

KENWOOD

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

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TK-2160

GENERAL / SYSTEM SET-UP

INTRODUCTION

SCOPE OF THIS MANUAL

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

ORDERING REPLACEMENT PARTS

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

| Unit | | TX-RX Unit | Frequency range | Remarks |
|---------------------|-----|-------------|-----------------|---------------------------------|
| Model & destination | | | | |
| TK-2160 | K,M | X57-6720-10 | 136~174MHz | IF1 : 49.95MHz LOC : 50.4MHz |

PERSONAL SAFETY

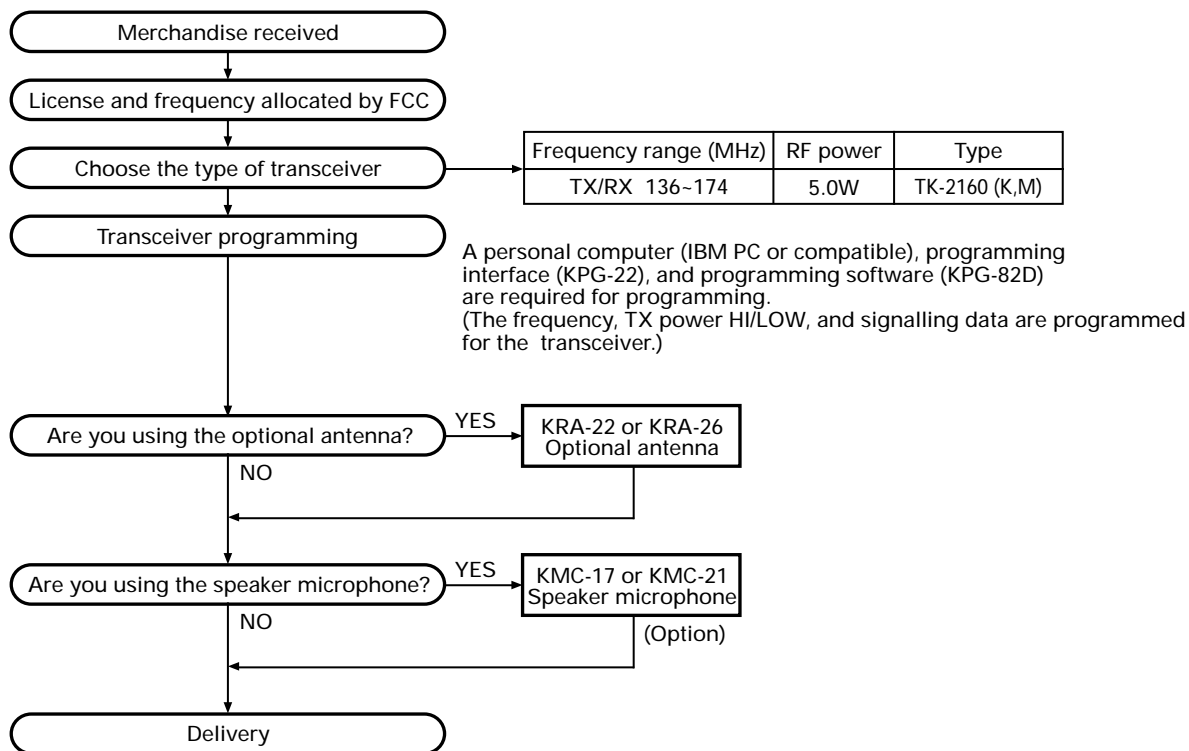
The following precautions are recommended for personal safety:

- 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.

SYSTEM SET-UP

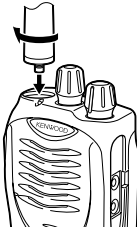


OPERATING FEATURES

1. Operation Features

Installing the (Optional) Antenna

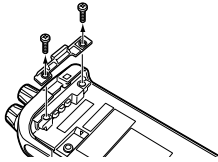
Screw the antenna into the connector on the top of the transceiver by holding the antenna at its base and turning it clockwise until secure.



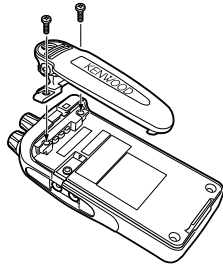
Installing the Belt Clip

Note: When first installing the belt clip, you must remove the battery pack from the rear of the transceiver.

- 1 Remove the two screws from the rear of the transceiver, then remove the small, plastic black covering that was held in place.
- 2 Insert the belt clip mount into the space on the rear of the transceiver.
- 3 Using the 2 screws, affix the belt clip in place.



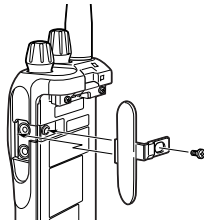
Note: Do not dispose of the plastic black covering! If you remove the belt clip, replace the covering into the space on the rear of the transceiver. Either this covering or the belt clip must be in place, otherwise the battery pack may not remain installed properly.



Installing the Cover over the Speaker/ Microphone Jacks

Note: When installing the speaker/ microphone jack cover, you must remove the battery pack from the rear of the transceiver.

If you are not using a speaker/ microphone, install the cover over the speaker/ microphone jacks using the supplied screw.

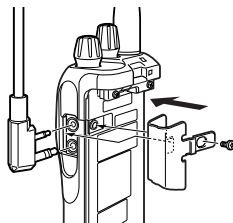


Note: To lift the cover after it has been installed, use a piece of hardened plastic or metal, such as a small screwdriver. Lift the cover by its tab, beside the screwhole, taking care not to damage the cover.

Installing the (Optional) Speaker/ Microphone

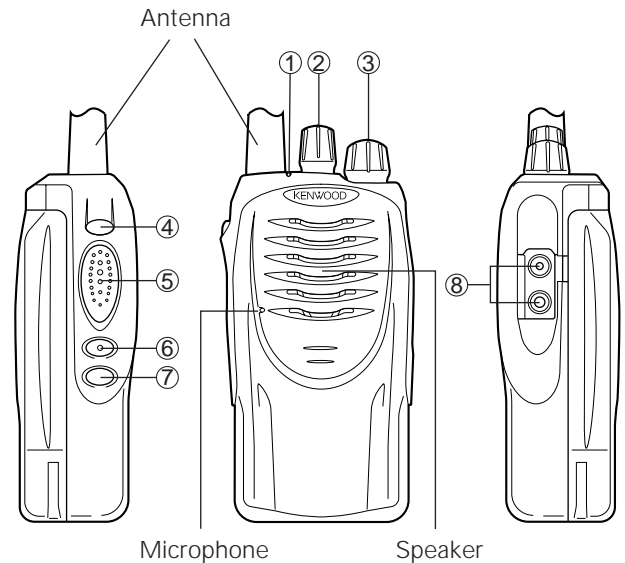
Note: When installing the optional speaker/ microphone and its locking bracket, you must remove the battery pack from the rear of the transceiver.

- 1 Insert the speaker/ microphone plugs into the speaker/ microphone jacks.
- 2 Attach the locking bracket using the supplied screw.



Note: To lift the locking bracket after it has been installed, use a piece of hardened plastic or metal, such as a small screwdriver. Lift the bracket by its tab, beside the screwhole, taking care not to damage the bracket.

GETTING ACQUAINTED



The transceiver is shown with the optional KNB-24L battery pack.

① LED indicator

Lights red while transmitting. Lights green while receiving. Flashes orange while receiving a 2-Tone, DTMF, or FleetSync signal that matches the one set up in your transceiver. If programmed by your dealer, flashes red when the battery power is low while transmitting.

② Channel Switch

Rotate to select a channel from 1 to 16.

③ Power switch/ Volume control

Turn clockwise to switch ON the transceiver. Rotate to adjust the volume. To switch OFF the transceiver, turn counterclockwise fully.

④ AUX key

This is a PF (Programmable Function) key. Press it to activate its auxiliary function (page 4). The default setting for this key is None.

⑤ PTT (Push-to-Talk) switch

Press this switch, then speak into the microphone to call a station.

⑥ Side 1 key

This is a PF (Programmable Function) key. Press it to activate its auxiliary function (page 4). The default setting for this key is None.

⑦ Side 2 key

This is a PF (Programmable Function) key. Press it to activate its auxiliary function (page 4). The default setting for this key is Squelch Off Momentary. Press each key to activate its auxiliary function.

⑧ SP/MIC jacks

Connect an optional speaker/ microphone here.

TK-2160

OPERATING FEATURES / REALIGNMENT

Programmable Auxiliary Functions

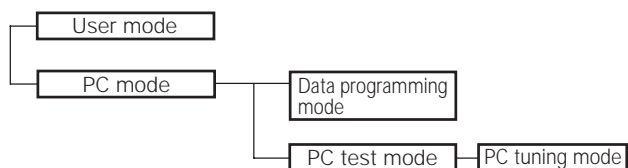
The **AUX**, **Side 1**, and **Side 2** keys can be programmed with the auxiliary functions listed below:

- 2-Tone Encode
- Emergency *1
- Monitor Momentary
- Monitor Toggle
- None
- RF Power Low
- Scan
- Scan Temporary Delete
- Scrambler
- Squelch Off Momentary
- Squelch Off Toggle

*1 This function can be programmed only on the AUX key.

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-82D. |

2. How to Enter Each Mode

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

3. PC Mode

3-1. Preface

The TK-2160 transceiver is programmed using a personal computer, a programming interface (KPG-22) and programming software (KPG-82D).

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

3-2. Connection procedure

1. Connect the TK-2160 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-2160 to PC mode, then attach the interface cable.

3-3. KPG-22 description

(PC programming interface cable: Option)

The KPG-22 is required to interface the TK-2160 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-2160 to the computer's RS-232C serial port.

3-4. Programming software description

KPG-82D is the programming software for TK-2160 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-2160 and edited on the screen. The programmed or edited data can be printed out. It is also possible to tune the transceiver.

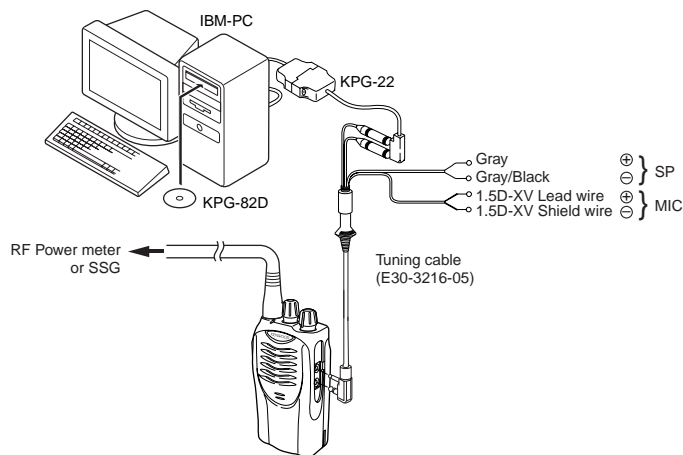


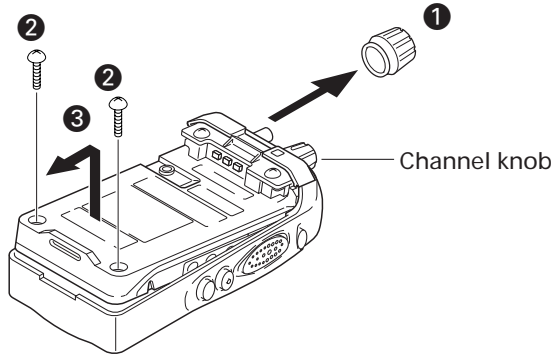
Fig. 1

DISASSEMBLY FOR REPAIR

1. Separating the case assembly from the chassis.

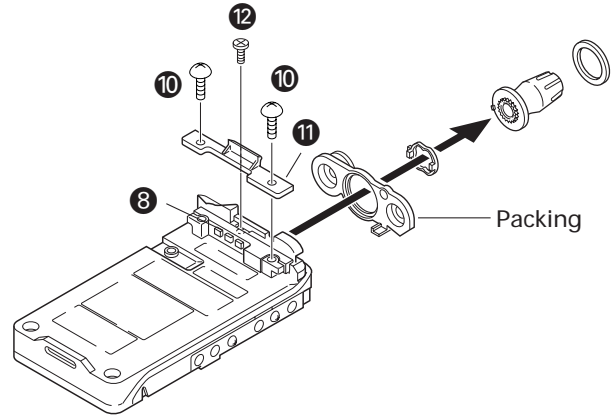
1. Remove the volume knob ①.
2. Remove the two screws ②.
3. Lift the chassis ③, and remove it from the case assembly.

Note: After separating the case assembly from the chassis, remove the channel knob.



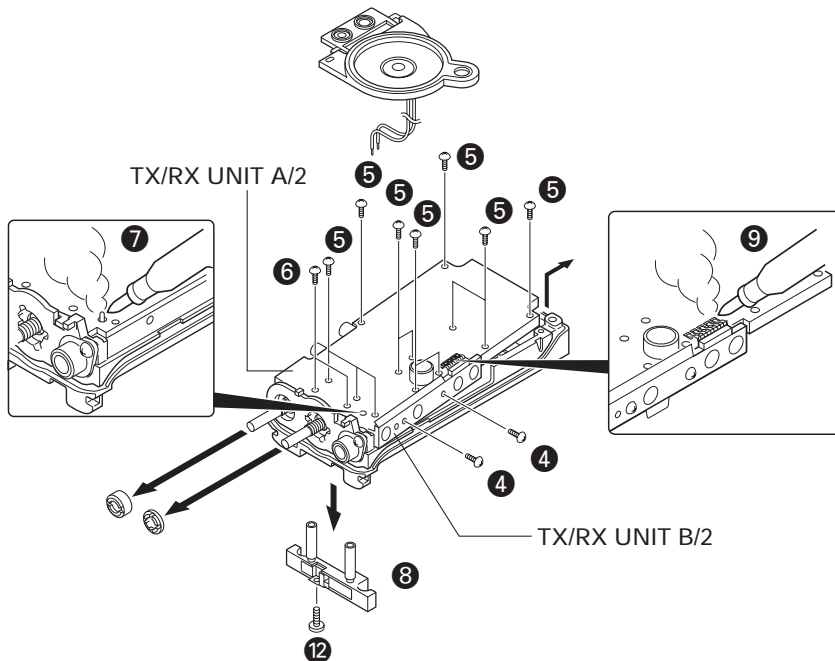
3. How to remove the battery terminal block.

1. Remove the two screws ⑩, then pull out the back cover ⑪.
2. Remove the screw ⑫.



2. Separating the chassis from the TX/RX unit.

1. Remove the two screws ④ fixing the TX/RX unit B/2.
2. Remove the twelve screws ⑤ and two screws ⑥ fixing the TX/RX unit A/2.
3. Remove the solder from the antenna terminal using a soldering iron ⑦, then lift the unit off.



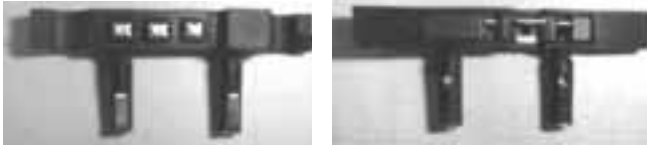
Note: To remove the TX/RX unit B/2, remove the solder using a soldering iron ⑨.

Note: The two screws ⑥ of TX/RX unit A/2 are fixing the battery terminal block ⑧.

DISASSEMBLY FOR REPAIR

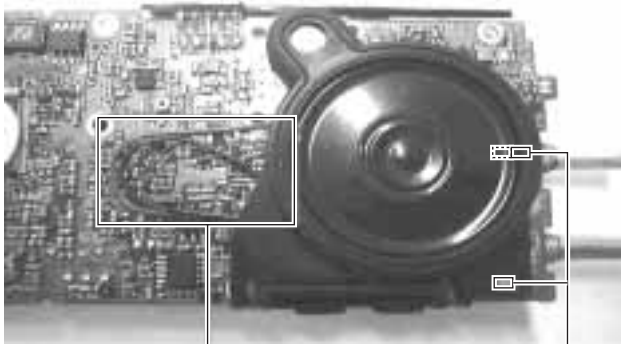
Assembling

- Installation of battery terminal block and packing



Install them so that no distortion or deformation occurs.

- Installation of speakers and cushion, and wire styling of speakers



Wire Styling

Install the cushion according to the guide.

Install the speakers so that they do not protrude from the cushion. Perform the wire styling of speakers as shown in a photograph.

- Attaching the cushion

Attach the cushion as shown in Fig. 1.

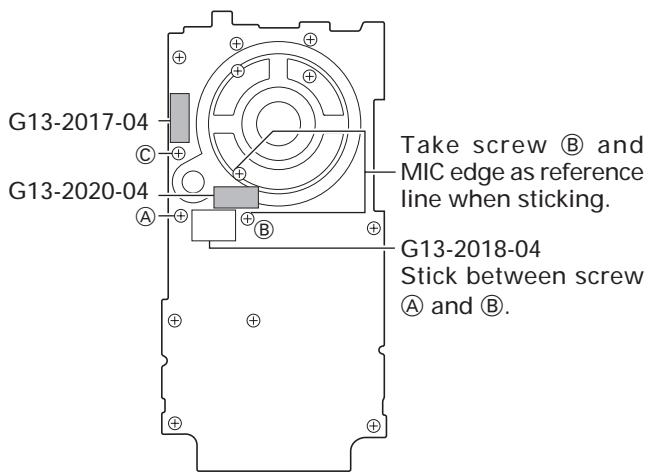


Fig. 1

Note: Cushion must not cover the screws ①, ② and ③.

- Installation of chassis and cabinet assy

Do not press this area, top packing easily deform.

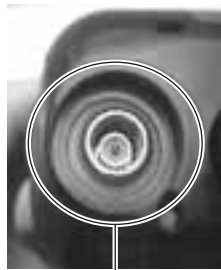


First, mount the set to the cabinet assy.



Second, press down the Chassis to the cabinet assy as shown in the diagram.

Good Condition



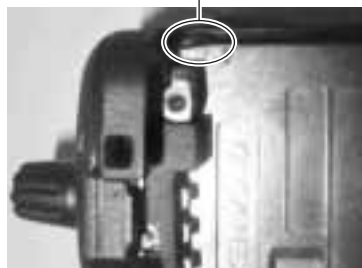
After mount, packing should be in this condition.

NG Condition



Packing deform.

Packing protruded out.



Note:

- Take care that the packing does not protrude from the chassis or case.
- Replace the protruded or deformed packing with a new one.

CIRCUIT DESCRIPTION

1. Frequency Configuration

The receiver utilizes double conversion. The first IF is 49.95 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.

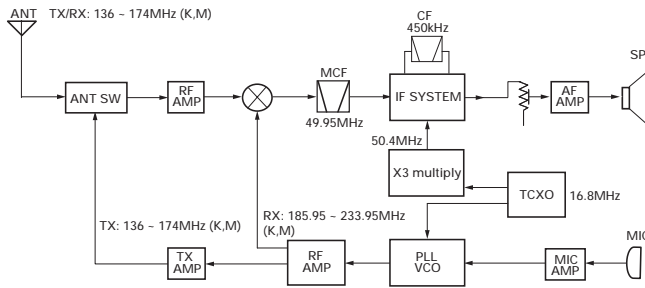


Fig. 1 Frequency configuration

2. Receiver

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

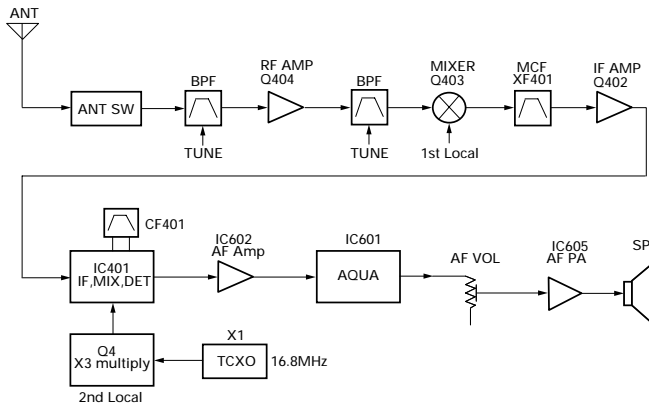


Fig. 2 Receiver section

1) Front End (RF AMP)

The signal coming from the antenna passes through the transmit/receive switching diode circuit, (D204, D206, D208 and D212) passes through a BPF (L411 and L412), and is amplified by the RF amplifier (Q404).

The resulting signal passes through a BPF (L407 and L409) and goes to the mixer. These BPFs are adjusted by variable capacitors (D402, D403, D404 and D405). The input voltage to the variable capacitor is regulated by voltage output from the microprocessor (IC805).

2) First Mixer

The signal from the front end is mixed with the first local oscillator signal generated in the PLL circuit by Q403 to produce a first IF frequency of 49.95 MHz.

The resulting signal passes through the XF401 MCF to cut the adjacent spurious and provide the optimum characteristics, such as adjacent frequency selectivity.

3) IF Amplifier Circuit

The first IF signal is passed through a four-pole monolithic crystal filter (XF401) to remove the adjacent channel signal. The filtered first IF signal is amplified by the first IF amplifier (Q402) and then applied to the IF system IC (IC401). 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 50.4MHz 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 (CF401) 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 (CD401). The demodulated signal is routed to the audio circuit.

4) Wide/Narrow Switching Circuit

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

The WIDE (high level) and NARROW (low level) data is output from IC805, pin 54.

When a WIDE (high level) data is received, Q401 turn off. When a NARROW (low level) data is received, Q401 turn on. Q401 turns on/off with the Wide/Narrow data and the IC401 detector output level is switched to maintain a constant output level during wide or narrow signals.

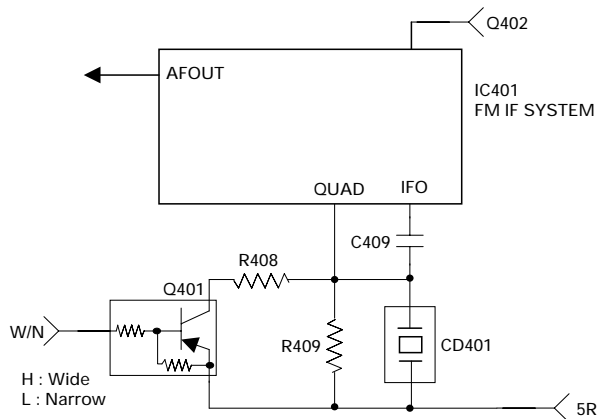


Fig. 3 Wide/Narrow switching circuit

5) Audio Amplifier Circuit

The demodulated signal from IC401 is amplified by IC602, and goes to AF amplifier through IC601.

The signal then goes through an AF volume control (VR801), and is routed to an audio power amplifier (IC605) where it is amplified and output to the speaker.

CIRCUIT DESCRIPTION

6) Tone Volume Fixed Circuit

This function generates a TONE signal sound even if the AF volume of the transceiver is the minimum. A TONE signal is sent through Q602 to the AF amplifier when, in the FPU, "TONE Volume Fixed" is set to ON.

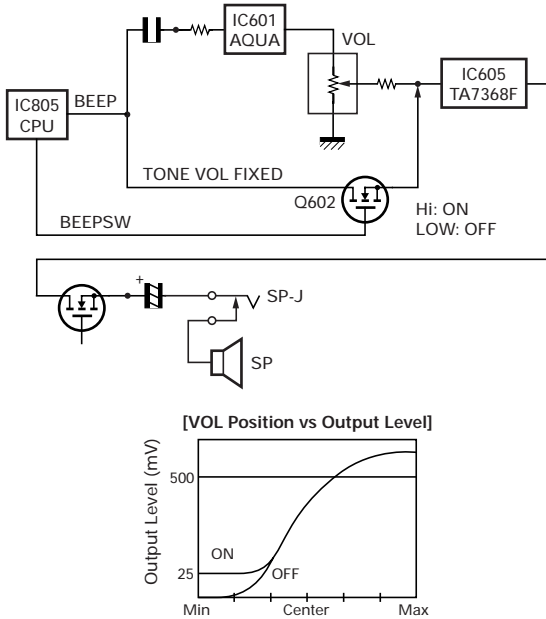


Fig. 4 Tone volume fixed circuit

7) Squelch

Part of the AF signal from the IC enters the FM IC (IC401) 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 (IC805). IC805 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, IC805 sends a high signal to the SP MUTE line and turns IC605 on through Q603, Q604, Q607 and Q608. (See Fig. 5)

8) Receive Signalling

(1) QT/DQT

The output signal from IF IC (IC401) enters the microprocessor (IC805) through IC601. IC805 determines whether the QT or DQT matches the preset value, and controls the SP MUTE and the speaker output sounds according to the squelch results.

(2) 2-TONE

Part of the received AF signal output from the AF amplifier IC602, and then passes through an audio processor (IC601), goes to the other AF amplifier IC603, is compared, and then goes to IC805. IC805 checks whether 2-TONE data is necessary. If it matches, IC805 carries out a specified operation, such as turning the speaker on. (See Fig. 5)

(3) MSK (Fleet Sync)

Fleet Sync utilizes 1200bps and 2400bps MSK signal is output from pin 6 of IC601. And is routed to the VCO. When encoding MSK, the microphone input signal is muted.

RECEIVE SIGNALING

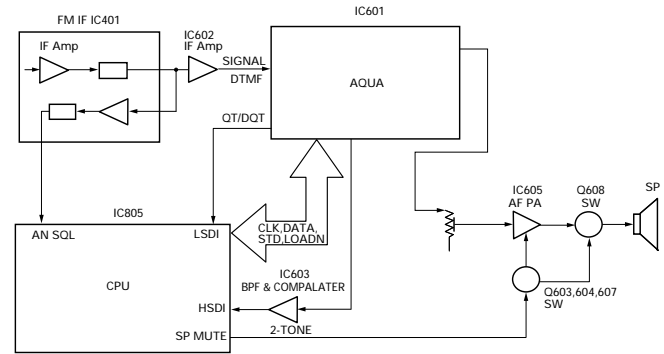


Fig. 5 AF amplifier and squelch

(4) DTMF

The DTMF input signal from the IF IC (IC401) is amplified by IC602 and goes to IC601. The decoded information is then processed by the CPU.

3. PLL Frequency Synthesizer

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

1) PLL

The frequency step of the PLL circuit is K:2.5,5,6.25 or 7.5kHz, M:6 or 6.25kHz.

A 16.8MHz reference oscillator signal is divided at IC1 by a fixed counter to produce an oscillator (VCO) output signal which is buffer amplified by Q9 then divided in IC1 by a dual-module 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. 6)

2) VCO

The operating frequency is generated by Q6 in transmit mode and Q5 in receive mode. The oscillator frequency is controlled by applying the VCO control voltage, obtained from the phase comparator, to the varactor diodes (D3, D5, D7 and D8 in transmit mode and D4, D6, D9 and D10 in receive mode). The RX pin is set high in receive mode causing Q8 and Q12 to turn Q6 off and Q5 on.

The TX pin is set high in transmit mode. The outputs from Q5 and Q6 are amplified by Q9 and sent to the RF amplifiers.

CIRCUIT DESCRIPTION

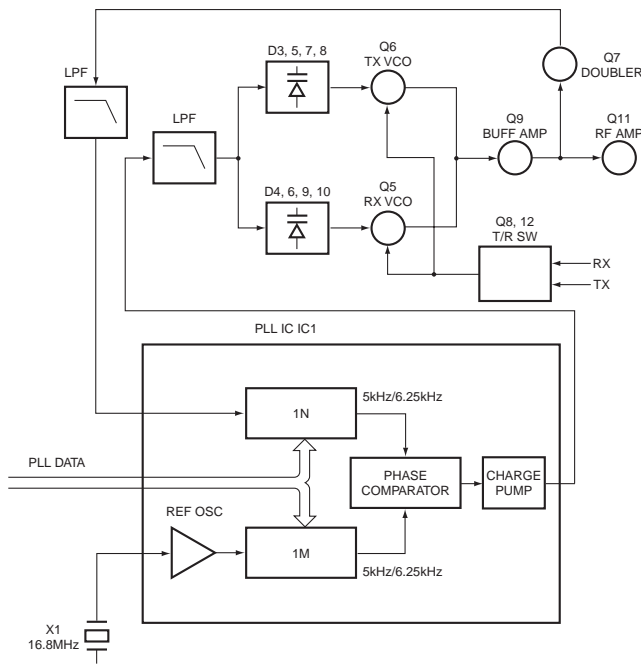


Fig. 6 PLL circuit

3) Unlock Detector

If a pulse signal appears at the LD pin of IC1, an unlock condition occurs, and the DC voltage obtained from C19, R6 and Q1 causes the voltage applied to the microprocessor to go high. When the microprocessor detects this condition, the transmitter is disabled, ignoring the push-to-talk switch input signal. (See Fig. 7)

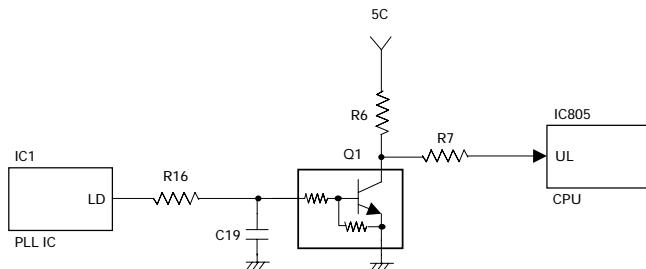


Fig. 7 Unlock detector circuit

4. Transmitter System

1) Microphone Amplifier

The signal from the microphone passes through the IC601. When encoding DTMF, it is turned OFF for muting the microphone input signal by IC601. The signal passes through the Audio processor (IC601) for the maximum deviation adjustment, and goes to the VCXO modulation input.

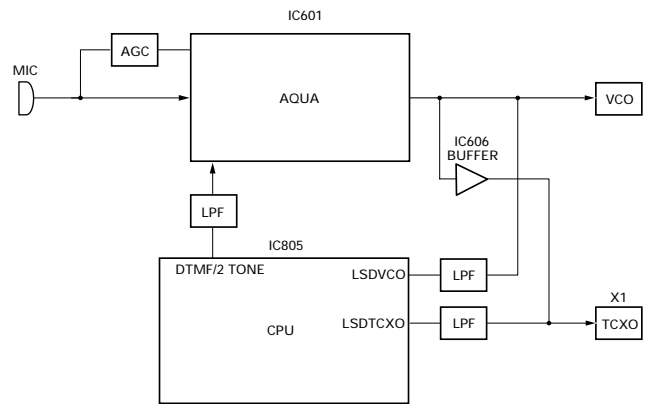


Fig. 8 Microphone amplifier

2) Drive and Final Amplifier

The signal from the T/R switch (D201 is on) is amplified by the drive amplifier (Q207) to 50mW.

The output of the drive amplifier is amplified by the RF power amplifier (Q211) to 5.0W (1W when the power is low). The RF power amplifier consists of two MOS FET stages. The output of the RF power amplifier is then passed through the harmonic filter (LPF) and antenna switch (D204 and D206) and applied to the antenna terminal.

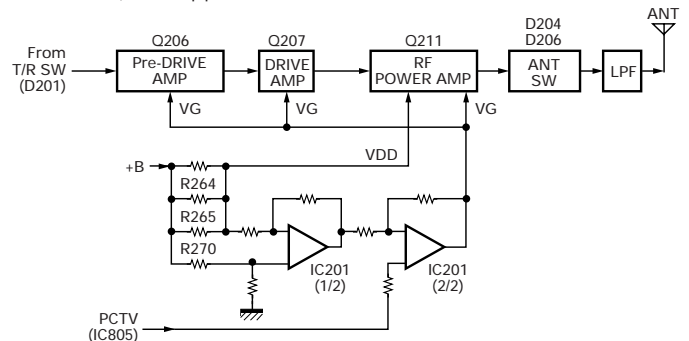


Fig. 9 Drive and final amplifier and APC circuit

3) APC Circuit

The APC circuit always monitors the current flowing through the RF power amplifier (Q211) and keeps a constant current. The voltage drop at R264, R265 and R270 is caused by the current flowing through the RF power amplifier and this voltage is applied to the differential amplifier IC201(1/2). IC201(2/2) compares the output voltage of IC201(1/2) with the reference voltage from IC805. The output of IC201(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.

4) Encode Signalling

(1) QT/DQT

QT, DQT data of the LSDTCXO Line is output from pin 22 of the CPU. The signal passes through a low-pass CR filter and goes to the TCXO(X1).

The QT, DQT data of the LSDVCO Line is output from pin

CIRCUIT DESCRIPTION

20 of the CPU. The signal passes through a low pass CR filter, mixes with the audio signal, and goes to the VCO modulation input. TX deviation is adjusted by the CPU.

(2) DTMF/2 TONE

High-speed data is output from pin 2 of the CPU. The signal passes through a low-pass CR filter, and provides a TX and SP out tone, and is then applied to the audio processor (IC601). The signal is mixed with the audio signal and goes to the VCO.

TX deviation is adjusted by the CPU.

(3) MSK (Fleet Sync)

The MSK input signal from the IF IC is amplified by IC602 (1/2) and goes to pin 31 of IC 601. The signal is demodulated by MSK demodulator in IC 601. The demodulated data goes to the CPU for processing.

5. Power Supply

There are 3.5V power supply for PLL circuit and five 5V power supplies for the microprocessor: 5M,5MS,5C,5R, and 5T. 5M 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 (IC805) and its peripheral circuits. It controls the TX-RX unit. IC805 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 (IC805) operates at a clock of 7.3728MHz. This oscillator has a circuit that shifts the frequency by BEAT SHIFT SW (Q810).

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.

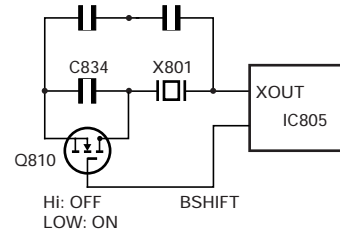


Fig. 10 Frequency shift circuit

2) Memory Circuit

Memory circuit consists of the CPU (IC805) and an EEPROM (IC804). 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.

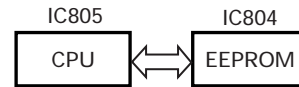


Fig. 11 Memory circuit

3) 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.
- (2) The red LED blinks when the battery voltage falls below the voltage (2) 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.

- (3) The transceiver immediately stops transmission when the battery voltage falls below the voltage (3) shown in the table. A message tone beeps while the PTT switch is released.

| | Battery Case | Li-ion Battery | Ni-Cd Battery | Ni-MH Battery |
|-----|--------------|----------------|---------------|---------------|
| (1) | 6.2[V] | 6.5[V] | 6.2[V] | 6.2[V] |
| (2) | 7.6[V] | 7.1[V] | 6.8[V] | 7.0[V] |
| (3) | 5.9[V] | 6.2[V] | 5.9[V] | 5.9[V] |

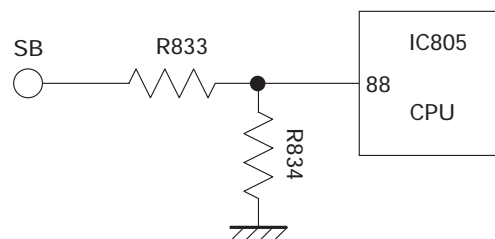


Fig. 12 Low battery warning

CIRCUIT DESCRIPTION / INSTALLATION

4) Battery Type Detection

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

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

7. Control System

Keys and channel selector circuit.

The signal from the keys and channel selector are directly input to the microprocessor, as shown in fig. 13.

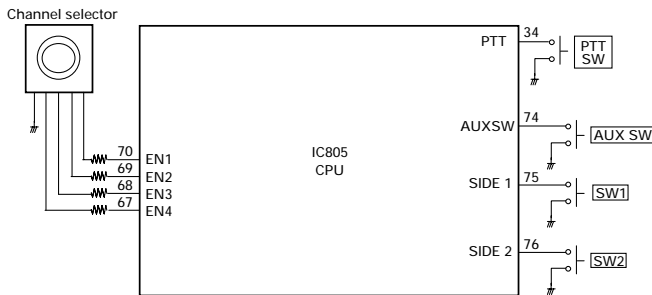


Fig. 13 Control system

INSTALLATION

1. Optional Board

Remove the TX/RX unit from the radio before installing the optional board in the radio.

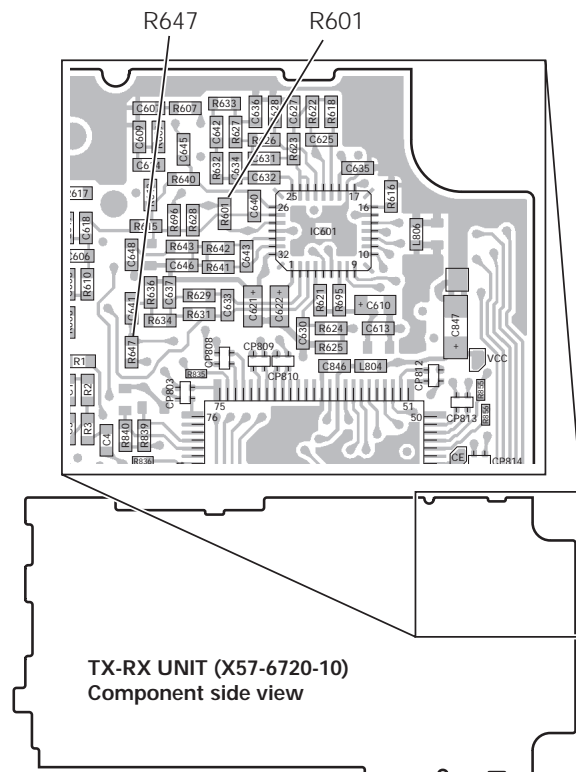
The procedure for removing the TX/RX unit is described in the DISASSEMBLY FOR REPAIR section in the Service Manual.

Install the optional board on the back of the TX/RX unit.

For details on installation of the optional board, refer to Installation Information supplied with the optional board.

When installing the optional board, also refer to the chart in TERMINAL FUNCTION section (page 12) given in the Service Manual.

Note: To install and use the Scrambler Board, remove "R601" and "R647" from the front of the TX/RX unit.



TERMINAL FUNCTION

■ CN801

| Pin No. | Designation | Function | Condition | Value |
|---------|-------------|-----------------------------|---|--|
| 1 | GND | GND | | Vss |
| 2 | SB | Switched B | Output Voltage/7mA load | DC (Battery terminal) $\pm 0.5V$ |
| 3 | A3 | AUX3 | Load >100k Ω | (Low) Vss ~ 0.4V (High) Vdd-0.8V ~ Vdd |
| 4 | TXAFI | Transmit AF input | Input sensitivity/Impedance (1kHz std. dev.) | 280 \pm 50mVrms @22k Ω Load |
| 5 | A2 | AUX2 | Load >100k Ω | (Low) Vss ~ 0.4V (High) Vdd-0.8V ~ Vdd |
| 6 | A6 | AUX6 | Load >100k Ω | (Low) Vss ~ 0.4V (High) Vdd-0.8V ~ Vdd |
| 7 | A1 | AUX1 | Load >100k Ω | (Low) Vss ~ 0.4V (High) Vdd-0.8V ~ Vdd |
| 8 | A5 | AUX5 | Load >100k Ω | (Low) Vss ~ 0.4V (High) Vdd-0.8V ~ Vdd |
| 9 | A4 | AUX4 | Load >100k Ω | (Low) Vss ~ 0.4V (High) Vdd-0.8V ~ Vdd |
| 10 | NC | Non connection | | Non connection |
| 11 | 5C | DC 5V | Output Voltage/10mA load | 5.0 \pm 0.5V |
| 12 | DEO | Discriminator signal output | Output voltage/Impedance (1kHz std. mod.) | 280 \pm 50mVrms @2.2k Ω Load |
| 13 | TXAFI | Transmit AF input | Input sensitivity/Impedance (1kHz std. dev.) | 280 \pm 50mVrms @22k Ω Load |
| 14 | DEO | Discriminator signal output | Output voltage/Impedance (1kHz std. mod.) | 280 \pm 50mVrms @2.2k Ω Load |
| 15 | NC | Non connection | | Non connection |
| 16 | ALT | Sidetone input | Input sensitivity/Impedance (1kHz rated AF power/Vol. MAX) | 7 \pm 3mVrms @22k Ω Load |
| 17 | NC | Non connection | | Non connection |
| 18 | NC | Non connection | | Non connection |
| 19 | NC | Non connection | | Non connection |
| 20 | GND | GND | | Vss |

■ Solder point connection

| Designation | Function | Condition | Value |
|-------------|-----------------------------|--|--|
| MIC_I | Mic input | Input sensitivity/Impedance (1kHz std. dev.) | 7 \pm 3mVrms @22k Ω Load |
| MIC_O | Mic output | Output voltage/Impedance (1kHz 15mVrms mic input) | 2.6 \pm 1.0mVrms @2.2k Ω Load |
| | | Output voltage/Impedance (1kHz 100mVrms mic input) | 90 \pm 20mVrms @100k Ω Load |
| RA_I | Receiver AF input | Input sensitivity/Impedance (1kHz rated AF power/Vol. MAX) | 75 \pm 20mVrms @22k Ω Load |
| RA_O | Receiver AF output | Output voltage/Impedance (1kHz std. mod.) | 150 \pm 50mVrms @2.2k Ω Load |
| | | Output voltage/Impedance (1kHz system mod.) | 290 \pm 50mVrms @100k Ω Load |
| A1 | AUX1 | Load >100k Ω | (Low) Vss ~ 0.4V (High) Vdd-0.8V ~ Vdd |
| A2 | AUX2 | Load >100k Ω | (Low) Vss ~ 0.4V (High) Vdd-0.8V ~ Vdd |
| A3 | AUX3 | Load >100k Ω | (Low) Vss ~ 0.4V (High) Vdd-0.8V ~ Vdd |
| A4 | AUX4 | Load >100k Ω | (Low) Vss ~ 0.4V (High) Vdd-0.8V ~ Vdd |
| A5 | AUX5 | Load >100k Ω | (Low) Vss ~ 0.4V (High) Vdd-0.8V ~ Vdd |
| A6 | AUX6 | Load >100k Ω | (Low) Vss ~ 0.4V (High) Vdd-0.8V ~ Vdd |
| SB | Switched B | Output Voltage/7mA load | DC (Battery terminal) $\pm 0.5V$ |
| GND | GND | | Vss |
| 5C | DC 5V | Output Voltage/10mA load | 5.0 \pm 0.5V |
| TXAFI | Transmit AF input | Input sensitivity/Impedance (1kHz std. dev.) | 280 \pm 50mVrms @22k Ω Load |
| DEO | Discriminator signal output | Output voltage/Impedance (1kHz std. mod.) | 280 \pm 50mVrms @2.2k Ω Load |
| LSDFO | Received sub-tone output | Output voltage/Impedance (150Hz 15% mod.) | 180 \pm 50mVrms @2.2k Ω Load |
| ALT | Sidetone input | Input sensitivity/Impedance (1kHz rated AF power/Vol. MAX) | 7 \pm 3mVrms @22k Ω Load |

SEMICONDUCTOR DATA

Microprocessor : M30622MCA7G7GP (TX-RX UNIT : IC805)

■ Pin function

| Pin No. | Port Name | I/O | Function |
|---------|------------------|-----|---|
| 1 | PCTV | O | APC/BPF control data output. |
| 2 | DTMF | O | DTMF, 2TONE. |
| 3 | HSDI | I | High speed data input (2TONE). |
| 4 | EEPDAT | I/O | EEPROM data input/output. |
| 5 | EEPCLK | O | EEPROM Clock |
| 6 | BYTE | I | GND. |
| 7 | CNVSS | I | GND. |
| 8 | AUX5 | O | Option Board 5 |
| 9 | AUX6 | O | Option Board 6 |
| 10 | RESET | I | CPU reset. |
| 11 | XOUT | O | CPU clock. |
| 12 | VSS | - | GND. |
| 13 | XIN | I | CPU clock. |
| 14 | VCC | - | +5V. |
| 15 | NC | I | NC |
| 16 | INT | I | Battery voltage monitor input Low battery : L |
| 17 | RDF/FD | I | Base Band IC Data input |
| 18 | TCLK/ DTRDI | I | Base Band IC Data input |
| 19 | NC | - | NC |
| 20 | LSDVCO | O | Low speed data output (VCO). |
| 21 | NC | I | NC |
| 22 | LSDTXO | O | Low speed data output (TCXO). |
| 23 | NC | I | NC |
| 24 | BEEP | O | Beep output. |
| 25 | OPTDET | I | Option detect input |
| 26 | NC | - | NC |
| 27 | NC | - | NC |
| 28 | NC | - | NC |
| 29 | AUX4 | O | Option board port 4 |
| 30 | AUX2 | I/O | Option board port 2 |
| 31 | NC | - | NC |
| 32 | NC | - | NC |
| 33 | TXD | I/O | Serial data. |
| 34 | PTT/RXD | I | PTT on : L/Serial data. |
| 35 | STD | I | Base Band IC Data input |
| 36 | BBDIR | O | Base Band IC Data output |
| 37 | BBCLK | O | Base Band IC clock output |
| 38 | BBDI/O | I/O | Base Band IC Data input/output |
| 39 | NC | - | NC |
| 40 | TDATA/ DTRCLK | O | Base Band IC Data output |
| 41 | DTRLOADN | O | Base Band IC Data output |
| 42 | AUX3 | O | Option board port 3 |
| 43 | AUX1 | O | Option board port 1 |
| 44 | NC | - | NC |
| 45 | NC | - | NC |
| 46 | DSW | O | APC voltage discharge Switch |
| 47 | BEEPSW | O | Beep switch. |
| 48 | AFCOUT | O | AF amp power supply control |
| 49 | AFMUTE | O | RX audio mute |
| 50 | NC | - | NC |
| 51 | TX | O | TX VCO power supply switch TX:L |
| 52 | RX | O | RX VCO power supply switch RX:L |

| Pin No. | Port Name | I/O | Function |
|---------|-----------|-----|---|
| 53 | BSHIFT | O | Beet shift switch. |
| 54 | W/N | O | W/N switch Wide:H |
| 55 | NC | - | NC |
| 56 | APCSW | O | APC switch output. |
| 57 | SAVE | O | Battery save output. |
| 58 | 5TC | O | 5T control output. |
| 59 | 5RC | O | 5R control output. |
| 60 | VCC | - | +5V. |
| 61 | 5MSC | O | 5M control output. |
| 62 | VSS | - | GND. |
| 63 | NC | - | NC |
| 64 | NC | - | NC |
| 65 | NC | - | NC |
| 66 | NC | - | NC |
| 67 | EN4 | I | CH selector input 4. |
| 68 | EN3 | I | CH selector input 3. |
| 69 | EN2 | I | CH selector input 2. |
| 70 | EN1 | I | CH selector input 1. |
| 71 | NC | - | NC |
| 72 | LEDTX | O | RED LED lights control output |
| 73 | LEDRX | O | GREEN LED lights control output |
| 74 | AUXSW | I | Key input (Emergency). |
| 75 | SIDE1 | I | Side key 1 input. |
| 76 | SIDE2 | I | Side key 2 input. |
| 77 | NC | - | NC |
| 78 | NC | - | NC |
| 79 | SIM1 | I | Destination select 1. |
| 80 | SIM2 | I | Destination select 2. |
| 81 | NC | - | NC |
| 82 | PLLUL | I | PLL unlock detect input. unlock : L |
| 83 | RFCLK | O | PLL clock output. Latch : L |
| 84 | RFDAT | O | PLL data output. |
| 85 | PS | O | PLL power save output. |
| 86 | PLLSTB | O | PLL strobe output. |
| 87 | BATTSEL | I | Battery distinction input. |
| 88 | BATT | I | Battery voltage input. |
| 89 | VOX | I | VOX input. |
| 90 | RSSQL | I | Received signal strength indicator input. |
| 91 | ANSQL | I | Squelch level input. |
| 92 | LSDI | I | Low speed data input (QT/DQT). |
| 93 | THM | I | Thermistor input. |
| 94 | AVSS | - | GND. |
| 95 | NC | - | NC |
| 96 | VREF | - | +5V. |
| 97 | AVCC | - | +5V. |
| 98 | NC | - | NC |
| 99 | NC | - | NC |
| 100 | NC | - | NC |

COMPONENTS DESCRIPTION

TX-RX UNIT (X57-672X-XX)

| Ref. No. | Use/Function | Operation/Condition |
|------------|--------------|--------------------------|
| IC1 | IC | PLL system |
| IC201 | IC | Comparator (APC) |
| IC401 | IC | FM IF system |
| IC601 | IC | Audio processor |
| IC602 | IC | AF AMP |
| IC603(1/2) | IC | HSD AMP |
| IC603(2/2) | IC | HSD AMP |
| IC604 | IC | VOX AMP |
| IC605 | IC | AF Power AMP |
| IC606 | IC | AF AMP |
| IC801 | IC | Voltage regulator / 5V |
| IC802 | IC | Voltage detector / Reset |
| IC803 | IC | Voltage detector / INT |
| IC804 | IC | EEPROM |
| IC805 | IC | Microprocessor |
| IC806 | IC | Flip Flop |
| Q1 | Transistor | Level shift |
| Q2 | Transistor | Level shift |
| Q3 | Transistor | Level shift |
| Q4 | Transistor | Tripler |
| Q5 | FET | VCO / RX |
| Q6 | FET | VCO / TX |
| Q7 | Transistor | Doubler |
| Q8 | FET | DC switch / TX VCO |
| Q9 | Transistor | RF Buffer AMP |
| Q10 | Transistor | Ripple filter |
| Q11 | Transistor | RF AMP |
| Q12 | FET | DC switch / RX VCO |
| Q206 | FET | Pre-drive AMP |
| Q207 | FET | TX Drive AMP |
| Q208 | Transistor | APC switch |
| Q209 | FET | APC switch |
| Q210 | Transistor | APC switch |
| Q211 | FET | TX Final AMP |
| Q212 | FET | APC switch |
| Q213 | Transistor | APC switch |
| Q400 | FET | W/N switch / TX |
| Q401 | Transistor | W/N switch / RX |
| Q402 | Transistor | IF AMP |
| Q403 | FET | Mixer |
| Q404 | FET | RF AMP |
| Q601 | FET | AF Mute |
| Q602 | FET | Beep switch |
| Q603 | Transistor | DC switch / SP Mute |
| Q604 | Transistor | DC switch |
| Q605 | Transistor | MIC AGC |
| Q606 | Transistor | MIC AGC |
| Q607 | Transistor | DC switch / SP Mute |
| Q608 | FET | SP Mute switch |
| Q801 | Transistor | 5T switch |
| Q802(1/2) | FET | 5TC switch |
| Q802(2/2) | FET | SAVE switch |
| Q803(1/2) | Transistor | AVR / 5C |
| Q803(2/2) | Transistor | AVR / 5T |

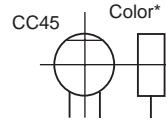
| Ref. No. | Use/Function | Operation/Condition |
|-----------|----------------------------|----------------------------|
| Q804 | Transistor | 5C switch |
| Q805(1/2) | Transistor | LED switch / Green |
| Q805(2/2) | Transistor | LED switch / Red |
| Q806 | Transistor | AVR / PLLB |
| Q807 | Transistor | PLLB switch |
| Q808 | Transistor | 5MS switch |
| Q809 | Transistor | 5R switch |
| Q810 | FET | Beet shift switch |
| D2 | diode | Shift switch |
| D3 | Variable capacitance diode | Frequency control / TX VCO |
| D4 | Variable capacitance diode | Frequency control / RX VCO |
| D5 | Variable capacitance diode | Frequency control / TX VCO |
| D6 | Variable capacitance diode | Frequency control / RX VCO |
| D7 | Variable capacitance diode | Frequency control / TX VCO |
| D8 | Variable capacitance diode | Frequency control / TX VCO |
| D9 | Variable capacitance diode | Frequency control / RX VCO |
| D10 | Variable capacitance diode | Frequency control / RX VCO |
| D11 | Diode | Shift switch |
| D12 | Variable capacitance diode | Modulator |
| D13 | Diode | Current steering |
| D14 | Diode | Shift switch |
| D201 | Diode | TX/RX RF switch |
| D203 | Zener diode | APC protect |
| D204 | Diode | ANT switch |
| D206 | Diode | ANT switch |
| D208 | Diode | ANT switch |
| D212 | Diode | ANT switch |
| D401 | Diode | TX/RX RF switch |
| D402 | Variable capacitance diode | RF BPF tuning |
| D403 | Variable capacitance diode | RF BPF tuning |
| D404 | Variable capacitance diode | RF BPF tuning |
| D405 | Variable capacitance diode | RF BPF tuning |
| D603 | Diode | Limiter |
| D604 | Diode | Detector |
| D605 | Diode | Detector |
| D606 | Diode | Detector |
| D801 | Diode | 5M protector |
| D802 | LED | LED / Red |
| D803 | LED | LED / Green |
| D805 | Diode | Reverse protection |

PARTS LIST

CAPACITORS

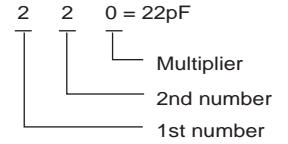
CC 45 TH 1H 220 J
 1 2 3 4 5 6

- 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)

| Code | 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

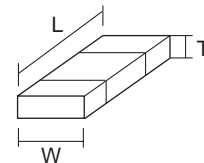
(Chip)(B,F)

Carbon resistor (Nomal type)

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

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

Dimension



Dimension (Chip resistor)

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

Rating wattage

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

TK-2160

PARTS LIST

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

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

TK-2160 (Y50-578X-XX) TX-RX UNIT (X57-672X-XX)

| Ref. No. | Address | New parts | Parts No. | Description | Destination |
|----------------|---------|-----------|-------------|-------------------------------------|-------------|
| TK-2160 | | | | | |
| 1 | 1B | * | A02-3826-33 | CABINET ASSY | |
| 2 | 2B | * | A10-4068-01 | CHASSIS | |
| 3 | 3A | * | A82-0054-02 | REAR PANEL | |
| 4 | 3A | | B01-0694-03 | ESCUTCHEON | |
| 5 | 2D | * | B09-0676-03 | CAP ACCESSORY | |
| 6 | 1C | * | B62-1716-00 | INSTRUCTION MANUAL | K |
| 6 | 1C | * | B62-1747-00 | INSTRUCTION MANUAL | M |
| 7 | 3B | * | B72-2153-04 | MODEL NAME PLATE | |
| 8 | 3A | * | E04-0446-05 | RF COAXIAL RECEPTACLE(SMA) | |
| 9 | 3B | * | E37-1085-05 | FLAT CABLE | |
| 10 | 2A | * | E37-1101-05 | SPEAKER WIRE(REDF) | |
| 11 | 2A | * | E37-1102-05 | SPEAKER WIRE(BLACK) | |
| 12 | 3A | * | E72-0416-13 | BATT TERMINAL BLOCK | |
| 13 | | * | G10-1315-04 | FIBROUS SHEET(CABINET) | |
| 14 | 2B | * | G11-4090-04 | SHEET(FINAL FET) | |
| 15 | 3B | * | G11-4254-04 | SHEET(PTT) | |
| 16 | 3A | * | G11-4287-04 | SHEET(TERMINAL BLOCK) | |
| 17 | 3A | * | G11-4289-04 | SHEET(CHASSIS) | |
| 18 | 2B | * | G13-2001-04 | CUSHION(CHASSIS) | |
| 19 | 2B | * | G13-2014-04 | CUSHION(CHASSIS BOTTOM) | |
| 20 | 2B | * | G13-2017-04 | CUSHION | |
| 21 | 2B | * | G13-2018-04 | CUSHION | |
| 22 | 3A | * | G13-2019-04 | CUSHION | |
| 23 | 2B | * | G13-2020-04 | CUSHION | |
| 24 | 3A | * | G53-1579-02 | PACKING | |
| 25 | 2B | * | G53-1580-03 | PACKING(CHASSIS) | |
| 26 | 1B | * | G53-1581-22 | PACKING(SPEAKER) | |
| 27 | 3B | * | G53-1582-03 | PACKING(BATT TERMINAL BLOCK) | |
| 28 | 3C | * | H12-3150-02 | PACKING FIXTURE | |
| 29 | | * | H25-2345-04 | PROTECTION BAG | |
| 30 | 1D | * | H52-1981-02 | ITEM CARTON CASE | |
| 31 | 2A | * | J19-5454-03 | HOLDER | |
| 32 | 2D | * | J21-8464-04 | HARDWARE FIXTURE ACCESSORY | |
| 33 | 2C | * | J29-0701-05 | HOOK ACCESSORY | |
| 34 | 3A | * | J30-1275-04 | SPACER(CH KNOB) | |
| 35 | 3A | * | J30-1281-04 | SPACER(CH KNOB) | |
| 36 | | * | J30-1283-04 | SPACER | |
| 37 | 1A | * | K29-9278-13 | KNOB(VOLUME) | |
| 38 | 1B | * | K29-9279-03 | KNOB(PTT) | |
| 39 | 3A | * | K29-9280-13 | KNOB(CH SELECTOR) | |
| A | 3A | | N14-0583-04 | CIRCULAR NUT(CH) | |
| B | 3A | * | N14-0805-04 | CIRCULAR NUT(VOLUME) | |
| C | 3A | | N30-2604-46 | PAN HEAD MACHINE SCREW | |
| D | 3B | | N30-2612-46 | PAN HEAD MACHINE SCREW | |
| E | 3A,3B | | N30-3006-45 | PAN HEAD MACHINE SCREW | |
| F | 2D | | N35-3004-45 | BINDING HEAD MACHINE SCREW | |
| G | 3A,3B | * | N78-2040-46 | PAN HEAD TAPTITE SCREW | |
| H | 2A,2B | | N83-2005-46 | PAN HEAD TAPTITE SCREW | |
| 40 | 2A | * | R31-0650-05 | VARIABLE RESISTOR | |
| 41 | 2A | | S60-0420-05 | ROTARY SWITCH | |

| Ref. No. | Address | New parts | Parts No. | Description | Destination |
|---|---------|-----------|---------------|--------------------------------|-------------|
| 42 | 1B | | T07-0369-05 | SPEAKER | |
| TX-RX UNIT (X57-672X-XX) 0-10 : K, M | | | | | |
| D802 | | | B30-2156-05 | LED(REDF) | |
| D803 | | | B30-2157-05 | LED(YELLOW) | |
| C1 | | | CK73GB1H822K | CHIP C 8200PF K | |
| C2 | | | CK73GB1H102K | CHIP C 1000PF K | |
| C3 | | | CK73GB1E123K | CHIP C 0.012UF K | |
| C4 | | | CK73GB0J225K | CHIP C 2.2UF K | |
| C5 | | | CK73GB1H102K | CHIP C 1000PF K | |
| C6 | | | CK73GB1H103K | CHIP C 0.010UF K | |
| C7 | | | CK73GB1H102K | CHIP C 1000PF K | |
| C8 | | | CC73GCH1H100D | CHIP C 10PF D | |
| C9 | | | CK73GB1H103K | CHIP C 0.010UF K | |
| C10 | | | CC73GCH1H100D | CHIP C 10PF D | |
| C11-13 | | | CC73GCH1H101J | CHIP C 100PF J | |
| C14 | | | C92-0713-05 | CHIP-TAN 10UF 6.3WV | |
| C15 | | | CK73GB1H102K | CHIP C 1000PF K | |
| C16 | | | CC73GCH1H470J | CHIP C 47PF J | |
| C18,19 | | | CK73GB1C104K | CHIP C 0.10UF K | |
| C22 | | | CK73GB1C104K | CHIP C 0.10UF K | |
| C23 | | | CK73GB0J225K | CHIP C 2.2UF K | |
| C24 | | | C92-0713-05 | CHIP-TAN 10UF 6.3WV | |
| C25 | | | CK73GB1H102K | CHIP C 1000PF K | |
| C27 | | | CK73GB1H102K | CHIP C 1000PF K | |
| C28 | | | CC73GCH1H560J | CHIP C 56PF J | |
| C30 | | | CC73GCH1H220J | CHIP C 22PF J | |
| C31 | | | CC73GCH1H560J | CHIP C 56PF J | |
| C32 | | | C92-0002-05 | CHIP-TAN 0.22UF 35WV | |
| C33 | | | CC73GCH1H470J | CHIP C 47PF J | |
| C34 | | | CK73GB1H102K | CHIP C 1000PF K | |
| C35 | | | CC73GCH1H680J | CHIP C 68PF J | |
| C36 | | | C92-0560-05 | CHIP-TAN 10UF 6.3WV | |
| C37 | | | CK73GB1H102K | CHIP C 1000PF K | |
| C38,39 | | | C92-0504-05 | CHIP-TAN 0.68UF 20WV | |
| C40 | | | CK73GB1H471K | CHIP C 470PF K | |
| C41 | | | CK73GB1H103K | CHIP C 0.010UF K | |
| C42 | | | CK73GB1H183K | CHIP C 0.018UF K | |
| C43 | | | CK73GB1A105K | CHIP C 1.0UF K | |
| C44 | | | CK73FB1A225K | CHIP C 2.2UF K | |
| C45 | | | CC73GCH1H120J | CHIP C 12PF J | |
| C46 | | | CC73GCH1H090B | CHIP C 9.0PF B | |
| C47 | | | CC73GCH1H040B | CHIP C 4.0PF B | |
| C48 | | | CK73HB1C103K | CHIP C 0.010UF K | |
| C49 | | | CK73HB1H102K | CHIP C 1000PF K | |
| C50 | | | CC73GCH1H120J | CHIP C 12PF J | |
| C52 | | | CC73GCH1H050B | CHIP C 5.0PF B | |
| C53 | | | CC73HCH1H560J | CHIP C 56PF J | |
| C54 | | | CC73HCH1H220J | CHIP C 22PF J | |
| C55 | | | CC73GCH1H050B | CHIP C 5.0PF B | |
| C56,57 | | | CC73HCH1H270J | CHIP C 27PF J | |
| C58 | | | CC73GCH1H150J | CHIP C 15PF J | |
| C59 | | | CC73HCH1HR75C | CHIP C 0.75PF C | |
| C60 | | | CC73GCH1H070B | CHIP C 7.0PF B | |
| C61 | | | CC73HCH1H070B | CHIP C 7.0PF B | |

PARTS LIST

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| Ref. No. | Address | New parts | Parts No. | Description | Destination | Ref. No. | Address | New parts | Parts No. | Description | Destination |
|-----------|---------|-----------|---------------|----------------------|-------------|-----------|---------|-----------|---------------|----------------------|-------------|
| C62 | | | CK73GB1E103K | CHIP C 0.010UF K | | C344 | | | CC73GCH1H820J | CHIP C 82PF J | |
| C63 | | | CC73GCH1H220J | CHIP C 22PF J | | C349 | | | CC73GCH1H030B | CHIP C 3.0PF B | |
| C64 | | | CC73GCH1H4R5B | CHIP C 4.5PF B | | C351 | | | CK73GB1H102K | CHIP C 1000PF K | |
| C65 | | | CC73HCH1H120J | CHIP C 12PF J | | C352 | | | CC73GCH1H270G | CHIP C 27PF G | |
| C66 | | | CK73GB1H102K | CHIP C 1000PF K | | C353 | | | CC73GCH1H270J | CHIP C 27PF J | |
| C67 | | | CK73HB1C103K | CHIP C 0.010UF K | | C355 | | | CK73GB1H102K | CHIP C 1000PF K | |
| C69 | | | CK73GB1E103K | CHIP C 0.010UF K | | C356 | | | CC73GCH1H060D | CHIP C 6.0PF D | |
| C70 | | | C92-0714-05 | CHIP-TAN 4.7UF 6.3WV | | C358 | | | CC73GCH1H100D | CHIP C 10PF D | |
| C71 | | | CC73HCH1H0R5B | CHIP C 0.5PF B | | C359 | | | CC73GCH1H240J | CHIP C 24PF J | |
| C72 | | | CC73HCH1H040B | CHIP C 4.0PF B | | C360 | | | CC73GCH1H120J | CHIP C 12PF J | |
| C73 | | | CK73GB1H102K | CHIP C 1000PF K | | C362 | | | CC73GCH1H110J | CHIP C 11PF J | |
| C74 | | | CC73HCH1H0R5B | CHIP C 0.5PF B | | C363 | | | CC73GCH1H070D | CHIP C 7.0PF D | |
| CC75,76 | | | CK73HB1H102K | CHIP C 1000PF K | | C365 | | | CC73GCH1H330J | CHIP C 33PF J | |
| C77 | | | C92-0713-05 | CHIP-TAN 10UF 6.3WV | | C368 | | | CC73GCH1H030C | CHIP C 3.0PF C | |
| C78 | | | CK73HB1H102K | CHIP C 1000PF K | | C400 | | | CK73GB0J225K | CHIP C 2.2UF K | |
| C80 | | | CC73HCH1H330J | CHIP C 33PF J | | C401 | | | CK73GB1H182K | CHIP C 1800PF K | |
| C81 | | | CC73HCH1H150J | CHIP C 15PF J | | CC402,403 | | | CC73GCH1H271J | CHIP C 270PF J | |
| C82-84 | | | CK73HB1H102K | CHIP C 1000PF K | | C405 | | | CC73GCH1H390J | CHIP C 39PF J | |
| C85 | | | CC73HCH1H100D | CHIP C 10PF D | | C406 | | | C92-0713-05 | CHIP-TAN 10UF 6.3WV | |
| C86 | | | CC73GCH1H090D | CHIP C 9.0PF D | | C407 | | | CK73GB1H103K | CHIP C 0.010UF K | |
| C87 | | | CC73GCH1H060B | CHIP C 6.0PF B | | C408 | | | CK73GB1C104K | CHIP C 0.10UF K | |
| CC201,202 | | | CK73GB1H102K | CHIP C 1000PF K | | C409 | | | CC73GCH1H680J | CHIP C 68PF J | |
| C203 | | | CC73GCH1H470J | CHIP C 47PF J | | C410 | | | CK73GB1H102K | CHIP C 1000PF K | |
| C212 | | | CK73GB1H102K | CHIP C 1000PF K | | C411-413 | | | CK73GB1C104K | CHIP C 0.10UF K | |
| C241 | | | CK73GB1H102K | CHIP C 1000PF K | | C414 | | | CC73GCH1H330J | CHIP C 33PF J | |
| C242 | | | CC73GCH1H390J | CHIP C 39PF J | | C415 | | | CK73GB1H102K | CHIP C 1000PF K | |
| C243 | | | CK73GB1C104K | CHIP C 0.10UF K | | CC416,417 | | | CK73GB1H103K | CHIP C 0.010UF K | |
| C246 | | | CK73GB1H102K | CHIP C 1000PF K | | C418 | | | CK73GB1H102K | CHIP C 1000PF K | |
| C248 | | | CK73GB1H102K | CHIP C 1000PF K | | C419 | | | CC73GCH1H010B | CHIP C 1.0PF B | |
| C249 | | | CC73GCH1H100D | CHIP C 10PF D | | C420 | | | CK73GB1C104K | CHIP C 0.10UF K | |
| C255 | | | CK73GB1H102K | CHIP C 1000PF K | | C421 | | | CC73GCH1H080B | CHIP C 8.0PF B | |
| C258 | | | CK73GB1C104K | CHIP C 0.10UF K | | C422 | | | CK73GB1H103K | CHIP C 0.010UF K | |
| C265 | | | CC73GCH1H220J | CHIP C 22PF J | | C424 | | | CK73GB1H103K | CHIP C 0.010UF K | |
| C273 | | | CC73GCH1H101J | CHIP C 100PF J | | C425 | | | CC73GCH1H150J | CHIP C 15PF J | |
| C277 | | | CC73GCH1H270J | CHIP C 27PF J | | C426 | | | CC73GCH1H020B | CHIP C 2.0PF B | |
| C280 | | | CK73GB1H102K | CHIP C 1000PF K | | C427 | | | CK73GB1H103K | CHIP C 0.010UF K | |
| C282 | | | CC73GCH1H100D | CHIP C 10PF D | | C428 | | | CC73GCH1H150J | CHIP C 15PF J | |
| C285 | | | C92-0565-05 | CHIP-TAN 6.8UF 10WV | | C429 | | | CK73GB1H102K | CHIP C 1000PF K | |
| C286 | | | CK73GB1A105K | CHIP C 1.0UF K | | C430 | | | CC73GCH1H120J | CHIP C 12PF J | |
| C288 | | | CK73GB1H102K | CHIP C 1000PF K | | C432 | | | CK73GB1H102K | CHIP C 1000PF K | |
| CC290,291 | | | CK73GB1H102K | CHIP C 1000PF K | | C434 | | | CK73GB1H103K | CHIP C 0.010UF K | |
| C292 | | | CC73GCH1H101J | CHIP C 100PF J | | C435 | | | CK73GB1H102K | CHIP C 1000PF K | |
| C293 | | | CK73GB1H102K | CHIP C 1000PF K | | C436 | | | CC73GCH1H050B | CHIP C 5.0PF B | |
| CC295,296 | | | CC73GCH1H050B | CHIP C 5.0PF B | | C437 | | | CC73GCH1H020B | CHIP C 2.0PF B | |
| C297 | | | CK73GB1H102K | CHIP C 1000PF K | | C438 | | | CC73GCH1H090B | CHIP C 9.0PF B | |
| C298 | | | CK73GB1H103K | CHIP C 0.010UF K | | C439 | | | CK73GB1H102K | CHIP C 1000PF K | |
| C299 | | | CK73GB1C104K | CHIP C 0.10UF K | | C440 | | | CK73HB1H102K | CHIP C 1000PF K | |
| C300 | | | CK73GB1A105K | CHIP C 1.0UF K | | C441 | | | CK73GB1H102K | CHIP C 1000PF K | |
| C301 | | | CK73GB1H102K | CHIP C 1000PF K | | C442 | | | CK73HB1A104K | CHIP C 0.10UF K | |
| C302 | | | CC73GCH1H180J | CHIP C 18PF J | | C443 | | | CK73GB1A105K | CHIP C 1.0UF K | |
| C308 | | | CK73GB1H103K | CHIP C 0.010UF K | | C444 | | | CC73GCH1H050B | CHIP C 5.0PF B | |
| C309 | | | CC73GCH1H100D | CHIP C 10PF D | | C445 | | | CC73GCH1H020B | CHIP C 2.0PF B | |
| C312 | | | CC73GCH1H820J | CHIP C 82PF J | | C446 | | | CC73GCH1H010C | CHIP C 1.0PF C | |
| C317 | | | CC73GCH1H100D | CHIP C 10PF D | | C447 | | | CC73GCH1H470J | CHIP C 47PF J | |
| C320 | | | CC73GCH1H220J | CHIP C 22PF J | | C448 | | | CK73GB1H102K | CHIP C 1000PF K | |
| C326 | | | CC73GCH1H220J | CHIP C 22PF J | | C456 | | | C92-0714-05 | CHIP-TAN 4.7UF 6.3WV | |
| C329 | | | CK73GB1H102K | CHIP C 1000PF K | | C462 | | | CK73HB1H102K | CHIP C 1000PF K | |
| C333 | | | CC73GCH1H120J | CHIP C 12PF J | | CC463,464 | | | CC73GCH1H040B | CHIP C 4.0PF B | |
| C338 | | | CC73GCH1H220J | CHIP C 22PF J | | CC465,466 | | | CK73GB1H102K | CHIP C 1000PF K | |
| C341 | | | CC73GCH1H100D | CHIP C 10PF D | | C467 | | | CC73GCH1H270J | CHIP C 27PF J | |

PARTS LIST

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| Ref. No. | Address | New parts | Parts No. | Description | Destination | Ref. No. | Address | New parts | Parts No. | Description | Destination |
|----------|---------|-----------|---------------|----------------------|-------------|----------|---------|-----------|---------------|----------------------|-------------|
| C468 | | | CC73GCH1H010B | CHIP C 1.0PF B | | C660 | | | CK73GB1A105K | CHIP C 1.0UF K | |
| C469 | | | CK73GB1H102K | CHIP C 1000PF K | | C661 | | | CK73GB1H471K | CHIP C 470PF K | |
| C472 | | | CK73GB1H102K | CHIP C 1000PF K | | C662,663 | | | CK73GB1C104K | CHIP C 0.10UF K | |
| C474 | | | CK73GB1H102K | CHIP C 1000PF K | | C664 | | | CK73GB1H102K | CHIP C 1000PF K | |
| C475 | | | CC73GCH1H4R5B | CHIP C 4.5PF B | | C667 | | | CK73GB1H102K | CHIP C 1000PF K | |
| C476 | | | CC73GCH1H0R5B | CHIP C 0.5PF B | | C668 | | | CK73GB1H103K | CHIP C 0.010UF K | |
| C477 | | | CC73GCH1H330J | CHIP C 33PF J | | C669 | | | CK73GB1H102K | CHIP C 1000PF K | |
| C478 | | | CK73GB1H102K | CHIP C 1000PF K | | C671 | | | CK73GB1C104K | CHIP C 0.10UF K | |
| C479 | | | CC73GCH1H040B | CHIP C 4.0PF B | | C672,673 | | | CK73GB1H472K | CHIP C 4700PF K | |
| C480 | | | CK73GB1H102K | CHIP C 1000PF K | | C674 | | | CC73GCH1H221J | CHIP C 220PF J | |
| C481 | | | CC73GCH1H220J | CHIP C 22PF J | | C675,676 | | | C92-0804-05 | CHIP-TAN 1.5UF 16WV | |
| C483 | | | CC73GCH1H100D | CHIP C 10PF D | | C677 | | | CK73GB1H332K | CHIP C 3300PF K | |
| C484 | | | CC73GCH1H040B | CHIP C 4.0PF B | | C678 | | | CK73FB1C474K | CHIP C 0.47UF K | |
| C485 | | | CK73GB1H471K | CHIP C 470PF K | | C679 | | | CC73GCH1H101J | CHIP C 100PF J | |
| C486 | | | CC73GCH1H040B | CHIP C 4.0PF B | | C680 | | | C92-0560-05 | CHIP-TAN 10UF 6.3WV | |
| C487 | | | CK73HB1A104K | CHIP C 0.10UF K | | C681 | | | CK73GB1C683K | CHIP C 0.068UF K | |
| C602 | | | CK73GB1A224K | CHIP C 0.22UF K | | C684 | | | CK73GB1C104K | CHIP C 0.10UF K | |
| C604 | | | CK73GB1C104K | CHIP C 0.10UF K | | C686 | | | CK73GB1C473K | CHIP C 0.047UF K | |
| C605 | | * | C92-0632-05 | CHIP-TAN 6.8UF 6.3WV | | C687 | | | C92-0560-05 | CHIP-TAN 10UF 6.3WV | |
| C606 | | | CK73GB1H332K | CHIP C 3300PF K | | C688 | | | CC73GCH1H221J | CHIP C 220PF J | |
| C607 | | | CK73GB1H103K | CHIP C 0.010UF K | | C689 | | | CK73GB1C223K | CHIP C 0.022UF K | |
| C608 | | | CK73GB1H392K | CHIP C 3900PF K | | C690 | | | CK73GB1H102K | CHIP C 1000PF K | |
| C609 | | | CK73GB1H103K | CHIP C 0.010UF K | | C691 | | | C92-0665-05 | CHIP-TAN 100UF 6.3WV | |
| C610 | | | C92-0714-05 | CHIP-TAN 4.7UF 6.3WV | | C692 | | | CC73GCH1H221J | CHIP C 220PF J | |
| C611 | | | CK73GB0J105K | CHIP C 1.0UF K | | C693 | | | CK73GB1H471K | CHIP C 470PF K | |
| C613-615 | | | CK73GB1C104K | CHIP C 0.10UF K | | C695 | | | CK73GB1H102K | CHIP C 1000PF K | |
| C618 | | | CK73GB1C104K | CHIP C 0.10UF K | | C696 | | | CK73GB1A224K | CHIP C 0.22UF K | |
| C619 | | | CK73GB1H472K | CHIP C 4700PF K | | C801 | | | CK73GB1A105K | CHIP C 1.0UF K | |
| C621,622 | | | C92-0714-05 | CHIP-TAN 4.7UF 6.3WV | | C802 | | | CK73GB1H103K | CHIP C 0.010UF K | |
| C624 | | | CK73GB1C104K | CHIP C 0.10UF K | | C803,804 | | | CK73GB1A105K | CHIP C 1.0UF K | |
| C625 | | | CC73GCH1H680J | CHIP C 68PF J | | C805 | | | CK73GB1H102K | CHIP C 1000PF K | |
| C627 | | | CK73GB1E123K | CHIP C 0.012UF K | | C807 | | | CK73GB1H102K | CHIP C 1000PF K | |
| C628 | | | CK73GB1H222K | CHIP C 2200PF K | | C809 | | | CK73GB1A105K | CHIP C 1.0UF K | |
| C629 | | | CK73GB1H103K | CHIP C 0.010UF K | | C811 | | | CK73GB1C104K | CHIP C 0.10UF K | |
| C630 | | | CC73GCH1H101J | CHIP C 100PF J | | C812 | | | CK73GB1H103K | CHIP C 0.010UF K | |
| C631 | | | CK73GB1E123K | CHIP C 0.012UF K | | C814 | | | CK73GB1H103K | CHIP C 0.010UF K | |
| C632 | | | CK73GB1C104K | CHIP C 0.10UF K | | C815 | | | CK73GB1A105K | CHIP C 1.0UF K | |
| C633 | | | CC73GCH1H020B | CHIP C 2.0PF B | | C816,817 | | | CK73GB1H102K | CHIP C 1000PF K | |
| C634 | | | CK73GB1H102K | CHIP C 1000PF K | | C818 | | | CK73GB1H103K | CHIP C 0.010UF K | |
| C635 | | | CK73GB1C104K | CHIP C 0.10UF K | | C819 | | | CK73GB1H102K | CHIP C 1000PF K | |
| C636 | | | CK73GB1C683K | CHIP C 0.068UF K | | C820,821 | | | CK73GB1A105K | CHIP C 1.0UF K | |
| C637 | | | CC73GCH1H101J | CHIP C 100PF J | | C822 | | | CK73GB1H102K | CHIP C 1000PF K | |
| C638 | | | CK73GB1H102K | CHIP C 1000PF K | | C823 | | | CK73GB1H103K | CHIP C 0.010UF K | |
| C639 | | | CC73GCH1H470J | CHIP C 47PF J | | C825 | | | C92-0713-05 | CHIP-TAN 10UF 6.3WV | |
| C640 | | | CC73GCH1H101J | CHIP C 100PF J | | C828 | | | CK73GB1H102K | CHIP C 1000PF K | |
| C641,642 | | | CK73GB1C104K | CHIP C 0.10UF K | | C830 | | | CK73GB1C104K | CHIP C 0.10UF K | |
| C643 | | | CC73GCH1H680J | CHIP C 68PF J | | C833 | | | CK73GB1A105K | CHIP C 1.0UF K | |
| C645 | | | CK73GB0J225K | CHIP C 2.2UF K | | C834 | | | CK73GB1C104K | CHIP C 0.10UF K | |
| C646 | | | CK73GB1H821K | CHIP C 820PF K | | C835,836 | | | CK73GB1A105K | CHIP C 1.0UF K | |
| C647 | | | CK73GB1H102K | CHIP C 1000PF K | | C837 | | | CK73GB1H102K | CHIP C 1000PF K | |
| C648,649 | | | CK73GB1C104K | CHIP C 0.10UF K | | C840 | | | CK73GB1H102K | CHIP C 1000PF K | |
| C650 | | | C92-0713-05 | CHIP-TAN 10UF 6.3WV | | C841 | | | CK73GB1H103K | CHIP C 0.010UF K | |
| C652 | | | CK73GB1H102K | CHIP C 1000PF K | | C842 | | | CC73GCH1H150J | CHIP C 15PF J | |
| C653 | | | CK73GB1A224K | CHIP C 0.22UF K | | C843 | | | CC73GCH1H030C | CHIP C 3.0PF C | |
| C654 | | | CK73GB1H103K | CHIP C 0.010UF K | | C845 | | | CC73GCH1H150J | CHIP C 15PF J | |
| C655 | | | CK73GB1E223J | CHIP C 0.022UF J | | C846 | | | CK73GB1H103K | CHIP C 0.010UF K | |
| C656 | | | CK73GB1C104K | CHIP C 0.10UF K | | C847 | | | C92-0712-05 | CHIP-TAN 22UF 6.3WV | |
| C657 | | | CC73GCH1H470J | CHIP C 47PF J | | C848 | | | CC73GCH1H101J | CHIP C 100PF J | |
| C658 | | | CK73GB1C104K | CHIP C 0.10UF K | | C849 | | | CK73GB1H471K | CHIP C 470PF K | |
| C659 | | | CK73GB1H103K | CHIP C 0.010UF K | | C850 | | | CK73GB1H103K | CHIP C 0.010UF K | |

PARTS LIST

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| Ref. No. | Address | New parts | Parts No. | Description | Destination | Ref. No. | Address | New parts | Parts No. | Description | Destination |
|----------|---------|-----------|--------------|------------------------------|-------------|------------|---------|-----------|--------------|------------------------------|-------------|
| C852,853 | | | CK73GB1H102K | CHIP C 1000PF K | | L413 | | | L40-3975-92 | SMALL FIXED INDUCTOR(39NH) | |
| C854 | | | CK73GB1H103K | CHIP C 0.010UF K | | L416 | | | L40-5681-86 | SMALL FIXED INDUCTOR(0.56UH) | |
| CTC1,2 | | | C05-0384-05 | CERAMIC TRIMMER CAP(10PF) | | L601 | | | L92-0140-05 | FERRITE CHIP | |
| CN801 | | | E40-5932-05 | PIN ASSY SOCKET | | L602 | | | L92-0149-05 | FERRITE CHIP | |
| J601 | | | E11-0457-05 | PHONE JACK | | L801 | | | L92-0149-05 | FERRITE CHIP | |
| F801 | | | F53-0190-05 | FUSE | | L802 | | | L92-0140-05 | FERRITE CHIP | |
| | | * | J99-0374-04 | ADHESIVE TAPE | | L803-807 | | | L92-0138-05 | FERRITE CHIP | |
| CD401 | | | L79-1582-05 | TUNING COIL | | X1 | | * | L77-1932-05 | TCXO(16.8MHZ) | |
| CF401 | | * | L72-1008-05 | CERAMIC FILTER | | X801 | | * | L77-1933-05 | CRYSTAL RESONATOR(7.3728MHZ) | |
| L1 | | | L40-4795-85 | SMALL FIXED INDUCTOR(4.7UH) | | XF401 | | * | L71-0617-05 | MCF(49.95MHZ) | |
| L3 | | | L40-1581-86 | SMALL FIXED INDUCTOR(0.15UH) | | RCP1,2 | | | RK75HA1J473J | CHIP-COM 47K J 1/16W | |
| L5 | | | L92-0138-05 | FERRITE CHIP | | RCP3,4 | | | RK75HA1J102J | CHIP-COM 1.0K J 1/16W | |
| L6 | | | L40-1085-92 | SMALL FIXED INDUCTOR(100NH) | | RCP801,802 | | | RK75HA1J473J | CHIP-COM 47K J 1/16W | |
| L7 | | | L92-0141-05 | FERRITE CHIP | | CP803-805 | | | RK75HA1J102J | CHIP-COM 1.0K J 1/16W | |
| L8 | | | L40-1075-92 | SMALL FIXED INDUCTOR(10NH) | | CP806 | | | RK75HA1J473J | CHIP-COM 47K J 1/16W | |
| L9 | | | L40-1001-86 | SMALL FIXED INDUCTOR(10UH) | | CP807 | | | RK75HA1J102J | CHIP-COM 1.0K J 1/16W | |
| L10 | | * | L40-1802-86 | SMALL FIXED INDUCTOR(18UH) | | CP808 | | | RK75HA1J472J | CHIP-COM 4.7K J 1/16W | |
| L11 | | | L40-2775-92 | SMALL FIXED INDUCTOR(27NH) | | CP809-818 | | | RK75HA1J102J | CHIP-COM 1.0K J 1/16W | |
| L12 | | * | L40-1502-86 | SMALL FIXED INDUCTOR(15UH) | | R1 | | | RK73GB1J223J | CHIP R 22K J 1/16W | |
| L14 | | | L40-1502-86 | SMALL FIXED INDUCTOR(15UH) | | R2 | | | RK73GB1J103J | CHIP R 10K J 1/16W | |
| L16 | | | L41-3378-14 | SMALL FIXED INDUCTOR | | R3 | | | RK73GB1J473J | CHIP R 47K J 1/16W | |
| L17 | | * | L41-2278-14 | SMALL FIXED INDUCTOR | | R4 | | | R92-1252-05 | CHIP R 0 OHM J 1/16W | |
| L18 | | | L40-2275-92 | SMALL FIXED INDUCTOR(22NH) | | R5 | | | RK73GB1J224J | CHIP R 220K J 1/16W | |
| L19,20 | | | L40-1001-86 | SMALL FIXED INDUCTOR(10UH) | | R6 | | | RK73GB1J473J | CHIP R 47K J 1/16W | |
| L21 | | | L40-2785-92 | SMALL FIXED INDUCTOR(270NH) | | R7 | | | R92-1252-05 | CHIP R 0 OHM J 1/16W | |
| L23 | | | L92-0138-05 | FERRITE CHIP | | R9 | | | RK73GB1J393J | CHIP R 39K J 1/16W | |
| L24,25 | | | L40-1085-92 | SMALL FIXED INDUCTOR(100NH) | | R12 | | | RK73GB1J101J | CHIP R 100 J 1/16W | |
| L208 | | | L40-1085-92 | SMALL FIXED INDUCTOR(100NH) | | R13 | | | R92-1252-05 | CHIP R 0 OHM J 1/16W | |
| L209 | | | L92-0138-05 | FERRITE CHIP | | R14 | | | RK73GB1J222J | CHIP R 2.2K J 1/16W | |
| L213 | | | L40-2775-92 | SMALL FIXED INDUCTOR(27NH) | | R15 | | | R92-1252-05 | CHIP R 0 OHM J 1/16W | |
| L214 | | | L40-4775-92 | SMALL FIXED INDUCTOR(47NH) | | R16 | | | RK73GB1J102J | CHIP R 1.0K J 1/16W | |
| L216 | | | L40-1585-54 | SMALL FIXED INDUCTOR(150NH) | | R17 | | | RK73GB1J101J | CHIP R 100 J 1/16W | |
| L217 | | | L92-0149-05 | FERRITE CHIP | | R18 | | | RK73GB1J474J | CHIP R 470K J 1/16W | |
| L218 | | | L40-2775-54 | SMALL FIXED INDUCTOR(27NH) | | R19 | | | RK73GB1J100J | CHIP R 10 J 1/16W | |
| L219 | | | L34-4577-05 | AIR-CORE COIL | | R20,21 | | | R92-1252-05 | CHIP R 0 OHM J 1/16W | |
| L220 | | | L92-0149-05 | FERRITE CHIP | | R22 | | | RK73GB1J561J | CHIP R 560 J 1/16W | |
| L221 | | | L34-4563-05 | AIR-CORE COIL | | R23 | | | RK73GB1J121J | CHIP R 120 J 1/16W | |
| L222 | | | L34-4573-05 | AIR-CORE COIL | | R24 | | | RK73GB1J471J | CHIP R 470 J 1/16W | |
| L223 | | | L34-4563-05 | AIR-CORE COIL | | R25 | | | RK73GB1J103J | CHIP R 10K J 1/16W | |
| L224 | | | L40-2295-85 | SMALL FIXED INDUCTOR(2.2UH) | | R26 | | | RK73GB1J223J | CHIP R 22K J 1/16W | |
| L225 | | | L34-4576-05 | AIR-CORE COIL | | R27 | | | RK73GB1J103J | CHIP R 10K J 1/16W | |
| L226 | | | L34-4575-05 | AIR-CORE COIL | | R28 | | | RK73GB1J472J | CHIP R 4.7K J 1/16W | |
| L227 | | | L34-4567-05 | AIR-CORE COIL | | R29 | | | RK73GB1J103J | CHIP R 10K J 1/16W | |
| L228 | | | L40-5675-92 | SMALL FIXED INDUCTOR(56NH) | | R30 | | | RK73GB1J393J | CHIP R 39K J 1/16W | |
| L229 | | | L34-4566-05 | AIR-CORE COIL | | R31 | | | RK73GB1J472J | CHIP R 4.7K J 1/16W | |
| L230 | | | L40-1092-81 | SMALL FIXED INDUCTOR | | R32 | | | RK73GB1J104J | CHIP R 100K J 1/16W | |
| L401 | | | L92-0138-05 | FERRITE CHIP | | R33 | | | RK73HB1J103J | CHIP R 10K J 1/16W | |
| L402 | | | L40-3975-92 | SMALL FIXED INDUCTOR(39NH) | | R35 | | | RK73HB1J223J | CHIP R 22K J 1/16W | |
| L403 | | | L40-5685-85 | SMALL FIXED INDUCTOR(0.56UH) | | R37 | | | RK73HB1J274J | CHIP R 270K J 1/16W | |
| L404 | | | L40-2785-92 | SMALL FIXED INDUCTOR(270NH) | | R38 | | | RK73HB1J271J | CHIP R 270 J 1/16W | |
| L405 | | | L40-1285-92 | SMALL FIXED INDUCTOR(120NH) | | R39 | | | RK73GB1J220J | CHIP R 22 J 1/16W | |
| L406 | | | L40-2785-92 | SMALL FIXED INDUCTOR(270NH) | | R40 | | | RK73HB1J221J | CHIP R 220 J 1/16W | |
| L407 | | | L41-6878-14 | SMALL FIXED INDUCTOR | | R41 | | | RK73GB1J331J | CHIP R 330 J 1/16W | |
| L408 | | | L92-0138-05 | FERRITE CHIP | | R42 | | | RK73GB1J683J | CHIP R 68K J 1/16W | |
| L409 | | | L41-6878-14 | SMALL FIXED INDUCTOR | | R43,44 | | | RK73HB1J220J | CHIP R 22 J 1/16W | |
| L411 | | | L41-6878-14 | SMALL FIXED INDUCTOR | | R46 | | | RK73HB1J154J | CHIP R 150K J 1/16W | |
| L412 | | | L41-5678-14 | SMALL FIXED INDUCTOR | | R47 | | | RK73HB1J472J | CHIP R 4.7K J 1/16W | |
| | | | | | | R49 | | | RK73HB1J101J | CHIP R 100 J 1/16W | |
| | | | | | | R50 | | | RK73HB1J332J | CHIP R 3.3K J 1/16W | |
| | | | | | | R51 | | | RK73HB1J103J | CHIP R 10K J 1/16W | |

PARTS LIST

TX-RX UNIT (X57-672X-XX)

| Ref. No. | Address | New parts | Parts No. | Description | Destination | Ref. No. | Address | New parts | Parts No. | Description | Destination |
|----------|---------|-----------|--------------|----------------------|-------------|----------|---------|-----------|--------------|----------------------|-------------|
| R55 | | * | RK73G1J1333D | CHIP R 33K D 1/16W | | R440 | | | RK73GB1J470J | CHIP R 47 J 1/16W | |
| R56 | | | RK73HB1J331J | CHIP R 330 J 1/16W | | R441 | | | RK73GB1J221J | CHIP R 220 J 1/16W | |
| R57 | | * | RK73G1J1104D | CHIP R 100K D 1/16W | | R443 | | | RK73HB1J224J | CHIP R 220K J 1/16W | |
| R58 | | | RK73HB1J222J | CHIP R 2.2K J 1/16W | | R457 | | | RK73HB1J104J | CHIP R 100K J 1/16W | |
| R59 | | | RK73HB1J470J | CHIP R 47 J 1/16W | | R459 | | | RK73GB1J184J | CHIP R 180K J 1/16W | |
| R60 | | | RK73GB1J472J | CHIP R 4.7K J 1/16W | | R460 | | | RK73GB1J104J | CHIP R 100K J 1/16W | |
| R61 | | | RK73GB1J103J | CHIP R 10K J 1/16W | | R461 | | | RK73GB1J101J | CHIP R 100 J 1/16W | |
| R201 | | | RK73GB1J101J | CHIP R 100 J 1/16W | | R462 | | | R92-1252-05 | CHIP R 0 OHM J 1/16W | |
| R202 | | | RK73GB1J472J | CHIP R 4.7K J 1/16W | | R463 | | | RK73GB1J105J | CHIP R 1.0M J 1/16W | |
| R203 | | | R92-1252-05 | CHIP R 0 OHM J 1/16W | | R465 | | | RK73GB1J105J | CHIP R 1.0M J 1/16W | |
| R214 | | | RK73GB1J223J | CHIP R 22K J 1/16W | | R466,467 | | | R92-0670-05 | CHIP R 0 OHM | |
| R215 | | | RK73GB1J103J | CHIP R 10K J 1/16W | | R468 | | | RK73GB1J332J | CHIP R 3.3K J 1/16W | |
| R252 | | | RK73GB1J331J | CHIP R 330 J 1/16W | | R469 | | | RK73GB1J221J | CHIP R 220 J 1/16W | |
| R254 | | | R92-1252-05 | CHIP R 0 OHM J 1/16W | | R601 | | | R92-1252-05 | CHIP R 0 OHM J 1/16W | |
| R256 | | | RK73GB1J683J | CHIP R 68K J 1/16W | | R602 | | | RK73GB1J184J | CHIP R 180K J 1/16W | |
| R257 | | | RK73GB1J473J | CHIP R 47K J 1/16W | | R603 | | | R92-1252-05 | CHIP R 0 OHM J 1/16W | |
| R258 | | | R92-1252-05 | CHIP R 0 OHM J 1/16W | | R604 | | | RK73GB1J184J | CHIP R 180K J 1/16W | |
| R259 | | | RK73GB1J150J | CHIP R 15 J 1/16W | | R607-609 | | | RK73GB1J103J | CHIP R 10K J 1/16W | |
| R260 | | | RK73GB1J331J | CHIP R 330 J 1/16W | | R610 | | | RK73GB1J472J | CHIP R 4.7K J 1/16W | |
| R261-263 | | | R92-1252-05 | CHIP R 0 OHM J 1/16W | | R612 | | | RK73GB1J682J | CHIP R 6.8K J 1/16W | |
| R264,265 | | | RK73EB2ER39K | CHIP R 0.39 K 1/4W | | R613 | | | RK73GB1J824J | CHIP R 820K J 1/16W | |
| R267 | | | RK73GB1J123J | CHIP R 12K J 1/16W | | R615 | | | RK73GB1J334J | CHIP R 330K J 1/16W | |
| R268 | | | RK73GB1J820J | CHIP R 82 J 1/16W | | R616 | | | R92-1252-05 | CHIP R 0 OHM J 1/16W | |
| R269 | | | RK73GB1J473J | CHIP R 47K J 1/16W | | R617 | | | RK73GB1J103J | CHIP R 10K J 1/16W | |
| R270 | | | RK73EB2ER39K | CHIP R 0.39 K 1/4W | | R618 | | * | RK73G1J364D | CHIP R 360K D 1/16W | |
| R272-277 | | | RK73GH1J154D | CHIP R 150K D 1/16W | | R621 | | | RK73GB1J473J | CHIP R 47K J 1/16W | |
| R278 | | | RK73GB1J103J | CHIP R 10K J 1/16W | | R622 | | | RK73GB1J684J | CHIP R 680K J 1/16W | |
| R279 | | | RK73GB1J473J | CHIP R 47K J 1/16W | | R623 | | | RK73GB1J274G | CHIP R 270K G 1/16W | |
| R280 | | | R92-1252-05 | CHIP R 0 OHM J 1/16W | | R624 | | | RK73GB1J822J | CHIP R 8.2K J 1/16W | |
| R281 | | | RK73GB1J222J | CHIP R 2.2K J 1/16W | | R625 | | | RK73GB1J563J | CHIP R 56K J 1/16W | |
| R282 | | | RK73GB1J105J | CHIP R 1.0M J 1/16W | | R626,627 | | | RK73GB1J184J | CHIP R 180K J 1/16W | |
| R283,284 | | | RK73GB1J104J | CHIP R 100K J 1/16W | | R628 | | | RK73GB1J224J | CHIP R 220K J 1/16W | |
| R285,286 | | | RK73GB1J271J | CHIP R 270 J 1/16W | | R629 | | | RK73GB1J394J | CHIP R 390K J 1/16W | |
| R287 | | | R92-1252-05 | CHIP R 0 OHM J 1/16W | | R630 | | | RK73GB1J684J | CHIP R 680K J 1/16W | |
| R401 | | | RK73GB1J100J | CHIP R 10 J 1/16W | | R631 | | | RK73GB1J394J | CHIP R 390K J 1/16W | |
| R403 | | | RK73GB1J102J | CHIP R 1.0K J 1/16W | | R632 | | | RK73GB1J823J | CHIP R 82K J 1/16W | |
| R404 | | | RK73GB1J334J | CHIP R 330K J 1/16W | | R633 | | | RK73GB1J223J | CHIP R 22K J 1/16W | |
| R406 | | | RK73GB1J332J | CHIP R 3.3K J 1/16W | | R634 | | | RK73GB1J103J | CHIP R 10K J 1/16W | |
| R407 | | | RK73GB1J474J | CHIP R 470K J 1/16W | | R636 | | | RK73GB1J474J | CHIP R 470K J 1/16W | |
| R408 | | | RK73GB1J332J | CHIP R 3.3K J 1/16W | | R637 | | | RK73GB1J394J | CHIP R 390K J 1/16W | |
| R409 | | | RK73GB1J392J | CHIP R 3.9K J 1/16W | | R639 | | | RK73GB1J393J | CHIP R 39K J 1/16W | |
| R412 | | | RK73GB1J122J | CHIP R 1.2K J 1/16W | | R640 | | | RK73GB1J184J | CHIP R 180K J 1/16W | |
| R413 | | | RK73GB1J124J | CHIP R 120K J 1/16W | | R641,642 | | | RK73GB1J124J | CHIP R 120K J 1/16W | |
| R414 | | | RK73GB1J681J | CHIP R 680 J 1/16W | | R643 | | | RK73GB1J154J | CHIP R 150K J 1/16W | |
| R415 | | | RK73GB1J472J | CHIP R 4.7K J 1/16W | | R644,645 | | | RK73GB1J472J | CHIP R 4.7K J 1/16W | |
| R416 | | | RK73GB1J101J | CHIP R 100 J 1/16W | | R646 | | | RK73GB1J223J | CHIP R 22K J 1/16W | |
| R417 | | | R92-1252-05 | CHIP R 0 OHM J 1/16W | | R647 | | | R92-1252-05 | CHIP R 0 OHM J 1/16W | |
| R418 | | | RK73GB1J561J | CHIP R 560 J 1/16W | | R648 | | | RK73GB1J103J | CHIP R 10K J 1/16W | |
| R419 | | | RK73GB1J221J | CHIP R 220 J 1/16W | | R649 | | | RK73GB1J104J | CHIP R 100K J 1/16W | |
| R421-424 | | | RK73GB1J823J | CHIP R 82K J 1/16W | | R650 | | | RK73GB1J102J | CHIP R 1.0K J 1/16W | |
| R425 | | | R92-1252-05 | CHIP R 0 OHM J 1/16W | | R651 | | | R92-1252-05 | CHIP R 0 OHM J 1/16W | |
| R427 | | | RK73GB1J105J | CHIP R 1.0M J 1/16W | | R652 | | | RK73GB1J273J | CHIP R 27K J 1/16W | |
| R428,429 | | | RK73HB1J562J | CHIP R 5.6K J 1/16W | | R653 | | | RK73GB1J392J | CHIP R 3.9K J 1/16W | |
| R431 | | | RK73GB1J105J | CHIP R 1.0M J 1/16W | | R654 | | | RK73GB1J103J | CHIP R 10K J 1/16W | |
| R433 | | | R92-1252-05 | CHIP R 0 OHM J 1/16W | | R655,656 | | | RK73GB1J105J | CHIP R 1.0M J 1/16W | |
| R434 | | | RK73HB1J103J | CHIP R 10K J 1/16W | | R657 | | | RK73GB1J332J | CHIP R 3.3K J 1/16W | |
| R435 | | | RK73HB1J224J | CHIP R 220K J 1/16W | | R658 | | | RK73GB1J103J | CHIP R 10K J 1/16W | |
| R436 | | | RK73HB1J473J | CHIP R 47K J 1/16W | | R660 | | | RK73GB1J154J | CHIP R 150K J 1/16W | |
| R437 | | | RK73HB1J224J | CHIP R 220K J 1/16W | | R661 | | | RK73GB1J684J | CHIP R 680K J 1/16W | |
| R438 | | | RK73GB1J471J | CHIP R 470 J 1/16W | | R665 | | | R92-1252-05 | CHIP R 0 OHM J 1/16W | |

PARTS LIST

TX-RX UNIT (X57-672X-XX)

| Ref. No. | Address | New parts | Parts No. | Description | Destination | Ref. No. | Address | New parts | Parts No. | Description | Destination |
|----------|---------|-----------|--------------|----------------------|-------------|----------|---------|-----------|----------------|----------------------------|-------------|
| R666 | | | RK73GB1J822J | CHIP R 8.2K J 1/16W | | R851 | | | R92-1368-05 | CHIP R 0 OHM | |
| R667 | | | RK73GB1J104J | CHIP R 100K J 1/16W | | R852 | | | RK73HB1J473J | CHIP R 47K J 1/16W | |
| R668 | | | RK73GB1J473J | CHIP R 47K J 1/16W | | R854 | | | RK73GB1J680J | CHIP R 68 J 1/16W | |
| R669 | | | RK73GB1J222J | CHIP R 2.2K J 1/16W | | R855-857 | | | RK73HB1J102J | CHIP R 1.0K J 1/16W | |
| R670 | | | RK73GB1J102J | CHIP R 1.0K J 1/16W | | R858 | | | R92-1368-05 | CHIP R 0 OHM | |
| R671 | | | RK73GB1J683J | CHIP R 68K J 1/16W | | R859 | | | RK73GB1J104J | CHIP R 100K J 1/16W | |
| R672 | | | RK73GB1J102J | CHIP R 1.0K J 1/16W | | R860 | | | RK73GB1J223J | CHIP R 22K J 1/16W | |
| R673 | | | RK73GB1J272J | CHIP R 2.7K J 1/16W | | VR1 | | | R12-7491-05 | TRIMMING POT.(68K) | |
| R674 | | | R92-1252-05 | CHIP R 0 OHM J 1/16W | | | | | | | |
| R675 | | | RK73GB1J103J | CHIP R 10K J 1/16W | | S802-805 | | | S70-0457-05 | TACT SWITCH | |
| R676 | | | RK73GB1J151J | CHIP R 150 J 1/16W | | MIC60 | | | T91-0543-05 | MIC ELEMENT | |
| R677-679 | | | R92-1252-05 | CHIP R 0 OHM J 1/16W | | | | | | | |
| R681 | | | RK73GB1J222J | CHIP R 2.2K J 1/16W | | D2 | | | HSC277 | DIODE | |
| R682 | | | RK73GB1J100J | CHIP R 10 J 1/16W | | D3-10 | | | 1SV325 | VARIABLE CAPACITANCE DIODE | |
| R683 | | | RK73GB1J474J | CHIP R 470K J 1/16W | | D11 | | | HSC277 | DIODE | |
| R684 | | | RK73GB1J182J | CHIP R 1.8K J 1/16W | | D12 | | | 1SV278 | VARIABLE CAPACITANCE DIODE | |
| R686 | | | RK73GB1J471J | CHIP R 470 J 1/16W | | D13 | | | MA2S111 | DIODE | |
| R687 | | | RK73GB1J102J | CHIP R 1.0K J 1/16W | | D14 | | | HSC277 | DIODE | |
| R688,689 | | | RK73GB1J101J | CHIP R 100 J 1/16W | | D201 | | | HSC277 | DIODE | |
| R691 | | | RK73GB1J333J | CHIP R 33K J 1/16W | | D203 | | | HZU5CLL | ZENER DIODE | |
| R692 | | | R92-1252-05 | CHIP R 0 OHM J 1/16W | | D204 | | | HVC131 | DIODE | |
| R693 | | | RK73GB1J273J | CHIP R 27K J 1/16W | | D206 | | | HVC131 | DIODE | |
| R694,695 | | | R92-1252-05 | CHIP R 0 OHM J 1/16W | | D208 | | | HVC131 | DIODE | |
| R696 | | | RK73GB1J103J | CHIP R 10K J 1/16W | | D212 | | | HVC131 | DIODE | |
| R697 | | | R92-1252-05 | CHIP R 0 OHM J 1/16W | | D401 | | | HSC277 | DIODE | |
| R698 | | | RK73GB1J152J | CHIP R 1.5K J 1/16W | | D402-405 | | | 1SV305 | VARIABLE CAPACITANCE DIODE | |
| R802 | | | RK73GB1J101J | CHIP R 100 J 1/16W | | D603-606 | | | RB706F-40 | DIODE | |
| R803,804 | | | R92-1252-05 | CHIP R 0 OHM J 1/16W | | D801 | | | RB521S-30 | DIODE | |
| R805 | | | RK73GB1J153J | CHIP R 15K J 1/16W | | D805 | | | 1SR154-400 | DIODE | |
| R807 | | | RK73GB1J103J | CHIP R 10K J 1/16W | | IC1 | | | MB15E03SL | MOS IC | |
| R808 | | | RK73GB1J102J | CHIP R 1.0K J 1/16W | | IC201 | | | TA75W01FU | MOS IC | |
| R809 | | | RK73GB1J272J | CHIP R 2.7K J 1/16W | | IC401 | | | TA31136FN | MOS IC | |
| R810 | | | RK73GB1J334J | CHIP R 330K J 1/16W | | IC601 | * | | AQUA | MOS IC | |
| R811 | | | RK73GB1J332J | CHIP R 3.3K J 1/16W | | IC602 | | | TC75S51FE | MOS IC | |
| R812 | | | RK73GB1J334J | CHIP R 330K J 1/16W | | IC603 | | | TC75W51FU | MOS IC | |
| R813 | | | RK73GB1J332J | CHIP R 3.3K J 1/16W | | IC604 | | | TC75S51FE | MOS IC | |
| R814 | | | RK73GB1J153J | CHIP R 15K J 1/16W | | IC605 | | | TA7368F | MOS IC | |
| R815 | | | R92-1252-05 | CHIP R 0 OHM J 1/16W | | IC606 | | | TC75S51FE | MOS IC | |
| R816 | | | RK73GB1J224J | CHIP R 220K J 1/16W | | IC801 | | | XC6204B502MR | MOS IC | |
| R817 | | | RK73GB1J272J | CHIP R 2.7K J 1/16W | | IC802 | * | | PST9134NR | MOS IC | |
| R818 | | | RK73GB1J821J | CHIP R 820 J 1/16W | | IC803 | | | XC61CN5002NR | MOS IC | |
| R819 | | | RK73GB1J103J | CHIP R 10K J 1/16W | | IC804 | * | | CAT24WC64JI | ROM IC | |
| R820 | | | RK73GB1J561J | CHIP R 560 J 1/16W | | IC805 | * | | 30622MCA-7G7GP | MPU | |
| R821 | | | RK73GB1J331J | CHIP R 330 J 1/16W | | IC806 | | | TC7W74FU | MOS IC | |
| R823 | | | RK73GB1J102J | CHIP R 1.0K J 1/16W | | Q1 | | | DTC144EE | DIGITAL TRANSISTOR | |
| R824 | | | RK73GB1J183J | CHIP R 18K J 1/16W | | Q2,3 | | | UMG9N | TRANSISTOR | |
| R825 | | | RK73GB1J473J | CHIP R 47K J 1/16W | | Q4 | | | KTC4082 | TRANSISTOR | |
| R827 | | | RK73GB1J102J | CHIP R 1.0K J 1/16W | | Q5,6 | | | 2SK508NV(K52) | FET | |
| R828 | | | RK73GB1J332J | CHIP R 3.3K J 1/16W | | Q7 | | | 2SC5108(Y) | TRANSISTOR | |
| R829 | | | RK73GB1J272J | CHIP R 2.7K J 1/16W | | Q8 | | | 2SJ347 | FET | |
| R830 | | | RK73GB1J821J | CHIP R 820 J 1/16W | | Q9 | | | 2SC5108(Y) | TRANSISTOR | |
| R833,834 | | | RK73GH1J474D | CHUP R 470K D 1/16W | | Q10 | | | 2SC4617(S) | TRANSISTOR | |
| R835,836 | | | RK73HB1J102J | CHIP R 1.0K J 1/16W | | Q11 | | | 2SC5108(Y) | TRANSISTOR | |
| R839,840 | | | RK73GB1J473J | CHIP R 47K J 1/16W | | Q12 | | | 2SJ347 | FET | |
| R841 | | | R92-1252-05 | CHIP R 0 OHM J 1/16W | | Q206 | * | | 2SK3077 | FET | |
| R842 | | | R92-1368-05 | CHIP R 0 OHM | | Q207 | | | 2SK2596 | FET | |
| R844 | | | RK73GB1J473J | CHIP R 47K J 1/16W | | Q208 | | | DTC114EE | DIGITAL TRANSISTOR | |
| R845 | | | R92-1368-05 | CHIP R 0 OHM | | Q209 | | | 2SK879(GR) | FET | |
| R847,848 | | | RK73GB1J102J | CHIP R 1.0K J 1/16W | | Q210 | | | DTC114EE | DIGITAL TRANSISTOR | |
| R849 | | | R92-1252-05 | CHIP R 0 OHM J 1/16W | | Q211 | | | 2SK2595 | FET | |

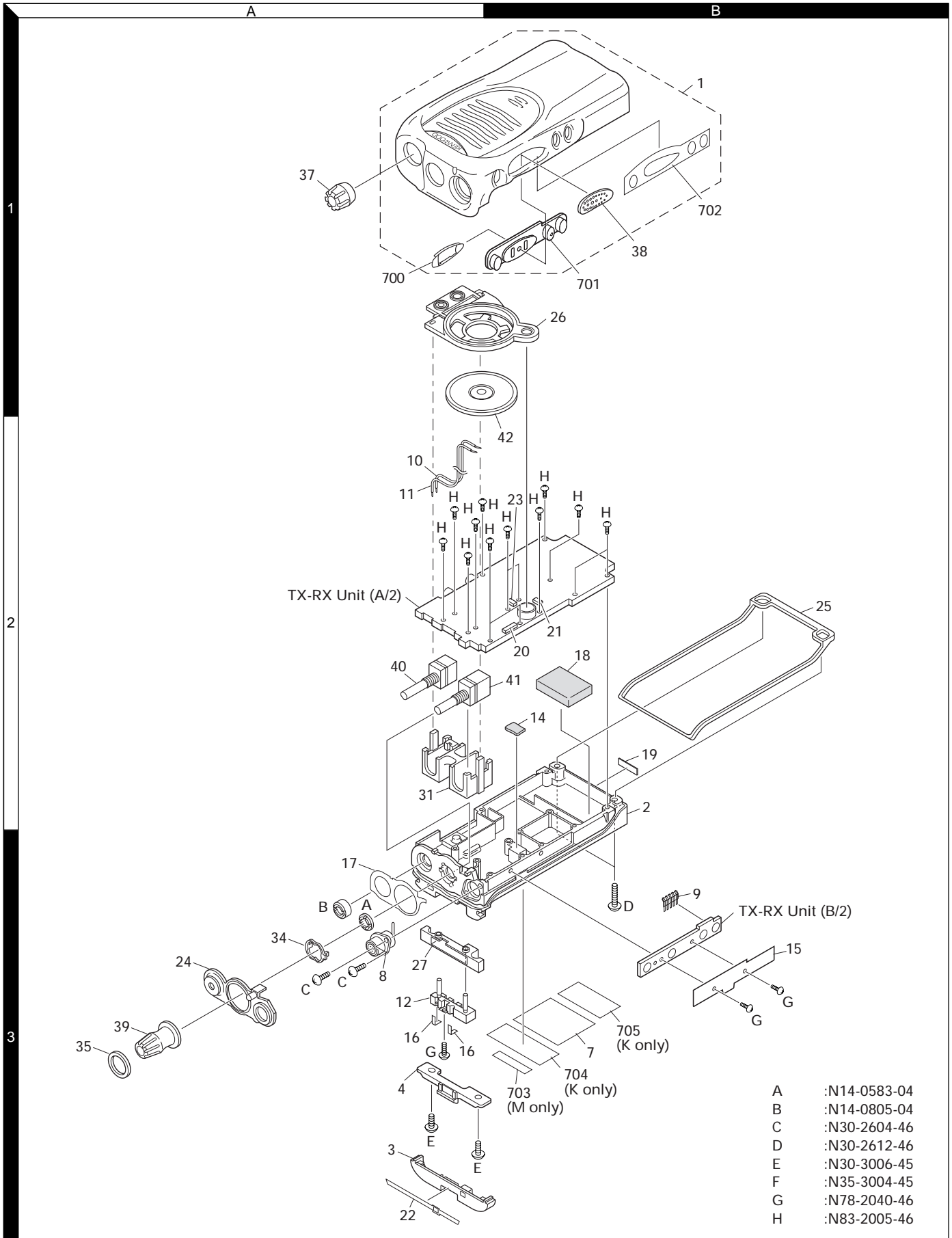
TK-2160

PARTS LIST

TX-RX UNIT (X57-672X-XX)

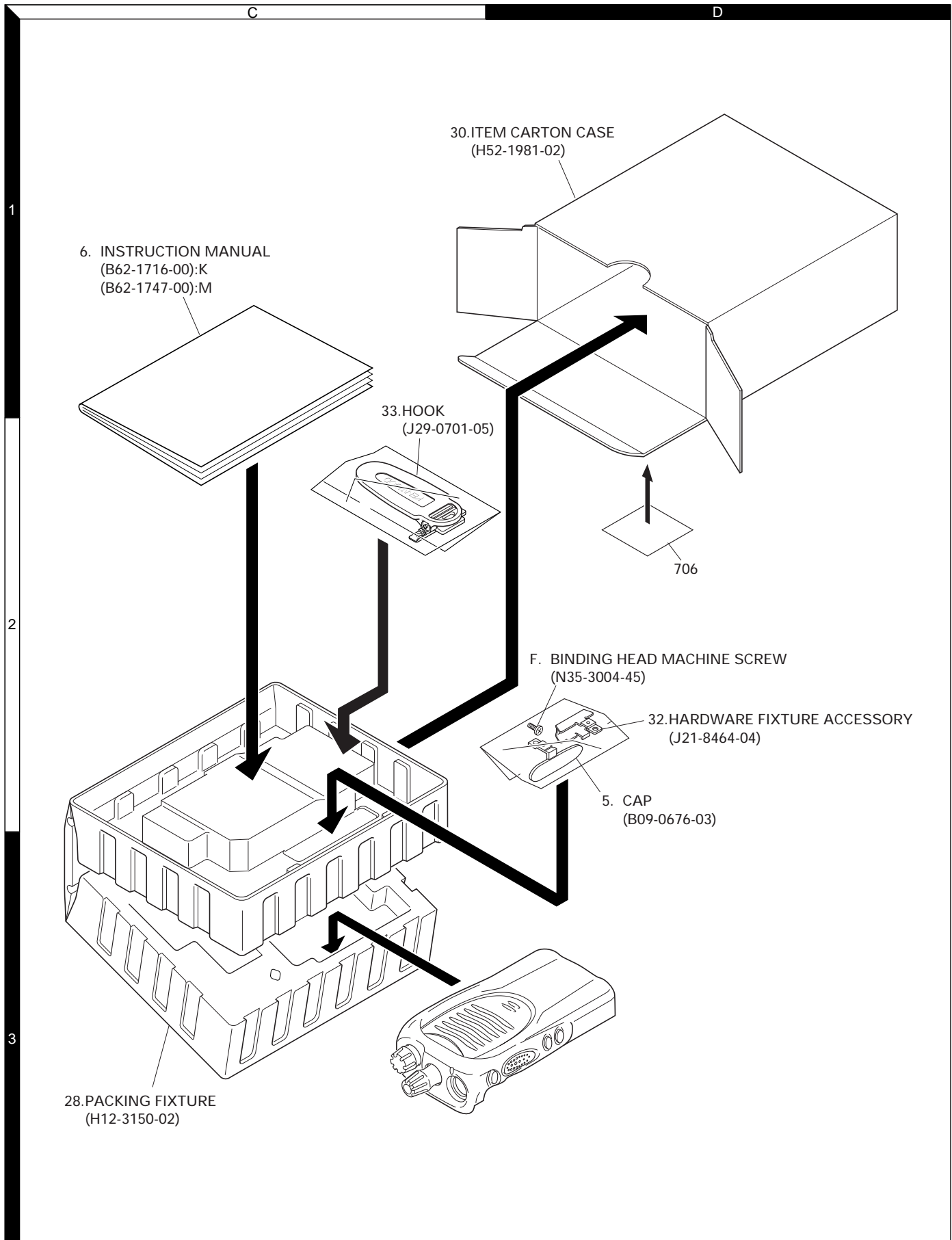
| Ref. No. | Address | New parts | Parts No. | Description | Destination | Ref. No. | Address | New parts | Parts No. | Description | Destination |
|----------|---------|-----------|---------------|--------------------|-------------|----------|---------|-----------|-----------|-------------|-------------|
| Q212 | | | 2SK1824 | FET | | | | | | | |
| Q213 | | | DTA144EE | DIGITAL TRANSISTOR | | | | | | | |
| Q400 | | | 2SK1824 | FET | | | | | | | |
| Q401 | | | DTA144EE | DIGITAL TRANSISTOR | | | | | | | |
| Q402 | | | 2SC4649(N,P) | TRANSISTOR | | | | | | | |
| Q403,404 | | | 3SK318 | FET | | | | | | | |
| Q601,602 | | | 2SK1824 | FET | | | | | | | |
| Q603 | | | DTC144EE | DIGITAL TRANSISTOR | | | | | | | |
| Q604 | | | 2SA1362(GR) | TRANSISTOR | | | | | | | |
| Q605 | | | 2SC4116(Y) | TRANSISTOR | | | | | | | |
| Q606 | | | 2SA1586(Y,GR) | TRANSISTOR | | | | | | | |
| Q607 | | | DTC144EE | DIGITAL TRANSISTOR | | | | | | | |
| Q608 | | | 2SK1588 | FET | | | | | | | |
| Q801 | | | UMG3N | TRANSISTOR | | | | | | | |
| Q802 | | | UPA672T | FET | | | | | | | |
| Q803 | | | FP210 | TRANSISTOR | | | | | | | |
| Q804 | | | UMG3N | TRANSISTOR | | | | | | | |
| Q805 | | | UMG9N | TRANSISTOR | | | | | | | |
| Q806 | | | KTA1298(Y) | TRANSISTOR | | | | | | | |
| Q807 | | | UMG3N | TRANSISTOR | | | | | | | |
| Q808,809 | | | DTA123JE | DIGITAL TRANSISTOR | | | | | | | |
| Q810 | | | 2SK1824 | FET | | | | | | | |
| TH1,2 | | | B57331V2104J | THERMISTOR | | | | | | | |

EXPLODED VIEW



- A :N14-0583-04
- B :N14-0805-04
- C :N30-2604-46
- D :N30-2612-46
- E :N30-3006-45
- F :N35-3004-45
- G :N78-2040-46
- H :N83-2005-46

PACKING



ADJUSTMENT

Test Equipment Required for Alignment

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

■ The following parts are required for adjustment

1. Antenna connector adapter

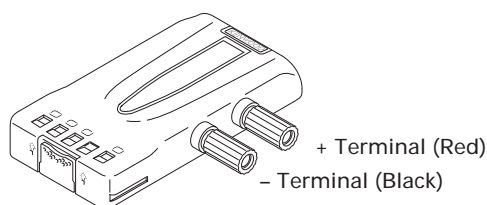
The antenna connector of this radio uses an SMA terminal. Use an antenna connector adapter [SMA(f) – BNC(f) or SMA(f) – N(f)] for adjustment. (The adapter is not provided as an option, so buy a commercially-available one.)

2. Repair Jig (Chassis)

Use jig (part No.: A10-4082-03) for repairing the TK-2160. 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.

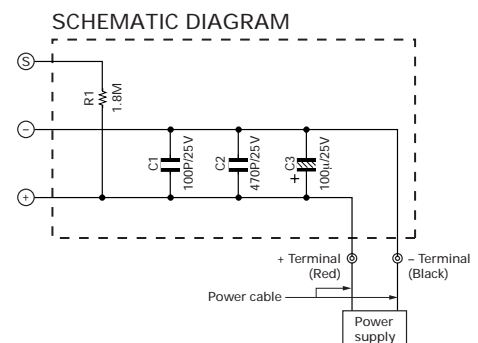
3. Battery Jig (W05-0909-00)



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

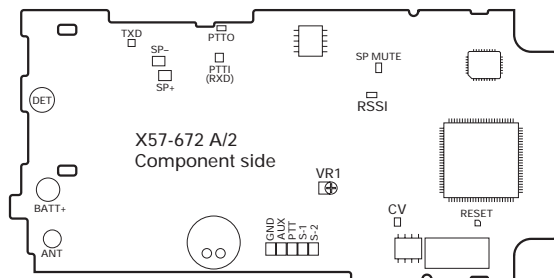
When using the battery jig in user mode, the transceiver assumes that a lithium-ion battery pack is attached to the transceiver. In adjustment mode, battery type detection is not performed. Refer to page 10 for details.

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.



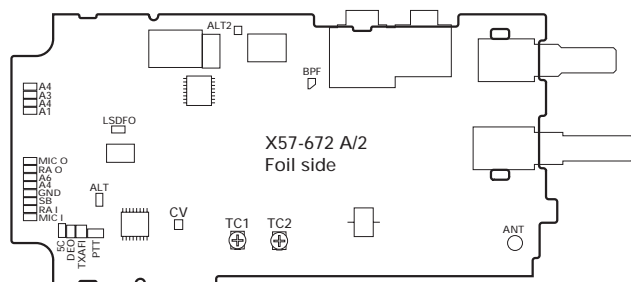
ADJUSTMENT

Adjustment points TX-RX unit (X57-672) Component side view



VR1 : Frequency adjustment
RSSI : Band-pass wave form test point

Foil Side View



TC1 : Transmit lock voltage adjustment
TC2 : Receive lock voltage adjustment
CV : 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) K, M type

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

Signalling

| Signalling No. | RX | TX |
|----------------|-----------------------------------|-----------------------------------|
| 1 | None | None |
| 2 | None | 100Hz Square Wave |
| 3 | QT 67.0Hz | QT 67.0Hz |
| 4 | QT 151.4Hz | QT 151.4Hz |
| 5 | QT 210.7Hz | QT 210.7Hz |
| 6 | QT 254.1Hz | QT 254.1Hz |
| 7 | DQT D023N | DQT D023N |
| 8 | DQT D754I | DQT D754I |
| 9 | DTMF 159D | DTMF 159D |
| 10 | None | DTMF tone 9 |
| 11 | 2 Tone: A:321.7Hz B:928.1Hz | 2 Tone: A:321.7Hz B:928.1Hz |
| 12 | None | Single Tone:1000Hz |
| 13 | None | MSK |
| 14 | MSK Code | MSK Code |

• 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 8W 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 | |
|---------|------------|------------|
| | RX | TX |
| Center | 155.050MHz | 155.000MHz |
| Low | 136.050MHz | 136.000MHz |
| High | 173.950MHz | 174.000MHz |
| Low' | 145.550MHz | 145.500MHz |
| High' | 164.550MHz | 164.500MHz |
| | 155.000MHz | 155.000MHz |
| | 155.200MHz | 155.200MHz |
| | 155.400MHz | 155.400MHz |

ADJUSTMENT


Common Section

| Item | Condition | Measurement | | Adjustment | | Specifications/ Remark |
|-----------------------------|--|--------------------|-----------|------------|--------|---------------------------|
| | | Test equipment | Terminal | Parts | Method | |
| 1.Setting | 1) BATT terminal vorage:7.5V 2) SSG standard modulation [Wide] MOD:1kHz,DEV:3kHz [Narrow] MOD:1kHz,DEV:1.5kHz | | | | | |
| 2.VCO lock voltage RX | 1) CH:High | Power meter DVM | ANT CV | TC2 | ADJ | 3.8V ±0.2V |
| | 2) CH:Low | | | | Check | 0.6V or more |
| 3.VCO lock voltage TX | 3) CH:High PTT:ON | | | TC1 | ADJ | 3.8V ±0.2V |
| | 4) CH:Low PTT:ON | | | | Check | 0.6V or more |

Transmitter Section

| Item | Condition | Measurement | | Adjustment | | Specifications/ Remark |
|-------------------------------------|--|---|-------------------------|---------------------------------|---|---|
| | | Test equipment | Terminal | Parts | Method | |
| 1.Frequency Adjust | 1) CH:Center 2) PTT:ON | Frequency counter | ANT | VR1 | | Ceter frequency ±50Hz |
| 2.High power Adjust | TEST CH:Center Low Low' Center High' High (5 points) BATT terminal voltage:7.5V PTT:ON | Power meter Ampere meter | | Programming Software:KPG-82D | | 4.8W ±0.1W 2.0 A or less |
| | | | | | | |
| 3.Low power Adjust | TEST CH:Center Low Low' Center High' High (5 points) BATT terminal voltage:7.5V PTT:ON | | | | | 1.0W ±0.1W 1.0 A or less |
| 4.Max deviation Adjust [Wide] | TEST CH:Center Low Center High AG:1kHz/150mV Dev meter filter LPF:15kHz HPF:OFF PTT:ON | Power meter Dev meter Oscilloscope AG AF VTVM | ANT SP/MIC connector | | 4.2kHz (According to the lager +,-) | ±50Hz |
| | [Narrow] | | | | TEST CH:Center PTT:ON | 2.1kHz (According to the lager +,-) |
| 5.VOX 1 Writing | TEST CH:Center AG:1KHz/60mV | Power meter Dev meter Oscilloscope AG AF VTVM | | | | |

ADJUSTMENT

| Item | Condition | Measurement | | Adjustment | | Specifications/ Remark |
|--|---|-------------------------------|-------------------------|---------------------------------|---|---|
| | | Test equipment | Terminal | Parts | Method | |
| 6. VOX 10 Writing | TEST CH:Center AG:1KHz/4.0mV | Power meter Dev meter | ANT SP/MIC connector | Programming Software:KPG-82D | | |
| 7.DQT TCXO Balance Writing | TEST CH:Center (Wide/Narrow) | Oscilloscope AG AF VTVM | ANT | Programming Software:KPG-82D | Write | 230 hex (Wide/Narrow) |
| 8.DQT VCO Balance Adjust [Wide] | TEST CH: Center Low High LPF:3kHz HPF:OFF PTT:ON | | | | Make the demodulation wave into square waves |  |
| [Narrow] | TEST CH:Center PTT:ON | | | | | |
| 9.QT Deviation Adjust [Wide] | TEST CH:Center Low High LPF:3kHz HPF:OFF PTT:ON | | | | 0.8kHz | ±40Hz |
| [Narrow] | TEST CH:Center PTT:ON | | | | 0.4kHz | ±40Hz |
| 10.DQT Deviation Adjust [Wide] | TEST CH: Center Low High LPF:3kHz HPF:OFF PTT:ON | | | | 0.75kHz | ±40Hz |
| [Narrow] | TEST CH:Center PTT:ON | | | | 0.35kHz | ±40Hz |
| 11.Tone Deviation Adjust [Wide] | TEST CH:Center LPF:15kHz HPF:OFF PTT:ON | | | | 3.0kHz | ±100Hz |
| [Narrow] | TEST CH:Center PTT:ON | | | | 1.5kHz | ±100Hz |
| 12.DTME Deviation Adjust [Wide] | TEST CH:Center LPF:15kHz HPF:OFF PTT:ON | | | | 3.0kHz | ±100Hz |
| [Narrow] | TEST CH: Center PTT:ON | | | | 1.5kHz | ±100Hz |
| 13.MSK Deviation Adjust [Wide] | TEST CH: Center Low High LPF:3kHz HPF:OFF PTT:ON | | | | 3.0kHz | ±100Hz |
| [Narrow] | TEST CH:Center PTT:ON | | | | 1.5kHz | ±100Hz |
| 14.BATT Detection Writing | BATT terminal voltage:5.9V PTT:ON | Power meter DVM | ANT BATT terminal | | Write | BATT terminal voltage:5.9V |

ADJUSTMENT

| Item | Condition | Measurement | | Adjustment | | Specifications/ Remark |
|-------------------------------|---|--------------------|----------------------|------------|--------|---------------------------|
| | | Test equipment | Terminal | Parts | Method | |
| 15.BATT Detection Check | 1) BATT terminal voltage:5.5V PTT:ON | Power meter DVM | ANT BATT terminal | | Check | Blinking of LED |
| | 2) BATT terminal voltage:7.5V PTT:ON | | | | | No blinking of LED |

Receiver Section

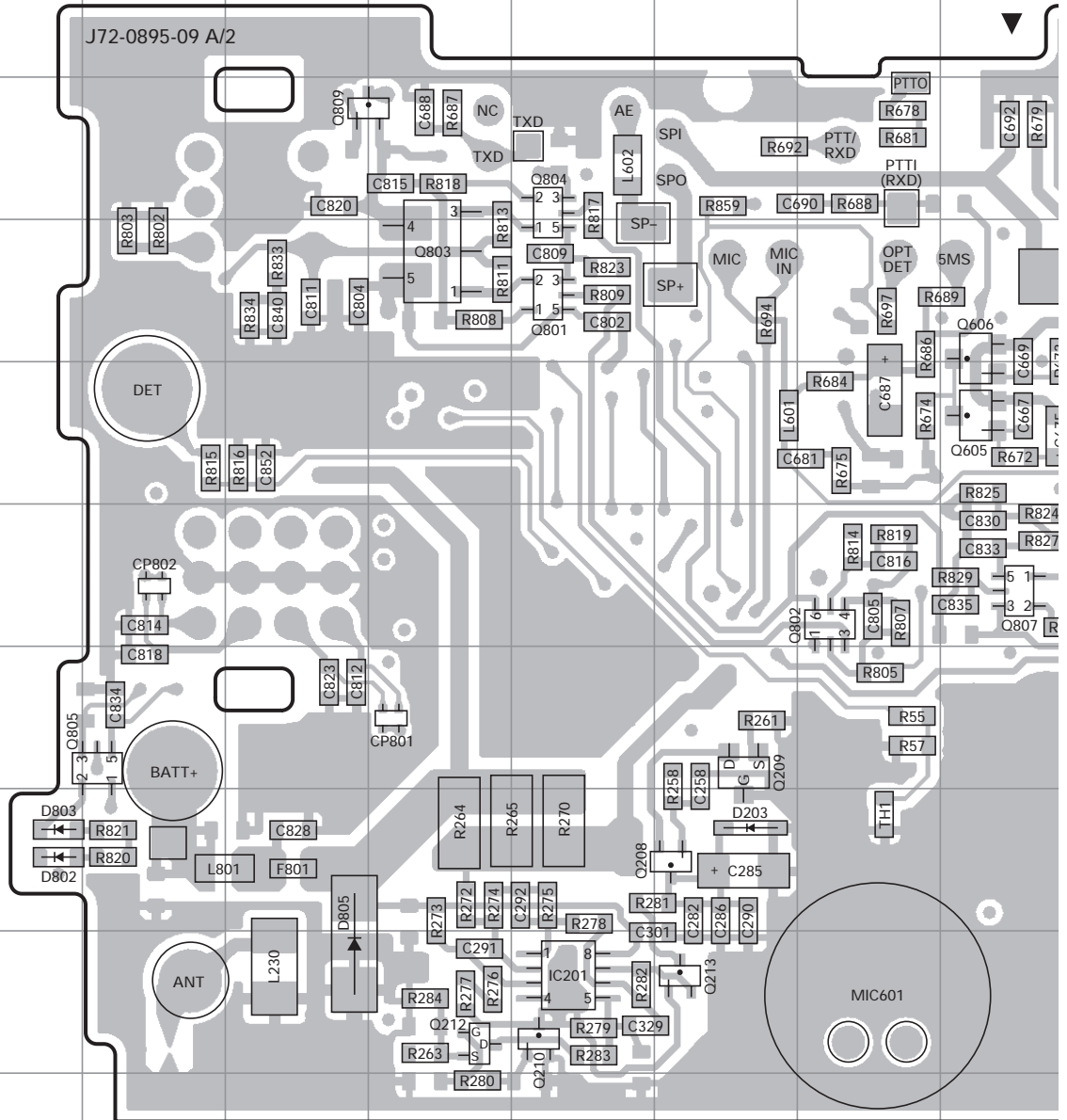
| Item | Condition | Measurement | | Adjustment | | Specifications/ Remark | |
|---|--|---------------------------------------|----------|---------------------------------|---------------------------------|---------------------------|--------------|
| | | Test equipment | Terminal | Parts | Method | | |
| 1.BPF Wave form ADJ | TEST CH:Center Low Low' Center High' High SSG oputut:-103 dBm(1.58μV) | SSG DVM Oscilloscope AF VTVM | ANT | Programming Software:KPG-82D | RSSI MAX | | |
| 2.Sesitivity check [Wide] | TEST CH:Center Low Low' Center High' High SSG oputut:-117 dBm(0.3μV) SSG MOD:3kHz | | ANT | | | | Check |
| 3.Sesitivity check [Narrow] | TEST CH:Center SSG oputut:-115 dBm(0.4μV) SSG MOD:1.5kHz | | | | Check | 12dB SINAD or more | |
| 4.Squelch threshold writing [Wide] | TEST CH:Low SSG oputut:-122 dBm(0.18μV) SSG MOD:3.0kHz | | | | Programming Software:KPG-82D | write | Squelch open |
| 5.Squelch threshold writing [Narrow] | TEST CH:Center SSG oputut:-120 dBm(0.22μV) SSG MOD:1.5kHz | | | | | | Squelch open |
| 6.Squelch tight writing [Wide] | TEST CH:High SSG oputut:-117 dBm(0.3μV) SSG MOD:3.0kHz | | | | | | Squelch open |
| 7.Squelch tight writing [Narrow] | TEST CH:Center SSG oputut:-116 dBm(0.35μV) SSG MOD:1.5kHz | | | | | | Squelch open |
| 8.RSSI writing [Wide] | TEST CH:Center SSG oputut:-123 dBm(0.16μV) SSG MOD:off | | | | | | |
| 9.RSSI writing [Narrow] | TEST CH:Center SSG oputut:-122 dBm(0.18μV) SSG MOD:off | | | | | | |

TK-2160 PC BOARD

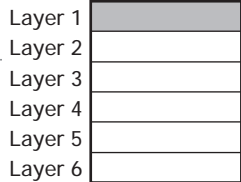
TX-RX UNIT (X57-6720-10)

| Ref. NO. | Address |
|----------|---------|
| IC201 | 9G |
| IC601 | 4Q |
| IC602 | 6M |
| IC603 | 8M |
| IC604 | 6L |
| IC605 | 3L |
| IC606 | 9N |
| IC802 | 8K |
| IC803 | 8K |
| IC804 | 9O |
| IC805 | 7Q |
| IC806 | 8R |
| Q1 | 7O |
| Q2 | 8O |
| Q3 | 8O |
| Q208 | 8H |
| Q209 | 7H |
| Q210 | 9G |
| Q212 | 9F |
| Q213 | 9H |
| Q400 | 9N |
| Q601 | 5M |
| Q602 | 2N |
| Q603 | 4M |
| Q604 | 3M |
| Q605 | 5J |
| Q606 | 4J |
| Q607 | 4M |
| Q608 | 4L |
| Q801 | 4G |
| Q802 | 6I |
| Q803 | 4F |
| Q804 | 3G |
| Q805 | 7D |
| Q806 | 6K |
| Q807 | 6J |
| Q809 | 3E |
| Q810 | 9R |
| D203 | 8H |
| D603 | 5M |
| D604 | 7K |
| D605 | 5K |
| D606 | 5K |
| D802 | 8C |
| D803 | 8C |
| D805 | 9E |

TX-RX UNIT (X57-6720-10) Component side view (J72-0895-09)



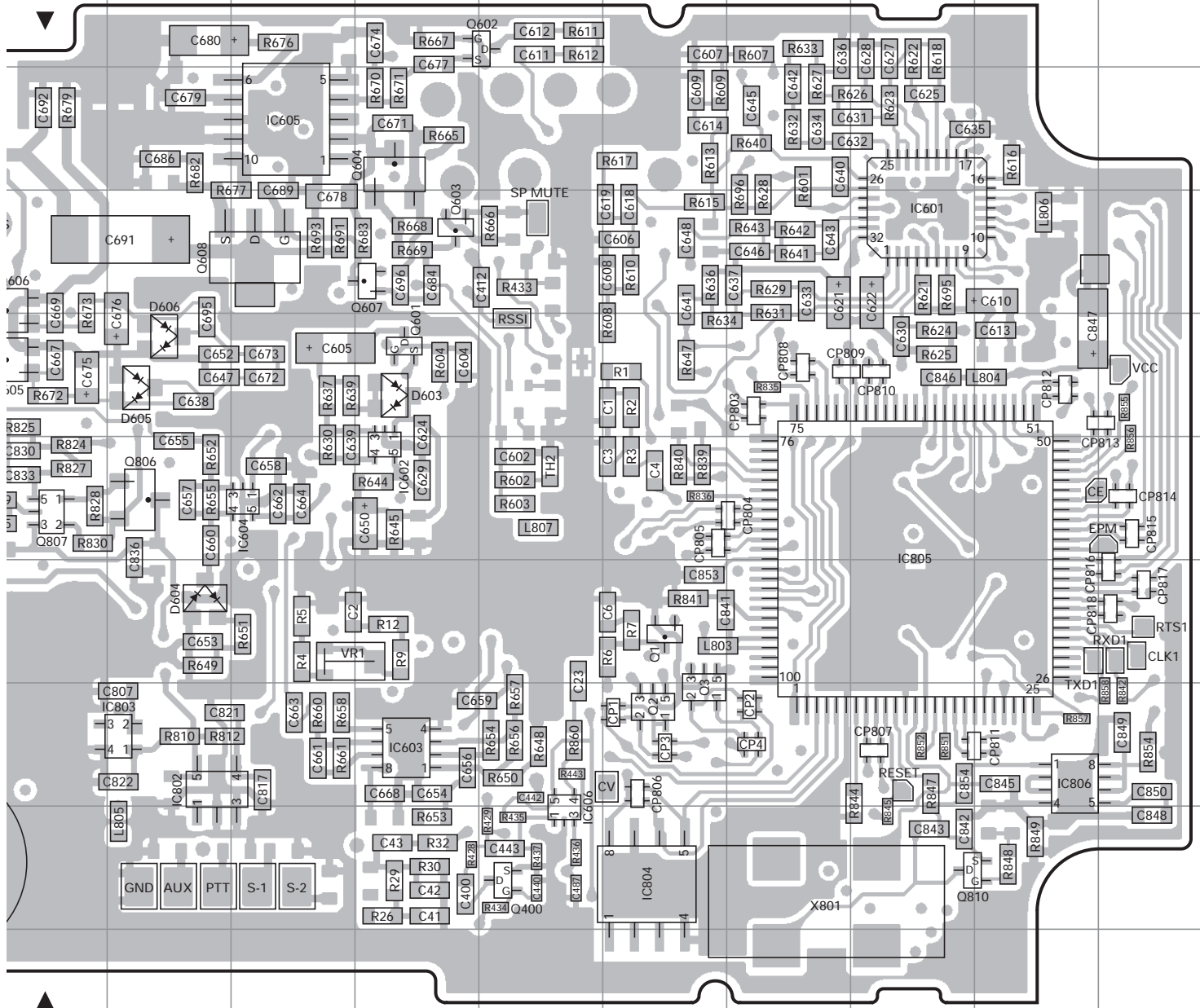
Component side



Foil side

PC BOARD TK-2160

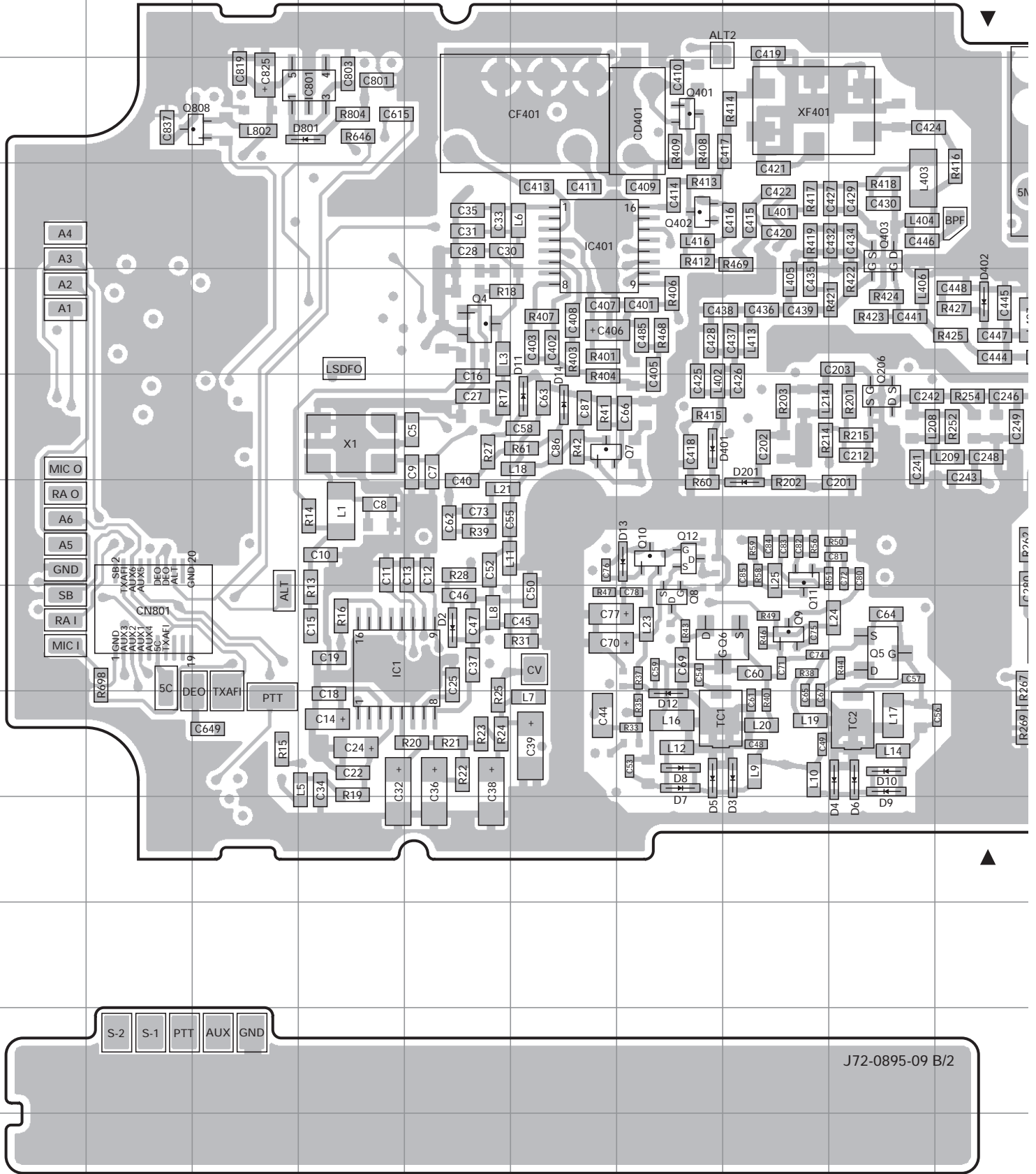
TX-RX UNIT (X57-6720-10) Component side view (J72-0895-09)



J72-0895-09 B/2

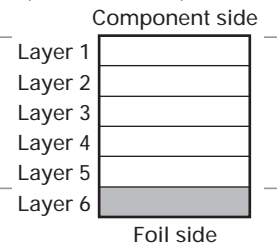
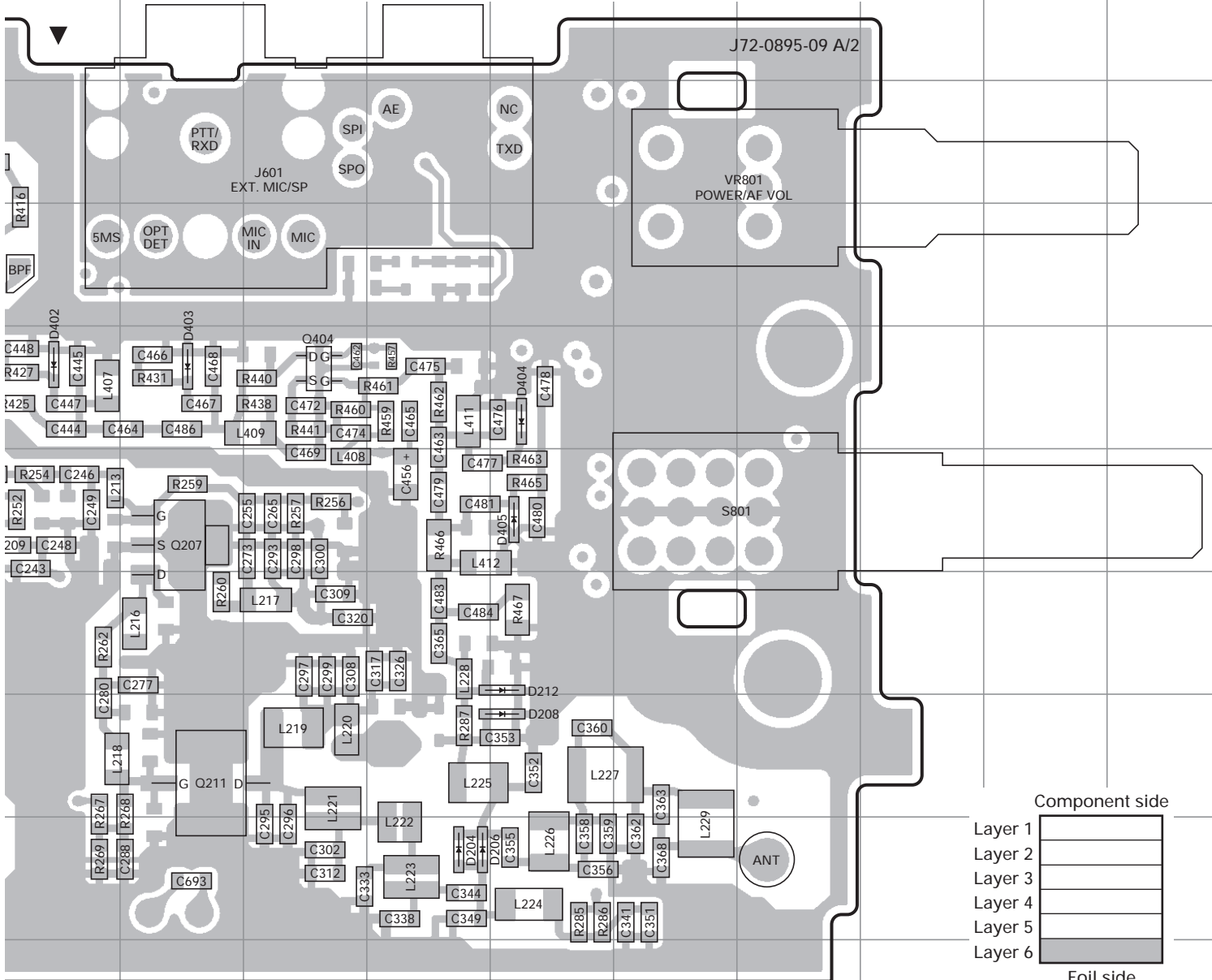
TK-2160 PC BOARD

TX-RX UNIT (X57-6720-10) Foil side view (J72-0895-09)



PC BOARD TK-2160

TX-RX UNIT (X57-6720-10) Foil side view (J72-0895-09)



TX-RX UNIT (X57-6720-10)

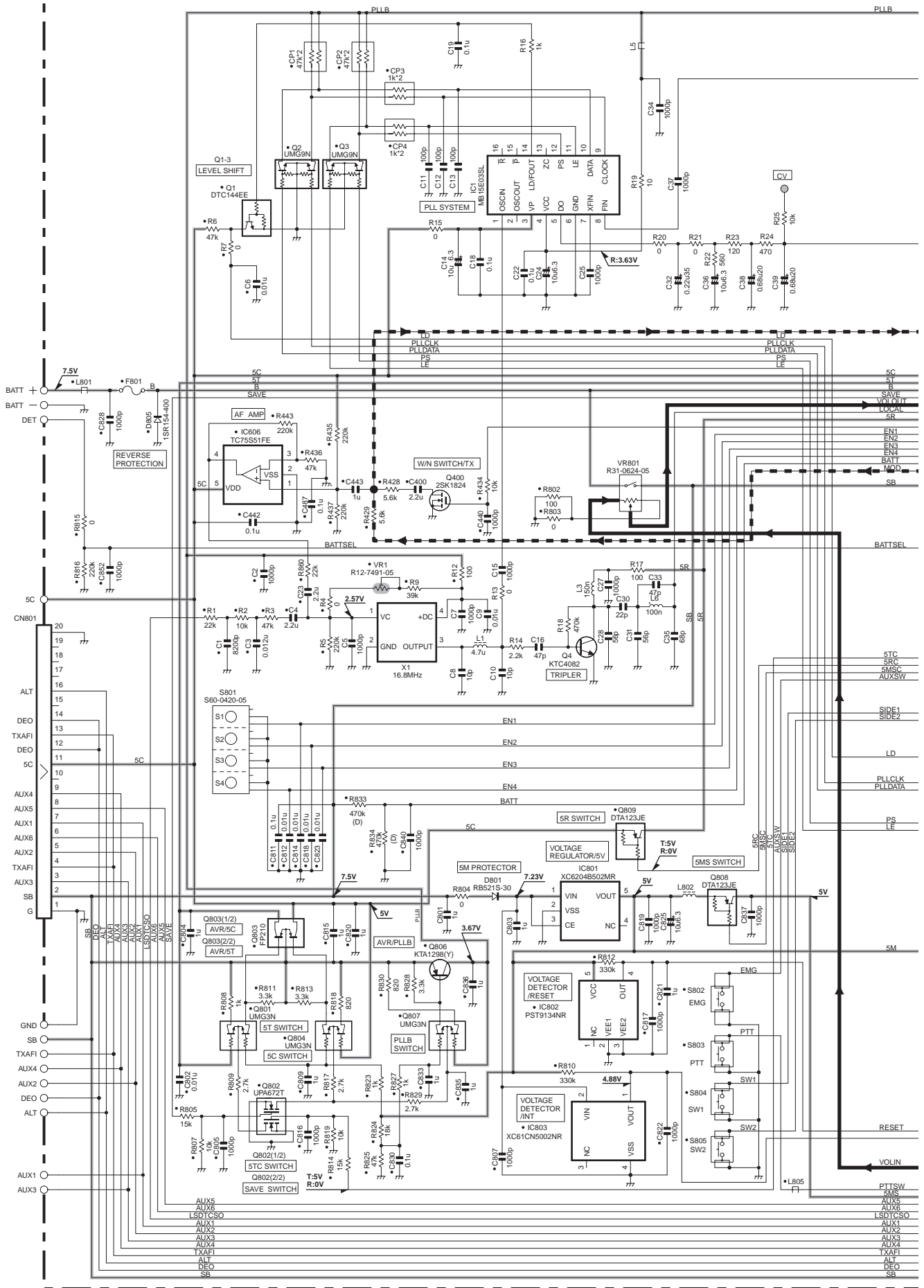
| Ref. NO. | Address |
|----------|---------|
| IC1 | 8D |
| IC401 | 4F |
| IC801 | 3D |
| Q4 | 5E |
| Q5 | 8I |
| Q6 | 8G |
| Q7 | 6F |
| Q8 | 8G |
| Q9 | 8H |
| Q10 | 7G |
| Q11 | 7H |
| Q12 | 7G |
| Q206 | 6I |
| Q207 | 6K |
| Q211 | 8K |
| Q401 | 3G |

| Ref. NO. | Address |
|----------|---------|
| Q402 | 4G |
| Q403 | 4I |
| Q404 | 5L |
| Q808 | 3C |
| D2 | 8E |
| D3 | 9H |
| D4 | 9I |
| D5 | 9G |
| D6 | 9I |
| D7 | 9G |
| D8 | 9G |
| D9 | 9I |
| D10 | 9I |
| D11 | 6F |
| D12 | 9G |
| D13 | 7G |

| Ref. NO. | Address |
|----------|---------|
| D14 | 6F |
| D201 | 7H |
| D204 | 9M |
| D206 | 9M |
| D208 | 8N |
| D212 | 7N |
| D401 | 6G |
| D402 | 5J |
| D403 | 5K |
| D404 | 5N |
| D405 | 5N |
| D801 | 3D |

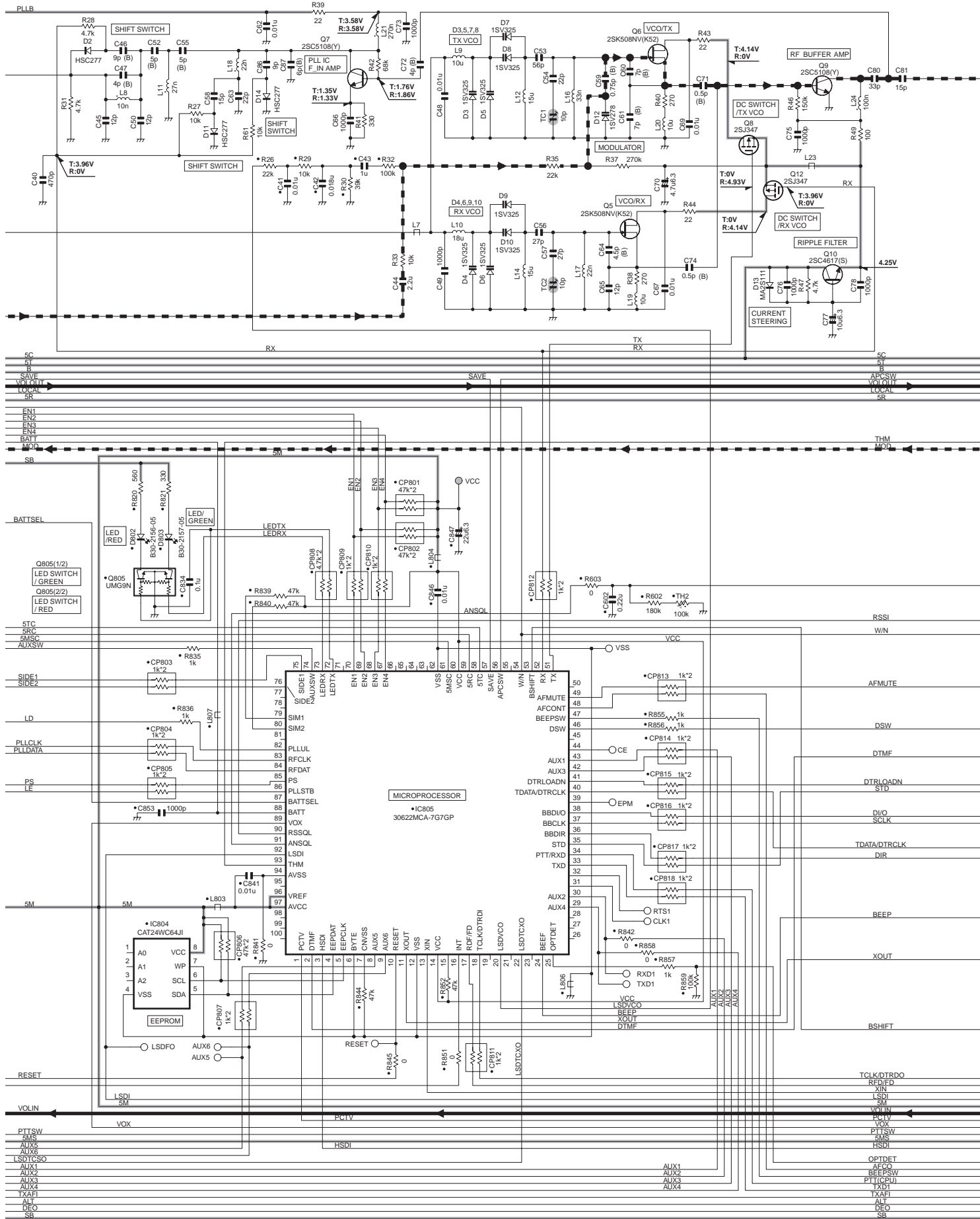
TK-2160 SCHEMATIC DIAGRAM

TX-RX UNIT (X57-6720-10)



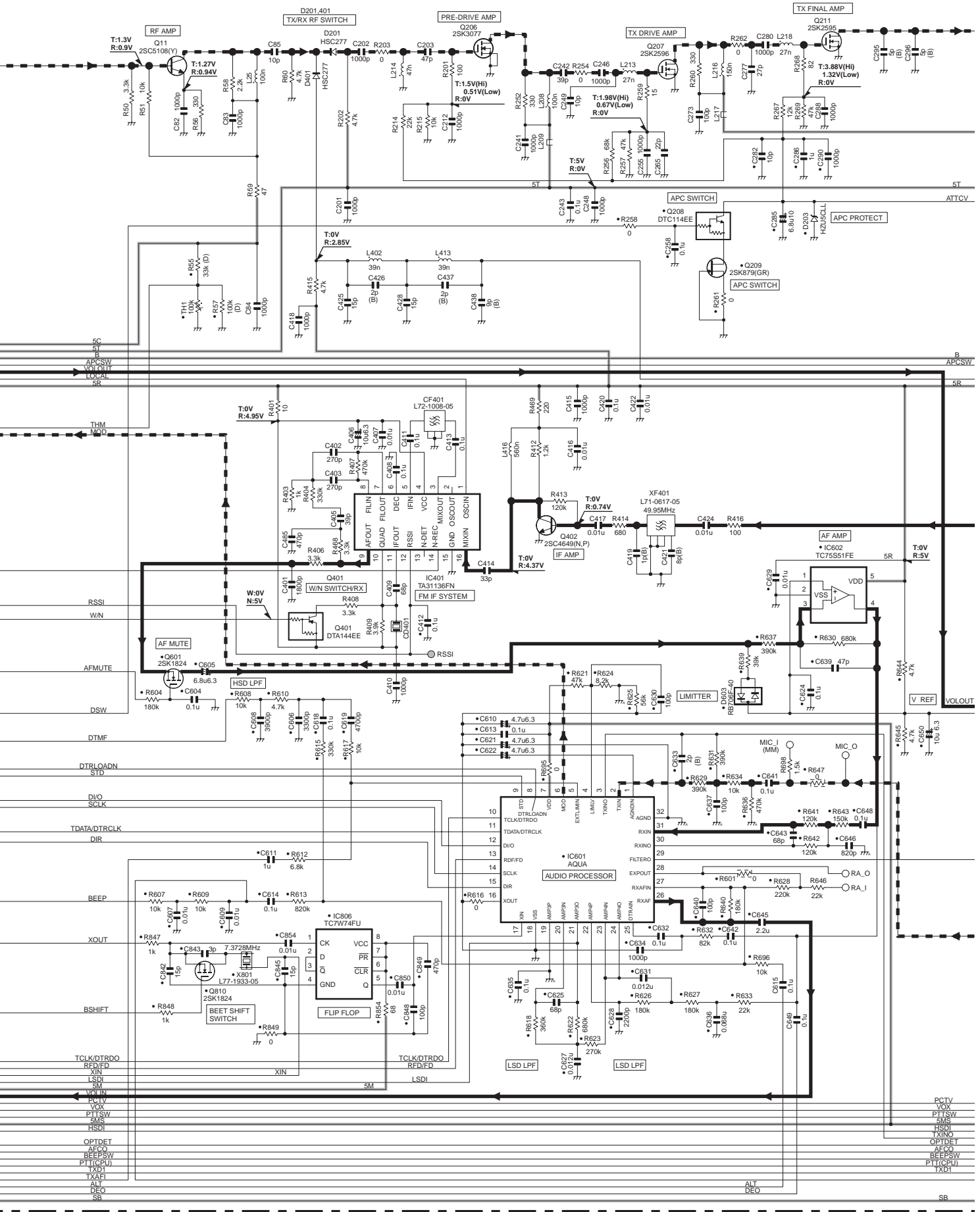
SCHEMATIC DIAGRAM TK-2160

TX-RX UNIT (X57-6720-10)



TK-2160 SCHEMATIC DIAGRAM

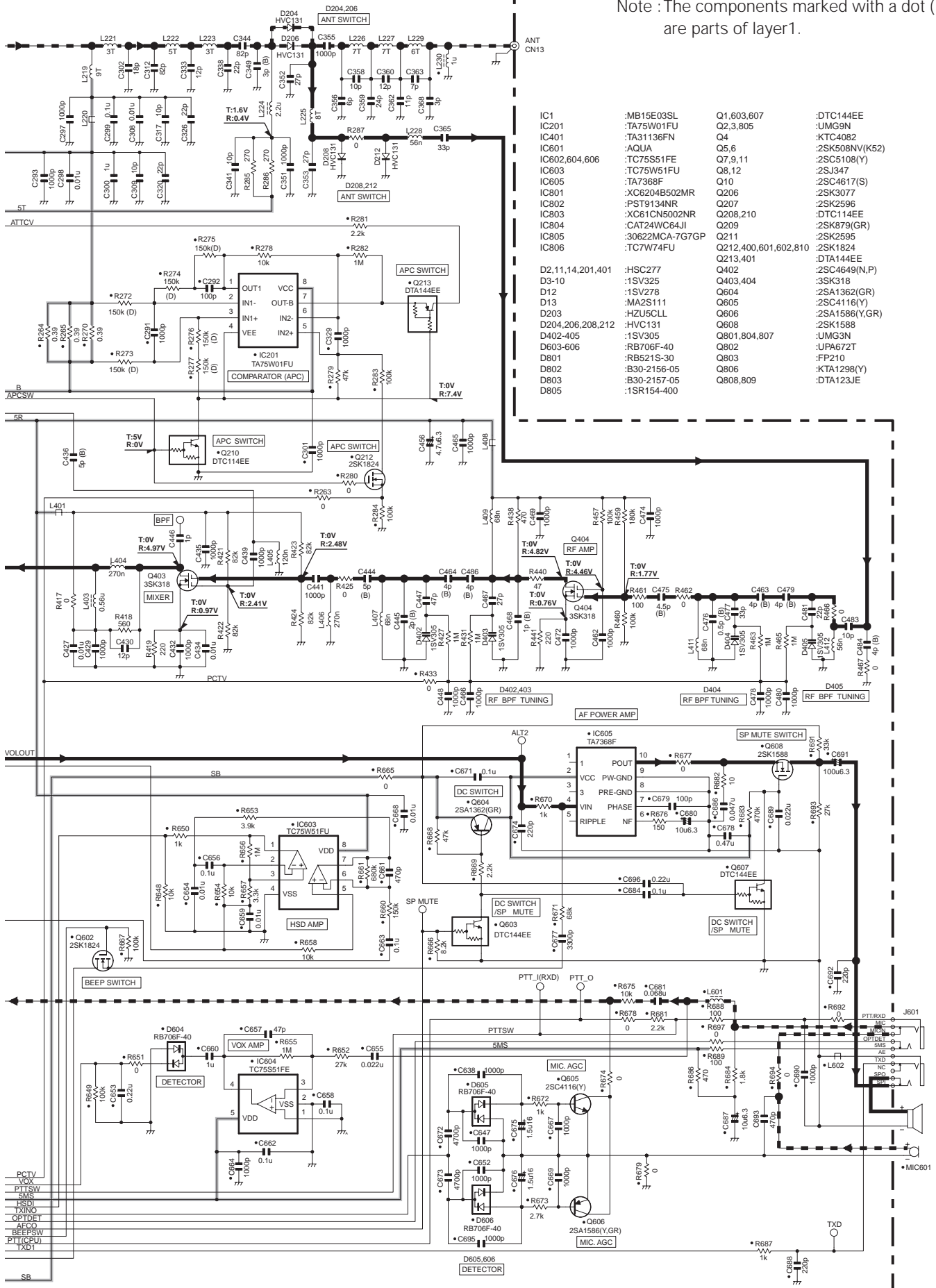
TX-RX UNIT (X57-6720-10)



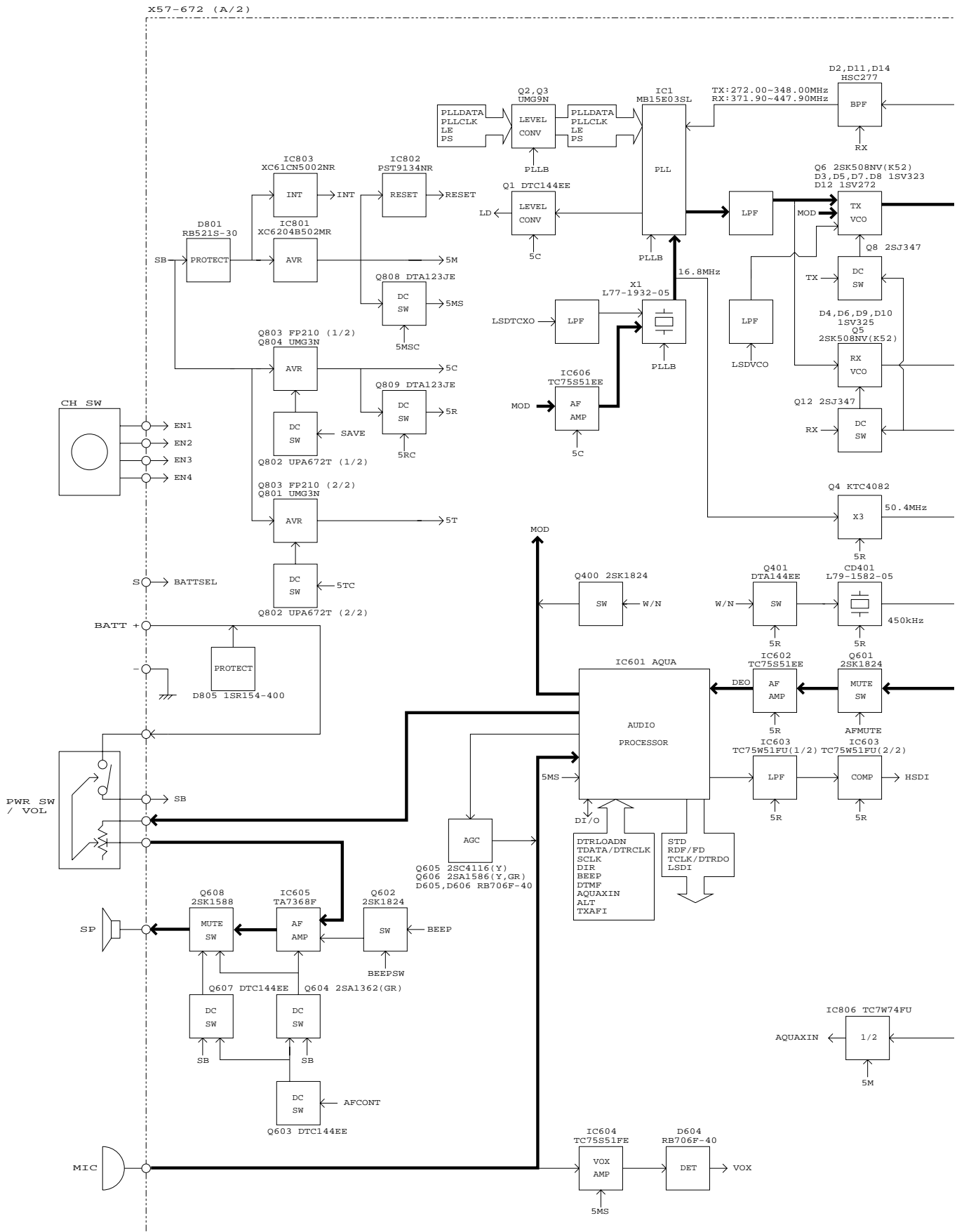
SCHEMATIC DIAGRAM TK-2160

TX-RX UNIT (X57-6720-10)

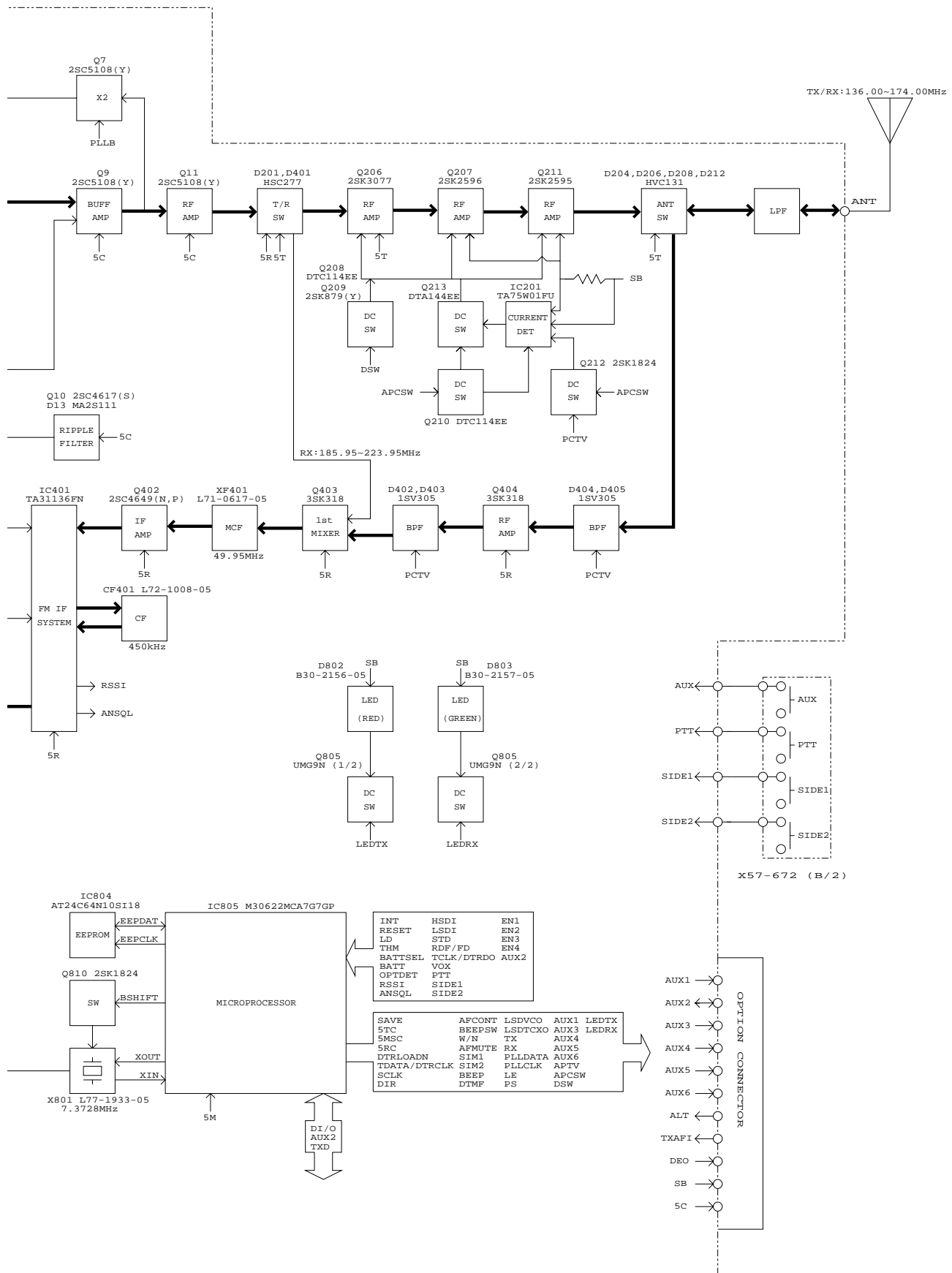
Note : The components marked with a dot (●) are parts of layer1.



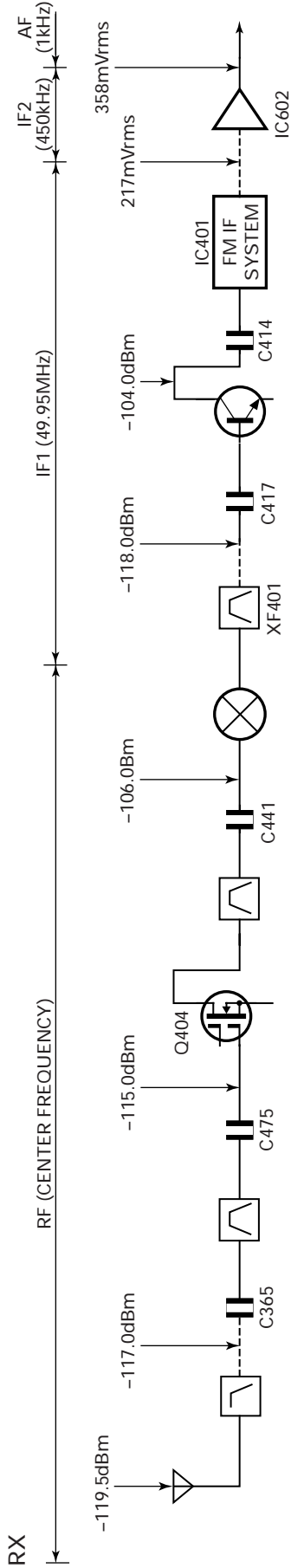
BLOCK DIAGRAM



BLOCK DIAGRAM

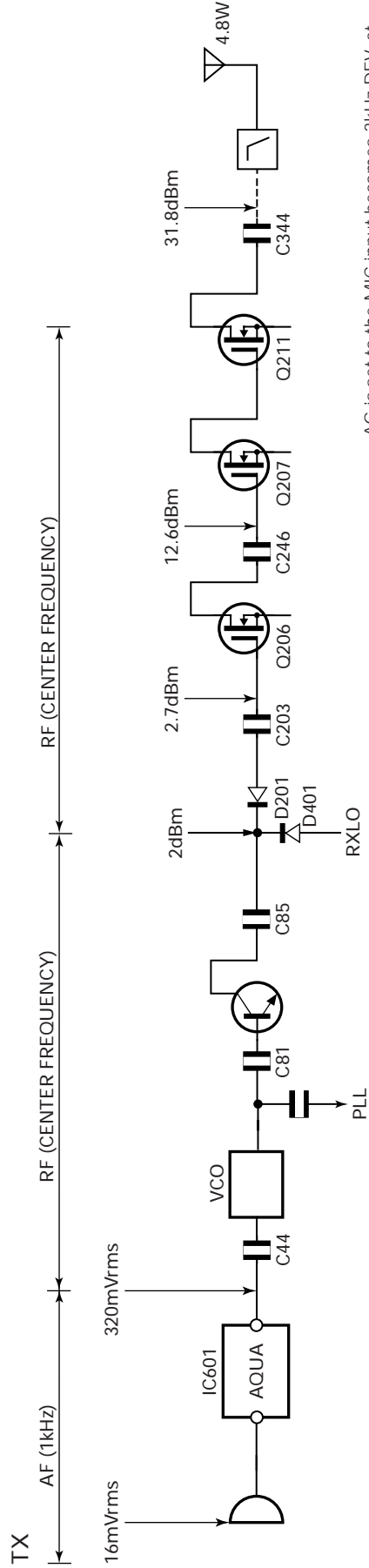
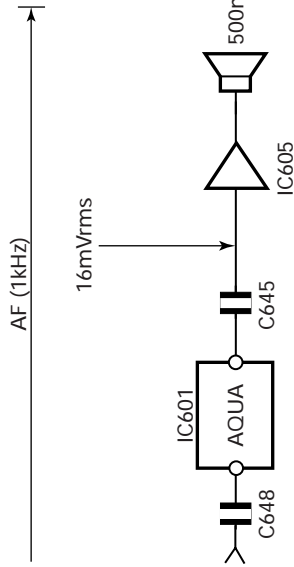


LEVEL DIAGRAM



To make measurements in the AF section, connect the AC level meter. (ANT input : -53dBm, 1kHz FM, 3kHz DEV(WIDE).)

In the RF section, use a 100pF 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 3kHz DEV. at 1kHz MOD. (WIDE)

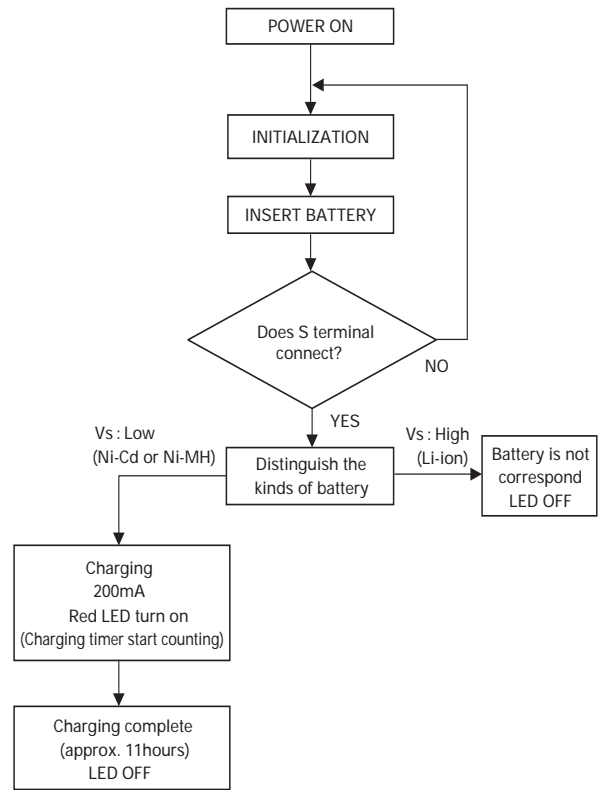
To make measurements in the AF section, connect the AC level meter.

In the RF section, use a 100pF coupling capacitor.

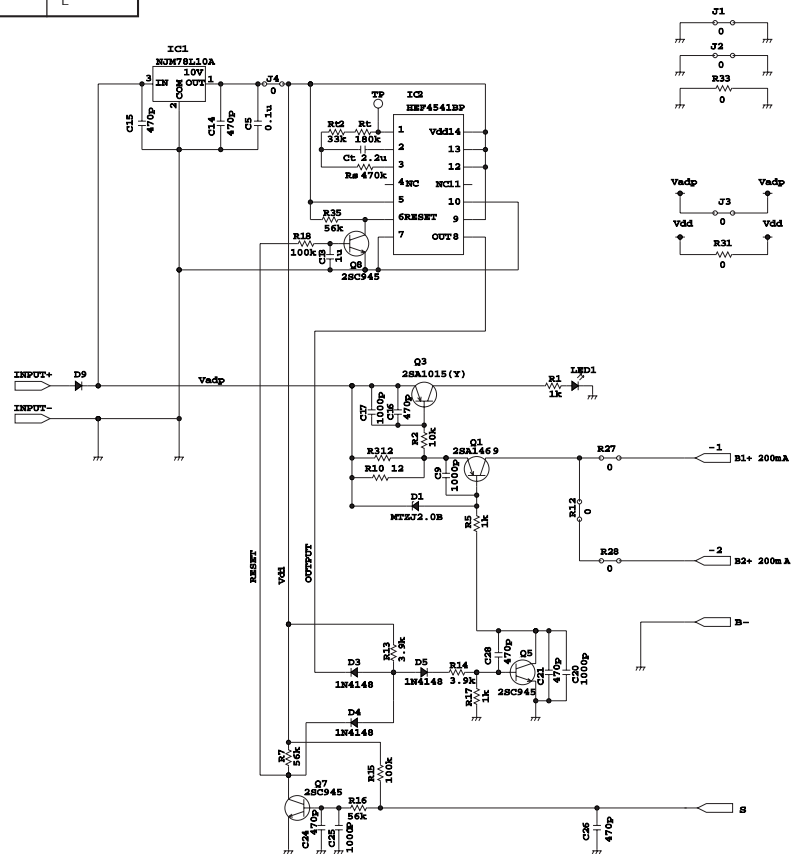
KSC-30



Operating flow chart



| Ref. No. | Address | New parts | Parts No. | Description | Destination |
|---------------|---------|-----------|-------------|-------------------------|-------------|
| KSC-30 | | | | | |
| | | * | A02-3656-08 | CABINET BOTTOM | |
| | | * | A02-3841-08 | CABINET UPPER | |
| | | * | B43-1151-08 | BADGE | |
| | | * | B62-1754-08 | INSTRUCTION MANUAL | K,T |
| | | * | B62-1755-08 | INSTRUCTION MANUAL | E |
| | | * | B72-2209-08 | MODEL NAME PLATE | |
| | | * | E03-0453-08 | DC JACK | |
| | | * | E23-1190-08 | RELAY TERMINAL | |
| | | | G13-1547-08 | CUSHION | |
| | | | N83-2610-45 | PAN HEAD TAPTITE SCREW | |
| | | * | W02-3671-08 | ELECTRIC CIRCUIT MODULE | |
| | | | W08-0479-05 | AC ADAPTER 120V AC 60HZ | K |
| | | | W08-0513-05 | AC ADAPTER 230V AC 50HZ | T |
| | | | W08-0558-15 | AC ADAPTER 230V AC 50HZ | E |



TK-2160

SPECIFICATIONS

K, M TYPE

General

| | |
|--------------------------------------|---|
| Frequency Range | 136~174MHz (K, M) |
| Number of channels | Max. 16 |
| Number of groups | Max. 16 |
| Channel Spacing | 25kHz, 30kHz (Wide) 12.5kHz, 15kHz (Narrow) |
| PLL Channel Stepping | K : 2.5kHz, 5kHz, 6.25kHz, 7.5kHz M : 5kHz, 6.25kHz |
| Operating Voltage | 7.5 VDC±20% |
| Battery Life | More than 9 hours at 5 watts (5-5-90 duty cycle with KNB-24L battery) |
| Operating Temperature range | -30°C to +60°C (-22 °F to +140 °F) |
| Dimensions and Weight | |
| With KNB-24L (1400mAh battery) | 56 (2-3/16) W x 109.3 (4-5/16) H x 34.5 (1-3/8) D mm (in) 290g (0.64lbs) |
| With KNB-25A (1200mAh battery) | 56 (2-3/16) W x 109.3 (4-5/16) H x 40.7 (1-5/8) D mm (in) 355g (0.78lbs) |
| With KNB-26N (2000mAh battery) | 56 (2-3/16) W x 109.3 (4-5/16) H x 40.7 (1-5/8) D mm (in) 400g (0.88lbs) |

Receiver (Measurements made per EIA standard EIA-603)

| | |
|--------------------------------|-------------------------------|
| Sensitivity | |
| EIA 12dB SINAD | 0.25µV (Wide)/0.28µV (Narrow) |
| Selectivity | 70dB (Wide)/62dB (Narrow) |
| Inter modulation | 65dB (Wide)/60dB (Narrow) |
| Spurious response | 65dB |
| Audio Power Output | 500mW |
| Frequency Stability | ±2.5ppm |
| Channel Frequency Spread | 38MHz (K, M) |

Transmitter (Measurements made per EIA standard EIA-603)

| | |
|--------------------------------|---------------------------------|
| RF Power Output | 5W/1W |
| Spurious and Harmonics | 70dB |
| Modulation | 16KφF3E (Wide)/11KφF3E (Narrow) |
| FM Noise | 45dB (Wide)/43dB (Narrow) |
| Audio Distortion | Less than 5% |
| Frequency Stability | ±2.5ppm |
| Channel Frequency Spread | 38MHz (K, M) |

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