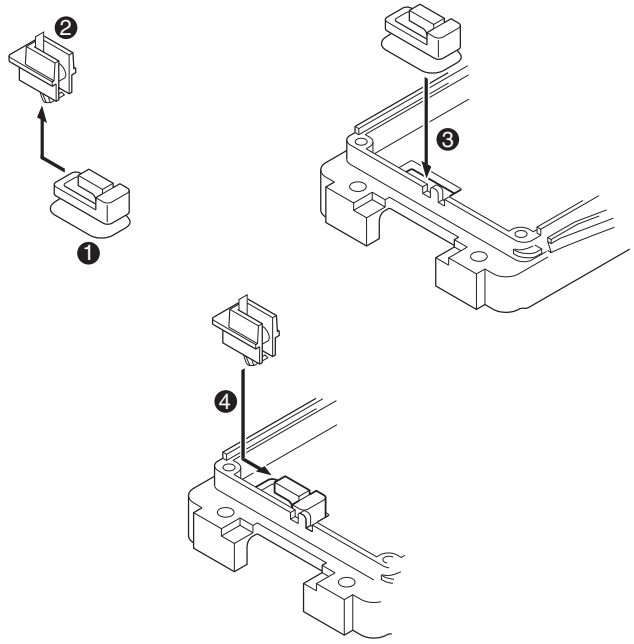


■ Cautions for assembly

1. Attaching the positive terminal to the chassis.

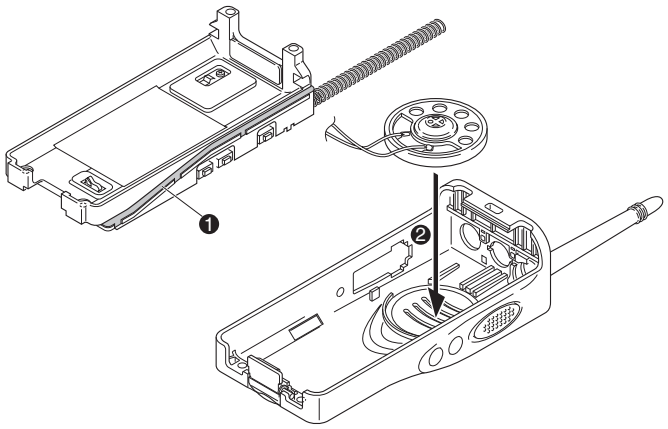
Always attach the positive terminal to the chassis, using the following procedures, before mounting the TX-RX unit onto the chassis.

1. Remove the holder assembly ❷ from the packing ❶ of the positive terminal.
2. Mount the packing of the positive terminal into the chassis hole ❸.
3. Mount the holder assembly into the packing of the positive terminal ❹.



2. 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 ❶.
2. Twist the speaker wires twice, then attach the speaker to the speaker recess of the case assembly ❷. Make sure the speaker is securely inserted.



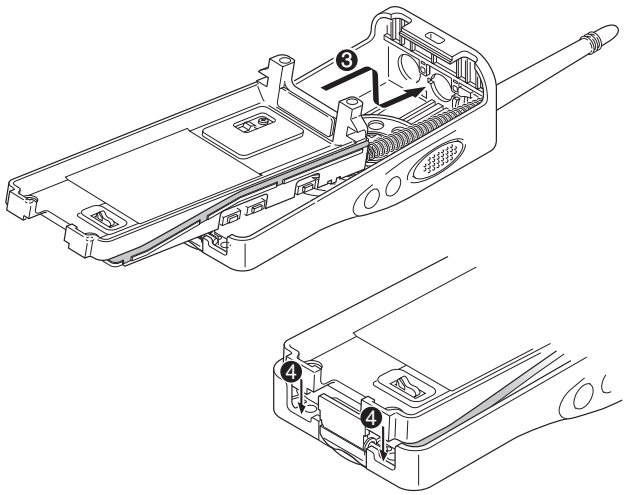
Confirm that the waterproof packing is securely inserted in the groove of the chassis.

3. Insert the antenna element into the cover ❸.

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

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

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



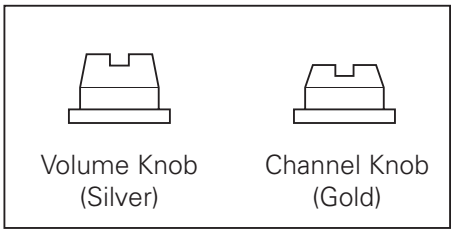
DISASSEMBLY FOR REPAIR

3. 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)

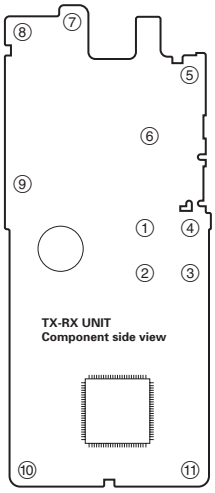
Use the following jig when removing the nuts of the volume knob and channel knob.

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



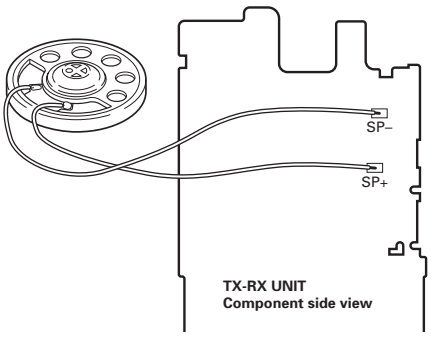
4. Screw sequence for mounting the TX-RX unit to the chassis.

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



5. Connecting the speaker wires to the TX-RX unit

Note: To connect the speaker wires, you must solder it to the location of the TX-RX unit as illustrated below.



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.

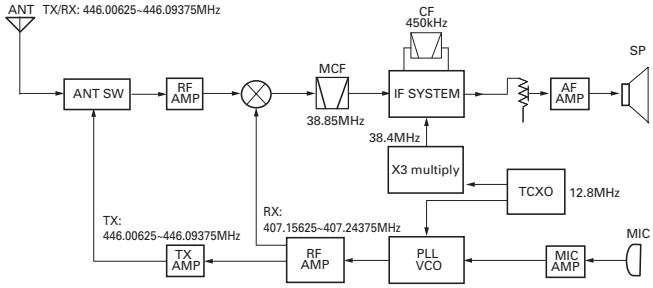


Fig. 1 Frequency configuration

2. Receiver

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

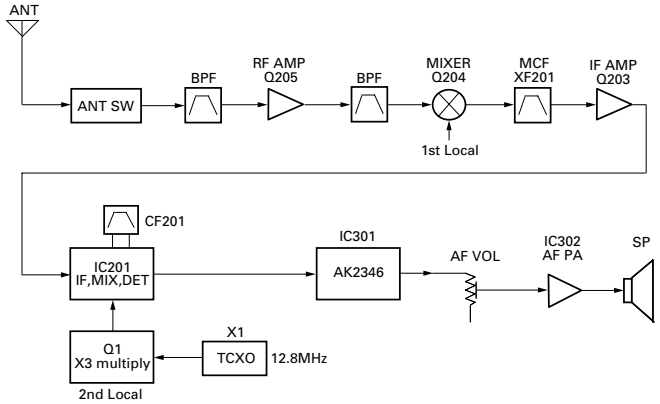


Fig. 2 Receiver section

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 goes to the mixer. These BPFs are fixed.

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 opitimun 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) 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.

5) 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)

6) Receive Signalling

(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.

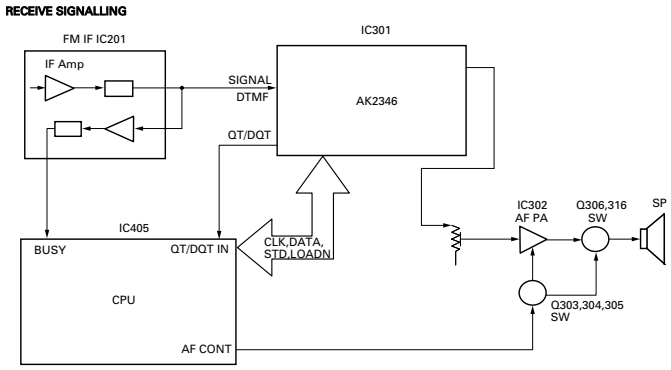


Fig. 3 AF amplifier and squelch

CIRCUIT DESCRIPTION

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 5 or 6.25kHz.
A 12.8MHz reference an 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. 4)

2) VCO

The operating frequency is generated by Q4. 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). The RX pin is set high in receive mode causing Q5 turn on.
The TX pin is set high in transmit mode. The output from Q4 is amplified by Q6 and sent to the RF amplifiers.

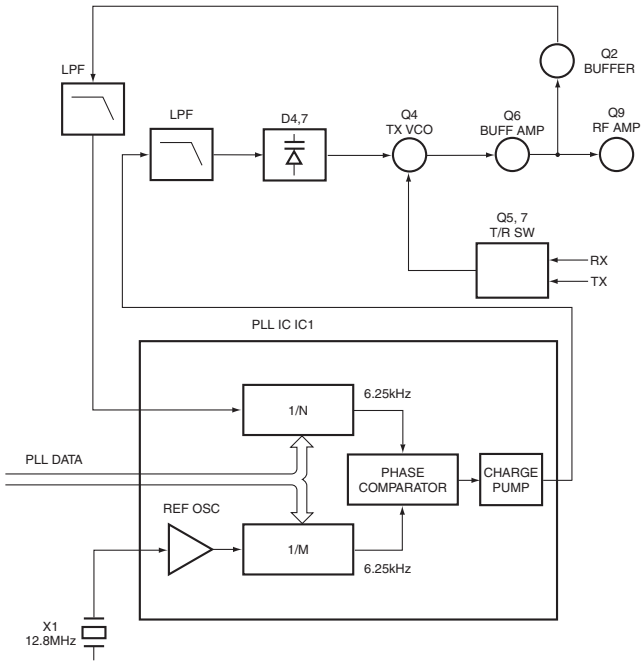


Fig. 4 PLL circuit

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.

4. Transmitter System

1) Microphone Amplifier

The signal from the microphone passes through IC301. The signal passes through the Audio processor (IC301) for the maximum deviation adjustment and necessary process as pre-emphasized, and goes to the VCO modulation input.

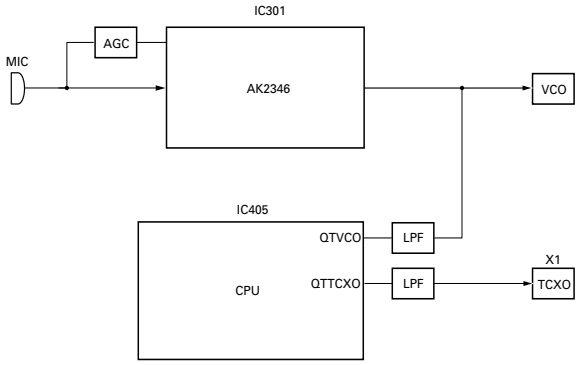


Fig. 5 Microphone amplifier

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 0.5W. 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.

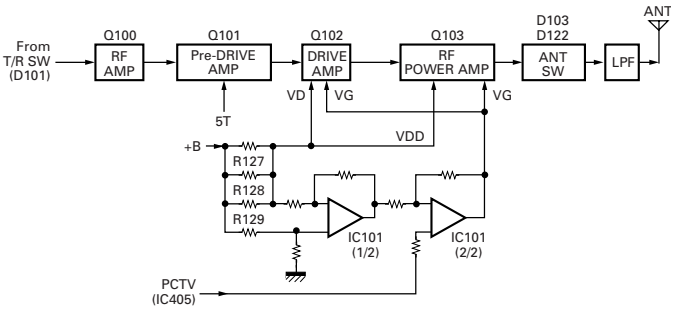


Fig. 6 Drive and final amplifier and APC circuit

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, Drive amplifier and Pre-Drive amplifier to make both voltages the same. The change of power high/low is carried out by the change of the reference voltage.

CIRCUIT DESCRIPTION

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.

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. 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) 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.

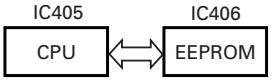


Fig. 7 Memory circuit

2) Low Battery Warning

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

(1) The red LED blinks when the battery voltage falls below the voltage (1) shown in the table during transmission.

Note:

The transceiver checks the battery voltage during reception even when, in the FPU, the Battery Warning status function is set to "On TX" (default setting).

However, the LED does not blink during reception. During transmission, the LED blinks to generate the warning tone of a low battery voltage.

(2) The transceiver immediately stops transmission when the battery voltage falls below the voltage (2) shown in the table. A message tone beeps while the PTT switch is released.

	Ni-Cd Battery	Ni-MH Battery
(1)	6.2[V]	6.2[V]
(2)	5.9[V]	5.9[V]

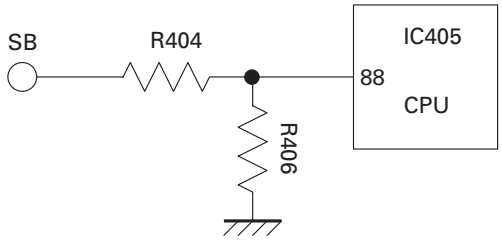


Fig. 8 Low battery warning

7. Control System

Keys and channel selector circuit.

The signal from keys and channel selector input to microprocessor directly as shown in fig. 9.

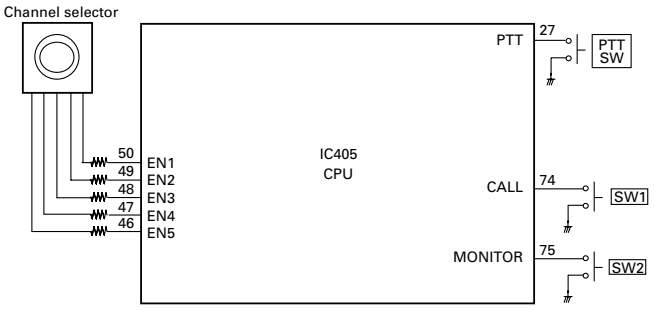


Fig. 9 Control system

TERMINAL FUNCTION / SEMICONDUCTOR DATA

TERMINAL FUNCTION

■ CN401

Pin No.	Name	I/O	Function
1	B	I	B (Battery Voltage)
2	SB	O	Switched B
3	SP1	I	Audio input
4	SP2	O	Audio output
5	GND	-	GND
6	EN1	I	Encoder pulse input
7	EN2	I	Encoder pulse input
8	GND	-	GND
9	EN3	I	Encoder pulse input
10	EN4	I	Encoder pulse input
11	EN5	I	Encoder pulse input

SEMICONDUCTOR DATA

Microprocessor : 30622MAA-B91GP (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	NC	-	NC
24	QT VCO	O	QT/DQT output
25	NC	-	NC
26	1/2 OSC	O	3.6864 MHz (7.3728 MHz/2)
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
46	EN5	I	Channel selectable input
47	EN4	I	Channel selectable input
48	EN3	I	Channel selectable input
49	EN2	I	Channel selectable input
50	EN1	I	Channel selectable input
51	OPTDET	I	Headset input detect
52	AF_CONT	O	Speaker mute
53	Calling Alert SW	O	Calling alert switch
54-59	NC	-	NC
60	VCC	-	+5V
61	NC	-	NC
62	VSS	-	GND
63-64	GND	-	GND
65-71	NC	-	NC
72	LEDTX	O	Red LED lights control output
73	LEDRX	O	Green LED lights control output
74	PF1	I	Call key input
75	PF2	I	Monitor 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

TX-RX UNIT (X57-6972-70)

Ref. No.	Use/Function	Operation/Condition
IC1	IC	PLL system
IC101	IC	Comparator (APC)
IC201	IC	FM IF system
IC301	IC	Audio processor
IC302	IC	AF AMP
IC401	IC	Voltage Regulator/ 5V
IC402	IC	Voltage Regulator/ 5V
IC403	IC	Voltage detector / Reset
IC404	IC	Voltage detector / Int
IC405	IC	Microprocessor
IC406	IC	EEPROM
IC408	IC	MIC AMP
Q1	Transistor	Tripler
Q2	Transistor	PLL IC f_in AMP
Q4	FET	VCO
Q6	Transistor	RF Buffer AMP
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
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
Q317	Transistor	Caller Alert
Q401	Transistor	LED switch / Red
Q402	Transistor	LED switch / Green
Q403	FET	5T switch
Q404	FET	5R switch
Q405	Transistor	5C switch
Q407	FET	Beat Shift switch
Q408	FET	Beat Shift switch

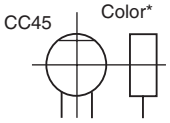
Ref. No.	Use/Function	Operation/Condition
D1	Diode	Ripple Filter
D2	Variable Capcitance Diode	Frequency control
D4	Variable Capcitance Diode	Frequency control
D6	Variable Capcitance Diode	Frequency control
D7	Variable Capcitance Diode	Frequency control
D10	Variable Capcitance Diode	Modulator
D11	Diode	Current steering
D101	Diode	TX/RX RF switch
D102	Zener Diode	APC protect
D103	Diode	ANT switch
D104	Diode	ANT switch
D106	Diode	ANT switch
D122	Diode	ANT switch
D202	Diode	TX/RX RF switch
D301	Diode	Detector
D302	Diode	Detector
D303	Diode	Isolation
D401	Diode	5V Protection
D402	Diode	Reverse Protection
D403	LED	LED/ Red
D404	LED	LED/ Green
D405	Zener Diode	Limiter

PARTS LIST

CAPACITORS

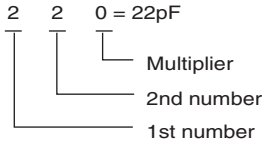
CC 45 TH 1H 220 J
1 2 3 4 5 6

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/℃	0	-80	-150	-220	-330	-470	-750

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

Example : CC45TH = -470 ± 60ppm/℃

· Tolerance (More than 10pF)

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

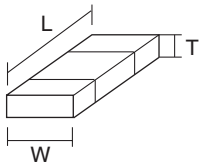
Dimension code	L	W	T
Empty	5.6 ±0.5	5.0 ±0.5	Less than 2.0
A	4.5 ±0.5	3.2 ±0.4	Less than 2.0
B	4.5 ±0.5	2.0 ±0.3	Less than 2.0
C	4.5 ±0.5	1.25 ±0.2	Less than 1.25
D	3.2 ±0.4	2.5 ±0.3	Less than 1.5
E	3.0 ±0.2	1.6 ±0.2	Less than 1.25
F	2.0 ±0.3	1.25 ±0.2	Less than 1.25
G	1.6 ±0.2	0.8 ±0.2	Less than 1.0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

RESISTORS

· Chip resistor (Carbon)

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

Dimension



· Carbon resistor (Nomal type)

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

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

Dimension (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		

PARTS LIST

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

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

TK-3201 (Y50-593X-XX)
TX-RX UNIT (X57-6972-70)

Ref. No.	Address	New parts	Parts No.	Description	Destination
TK-3201					
1	1A	∗	A02-3888-03	CABINET ASSY(16CH)	
2	3A		A10-4078-31	CHASSIS	
3	1B		A21-1644-13	DRESSING PANEL	
4	2C		B09-0680-03	CAP(SP/MIC) ACCESSORY	
5	2B		B11-1817-04	ILLUMINATION GUIDE	
6	1B		B43-1156-04	BADGE(KENWOOD)	
7	1A		B43-1173-04	BADGE	
8	1C		B62-1807-10	INSTRUCTION MANUAL	
9	1A		D10-0649-03	LEVER	
10	1A		D21-0863-04	SHAFT	
11	1A		D32-0441-03	STOPPER	
13	3A		E23-1253-04	TERMINAL(BATT-)	
15	2B	∗	E37-1157-05	PROCESSED LEAD WIRE(SP+)	
16	2B	∗	E37-1158-05	PROCESSED LEAD WIRE(SP-)	
17	1B	∗	F07-1882-03	COVER(ANT)	
18	3A		F20-3353-14	INSULATING SHEET(CHASSIS BATT+)	
19	2A		G01-4542-04	COIL SPRING(LEVER)	
20	1A		G01-4543-04	COIL SPRING(STOPPER)	
21	2B		G10-1330-04	FIBROUS SHEET(IC302:AUDIO IC)	
22	2A		G11-4283-04	RUBBER SHEET(Q103:FINAL FET)	
23	2A		G11-4313-04	SHEET(MIC ELEMENT)	
24	1A		G11-4319-04	SHEET(PTT)	
25	3A		G13-2033-04	CUSHION(TERMINAL BATT-)	
26	3B		G13-2034-14	CUSHION(TERMINAL BATT-)	
27	2B		G13-2037-04	CUSHION(CHASSIS VOL/CH)	
28	3A		G13-2038-14	CUSHION(CHASSIS-CERAMIC FILTER)	
29	2A		G13-2039-04	CUSHION(PCB-CERAMIC FILTER)	
30	3B		G13-2045-04	CUSHION(CHASSIS)	
31	2B	∗	G13-2076-04	CUSHION(SP)	
32	3A		G53-1604-03	PACKING(CHASSIS)	
33	3A		G53-1605-03	PACKING(TERMINAL BATT+)	
34	2B		G53-1606-03	PACKING(VOL/CH/LED)	
35	1B		G53-1607-03	PACKING(SP/MIC)	
36	2B		G53-1608-03	PACKING(SP)	
37	2A		G53-1609-14	PACKING(MIC ELEMENT)	
38	1B	∗	G53-1611-04	PACKING(ANT)	
40	2C	∗	H12-3172-05	PACKING FIXTURE	
41	2C	∗	H13-2112-03	CARTON BOARD	
42	1C		H25-0085-04	PROTECTION BAG (100/200/0.07)	
43	3C	∗	H52-2065-02	ITEM CARTON CASE	
44	1D		J19-5472-03	HOLDER(SP/MIC) ACCESSORY	
45	2A		J19-5473-03	HOLDER ASSY(TERMINAL BATT+)	
46	2B		J21-8477-04	HARDWARE FIXTURE(VOL/CH)	
47	2B		J21-8478-04	HARDWARE FIXTURE(SP/MIC)	
48	2D		J29-0713-05	BELT CLIP ACCESSORY	
49	2B		J82-0092-05	FPC	
50	1A		K29-9307-13	BUTTON KNOB(CALL/MONITOR)	
51	1A		K29-9308-03	BUTTON KNOB(PTT)	
52	1B		K29-9309-03	KNOB(VOL)	
53	1B		K29-9318-03	KNOB(CH)	
A	2B	∗	N14-0818-04	CIRCULAR NUT(CH KNOB)	
B	2B		N14-0819-04	CIRCULAR NUT(VOL KNOB)	
D	3A		N30-2606-46	PAN HEAD MACHINE SCREW(CHASSIS)	
E	2A,2B,3B		N83-2005-46	PAN HEAD TAPTITE SCREW(PCB)	
54	1D		N99-2043-05	SCREW SET ACCESSORY	
55	3B		R31-0653-05	VARIABLE RESISTOR(POWER SW/VOL)	
56	2B		S60-0427-05	ROTARY SWITCH(16CH)	
57	2B		T07-0369-05	SPEAKER	
58	2B	∗	T90-1043-05	ANTENNA ELEMENT	
59	2D		W08-0969-05	CHARGER ACCESSORY	
60	3D		W08-0971-05	AC ADAPTER(2PIN) ACCESSORY	E
60	3D	∗	W08-0972-05	AC ADAPTER(3PIN) ACCESSORY	T
TX-RX UNIT (X57-6972-70)					
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			CC73HCH1H100C	CHIP C 10PF C	
C10			C92-0713-05	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			CC73HCH1H100C	CHIP C 10PF C	
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			C92-0713-05	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 C 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	
C45			CK73GB1A105K	CHIP C 1.0UF K	

PARTS LIST

TX-RX UNIT (X57-6972-70)

Ref. No.	Address	New parts	Parts No.	Description	Destination
C47			CC73HCH1H101J	CHIP C 100PF J	
C48			CK73HB1H471K	CHIP C 470PF K	
C50			CC73HCH1H100C	CHIP C 10PF C	
C52			CC73HCH1H120J	CHIP C 12PF J	
C54			CC73HCH1H060B	CHIP C 6.0PF B	
C59			CC73HCH1H1R5B	CHIP C 1.5PF B	
C60			CC73HCH1H010B	CHIP C 1.0PF B	
C62			CC73HCH1H030B	CHIP C 3.0PF B	
C64			CC73HCH1H040B	CHIP C 4.0PF B	
C67			CC73HCH1H040B	CHIP C 4.0PF B	
C69 ,70			CK73HB1H471K	CHIP C 470PF K	
C72			CK73HB1A104K	CHIP C 0.10UF K	
C73			CC73HCH1H0R5B	CHIP C 0.5PF B	
C75 ,76			CK73HB1H102K	CHIP C 1000PF K	
C77			CK73HB1H471K	CHIP C 470PF K	
C78			CC73HCH1H330J	CHIP C 33PF J	
C79			C92-0713-05	CHIP-TAN 10UF 6.3WV	
C80			CK73HB1H471K	CHIP C 470PF K	
C83			CC73HCH1H150J	CHIP C 15PF J	
C84 -86			CK73HB1H102K	CHIP C 1000PF K	
C87			CC73HCH1H100C	CHIP C 10PF C	
C100			CK73HB1H471K	CHIP C 470PF K	
C101			CK73GB1H471K	CHIP C 470PF K	
C102			CC73GCH1H120J	CHIP C 12PF J	
C106			CK73HB1H471K	CHIP C 470PF K	
C107			CC73GCH1H060B	CHIP C 6.0PF B	
C108			CK73GB1H471K	CHIP C 470PF K	
C110,111			CK73GB1H471K	CHIP C 470PF K	
C112			CC73GCH1H070D	CHIP C 7.0PF D	
C113			CK73GB1C104K	CHIP C 0.10UF K	
C116			CC73GCH1H030B	CHIP C 3.0PF B	
C119			CK73GB1H471K	CHIP C 470PF K	
C122			CC73GCH1H330J	CHIP C 33PF J	
C123			CC73GCH1H060B	CHIP C 6.0PF B	
C124			CC73HCH1H100C	CHIP C 10PF C	
C125			CC73GCH1H030B	CHIP C 3.0PF B	
C126			C92-0004-05	CHIP-TAN 1.0UF 16WV	
C127			CC73GCH1H4R5B	CHIP C 4.5PF B	
C128			CK73HB1H471K	CHIP C 470PF K	
C129			CK73GB1H471K	CHIP C 470PF K	
C130			CK73HB1H471K	CHIP C 470PF K	
C132			CC73GCH1H030B	CHIP C 3.0PF B	
C133			CK73GB1H471K	CHIP C 470PF K	
C134			CK73GB1H103K	CHIP C 0.010UF K	
C135			CK73GB1C104K	CHIP C 0.10UF K	
C136			CK73GB1A105K	CHIP C 1.0UF K	
C138			CK73GB1H102K	CHIP C 1000PF K	
C140			CC73GCH1H101J	CHIP C 100PF J	
C144			CK73GB1H102K	CHIP C 1000PF K	
C145			CC73GCH1H110J	CHIP C 11PF J	
C146			CK73GB1H102K	CHIP C 1000PF K	
C148			CK73GB1H102K	CHIP C 1000PF K	
C149			CC73GCH1H040B	CHIP C 4.0PF B	
C152			CC73GCH1H200J	CHIP C 20PF J	
C154			CK73GB1H471K	CHIP C 470PF K	
C156			CC73GCH1H040B	CHIP C 4.0PF B	
C157			CC73GCH1H2R5B	CHIP C 2.5PF B	
C158			CC73GCH1H101J	CHIP C 100PF J	
C159			CC73GCH1H020C	CHIP C 2.0PF C	
C160			CC73GCH1H020B	CHIP C 2.0PF B	

Ref. No.	Address	New parts	Parts No.	Description	Destination
C161			CC73GCH1H050B	CHIP C 5.0PF B	
C163			CC73GCH1H2R5B	CHIP C 2.5PF B	
C164			CC73GCH1H050B	CHIP C 5.0PF B	
C169			CC73GCH1H060B	CHIP C 6.0PF B	
C170			CC73GCH1H150J	CHIP C 15PF J	
C171			CK73GB1H102K	CHIP C 1000PF K	
C190			CK73GB1A105K	CHIP C 1.0UF K	
C191			CK73GB1H103K	CHIP C 0.010UF K	
C201			CK73GB1A224K	CHIP C 0.22UF K	
C205			CK73HB1H102K	CHIP C 1000PF K	
C206			CK73HB1A104K	CHIP C 0.10UF K	
C207			CK73HB1H182K	CHIP C 1800PF K	
C208			CK73HB1H471K	CHIP C 470PF K	
C209			C92-0713-05	CHIP-TAN 10UF 6.3WV	
C210			CK73HB1H471K	CHIP C 470PF K	
C211			CK73HB1C103K	CHIP C 0.010UF K	
C213			CK73HB1A104K	CHIP C 0.10UF K	
C214			CC73HCH1H680J	CHIP C 68PF J	
C215			CK73HB1H102K	CHIP C 1000PF K	
C216			CK73GB1C104K	CHIP C 0.10UF K	
C217			CK73HB1A104K	CHIP C 0.10UF K	
C218			CK73GB1C104K	CHIP C 0.10UF K	
C219			CC73HCH1H330J	CHIP C 33PF J	
C220			CK73HB1H102K	CHIP C 1000PF K	
C221			CK73GB1C104K	CHIP C 0.10UF K	
C222			CK73HB1H102K	CHIP C 1000PF K	
C224,225			CK73HB1C103K	CHIP C 0.010UF K	
C228			CC73GCH1H100C	CHIP C 10PF C	
C230			CK73HB1C103K	CHIP C 0.010UF K	
C231			CK73GB1H103K	CHIP C 0.010UF K	
C232			CK73HB1C103K	CHIP C 0.010UF K	
C233			CC73GCH1H060B	CHIP C 6.0PF B	
C234			CK73HB1H102K	CHIP C 1000PF K	
C236			CC73GCH1H180J	CHIP C 18PF J	
C237			CK73HB1H102K	CHIP C 1000PF K	
C238			CK73GB1C104K	CHIP C 0.10UF K	
C239			CK73GB1H102K	CHIP C 1000PF K	
C240			CC73GCH1H3R5B	CHIP C 3.5PF B	
C241			CK73GB1H471K	CHIP C 470PF K	
C249			CC73GCH1H060B	CHIP C 6.0PF B	
C252			CC73GCH1H1R5B	CHIP C 1.5PF B	
C253			CC73GCH1H020B	CHIP C 2.0PF B	
C256			C92-0714-05	CHIP-TAN 4.7UF 6.3WV	
C257			CC73GCH1H100C	CHIP C 10PF C	
C258			CK73HB1H471K	CHIP C 470PF K	
C259			CK73GB1H471K	CHIP C 470PF K	
C262,263			CK73HB1H471K	CHIP C 470PF K	
C265			CK73HB1H471K	CHIP C 470PF K	
C266			CK73GB1H471K	CHIP C 470PF K	
C267			CC73GCH1H090B	CHIP C 9.0PF B	
C269			CC73GCH1H1R5B	CHIP C 1.5PF B	
C272			CC73GCH1H020B	CHIP C 2.0PF B	
C274			CC73GCH1H070B	CHIP C 7.0PF B	
C275			CC73GCH1H2R5B	CHIP C 2.5PF B	
C276			CC73GCH1H3R5B	CHIP C 3.5PF B	
C290			CC73GCH1H020B	CHIP C 2.0PF B	
C291			CC73GCH1H060B	CHIP C 6.0PF B	
C292			CK73HB1H102K	CHIP C 1000PF K	
C301			CK73HB1H392K	CHIP C 3900PF K	
C302			CK73HB1H271K	CHIP C 270PF K	

PARTS LIST

TX-RX UNIT (X57-6972-70)

Ref. No.	Address	New parts	Parts No.	Description	Destination
C304			CK73GB1A224K	CHIP C 0.22UF K	
C306			C92-0714-05	CHIP-TAN 4.7UF 6.3WV	
C307,308			CK73HB1A104K	CHIP C 0.10UF K	
C309			CC73GCH1H820J	CHIP C 82PF J	
C310			CK73HB1A683K	CHIP C 0.068UF K	
C311			CK73GB1A105K	CHIP C 1.0UF K	
C312			CC73GCH1H120J	CHIP C 12PF J	
C313			CC73GCH1H221J	CHIP C 220PF J	
C314			CK73HB1A104K	CHIP C 0.10UF K	
C315			CK73GB1A105K	CHIP C 1.0UF K	
C316			CK73GB1C104K	CHIP C 0.10UF K	
C317			CK73HB1A104K	CHIP C 0.10UF K	
C318			C92-0714-05	CHIP-TAN 4.7UF 6.3WV	
C319			CC73GCH1H271J	CHIP C 270PF J	
C320			CK73HB1C103K	CHIP C 0.010UF K	
C321			CK73GB1A105K	CHIP C 1.0UF K	
C322			CK73HB1C153K	CHIP C 0.015UF K	
C323			CC73GCH1H820J	CHIP C 82PF J	
C324			CC73HCH1H820J	CHIP C 82PF J	
C327			CC73HCH1H101J	CHIP C 100PF J	
C328			CK73HB1H391K	CHIP C 390PF K	
C329,330			CK73GB1A105K	CHIP C 1.0UF K	
C332			CK73HB1H471K	CHIP C 470PF K	
C333,334			CK73GB1C104K	CHIP C 0.10UF K	
C335			CC73GCH1H221J	CHIP C 220PF J	
C336			CK73FB1C474K	CHIP C 0.47UF K	
C338			CC73GCH1H101J	CHIP C 100PF J	
C339			C92-0560-05	CHIP-TAN 10UF 6.3WV	
C340			CK73GB1C104K	CHIP C 0.10UF K	
C341			CK73GB1C473K	CHIP C 0.047UF K	
C342			C92-0560-05	CHIP-TAN 10UF 6.3WV	
C343			CK73GB1C473J	CHIP C 0.047UF J	
C344			CC73GCH1H221J	CHIP C 220PF J	
C345			C92-0665-05	TANTAL 100UF 6.3WV	
C346			CK73GB1H102K	CHIP C 1000PF K	
C348			CK73HB1H471K	CHIP C 470PF K	
C351,352			CK73HB1C103K	CHIP C 0.010UF K	
C354			CK73HB1A104K	CHIP C 0.10UF K	
C401			CK73GB1H471K	CHIP C 470PF K	
C402			CK73HB1H102K	CHIP C 1000PF K	
C403			CK73GB1C104K	CHIP C 0.10UF K	
C405			CC73GCH1H101J	CHIP C 100PF J	
C407			CK73HB1H102K	CHIP C 1000PF K	
C409,410			CK73GB1A105K	CHIP C 1.0UF K	
C411			CK73HB1H102K	CHIP C 1000PF K	
C415			CK73HB1H471K	CHIP C 470PF K	
C417			CK73GB1A105K	CHIP C 1.0UF K	
C418,419			CK73HB1H102K	CHIP C 1000PF K	
C421			CK73GB1A105K	CHIP C 1.0UF K	
C426,427			CK73GB1A105K	CHIP C 1.0UF K	
C428,429			CK73HB1H102K	CHIP C 1000PF K	
C430			CK73GB1H103K	CHIP C 0.010UF K	
C431			CK73HB1C103K	CHIP C 0.010UF K	
C432			CC73HCH1H050B	CHIP C 5.0PF B	
C433,434			CC73HCH1H030B	CHIP C 3.0PF B	
C435			CC73HCH1H050B	CHIP C 5.0PF B	
C436			CK73HB1H102K	CHIP C 1000PF K	
C440			CC73GCH1H1R5B	CHIP C 1.5PF B	
C443			CK73GB1A474K	CHIP C 0.47UF K	
C444			CC73GCH1H030B	CHIP C 3.0PF B	

Ref. No.	Address	New parts	Parts No.	Description	Destination
C902			CK73GB1A105K	CHIP C 1.0UF K	
TC1			C05-0384-05	CERAMIC TRIMMER CAP(10PF)	
CN101			E04-0193-05	PIN SOCKET	
CN201			E23-1081-05	TERMINAL	
CN401			E40-6362-05	FLAT CABLE CONNECTOR	
J301			E11-0457-05	PHONE JACK(2.5/3.5)	
F401			F53-0190-05	FUSE(2.5A)	
61	2A		J30-1282-04	SPACER(MIC ELEMENT)	
CD201			L79-1582-05	TUNING COIL	
CF201	2A		L72-0959-05	CERAMIC FILTER	
L1			L40-4791-37	SMALL FIXED INDUCTOR(4.700UH)	
L3			L40-5681-86	SMALL FIXED INDUCTOR(0.56UH)	
L5			L40-5681-86	SMALL FIXED INDUCTOR(0.56UH)	
L6 ,7			L92-0138-05	FERRITE CHIP	
L8 ,9		*	L41-1875-38	SMALL FIXED INDUCTOR	
L10		*	L41-1085-38	SMALL FIXED INDUCTOR	
L12			L92-0138-05	FERRITE CHIP	
L13		*	L41-1085-38	SMALL FIXED INDUCTOR	
L16			L40-2778-67	SMALL FIXED INDUCTOR(27NH)	
L19			L41-2285-03	SMALL FIXED INDUCTOR	
L21			L40-3391-86	SMALL FIXED INDUCTOR(3.3UH)	
L22			L92-0138-05	FERRITE CHIP	
L23		*	L41-2275-38	SMALL FIXED INDUCTOR	
L24			L92-0141-05	FERRITE CHIP	
L25		*	L41-2275-38	SMALL FIXED INDUCTOR	
L100,101		*	L41-1575-38	SMALL FIXED INDUCTOR	
L102			L92-0138-05	FERRITE CHIP	
L103		*	L41-1575-38	SMALL FIXED INDUCTOR	
L105			L40-1575-54	SMALL FIXED INDUCTOR(15NH)	
L106			L92-0149-05	FERRITE CHIP	
L107		*	L41-8261-38	SMALL FIXED INDUCTOR	
L109			L92-0149-05	FERRITE CHIP	
L110			L40-2285-54	SMALL FIXED INDUCTOR(220NH)	
L111			L40-1092-81	SMALL FIXED INDUCTOR	
L112		*	L41-4763-38	SMALL FIXED INDUCTOR	
L201			L40-1091-37	SMALL FIXED INDUCTOR(1.000UH)	
L202			L92-0138-05	FERRITE CHIP	
L203			L40-5685-85	SMALL FIXED INDUCTOR(0.56UH)	
L204			L40-2785-92	SMALL FIXED INDUCTOR(270NH)	
L212			L41-8268-14	SMALL FIXED INDUCTOR	
L214			L41-8268-14	SMALL FIXED INDUCTOR	
L215			L41-2285-03	SMALL FIXED INDUCTOR	
L220			L34-4602-05	AIR-CORE COIL	
L223			L34-4572-05	AIR-CORE COIL	
L224-226			L34-4564-05	AIR-CORE COIL	
L228,229			L41-8268-14	SMALL FIXED INDUCTOR	
L230			L41-4778-03	SMALL FIXED INDUCTOR	
L250		*	L41-1875-38	SMALL FIXED INDUCTOR	
L290			L41-3078-17	SMALL FIXED INDUCTOR	
L301			L92-0140-05	FERRITE CHIP	
L302			L92-0149-05	FERRITE CHIP	
L401			L92-0149-05	FERRITE CHIP	
L402-404			L92-0138-05	FERRITE CHIP	
L410			L92-0138-05	FERRITE CHIP	
L411		*	L41-1875-38	SMALL FIXED INDUCTOR	
X1			L77-1931-05	TCXO(12.8MHZ)	
X2			L78-1411-05	RESONATOR(7.37MHZ)	
XF201			L71-0549-15	MCF(38.85MHZ)	

PARTS LIST

TX-RX UNIT (X57-6972-70)

Ref. No.	Address	New parts	Parts No.	Description	Destination
CP404,405			RK75HA1J473J	CHIP-COM 47K J 1/16W	
R1			RK73HB1J223J	CHIP R 22K J 1/16W	
R2			RK73HB1J103J	CHIP R 10K J 1/16W	
R3			RK73HB1J333J	CHIP R 33K J 1/16W	
R4			RK73HB1J563J	CHIP R 56K J 1/16W	
R5 ,6			RK73HB1J104J	CHIP R 100K J 1/16W	
R7			RK73HB1J101J	CHIP R 100 J 1/16W	
R8 -11			R92-1368-05	CHIP R 0 OHM	
R12			RK73HB1J222J	CHIP R 2.2K J 1/16W	
R13			R92-1252-05	CHIP R 0 OHM J 1/16W	
R14			RK73HB1J334J	CHIP R 330K J 1/16W	
R15			RK73GB1J221J	CHIP R 220 J 1/16W	
R16			RK73GB1J561J	CHIP R 560 J 1/16W	
R17			RK73HB1J101J	CHIP R 100 J 1/16W	
R18			RK73GB1J181J	CHIP R 180 J 1/16W	
R19			RK73GB1J122J	CHIP R 1.2K J 1/16W	
R20			RK73HB1J100J	CHIP R 10 J 1/16W	
R21			RK73GB1J681J	CHIP R 680 J 1/16W	
R22			R92-1252-05	CHIP R 0 OHM J 1/16W	
R23			RK73GB1J103J	CHIP R 10K J 1/16W	
R25			RK73HB1J223J	CHIP R 22K J 1/16W	
R26			RK73HB1J103J	CHIP R 10K J 1/16W	
R27			RK73HB1J220J	CHIP R 22 J 1/16W	
R30			RK73HB1J393J	CHIP R 39K J 1/16W	
R31			RK73HB1J474J	CHIP R 470K J 1/16W	
R32			RK73HB1J102J	CHIP R 1.0K J 1/16W	
R33			RK73HB1J154J	CHIP R 150K J 1/16W	
R34			RK73HB1J474J	CHIP R 470K J 1/16W	
R35			RK73HB1J334J	CHIP R 330K J 1/16W	
R36			RK73HB1J274J	CHIP R 270K J 1/16W	
R39			RK73HB1J151J	CHIP R 150 J 1/16W	
R40			RK73HB1J101J	CHIP R 100 J 1/16W	
R41			RK73HB1J154J	CHIP R 150K J 1/16W	
R42			RK73HB1J472J	CHIP R 4.7K J 1/16W	
R43			RK73HB1J101J	CHIP R 100 J 1/16W	
R46			RK73HB1J103J	CHIP R 10K J 1/16W	
R47			RK73HB1J220J	CHIP R 22 J 1/16W	
R48			RK73HB1J331J	CHIP R 330 J 1/16W	
R49			RK73HB1J222J	CHIP R 2.2K J 1/16W	
R50			RK73HB1J472J	CHIP R 4.7K J 1/16W	
R99			R92-1368-05	CHIP R 0 OHM	
R100			RK73HB1J472J	CHIP R 4.7K J 1/16W	
R103			RK73GB1J103J	CHIP R 10K J 1/16W	
R105			RK73GB1J331J	CHIP R 330 J 1/16W	
R106			RK73GB1J121J	CHIP R 120 J 1/16W	
R107			RK73HB1J681J	CHIP R 680 J 1/16W	
R108			RK73HB1J152J	CHIP R 1.5K J 1/16W	
R109			RK73GB1J100J	CHIP R 10 J 1/16W	
R110			RK73GB1J331J	CHIP R 330 J 1/16W	
R112			RK73GB1J270J	CHIP R 27 J 1/16W	
R113			RK73GB1J221J	CHIP R 220 J 1/16W	
R114			RK73GB1J563J	CHIP R 56K J 1/16W	
R115			RK73GB1J103J	CHIP R 10K J 1/16W	
R116			RK73GB1J220J	CHIP R 22 J 1/16W	
R120			RK73GB1J180J	CHIP R 18 J 1/16W	
R121			RK73GB1J220J	CHIP R 22 J 1/16W	
R124			RK73GB1J224J	CHIP R 220K J 1/16W	
R126			RK73GB1J222J	CHIP R 2.2K J 1/16W	
R127-129			RK73EB2ER39K	CHIP R 0.39 K 1/4W	
R130-135			RK73GH1J154D	CHIP R 150K D 1/16W	

Ref. No.	Address	New parts	Parts No.	Description	Destination
R137			R92-0670-05	CHIP R 0 OHM	
R138			RK73GB1J105J	CHIP R 1.0M J 1/16W	
R139			RK73GB1J473J	CHIP R 47K J 1/16W	
R140			RK73GB1J563J	CHIP R 56K J 1/16W	
R141			RK73GB1J104J	CHIP R 100K J 1/16W	
R142			R92-1252-05	CHIP R 0 OHM J 1/16W	
R143			RK73GB1J104J	CHIP R 100K J 1/16W	
R145			R92-1252-05	CHIP R 0 OHM J 1/16W	
R147			R92-1252-05	CHIP R 0 OHM J 1/16W	
R148			RK73GB1J221J	CHIP R 220 J 1/16W	
R149			R92-1252-05	CHIP R 0 OHM J 1/16W	
R190			RK73GB1J101J	CHIP R 100 J 1/16W	
R191,192			RK73GB1J271J	CHIP R 270 J 1/16W	
R193,194			RK73GB1J473J	CHIP R 47K J 1/16W	
R203			RK73HB1J184J	CHIP R 180K J 1/16W	
R206			RK73GB1J100J	CHIP R 10 J 1/16W	
R207			RK73HB1J153J	CHIP R 15K J 1/16W	
R208			RK73HB1J823J	CHIP R 82K J 1/16W	
R209			RK73HB1J272J	CHIP R 2.7K J 1/16W	
R210			RK73HB1J332J	CHIP R 3.3K J 1/16W	
R212			RK73HB1J823J	CHIP R 82K J 1/16W	
R213			RK73HB1J392J	CHIP R 3.9K J 1/16W	
R215			RK73HB1J101J	CHIP R 100 J 1/16W	
R216			RK73HB1J124J	CHIP R 120K J 1/16W	
R217			RK73HB1J472J	CHIP R 4.7K J 1/16W	
R218			RK73HB1J561J	CHIP R 560 J 1/16W	
R219			RK73GB1J561J	CHIP R 560 J 1/16W	
R226,227			RK73GB1J102J	CHIP R 1.0K J 1/16W	
R228			RK73GB1J151J	CHIP R 150 J 1/16W	
R233			RK73HB1J104J	CHIP R 100K J 1/16W	
R236			RK73HB1J563J	CHIP R 56K J 1/16W	
R238			RK73HB1J104J	CHIP R 100K J 1/16W	
R239			RK73HB1J563J	CHIP R 56K J 1/16W	
R240			R92-1252-05	CHIP R 0 OHM J 1/16W	
R248			RK73GB1J221J	CHIP R 220 J 1/16W	
R249			RK73GB1J101J	CHIP R 100 J 1/16W	
R251			RK73HB1J104J	CHIP R 100K J 1/16W	
R253			RK73HB1J104J	CHIP R 100K J 1/16W	
R254			RK73HB1J683J	CHIP R 68K J 1/16W	
R255			R92-1252-05	CHIP R 0 OHM J 1/16W	
R258			R92-0670-05	CHIP R 0 OHM	
R301			RK73HB1J103J	CHIP R 10K J 1/16W	
R304			RK73HB1J273J	CHIP R 27K J 1/16W	
R305			RK73HB1J104J	CHIP R 100K J 1/16W	
R306			RK73HB1J102J	CHIP R 1.0K J 1/16W	
R307,308			R92-1368-05	CHIP R 0 OHM	
R310			RK73GB1J394J	CHIP R 390K J 1/16W	
R311			RK73HB1J123J	CHIP R 12K J 1/16W	
R312			RK73GB1J334J	CHIP R 330K J 1/16W	
R313			RK73GB1J823J	CHIP R 82K J 1/16W	
R314			RK73GB1J123J	CHIP R 12K J 1/16W	
R315			RK73GB1J334J	CHIP R 330K J 1/16W	
R316			RK73GB1J823J	CHIP R 82K J 1/16W	
R317			RK73GB1J474J	CHIP R 470K J 1/16W	
R318			RK73GB1J122J	CHIP R 1.2K J 1/16W	
R319			RK73HB1J563J	CHIP R 56K J 1/16W	
R320			RK73HB1J332J	CHIP R 3.3K J 1/16W	
R321			RK73HB1J224J	CHIP R 220K J 1/16W	
R322			RK73HB1J124J	CHIP R 120K J 1/16W	
R323			RK73HB1J563J	CHIP R 56K J 1/16W	

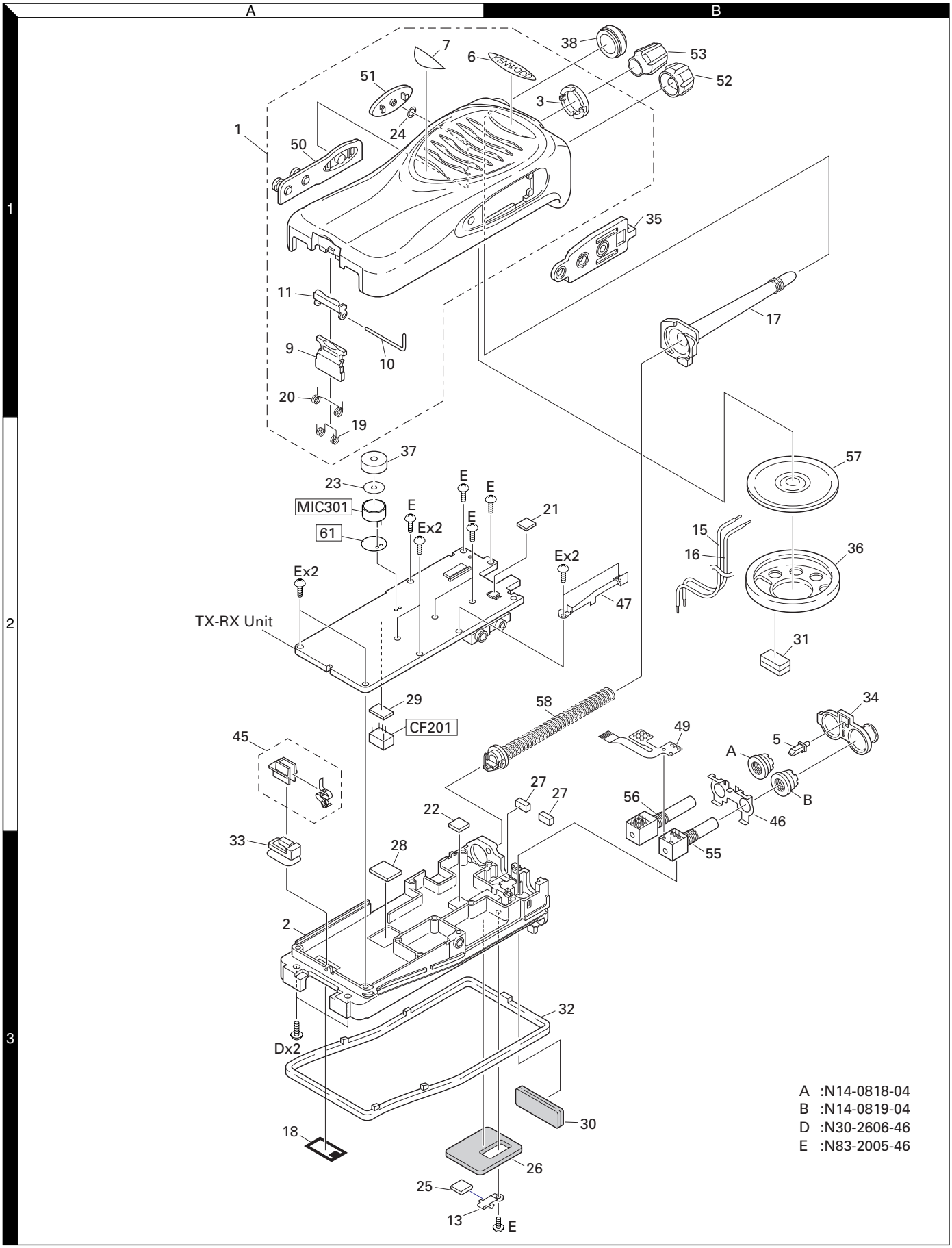
PARTS LIST

TX-RX UNIT (X57-6972-70)

Ref. No.	Address	New parts	Parts No.	Description	Destination
R324,325			RK73GB1J154J	CHIP R 150K J 1/16W	
R326			R92-1252-05	CHIP R 0 OHM J 1/16W	
R327			RK73GB1J184J	CHIP R 180K J 1/16W	
R328			RK73GB1J103J	CHIP R 10K J 1/16W	
R329			RK73GB1J154J	CHIP R 150K J 1/16W	
R330			RK73HB1J332J	CHIP R 3.3K J 1/16W	
R332			RK73GB1J153J	CHIP R 15K J 1/16W	
R334			RK73GB1J473J	CHIP R 47K J 1/16W	
R335			RK73GB1J222J	CHIP R 2.2K J 1/16W	
R336			RK73GB1J102J	CHIP R 1.0K J 1/16W	
R337			RK73GB1J151J	CHIP R 150 J 1/16W	
R338			RK73HB1J222J	CHIP R 2.2K J 1/16W	
R339			RK73GB1J471J	CHIP R 470 J 1/16W	
R340			RK73GB1J182J	CHIP R 1.8K J 1/16W	
R341			RK73GB1J103J	CHIP R 10K J 1/16W	
R342			RK73GB1J100J	CHIP R 10 J 1/16W	
R343			RK73GB1J474J	CHIP R 470K J 1/16W	
R344			RK73GB1J102J	CHIP R 1.0K J 1/16W	
R345,346			RK73GB1J101J	CHIP R 100 J 1/16W	
R347			RK73GB1J104J	CHIP R 100K J 1/16W	
R348			RK73GB1J563J	CHIP R 56K J 1/16W	
R349			RK73GB1J333J	CHIP R 33K J 1/16W	
R350			R92-1368-05	CHIP R 0 OHM	
R354,355			RK73HB1J103J	CHIP R 10K J 1/16W	
R357			R92-1368-05	CHIP R 0 OHM	
R360			R92-1368-05	CHIP R 0 OHM	
R388			R92-1368-05	CHIP R 0 OHM	
R403			RK73GB1J101J	CHIP R 100 J 1/16W	
R404			RK73HH1J474D	CHIP R 470K D 1/16W	
R405			RK73GB1J334J	CHIP R 330K J 1/16W	
R406			RK73HH1J474D	CHIP R 470K D 1/16W	
R407			RK73HB1J334J	CHIP R 330K J 1/16W	
R408-412			RK73HB1J473J	CHIP R 47K J 1/16W	
R413,414			RK73GB1J331J	CHIP R 330 J 1/16W	
R415-420			RK73HB1J473J	CHIP R 47K J 1/16W	
R421,422			RK73HB1J102J	CHIP R 1.0K J 1/16W	
R423			R92-1368-05	CHIP R 0 OHM	
R424,425			RK73HB1J473J	CHIP R 47K J 1/16W	
R426			R92-1368-05	CHIP R 0 OHM	
R435			RK73HB1J473J	CHIP R 47K J 1/16W	
R436			R92-1252-05	CHIP R 0 OHM J 1/16W	
R437,438			RK73HB1J473J	CHIP R 47K J 1/16W	
R447			RK73HB1J123J	CHIP R 12K J 1/16W	
R449,450			R92-1252-05	CHIP R 0 OHM J 1/16W	
R454,455			RK73GB1J271J	CHIP R 270 J 1/16W	
R901			RK73GB1J472J	CHIP R 4.7K J 1/16W	
VR1			R12-7491-05	TRIMMING POT.(68K)	
S401-403			S70-0414-05	TACT SWITCH	
MIC301	2A	*	T91-0649-05	MIC ELEMENT	
D1			MA2S111	DIODE	
D2			HVC376B	VARIABLE CAPACITANCE DIODE	
D4			HVC376B	VARIABLE CAPACITANCE DIODE	
D6 ,7			HVC376B	VARIABLE CAPACITANCE DIODE	
D10			1SV278	VARIABLE CAPACITANCE DIODE	
D11			MA2S111	DIODE	
D101			HSC277	DIODE	
D102			HZU5CLL	ZENER DIODE	
D103,104			HVC131	DIODE	

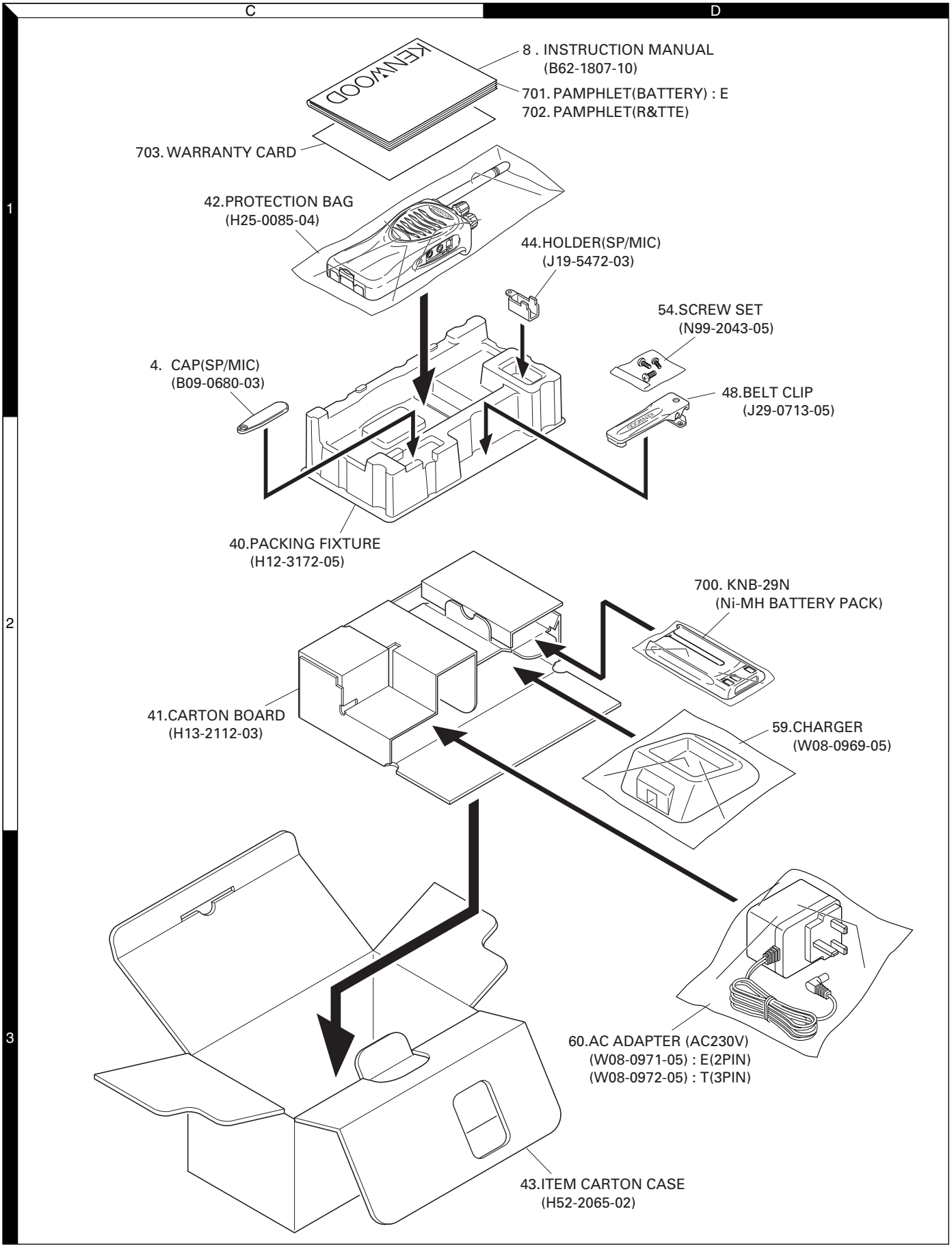
Ref. No.	Address	New parts	Parts No.	Description	Destination
D106			HVC131	DIODE	
D122			HVC131	DIODE	
D202			HSC277	DIODE	
D301,302			RB706F-40	DIODE	
D303		*	MC2858	DIODE	
D401			RB521S-30	DIODE	
D402			1SR154-400	DIODE	
D405			KDZ3.3V	ZENER DIODE	
IC1			MB15A02	MOS IC	
IC101			TA75W01FU	MOS IC	
IC201			TA31136FN	MOS IC	
IC301			AK2346	MOS IC	
IC302			TA7368F	MOS IC	
IC401,402			XC6204B502MR	MOS IC	
IC403			BD4840FVE	MOS IC	
IC404			BD4845FVE	MOS IC	
IC405			30622MAA-B91GP	MPU	
IC406			BR24L08F-W	ROM IC	
IC408			NJM2100V	MOS IC	
Q1			KTC4082	TRANSISTOR	
Q2			2SC5108(Y)	TRANSISTOR	
Q4			2SK508NV(K52)	FET	
Q6			2SC5108(Y)	TRANSISTOR	
Q8		*	2SC5383	TRANSISTOR	
Q9			2SC4619(P,Q)	TRANSISTOR	
Q100			2SC4619(P,Q)	TRANSISTOR	
Q101			2SC5192	TRANSISTOR	
Q102		*	RD00HVS1	FET	
Q103			RD02MUS1	FET	
Q103		*	RD02MUS1-T22	FET	
Q104		*	RT1N141U	TRANSISTOR	
Q105			2SK879(Y)	FET	
Q107		*	RT1N141U	TRANSISTOR	
Q108			2SK1824	FET	
Q109			RT1P441U	TRANSISTOR	
Q203			2SC4649(N,P)	TRANSISTOR	
Q204,205			3SK318	FET	
Q301		*	RT1P141U	TRANSISTOR	
Q302			2SC4919	TRANSISTOR	
Q303			RT1N441U	TRANSISTOR	
Q304			2SA1362(GR)	TRANSISTOR	
Q305			RT1N441U	TRANSISTOR	
Q306			CPH3413	FET	
Q316			CPH3413	FET	
Q317			2SK1824	FET	
Q401,402		*	RT1N141U	TRANSISTOR	
Q403,404			CPH3317	FET	
Q405		*	RT1P237U	TRANSISTOR	
Q407,408			2SK1830	FET	
TH101			157-104-65001	THERMISTOR	
TH203			157-104-65001	THERMISTOR	

EXPLODED VIEW



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

PACKING



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

ADJUSTMENT

Test Equipment Required for Alignment

Test Equipment	Major Specifications	
1. Standard Signal Generator (SSG)	Frequency Range	446.0 to 446.1MHz
	Modulation	Frequency modulation and external modulation.
	Output	-127dBm/0.1μV to greater than -47dBm/1mV
2. Power Meter	Input Impedance	50Ω.
	Operation Frequency	446.0 to 446.1MHz
	Measurement Range	Vicinity of 10W
3. Deviation Meter	Frequency Range	446.0 to 446.1MHz
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 radio uses an SMA terminal.

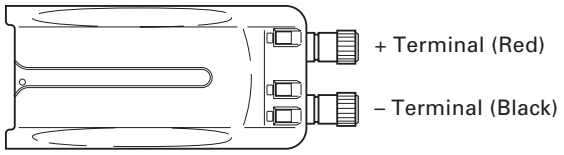
Use an antenna connector adapter [SMA(f) – BNC(f) or SMA(f) – N(f)] for adjustment. (The adapter is not provided as an option, so buy a commercially-available one.)

2. Repair Jig (Chassis)

Use jig (part No.: A10-4086-03) for repairing the TK-3201. 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.

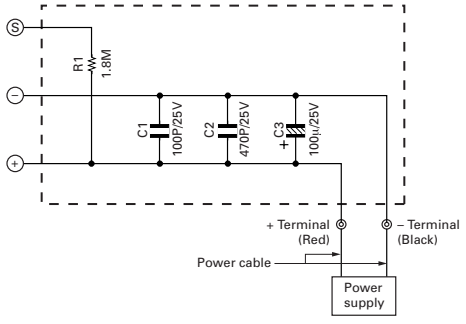
3. Battery Jig (W05-1011-00)



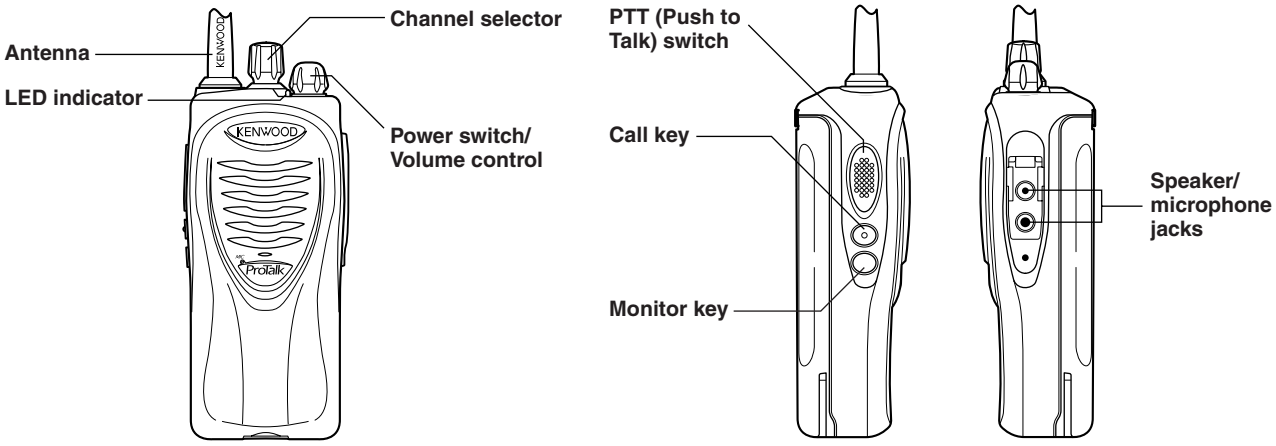
Connect the power cable properly between the battery jig installed in the transceiver and the power supply, and be sure output voltage and the power supply polarity prior to switching the power supply ON, otherwise over voltage and reverse connection may damage the transceiver, or the power supply or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

SCHEMATIC DIAGRAM



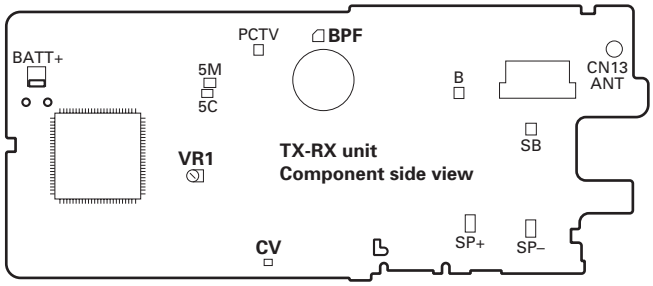
ADJUSTMENT



Adjustment points

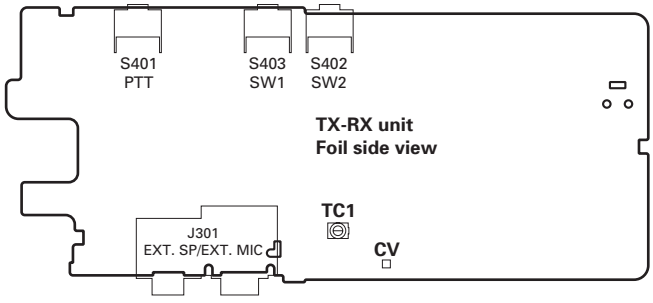
TX-RX unit (X57-697)

Component side view



VR1 : Frequency adjustment
BPF : Band-pass wave form test point
CV : VCO lock voltage adjustment terminal

Foil Side View



TC1 : Transmit VCO lock voltage adjustment
CV : VCO lock voltage adjustment terminal

Fig. 1 Adjustment points

■ Frequency and signalling

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

Frequency (MHz)

Channel No.	RX Frequency	TX Frequency
1	446.00625	446.00625
2	446.01875	446.01875
3	446.03125	446.03125
4	446.04375	446.04375
5	446.05625	446.05625
6	446.06875	446.06875
7	446.08125	446.08125
8	446.09375	446.09375

Signalling

Signalling No.	RX	TX
1	None	None
2	None	100Hz Square Wave
3	QT 67.0Hz	QT 67.0Hz
4	QT 151.4Hz	QT 151.4Hz
5	QT 250.3Hz	QT 250.3Hz
6	DQT D023N	DQT D023N
7	DQT D754I	DQT D754I

- **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	RX Frequency	TX Frequency
1	446.00625 MHz	446.00625 MHz
2	446.01875 MHz	446.01875 MHz
3	446.03125 MHz	446.03125 MHz
4	446.04375 MHz	446.04375 MHz
5	446.05625 MHz	446.05625 MHz
6	446.06875 MHz	446.06875 MHz
7	446.08125 MHz	446.08125 MHz
8	446.09375 MHz	446.09375 MHz

ADJUSTMENT

Common Section

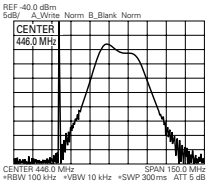
Item	Condition	Measurement		Adjustment		Specifications/ Remark
		Test equipment	Terminal	Parts	Method	
1. Setting	1) BATT terminal votage:7.5V 2) SSG standard modulation MOD:1kHz,DEV:1.5kHz					
2. VCO lock voltage TX	1) CH:5 PTT:ON	Power meter DVM	ANT CV	TC1	3.0 V	±0.1V
3. VCO lock voltage RX	2) CH:1				Check	0.6V or more

Transmitter Section

Item	Condition	Measurement		Adjustment		Specifications/ Remark
		Test equipment	Terminal	Parts	Method	
1. Frequency Adjust	1) CH:5-1 PTT:ON	Frequency counter	ANT	VR1	446.05625MHz	±50Hz
2. Power Adjust	TEST CH: 5-1 BATT terminal voltage:7.5V PTT:ON	Power meter Ammeter		Programming Software:KPG-90D		0.6W ±0.05W 0.8A or less
3. VOX 1 Writing	TEST CH: 5-1 AG:1kHz/45mV	Power meter Deviation meter Oscilloscope AG AF VTVM	ANT SP/MIC connector			
4. VOX 10 Writing	TEST CH:5-1 AG:1KHz/3.0mV					
5. Max deviation Adjust	TEST CH: 6-1 AG:1kHz/150mV Deviation meter filter LPF:15kHz HPF:OFF PTT:ON				2.2kHz (According to the lager +,–)	±50Hz
6. DQT Balance Adjust	TEST CH: 6-1 LPF:3kHz HPF:OFF PTT:ON		ANT		Make the demodulation wave into square waves	
7. QT Deviation Adjust	TEST CH: 6-3 QT:67.0Hz LPF:3kHz HPF:OFF PTT:ON				0.40kHz	±40Hz
8. DQT Deviation Adjust	TEST CH: 6-6 DQT:023 LPF:3kHz HPF:OFF PTT:ON				0.35kHz	±40Hz

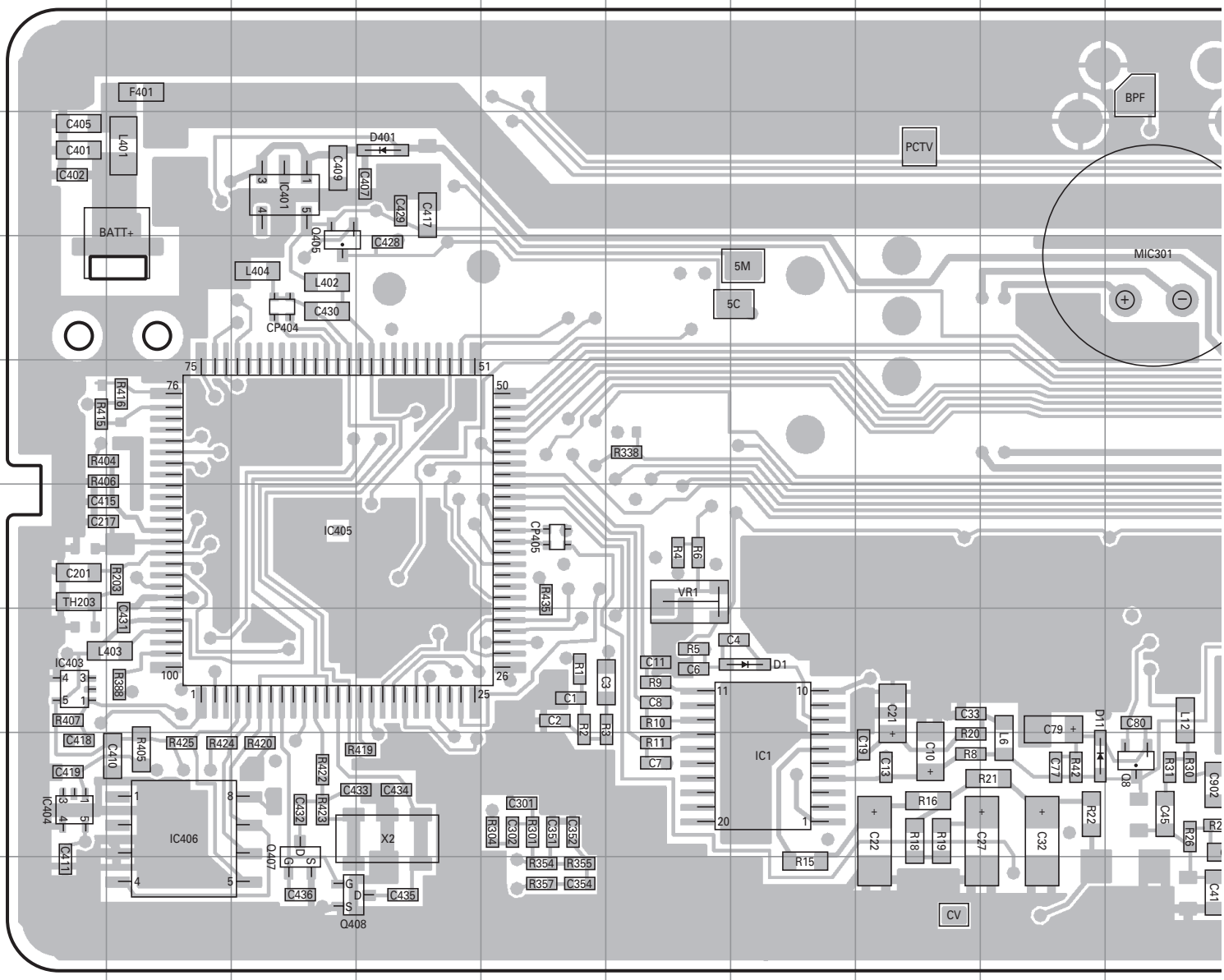
ADJUSTMENT

Receiver Section

Item	Condition	Measurement		Adjustment		Specifications/ Remark
		Test equipment	Terminal	Parts	Method	
1.BPF Wave Check	Spectrum analyzer setting Center-f : 446MHz Span : 150MHz RBW : 100kHz VBW : 10kHz ATT : 5dB	Spectrum analyzer	ANT BPF		Check the waveform as shown to the right.	
2.Sensitivity check	TEST CH: 1-1 SSG otuput:–115 dBm(0.4μV) SSG MOD:1.5kHz	SSG DVM Oscilloscope AF VTVM	ANT		Check	20dB SINAD or more
3.SQL1 (Threshold) writing	TEST CH: 1-1 SSG otuput:12dB SINAD–4dB SSG MOD:1.5kHz			Programming Software: KPG-90D	Write	Squelch open
4.SQL9 (Tight) writing	TEST CH: 1-1 SSG otuput:12dB SINAD+2dB SSG MOD:1.5kHz					
5.BATT Detection Writing	TEST CH: 1-1 BATT terminal voltage:5.9V	DVM	ANT BATT terminal		Write	BATT terminal voltage:5.9V

TK-3201 PC BOARD

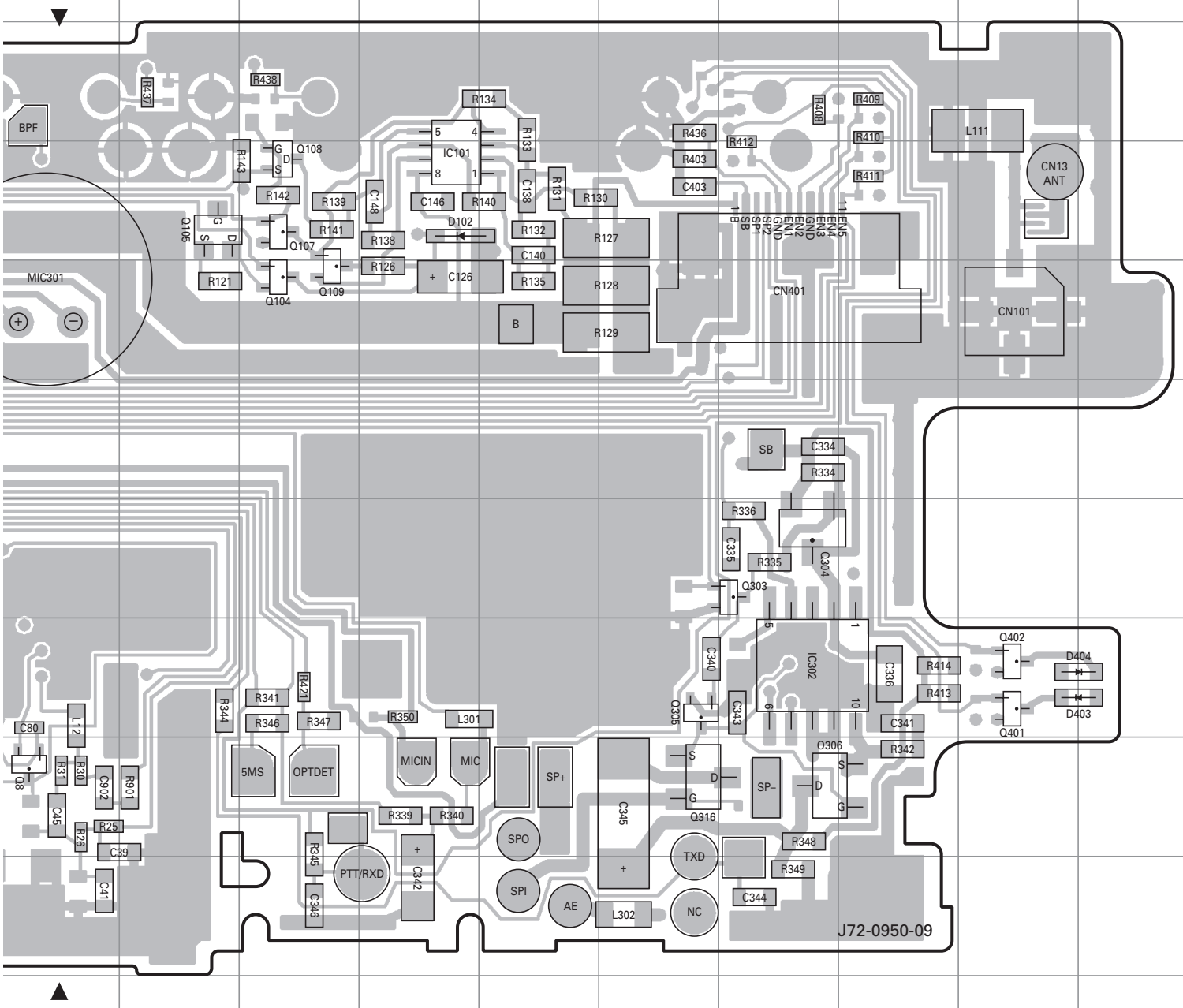
TX-RX UNIT (X57-6972-70) Component side view (J72-0950-09)



Ref. No.	Address	Ref. No.	Address	Ref. No.	Address	Ref. No.	Address
IC1	9G	Q8	9J	Q305	8O	D1	8G
IC101	4M	Q104	5L	Q306	9P	D11	9I
IC302	8P	Q105	4K	Q316	9O	D102	4M
IC401	4C	Q107	4L	Q401	8R	D401	4D
IC403	8A	Q108	4L	Q402	8R	D403	8R
IC404	9A	Q109	5L	Q405	5C	D404	8R
IC405	7C	Q303	7P	Q407	9C		
IC406	9B	Q304	7P	Q408	10C		

PC BOARD TK-3201

TX-RX UNIT (X57-6972-70) Component side view (J72-0950-09)



Component side

Layer 1	
Layer 2	
Layer 3	
Layer 4	

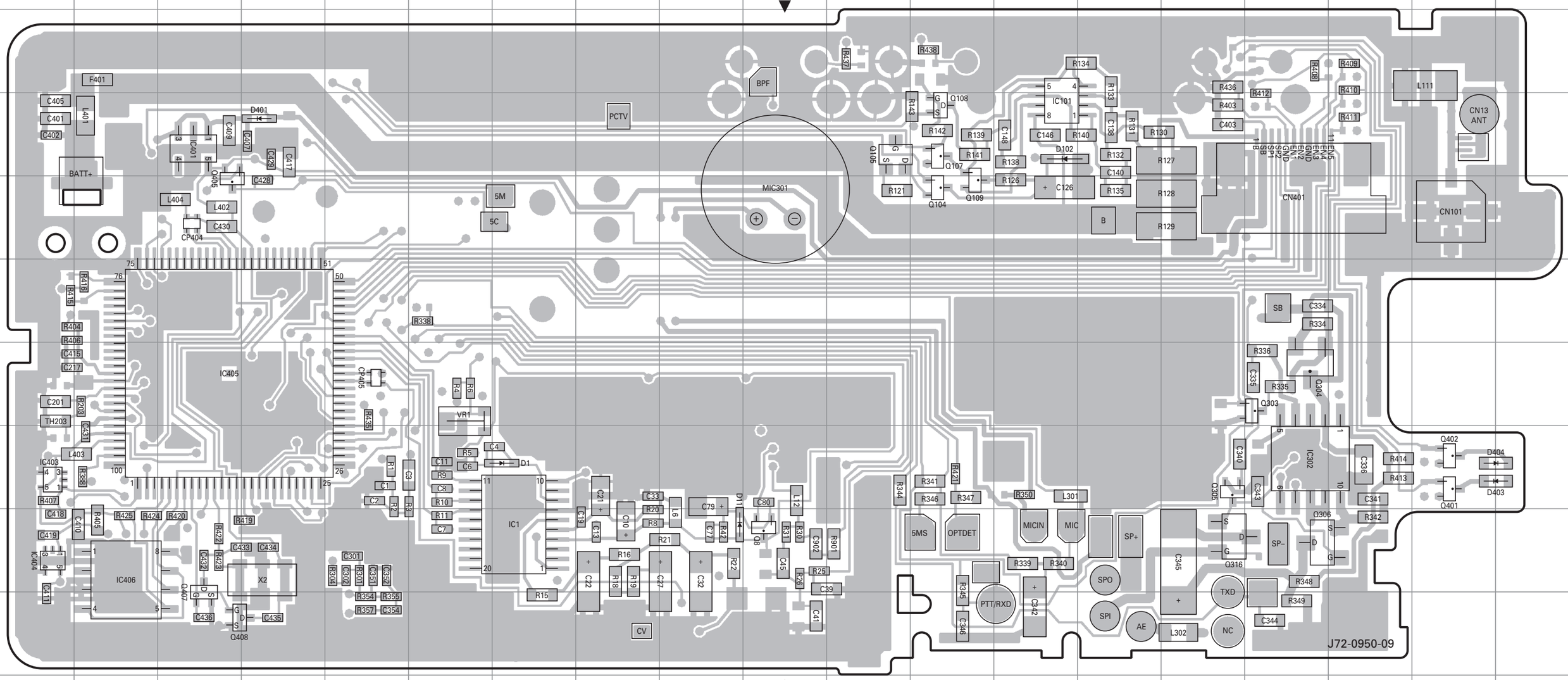
Foil side

TK-3201 PC BOARD

PC BOARD TK-3201

TX-RX UNIT (X57-6972-70) Component side view (J72-0950-09)

TX-RX UNIT (X57-6972-70) Component side view (J72-0950-09)

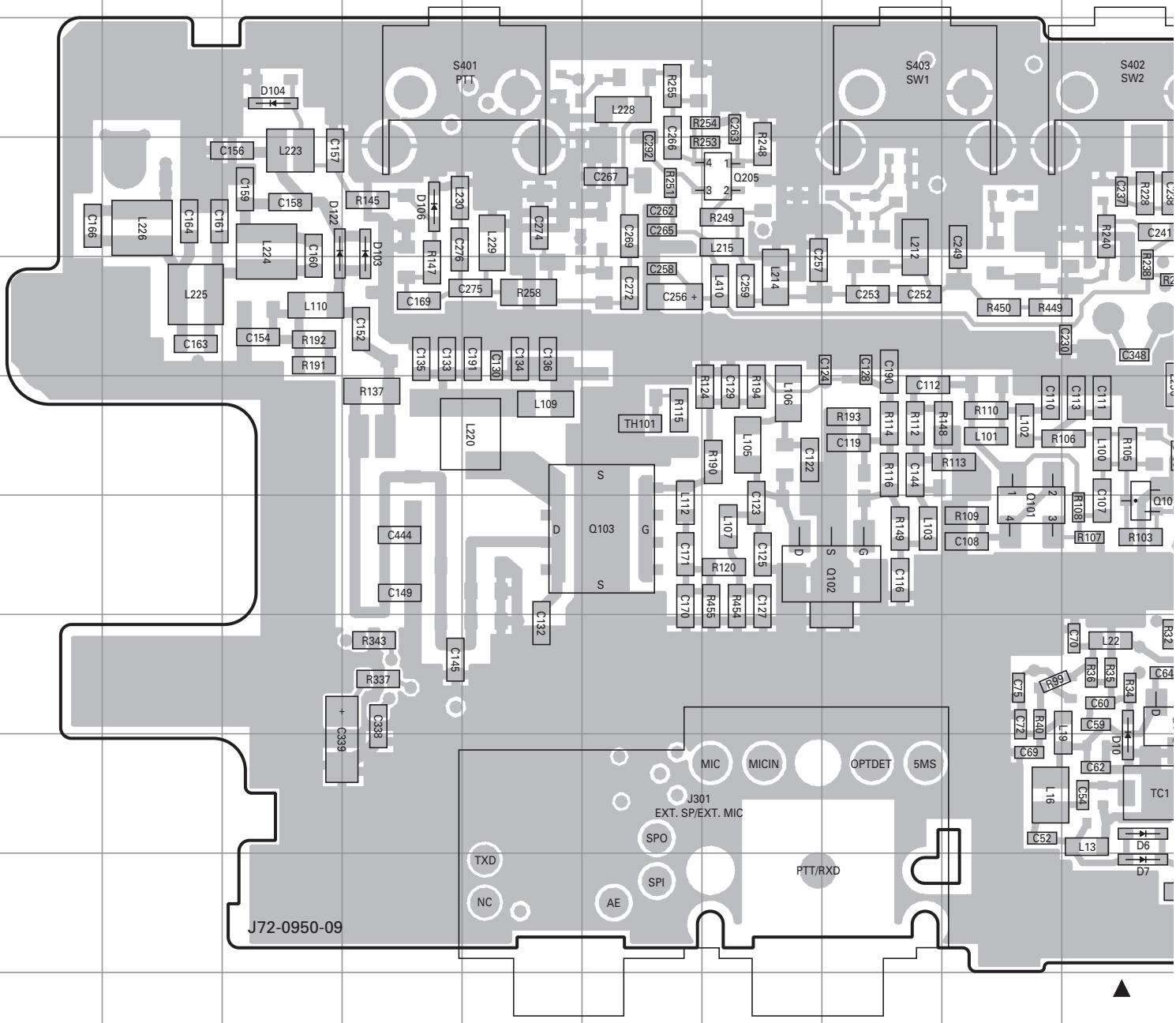


Ref. No.	Address	Ref. No.	Address	Ref. No.	Address	Ref. No.	Address
IC1	9G	Q8	9J	Q305	8O	D1	8G
IC101	4M	Q104	5L	Q306	9P	D11	9I
IC302	8P	Q105	4K	Q316	9O	D102	4M
IC401	4C	Q107	4L	Q401	8R	D401	4D
IC403	8A	Q108	4L	Q402	8R	D403	8R
IC404	9A	Q109	5L	Q405	5C	D404	8R
IC405	7C	Q303	7P	Q407	9C		
IC406	9B	Q304	7P	Q408	10C		

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

TK-3201 PC BOARD

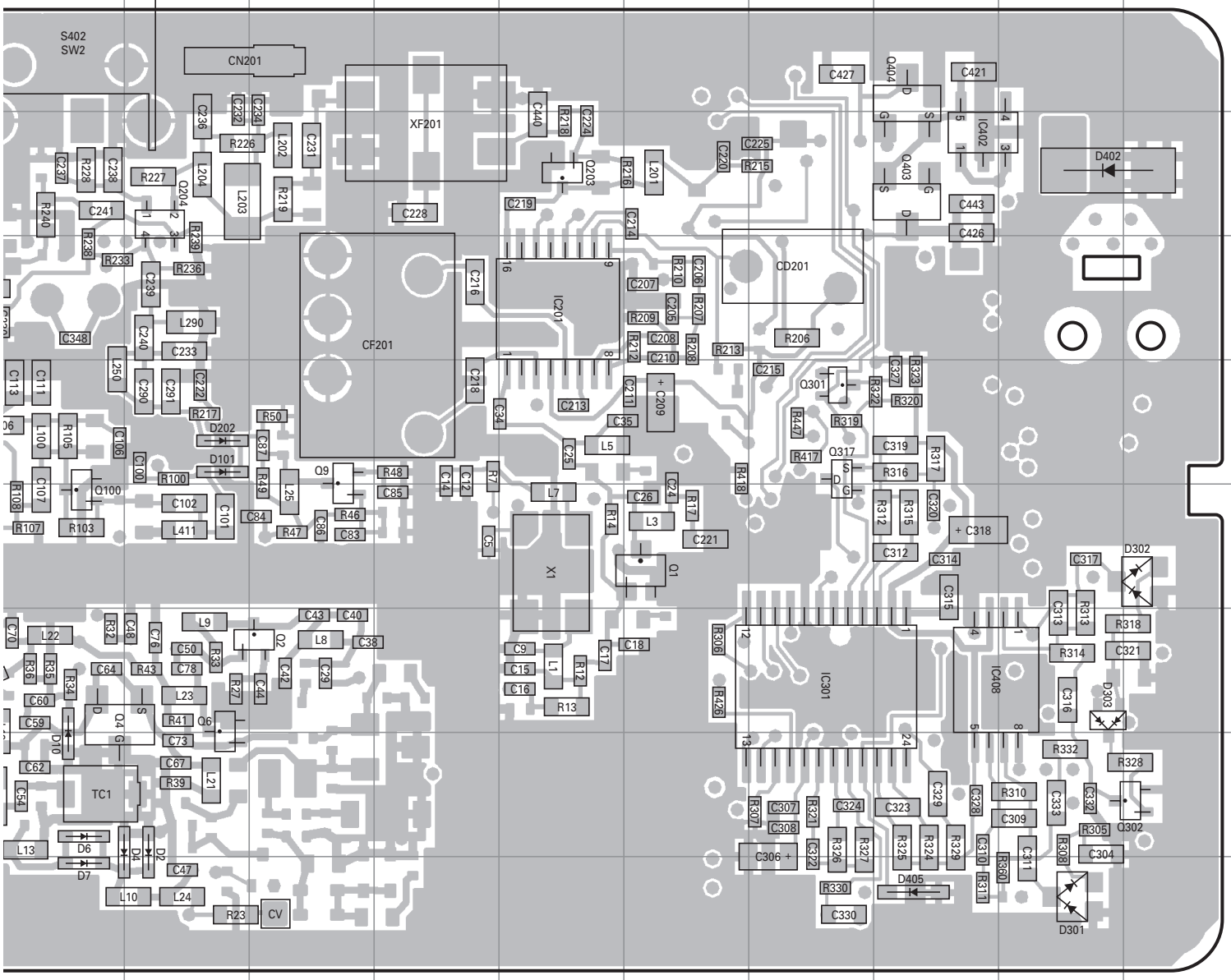
TX-RX UNIT (X57-6972-70) Foil side view (J72-0950-09)



Ref. No.	Address	Ref. No.	Address	Ref. No.	Address	Ref. No.	Address	Ref. No.	Address
IC201	5N	Q9	6L	Q301	6P	D7	10J	D301	10R
IC301	8P	Q100	7J	Q302	9S	D10	9J	D302	7S
IC402	4Q	Q101	7I	Q317	6P	D101	6K	D303	8R
IC408	8Q	Q102	7H	Q403	4Q	D103	4D	D402	4R
Q1	7O	Q103	7F	Q404	3Q	D104	3C	D405	10Q
Q2	8L	Q203	4N	D2	9K	D106	4D		
Q4	8J	Q204	4K	D4	9K	D122	4C		
Q6	8K	Q205	4G	D6	9J	D202	6K		

PC BOARD TK-3201

TX-RX UNIT (X57-6972-70) Foil side view (J72-0950-09)



Component side

Layer 1

Layer 2

Layer 3

Layer 4

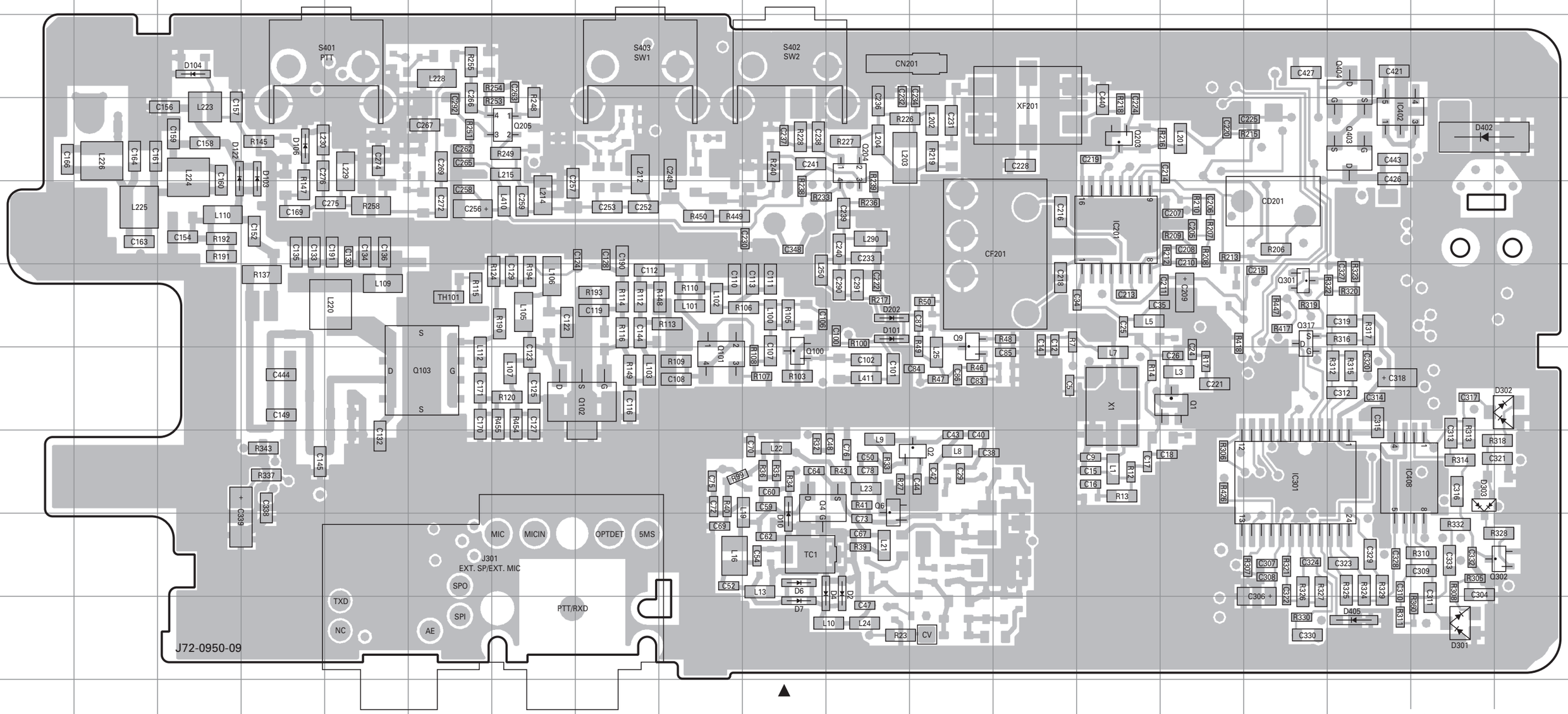
Foil side

TK-3201 PC BOARD

PC BOARD TK-3201

TX-RX UNIT (X57-6972-70) Foil side view (J72-0950-09)

TX-RX UNIT (X57-6972-70) Foil side view (J72-0950-09)

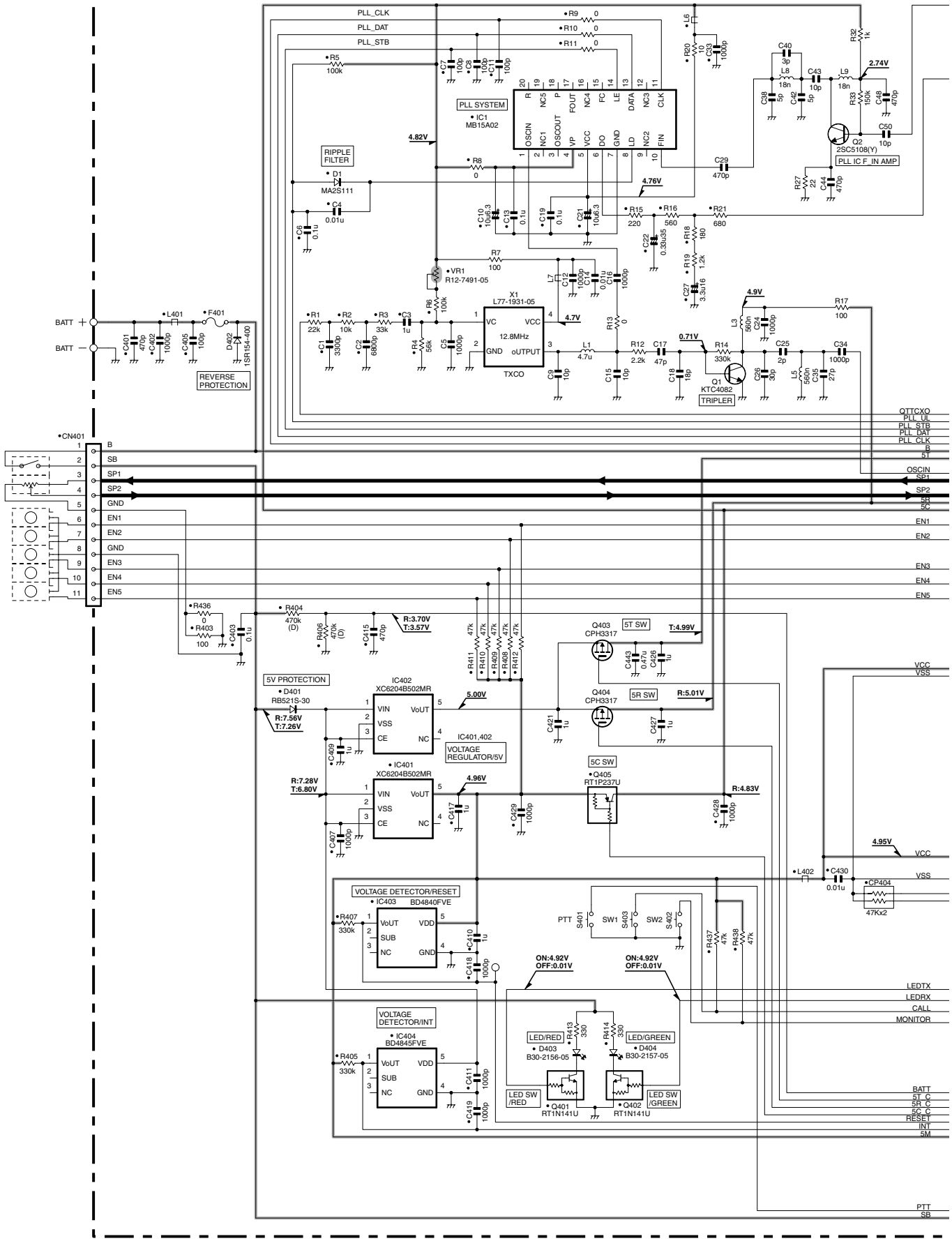


Ref. No.	Address	Ref. No.	Address	Ref. No.	Address	Ref. No.	Address	Ref. No.	Address
IC201	5N	Q9	6L	Q301	6P	D7	10J	D301	10R
IC301	8P	Q100	7J	Q302	9S	D10	9J	D302	7S
IC402	4Q	Q101	7I	Q317	6P	D101	6K	D303	8R
IC408	8Q	Q102	7H	Q403	4Q	D103	4D	D402	4R
Q1	7O	Q103	7F	Q404	3Q	D104	3C	D405	10Q
Q2	8L	Q203	4N	D2	9K	D106	4D		
Q4	8J	Q204	4K	D4	9K	D122	4C		
Q6	8K	Q205	4G	D6	9J	D202	6K		

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

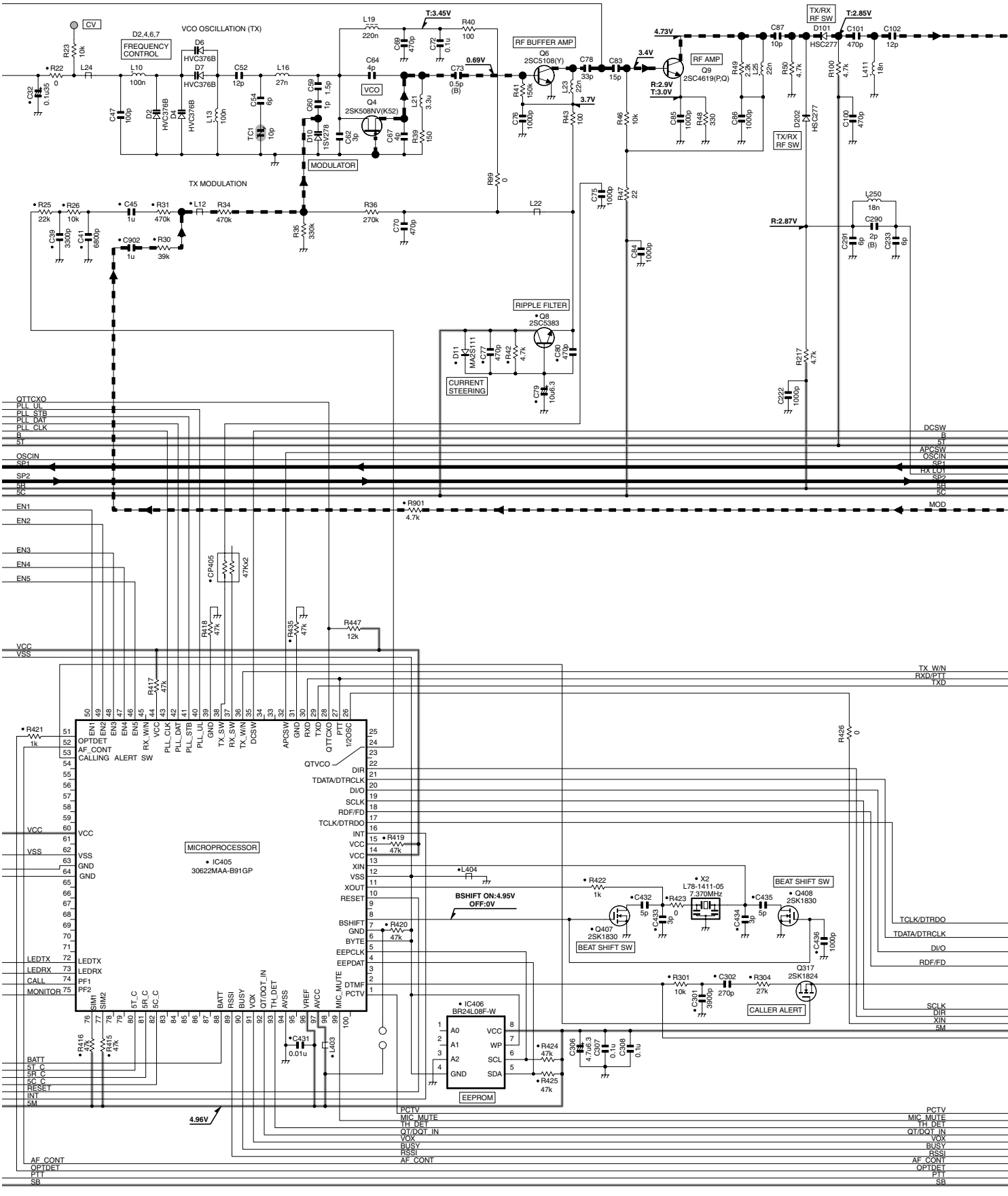
TK-3201 SCHEMATIC DIAGRAM

TX-RX UNIT (X57-6972-70)



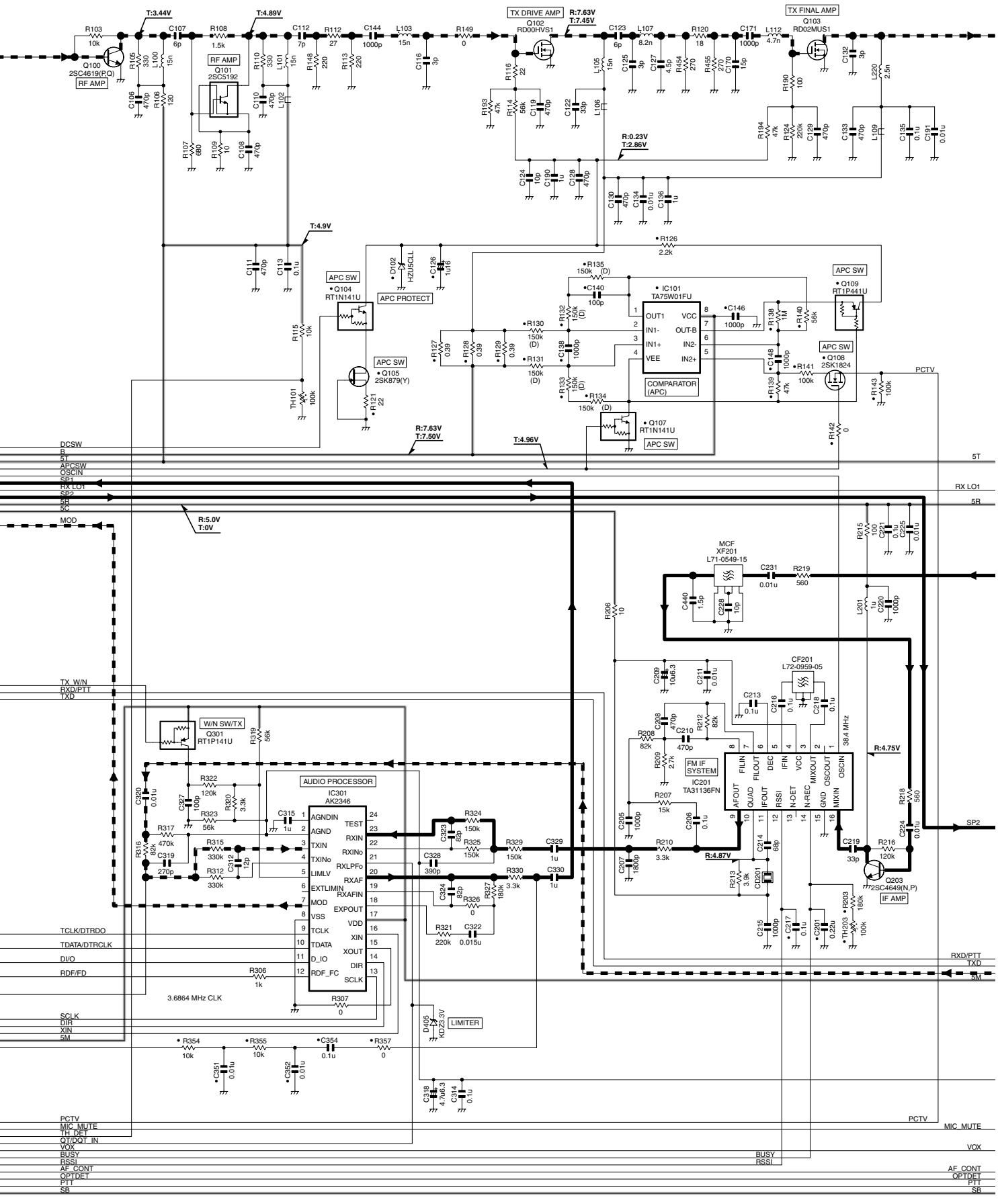
SCHEMATIC DIAGRAM TK-3201

TX-RX UNIT (X57-6972-70)



TK-3201 SCHEMATIC DIAGRAM

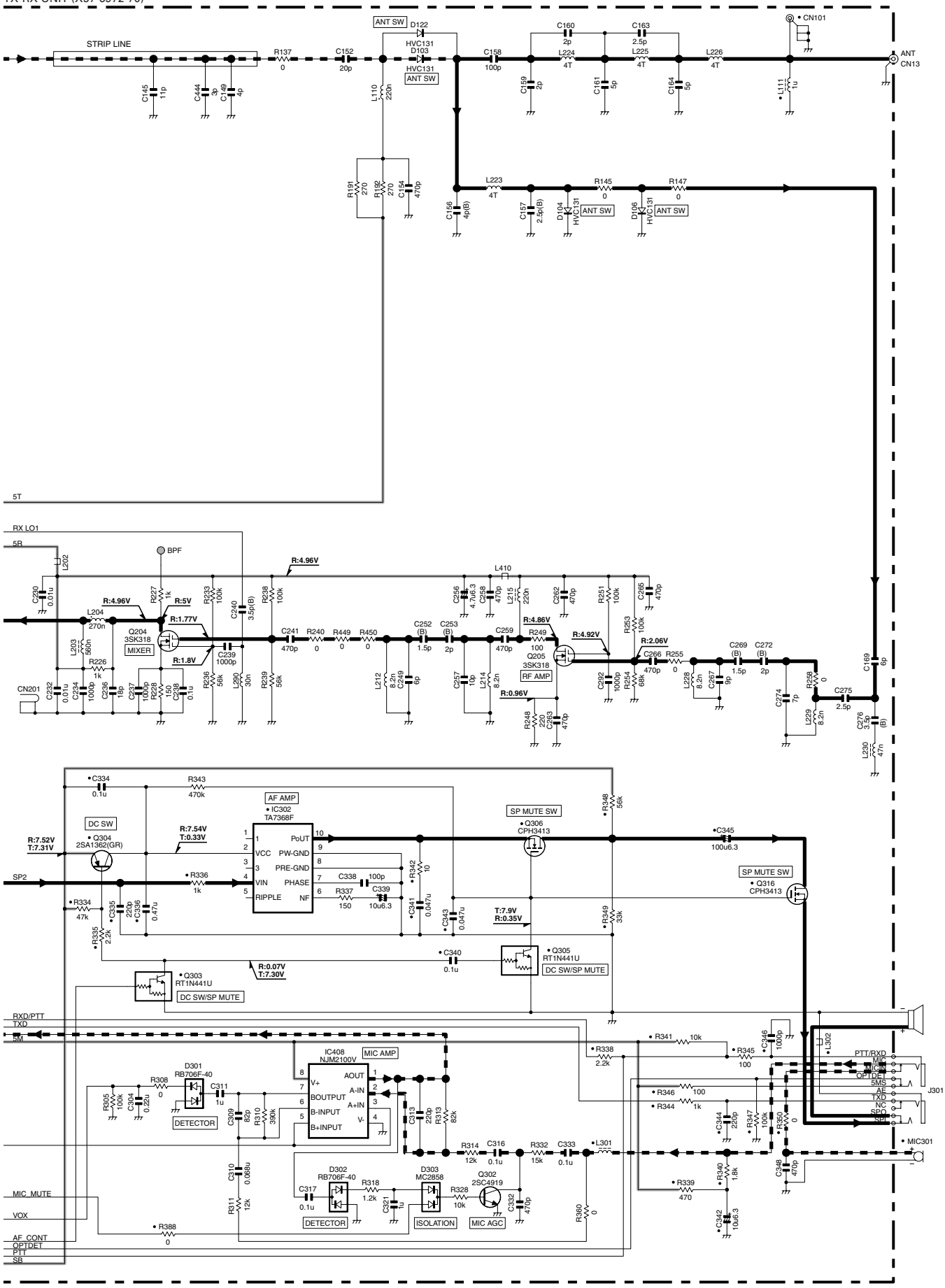
TX-RX UNIT (X57-6972-70)



SCHEMATIC DIAGRAM TK-3201

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

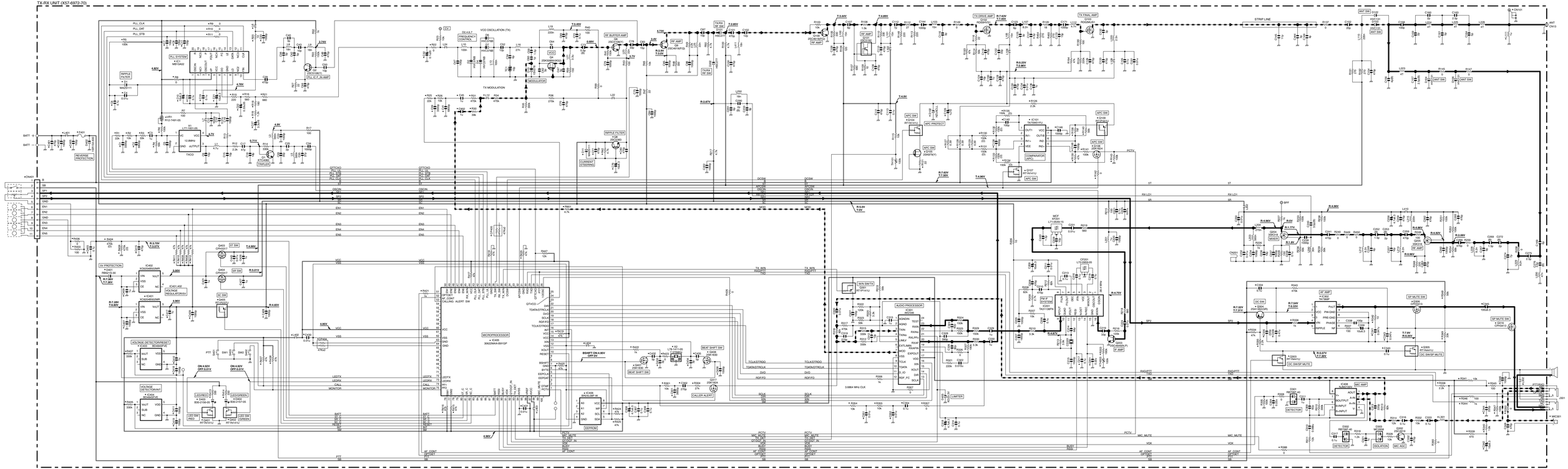
TX-RX UNIT (X57-6972-70)



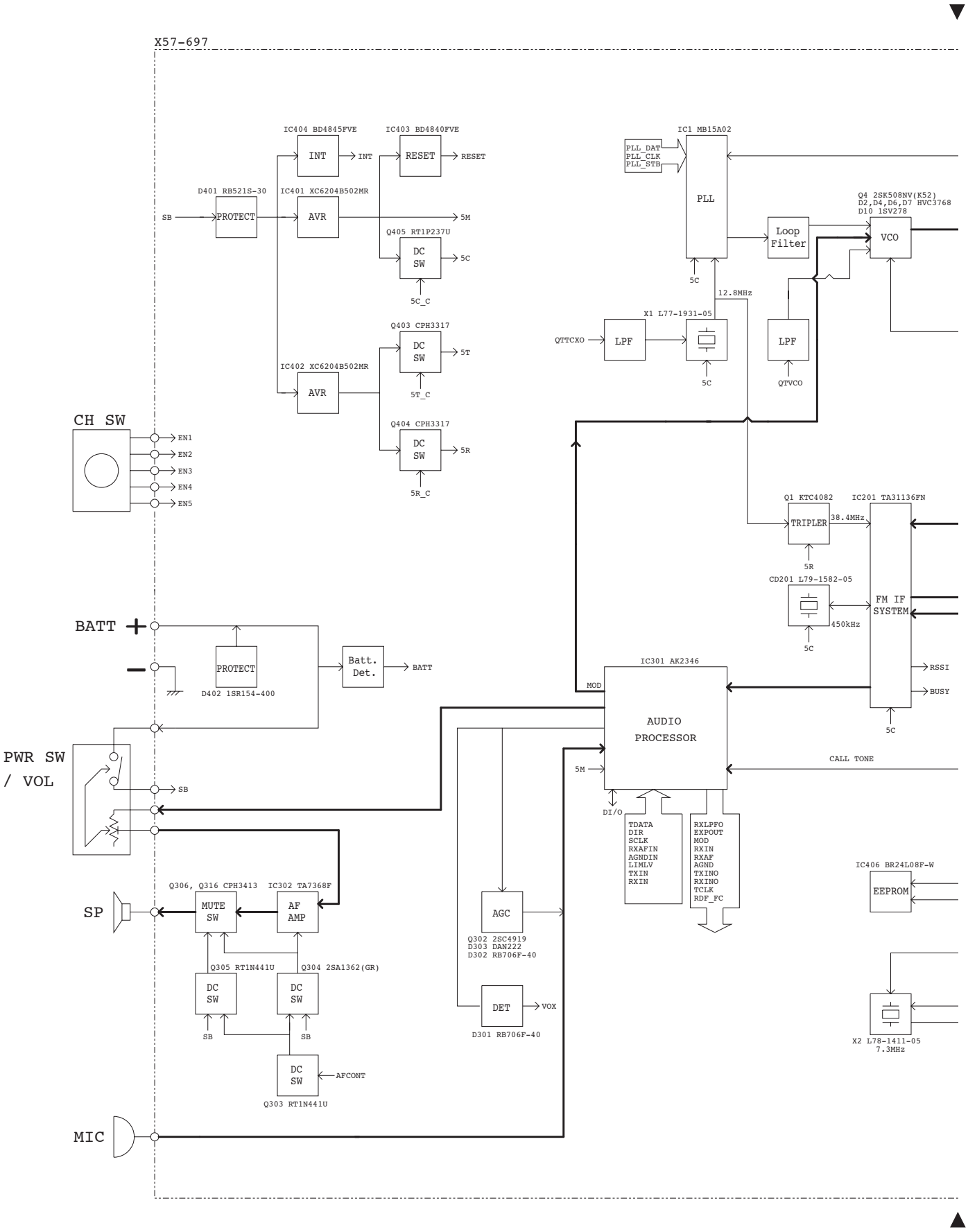
TK-3201 SCHEMATIC DIAGRAM

TX-RX UNIT (X57-6972-70)

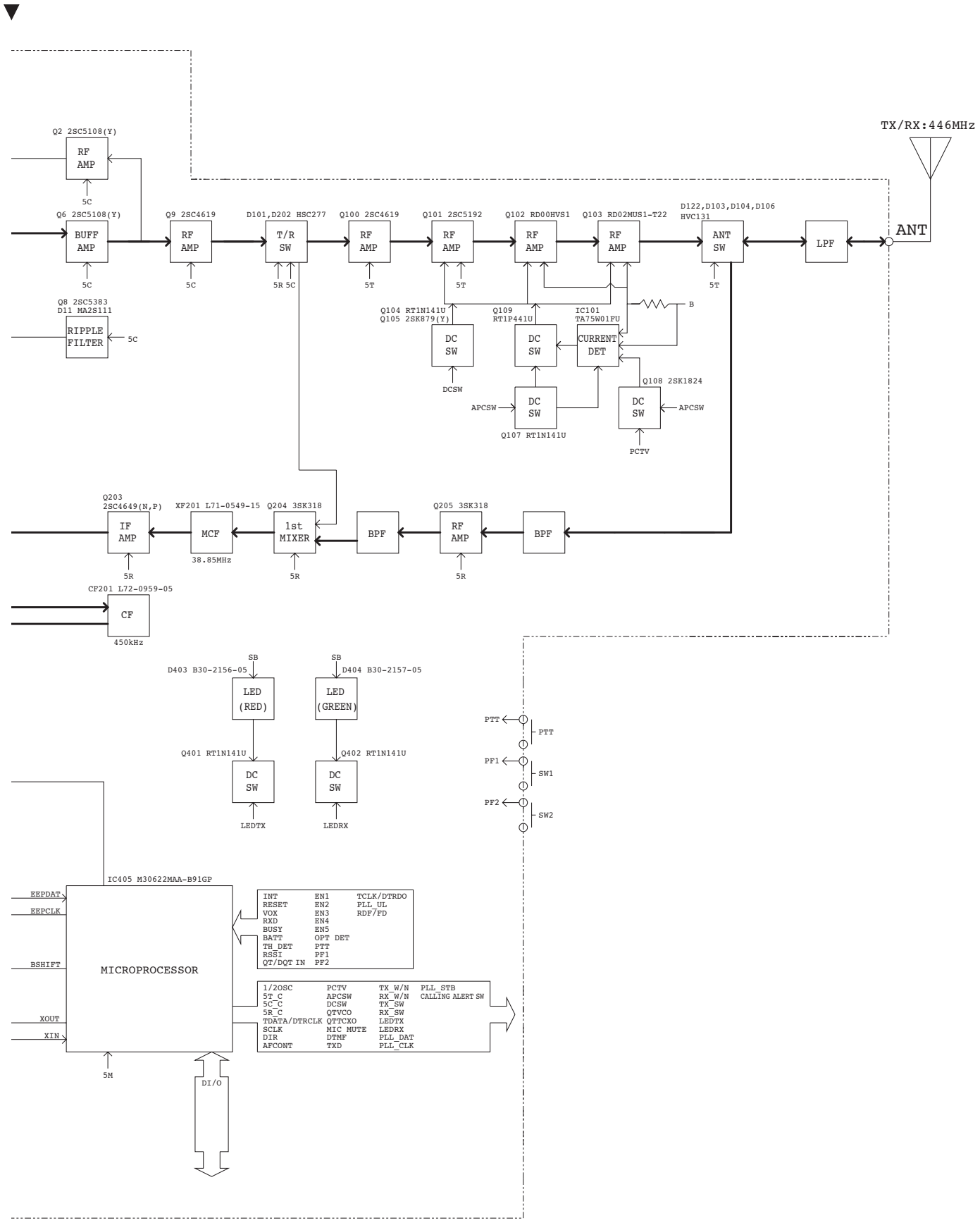
Note : The components marked with a dot (●) are parts of layer1.



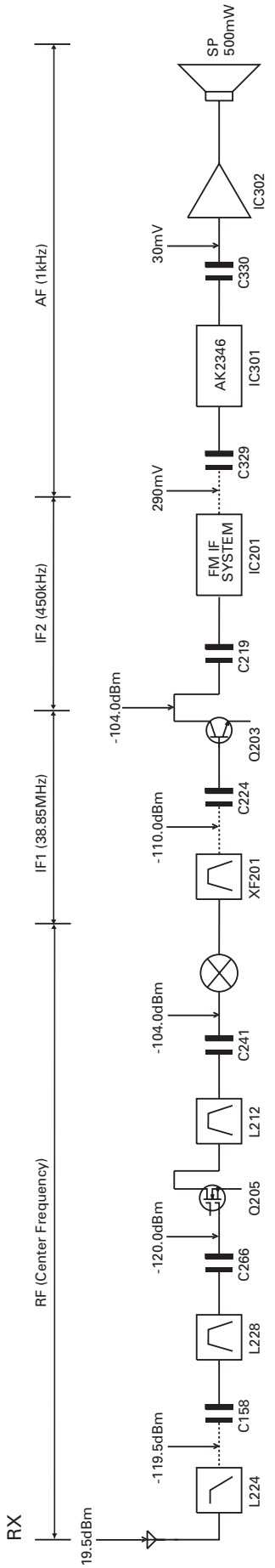
BLOCK DIAGRAM



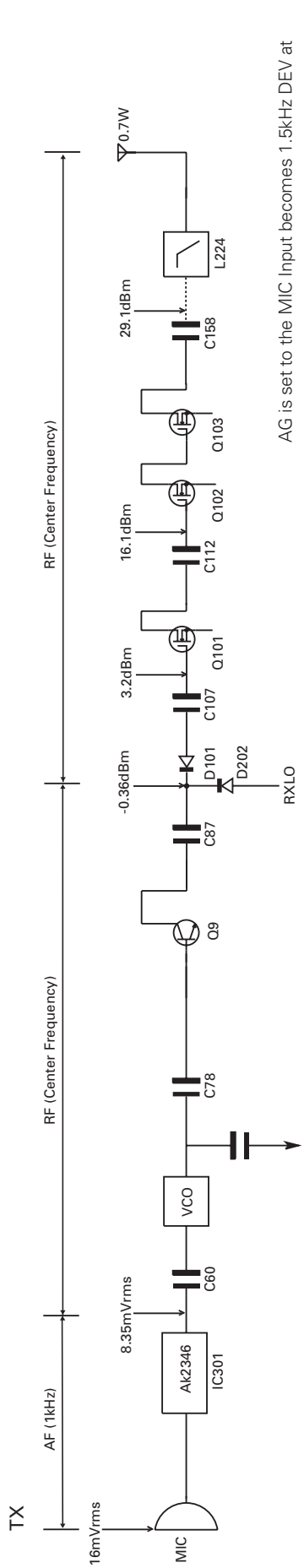
BLOCK DIAGRAM



LEVEL DIAGRAM



To make measurements in the AF section, connect the AC level meter. (ANT input: -53dBm, 1kHz FM, 1.5kHz DEV)
In the RF section,use 1000pF coupling capacitor. (The display shows the SSG input value required to obtain 12dB SINAD without Local Level.)



AG is set to the MIC Input becomes 1.5kHz 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.

KSC-31 / KNB-29N / KNB-30A / KBH-10

KSC-31 (RAPID CHARGER)

■ External View

■ Specifications

Charging current	850mA ±5%
Charging time	KNB-29N : Approx.180 minutes
	KNB-30A : Approx.120 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

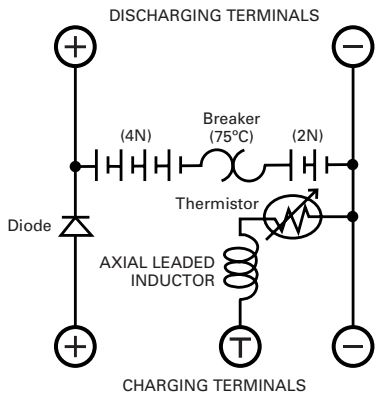
KNB-30A (Ni-Cd BATTERY PACK)

■ External View

■ Specifications

Voltage ..... 7.2V (1.2V x 6)
Battery capacity ... 1100mAh

■ Schematic Diagram



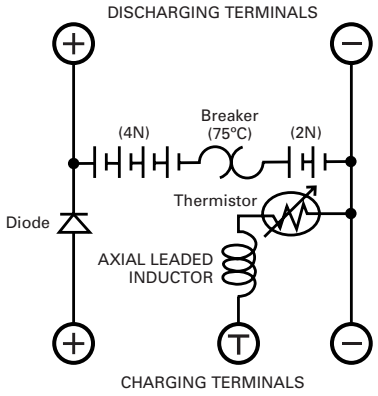
KNB-29N (Ni-MH BATTERY PACK)

■ External View

■ Specifications

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

■ Schematic Diagram



KBH-10 (BELT CLIP)

■ External View

TK-3201

SPECIFICATIONS

General

Frequency Range	446.0~446.1MHz
Number of Channels	16
Channel Spacing	12.5kHz
PLL Channel Stepping	12.5kHz
Operating Voltage	7.5 V DC ±20%
Battery Life	
5-5-90 duty cycle with KNB-29N battery	Battery Saver off : Approx. 16 hours
	Battery Saver on and QT on : Approx. 20 hours
	Battery Saver on and QT off : Approx. 24 hours
5-5-90 duty cycle with KNB-30A battery	Battery Saver off : Approx. 11 hours
	Battery Saver on and QT on : Approx. 15 hours
	Battery Saver on and QT off : Approx. 17 hours
Operating Temperature range	–30˚C to +60˚C (–22 ˚F to +140 ˚F)
Frequency Stability	±2.5ppm (–30˚C to +60˚C)
Channel Frequency Spread	0.1MHz
Dimensions and Weight	
Radio Only	54 (2-1/8) W x 122 (4-13/16) H x 21.1 (13/16) D mm (inches)
	163g (0.36 lbs)
With KNB-29N (1500mAh battery)	54 (2-1/8) W x 122 (4-13/16) H x 33 (1-5/16) D mm (inches)
	363g (0.80 lbs)
With KNB-30A (1100mAh battery)	54 (2-1/8) W x 122 (4-13/16) H x 33 (1-5/16) D mm (inches)
(Dimensions not including protrusions)	343g (0.76 lbs)

Receiver (Measurements made per EN standard)

Sensitivity	
EIA 12dB SINAD	0.28μV
EN 20dB SINAD	-3dBμV (0.7μV)
Selectivity	60dB
Intermodulation	60dB
Spurious Response	60dB
Audio Power Output	500mW at 8Ω less than 10% distortion

Transmitter (Measurements made per EN standard)

RF Power Output	ERP 0.5W
Spurious Response	65dB
Modulation	8K50F3E
FM Noise	40dB
Audio Distortion	Less than 5%

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