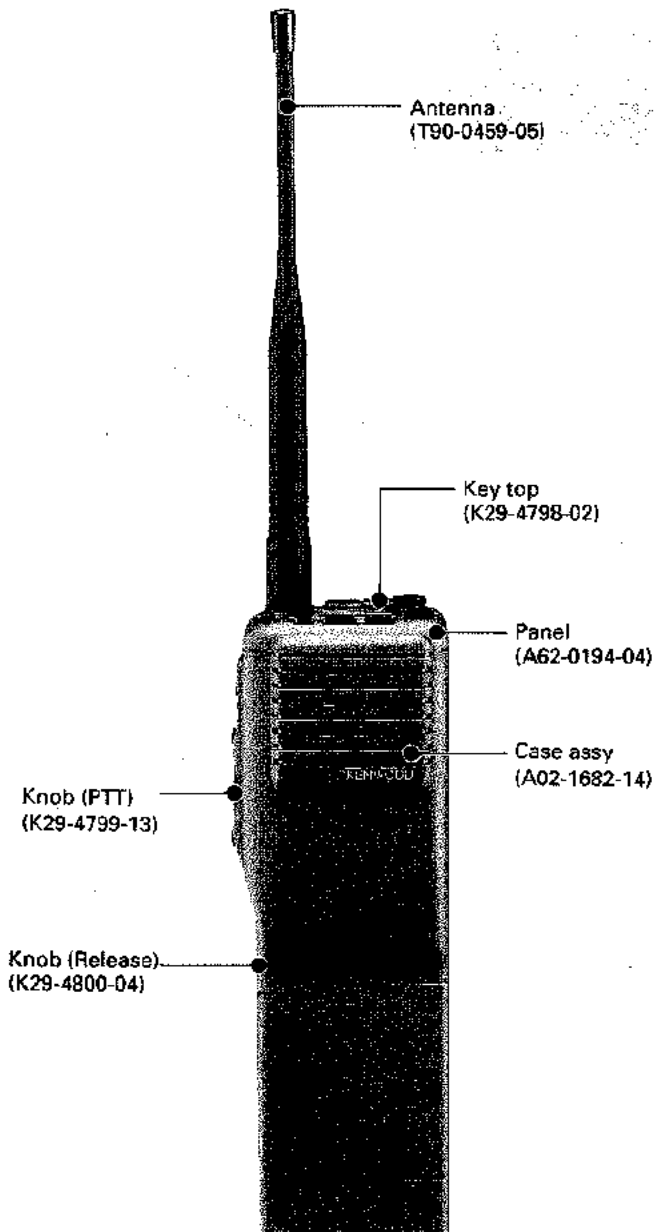


TK-431

SERVICE MANUAL



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GENERAL

INTRODUCTION

SCOPE OF THIS MANUAL

This manual is intended for use by experienced technicians familiar with similar types of commercial grade communications equipment. It contains all required service information for the equipment and is current as of the publication data. 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.

PERSONNEL SAFETY

The following precautions are recommended for personnel 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.

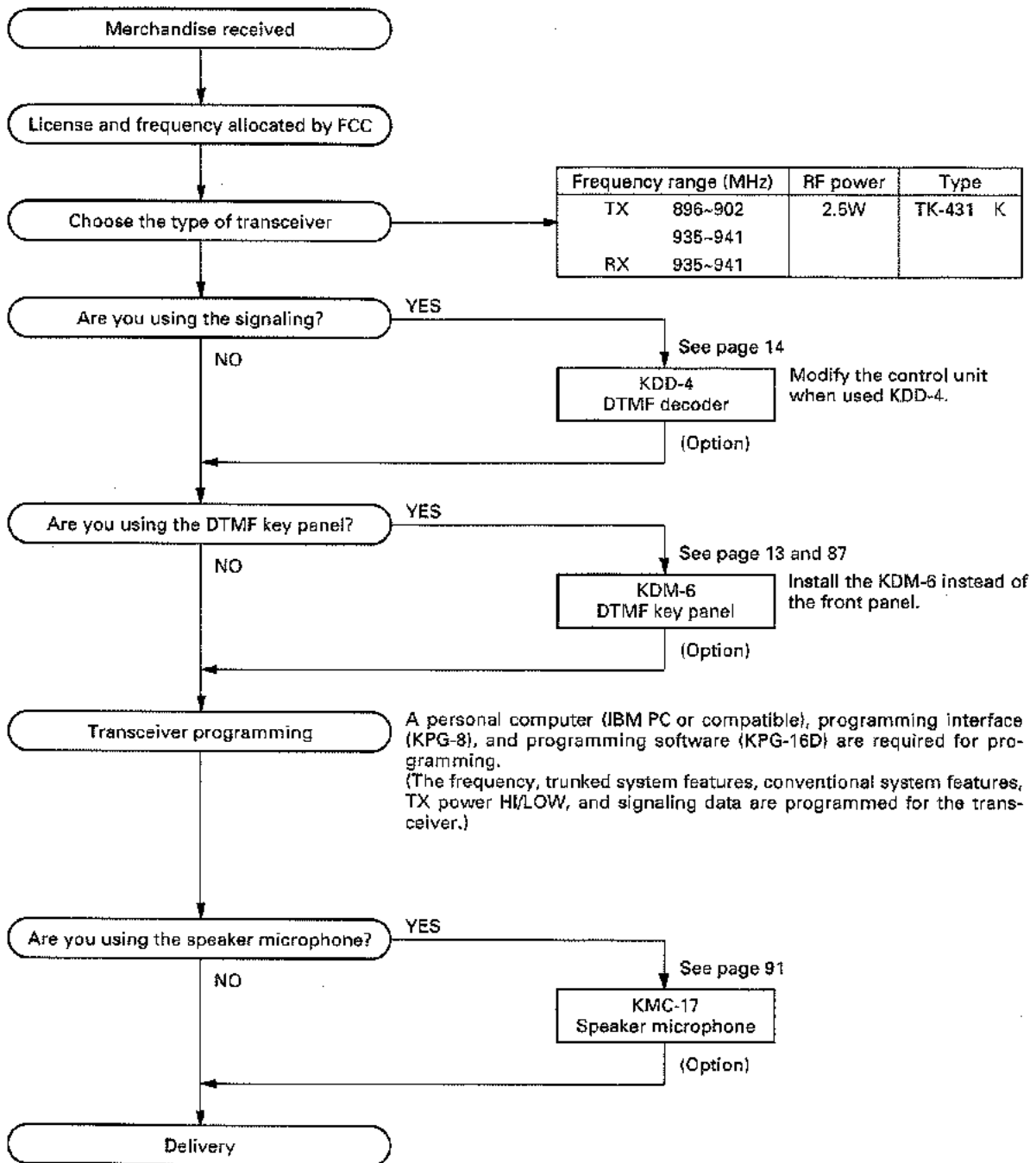
NOTE

WE CANNOT guarantee oscillator stability when using channel element manufactured by other than KENWOOD or its authorized agents.

FCC COMPLIANCE AND TYPE NUMBERS

Type acceptance number	Frequency range	Compliance
ALHTK-431-1	896~941MHz	Part 90

SYSTEM SET-UP



OPERATING FEATURES

1. Operation Features

The TK-431 is an 900-MHz-band EFJ LTR™-compatible trunked radio designed to operate in both trunked and conventional modes. The programmable features are summarized.

1-1. General Transceiver Features

- Any combination of sixteen trunked and conventional systems programmable.
- Up to ten groups are programmable in each system.
- Four-digit alphanumeric characters are programmable for each group.
- System scan is selectable with front-panel "S" key.
- System lockout during scanning
- Time-out timer
- CALL indicator
- Time-out timer
- Clear-to-talk
- External DTMF decoder (The optional KDD-4 DTMF decoder is required.)
- Test mode

1-2. Trunked System Features

The following features are available with systems programmed for trunked transceiver operation.

- Group Scan
- Transmit Inhibit
- Telephone Interconnect (The optional KDM-6 DTMF key panel is required.)
- Free System Ringback (This feature is available only when a telephone interconnect ID code is selected.)
- AUTO TEL (This feature is available only when a telephone interconnect ID code is selected.)
- Transpond
- Talk-around (Can be set for each group.)
- System Search

1-3. Conventional System Features

The following features are available with systems programmed for conventional transceiver operation.

- Up to ten channels are programmable in each system. (Channels are selected using the GROUP key.)
- Carrier squelch and QT/DQT operation
- Transmit Disable (Receive-only channel)
- Talk-around (Can be set for each group.)
- Busy Channel Lockout

2. Transceiver Controls and Indicators (Fig. 1)

2-1. Top Panel Controls

All the keys on the top panel are momentary-type push buttons. The functions of these keys are explained below.

• POWER key

Transceiver POWER key. When the power is switched off, all the parameters, such as the system and group, are stored in memory. When the power is switched on again, the system returns to the previous conditions.

• LAMP key

This key illuminates the LCD on the top panel. When the key is pressed, the LED lamp goes on. When it is released, the lamp goes off after about five seconds. If any key, except the power key, is pressed while the LED lamp is on, the lamp is kept on for five seconds. It is also kept on for five seconds by pressing a key on the optional KDM-6. This key also functions as the KDM-6 (DTMF key panel) backlight on/off key.

• SYSTEM key

When the SYSTEM key is pressed, the system number to be selected is incremented by one. When the key is held down, the system number changes continuously. After the system number reaches the highest system number, it goes back to the lowest system number. System numbers not set are skipped.

• GROUP key

This key is operated in the same way as the SYSTEM key. When the system number is changed, the GROUP indicator shows the original group number (the last selected group number in each system). The group to be set may differ by system.

• S (Scan) key

Each time this key is pressed, the system scan function is toggled on and off. The function of this key can be disabled by programming.

• A (Auxiliary) key

This key toggles the auxiliary function on and off. If this key is pressed once, the auxiliary function is enabled. If the key is pressed again, the auxiliary function is disabled. The confirmation tone is the same as that of the scan key. The following auxiliary functions are available and can be programmed by the FPU:

- 1) System scan delete function
- 2) Fixed revert system call (invalid if the system is not set)

OPERATING FEATURES

- 3) Switching between alphanumeric display and system/group indicator (toggle)
(Invalid if the alphanumeric display is not set)
When the alphanumeric display is selected, the 1460-Hz confirmation tone is output for about 50ms. When the system/group indicator is selected, the confirmation tone is output twice (output 50ms, off 50ms, output 50ms).
- 4) RIC search function
- 5) TX power high/low switching function (toggle)
- 6) Invalid

2-2. Top Panel Displays and Indicators

• System display

Indicates the selected system number (1~16). Only the programmed systems are displayed. The system display is located above the SYSTEM key.

• Group display

Shows the selected group number (0~9). Zero indicates group 10. Only the programmed groups are displayed. The group display is located above the GROUP key.

• Scan indicator

The (S) mark on the left of the system display goes on in system scan mode.

• Delete (▶) indicator

When a system locked out of the system scan sequence is selected, the ▶ mark on the left of the system display goes on. It flashes when there is any locked system during system scan.

• BUSY indicator

The BUSY indicator goes on if the PTT button is pressed when the trunked system is busy or while a TX inhibit ID is being received.

• CALL indicator

The CALL indicator can be programmed so that it goes on when a specified call is received. This indicator goes off when any top panel key other than the LAMP key is pressed.

If the KDD-4 is installed and the call flag is Y, this indicator does not go on unless the DTMF code matches.

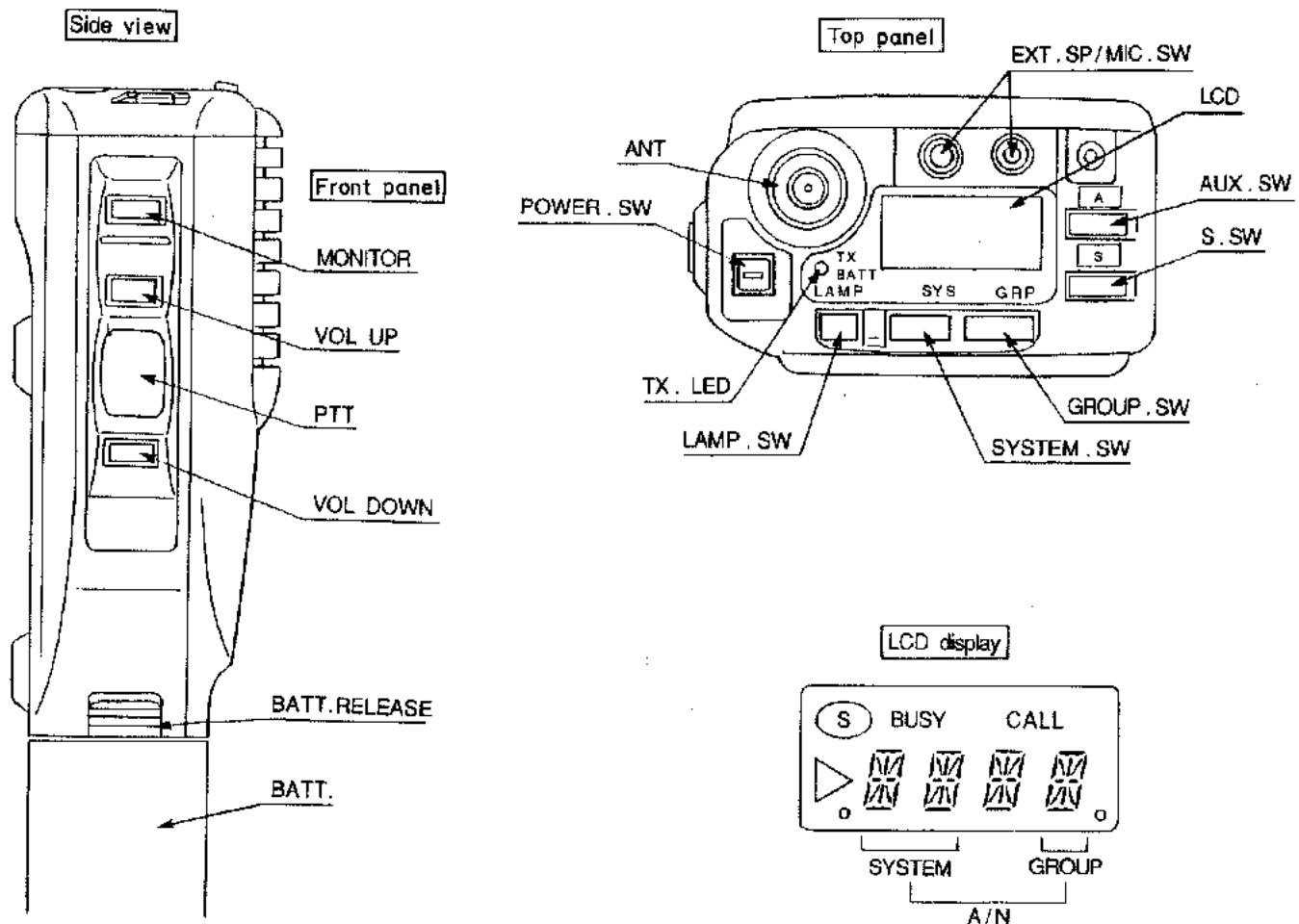


Fig. 1

OPERATING FEATURES

- **Alphanumeric Display**

The four-digit alphanumeric (A/N) display also shows system and group numbers. Up to 160 sets of 4-digit alphanumeric displays can be programmed for each system/group. If the alphanumeric display is not programmed, the system and group numbers are displayed.

- **Auxiliary 1 (•) indicator**

The dot (•) mark shown at the lower right of the group indicator is an indicator that can be programmed for each system/group. If this key is programmed for a specific group function (interconnect, talk-around, scan lockout, etc.), it can be used to indicate the function.

If the KDD-4 is installed, it turns on according to the DECODE LATCH high/low.

- **Auxiliary 2 (•) indicator**

The dot (•) mark shown at the lower left of the system indicator is displayed only when the A key is set to the power change function. When the dot (•) is on, the TX power is low, and when it is off, the power is high.

- **TX/BATT indicator**

This red LED lights during transmission (it does not light during busy or TX inhibit is enabled). If the battery voltage falls below the programmed voltage during transmission, the brightness of this indicator decreases at intervals of about one second, so it can be used as the battery voltage alert function (except during linking).

3. Details of Features

3-1. System Scan

System scan can be selected with the "S" key by programming the scan feature. When the "S" key is pressed and the (S) mark appears, scan mode is entered. Scanning starts from the system following the currently displayed system. When scanning, a dash (-) is indicated on both the SYSTEM and GROUP indicators. When a call is received, scanning stops, and the system and group are displayed.

When the system or group key is pressed during scanning, the scan stops and the revert system or group can be changed. Scanning resumes one second after the key is released. If the scan feature is not programmed, the "S" key on the top panel is ineffective.

3-2. System Lockout

The system lockout feature is used to lock systems out of the scan sequence, and can be selected by programming in the following two ways:

- **Fixed lockout**

The system to be locked out is selected by programming. When a locked system is selected, the Delete (▶) indicator appears on the left of the SYSTEM indicator. The revert system is scanned even if it is locked out. If there is a locked system, the Delete (▶) indicator flashes during scanning.

- **User selectable lockout**

If the A (Auxiliary) key is programmed for the scan lockout feature, the user can lock systems out of the scan sequence with the A key. To lock a system out of the scan sequence, press the A key when the system is displayed. The Delete (▶) indicator is displayed on the left of the SYSTEM indicator.

To unlock a system, select the system and press the A key. The Delete (▶) indicator disappears to indicate that the system has returned to the scan sequence. The revert system is scanned even if it is locked out. If there a locked system, the Delete (▶) indicator flashes during scanning. If all systems are locked out, the scan stops and only the revert system is received.

If another function is assigned to the A (Auxiliary) key, the USER SELECTABLE LOCKOUT feature does not function.

3-3. Drop-Out Delay Time (Scan Resume Time)

If a call is received during scan, the scan stops. The scan resume time can be programmed as 0 to 254 seconds in one-second increments. The default value is 3 seconds.

3-4. Dwell Time

The dwell time is the time after transmission ends until the scan resumes in scan mode. It can be set to 0 to 254 seconds by programming. The default value is 15 seconds.

3-5. System/Group Revert

System/Group revert can be programmed for one of the following:

- **Last call revert**

The system or group changes to the revert system or group when a call is received with the system or group being scanned.

- **Last use revert**

If a system/group call is received during scanning and the PTT button is pressed for transmission and response within the drop out delay time, the system or group is assigned as the new revert system or group.

OPERATING FEATURES

3-6. Scan Message Wait

The time for staying with the home repeater that receives a signal during system scan and monitoring data messages can be programmed. If there is no signal from the home repeater, the system is scanned for about 50ms. If there is a signal, three data messages are monitored. Normally, three data messages are monitored for each system, and it can be increased in multiples of three data messages per line to up to eight lines.

If the repeater data message indicates that there is no call, data monitoring is terminated and the home repeater of the next system is scanned.

3-7. Call Indicator

The call indicator can be programmed for each group. In trunked systems, it can be set to respond to a selectable decode ID or one of two fixed IDs, except block IDs. When a call is received with a selectable decode ID, the call indicator flashes. When a call is received with a fixed ID, the call indicator lights continuously.

In a conventional system, the call indicator can be programmed to light for each QT or DQT code. It keeps flashing while a call is being received. It is turned off by pressing any top-panel key except the LAMP key.

3-8. Time-Out Timer

The time-out timer can be programmed in 15 seconds increments from 15 seconds to ten minutes for dispatch and interconnect operations. If the transmitter is keyed continuously for longer than the programmed time, the transmitter is disabled and a warning tone sounds while the PTT button is held down. The alert tone stops when the PTT button is released. The default value is one minute for dispatch and three minutes for interconnect.

3-9. Priority ID Codes

The priority of the programmable decode ID codes for each system is as follows:

- 1) Fixed ID code 1.
- 2) Fixed ID code 2
- 3) Selected ID code
- 4) Other selectable ID codes (Group scan only)
- 5) Block decode codes

When a call with a higher priority is received, that call is received immediately (except when the transceiver is trunked out).

3-10. Group Scan Operation

Group scan can be programmed for each group. In addition to the ID codes of the selected group, the ID codes of the other groups that are permitted for group scan are decoded. (The two fixed ID and block decode codes are always decoded.)

If, during group scanning, a call is received with one of the selectable group ID codes for which group scan is enabled, the group display indicates the group number that the call came in with. That group then becomes the new selected group. Group scan resumes after the specified drop-out delay time or dwell time shared by the system scan elapses.

3-11. Transmit Inhibit

The transceiver can be programmed with a transmit inhibit block of ID codes. If an ID code within this block is decoded the preset time before the PTT button is pressed, transmission is inhibited. The BUSY indicator lights and a busy tone sounds until the PTT button is released to indicate that transmission is not possible (except clear-to-talk mode).


Transmission with the group for which the encode ID is not set is inhibited, and the busy tone is output while the PTT button is held down, regardless of the clear-to-talk setting.

3-12. RIC ID Codes (RIC MODE)

The ID code in the RIC ID block can be used to make a phone call by programming the block. To make a phone call, the transceiver front panel must be replaced with the optional KDM-6 (DTMF keypad).

3-13. Free System Ringback

This feature is available only when a telephone interconnect ID code is selected. If a busy tone sounds when the PTT button is pressed, the transceiver enters this mode automatically.

When the PTT button is released, a beep sounds for 400ms to indicate that the mode has been entered. If the scan is on, it is canceled automatically (the  mark goes off.) When any repeater becomes available, a ringing tone sounds and this mode ends.

System scan is automatically terminated when the mode is entered. The mode is terminated when the system, group, scan, PTT, or A key is changed.

OPERATING FEATURES

3-14. System Search

This feature can be programmed to automatically access other programmed systems when the selected system cannot be accessed. If an intercept tone sounds when the PTT button is pressed after setting the mode, the transceiver has entered the mode. System scan is automatically terminated at this point.

If the group ID is a telephone interconnect ID, the transceiver then attempts to access, in succession, other systems that have a telephone interconnect ID in the revert group location. If the group ID is a dispatch ID, the transceiver attempts to access other systems that have a dispatch ID programmed in the revert group location.

If there is no system to be accessed, an intercept tone sounds, the mode is terminated, and the transceiver returns to the first system. If the access is successful, the mode is terminated, and the searched system becomes the new selected system.

3-15. Transpond

This feature can be programmed to turn on and off for each group. If the ID of the group for which transpond is enabled is received, two data messages (transmit ID and turn-off code) are automatically transmitted if the PTT button is not pressed as a response within the time set (0 to 254 seconds in 1-second increments). If the PTT button is pressed within the time, or if the signaling option has been set, the transpond is not performed.

3-16. Talk-Around

This feature can be programmed to turn on or off for each group. When the PTT button is pressed for the group to which the talk-around feature is set, the home repeater channel is used for transmission, and the repeater link operation is not performed. Signaling must be in LTR format.

If clear-to-talk is set, a proceed tone is output at the beginning of transmission. If both interconnect and talk-around are set, the talk-around operation is not performed.

3-17. Preferred System Revert

This feature is available by assigning this feature to the A (Auxiliary) key. The feature is used to move the revert system/group to the fixed programmed system/group quickly. When the A key is pressed during scanning, the scan stops temporarily, and the revert system/group is displayed. The scan resumes about one second after the A key is released.

3-18. Alphanumeric Display Select

The system/group number display and the alphanumeric display can be switched with the A key by assigning this feature to the key. Figure 2 shows the characters that can be displayed. These are basic characters, and can be displayed in each segment. Four digits can be displayed at the same time.

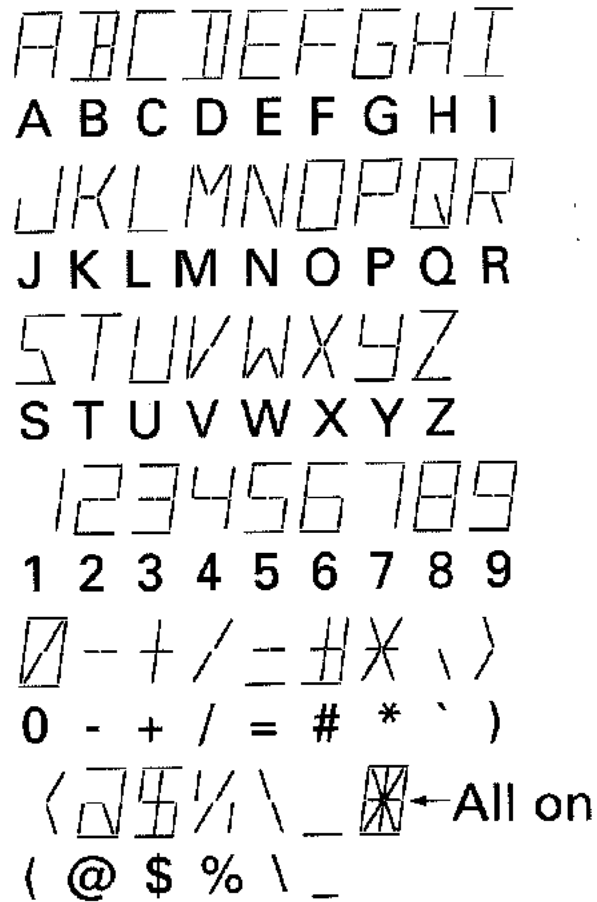


Fig. 2

OPERATING FEATURES

3-19. AUTO TEL

A telephone interconnect call can be made by simply pressing the A (Auxiliary) key by assigning this feature to the key. This feature accesses the RIC channel of the available system automatically.

When the A key is pressed, a queue tone is output, and the "RIC" message appears on the alphanumeric display to indicate that this mode has been entered. If the RIC ID is set for the revert system, the RIC channel of that system is accessed. If all RIC channels are busy, an attempt is made to access the RIC channels of another system in which the RIC ID code has been programmed. It is repeated for 60 seconds until the access succeeds. If the access succeeds, a dial tone returns from the repeater. If the A key is pressed again when the queue tone is sounding, this mode is canceled.

If the access fails after 60 seconds, a deny tone is output and this mode is terminated. When the talk ends, the revert system/group returns. When the scan mode is effective, the scan resumes. The AUTO TEL feature can be programmed to turn on or off for each system.

3-20. Low Battery Indicator

If the battery voltage falls below the programmed level during transmission, the brightness of the TX LED is reduced in periods of one second to give an alert.

It can be programmed in the range 5.20 to 6.8V in increments of 0.2V. Normally, set it to 6.2V. This transceiver sounds an alert tone and inhibits transmission if the battery voltage falls below 5.2V.

3-21. TX Power Switching Feature

Transmission power can be programmed to high or low for each group. The A key can be used by assigning this feature to the key.

- **When the A key is not used**

Set the program item to YES to set the power to low. (NO : High)

- **When the A key is used**

You can switch the transmission power between high and low with the A key by assigning this feature to the key.

If the A key is pressed once, the [•] indicator on the system display lights and the power becomes low. (The 1460-Hz confirmation tone sounds once.)

If the A key is pressed again, the [•] indicator goes off and the power becomes high. (The 1460-Hz confirmation tone sounds twice.)

3-22. Audible User Feedback Tones

The transceiver outputs various combinations of three tones (high, mid, and low) to notify the user of the transceiver operating state. The main tones are listed below. The high tone is 1460Hz, the mid tone is 980Hz, the and low tone is 730Hz.

- **Busy tone**

This tone is output when the PTT button is pressed but no repeater is available and transmission is not possible. It is output until transmission is enabled while the PTT button is held down and transmission starts, or until the PTT button is released. (The mid tone and low tone are output alternately in 150ms intervals.)

- **Intercept tone**

This tone indicates that the transceiver is out of range. It indicates that the PTT button is pressed, and transmission has started, but the repeater cannot be connected and talking is not possible. It is output until the PTT button is released. (The mid tone and low tone are output alternately in 200ms intervals.)

- **Delay tone**

This tone is output when the PTT button is pressed and the repeater is accessed three times or more to indicate connection with the repeater is delayed. This tone is the same as the Busy tone.

- **Proceed tone**

This tone is output when the PTT button is pressed, transmission starts, and the repeater is connected to indicate that the user can talk if the Clear-to-Talk function has been set. (The high tone is output for 100ms.)

- **Queue tone**

This tone is output until the AUTO TEL function is set and the RIC channel is accepted successfully. (The mid tone on for 50ms, off for 50ms, and on for 50ms in 1 second intervals.)

- **Deny tone**

This tone is output if the AUTO TEL function is set, the queue tone is output, but the RIC channel cannot be accessed within 60 seconds. It is similar to the intercept tone. (The mid tone and low tone are output alternately in 150ms intervals.)

OPERATING FEATURES

3-23. Clear-to-Talk

This feature can be programmed to turn on or off.

- **Clear-to-talk operation (Set to ON)**

If a dispatch ID is used and the PTT button is pressed when no repeater can transmit, a busy tone is not output (it is output when an interconnect ID is used). If transmission becomes possible while the PTT button is held down, transmission starts.

When connection with the repeater is completed, a proceed tone is output. The delay tone is not output in this mode. (It is output when an interconnect ID is used.)

- **Normal operation (Set to OFF)**

If the PTT button is pressed when there is no repeater that can transmit signals (no free repeater or TX inhibit is enabled), a busy tone is output. If transmission becomes possible while the PTT button is held down, transmission starts. The delay tone is output if link operation is performed three to six times.

3-24. Conventional System Operation

Up to 10 channels can be programmed for each system programmed as a conventional system. Channels can be selected by the group key. This transceiver can program up to 160 channels.

QT (Quiet-Talk), DOT (Digital Quiet-Talk), or carrier squelch can be set for transmit or receive channels. If signaling is set for transmission, a squelch tail eliminator (reverse burst or turn-off code) is transmitted.

- **Monitor operation**

If QT or DQT signaling is set during reception, it can be canceled by pressing the monitor key. This feature can be programmed to be disabled.

- **Talk-around**

The Talk-around feature can be programmed for each channel.

- **Transmit disable (receive-only channels)**

Transmission can be programmed to be inhibited for each channel. This feature is used to set receive-only channels. When the PTT button is pressed on a receive-only channel, a busy tone sounds, and transmission is not performed.

- **Busy channel lockout**

The busy channel lockout feature can be programmed for each channel. If a channel is locked out by pressing the PTT button, a busy tone is output, and if transmission becomes possible, it starts.

- **Scanning conventional systems**

For the conventional system scan, only the revert channel of each system is scanned. If QT or DQT is set for the channel, the channels, including signaling, are scanned.

3-25. DTMF Key Panel (KDM-6 Option)

The 0 to 9, *, and # keys are used to generate DTMF tones for telephone number dialing. A DTMF tone is generated only when transmission is performed by pressing the PTT button.

3-26. External Decoder (KDD-4 Option)

The optional DTMF decoder (KDD-4) can be installed in the transceiver. Use of the optional decoder can be programmed for each group (for each channel of a conventional system). The monitor key functions as the external decoder reset key.

The KDD-4 can be supported with the decode ID of each group. If the decode ID of group 1 is equal to fixed ID 1 or the decode ID of group 2 is equal to fixed ID 2 in the LTR system, the KDD-4 can be supported with each fixed ID. If it is supported, the following features are available:

- **Audio mute**

If the decode latch input port is low during reception and the LTR data or signaling matches (when the squelch is open if signaling is not set), the audio is output.

During system/group scanning, the " - " display changes to the system/group display (or alphanumeric display). If it is the last call, the revert system/group returns.

- **Call indicator, alert tone**

If the Decode Latch input port changes from high to low during reception and the LTR data or signaling matches (when the squelch is open if signaling is not set), a KDD-4 alert tone is output when the monitor key is off. CALL lights or flashes (or nothing occurs) according to the CALL indicator set for each group.

The CALL indicator/KDD-4 alert tone does not operate unless the Decode Latch input port goes high.

- **Operation during scan**

If signaling matches during scanning, the scan stops at the system. The display shows " - " until the Decode Latch input port goes low. When the port goes low, the system/group is displayed.

OPERATING FEATURES

4. Transceiver Programming

4-1. Introduction

The TK-431 transceiver is programmed using an IBM PC or compatible machine, a programming interface (KPG-8), and a programming disk (KPG-16D). Figure 3 shows the setup for an IBM PC.

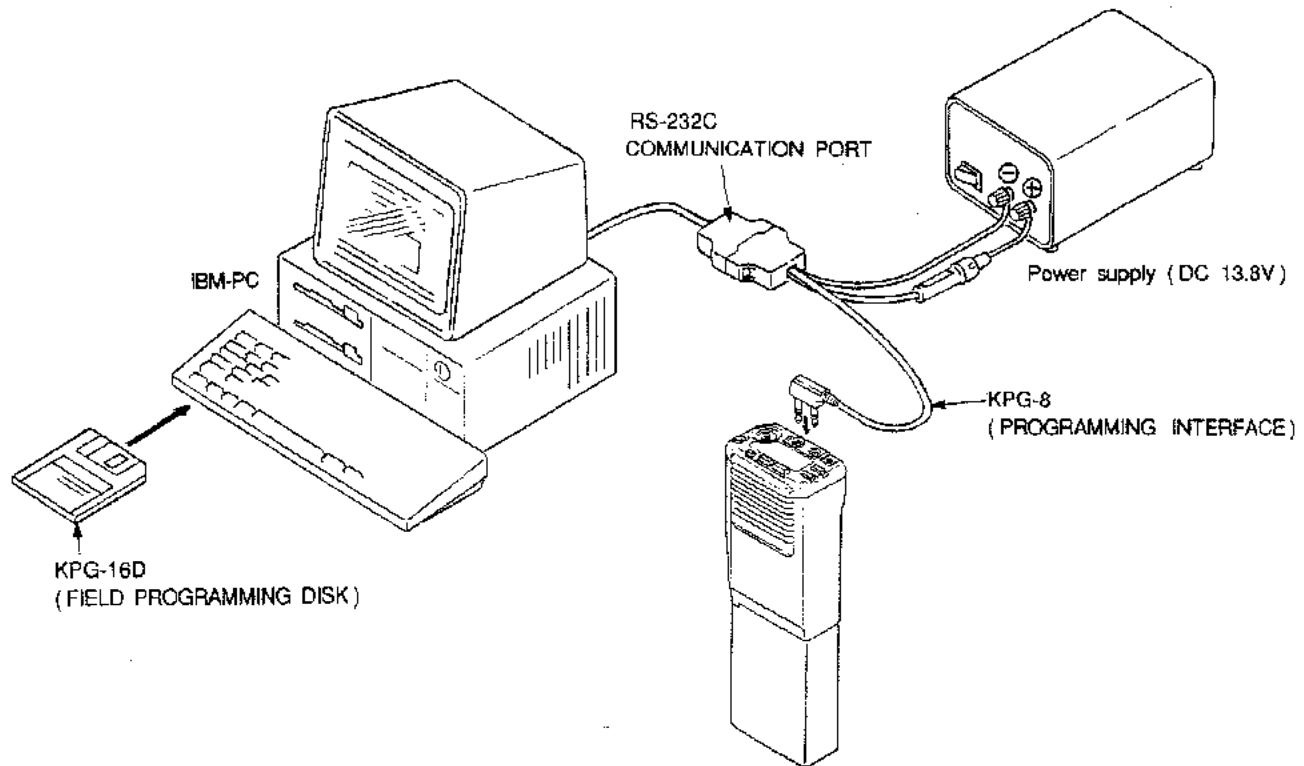


Fig. 3

4-2. KPG-8 Description

(Optional PC programming interface cable)

The KPG-8 is needed to connect the TK-431 to the computer. It has a circuit in the D-subconnector (25-pin) case that converts the RS-232C logic level to TTL level. The KPG-8 plug is connected to external socket of the TK-431 and to the computer by a conversion cable (option) with a 9-pin female connector and a 25-pin male connector. Connect the KPG-8 DC power input cable to the DC power supply (13.8V).

4-3. Programming Software Description

KPG-16D is the programming software for the TK-431, supplied on a 3.5" or 5.25" floppy disk. This software runs under MS-DOS (version 3.3 or later) on an IBM-PC/XT, AT, or PS2, or on a compatible machine. Data can be input to or read from the TK-431, and edited on the screen. Programmed data can be printed.

4-4. Program Mode

Data can be programmed in to the transceiver in this mode. To put the transceiver in to this mode, hold down the A (Auxiliary) key, switch the power on, wait for at least two seconds, then release the A key. The system or group display shows a dash (-). The message "PROG" appears on the alphanumeric display.

Firmware programming: Hold SYS key while turning on power. Version check: Press A key. Use 19200 baud. Use DOS FPRO.exe

OPERATING FEATURES

4-5. Clone Mode (Fig. 4)

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

1. Power on both radios.
2. Connect the KCT-8 cloning cable to the microphone connectors of master and slave.
3. Put the master into programming mode, then press the GROUP key. The dot (•) at the lower right of the group indicator goes on to indicate that the master is in clone mode.
4. Put the slave into programming mode.

5. Press the "S" key on the master. Data is transmitted to the slave and the (S) mark goes on. When data has been completely cloned, the (S) mark disappears.
6. Switch the slave's power off, disconnect the clone cable, then switch the power on again. The slave can then be operated by the same program as the master.
7. Any number of radio can be cloned by connecting the slave side of the microphone cable to the microphone connector of another radio, putting it into programming mode, and performing steps 5 and 6.

Note : Only the same models can be cloned together.

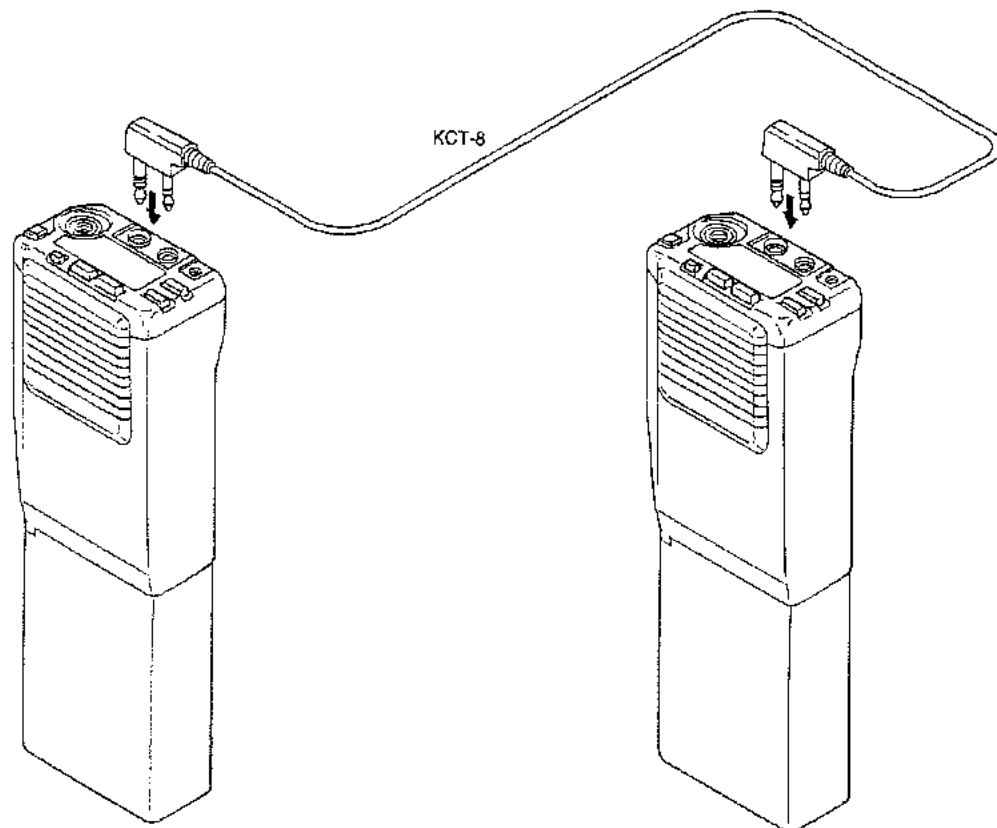


Fig. 4

INSTALLATION

1. Installing the DTMF Key Panel (KDM-6 Option)

The KDM-6 is used to generate DTMF tones for dialing a phone numbers.

1. Loosen the two screws (①) securing the bottom plate, pull the top panel (②), and remove the transceiver from the case. (Fig. 5)

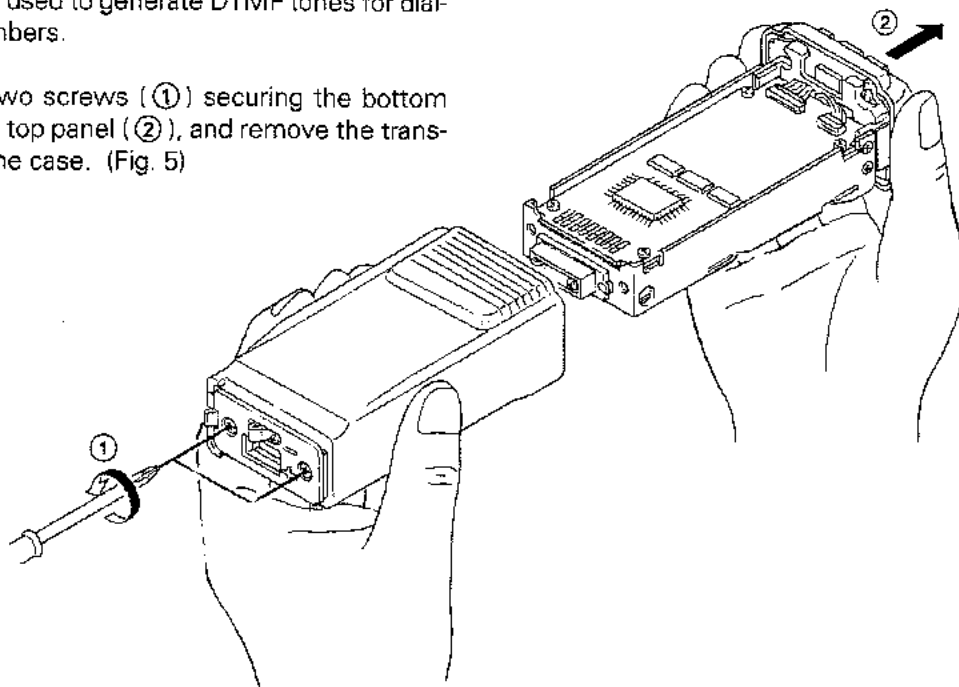


Fig. 5

2. Remove the one screw (N09-2053-05) holding the bottom plate (③), and remove the bottom plate (④). See Figure 6 for 2 to 6.
3. Remove the terminal (E23-0474-14) and cushion (G11-0617-04) (⑤).
4. Remove the release knob (⑥) and spring (G01-0867-04) (⑦).
5. Remove the front half of the case from the rear half.

Note: To remove the front half of the case from the rear half, push up the front panel in direction (⑧) shown in Figure 6 and remove it in direction (⑨).

6. Install the KDM-6 instead of the front panel.

Reassemble the unit in the reverse order of disassembly.

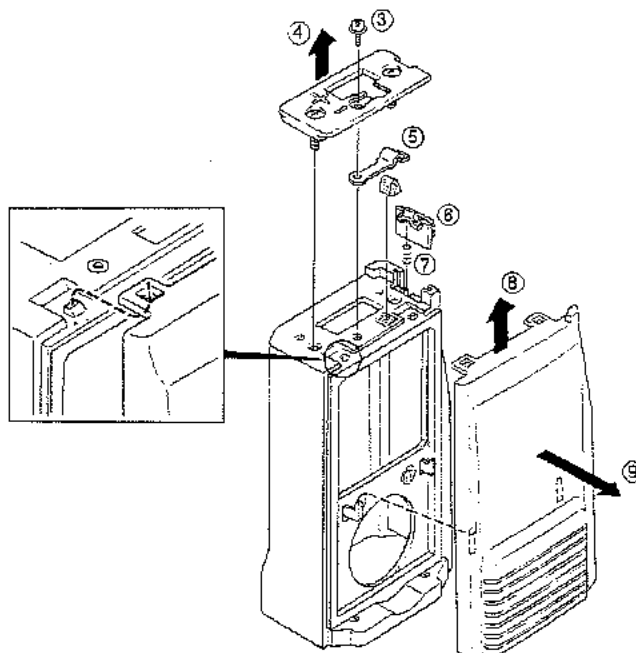


Fig. 6

INSTALLATION

2. Installing the Signaling Unit (KDD-4 DTMF Option)

- Loosen the two screws holding the bottom plate, pull the top panel, and remove the transceiver from the case. (Fig. 5)
- Remove the four screws holding TX-RX unit B/4 on the frame.
- Remove TX-RX unit B/4 (①). (Fig. 7)
- Cover the entire KDD-4 with the supplied insulating tube (②).
- Attach the double-sided adhesive cushion to the insulating tube (③) (on the insulating tube on the soldered side of the KDD-4).
- Insert the KDD-4 lead connector into CN204 on the component side of the TX-RX unit B/4 (④).
- Fix the KDD-4 covered with the insulating tube on TX-RX unit B/4 with the cushion facing down. (See Figure 7 for the fixing location (⑤)). If it is not fixed correctly, it will touches other components.)

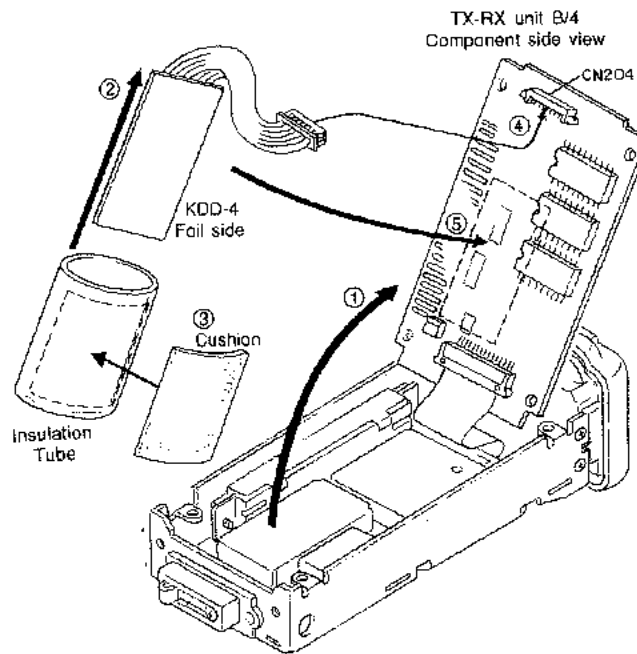


Fig. 7

2-1. Setting the KDD-4 Code (DTMF)

This product is built using surface mount construction techniques. The solder jumpers used to configure this product should be changed using equipment and techniques suitable for surface mount device repair. Abuse due to the use of inappropriate tools and techniques will VOID the warranty.

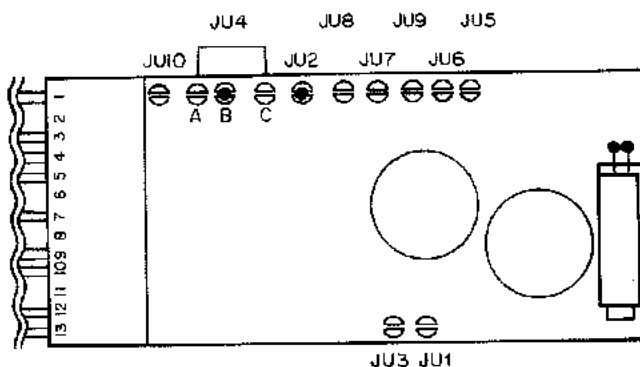


Fig. 8

MON/RESET >	ON-HOOK	OFF-HOOK	
JU2	Shorted	Open circuit	(-) supply

JU3	JU4	MUTE	UNMUTE
Shorted	B	Open circuit	Sinks to (-) supply
Open	A	Sources (+) supply	Open circuit
Shorted	A	Open circuit	Sources (+) supply
Open	C	HCMOS HI (5Vdc)	HCMOS LO (0Vdc)
Shorted	C	HCMOS LO (0Vdc)	HCMOS HI (5Vdc)

JU1	Shorted	DTMF input 10~280mVrms.
JU7	Open	All call disabled
	Shorted	All call enabled
JU8 & JU10	Shorted	[5] (ORG/BLK) is deadbeat disable
JU9	Shorted	J1 pin 2 secondary programming
	Open	J1 pin 2 secondary set input

Table 1 Jumper setup charts

DISASSEMBLY FOR REPAIR

1. Removing the Case, Front Panel, and Bottom Plate

See page 13 : Installing the DTMF key panel.

2. Disassembling the Front Panel (Fig. 1)

1. Remove the six screws (①) holding the PC board (J72-0208-02), then remove the front panel.

3. Removing the TX-RX unit (B/4) (Fig. 2)

1. Remove the four screws (①) holding TX-RX unit B/4, then remove the frame.
2. Remove the cable connectors (②) from CN202 and CN203.
3. Remove the cable (W1) from CN201. CN201 is located on the foil side of TX-RX unit B/4. Unlock CN201 and remove W1. To unlock it, pull the cap of CN201.

4. Removing the Top Panel (Fig. 2)

1. Remove the four screws (③) holding the top panel, then remove the frame.
2. Remove the solder fixing the lead connecting J2 on the component side of TX-RX unit A/4 and the antenna terminal (④).
3. Remove the solder connecting the ground pattern on the foil side of TX-RX unit A/4 and the top panel shield terminal (⑤).

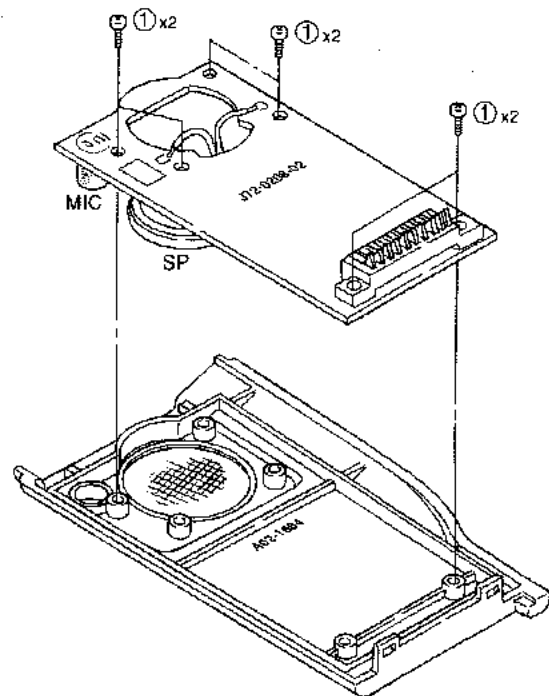


Fig. 1

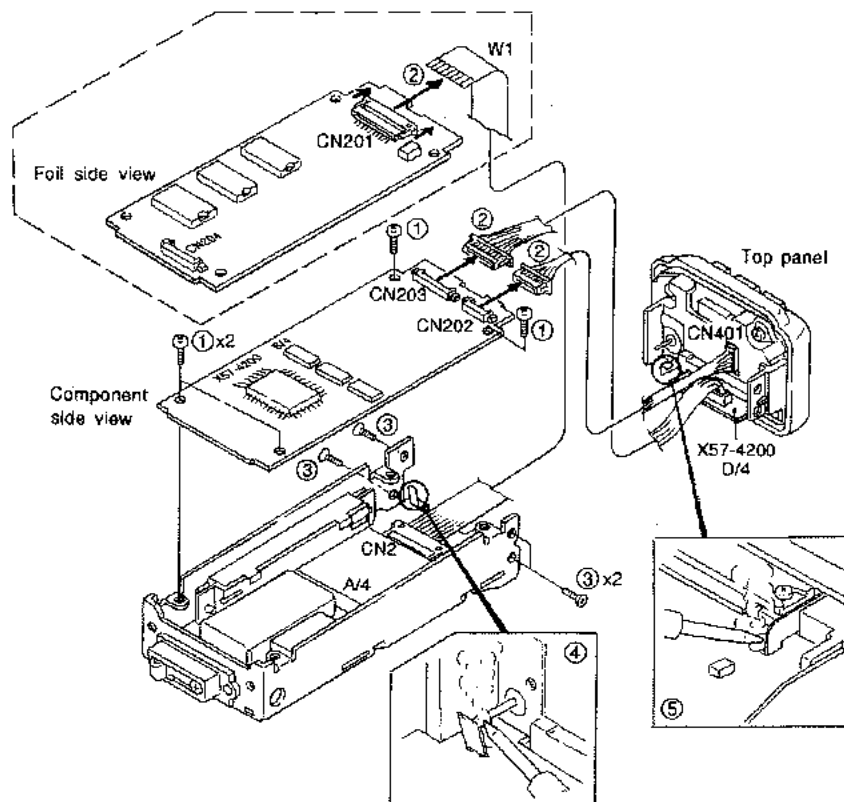


Fig. 2

DISASSEMBLY FOR REPAIR

5. Removing the TX-RX Unit A/4 (Fig. 3)

1. Remove the two screws (①) holding IC2, then remove the frame.
2. With a soldering iron, remove the solder fixing the TX-RX unit A/4 (foil side) and the frame. (Remove the solder marked with.)
3. With a soldering iron, remove the solder fixing the TP1 terminal of the TX-RX unit A/4 (component side) and the battery power terminal.

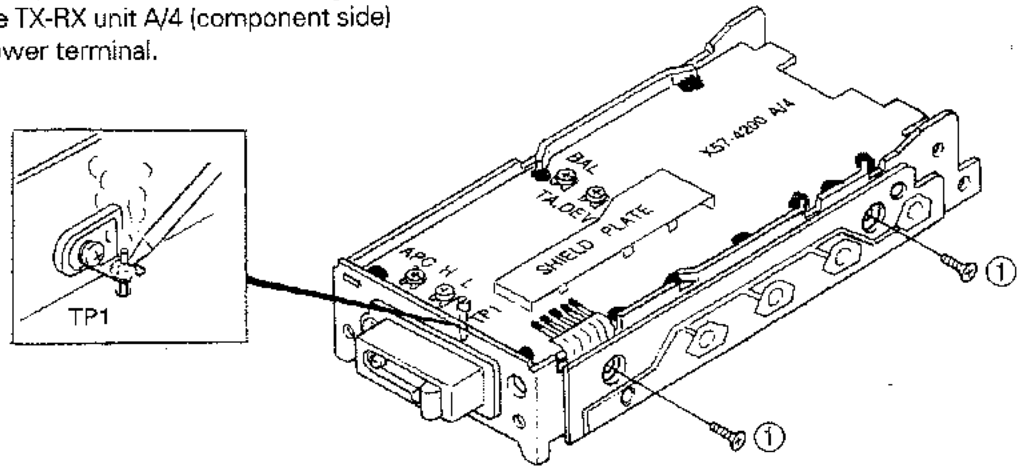


Fig. 3

6. Disassembling the Top Panel (Fig. 4)

1. Remove the four screws (①) holding the top panel, key top, and TX-RX unit C/4, then remove the subpanel.
2. Remove the two screws (②) holding TX-RX unit D/4 and spacer, then remove the subpanel.
3. Remove the two screws (③) holding the ANT receptacle, then remove the subpanel.

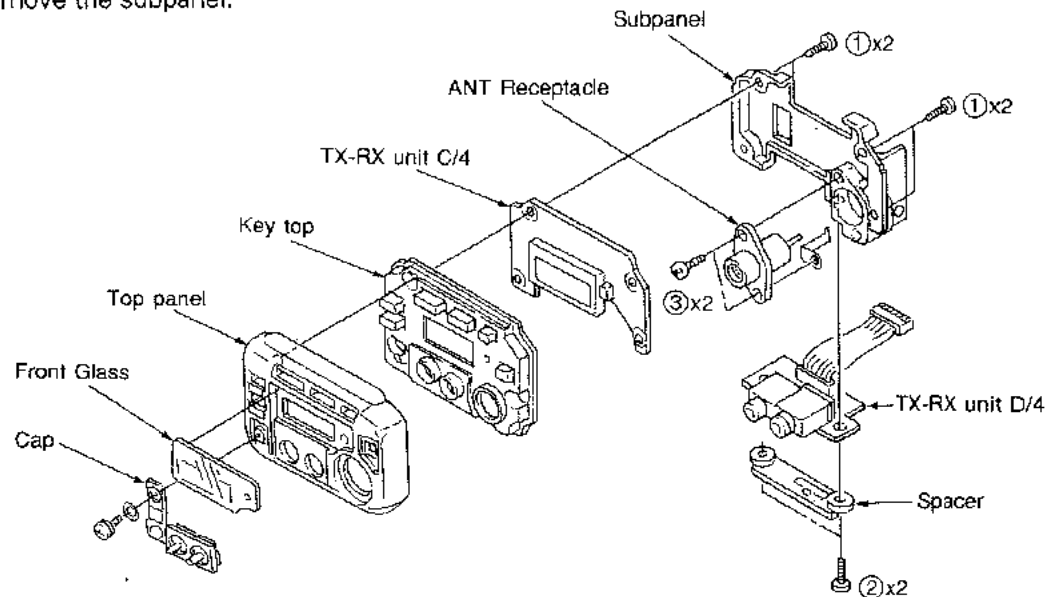
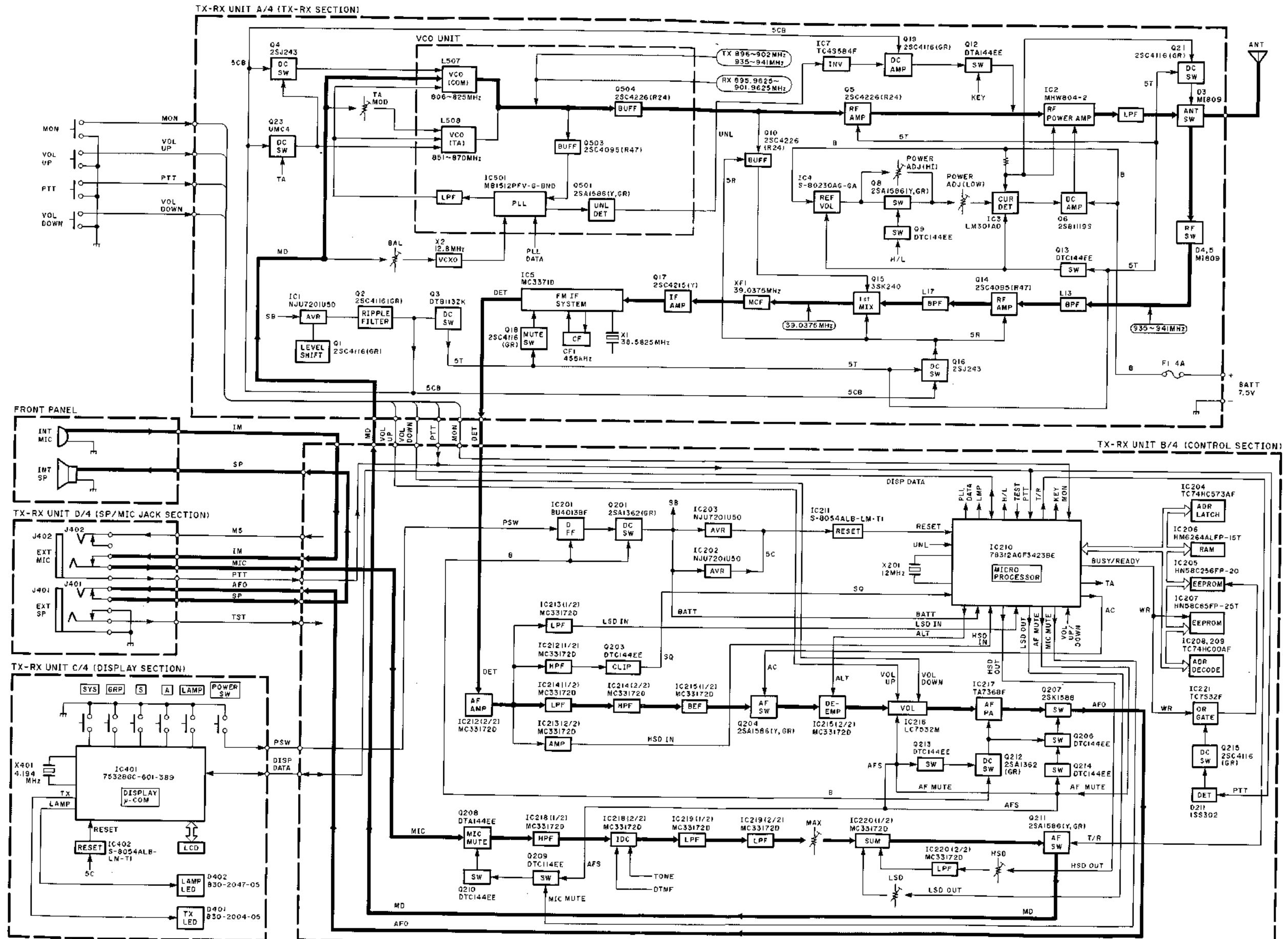


Fig. 4

TK-431 TK-431 BLOCK DIAGRAM



CIRCUIT DESCRIPTION

1. Overview

This transceiver is an 900-MHz-band EFJ LTR™ trunked-system-compatible FM portable transceiver that can be programmed to operate on both LTR and conventional systems.

2. Circuit Configuration by Frequency

The receiver is a double-conversion superhet with a first intermediate frequency (IF) of 39.0375MHz and a second IF of 455kHz. Incoming signals from the antenna are mixed with the local signal from the PLL to produce the first IF of 39.0375 MHz.

This is then mixed with the 38.5825MHz second local oscillator output to produce the 455Hz second IF. This is detected to give the demodulated signal.

The transmit signal frequency is generated by the PLL VCO, and modulated by the signal from the microphone. It is then amplified and sent to the antenna.

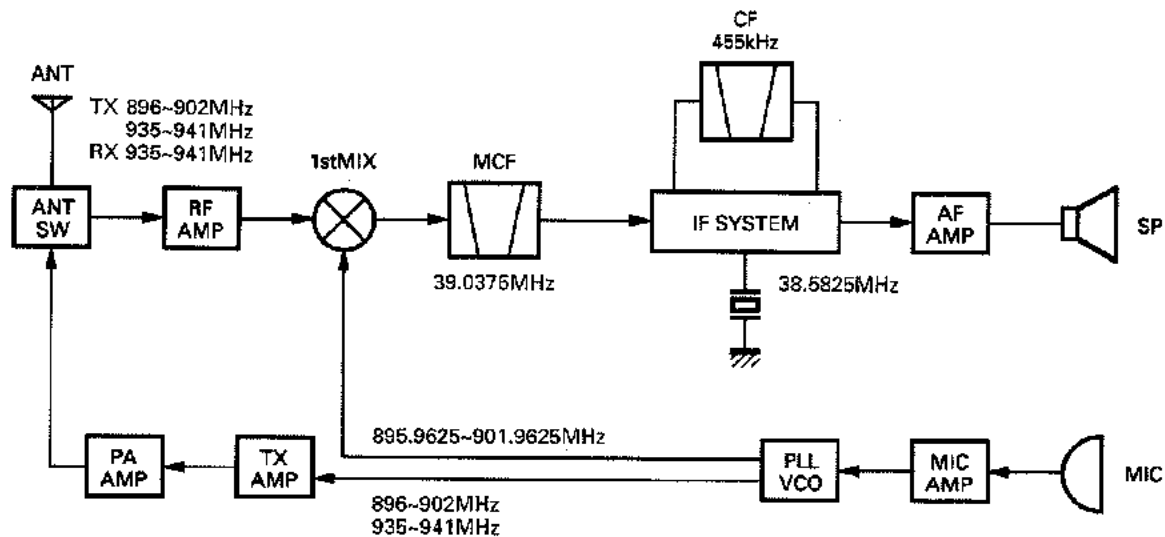


Fig. 1 Frequency configuration

3. Receiving System

3-1. RF unit

An incoming RF signal from the antenna terminal passes through the antenna switch (D3, D4, and D5 are off) and then the bandpass filter (L13). The signal is amplified by RF amplifier Q14, and passes through the bandpass filter (L17) again. The resulting signal goes to the first mixer (Q15), where it is mixed with the first local oscillator signal output from the frequency synthesizer to produce the first IF (39.0375MHz).

3-2. IF unit

The first IF signal then passes through a four-pole monolithic crystal filter (XF1). The signal is amplified by first IF amplifier Q17 and goes to the second IF unit.

The second IF unit consists of an IF system IC (IC5) and the second mixer, second local oscillator, second IF filter, and FM detector. IC5 mixes the signal input to it with the 38.5825MHz second local oscillator output of the crystal oscillator (X1) to produce the second IF of 455kHz.

The 455kHz signal then goes through 455kHz ceramic filter CF1, is amplified by the limiting amplifier, demodulated by the quadrature FM detector (in the same IC), and output to the receive audio amplifier.

CIRCUIT DESCRIPTION

3-3. Audio amplifier unit

The demodulated signal is amplified by IC212 (2/2), and goes through a low-pass filter consisting of IC214 (1/2), a high-pass filter consisting of IC214 (2/2), and a BEF consisting of IC215 (1/2) to remove the audio signal.

The signal then goes through a AF switch (Q204 : ON), the deemphasis circuit consisting of IC215 (2/2), and an electronic volume control circuit consisting of IC216, the on to audio power amplifier IC217, where it is amplified and output to the speaker.

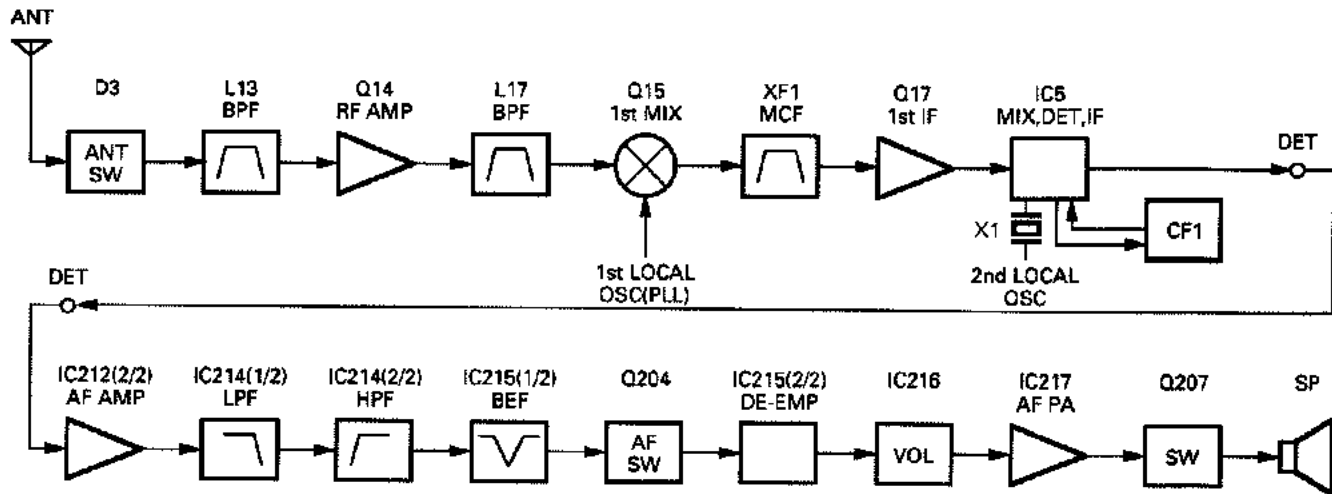


Fig. 2 Receiving system

3-4. Squelch circuit

The receive detector output is amplified by IC212 (2/2), then passes through a high-pass filter consisting of IC212 (1/2) to remove the noise component from the signal. It passes through Q203, and the noise pulse signal is sent to pin 20 of the CPU (IC210).

The CPU counts the pulse signals and performs digital integration. It reads the voltage across the preset squelch semi-fixed resistor (VR201) via pin 29, compares the voltage with the integration value, and turns the squelch on and off accordingly.

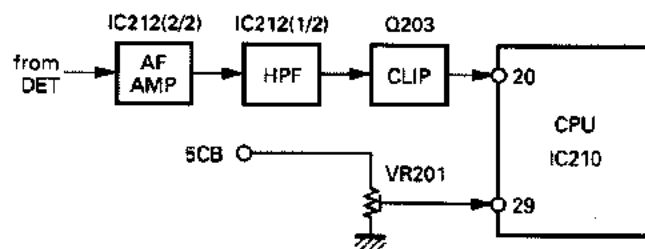


Fig. 3 Squelch

CIRCUIT DESCRIPTION

4. Transmitter System

4-1. Microphone amplifier

The signal from the microphone goes through the microphone mute switch (Q208 : ON). It passes through the high-pass filter in IC218 (1/2) and the preemphasis/IDC circuit in IC218 (2/2). (The output is mixed with the encode signal if an option is installed.)

The signal then passes through the four-stage low-pass filter consisting of IC219 (1/2, 2/2), and unwanted harmonics are removed.

The signal passes through the MAX DEV adjustment VR (VR202), and enters the summing amplifier consisting of IC220 (1/2), and is mixed with the low speed data from the CPU (IC210).

The output signal from the summing amplifier passes through the AF switch (Q211 : ON), and goes to the VCO and VCXO modulation input.

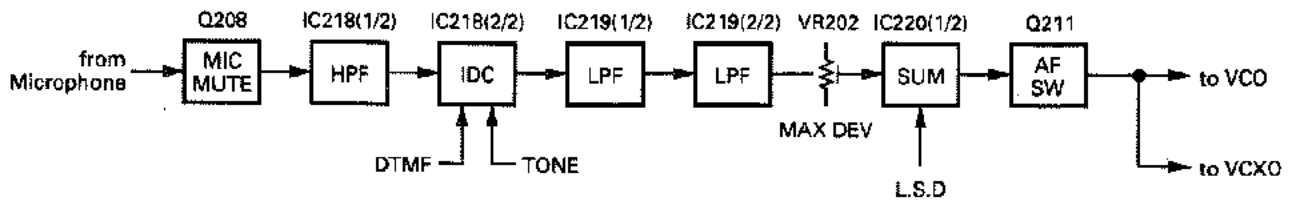


Fig. 4 Microphone amplification

4-2. Final amplifier

The signal from the PLL (Q5 : RF amplifier output) passes through the 3dB attenuator and is amplified by the RF power amplifier (IC2) to 2.5W (1W when the power is low). It then goes through the harmonic filter (LPF) and antenna switch (D3 : ON), and on to the antenna terminal.

4-3. APC circuit

The current flowing through the RF power amplifier (IC2) is always monitored by detecting the voltage drop at resistor R37. This voltage is applied to pin 2 (non-reverse pin) of IC3.

The reference voltage from IC4 is applied to pin 3 of IC3. The power is amplified according to the difference with the reference voltage and so the DC amplifier (Q6) is controlled to keep the transmission power current and the transmission output constant. Q8 is normally off, and turns on when lower power mode is selected.

This switches the reference voltage (IC4, pin 3) and power high/low (2.5W/1W). The power level can be adjusted by VR2 (high power) or VR3 (low power).

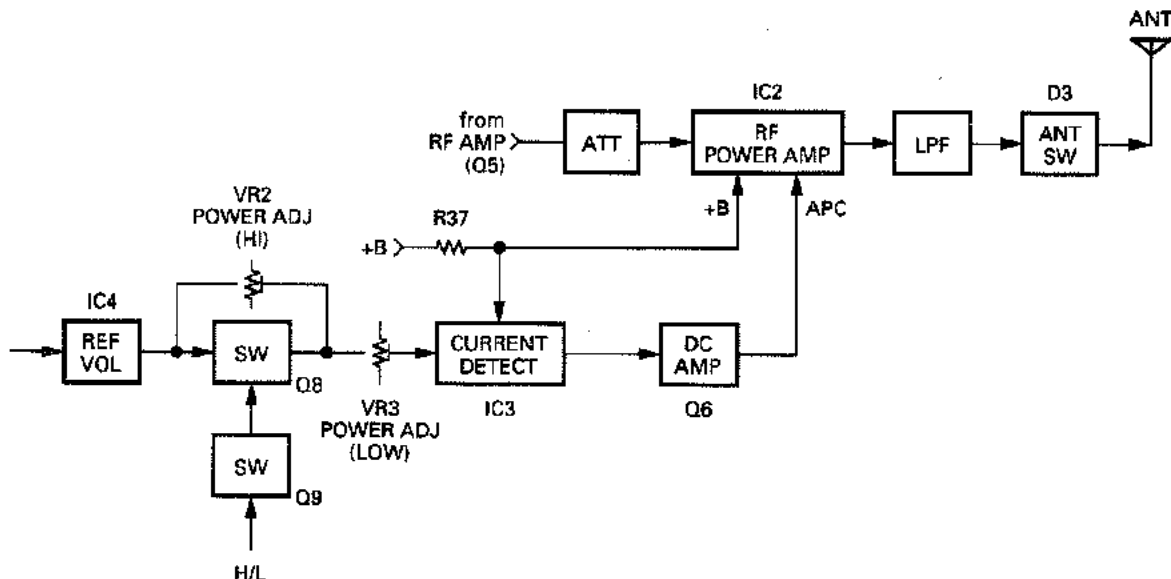


Fig. 5 Transmit power circuit and APC circuit

CIRCUIT DESCRIPTION

5. Frequency Synthesizer Unit

5-1. PLL

The frequency synthesizer consists of a VCXO (X2), a VCO (L507, L508), a PLL circuit, and peripheral circuits.

The VCXO generates 12.8MHz. The frequency stability is within 2.5ppm within the temperature range of -30 to +60°C. This output enters the PLL IC (IC501), and is divided by 1024 to produce a 12.5kHz reference signal.

The VCO output passes through the buffer amplifier (Q503) and is sent to the PLL IC. The phase of this signal is compared with the 12.5kHz reference signal in the IC. The output from the phase comparator goes through the charge pump and is directed to the external low-pass filter.

The signal is applied to the VCO F. C. terminal and is locked to keep the VCO frequency constant.

The other VCO output passes through the buffer amplifier (Q504), is amplified by Q5 in transmit mode and by Q10 in receive mode, and is output to the transmit circuit or receive circuit.

There are two VCOs. L508 operates only if talk-around (TA) mode is selected in transmit mode. Otherwise, L507 operates. The VCO oscillation frequencies are as follows:

L507 : 896 to 902MHz

L508 : 935 to 941MHz

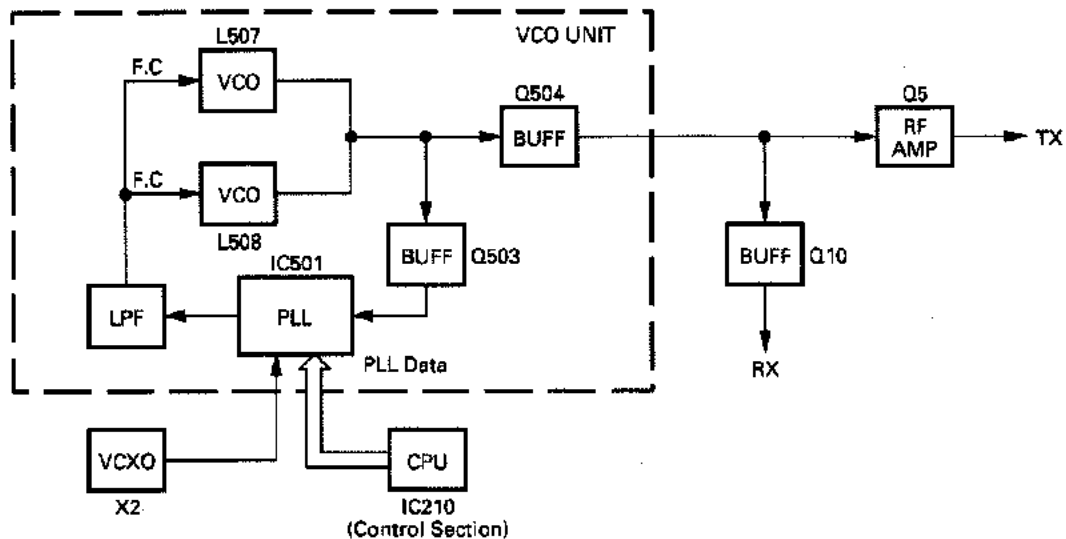


Fig. 6 PLL unit block diagram

5-2. PLL unlock

When the PLL is unlocked, the lock detect signal (LD) of the PLL IC (IC501) is converted to a DC signal by Q501 and IC7. This signal turns Q19 off, and cuts off the V control (3.7V) of the TX power amplifier (IC2), stopping unnecessary transmission.

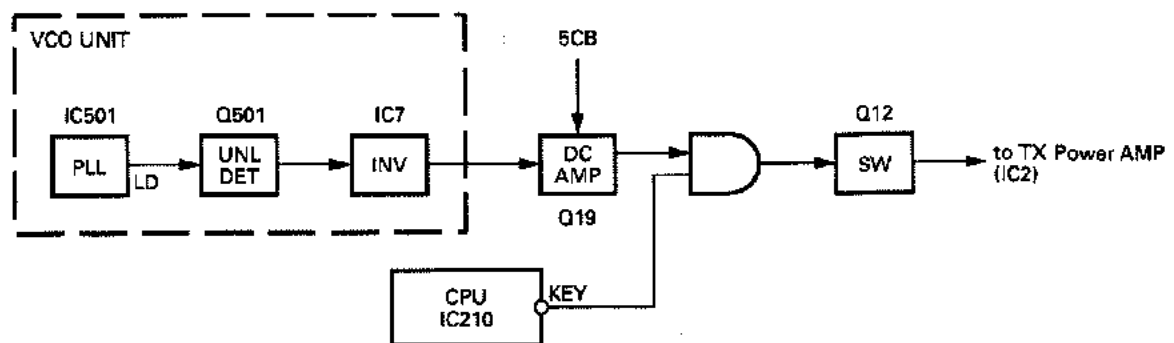


Fig. 7 PLL unlock circuit

CIRCUIT DESCRIPTION

6. Control unit

The control unit consists of microprocessor IC210 and its peripheral circuits. It controls the TX-RX unit and transfers data to and from the display section. The CPU (IC210) mainly performs the following:

- 1) Switching between transmission and reception by PTT signal input.
- 2) Reading system, group, frequency, and program data from the memory circuit.
- 3) Sending frequency program data to the PLL.
- 4) Controlling squelch on/off by the pulse signal input from the squelch circuit.
- 5) Controlling the audio mute circuit by decode data input.
- 6) Transmitting tone and encode data.

6-1. Memory circuit

IC205 is an EEPROM with a capacity of 32K x 8 bits that contains the transceiver control program for the CPU.

This program can be easily written from an external device. Data, such as transceiver channels and operating features, are programmed into the EEPROM consisting of IC207. IC206 is a static RAM used as a data buffer.

6-2. TX encode data

The CPU (IC210) transmits the encode data selected by the program.

• Low-speed data (QT, DQT, LTR)

Low-speed data is output from pin 33 of the CPU. The signal passes through a low-pass CR filter, and goes to the summing amplifier (IC220 (1/2)) of the microphone amplifier. The signal is mixed with the audio signal and goes to the VCO and VCXO modulation input. The modulation level of the low-speed data can be adjusted to an appropriate value with potentiometer VR203.

• High-speed data

High-speed data is output from pin 4 of the CPU. The signal passes through a low-pass filter consisting of IC220 (2/2) in the microphone amplifier, and goes to the VCO and VCXO modulation input. The audio signal is muted, and only high-speed data is transmitted. The modulation level of the high-speed data can be adjusted to an appropriate value with potentiometer VR204.

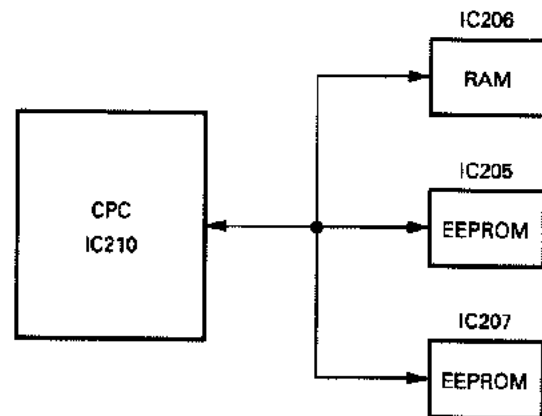


Fig. 8 Memory circuit

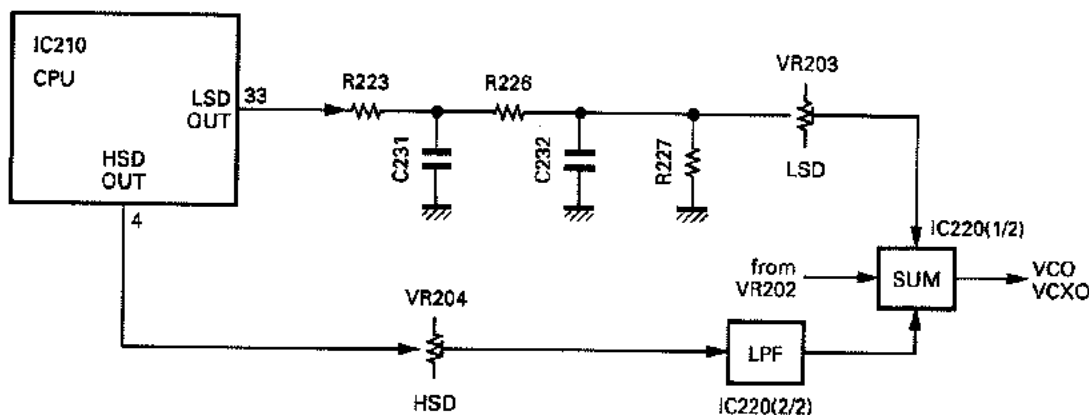


Fig. 9 TX encode data circuit

CIRCUIT DESCRIPTION

6-3. RX decode data

• Low-speed data (QT, DQT, LTR)

The receive detection signal is amplified by IC212 (2/2), and passes through a low-pass filter IC213 (1/2) to remove audio components. This signal is input to pin 27 of the CPU.

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

• High-speed data

The receive detection signal is amplified by IC212 (2/2), and goes to IC213 (2/2) (amplifier). This signal is input to pin 13 of the CPU. The CPU reads and decodes the input signal.

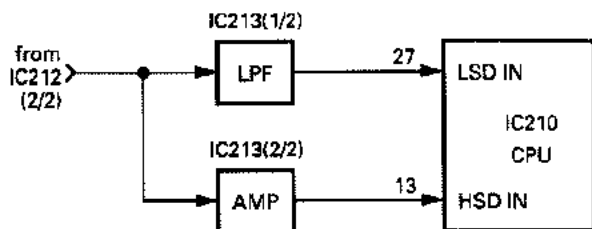


Fig. 10 RX decode data block diagram

6-4. PLL data output

PLL data is output from DATA (pin 62), ENABLE (pin 63), and CLOCK (pin 64) of the CPU (IC210). The signals are input to the PLL IC (IC501) when the channel is changed or when transmission is changed to reception and vice versa.

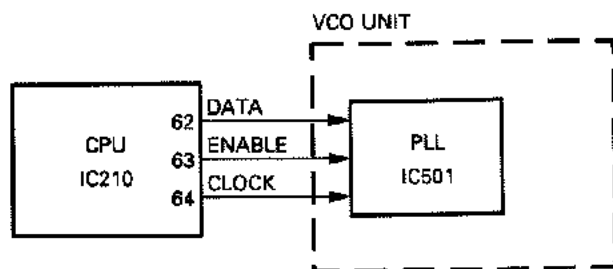


Fig. 11 PLL data output block diagram

6-5. Tone generator

The beeps and alert tones are generated by combining square wave signals of about 700Hz, 900Hz, and 1500Hz generated by the CPU. These signals are output from pins 34, 35, and 36 of the CPU (IC210). The signals are rectified by a CR network and fed to the deemphasis circuit of IC215 (2/2).

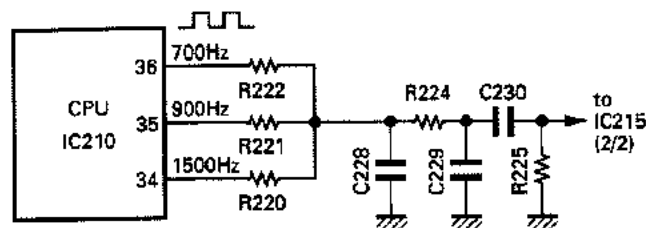


Fig. 12 Tone generator circuit

6-6. Power switch circuit

The power switch consists of a D-type flip-flop (IC201), DC switch (Q201), and its peripheral circuits. When the power key on the display section is pressed, the PSW goes low, and enters IC201. Q201 turns on and power is supplied (SB). This circuit toggles the momentary-type power switch.

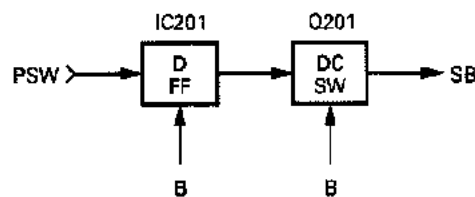


Fig. 13 Power switch block diagram

6-7. Display circuit

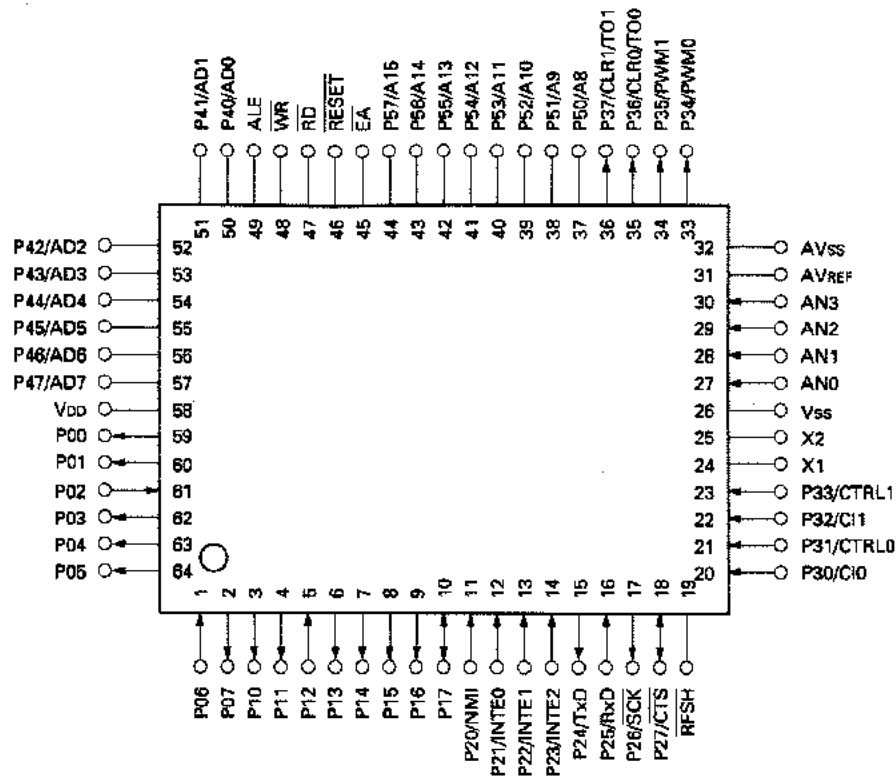
The display circuit consists of the CPU, LCD, and peripheral circuits. The CPU (IC401) mainly controls the following functions:

- 1) Transmitting the on/off serial data signal from the system switch, group switch, lamp switch, SCAN switch, and A (AUX) switch to the control unit
- 2) Receiving the serial data signal from the control unit and displaying the data on the LCD. The LCD contains the 13-segment display (system, group), and BUSY, CALL, SCAN, and AUX indicators. Controls the LEDs (TX, LAMP).

SEMICONDUCTOR DATA

Microprocessor : 78312AGF3423BE (TX-RX UNIT IC210)

• Terminal connection diagram



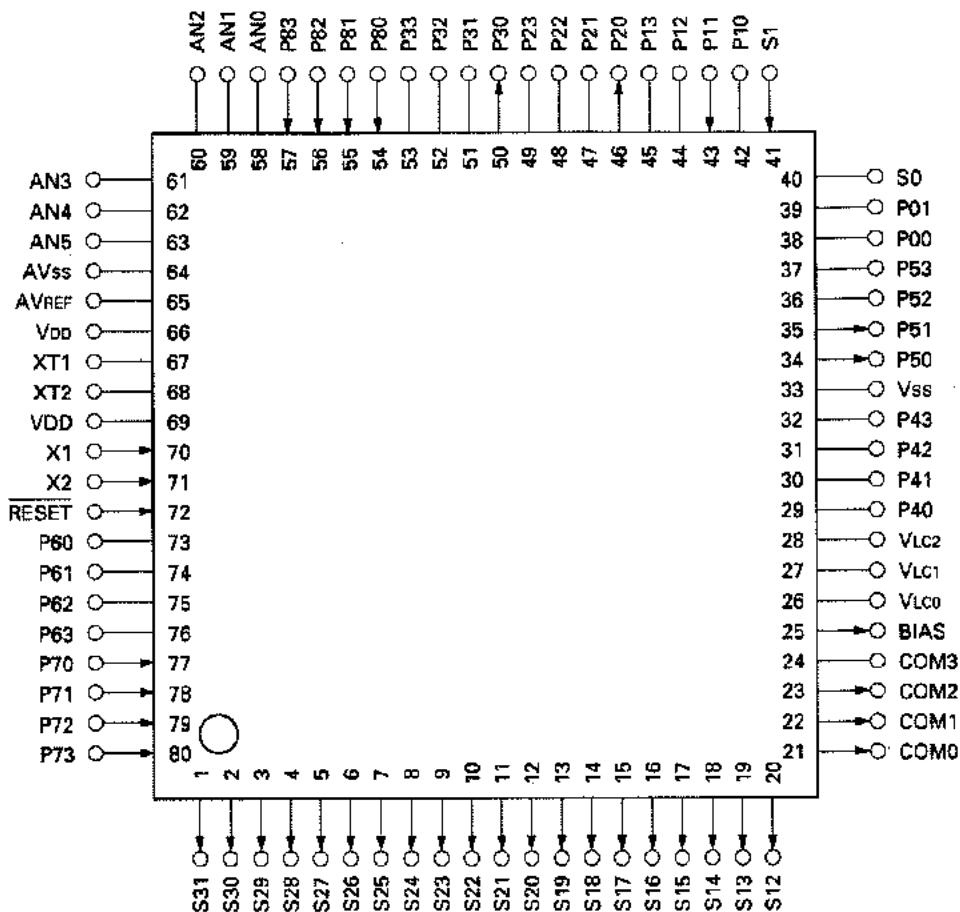
• Terminal function

Pin No.	Pin Name	I/O	Function	Pin No.	Pin Name	I/O	Function
1	P06	I	Power switch input.	26	Vss	-	GND.
2	P07	O	Audio amp mute (When transmit).	27	AN0	I	Low speed data input.
3	P10	O	Mic mute (When receive/rink).	28	AN1	I	800/900MHz band switch input.
4	P11	O	High speed encode data output.	29	AN2	I	SQ reference input.
5	P12	I	EEPROM busy.	30	AN3	I	BATT check input.
6	P13	O	Talk-around (Active 'H').	31	AVREF	-	+5V.
7	P14	O	T/R (Transmit : active 'L').	32	AVss	-	GND.
8	P15	O	Data output with clone.	33	P34/PWM0	O	Low speed data (signaling) output.
9	P16	O	KEY (Transmit : active 'L').	34	P35/PWM1	O	1500Hz BEEP output.
10	P17	I/O	Data output with programming.	35	P36/CLR0/TO0	O	900Hz BEEP output.
11	P20/NMI	I	GND.	36	P37/CLR1/TO1	O	700Hz BEEP output.
12	P21/INTE0	I	For display serial (RX) data input.	37-44	P50/A8-P57/A15	-	A8-A15 address bus.
13	P22/INTE1	I	HS data clock recovery input.	45	EA	-	External access.
14	P23/INTE2	I	PTT/program RXD.	46	RESET	-	Power on reset.
15	P24/TXD	O	Serial TX data (TXD) output.	47	/RD	-	Read [bus].
16	P25/RXD	I	Serial RX data (RXD) input.	48	/WR	-	Writ [bus].
17	P26/SCK	O	Request to send (RTS) data output.	49	/ALE	-	Address latch.
18	P27/CTS	I/O	Clear to send (CTS)/Lmp ('L' → on).	50-57	P40/AD0-P47/AD7	-	AD0-AD7 address/data bus.
19	RFSH	O	For engineer check (not use).	58	VDD	-	+5V.
20	P30/CIO	I	Noise pulse input.	59	P00	O	AC (BEEP output is mute when transmit).
21	P31/CTRL0	I	MONI switch input.	60	P01	O	For display serial (TX) data output.
22	P32/C11	I	Unlock signal input.	61	P02	I	EXT signaling control (Active 'H').
23	P33/CTRL1	I	Volume control input.	62	P03	O	PLL enable output.
24	X1	-	12.000MHz (system clock).	63	P04	O	PLL data output.
25	X2	-	12.000MHz (system clock).	64	P05	O	PLL clock output.

SEMICONDUCTOR DATA

Microprocessor : 75328GC-601-3B9 (TX-RX UNIT IC401)

• Terminal connection diagram



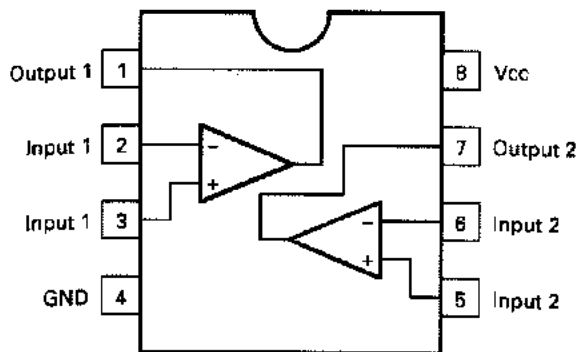
• Terminal function

Pin No.	Pin Name	I/O	Function	Pin No.	Pin Name	I/O	Function
1-20	S31-S12	O	LCD output (S0-S19).	47-49	P21-P23	-	Open (not use).
21	COM0	O	LCD COM2 output.	50	P30	O	LAMP LED output.
22	COM1	O	LCD COM1 output.	51-53	P31-P33	-	Open (not use).
23	COM2	O	LCD COM0 output.	54	P80	I	SYS SW input.
24	COM3	-	Open (not use).	55	P81	I	LAMP SW input.
25	BIAS	O	LCD power supply voltage.	56	P82	I	S SW input.
26-28	VCL0-VCL2	-	LCD voltage level generator.	57	P83	I	A SW input.
29-32	P40-P43	-	Open (not use).	58-60	AN0-AN2	-	+5V.
33	VSS	-	GND.	61-63	AN3-AN5	-	GND.
34, 35	P50, P51	O	TX LED output.	64	AVSS	-	GND.
36, 37	P52, P53	-	Open (not use).	65	AVREF	-	+5V.
38	P00	-	+5V.	66	VDD	-	+5V.
39	P01	-	Open (not use).	67	XT1	-	+5V.
40	S0	-	Open (not use).	68	XT2	-	Open (not use).
41	S1	I	Serial (TX) data input.	69	VDD	-	+5V.
42	P10	-	Open (not use).	70, 71	X1, X2	I	System clock input.
43	P11	I	Serial (TX) data input.	72	RESET	I	System reset input.
44, 45	P12, P13	-	Open (not use).	73-76	P60-P63	-	Open (not use).
46	P20	O	Serial (RX) data output.	77-80	P70-P73	I	GRP SW input.

SEMICONDUCTOR DATA

Amplifiers : MC33172D (TX-RX UNIT IC212~215, IC218~IC220)

• Terminal connection diagram



• Maximum ratings

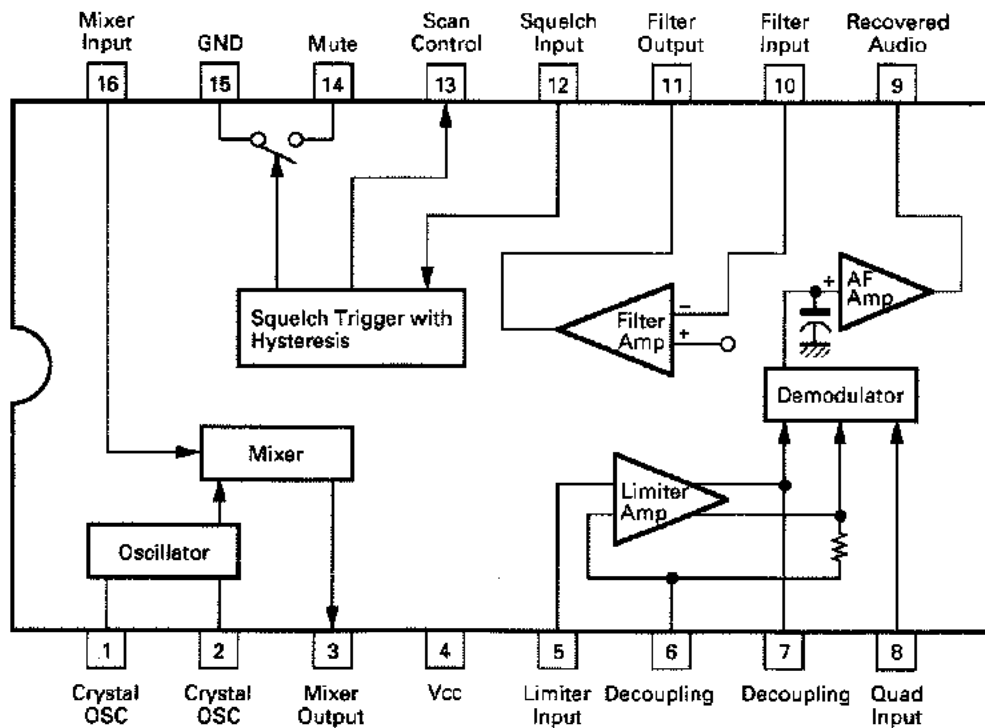
Item	Symbol	Rating	Unit
Supply voltage	V _{CC} /V _{EE}	±22	V
Input differential voltage range	V _{IDR}	(Note 1)	V
Input voltage range	V _{IR}	(Note 1)	V
Output short circuit duration (Note 2)	T _S	Indefinite	Seconds
Operating ambient temperature range	T _A	-40~+125	°C
Operating junction temperature	T _J	+150	°C
Storage temperature range	T _{STG}		°C
Ceramic package		-65~+150	
Plastic package		-55~+125	

Notes :

1. Either or both input voltages must not exceed the magnitude of V_{CC} or V_{EE}.
2. Power dissipation must be considered to ensure maximum junction temperature (T_J) is not exceeded.

IF System : MC3371D (TX-RX UNIT IC5)

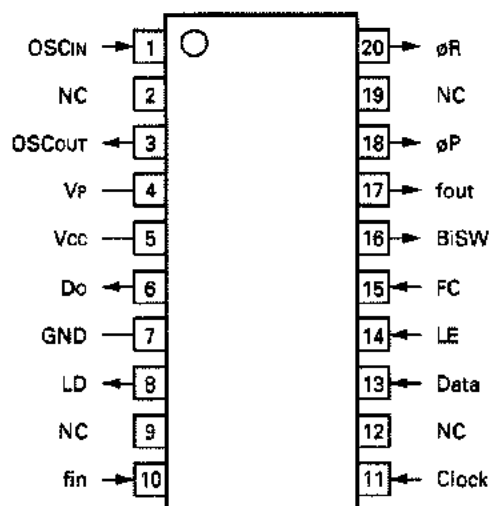
• Terminal connection diagram



SEMICONDUCTOR DATA

PLL IC : MB1512PFV-G-BND (VCO UNIT IC501)

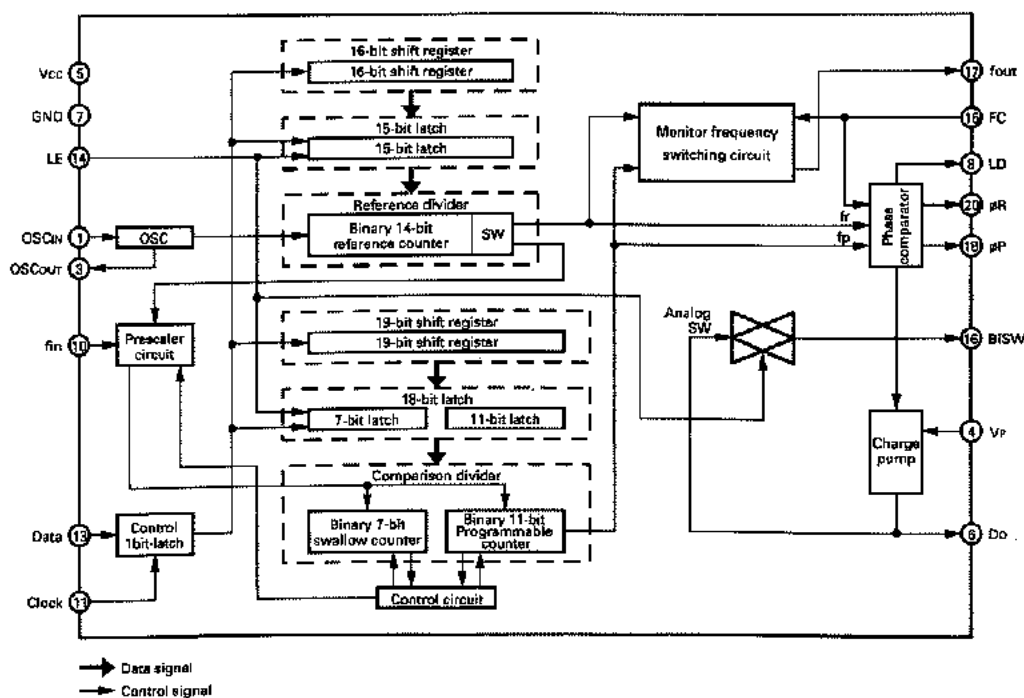
• Terminal connection diagram



• Terminal function

Pin No.	Pin Name	I/O	Function
1	OSCIN	I	Terminal for crystal connection.
3	OSCOUT	O	(OSCIN = Oscillator circuit input terminal, OSCOUT = Oscillator circuit output terminal)
4	Vp	-	Power supply terminal for charge pump output, and analog switch output.
5	Vcc	-	Power supply terminal.
6	Do	O	Charge pump output terminal. Phase characteristics are inverted according to the setting of the FC terminal.
7	GND	-	Ground terminal.
8	LD	O	Phase detector output terminal. Normally high. Low for the period of about the phase difference between fr and fp.
10	fin	I	Prescaler input terminal. Input with AC coupling.
11	Clock	I	Clock input terminal for 19-bit and 16-bit shift register. Read data during rise of clock pulse.
13	Data	I	Serial data input terminal in binary code. When high, send data to 15-bit latch. When low, send data to 18-bit latch.
14	LE	I	Load enable signal input terminal. When high, send contents of shift register to latch (includes pull up resistor).
15	FC	I	Phase switch terminal of phase detector. When low, the charge pump and phase detector characteristics invert (includes pull up resistor).
16	BiSW	O	Analog switch output terminal. Normally high. Charge pump output when analog switch is on (LE : "H").
17	fout	O	Monitor terminal of phase detector input. fr output when FC is "H", fp output when FC is "L".
18	øP	O	Phase detector output terminal for external charge pump.
20	øR	O	Phase characteristics are inverted according to the setting of the FC terminal.

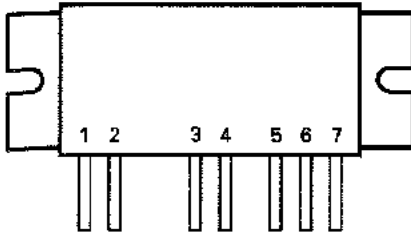
• Block diagram



SEMICONDUCTOR DATA

TX Power Amplifier : MHW804-2 (TX-RX UNIT IC2)

• Terminal connection diagram



- 1 : RF input 5 : +DC (Control)
 2 : +DC (Control) 6 : +DC (Supply)
 3 : +DC (Supply) 7 : RF output
 4 : +DC (Supply)

• Maximum ratings

Flange temperature = 25°C

Item	Symbol	Rating	Unit
DC supply voltage	Vs	10	Vdc
RF input power	Pin	5.0	mW
RF output power	Pout	6.0	W
Storage temperature range	Tstg	-30 to +100	°C
Operating case temperature range	Tc	-30 to +100	°C
Frequency range		896 to 940	MHz

MCF : L71-0430-05 (TX-RX UNIT XF1)

Item	Rating
Nominal center frequency	39.0375MHz
Pass bandwidth	±3.75kHz or more at 3dB
Attenuation bandwidth	±20kHz or less at 45dB
Ripple	1.5dB or less
Insertion loss	4dB or less
Guaranteed attenuation	65dB or more within ±(350kHz~1MHz)
Terminal impedance	560Ω ± 10% / 3pF ± 10%

DESCRIPTION OF COMPONENTS

TX-RX UNIT (X57-4200-11) (A/4) : TX-RX Section

Ref. No.	Parts No.	Use/Function	Operation/Condition
IC1	NJU7201U50	Voltage regulator	5V
IC2	MHW804-2	TX power amplifier	
IC3	LM301AD	DC amplifier	APC
IC4	S-80230AG-GA	Voltage regulator	-3V (APC reference voltage)
IC5	MC3371D	IF system	
IC7	TC4S584F	Schmitt inverter	
Q1	2SC4116(GR)	Level shift	
Q2	2SC4116(GR)	Ripple filter	5CB
Q3	DTB113ZK	DC switch	5T
Q4	2SJ243	DC switch	V1, V2
Q5	2SC4226(R24)	RF amplifier	
Q6	2SB1119S	DC amplifier	APC
Q8	2SA1586(Y,GR)	DC switch	
Q9	DTC144EE	DC switch	
Q10	2SC4226(R24)	Buffer amplifier	
Q12	DTA144EE	DC switch	
Q13	DTC144EE	DC switch	
Q14	2SC4095(R47)	RF amplifier	
Q15	3SK240	Mixer	
Q16	2SJ243	DC switch	5R
Q17	2SC4215(Y)	IF amplifier	
Q18	2SC4116(GR)	Mute switch	
Q19	2SC4116(GR)	DC amplifier	
Q21	2SC4116(GR)	Current steering	
Q23	UMC4	DC switch	
D1	D1F10	Protection	Reverse polarity protection
D3-5	M1809	RF switch	

TX-RX UNIT (X57-4200-11) (B/4) : Control section

Ref. No.	Parts No.	Use/Function	Operation/Condition
IC201	BU4013BF	D-type flip flop	
IC202,203	NJU7201U50	Voltage regulator	5V
IC204	TC74HC573AF	Octal D-type latch	
IC205	HN58C256FP-20	EEPROM	
IC206	HM6264ALFP-15T	Static RAM	
IC207	HN58C65FP-25T	EEPROM	
IC208,209	TC74HC00AF	Quad 2-input nand gate	
IC210	78312AGF3423BE	Microprocessor	
IC211	S-8054ALB-LM-T1	Precision references	
IC212	MC33172D	Audio amplifier	
IC213~215	MC33172D	Active filter	
IC216	LC7532M	Electronic attenuator	
IC217	TA7368F	Audio power amplifier	
IC218	MC33172D	Microphone amplifier, Limiter	
IC219,220	MC33172D	Active filter	
IC221	TC7S32F	2-input or gate	
Q201	2SA1362(GR)	DC switch	SB
Q203	DTC144EE	Noise amplifier	
Q204	2SA1586(Y,GR)	Audio mute switch	
Q206	DTC144EE	DC switch	
Q207	2SK1588	Audio mute switch	

DESCRIPTION OF COMPONENTS

Ref. No.	Parts No.	Use/Function	Operation/Condition
Q208	DTA144EE	Audio mute switch	
Q209	DTC114EE	DC switch	
Q210	DTC144EE	DC switch	
Q211	2SA1586(Y,GR)	Audio mute switch	
Q212	2SA1362(GR)	DC switch	
Q213,214	DTC144EE	DC switch	
Q215	2SC4116(GR)	DC switch	
D201	1SS302	Voltage clamp	BATT
D202	1SS302	Voltage clamp	TEST
D203	1SS302	Voltage clamp	PTT
D204	1SS300	Current steering	
D205-209	1SS301	Current steering	
D210	1SS300	Current steering	
D211	1SS302	Detector	

TX-RX UNIT (X57-4200-11) (C/4) : Display section

Ref. No.	Parts No.	Use/Function	Operation/Condition
IC401	75328GC-601-3B9	Microprocessor	
IC402	S-8054ALB-LM-T1	Precision reference	
D401	B30-2004-05	LED	Red
D402	B30-2047-05	LED	Yellow

VCO (X58-4000-11)

Ref. No.	Parts No.	Use/Function	Operation/Condition
IC501	MB1512PFV-G-BND	PLL system	
Q501	2SA1588(T,GR)	DC amplifier	
Q503	2SC4095(R47)	Buffer amplifier	
Q504	2SC4226(R24)	Buffer amplifier	
D501	1SS300		

SIGNALLING UNIT (X52-3260-20) : Option (KDM-6)

Ref. No.	Parts No.	Use/Function	Operation/Condition
IC1	TC4S584F	Schmitt inverter	
IC2	TC7S00F	Nand gate	
IC3	LR40872	Tone dialer	
Q1	2SA1162(Y)	DC switch	
Q2	2SC2712(GR)	DC switch	
Q3	2SA1162(Y)	DC switch	
Q4	2SC2712(GR)	DC switch	
D1-12	B30-2050-05	LED	Yellow
D13	DAP202K	Current steering	

PARTS LIST

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TK-431

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名/規格	Desti- nation 仕向	Re- marks 備考
TK-431						
1	2A	*	A02-1682-14	CASE ASSY(FRONT)		
-	-	*	A02-1683-04	CASE(FRONT)		
3	3B	*	A02-1685-11	CASE(REAR)		
4	1B	*	A13-0700-03	FRAME		
5	2A	*	A22-0783-13	SUB PANEL		
6	3B	*	A40-0635-13	BOTTOM PLATE		
7	2A	*	A62-0194-04	PANEL(TOP)		
9	3B	*	B01-0678-03	PANEL ESCUTCHEON(PTT)		
10	2A	*	B09-0332-03	CAP		
11	2A	*	B10-1185-04	FRONT GLASS		
12	3B	*	B42-2437-04	S/NO LABEL(RADIO)		
16	1D	*	B46-0409-30	WARRANTY CARD		
17	1D	*	B62-0285-00	INSTRUCTION MANUAL		
18	3B	*	B72-0472-04	MODEL NAME PLATE		
20	2A	*	E04-0185-05	RF COAXIAL CABLE RECEPTACLE		
21	1B, 3B	*	E23-0474-14	TERMINAL(-)		
22	1B	*	E23-0914-04	TERMINAL(+)		
23	2A	*	E23-0915-04	TERMINAL(ANT-GND)		
-	-	*	E37-0301-05	CONNECTING WIRE(SP)		
25	3A	*	E37-0302-05	FINISHED WIRE(SP)		
26	2B	*	E37-0303-05	FPC(TX-RX B/4)		
27	2B	*	E37-0308-05	CONNECTING WIRE(9P)		
28	3A	*	E40-5582-05	PIN ASSY(12P)		
30	1A	*	F10-2047-04	SHIELDING PLATE(MODULE)		
31	2B	*	F10-2058-03	SHIELDING PLATE(MIXER)		
33	3B	*	G01-0867-04	LEAF SPRING		
34	3A	*	G10-0731-04	SHEET(MIC)		
35	1B, 3B	*	G11-0617-04	CUSHION		
36	3A	*	G11-0682-04	SHEET(REAR CASE)		
37	2B	*	G53-0741-04	PACKING(FRONT/REAR CASE)		
38	1B	*	G53-0742-04	PACKING(HOLDER)		
40	3D	*	H10-2760-02	POLYSTYRENE FOAMED FIXTURE		
41	2D	*	H11-0874-04	POLYSTYRENE PLATE(BATT.SPACER)		
42	1D	*	H11-0875-04	POLYSTYRENE PLATE		
43	1C	*	H13-0895-04	PROTECTION BOARD		
44	2D	*	H21-0745-04	PROTECTION SHEET		
45	2D	*	H25-0085-04	PROTECTION BAG		
46	3C	*	H52-0329-04	ITEM CARTON BOX		
48	1C	*	J11-0427-14	CLAMPER(ACS)		
49	1B	*	J19-1525-04	HOLDER (TERMINAL +)		
50	1A	*	J21-4401-04	MOUNTING HARDWARE(MODULE)		
51	3B	*	J21-4403-04	MOUNTING HARDWARE(PTT)		
52	3A	*	J21-4411-04	MOUNTING HARDWARE(REAR CASE)		
53	2C	*	J29-0424-04	BELT HOOK(ACS)		
54	3A	*	J39-0434-04	SPACER(MIC)		
55	2A	*	J39-0456-04	SPACER		
56	3A	*	J69-0329-05	STRING(SP)		
57	3B	*	J69-0330-05	STRING(BOTTOM PLATE)		
58	3A	*	J72-0208-02	P.C(FRONT CASE)		
59	1B	*	J82-0023-05	F.P.C(PTT)		

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TK-431

TX-RX UNIT (X57-4200-11)

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名/規格	Desti- nation 仕向	Re- marks 備考
61	2A	*	K29-4798-02	KEY TOP		
62	3B	*	K29-4799-13	KNØB(PTT)		
63	3B	*	K29-4800-04	KNØB(RELEASE)		
65	2A, 2B	*	N15-1020-60	FLAT WASHER(CAP, REAR CASE)		
66	2B	*	N17-1026-60	TOOTHED LOCK WASHER(BOTTOM)		
A	2A, 1B	*	N09-2053-05	SCREW (TERMINAL, CAP)		
B	2B	*	N09-2185-05	SCREW (BOTTOM PLATE)		
C	2A	*	N30-2606-46	PAN HEAD MACHIN SCREW(ANT)		
D	1B	*	N32-2004-46	FLAT HEAD MACHIN SCREW(SUBPAN)		
E	1B	*	N32-2008-46	FLAT HEAD MACHIN SCREW(MODULE)		
F	1B	*	N35-2004-46	BINDING HEAD MACHINE SCREW		
G	2B	*	N39-2020-46	PAN HEAD MACHINE SCREW		
H	3B	*	N79-2028-46	PAN HEAD TAPTITE SCREW(PTT)		
I	2A, 3B	*	N82-2006-46	BINDING HEAD TAPTITE SCREW		
J	2A	*	N89-2006-46	BINDING HEAD TAPTITE SCREW		
67	1C	*	N99-0375-05	SCREW SET(ACS)		
69	3A	*	T07-0257-05	LOUDSPEAKER(FULLRANGE)		
70	2C	*	T90-0459-05	ANTENNA(896-941MHZ)		
71	3A	*	T91-0502-05	MICROPHONE(BCM)		
73	2D	*	W09-0813-05	BATTERY PACK(KNB-9A)		
75	2A, 1B	*	X57-4200-11	TX-RX UNIT		
TX-RX UNIT (X57-4200-11)						
		*	B11-1069-04	FILTER		
		*	B38-0378-05	DISPLAY ASSY		
C1	3A		CC73FCH1H470J	CHIP C 47PF J		
C2			CC73GCH1H101J	CHIP C 100PF J		
C3			CK73GB1H471K	CHIP C 470PF K		
C4	,5		CC73GCH1H101J	CHIP C 100PF J		
C6			CK73GB1H102K	CHIP C 1000PF K		
C7			CK73GB1H103K	CHIP C 0.01UF K		
C8			C92-0546-05	CHIP TAN 68UF 6.3WV		
C9	-11		CC73GCH1H101J	CHIP C 100PF J		
C12			C92-0546-05	CHIP TAN 68UF 6.3WV		
C13			CC73GCH1H101J	CHIP C 100PF J		
C14			CK73GB1H103K	CHIP C 0.01UF K		
C15	,16		CC73GCH1H101J	CHIP C 100PF J		
C17	,18		C92-0004-05	ELECTRO 1.0UF 16WV		
C19	-21		CC73GCH1H101J	CHIP C 100PF J		
C23	,24		CC73GCH1H101J	CHIP C 100PF J		
C25			CK73GB1H102K	CHIP C 1000PF K		
C26			CC73GCH1H101J	CHIP C 100PF J		
C30			CC73GCH1H101J	CHIP C 100PF J		
C34			CC73GCH1H101J	CHIP C 100PF J		
C35			CC73GCH1H050C	CHIP C 5PF C		
C37			CC73GCH1H101J	CHIP C 100PF J		
C38			CK73GB1H103K	CHIP C 0.01UF K		
C39			CK73GB1H102K	CHIP C 1000PF K		
C40			CC73GCH1H101J	CHIP C 100PF J		
C41			CC73GCH1H030C	CHIP C 3PF C		
C43	-45		CC73GCH1H101J	CHIP C 100PF J		
C46			CC73GCH1H470J	CHIP C 47PF J		
C48			CC73GCH1H101J	CHIP C 100PF J		

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TX-RX UNIT (X57-4200-11)

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名 / 規格	Desti- nation 仕向	Re- marks 備考
C49 ,50			CK73FF1C105Z	CHIP C 1.0UF Z		
C51			CC73GCH1H101J	CHIP C 100PF J		
C52			CK73FF1C105Z	CHIP C 1.0UF Z		
C53 ,54			CC73GCH1H101J	CHIP C 100PF J		
C55			CK73FF1C105Z	CHIP C 1.0UF Z		
C56			CC73FCH1H030C	CHIP C 3PF C		
C57			CC73FCH1H040C	CHIP C 4PF C		
C58			CC73FCH1H020C	CHIP C 2PF C		
C59			CC73FCH1H101J	CHIP C 100PF J		
C60			CC73GCH1H101J	CHIP C 100PF J		
C61			CC73FCH1H101J	CHIP C 100PF J		
C62 -65			CC73GCH1H101J	CHIP C 100PF J		
C66			CK73FB1E104K	CHIP C 0.10UF K		
C69			CK73GB1H102K	CHIP C 1000PF K		
C70			CC73GCH1H101J	CHIP C 100PF J		
C72			CC73GCH1H050C	CHIP C 5PF C		
C73			CC73GCH1H470J	CHIP C 47PF J		
C74 ,75			CK73GB1H103K	CHIP C 0.01UF K		
C76 ,77			CC73GCH1H101J	CHIP C 100PF J		
C79			CC73GCH1H101J	CHIP C 100PF J		
C80			CK73GB1H102K	CHIP C 1000PF K		
C81 ,82			CC73GCH1H101J	CHIP C 100PF J		
C83			CC73GCH1H151J	CHIP C 150PF J		
C84			CK73GB1H102K	CHIP C 1000PF K		
C85 ,86			CC73GCH1H101J	CHIP C 100PF J		
C91			CC73FCH1H010C	CHIP C 1PF C		
C92			CC73GCH1H020C	CHIP C 2.0PF C		
C93			CC73GCH1H010C	CHIP C 1PF C		
C94 ,95			CC73GCH1H101J	CHIP C 100PF J		
C96			CK73GB1H102K	CHIP C 1000PF K		
C97			CC73GCH1H101J	CHIP C 100PF J		
C98			CK73GB1H103K	CHIP C 0.01UF K		
C99			CC73GCH1H020C	CHIP C 2PF C		
C100			CC73GCH1H030C	CHIP C 3PF C		
C101			CK73GB1H102K	CHIP C 1000PF K		
C102			CC73GCH1H020C	CHIP C 2PF C		
C103			CC73GCH1H101J	CHIP C 100PF J		
C104			CK73GB1H103K	CHIP C 0.01UF K		
C105			CK73GB1H102K	CHIP C 1000PF K		
C106			CC73GCH1H101J	CHIP C 100PF J		
C107			CC73GCH1H220J	CHIP C 22PF J		
C108			CC73GCH1H120J	CHIP C 12PF J		
C109			CK73GB1H102K	CHIP C 1000PF K		
C110			CC73GCH1H101J	CHIP C 100PF J		
C111			CK73GB1H103K	CHIP C 0.01UF K		
C112,113			CC73GCH1H101J	CHIP C 100PF J		
C114			CK73GB1H103K	CHIP C 0.01UF K		
C115			CK73GB1H102K	CHIP C 1000PF K		
C116-118			CK73FB1B104K	CHIP C 0.10UF K		
C119			C92-0012-05	TANTAL 22UF 6.3WV		
C120			CK73GB1H102K	CHIP C 1000PF K		
C121			CC73GCH1H330J	CHIP C 33PF J		
C122			CC73GCH1H100D	CHIP C 10PF D		
C123			CK73GB1H102K	CHIP C 1000PF K		
C124-128			CC73GCH1H101J	CHIP C 100PF J		

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TX-RX UNIT (X57-4200-11)

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名/規格	Desti- nation 仕向	Re- marks 備考
C129			CK73GB1H102K	CHIP C 1000PF K		
C130			CK73GB1H471K	CHIP C 470PF K		
C131-133			CC73GCH1H101J	CHIP C 100PF J		
C134			CK73GB1H471K	CHIP C 470PF K		
C147			CC73GCH1H101J	CHIP C 100PF J		
C151			CK73GB1H471K	CHIP C 470PF K		
C158, 159			CC73GCH1H030C	CHIP C 3PF C		
C160			CC73GCH1H101J	CHIP C 100PF J		
C161			CK73GB1H102K	CHIP C 1000PF K		
C162-164			CC73GCH1H101J	CHIP C 100PF J		
C166, 167			CC73GCH1H101J	CHIP C 100PF J		
C168			CK73GB1H103K	CHIP C 0.01UF K		
C169			CC73GCH1H101J	CHIP C 100PF J		
C170			CK73GB1H103K	CHIP C 0.01UF K		
C174			CC73GCH1H020C	CHIP C 2PF C		
C175-177			CC73GCH1H101J	CHIP C 100PF J		
C201-202			CC73GCH1H101J	CHIP C 100PF J		
C203-205			CK73GB1H471K	CHIP C 470PF K		
C206			CK73GB1H103K	CHIP C 0.01UF K		
C207			CK73FB1E104K	CHIP C 0.10UF K		
C208, 209			CK73GB1H103K	CHIP C 0.01UF K		
C210			C92-0004-05	ELECTRO 1.0UF 16WV		
C211			CK73GB1H102K	CHIP C 1000PF K		
C212			C92-0004-05	ELECTRO 1.0UF 16WV		
C214			C92-0004-05	ELECTRO 1.0UF 16WV		
C215-219			CK73GB1H103K	CHIP C 0.01UF K		
C220			CK73GB1H102K	CHIP C 1000PF K		
C221			CK73GB1H103K	CHIP C 0.01UF K		
C222-224			C92-0513-05	CHIP-TAN 3.3UF 6.3WV		
C225			CK73GB1H103K	CHIP C 0.01UF K		
C226			C92-0004-05	ELECTRO 1.0UF 16WV		
C227			CK73GB1H102K	CHIP C 1000PF K		
C228-230			CK73GB1H103K	CHIP C 0.01UF K		
C231			CK73GB1H472K	CHIP C 4700PF K		
C232			CK73GB1H103K	CHIP C 0.01UF K		
C233-240			CC73GCH1H101J	CHIP C 100PF J		
C243			CC73GCH1H101J	CHIP C 100PF J		
C246, 247			CC73GCH1H101J	CHIP C 100PF J		
C249			C92-0509-05	TANTAL 10UF 6.3WV		
C250			C92-0513-05	CHIP-TAN 3.3UF 6.3WV		
C251			CC73GCH1H221J	CHIP C 220PF J		
C252			CK73GB1H472K	CHIP C 4700PF K		
C253			CK73GB1H102K	CHIP C 1000PF K		
C254-256			CK73GB1H103K	CHIP C 0.01UF K		
C257-259			CK73FB1E273K	CHIP C 0.027UF K		
C261, 262			CK73GB1H103K	CHIP C 0.01UF K		
C263			CK73FB1E104K	CHIP C 0.10UF K		
C264, 265			CK73GB1H103K	CHIP C 0.01UF K		
C266			C92-0509-05	TANTAL 10UF 6.3WV		
C267			C92-0004-05	ELECTRO 1.0UF 16WV		
C268			CK73GB1H103K	CHIP C 0.01UF K		
C269, 270			CC73GCH1H101J	CHIP C 100PF J		
C271			CK73GB1H102K	CHIP C 1000PF K		
C272, 273			C92-0004-05	ELECTRO 1.0UF 16WV		
C274			CC73GCH1H101J	CHIP C 100PF J		

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TX-RX UNIT (X57-4200-11)

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名 / 规格	Destination 仕向	Remarks 備考
C275			CK73GB1H103K	CHIP C 0.01UF K		
C276			CK73GB1H102K	CHIP C 1000PF K		
C278			C92-0514-05	CHIP TAN 2.2UF 10WV		
C279			C92-0002-05	CHIP TAN 0.22UF 35WV		
C280			C92-0546-05	CHIP TAN 68UF 6.3WV		
C281			CC73GCH1H101J	CHIP C 100PF J		
C282			CK73GB1H102K	CHIP C 1000PF K		
C283			C92-0513-05	CHIP-TAN 3.3UF 6.3WV		
C284			CK73FB1B223K	CHIP C 0.022UF K		
C285			CK73GB1H222K	CHIP C 2200PF K		
C286			CK73FB1E223K	CHIP C 0.022UF K		
C287			CC73GCH1H470J	CHIP C 47PF J		
C288			C92-0004-05	ELECTRO 1.0UF 16WV		
C289			CC73GCH1H101J	CHIP C 100PF J		
C290			CK73FB1E223K	CHIP C 0.022UF K		
C291			CC73GCH1H101J	CHIP C 100PF J		
C292			CK73GB1E223K	CHIP C 0.022UF K		
C293			CK73GB1H332K	CHIP C 3300PF K		
C294			CC73GCH1H100D	CHIP C 10PF D		
C295			C92-0004-05	ELECTRO 1.0UF 16WV		
C296			CK73GB1H122K	CHIP C 1200PF K		
C297			CC73FCH1H751J	CHIP C 750PF J		
C298			CK73GB1H332K	CHIP C 3300PF K		
C299			CC73GCH1H181J	CHIP C 180PF J		
C300			C92-0513-05	CHIP-TAN 3.3UF 6.3WV		
C301			CK73FB1B104K	CHIP C 0.10UF K		
C302			C92-0513-05	CHIP-TAN 3.3UF 6.3WV		
C303			CC73FCH1H751J	CHIP C 750PF J		
C304			C92-0513-05	CHIP-TAN 3.3UF 6.3WV		
C305			CK73GB1H152K	CHIP C 1500PF K		
C306			CC73GCH1H101J	CHIP C 100PF J		
C307			CK73GB1H103K	CHIP C 0.01UF K		
C308			CK73FB1E334Z	CHIP C 0.33UF Z		
C309			CC73GCH1H271J	CHIP C 270PF J		
C310			C92-0509-05	TANTAL 10UF 6.3WV		
C311			C92-0516-05	CHIP TAN 4.7UF 16WV		
C312			C92-0004-05	ELECTRO 1.0UF 16WV		
C313, 314			CK73GB1H102K	CHIP C 1000PF K		
C315			CK73GB1H471K	CHIP C 470PF K		
C316, 317			CK73GB1H102K	CHIP C 1000PF K		
C318			CK73FB1E104K	CHIP C 0.10UF K		
C319			CK73GB1H472K	CHIP C 4700PF K		
C320			CK73GB1H102K	CHIP C 1000PF K		
C321			CK73FB1E104K	CHIP C 0.10UF K		
C322			CK73GB1H102K	CHIP C 1000PF K		
C323			CC73GCH1H101J	CHIP C 100PF J		
C324			C92-0513-05	CHIP-TAN 3.3UF 6.3WV		
C325			CK73FB1E473K	CHIP C 0.047UF K		
C401, 402			CK73GB1H103K	CHIP C 0.01UF K		
C403			C92-0004-05	ELECTRO 1.0UF 16WV		
C404-409			CC73GCH1H101J	CHIP C 100PF J		
CN2		*	E29-1111-04	CONNECTOR(LOD)		
CN201		*	E40-5307-05	PIN ASSY(18P)		
		*	E40-5307-05	PIN ASSY(18P)		

L:Scandinavia

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△ indicates safety critical components.

PARTS LIST

× New Parts

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.

TX-RX UNIT (X57-4200-11)

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名/規格	Desti- nation 仕向	Re- marks 備考
CN202		*	E40-5584-05	PIN ASSY(5P)		
CN203, 204		*	E40-5585-05	PIN ASSY(9P)		
CN401		*	E40-5583-05	PIN ASSY(5P)		
J1			E03-0170-05	DC JACK(BATT)		
J2		*	E23-0923-04	TERMINAL(ANT)		
J401			E11-0439-05	PHONE JACK(2.5D)		
J402			E11-0420-15	MIC JACK(3.5D)		
TP1			E23-0467-05	TERMINAL		
F1		*	F10-2056-04	SHIELDING PLATE		
			F53-0010-05	FUSE(4A/125V)		
		*	J21-4408-04	MOUNTING HARDWARE(LCD)		
CF1			L72-0376-05	CERAMIC FILTER(CP4M455G)		
L1 , 2			L92-0131-05	CORE		
L3		*	L33-0758-05	SMALL FIXED INDUCTOR(10NH)		
L4 , 5		*	L34-1380-05	COIL(1T)		
L6		*	L34-1381-05	COIL(8T)		
L7		*	L40-8281-34	SMALL FIXED INDUCTOR(0.82UH)		
L8 , 9			L92-0131-05	CORE		
L10 , 11		*	L34-1389-05	COIL(1T)		
L12		*	L33-0757-05	SMALL FIXED INDUCTOR(6.8NH)		
L13		*	L79-1053-05	FILTER		
L14		*	L40-2205-34	SMALL FIXED INDUCTOR(22UH)		
L15		*	L33-0757-05	SMALL FIXED INDUCTOR(6.8NH)		
L17		*	L79-1053-05	FILTER		
L18		*	L33-0756-05	SMALL FIXED INDUCTOR(4.7NH)		
L19		*	L33-0757-05	SMALL FIXED INDUCTOR(6.8NH)		
L20		*	L33-0758-05	SMALL FIXED INDUCTOR(10NH)		
L21 , 22			L40-3385-34	SMALL FIXED INDUCTOR(0.33UH)		
L23			L34-4015-05	COIL		
L24			L40-8281-34	SMALL FIXED INDUCTOR(0.82UH)		
L25		*	L40-3972-34	SMALL FIXED INDUCTOR(39NH)		
L26			L92-0131-05	CORE		
L27		*	L33-0756-05	SMALL FIXED INDUCTOR(4.7NH)		
X1			L77-1434-05	CRYSTAL RESONATOR(38.5825MHZ)		
X2		*	L77-1500-05	CRYSTAL RESONATOR(12.8MHZ)		
X201		*	L78-0308-05	RESONATOR(12MHZ)		
X401			L78-0043-05	RESONATOR(4.194MHZ)		
XF1		*	L71-0430-05	CRYSTAL FILTER(39.0375MHZ)		
R1			RK73GB1J471J	CHIP R 470 J 1/16W		
R2			RK73GB1J104J	CHIP R 100K J 1/16W		
R3			RK73GB1J683J	CHIP R 68K J 1/16W		
R4			RK73GB1J124J	CHIP R 120K J 1/16W		
R6			RK73GB1J473J	CHIP R 47K J 1/16W		
R7			RK73GB1J470J	CHIP R 47 J 1/16W		
R16			RK73GB1J101J	CHIP R 100 J 1/16W		
R17			RK73GB1J104J	CHIP R 100K J 1/16W		
R20			RK73GB1J123J	CHIP R 12K J 1/16W		
R21			RK73GB1J223J	CHIP R 22K J 1/16W		
R22 , 23			RK73GB1J470J	CHIP R 47 J 1/16W		
R26			RK73GB1J391J	CHIP R 390 J 1/16W		
R27			RK73GB1J103J	CHIP R 10K J 1/16W		
R30			RK73GB1J102J	CHIP R 1.0K J 1/16W		
R31			RK73FB2A101J	CHIP R 100 J 1/10W		

L:Scandinavia

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PARTS LIST

× New Parts

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Teile ohne Parts No. werden nicht geliefert.

TX-RX UNIT (X57-4200-11)

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名 / 規格	Desti- nation 仕 向	Re- marks 備考
R32			RK73GB1J153J	CHIP R 15K J 1/16W		
R33			RK73GB1J473J	CHIP R 47K J 1/16W		
R34			RK73GB1J102J	CHIP R 1.0K J 1/16W		
R35			RK73GB1J124J	CHIP R 120K J 1/16W		
R36			RK73GB1J222J	CHIP R 2.2K J 1/16W		
R37			R92-1218-05	CHIP R 0.1 J 1/2W		
R38			RK73GB1J822J	CHIP R 8.2K J 1/16W		
R39			RK73GB1J394J	CHIP R 390K J 1/16W		
R40			RK73GB1J104J	CHIP R 100K J 1/16W		
R41			RK73GB1J103J	CHIP R 10K J 1/16W		
R42			RK73GB1J101J	CHIP R 100 J 1/16W		
R44			RK73GB1J154J	CHIP R 150K J 1/16W		
R45			RK73GB1J274J	CHIP R 270K J 1/16W		
R46			RK73GB1J101J	CHIP R 100 J 1/16W		
R47			RK73GB1J681J	CHIP R 680 J 1/16W		
R50			RK73GB1J101J	CHIP R 100 J 1/16W		
R51	,52		RK73GB1J471J	CHIP R 470 J 1/16W		
R53			RK73GB1J684J	CHIP R 680K J 1/16W		
R54			RK73GB1J272J	CHIP R 2.7K J 1/16W		
R55			RK73GB1J122J	CHIP R 1.2K J 1/16W		
R56			RK73GB1J104J	CHIP R 100K J 1/16W		
R57			RK73GB1J822J	CHIP R 8.2K J 1/16W		
R58			RK73GB1J474J	CHIP R 470K J 1/16W		
R59			RK73GB1J102J	CHIP R 1.0K J 1/16W		
R60			RK73GB1J220J	CHIP R 22 J 1/16W		
R69			RK73GB1J101J	CHIP R 100 J 1/16W		
R73			RK73GB1J103J	CHIP R 10K J 1/16W		
R74			RK73GB1J271J	CHIP R 270 J 1/16W		
R75			RK73GB1J180J	CHIP R 18 J 1/16W		
R76	-78		RK73GB1J332J	CHIP R 3.3K J 1/16W		
R80			RK73GB1J271J	CHIP R 270 J 1/16W		
R83			RK73GB1J102J	CHIP R 1.0K J 1/16W		
R84			R92-1252-05	CHIP R 0 OHM		
R85			RK73GB1J102J	CHIP R 1.0K J 1/16W		
R86			R92-1252-05	CHIP R 0 OHM		
R88			RK73GB1J472J	CHIP R 4.7K J 1/16W		
R91			RK73GB1J101J	CHIP R 100 J 1/16W		
R202			RK73GB1J473J	CHIP R 47K J 1/16W		
R203			RK73GB1J682J	CHIP R 6.8K J 1/16W		
R204, 205			RK73GB1J104J	CHIP R 100K J 1/16W		
R206			RK73GB1J473J	CHIP R 47K J 1/16W		
R207, 208			RK73GB1J104J	CHIP R 100K J 1/16W		
R209			RK73GB1J102J	CHIP R 1.0K J 1/16W		
R210			RK73GB1J104J	CHIP R 100K J 1/16W		
R211			RK73GB1J102J	CHIP R 1.0K J 1/16W		
R212, 213			RK73GB1J473J	CHIP R 47K J 1/16W		
R214-216			RK73GB1J102J	CHIP R 1.0K J 1/16W		
R218, 219			RK73GB1J473J	CHIP R 47K J 1/16W		
R220, 221			RK73GB1J472J	CHIP R 4.7K J 1/16W		
R222, 223			RK73GB1J223J	CHIP R 22K J 1/16W		
R224-226			RK73GB1J103J	CHIP R 10K J 1/16W		
R227			RK73GB1J223J	CHIP R 22K J 1/16W		
R228			RK73GB1J473J	CHIP R 47K J 1/16W		
R230, 231			RK73GB1J102J	CHIP R 1.0K J 1/16W		
R232-241			RK73GB1J473J	CHIP R 47K J 1/16W		

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TX-RX UNIT (X57-4200-11)

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名/規格	Desti- nation 仕向	Re- marks 備考
R242			RK73GB1J102J	CHIP R 1.0K J 1/16W		
R243			RK73GB1J473J	CHIP R 47K J 1/16W		
R244-247			RK73GB1J102J	CHIP R 1.0K J 1/16W		
R248			RK73GB1J473J	CHIP R 47K J 1/16W		
R249			RK73GB1J101J	CHIP R 100 J 1/16W		
R250			RK73GB1J103J	CHIP R 10K J 1/16W		
R251			RK73GB1J123J	CHIP R 12K J 1/16W		
R252			RK73GB1J104J	CHIP R 100K J 1/16W		
R253			RK73GB1J334J	CHIP R 330K J 1/16W		
R254			RK73GB1J103J	CHIP R 10K J 1/16W		
R255, 256			RK73GB1J223J	CHIP R 22K J 1/16W		
R257			RK73GB1J684J	CHIP R 680K J 1/16W		
R258, 259			RK73GB1J473J	CHIP R 47K J 1/16W		
R260			RK73GB1J563J	CHIP R 56K J 1/16W		
R261			RK73GB1J103J	CHIP R 10K J 1/16W		
R262, 263			RK73GB1J224J	CHIP R 220K J 1/16W		
R264, 265			RK73GB1J103J	CHIP R 10K J 1/16W		
R266			RK73GB1J474J	CHIP R 470K J 1/16W		
R267			RK73GB1J102J	CHIP R 1.0K J 1/16W		
R269, 270			RK73GB1J223J	CHIP R 22K J 1/16W		
R271			RK73GB1J183J	CHIP R 18K J 1/16W		
R272			RK73GB1J563J	CHIP R 56K J 1/16W		
R273			RK73GB1J273J	CHIP R 27K J 1/16W		
R274			RK73GB1J224J	CHIP R 220K J 1/16W		
R275, 276			RK73GB1J824J	CHIP R 820K J 1/16W		
R277			RK73GB1J822J	CHIP R 8.2K J 1/16W		
R278, 279			RK73GB1J103J	CHIP R 10K J 1/16W		
R280			RK73GB1J183J	CHIP R 18K J 1/16W		
R281			RK73GB1J104J	CHIP R 100K J 1/16W		
R282			RK73GB1J103J	CHIP R 10K J 1/16W		
R283			RK73GB1J102J	CHIP R 1.0K J 1/16W		
R284			RK73GB1J473J	CHIP R 47K J 1/16W		
R285			RK73GB1J104J	CHIP R 100K J 1/16W		
R286			RK73GB1J223J	CHIP R 22K J 1/16W		
R288, 289			RK73GB1J103J	CHIP R 10K J 1/16W		
R290			RK73GB1J473J	CHIP R 47K J 1/16W		
R291			RK73GB1J100J	CHIP R 10 J 1/16W		
R292			RK73GB1J101J	CHIP R 100 J 1/16W		
R293			RK73GB1J223J	CHIP R 22K J 1/16W		
R294			RK73GB1J393J	CHIP R 39K J 1/16W		
R295			RK73GB1J333J	CHIP R 33K J 1/16W		
R296			RK73GB1J474J	CHIP R 470K J 1/16W		
R297			RK73GB1J471J	CHIP R 470 J 1/16W		
R298, 299			RK73GB1J102J	CHIP R 1.0K J 1/16W		
R300			RK73GB1J223J	CHIP R 22K J 1/16W		
R301			RK73GB1J474J	CHIP R 470K J 1/16W		
R302			RK73GB1J124J	CHIP R 120K J 1/16W		
R303			RK73GB1J104J	CHIP R 100K J 1/16W		
R304			RK73GB1J103J	CHIP R 10K J 1/16W		
R305			RK73GB1J561J	CHIP R 560 J 1/16W		
R306			RK73GB1J124J	CHIP R 120K J 1/16W		
R307			RK73GB1J562J	CHIP R 5.6K J 1/16W		
R308			RK73GB1J154J	CHIP R 150K J 1/16W		
R309			RK73GB1J103J	CHIP R 10K J 1/16W		
R310			RK73GB1J273J	CHIP R 27K J 1/16W		

L:Scandinavia

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PARTS LIST

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Teile ohne Parts No. werden nicht geliefert.

TX-RX UNIT (X57-4200-11)

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名 / 規格	Desti- nation 仕 向	Re- marks 備考
R311			RK73GB1J103J	CHIP R 10K J 1/16W		
R312			RK73GB1J104J	CHIP R 100K J 1/16W		
R313			RK73GB1J124J	CHIP R 120K J 1/16W		
R314, 315			RK73GB1J823J	CHIP R 82K J 1/16W		
R316, 317			RK73GB1J683J	CHIP R 68K J 1/16W		
R318			RK73GB1J473J	CHIP R 47K J 1/16W		
R319			RK73GB1J823J	CHIP R 82K J 1/16W		
R320			RK73GB1J473J	CHIP R 47K J 1/16W		
R321			RK73GB1J104J	CHIP R 100K J 1/16W		
R322			RK73GB1J333J	CHIP R 33K J 1/16W		
R323			RK73GB1J124J	CHIP R 120K J 1/16W		
R324			RK73GB1J104J	CHIP R 100K J 1/16W		
R325			RK73GB1J823J	CHIP R 82K J 1/16W		
R326			RK73GB1J473J	CHIP R 47K J 1/16W		
R327			RK73GB1J103J	CHIP R 10K J 1/16W		
R328			RK73GB1J104J	CHIP R 100K J 1/16W		
R329			RK73GB1J473J	CHIP R 47K J 1/16W		
R330			RK73GB1J222J	CHIP R 2.2K J 1/16W		
R331			RK73GB1J473J	CHIP R 47K J 1/16W		
R332			R92-1252-05	CHIP R 0 OHM		
R333			RK73GB1J152J	CHIP R 1.5K J 1/16W		
R334			RK73GB1J102J	CHIP R 1.0K J 1/16W		
R335			RK73GB1J103J	CHIP R 10K J 1/16W		
R336, 337			RK73GB1J104J	CHIP R 100K J 1/16W		
R338			RK73GB1J473J	CHIP R 47K J 1/16W		
R339			RK73GB1J474J	CHIP R 470K J 1/16W		
R340			RK73GB1J473J	CHIP R 47K J 1/16W		
R341-346			RK73GB1J102J	CHIP R 1.0K J 1/16W		
R347			RK73GB1J105J	CHIP R 1.0M J 1/16W		
R401-403			RK73GB1J473J	CHIP R 47K J 1/16W		
R404			RK73GB1J332J	CHIP R 3.3K J 1/16W		
R405			RK73GB1J561J	CHIP R 560 J 1/16W		
R406			RK73GB1J331J	CHIP R 330 J 1/16W		
R408-410			RK73GB1J102J	CHIP R 1.0K J 1/16W		
R411-413			R92-1252-05	CHIP R 0 OHM		
R414			R92-2021-05	CHIP R 2.2 J 1/2W		
VR1, 2		*	R12-3468-05	TRIMMING POT. (47K)		
VR3		*	R12-3467-05	TRIMMING POT. (10K)		
VR4		*	R12-3468-05	TRIMMING POT. (47K)		
VR201-204		*	R12-6585-05	TRIMMING POT. (47K)		
D1			D1F10	DIODE		
D3 -5			MI809	DIODE		
D201-203			1SS302	DIODE		
D204			1SS300	DIODE		
D205-209			1SS301	DIODE		
D210			1SS300	DIODE		
D211			1SS302	DIODE		
D401			B30-2004-05	LED (RED)		
D402		*	B30-2047-05	LED (YELLOW)		
IC1		*	NJU7201U50	IC (VOLTAGE REGULATOR) 5V		
IC2	1A	*	MHW804-2	IC (POWER MODULE)		
IC3			LM301AD	IC (OP AMP)		
IC4		*	S-80230AG-GA	IC (VOLTAGE REGULATOR, APC)		
IC5			MC3371D	IC (FM IF)		
IC7			TC4S584F	IC (SCHMITT TRIGGER)		

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TX-RX UNIT (X57-4200-11)

VCO UNIT (X58-4000-11)

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名 / 規格	Desti- nation 仕向	Re- marks 備考
IC201		*	BU4013BF	IC		
IC202, 203		*	NJU7201U50	IC(VOLTAGE REGULATOR)5V)		
IC204			TC74HC573AF	IC(LATCH)		
IC205		*	HN58C256FP-20	IC(EEPROM)		
IC206			HM6264ALFP-15T	IC(STATIC RAM)		
IC207			HN58C65FP-25T	IC(EEPROM)		
IC208, 209			TC74HC00AF	IC(2-INPUT NAND GATE)		
IC210		*	78312AGP3423BE	IC(MPU)		
IC211			S-8054ALB-LM-T1	IC(VOLTAGE DETECTOR)		
IC212-215		*	MC33172D	IC		
IC216			LC7532M	IC(BILATERAL SWITCH)		
IC217			TA7368F	IC(AF POWER AMP)		
IC218-220		*	MC33172D	IC		
IC221			TC7532F	IC(2CH NAND GATE)		
IC401		*	75328GC-601-3B9	IC(DISPLAY, MPU)		
IC402			S-8054ALB-LM-T1	IC(VOLTAGE DETECTOR)		
Q1 , 2			2SC4116(GR)	TRANSISTOR		
Q3			DTB113ZK	DIGITAL TRANSISTOR		
Q4			2SJ243	FET		
Q5			2SC4226(R24)	TRANSISTOR		
Q6			2SB1119(S)	TRANSISTOR		
Q8			2SA1586(Y, GR)	TRANSISTOR		
Q9			DTC144BE	DIGITAL TRANSISTOR		
Q10			2SC4226(R24)	TRANSISTOR		
Q12			DTA144BE	DIGITAL TRANSISTOR		
Q13			DTC144BE	DIGITAL TRANSISTOR		
Q14			2SC4095(R47)	TRANSISTOR		
Q15			3SK240	FET		
Q16			2SJ243	FET		
Q17			2SC4215(Y)	TRANSISTOR		
Q18 , 19			2SC4116(GR)	TRANSISTOR		
Q21			2SC4116(GR)	TRANSISTOR		
Q23			UNC4	TRANSISTOR		
Q201			2SA1362(GR)	TRANSISTOR		
Q203			DTC144BE	DIGITAL TRANSISTOR		
Q204			2SA1586(Y, GR)	TRANSISTOR		
Q206			DTC144BE	DIGITAL TRANSISTOR		
Q207			2SK1588	FET		
Q208			DTA144BE	DIGITAL TRANSISTOR		
Q209			DTC114BE	DIGITAL TRANSISTOR		
Q210			DTC144BE	DIGITAL TRANSISTOR		
Q211			2SA1586(Y, GR)	TRANSISTOR		
Q212			2SA1362(GR)	TRANSISTOR		
Q213, 214			DTC144BE	DIGITAL TRANSISTOR		
Q215			2SC4116(GR)	TRANSISTOR		
TH201			157-302-53008	THERMISTER(3K)		
A1		*	X58-4000-11	VCO UNIT		
VCO UNIT (X58-4000-11)						
C501			C92-0004-05	ELECTRO	1.0UF	16WV
C502			CK73GB1H102K	CHIP C	1000PF	K
C503			CC73GCH1H101J	CHIP C	100PF	J
C504			CK73GB1H102K	CHIP C	1000PF	K
C505			CC73GCH1H101J	CHIP C	100PF	J

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M:Other Areas

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PARTS LIST

* New Parts

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Telle ohne Parts No. werden nicht geliefert.

VCO UNIT (X58-4000-11)

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名/規格	Desti- nation 仕向	Re- marks 備考
C508			C92-0004-05	ELECTRO 1.0UF 16WV		
C509			CK73GB1H102K	CHIP C 1000PF K		
C510			CC73GCH1H101J	CHIP C 100PF J		
C511			CK73GB1H102K	CHIP C 1000PF K		
C512			C92-0004-05	ELECTRO 1.0UF 16WV		
C513			CC73GCH1H101J	CHIP C 100PF J		
C514, 515			CK73GB1H102K	CHIP C 1000PF K		
C517			C92-0004-05	ELECTRO 1.0UF 16WV		
C518			CC73GCH1H101J	CHIP C 100PF J		
C519			C92-0004-05	ELECTRO 1.0UF 16WV		
C520			CC73GCH1H101J	CHIP C 100PF J		
C522			CK73GB1H102K	CHIP C 1000PF K		
C523		*	C92-0555-05	CHIP TAN 0.047UF 35WV		
C524			CC73GCH1H101J	CHIP C 100PF J		
C525		*	C92-0555-05	CHIP TAN 0.047UF 35WV		
C526			CC73GCH1H101J	CHIP C 100PF J		
C527			C92-0004-05	ELECTRO 1.0UF 16WV		
C528			CK73GB1H102K	CHIP C 1000PF K		
C529			CC73GCH1H1R5C	CHIP C 1.5PF C		
C530			CK73GB1H471K	CHIP C 470PF K		
C531			CC73GCH1H010C	CHIP C 1PF C		
C532			CC73GCH1H050C	CHIP C 5PF C		
C533, 534			CC73GCH1H101J	CHIP C 100PF J		
C535			CK73GB1H102K	CHIP C 1000PF K		
C536			CC73GCH1H020C	CHIP C 2PF C		
CN501		*	E40-5599-05	PIN ASSY(11P)		
CN502		*	E40-5601-05	PIN ASSY(3P)		
		*	F10-2055-04	SHIELDING PLATE		
L501-503			L92-0131-05	CORE		
L504		*	L33-0756-05	SMALL FIXED INDUCTOR(4.7NH)		
L505			L40-2271-34	SMALL FIXED INDUCTOR(22NH)		
L506		*	L33-0757-05	SMALL FIXED INDUCTOR(6.8NH)		
L507		*	L78-0311-05	RESONATOR(900MHZ)		
L508		*	L78-0312-05	RESONATOR(TA, 900MHZ)		
R501			RK73GB1J224J	CHIP R 220K J 1/16W		
R502			RK73GB1J181J	CHIP R 180 J 1/16W		
R503			RK73GB1J101J	CHIP R 100 J 1/16W		
R504			RK73GB1J224J	CHIP R 220K J 1/16W		
R505			RK73GB1J181J	CHIP R 180 J 1/16W		
R506			RK73GB1J123J	CHIP R 12K J 1/16W		
R507			RK73GB1J333J	CHIP R 33K J 1/16W		
R508			RK73GB1J102J	CHIP R 1.0K J 1/16W		
R509			RK73GB1J101J	CHIP R 100 J 1/16W		
R510			RK73GB1J102J	CHIP R 1.0K J 1/16W		
R511			RK73GB1J100J	CHIP R 10 J 1/16W		
R512			RK73GB1J472J	CHIP R 4.7K J 1/16W		
R513-515			RK73GB1J332J	CHIP R 3.3K J 1/16W		
R516, 517			RK73GB1J102J	CHIP R 1.0K J 1/16W		
R518, 519			RK73GB1J472J	CHIP R 4.7K J 1/16W		
R520			RK73GB1J104J	CHIP R 100K J 1/16W		
R521			RK73GB1J101J	CHIP R 100 J 1/16W		

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VCO UNIT (X58-4000-11)

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名 / 規格	Desti- nation 仕向	Re- marks 備考
R522			RK73GB1J221J	CHIP R 220 J 1/16W		
R523			RK73GB1J102J	CHIP R 1.0K J 1/16W		
R524			RK73GB1J474J	CHIP R 470K J 1/16W		
R525			RK73GB1J224J	CHIP R 220K J 1/16W		
R526			RK73GB1J471J	CHIP R 470 J 1/16W		
R527			RK73GB1J271J	CHIP R 270 J 1/16W		
R528			RK73GB1J180J	CHIP R 18 J 1/16W		
R529			RK73GB1J271J	CHIP R 270 J 1/16W		
R530			RK73GB1J103J	CHIP R 10K J 1/16W		
R531,532			RK73GB1J100J	CHIP R 10 J 1/16W		
D501			1SS300	DIODE		
IC501		*	MB1512PFV-G-BND	IC (PLL SYSTEM)		
Q501			2SA1586(Y,GR)	TRANSISTOR		
Q503			2SC4095(R47)	TRANSISTOR		
Q504			2SC4226(R24)	TRANSISTOR		

L:Scandinavia

K:USA

P:Canada

Y:PX(Far East, Hawaii)

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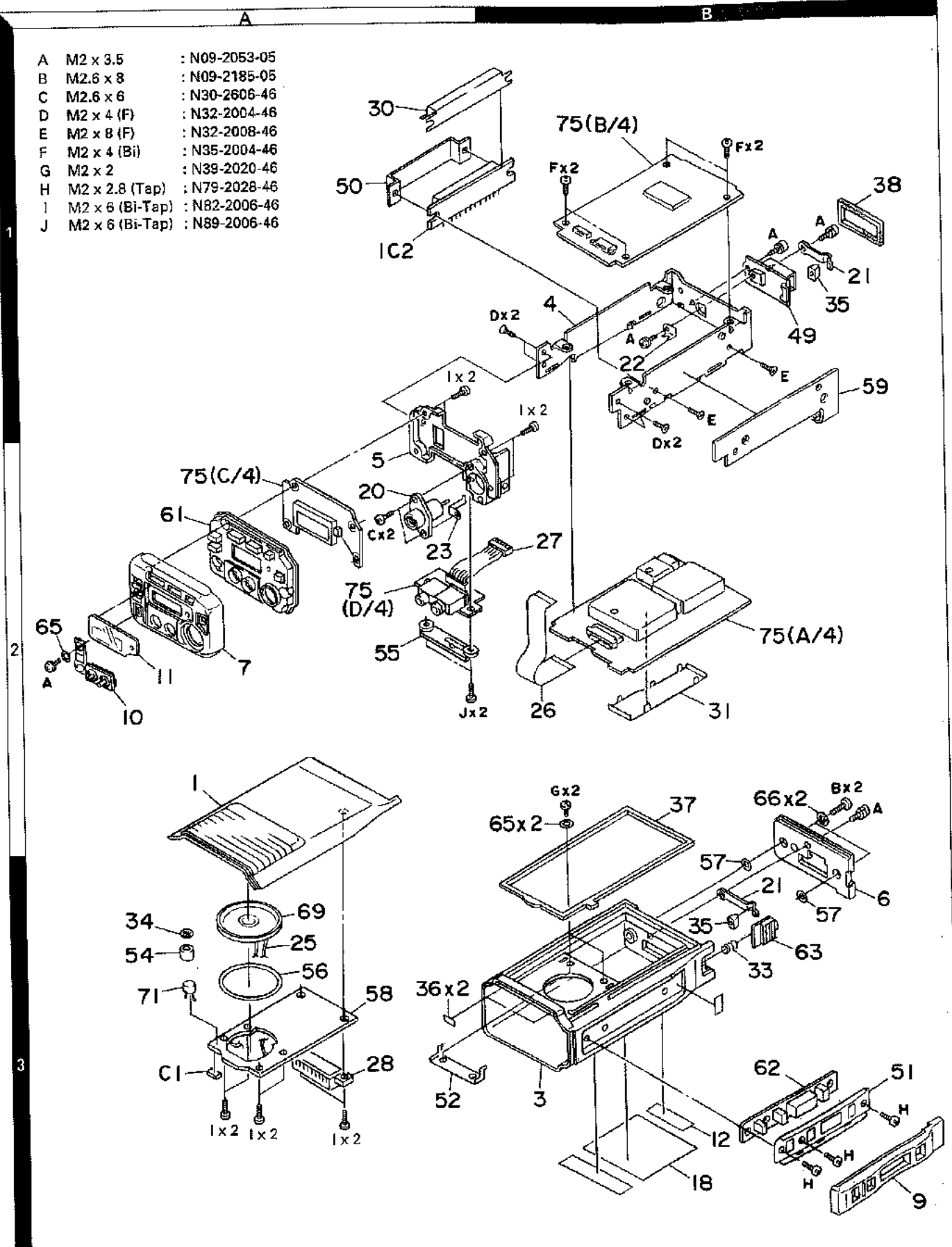
X:Australia

M:Other Areas

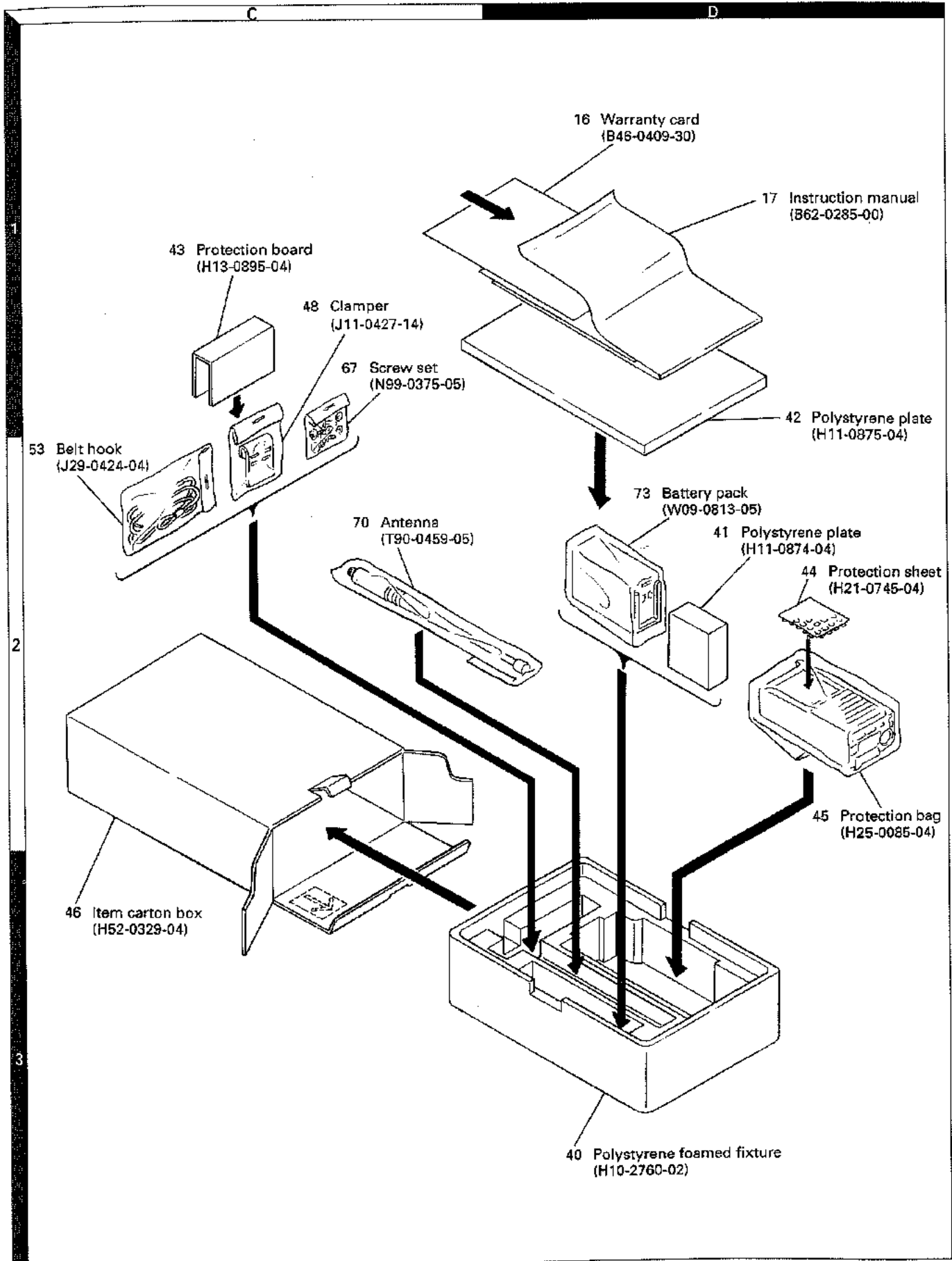
⚠ indicates safety critical components.

EXPLODED VIEW

- | | | |
|---|-----------------|---------------|
| A | M2 x 3.5 | : N09-2053-05 |
| B | M2.6 x 8 | : N09-2185-05 |
| C | M2.6 x 6 | : N30-2606-46 |
| D | M2 x 4 (F) | : N32-2004-46 |
| E | M2 x 8 (F) | : N32-2008-46 |
| F | M2 x 4 (Bi) | : N35-2004-46 |
| G | M2 x 2 | : N39-2020-46 |
| H | M2 x 2.8 (Tap) | : N79-2028-46 |
| I | M2 x 6 (Bi-Tap) | : N82-2006-46 |
| J | M2 x 6 (Bi-Tap) | : N89-2006-46 |



PACKING



ADJUSTMENT

Test Equipment Required for Alignment

No.	Test Equipment	Major Specifications	
1	Standard Signal Generator (SSG)	Frequency Range Modulation Output	800 to 950MHz or more. Frequency modulation and external modulation. 0.1 μ V to greater than 1mV.
2	Power Meter	Input Impedance Operation Frequency Measurement Capability	50 Ω . 800 to 950MHz or more. Vicinity of 10W.
3	Deviation Meter	Frequency Range	800 to 950MHz.
4	Digital Volt Meter (DVM)	Measuring Range Accuracy	1 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 (AFVTVM)	Frequency Range Voltage Range	50Hz to 10kHz. 3mV to 3V.
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	Voltmeter	Measuring Range Input Impedance	10 to 1.5V DC or less. 50k Ω /V or greater.
12	8 Ω Dummy Load		Approx. 8 Ω , 3W.
13	Regulated Power Supply		7.5V, approx. 5A (adjustable from 6 to 9V). Useful if ammeter equipped.

The following parts are required for adjustment:**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.)

DC cable

Use the optional DC cable (PG-2W).

ADJUSTMENT

Test Mode

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.

		GRP1	GRP2	GRP3	GRP4	GRP5	GRP6	GRP7	GRP8	GRP9
SYS1	TX (MHz)	896.0000	896.0000	896.0000	896.0000	896.0000	896.0000	896.0000	896.0000	896.0000
	RX (MHz)	935.0000	935.0000	935.0000	935.0000	935.0000	935.0000	935.0000	935.0000	935.0000
	TONE	-	100Hz square wave	LTR	QT 103.5Hz	QT 100Hz	DQT 065N	EOS	EOS	-
SYS2	TX (MHz)	896.0250	896.0250	896.0250	896.0250	896.0250	896.0250	896.0250	896.0250	896.0250
	RX (MHz)	935.0250	935.0250	935.0250	935.0250	935.0250	935.0250	935.0250	935.0250	935.0250
	TONE	-	100Hz square wave	LTR	QT 103.5Hz	QT 100Hz	DQT 065N	EOS	EOS	-
SYS3	TX (MHz)	899.0000	899.0000	899.0000	899.0000	899.0000	899.0000	899.0000	899.0000	899.0000
	RX (MHz)	938.0000	938.0000	938.0000	938.0000	938.0000	938.0000	938.0000	938.0000	938.0000
	TONE	-	100Hz square wave	LTR	QT 103.5Hz	QT 100Hz	DQT 065N	EOS	EOS	-
SYS4	TX (MHz)	899.0250	899.0250	899.0250	899.0250	899.0250	899.0250	899.0250	899.0250	899.0250
	RX (MHz)	938.0250	938.0250	938.0250	938.0250	938.0250	938.0250	938.0250	938.0250	938.0250
	TONE	-	100Hz square wave	LTR	QT 103.5Hz	QT 100Hz	DQT 065N	EOS	EOS	-
SYS5	TX (MHz)	900.9875	900.9875	900.9875	900.9875	900.9875	900.9875	900.9875	900.9875	900.9875
	RX (MHz)	939.9875	939.9875	939.9875	939.9875	939.9875	939.9875	939.9875	939.9875	939.9875
	TONE	-	100Hz square wave	LTR	QT 103.5Hz	QT 100Hz	DQT 065N	EOS	EOS	-
SYS6	TX (MHz)	901.4000	901.4000	901.4000	901.4000	901.4000	901.4000	901.4000	901.4000	901.4000
	RX (MHz)	940.4000	940.4000	940.4000	940.4000	940.4000	940.4000	940.4000	940.4000	940.4000
	TONE	-	100Hz square wave	LTR	QT 103.5Hz	QT 100Hz	DQT 065N	EOS	EOS	-
SYS7	TX (MHz)	901.9000	901.9000	901.9000	901.9000	901.9000	901.9000	901.9000	901.9000	901.9000
	RX (MHz)	940.9000	940.9000	940.9000	940.9000	940.9000	940.9000	940.9000	940.9000	940.9000
	TONE	-	100Hz square wave	LTR	QT 103.5Hz	QT 100Hz	DQT 065N	EOS	EOS	-
SYS8	TX (MHz)	897.2500	897.2500	897.2500	897.2500	897.2500	897.2500	897.2500	897.2500	897.2500
	RX (MHz)	936.2500	936.2500	936.2500	936.2500	936.2500	936.2500	936.2500	936.2500	936.2500
	TONE	-	100Hz square wave	LTR	QT 103.5Hz	QT 100Hz	DQT 065N	EOS	EOS	-
SYS9	TX (MHz)	900.3000	900.3000	900.3000	900.3000	900.3000	900.3000	900.3000	900.3000	900.3000
	RX (MHz)	939.3000	939.3000	939.3000	939.3000	939.3000	939.3000	939.3000	939.3000	939.3000
	TONE	-	100Hz square wave	LTR	QT 103.5Hz	QT 100Hz	DQT 065N	EOS	EOS	-
SYS10	TX (MHz)	897.7500	897.7500	897.7500	897.7500	897.7500	897.7500	897.7500	897.7500	897.7500
	RX (MHz)	936.7500	936.7500	936.7500	936.7500	936.7500	936.7500	936.7500	936.7500	936.7500
	TONE	-	100Hz square wave	LTR	QT 103.5Hz	QT 100Hz	DQT 065N	EOS	EOS	-

TEST MODE operating features : See next page.

ADJUSTMENT

Test Mode Operating Features

This transceiver has a test mode. **To enter test mode, insert a 2.5mm stereo plug into the external speaker socket and switch the power on.** Test mode can be inhibited by programming. To exit test mode, remove the stereo plug or insert a mono plug (some diameter) and switch the power on again. The following functions are available in test mode:

- **System key**

The system key is used to select up to 16 preprogrammed test frequencies. Test frequencies are set by programming.

If no system has frequency data, the main program writes default values.

- **Group key**

The following modulation signals or squelch type can be selected with the group key:

Group	Modulation	Squelch type	Power
1	No modulation	Carrier	HI
2	100Hz square wave	Carrier	HI
3	LTR format data	LTR format data	HI
4	QT (103.5Hz) tone	QT 103.5Hz	HI
5	QT (100Hz) tone	QT 100Hz	HI
6	DQT (065N) code	DQT 065N	HI
7	EOS (HSD)	EOS (HSD)	HI
8	EOS (HSD)	EOS (HSD)	LOW
9	No modulation	Carrier	LOW

- **A key**

If the A key is pressed in the test mode, transmitter enters talk-around mode to transmit with the receive frequency. The dot (•) at the lower left of the system indicator lights.

- **S key**

If the S key is pressed in test mode, a scan operation is performed. The system indicator shows a dash (-). All programmed test frequencies are scanned.

- **Monitor key**

If this key is pressed in test mode, the squelch is turned off. If there is no signal, noise is output from the speaker.

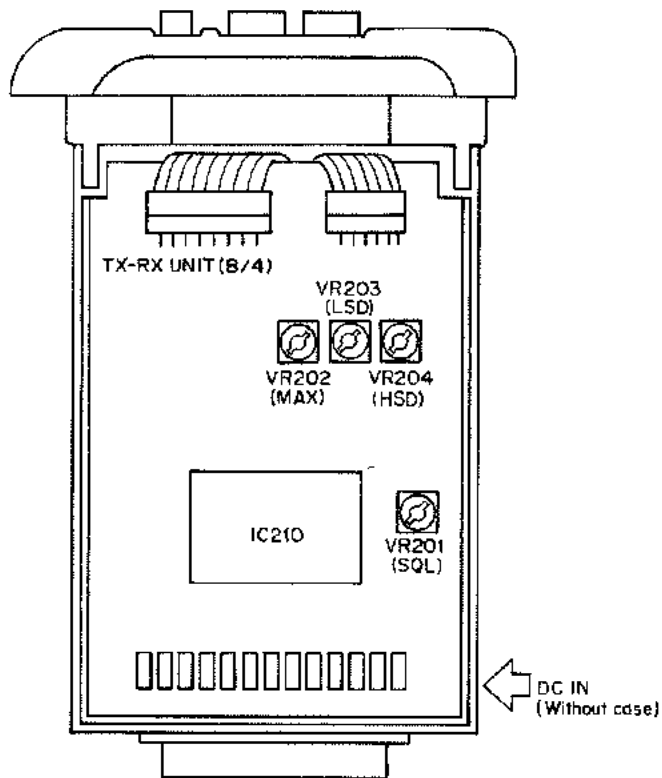
- **Transmitter**

The transmitter is keyed using the microphone PTT button. The modulation signal selected with the group key is transmitted.

ADJUSTMENT

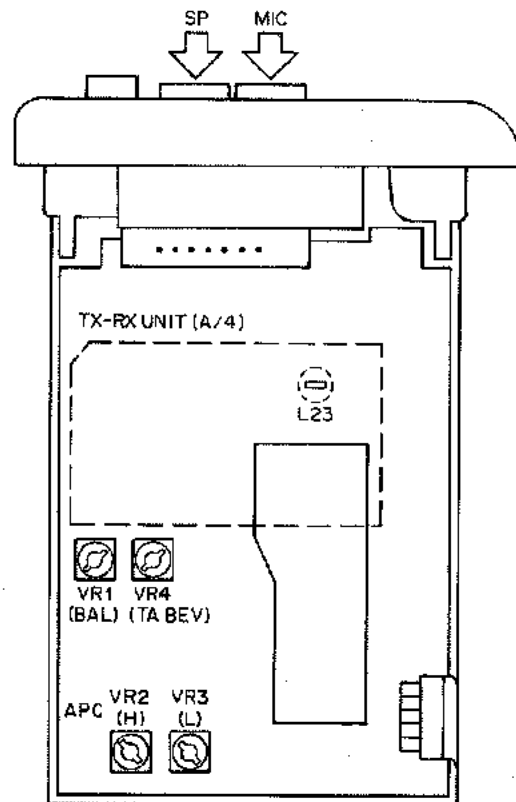
Adjustment Location

• Top view



- VR201 : Squelch
- VR202 : Maximum deviation
- VR203 : LSD deviation
- VR204 : HSD deviation

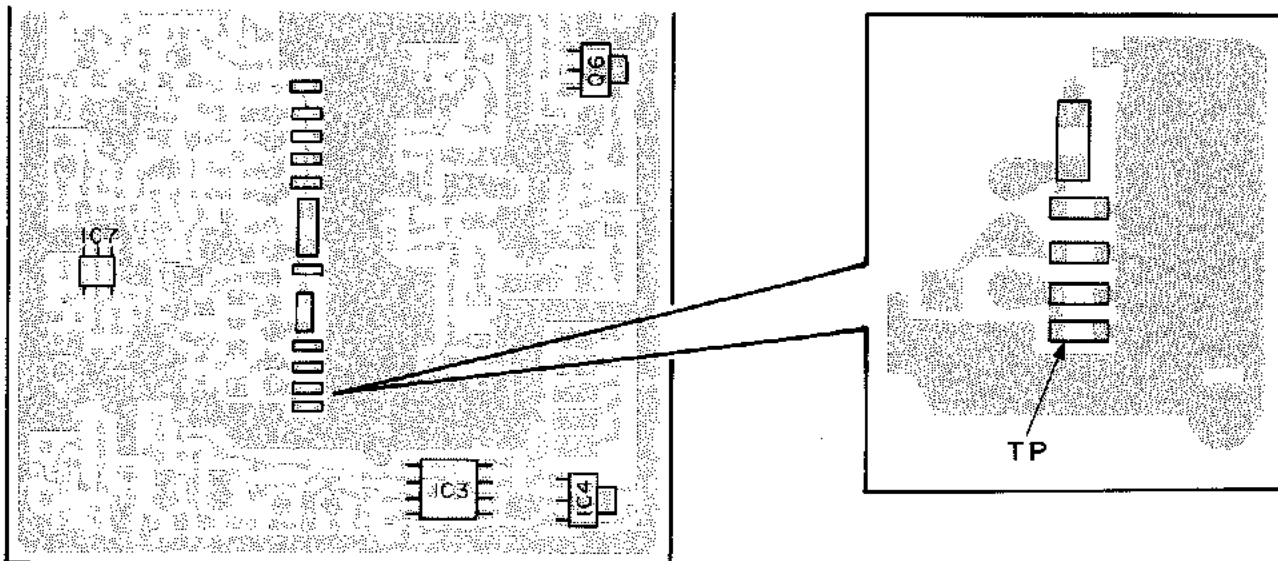
• Bottom view



- L23 : AF signal level
- VR1 : DQT waveform correction
- VR2 : High power (APC)
- VR3 : Low power (APC)
- VR4 : Maximum deviation (Talk-around)

TX-RX UNIT (A/4)

Foil side view


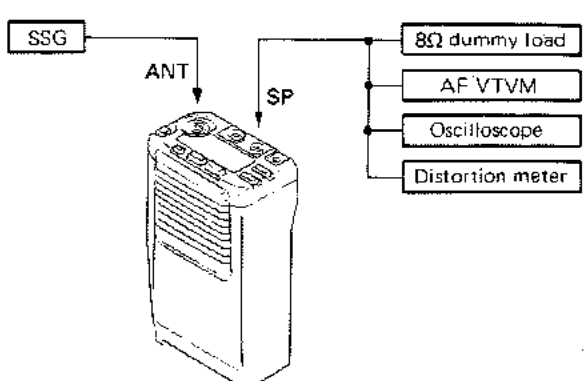


ADJUSTMENT

Alignment

Item	Condition	Measurement			Adjustment			Specifications/Remarks
		Test-equipment	Unit	Terminal	Unit	Parts	Method	
1. Setting	1) Connect the power cable to the rear panel. TX-RX unit : TEST MODE POWER SW : ON							
2. PLL lock voltage	1) CH : SYS1 GPR1	DVM	TX-RX	TP			Check	$1.1 \pm 0.5V$
	2) CH : SYS4 GRP1	Power meter						$2.0 \pm 0.5V$
	3) CH : SYS7 GRP1							$2.8 \pm 0.5V$
	4) CH : SYS1 GRP1 A SW : ON (T. A) PTT : ON							$1.2 \pm 0.5V$
	5) CH : SYS7 GRP1 PTT : ON							$2.7 \pm 0.5V$
	6) A SW : OFF							
3. Power adjustment	1) CH : SYS7 GRP9 PTT : ON	Power meter		ANT	TX-RX (A/4)	VR3	1.0W	$\pm 0.1W$ 1.1A or less
	2) CH : SYS7 GRP1 PTT : ON	Ammeter				VR2	2.5W	$\pm 0.1W$ 1.6A or less
	3) A SW : ON (T. A)							
	4) CH : SYS7 GRP1 PTT : ON						Check	1.5~3.0W
	5) A SW : OFF							
4. Maximum deviation adjustment	1) Connect AG to the MIC terminal. AG : 1kHz/200mV Deviation meter filter LPF : 15kHz HPF : OFF De-emphasis : OFF CH : SYS8 GRP1 PTT : ON	Power meter		ANT	TX-RX (B/4)	VR202	$\pm 1.7kHz$ Adjust one more than the other by switching between -P and +P.	$\pm 100Hz$
	2) A SW : ON (T. A) PTT : ON	Deviation meter						
	3) A SW : OFF	AF VTVM				VR4		

ADJUSTMENT

Item	Condition	Measurement			Adjustment			Specifications/Remarks
		Test-equipment	Unit	Terminal	Unit	Parts	Method	
5. DQT waveform correction	1) MIC input : OFF Deviation meter filter LPF : 15kHz HPF : OFF De-emphasis : OFF CH : SYS8 GRP2 PTT : ON	Power meter Deviation meter AF VTVM AG Oscilloscope		ANT	TX-RX (A/4)	VR1	Make the de-modulation waveform neat.	
6. LSD deviation	1) MIC input : OFF Deviation meter filter LPF : 15kHz HPF : OFF De-emphasis : OFF CH : SYS8 GRP3 PTT : ON				TX-RX (B/4)	VR203	±0.75kHz	±100Hz
7. HSD deviation	1) MIC input : OFF CH : SYS8 GRP7 PTT : ON					VR204	±1.75kHz	±100Hz
8. Distortion adjustment	1) CH : SYS4 GRP1 MONITOR SW : ON (BUSY)	SSG AF VTVM Distortion meter Oscilloscope 8Ω dummy load		ANT EXT. SP				
	2) SSG freq' : 938.0250MHz Output : 500μV/54dBμ/-53dBm MOD : 1kHz DEV : ±1.5kHz				TX-RX (A/4)	L23	Adjust for maximum AF output.	
	3) CH : SYS6 GRP1 SSG freq' : 940.400MHz Output : 500μV/54dBμ/-53dBm MOD : 1kHz DEV : ±1.5kHz AF : 1.0V/8Ω						Check	Distortion : 5% or less
9. Sensitivity	1) CH : SYS1 and 6 GRP1 SSG freq' : 935.000MHz and 940.400MHz Output : 0.32μV/-10dBμ/-117dBm MOD : 1kHz DEV : ±1.5kHz						Check	SINAD 12dB or more.

ADJUSTMENT

Item	Condition	Measurement			Adjustment			Specifications/Remarks
		Test-equipment	Unit	Terminal	Unit	Parts	Method	
10. Squelch adjustment	1) CH : SYS4 GRP1 SSG freq' : 938.025MHz Output : Value when 3dB is subtracted from the sensitivity value of 12dB SINAD. MOD : 1kHz DEV : ± 1.5 kHz MONITOR SW : OFF	SSG AF VTVM Distortion meter Oscilloscope 8 Ω dummy load		ANT EXT. SP	TX-RX (B/4)	VR201	Set to threshold point.	
	2) SSG output : 12dB SINAD level					Check	Squelch open.	
	3) SSG output : 12dB SINAD level - 3dB μ .							Squelch close.
11. QT	1) CH : SYS4 GRP1 SSG freq' : 938.025MHz Output : 10dB SINAD level	SSG AF VTVM Distortion meter Oscilloscope AG1 AG2		ANT EXT. SP				
	2) CH : SYS4 GRP4 SSG freq' : 938.025MHz EXT MOD AG1 : 1kHz/ System DEV ± 1.85 kHz AG2 : 103.5Hz/ Tone DEV ± 0.35 kHz						Check	QT open.
	3) CH : SYS3 GRP4							QT close.

TERMINAL FUNCTIONS

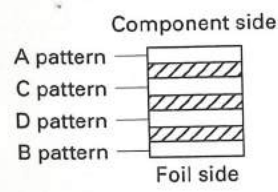
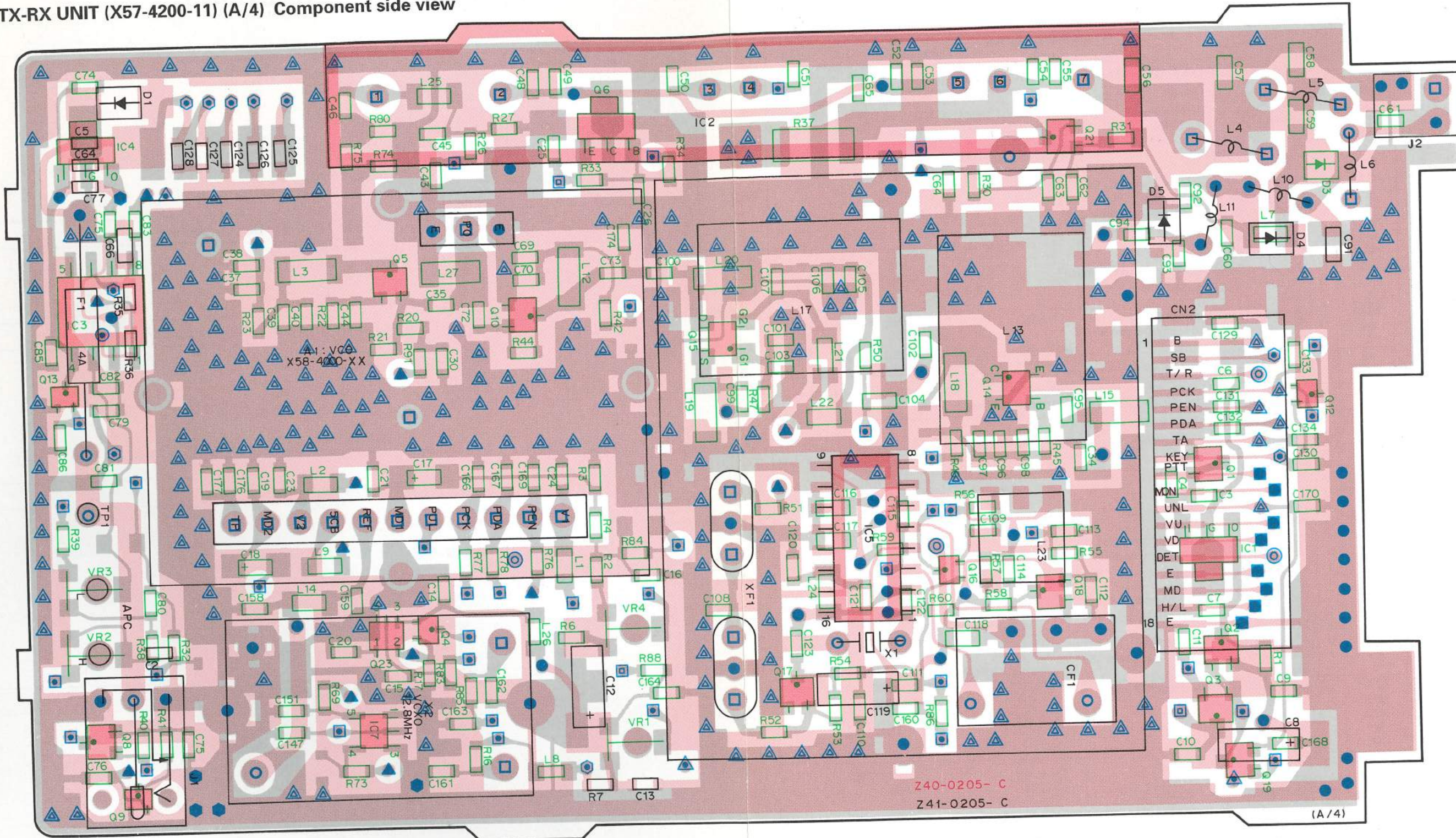
Connector No.	Terminal No.	Terminal Name	I/O	Terminal function
TX-RX UNIT (X57-4200-11) (A/4) : TX-RX section				
CN2	1	B	O	Power output after passing through the fuse.
	2	SB	I	Power input after power switch.
	3	T/R	I	Normally : 5V, Transmit : 0V
	4	PCK	I	PLL clock data input.
	5	PEN	I	PLL enable data input.
	6	PDA	I	PLL data line input.
	7	TA	I	Conventional mode : 0V, Talk-around : 5V
	8	KEY	I	Normally : 5V, Transmit : 0V
	9	PTT	O	Normally : 5V, Transmit when connected GND.
	10	MON	O	Normally : 5V, Monitor when connected GND.
	11	UNL	O	Normally : 5V, Unlock : 0V
	12	VU	O	AF volume up switch output.
	13	VD	O	Normally : 5V, AF volume down switch output.
	14	DET	O	AF detection signal output (RX).
	15	E	-	GND.
	16	MD1	I	AF modulation signal output (TX).
	17	H/L	O	Normally : 0V, Transmit, and low power : 5V
	18	E	-	GND.
J1		+B	I	External power supply input.
J2		ANT		Connector for ANT connection.
TX-RX UNIT (X57-4200-11) (B/4) : Control section				
CN201	1	B	I	Power input after passing through the fuse.
	2	SB	O	Power output after power switch.
	3	T/R	O	Normally : 5V, Transmit : 0V
	4	PCK	O	PLL clock data output.
	5	PEN	O	PLL enable data output.
	6	PDA	O	PLL data line output.
	7	TA	O	Conventional mode : 0V, Talk-around : 5V
	8	KEY	O	Normally : 5V, Transmit : 0V
	9	PTT	I	Normally : 5V, Transmit when connected GND.
	10	MON	I	Normally : 5V, Monitor when connected GND.
	11	UNL	I	Normally : 5V, Unlock : 0V
	12	VU	I	AF volume up switch input.
	13	VD	I	Normally : 5V, AF volume down switch input.
	14	DET	I	AF detection signal output (RX).
	15	E	-	GND.
	16	MD1	O	AF modulation signal output (TX).
	17	H/L	I	Normally : 0V, Transmit, and low power : 5V
	18	E	-	GND.
CN202	1	PSW	I	Normally : 7.5V, Power switch ON : 0V
	2	MRX	I	Serial control signal input.
	3	MTX	O	Serial control signal output.
	4	5C	-	5V.
	5	E	-	GND.
CN203	1	TST	I	Data input with programming.
	2	AFO	O	Audio output (Max. 0.8W).
	3	SP	I	Input for internal speaker (Max. 0.5W).
	4	E	-	GND.
	5	PTT	I	Normally : 5V, Transmit when connected GND.
	6	MIC	I	MIC signal input.
	7	IM	O	Output for internal MIC.
	8	NC	-	Normally : 5V, 0V : Connected external MIC
	9	M5	-	5V for external MIC (Max. 10mA).

TERMINAL FUNCTIONS

Connector No.	Terminal No.	Terminal Name	I/O	Terminal function
CN204 For option KDD-4	1	DED	I	Dead beat disable input.
	2	RST	-	Reset.
	3	E	-	GND.
	4	DSN	O	RX audio tone output.
	5	PTT	O	Normally : 5V, Transmit when connected GND.
	6	MT	I	MIC mute switch input.
	7	SB	O	Power output after power switch.
	8	TON	I	TX audio tone input.
	9	ALT	I	Not use.
TX-RX UNIT (X57-4200-11) (C/4) : Display section				
CN401	1	PSW	O	Normally : 7.5V, Power switch ON : 0V
	2	MRX	O	Serial control signal output.
	3	MTX	I	Serial control signal input.
	4	5C	-	5V.
	5	E	-	GND.
TX-RX UNIT (X57-4200-11) (D/4) : SP/MIC jack section				
W401	1	M5	-	5V for external MIC (Max. 10mA).
	2	NC	-	Normally : 5V, 0V : Connected external MIC
	3	IM	I	Input for internal MIC.
	4	MIC	O	MIC signal output.
	5	PTT	O	Normally : 5V, Transmit when connected GND.
	6	E	-	GND.
	7	SP	O	Output from internal speaker (Max. 0.5W).
	8	AFO	I	Audio input (Max. 0.8W).
	9	TST	O	Data output with programing.
Front panel section				
CN1	1	NC	-	Not use.
	2	IMC	O	Internal MIC output.
	3	MCE	-	GND.
	4	SP	I	Internal speaker input (Max. 0.5W).
	5	NC	-	Not use.
	6	NC	-	Not use.
	7	NC	-	Not use.
	8	E	-	GND.
	9	NC	-	Not use.
	10	NC	-	Not use.
	11	NC	-	Not use.
	12	NC	-	Not use.
VCO UNIT (X58-4000-11)				
CN501		TP	O	PLL lock voltage output (0V~5V).
		MD2	I	Modulation (VCO2).
		V2	-	5V (Talk-around).
		5CB	-	5V.
		REF	I	12.8MHz input (1Vp-p).
		MD1	I	Modulation (VCO1).
		PUL	O	Unlock signal. Normally : 5V, Unlock : 0V
		PCK	I	PLL clock data input. Normally : 5V
		PDA	I	PLL data line input. Normally : 5V
		PEN	I	PLL enable data input. Normally : 5V
		V1	-	5V (VCO1).
CN502		E	-	GND.
		PO	O	VCO output.
		E	-	GND.

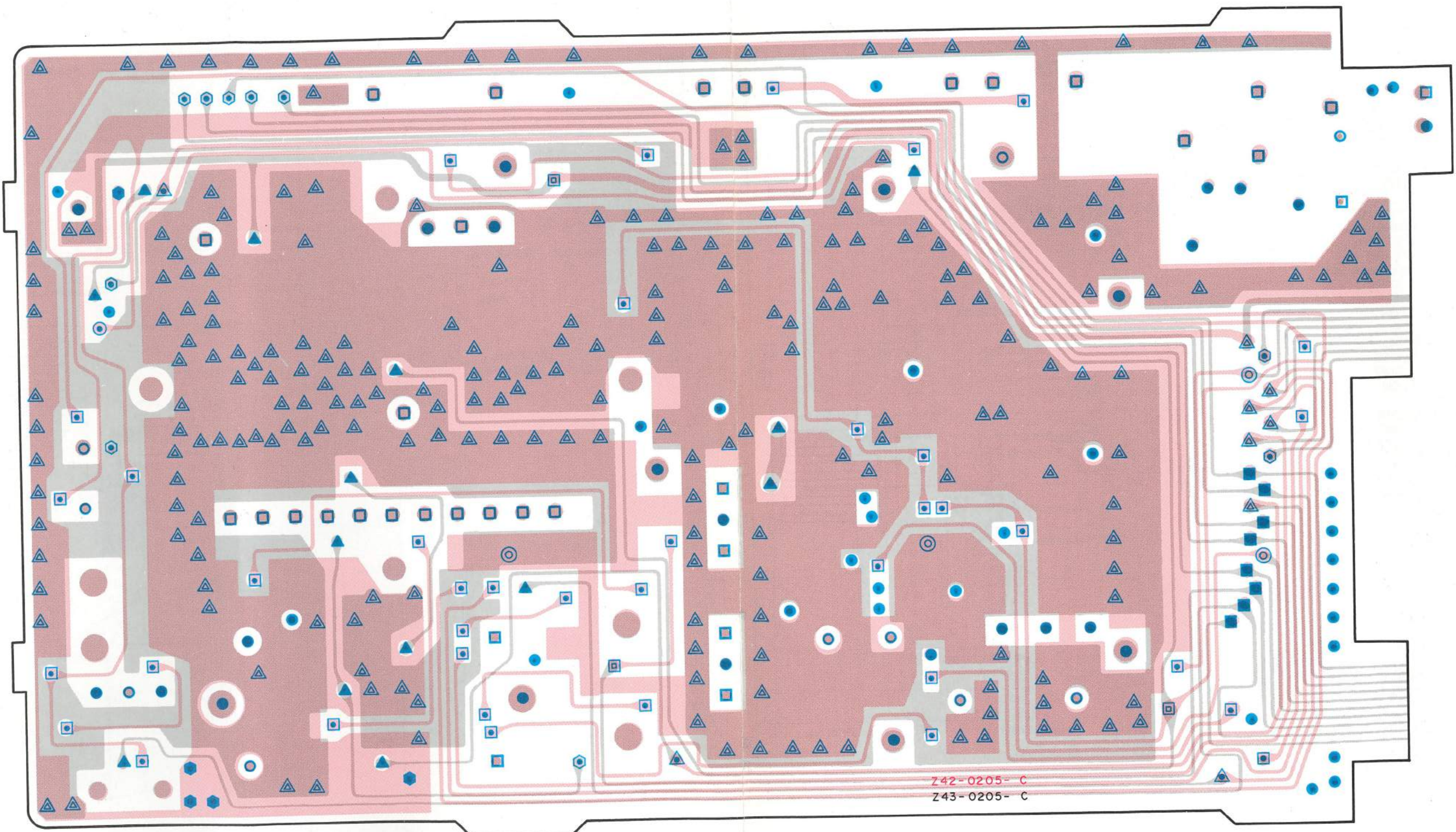
TK-431 PC BOARD VIEWS

TX-RX UNIT (X57-4200-11) (A/4) Component side view



- A and B connected
- A and C connected
- A and D connected
- B and C connected
- ▲ B and D connected
- ▲ C and D connected
- A, B and C connected
- A, B and D connected
- A, C and D connected
- B, C and D connected
- ▲ A, B, C and D connected
- A only
- B only
- ▲ C only
- D only
- No mark is not connected

A pattern
 B pattern



Z42-0205-C
 Z43-0205-C

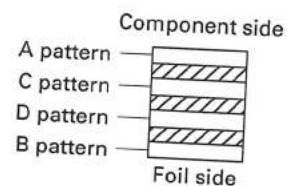
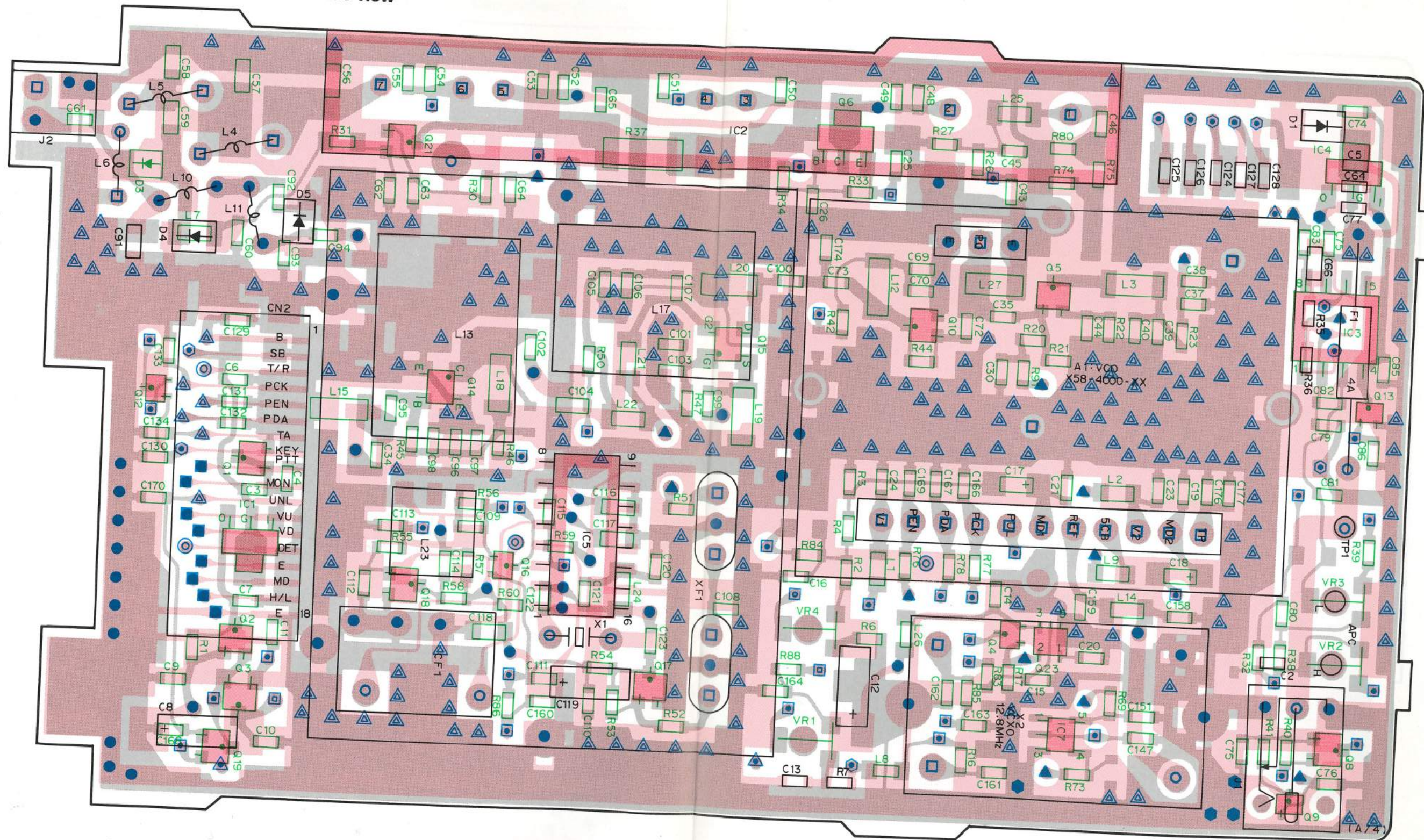
■ C pattern
 ■ D pattern

2
 3
 4
 5
 6

A
 C
 D
 B

7

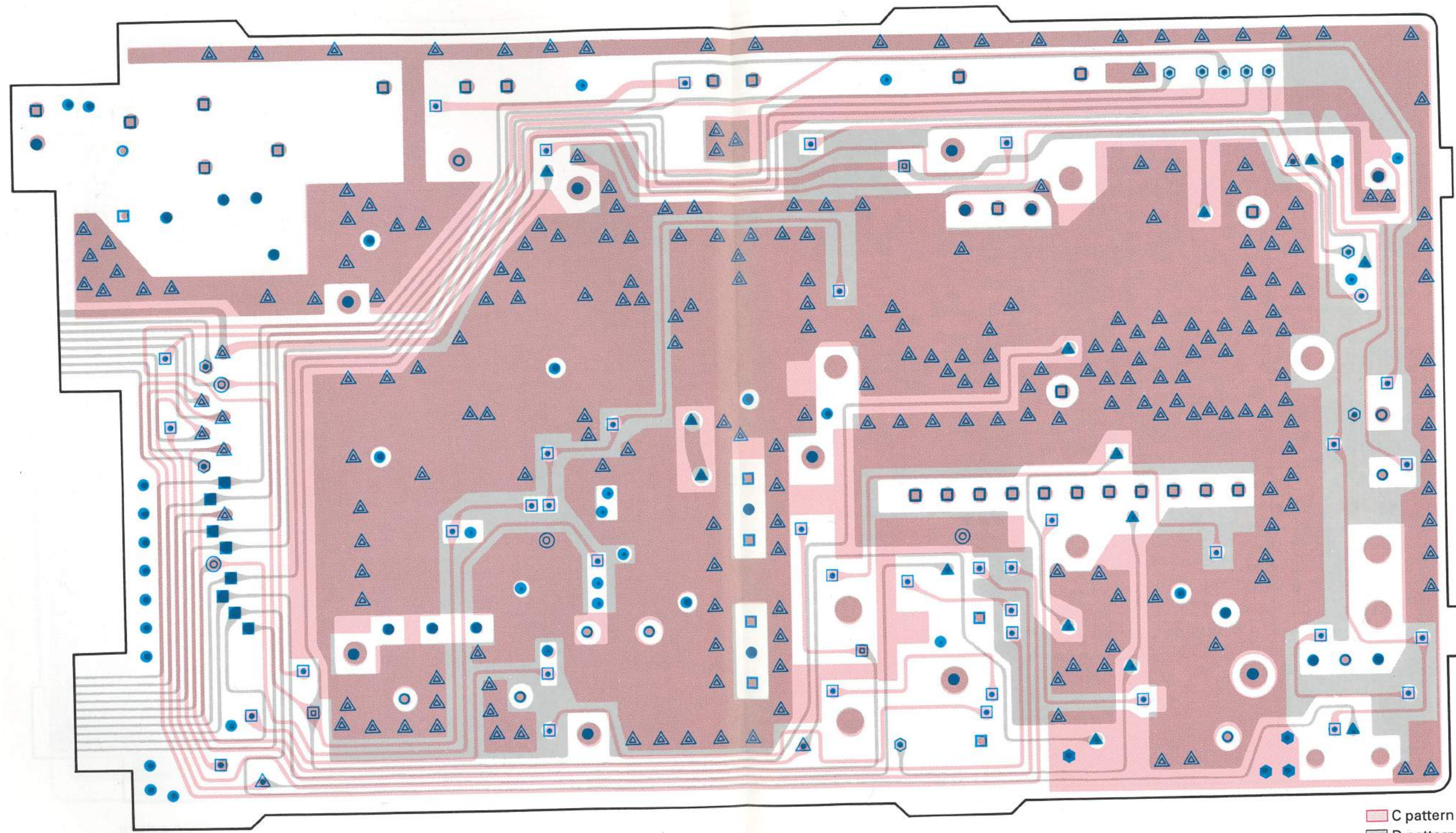
TX-RX UNIT (X57-4200-11) (A/4) Foil side view



- A and B connected
- ⊙ A and C connected
- A and D connected
- B and C connected
- ▲ B and D connected
- △ C and D connected
- A, B and C connected
- ⊙ A, B and D connected
- ⊙ A, C and D connected
- B, C and D connected
- ▲ A, B, C and D connected
- A only
- B only
- △ C only
- ⊙ D only
- No mark is not connected

- A pattern
- B pattern

PC BOARD VIEWS TK-431

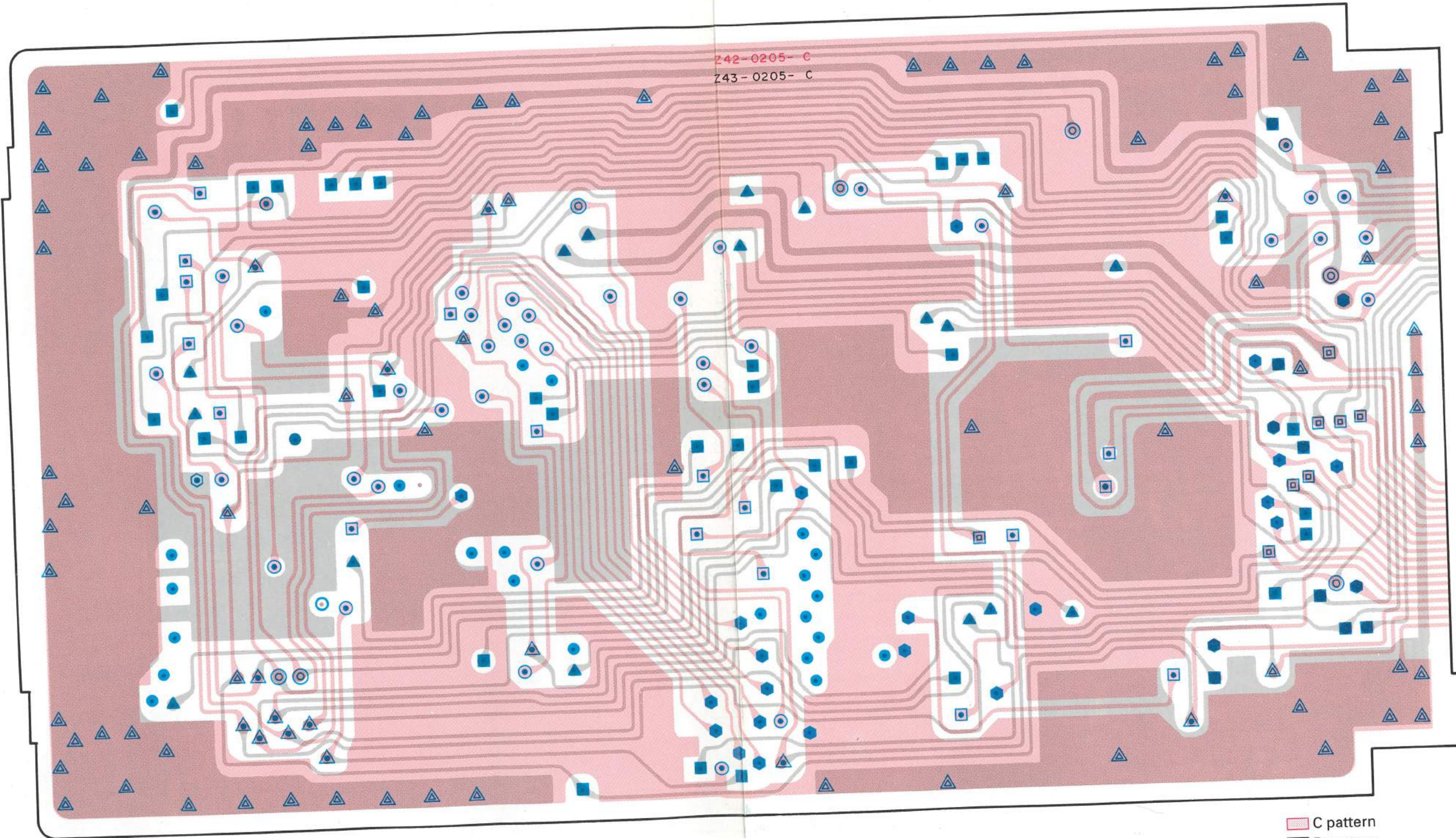


C pattern
D pattern

L M N O P Q R S T

1
2
3
4
5
6
7

TK-4
A
1
2
3
4
5
6
7

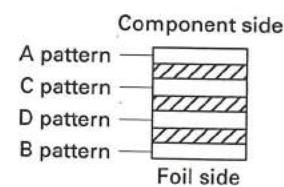
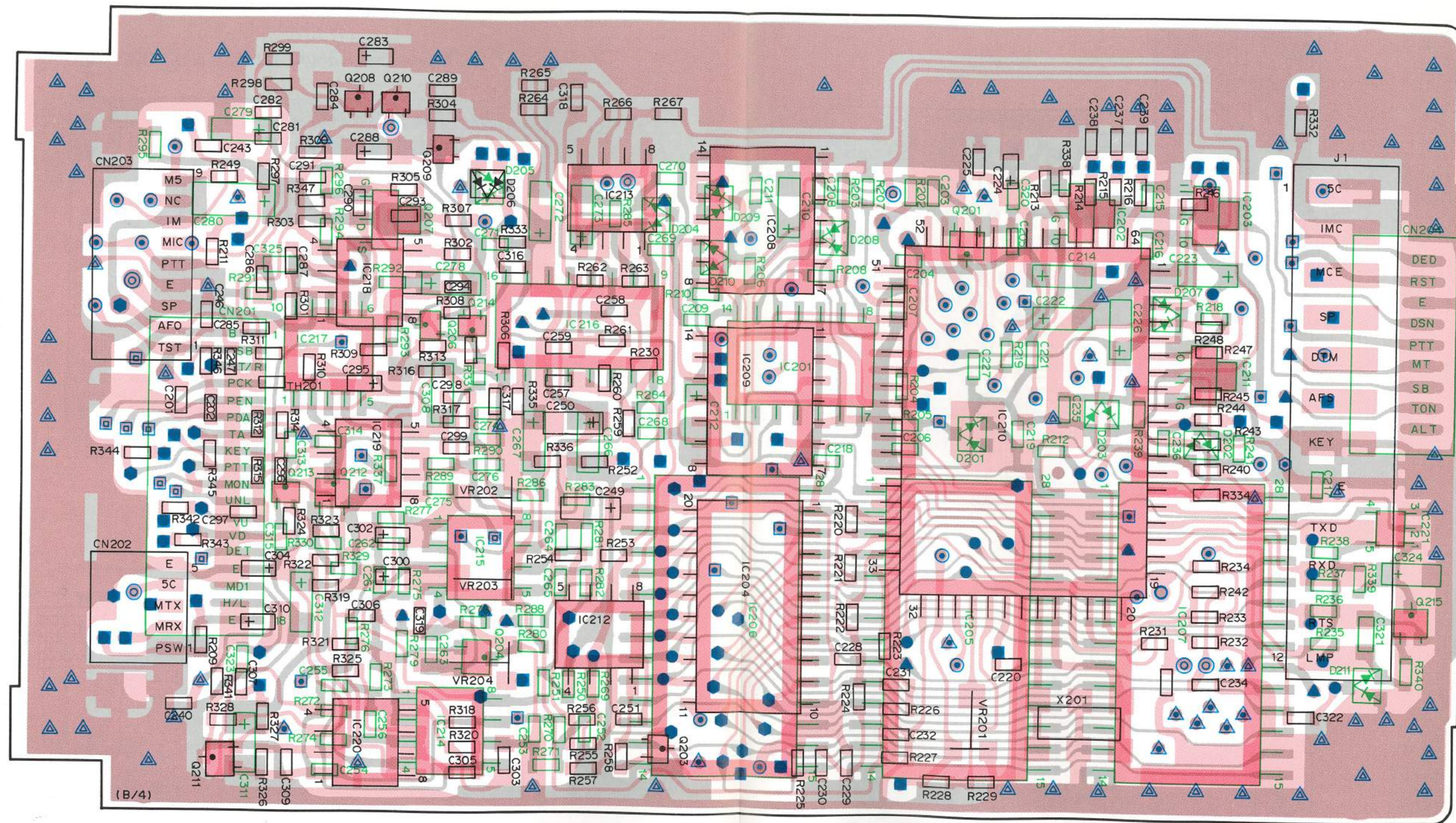


242-0205-C
243-0205-C

C pattern
D pattern

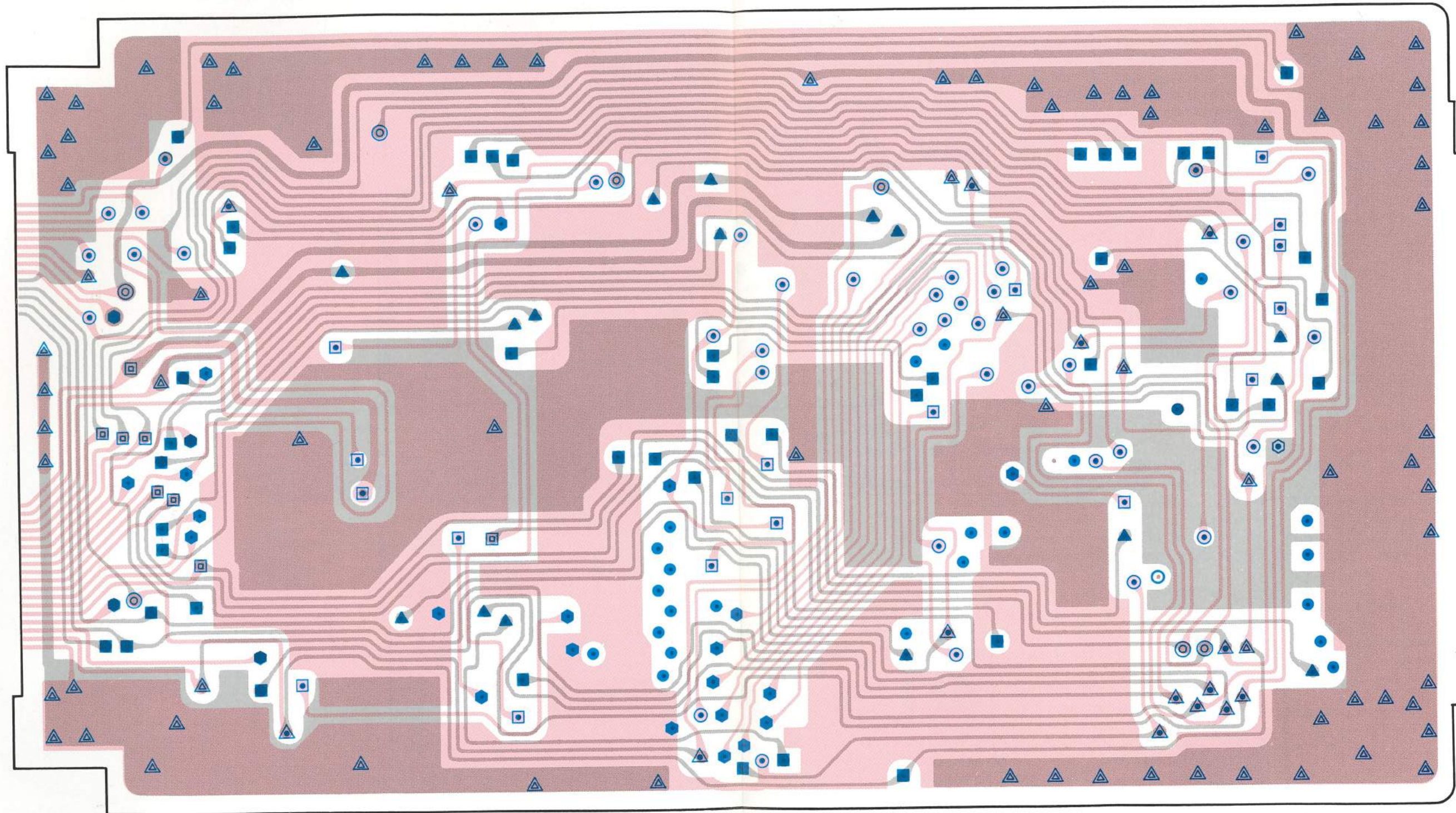
2
3
4
5
6

TX-RX UNIT (X57-4200-11) (B/4) Foil side view



- A and B connected
- ⊙ A and C connected
- A and D connected
- ▣ B and C connected
- ▲ B and D connected
- △ C and D connected
- A, B and C connected
- ⊙ A, B and D connected
- ⊙ A, C and D connected
- B, C and D connected
- ▲ A, B, C and D connected
- A only
- B only
- ▲ C only
- ⊙ D only
- No mark is not connected

- A pattern
- B pattern



■ C pattern
■ D pattern

d by program-
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SYSTEM indi-
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system out of
en the system
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3 appears to indi-
the scan se-
d even if it is
e Delete (▶)
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revert system

e A (Auxiliary)
feature does

Time Time)
an stops. The
l as 0 to 254
default value

mission ends
5 can be set to 0
default value is

hed for one of

revert system
6 ne system of

ing scanning
ission and re-
ne system of
em or group.

3-6. Scan Me

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monitored for
multiples of th
lines.

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no call, data m
peater of the

3-7. Call Indic

The call in
group. In trun
a selectable d
block IDs. W
decode ID, th
received with
tinuously.

In a conver
programmed
keeps flashing
off by pressi
key.

3-8. Time-Out

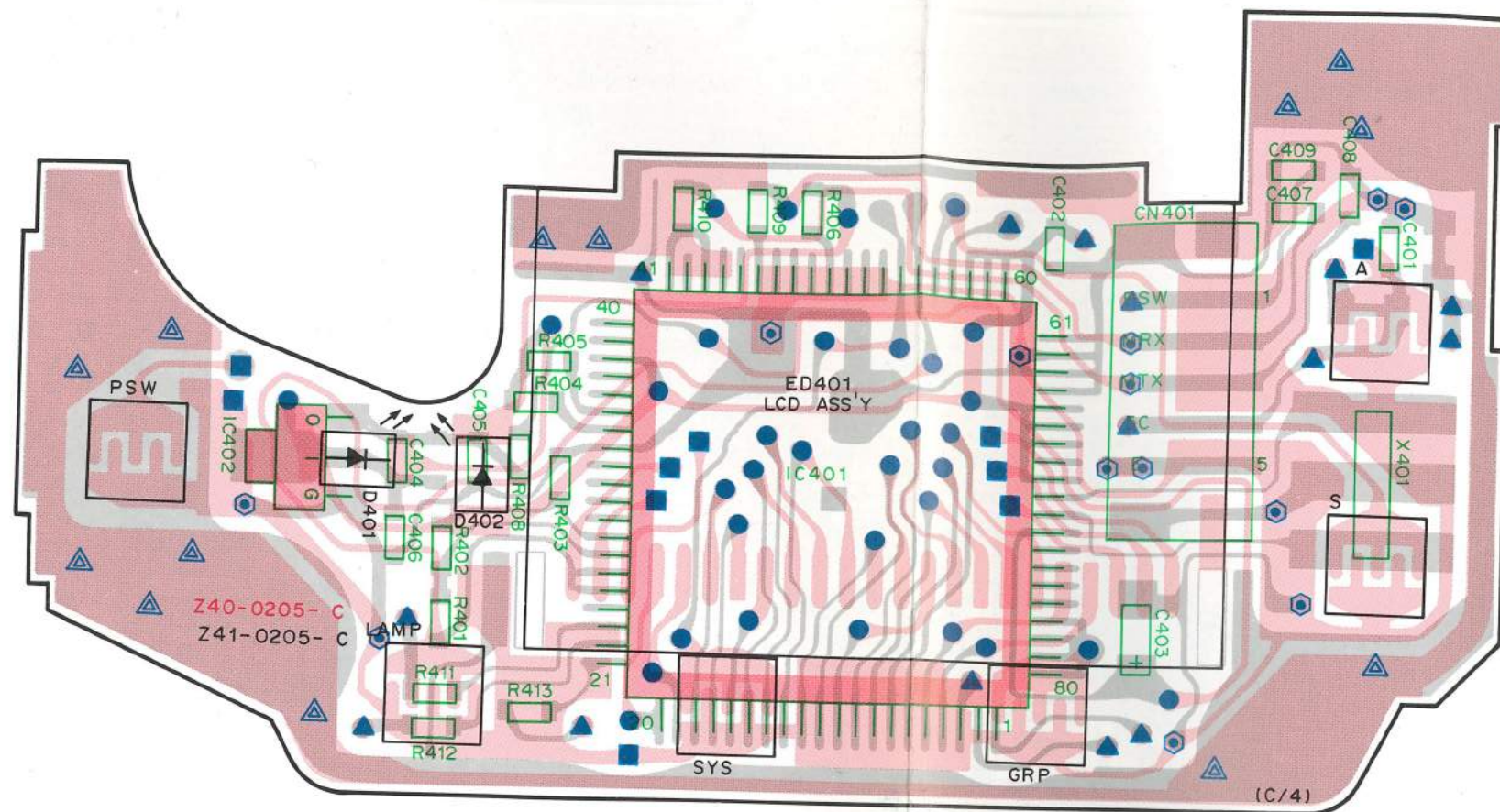
The time-o
onds increme
dispatch and i
ter is keyed
grammed time
ing tone sour
The alert tone
The default va
minutes for in

3-9. Priority I

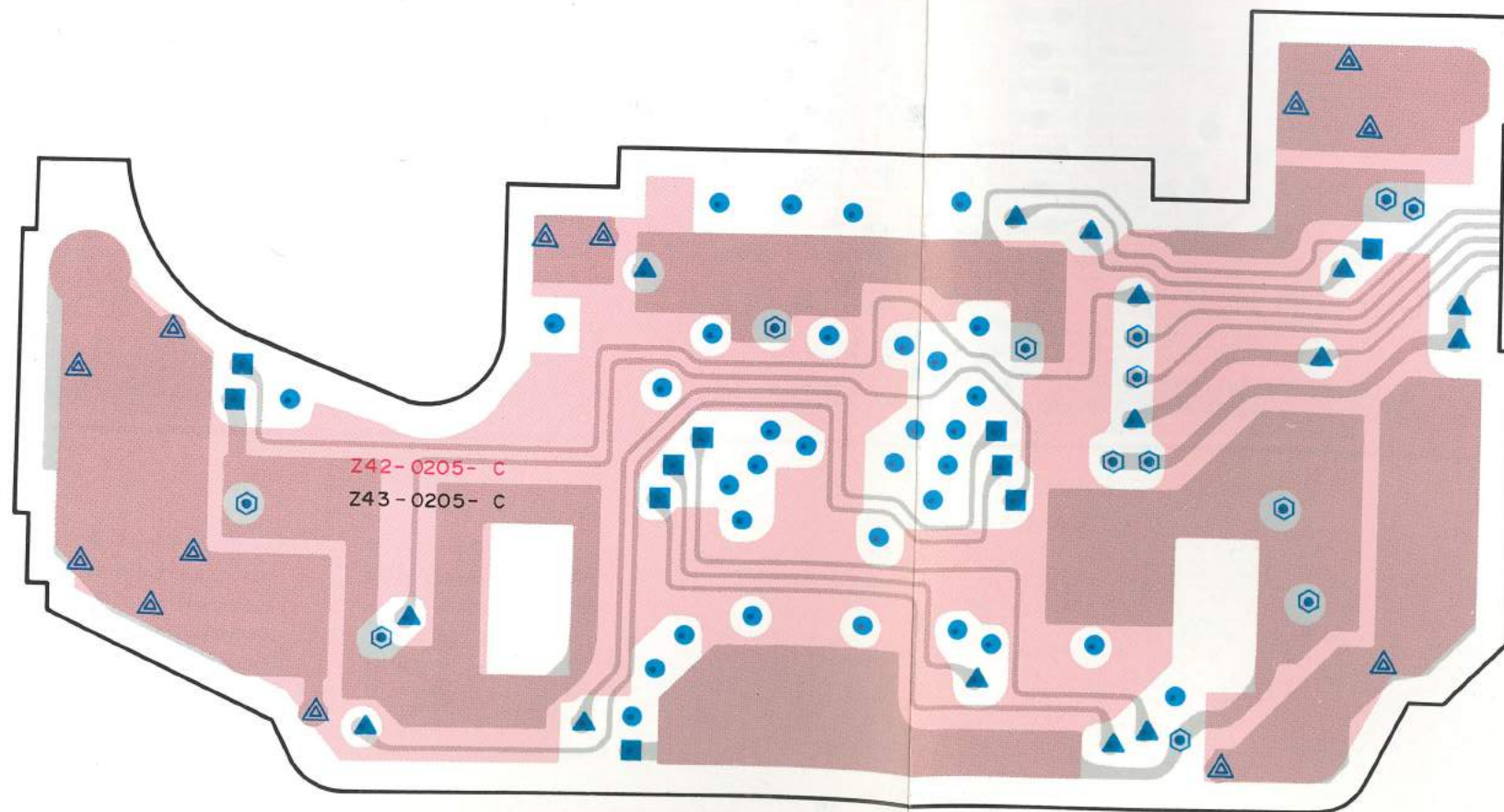
The priority
for each syste
1) Fixed ID
2) Fixed ID
3) Selected
4) Other se
5) Block de
When a call
call is receive
ceiver is trunk

TK-431 PC BOARD VIEWS

TX-RX UNIT (X57-4200-11) (C/4) Component side view

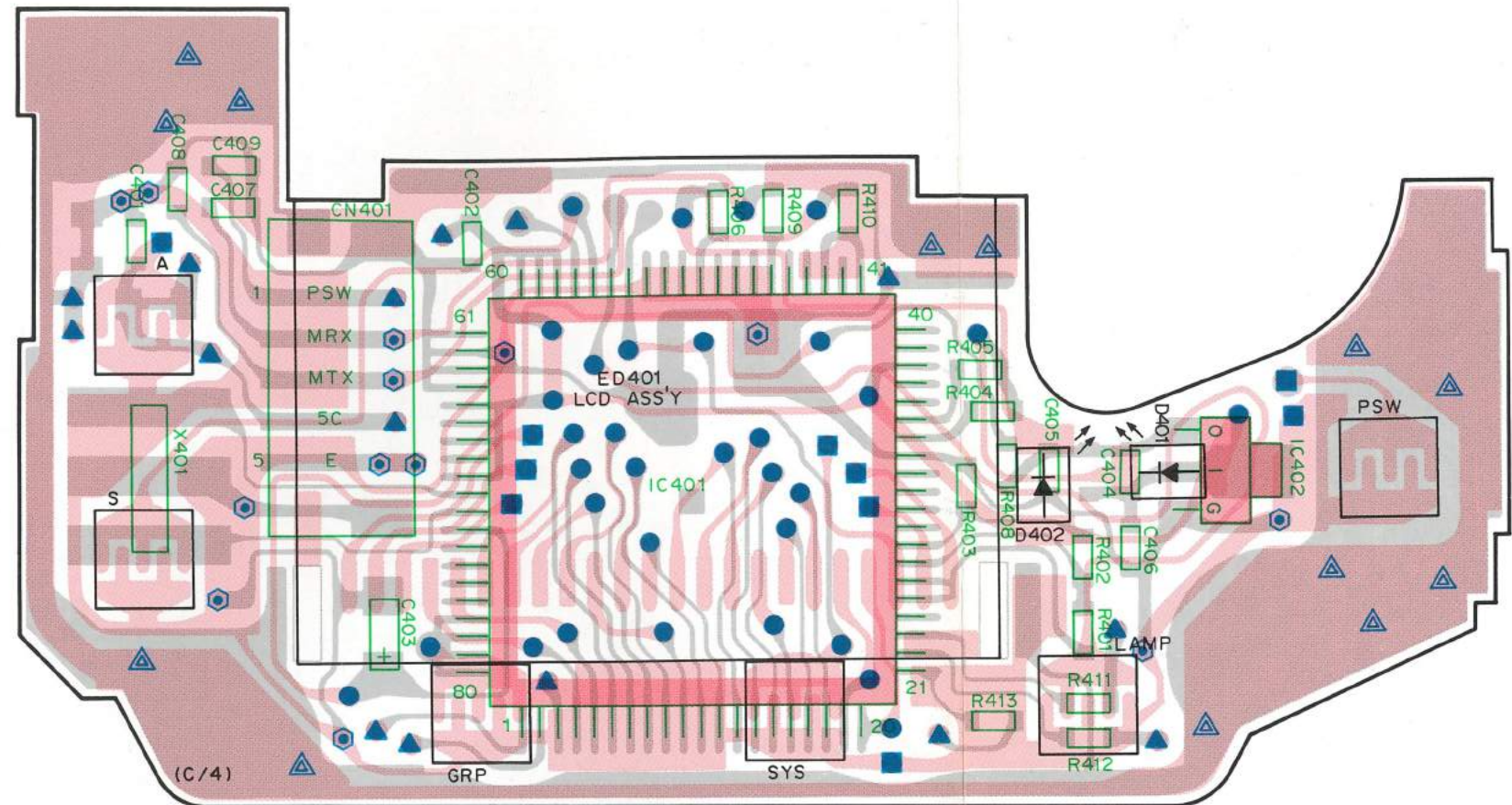


A pattern
B pattern

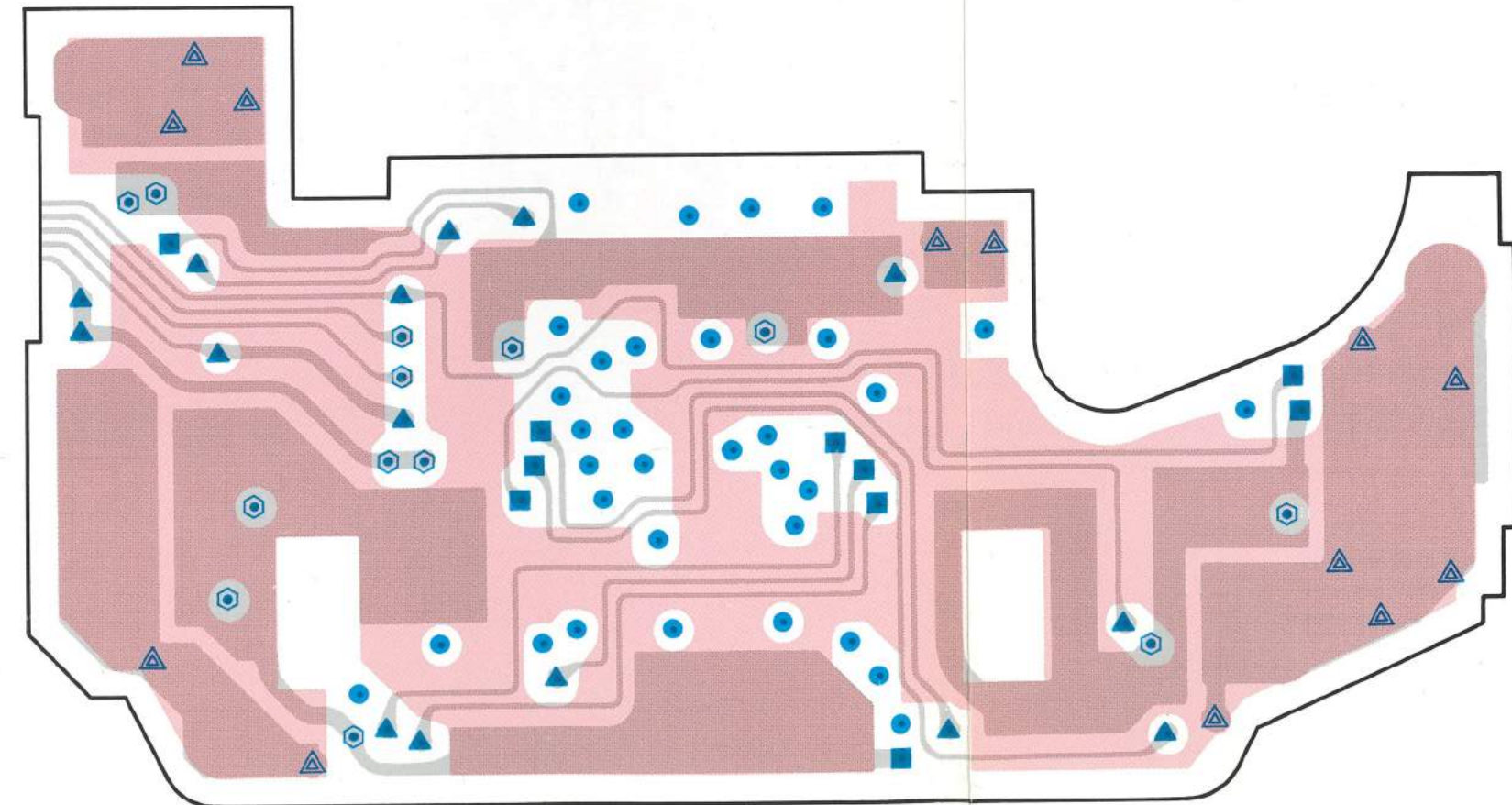


C pattern
D pattern

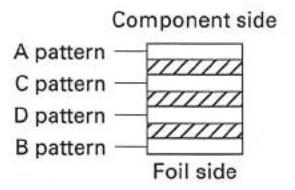
TX-RX UNIT (X57-4200-11) (C/4) Foil side view



A pattern
B pattern

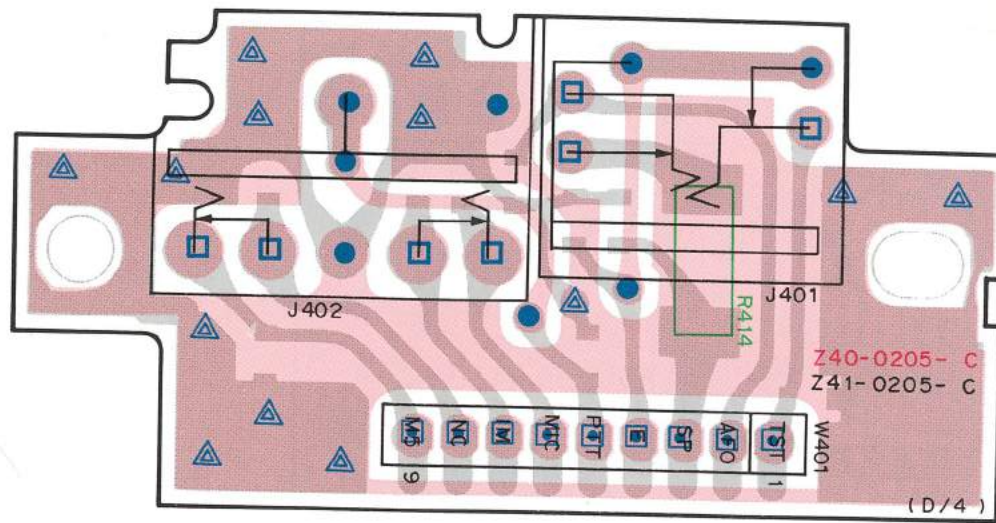


C pattern
D pattern

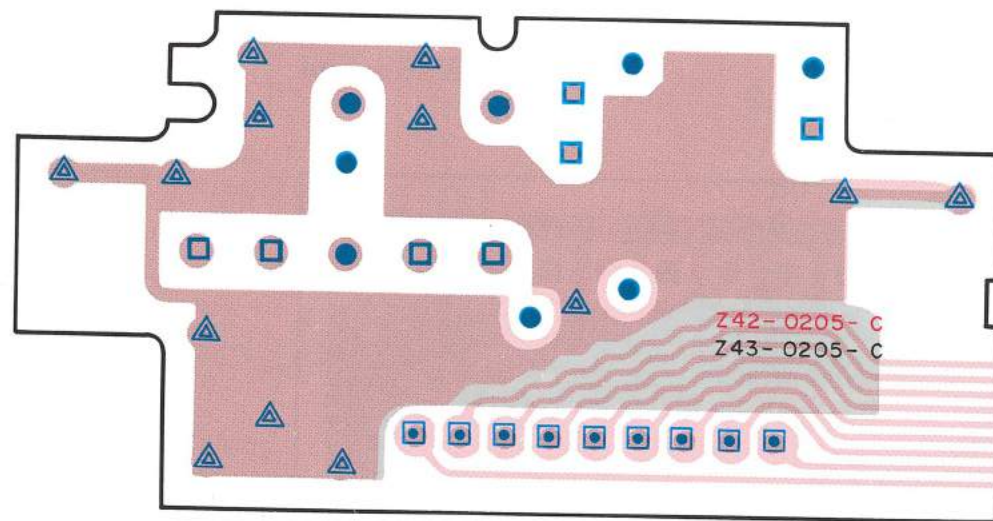


- A and B connected
- ⊙ A and C connected
- A and D connected
- ⊠ B and C connected
- ▲ B and D connected
- △ C and D connected
- A, B and C connected
- ⊙ A, B and D connected
- ⊙ A, C and D connected
- ⊠ B, C and D connected
- ▲ A, B, C and D connected
- A only
- B only
- △ C only
- D only
- No mark is not connected

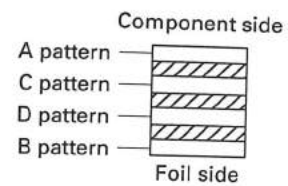
TX-RX UNIT (X57-4200-11) (D/4) Component side view



A pattern
 B pattern

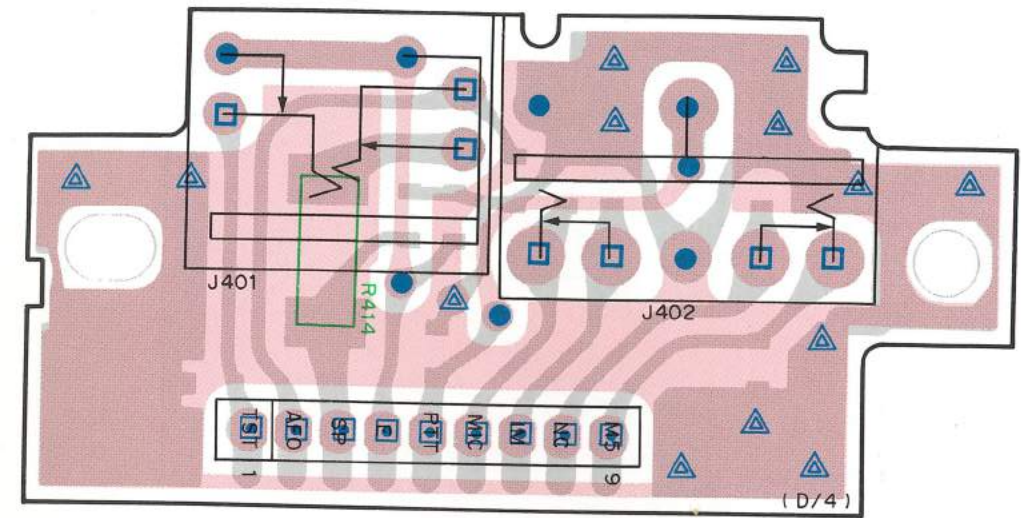


C pattern
 D pattern

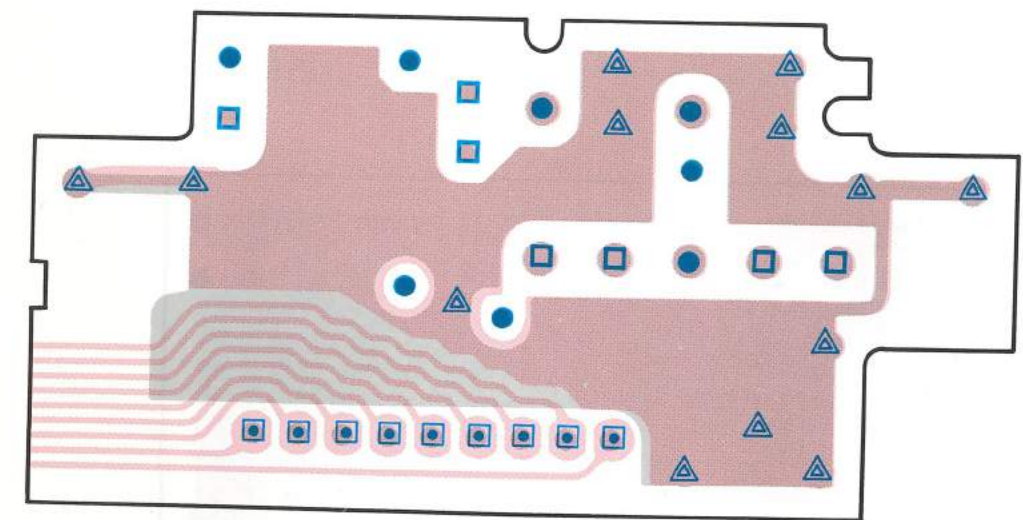


- A and B connected
- A and C connected
- A and D connected
- B and C connected
- ▲ B and D connected
- △ C and D connected
- A, B and C connected
- A, B and D connected
- ⊙ A, C and D connected
- ⊠ B, C and D connected
- ▲ A, B, C and D connected
- A only
- B only
- △ C only
- D only
- No mark is not connected

TX-RX UNIT (X57-4200-11) (D/4) Foil side view



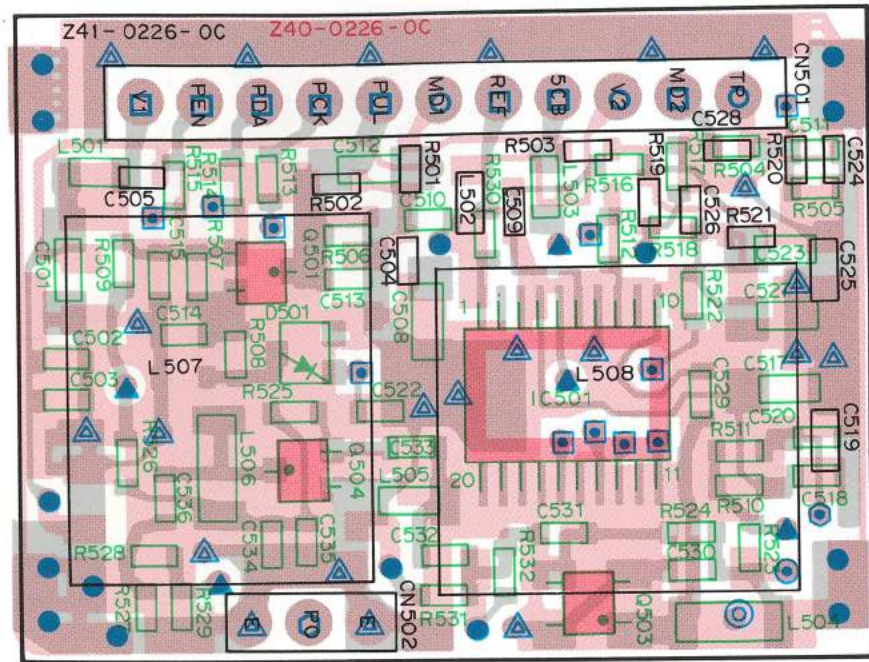
A pattern
 B pattern



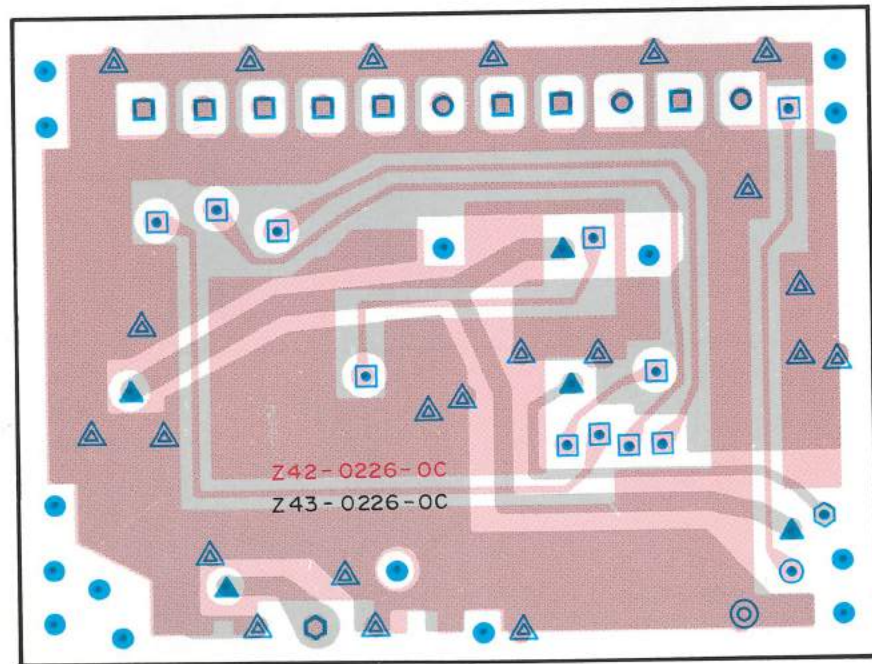
C pattern
 D pattern

TK-431 PC BOARD VIEWS

VCO UNIT (X58-4000-11) Component side view

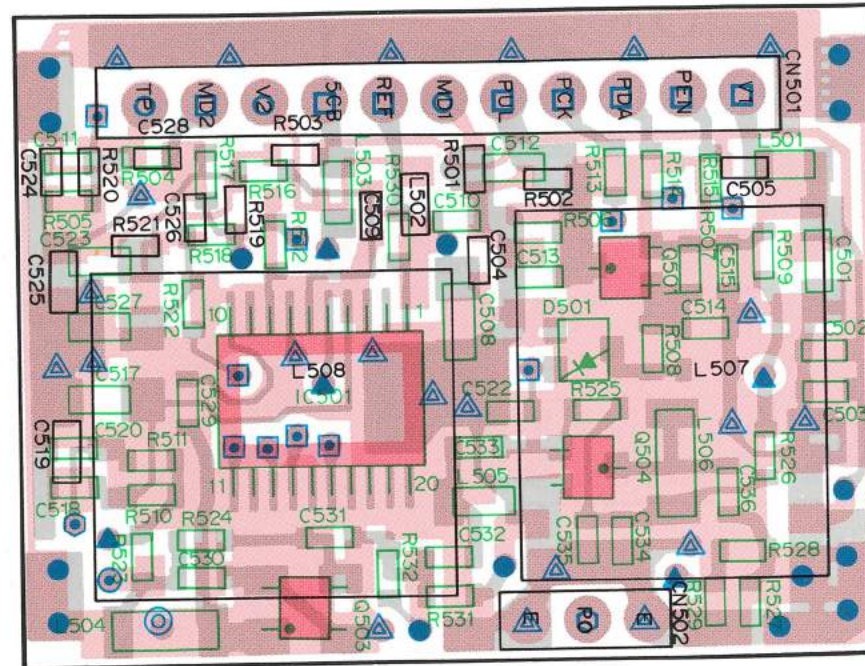


A pattern
 B pattern

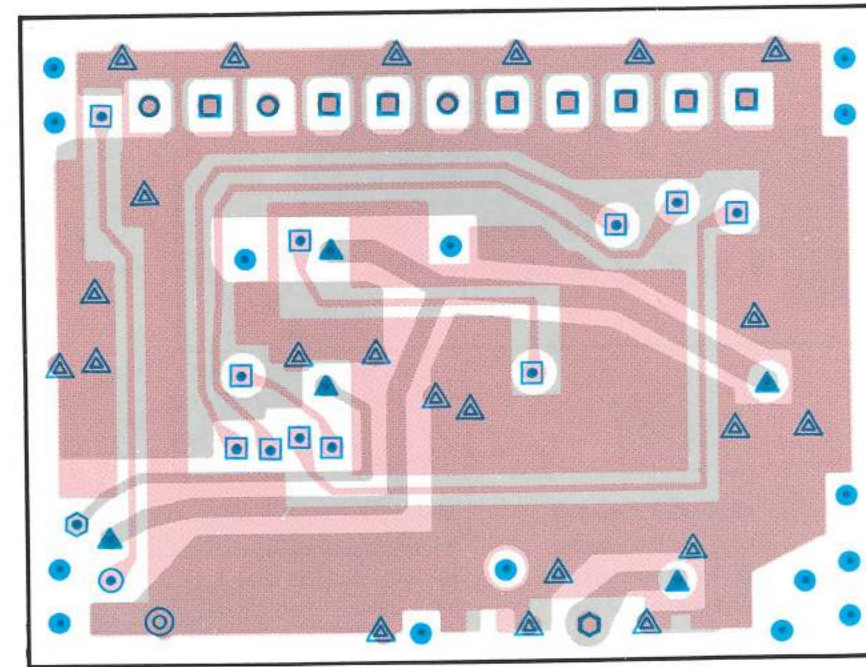


C pattern
 D pattern

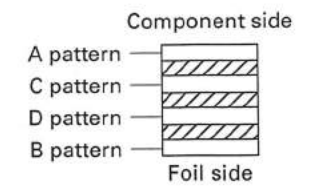
VCO UNIT (X58-4000-11) Foil side view



A pattern
 B pattern



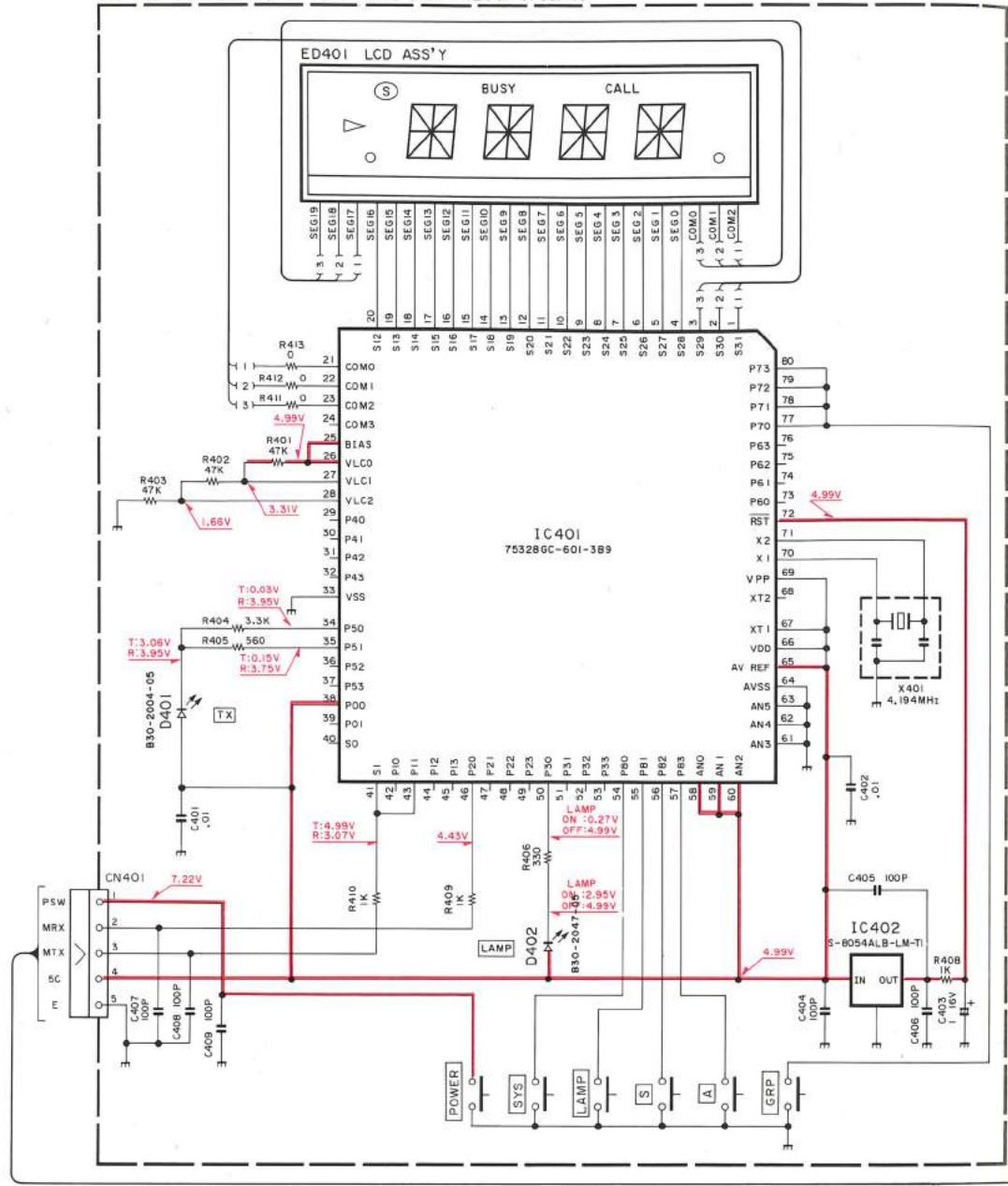
C pattern
 D pattern



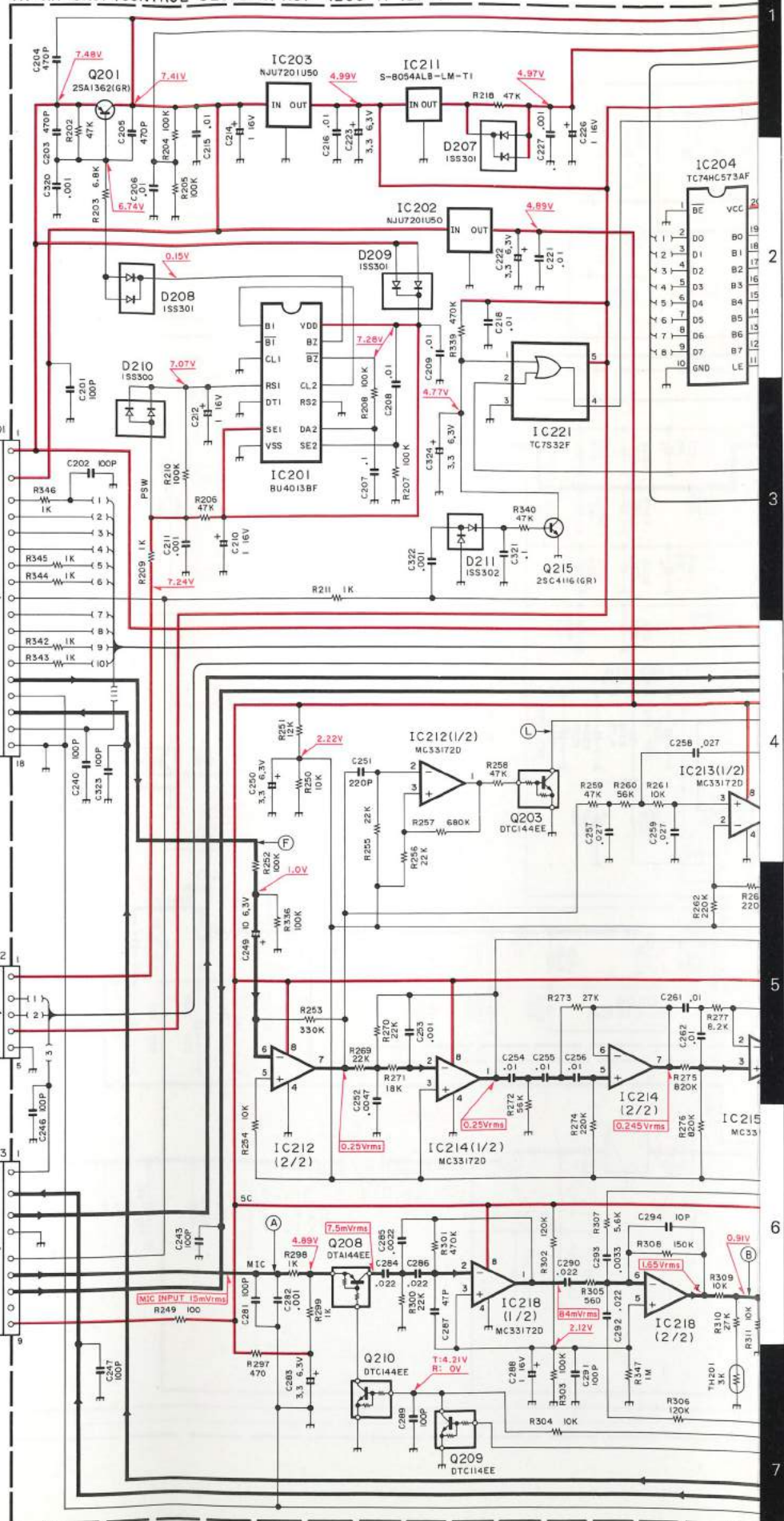
- A and B connected
- ⊙ A and C connected
- A and D connected
- B and C connected
- ▲ B and D connected
- △ C and D connected
- A, B and C connected
- ⊙ A, B and D connected
- ⊙ A, C and D connected
- B, C and D connected
- ▲ A, B, C and D connected
- A only
- B only
- △ C only
- ⊙ D only

No mark is not connected

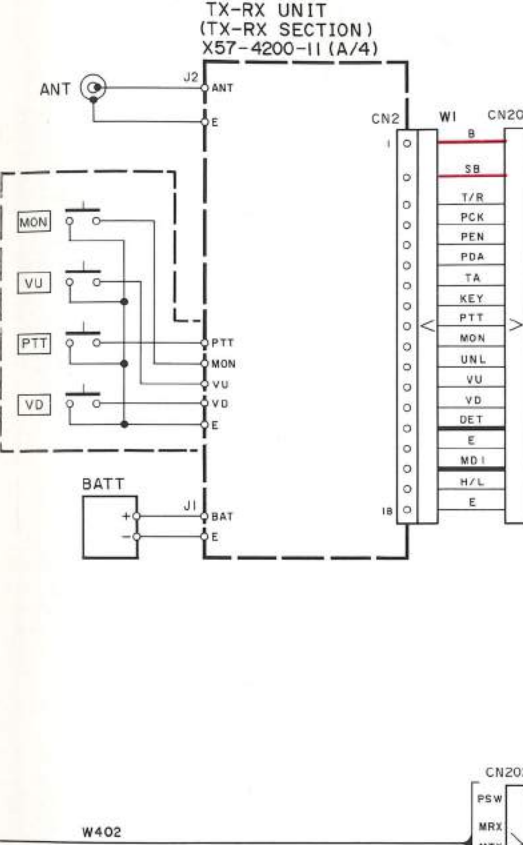
TX-RX UNIT(DISPLAY SECTION) X57-4200-11 (C/4)



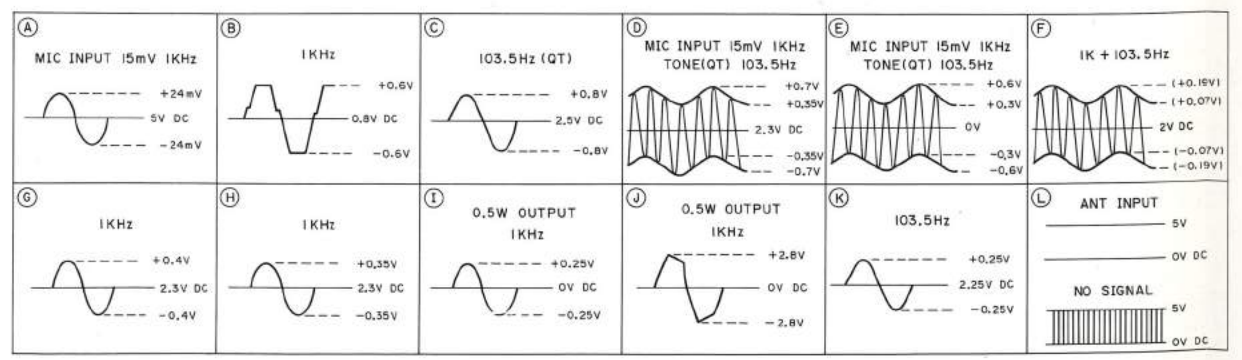
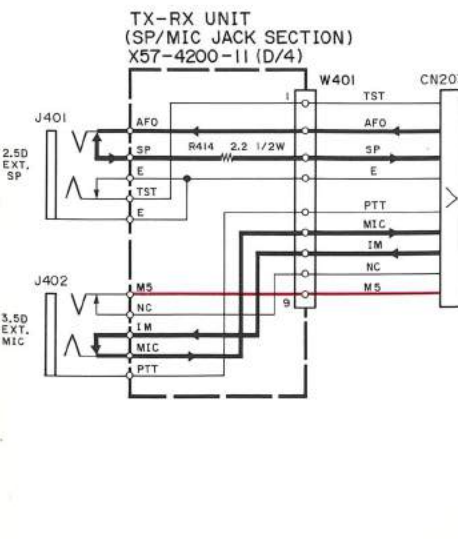
TX-RX UNIT (CONTROL SECTION) X57-4200-11 (B/4)



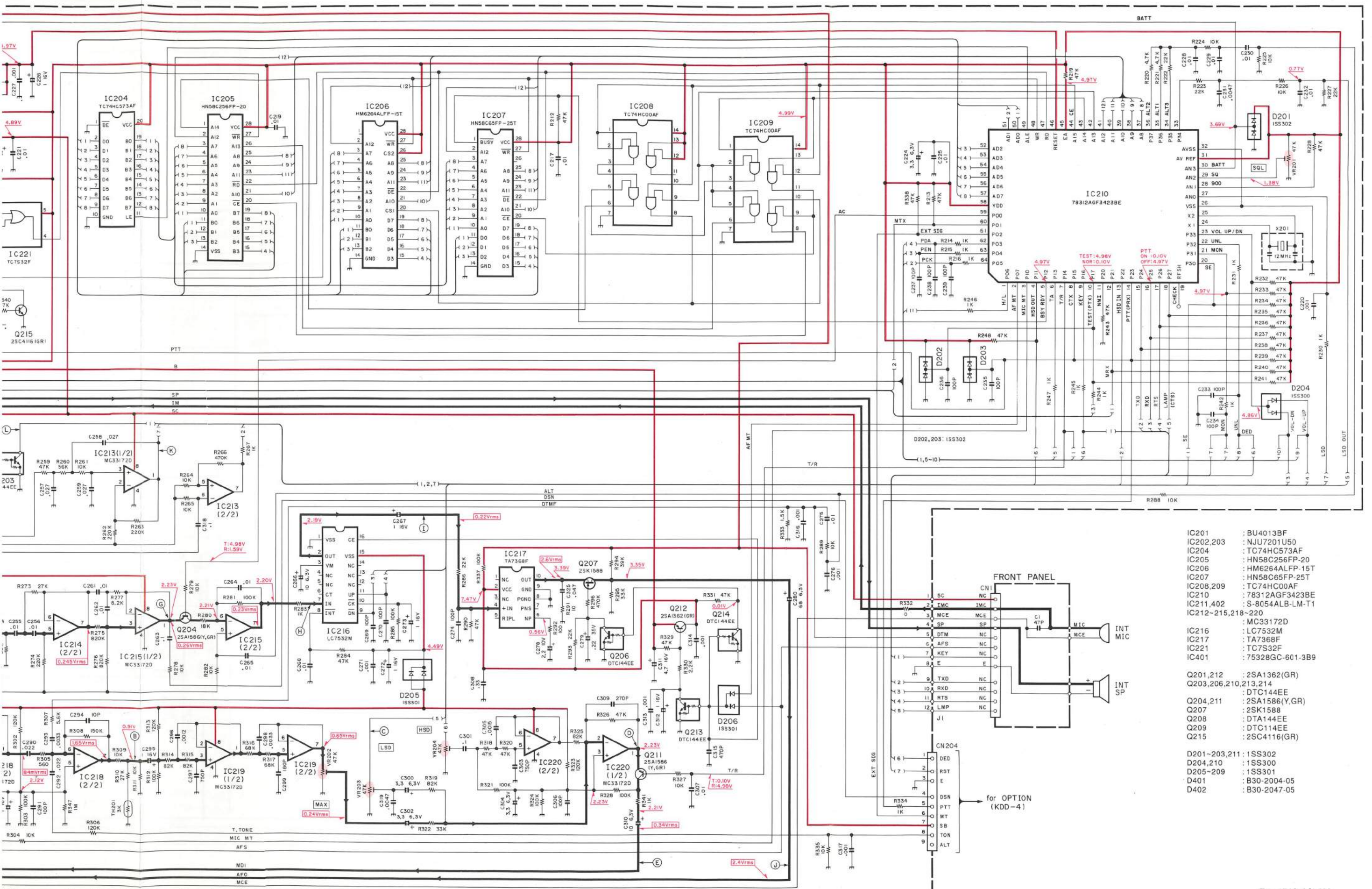
TX-RX UNIT (TX-RX SECTION) X57-4200-11 (A/4)



TX-RX UNIT (SP/MIC JACK SECTION) X57-4200-11 (D/4)



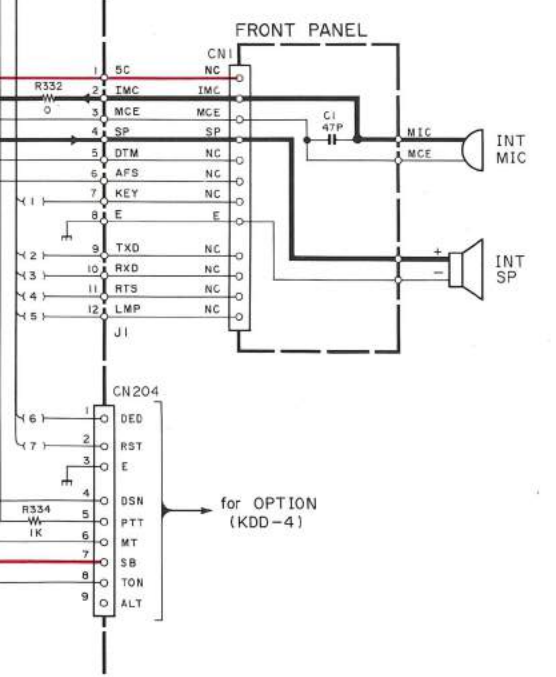
SCHEMATIC DIAGRAM TK-431



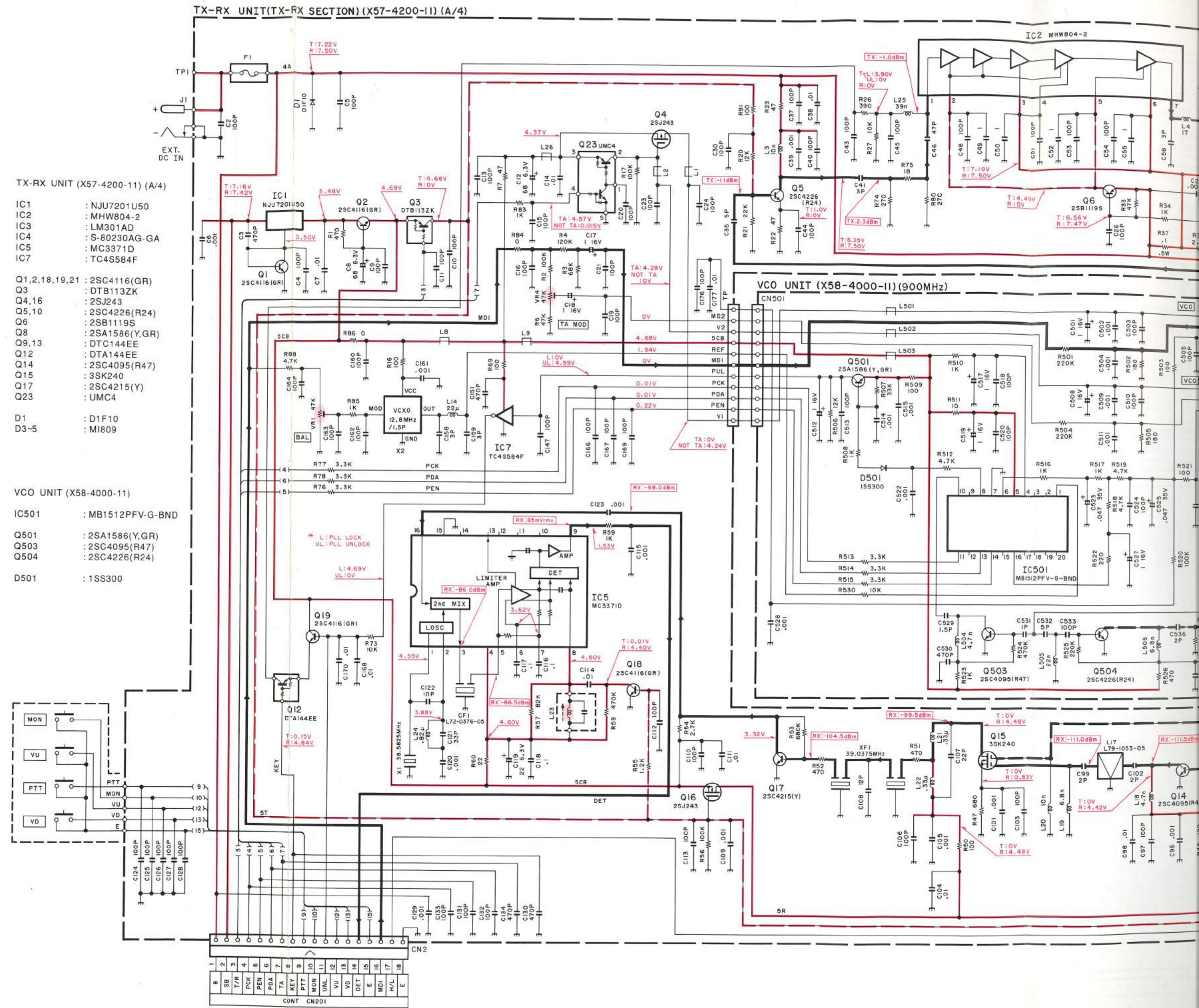
- IC201 : BU4013BF
- IC202,203 : NJU7201U50
- IC204 : TC74HC573AF
- IC205 : HN58C256FP-20
- IC206 : HM6264ALFP-15T
- IC207 : HN58C65FP-25T
- IC208,209 : TC74HC00AF
- IC210 : 78312AGF3423BE
- IC211,402 : S-8054ALB-LM-T1
- IC212-215,218-220 : MC33172D
- IC216 : LC7532M
- IC217 : TA7368F
- IC221 : TC7S32F
- IC401 : 75328GC-601-3B9

- Q201,212 : 2SA1362(GR)
- Q203,206,210,213,214 : DTC144EE
- Q204,211 : 2SA1586(Y,GR)
- Q207 : 2SK1588
- Q208 : DTA144EE
- Q209 : DTC114EE
- Q215 : 2SC4116(GR)

- D201-203,211 : 1SS302
- D204,210 : 1SS300
- D205-209 : 1SS301
- D401 : B30-2004-05
- D402 : B30-2047-05



TK-431 SCHEMATIC DIAGRAM



TX-RX UNIT (X57-4200-11) (A/4)

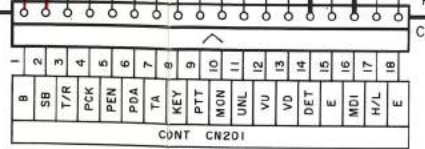
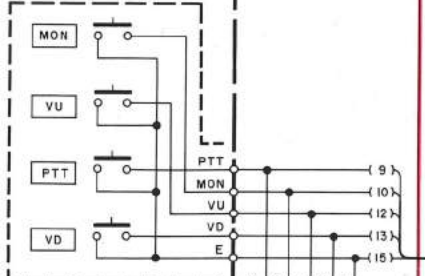
- IC1 : NJU7201U50
- IC2 : MHW804-2
- IC3 : LM301AD
- IC4 : S-80230AG-GA
- IC5 : MC3371D
- IC7 : TC4S584F

- Q1,2,18,19,21 : 2SC4116(GR)
- Q3 : DTB113ZK
- Q4,16 : 2SJ243
- Q5,10 : 2SC4226(R24)
- Q6 : 2SB1119S
- Q8 : 2SA1586(Y,GR)
- Q9,13 : DTC144EE
- Q12 : DTA144EE
- Q14 : 2SC4095(R47)
- Q15 : 3SK240
- Q17 : 2SC4215(Y)
- Q23 : UMC4

- D1 : D1F10
- D3-5 : MI809

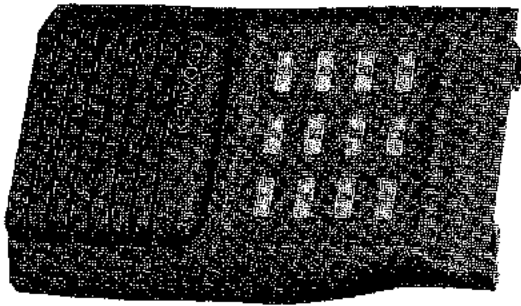
VCO UNIT (X58-4000-11)

- IC501 : MB1512PFV-G-BND
- Q501 : 2SA1586(Y,GR)
- Q503 : 2SC4095(R47)
- Q504 : 2SC4226(R24)
- D501 : 1SS300

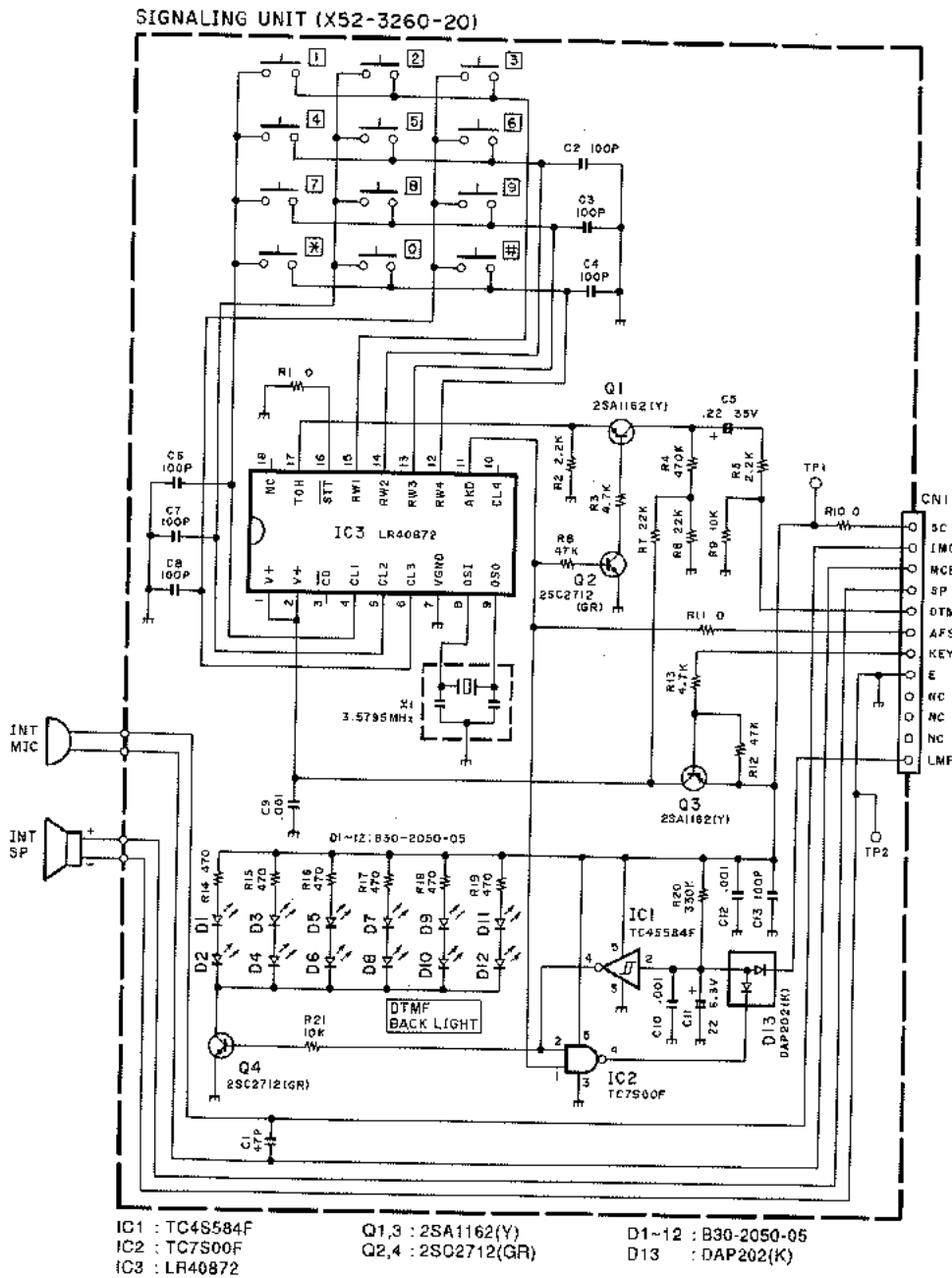


KDM-6 (DTMF KEY PANEL)

KDM-6 External View



KDM-6 Circuit Diagram



KDM-6 (DTMF KEY PANEL)

* New Parts

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.

KDM-6 Parts List

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名/規格	Desti- nation 仕向	Re- marks 備考
KDM-6						
		*	A02-1686-14	FRONT CASE ASSY		
		*	A02-1687-04	FRONT CASE		
			B37-0302-05	FINISHED WIRE(SP)		
			E40-5582-05	PIN ASSY		
			G10-0731-04	PBLT(MIC)		
		*	H25-0721-04	PROTECTION BAG		
		*	H52-0330-03	ITEM CARTON BOX		
			J39-0434-04	SPACER(MIC)		
			J69-0329-05	RING SPACER		
		*	K29-4801-13	KEY TOP		
		*	N82-2006-46	BINDING HEAD TAPTITE SCREW		
			T07-0257-05	LOUDSPEAKER(8 OHM,0.5W)		
			T91-0502-05	CONDENSER MIC		
		*	X52-3260-20	SIGNALING UNIT		
SIGNALING UNIT (X52-3260-20)						
C1			CC73FCH1H470J	CHIP C 47PF J		
C2 -4			CC73FCH1H101J	CHIP C 100PF J		
C5			C92-0002-05	CHIP TAN 0.22UF 35WV		
C6 -8			CC73FCH1H101J	CHIP C 100PF J		
C9 -10			CK73FB1H102K	CHIP C 1000PF K		
C11			C92-0012-05	TANTAL 22UF 6.3WV		
C12			CC73FB1H102K	CHIP C 1000PF K		
C13			CC73FCH1H101J	CHIP C 100PF J		
TP1 ,2			E23-0342-05	TERMINAL		
X1			L78-0035-05	CRYSTAL RESONATOR(3.5795MHZ)		
R1			R92-0670-05	CHIP R 0 OHM		
R2			RK73FB2A222J	CHIP R 2.2K J 1/10W		
R3			RK73FB2A472J	CHIP R 4.7K J 1/10W		
R4			RK73FB2A474J	CHIP R 470K J 1/10W		
R5			RK73FB2A222J	CHIP R 2.2K J 1/10W		
R6			RK73FB2A473J	CHIP R 47K J 1/10W		
R7 ,8			RK73FB2A223J	CHIP R 22K J 1/10W		
R9			RK73FB2A103J	CHIP R 10K J 1/10W		
R10 ,11			R92-0670-05	CHIP R 0 OHM		
R12			RK73FB2A473J	CHIP R 47K J 1/10W		
R13			RK73FB2A472J	CHIP R 4.7K J 1/10W		
R14 -19			RK73FB2A471J	CHIP R 470 J 1/10W		
R20			RK73FB2A334J	CHIP R 330K J 1/10W		
R21			RK73FB2A103J	CHIP R 10K J 1/10W		
D1 -12			B30-2050-05	DIODE		
D13			DAP202K	DIODE		
IC1			TC4S584F	IC(SCHMITT TRIGGER)		
IC2			TC7S00F	IC(2CH NAND GATE)		
IC3			LR40872	IC(TONE DIALER)		
Q1 ,3			2SA1162(Y)	TRANSISTOR		
Q2 ,4			2SC2712(GR)	TRANSISTOR		

L:Scandinavia

K:USA

P:Canada

Y:PX(Far East, Hawaii)

T:England

E:Europe

Y:AAFES(Europe)

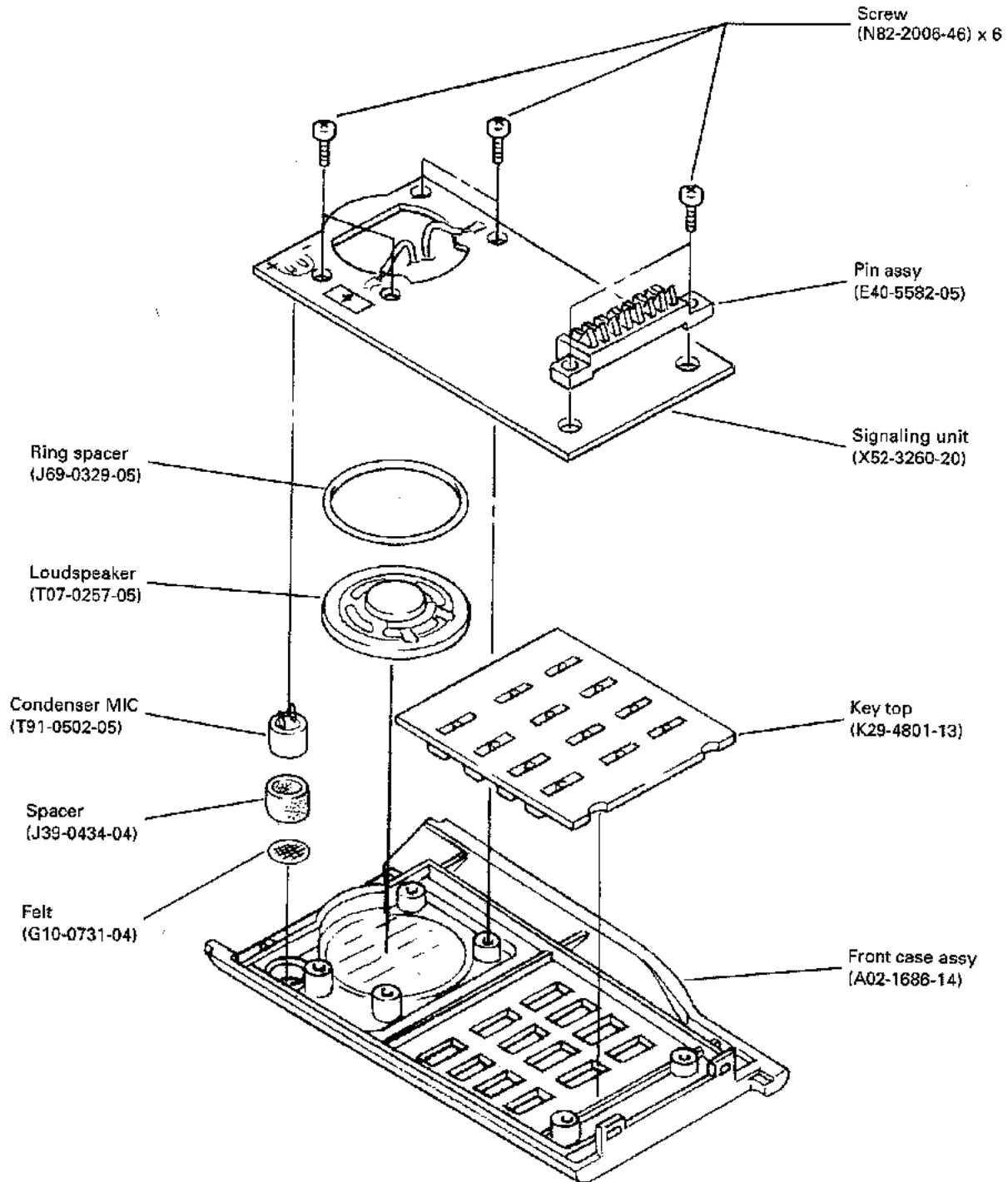
X:Australia

M:Other Areas

△ indicates safety critical components.

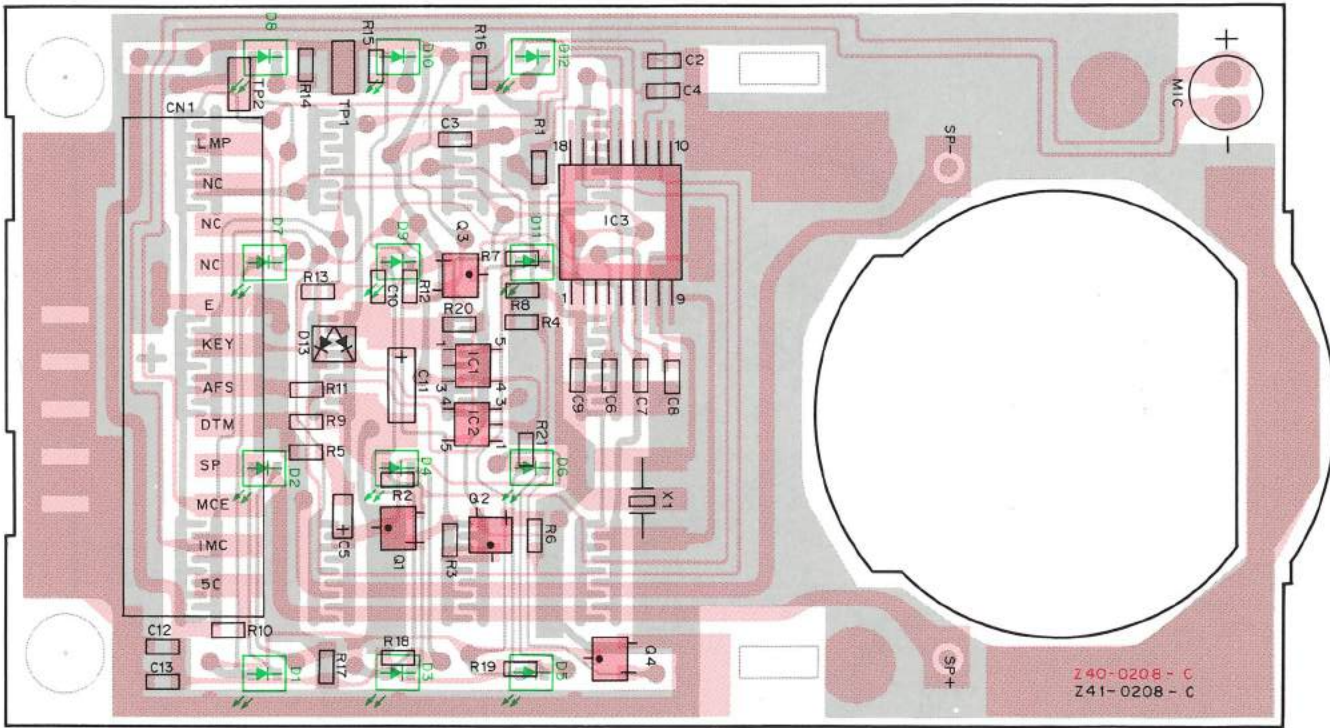
KDM-6 (DTMF KEY PANEL)

KDM-6 Disassembly

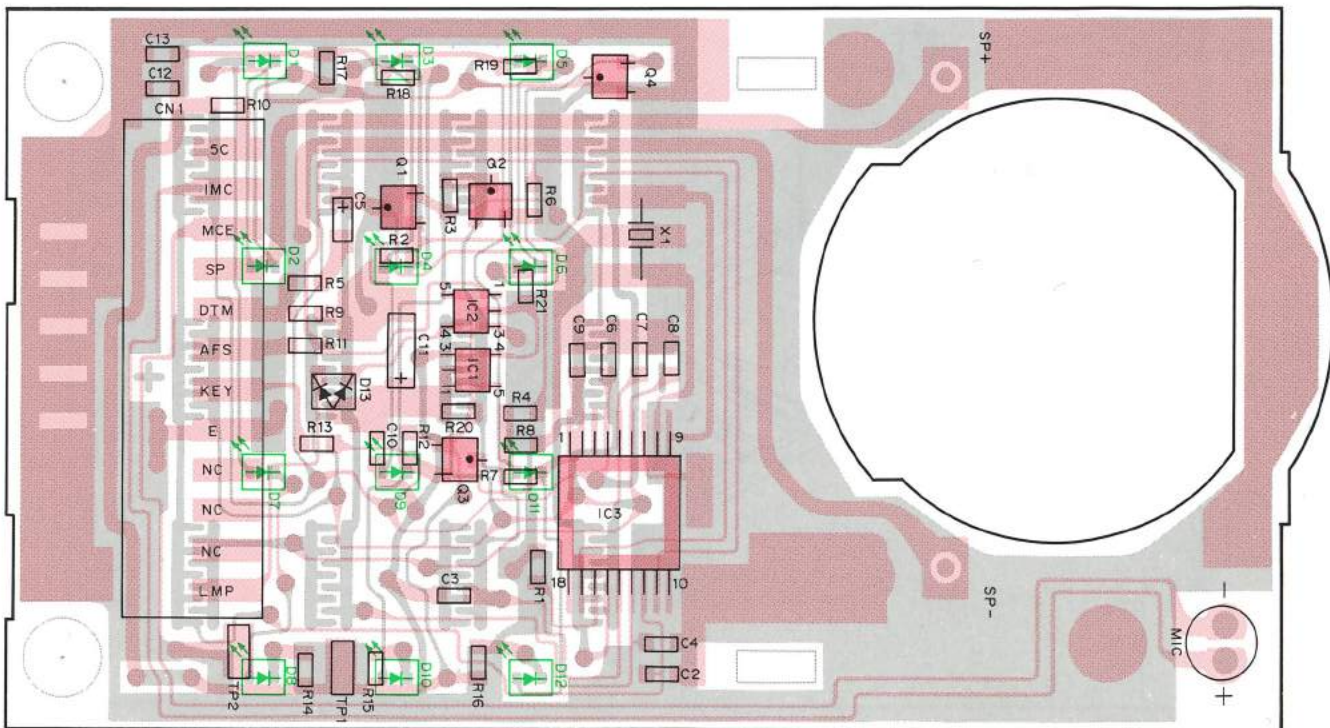


KDM-6 (DTMF KEY PANEL)

KDM-6 PC Board View
 SIGNALING UNIT (X52-3260-20)
 Component side view



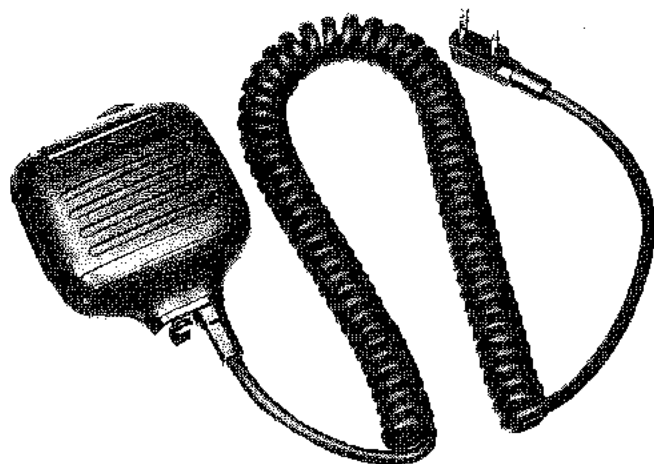
Foil side view



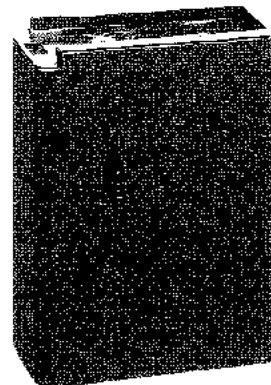
: Component side
 : Foil side

KMC-17 (SPEAKER MICROPHONE) / KNB-9A (Ni-Cd BATTERY) / KPG-8 (PC PROGRAM INTERFACE)

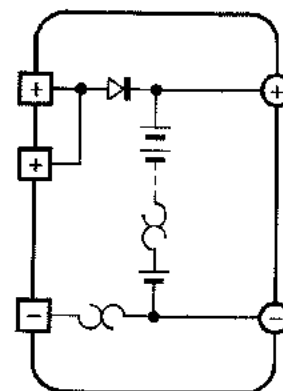
KMC-17 External View



KNB-9A External View



KNB-9A Circuit Diagram



Note : Before connecting an option to the universal connector, be sure to turn the radio POWER switch off because there is a possibility of a short circuit.

KMC-17 Parts List

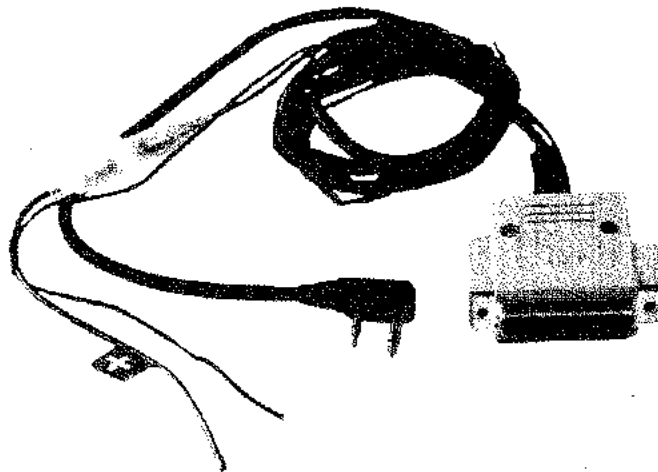
* : New parts

Ref. No.	New parts	Parts No.	Description	Re- marks
		A02-0907-08	Case (Front)	
		A02-0908-08	Case (Rear)	
	*	B09-0316-08	Cap	
		B50-0303-08	Instruction manual	
		D10-0606-08	Lever (PTT)	
		E11-0421-05	Phone jack	
		E30-3138-08	Curl cord	
		F07-0889-08	Silicon rubber (PTT)	
		G53-0569-08	Packing (MIC case)	
	*	J29-0440-08	Clip assy	
		J39-0601-08	Packing (MIC)	
		N46-2605-60	Screw (Clip assy)	
		N46-3016-60	Screw (Case)	
		N80-2005-41	Screw (MIC unit)	
		S50-1415-05	Tact switch (PTT)	
	*	T07-0290-05	Loudspeaker (1W, 8Ω)	
	*	T91-0534-08	Condenser MIC	

KNB-9A Specifications

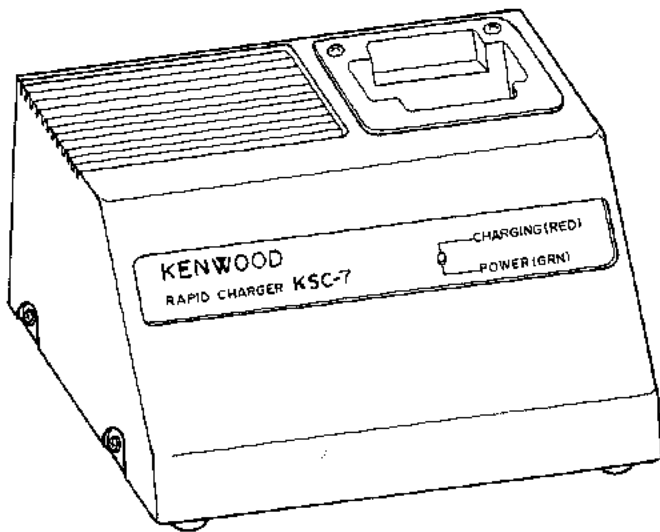
Electrical characteristic
 Voltage 7.2V (1.2V x 6)
 Charge current 1100mAh
 Dimensions 57.5 W x 75.5 H x 30.5 D (mm)
 Weight..... 300g

KPG-8 External View



KSC-7 (RAPID CHARGER)

KSC-7 External View



Dimension (Body only)
7.87" (200mm) W x 5.28" (134mm) D x 3.35" (85mm) H

KSC-7 Circuit Description

1. General

The KSC-7 is a rapid charger for the KNB-5, KNB-6, KNB-7 and KNB-9A Ni-Cd batteries.

2. Theory of operation

The operation of each block is explained below.

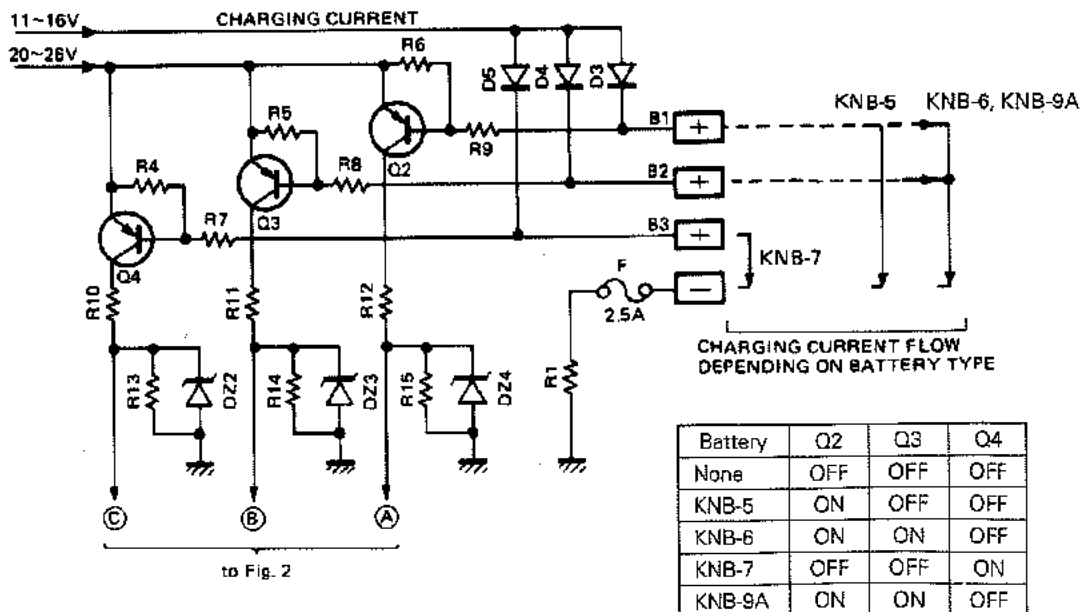
• +11V AVR circuit

This AVR circuit, consisting of a 2SD600F transistor (Q1) and GZA11Y Zener diode (DZ1) provides an output of approximately +11V as the reference voltage for the charging circuit consisting of IC2 to IC5.

• Battery pack detect circuit

This circuit detects whether a battery pack is inserted in the charger. Outputs from this circuit are routed to the reset circuit and the battery recognition circuit.

When a KNB-5 is inserted in the charger, a small amount of current flows from Q2 : 2SA608E through R9 to the charging terminal B1 and Q2 turns on. As a result, an output of approximately 11V appears at (A) in Fig. 1. Similarly when a KNB-6 or KNB-9A is inserted Q3 : 2SA608E turns on and approximately 11V is provided at output (B). When a KNB-7 is inserted Q4 : 2SA608E turns on and approximately 11V is provided at output (C).



to Fig. 2

Table 1

Fig. 1 Battery pack detect circuit block diagram

KSC-7 (RAPID CHARGER)

• **Reset, Charge status memory and display circuit**

The reset circuit initializes the charging status memory circuit.

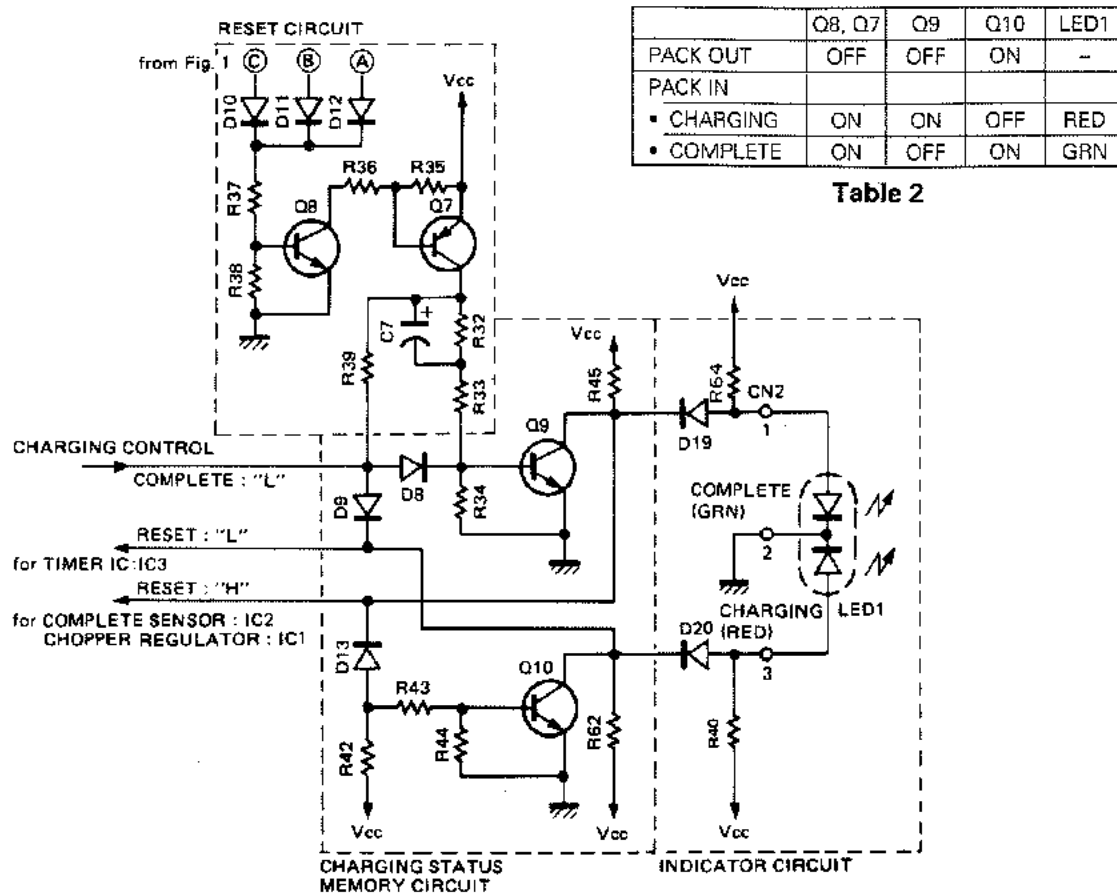


Fig. 2 Reset circuit/Charge status memory circuit/Display circuit block diagram

The charge status memory circuit is an R-S flip-flop configured from transistors and resistors. The two states of the flip-flop are called COMPLETE and CHARGING. Outputs from the flip-flop drive the LED in the indicator circuit and reset the timer, complete sensor, and chopper regulator. In the COMPLETE state Q9 : 2SC536E is off and Q10 : 2SC536E is on. In the CHARGING state Q9 is on and Q10 is off.

When a battery pack is not inserted, Q8 : 2SC536E and Q7 : 2SC536E turn off. As there is no base voltage to Q9, Q9 also turns off. The base of Q10 receives enough bias from Vcc to turn on, resulting in 0V at the collector. The current flow through R41 to the COMPLETE indicator in LED1 which glows green, because of Q9 is off.

When the battery pack is inserted Q8 and Q7 turn on. As soon as Q7 turns on, charging current flows through R33, R34, and Q9 to C7 and Q9 turns on. The base voltage of Q10, which is connected to Q9 through diode D13, then drops and Q10 turns off. Since Q10 is off, current flows through R40 to the CHARGING indicator in LED1, which glows red to indicate that the battery is charging. When charging of C7 is completed, on-current continues to flow to the base of Q9 through R39 and D8.

When charging is completed the complete sensor (IC2) outputs a low ("L") signal that ends the flow of current to the base of Q9, turning Q9 off. As a result current flows through R64 to the COMPLETE indicator in LED1, which glows green to indicate that charging is complete.

KSC-7 (RAPID CHARGER)

Battery recognition circuit

The battery recognition circuit uses NAND logic to recognize the battery type from the outputs from the battery pack detect circuit. Outputs from this circuit are sent to the charging current limiting circuit and sensor level switching circuit.

	INPUT		OUTPUT		
	A	B	D	F	G
KNB-5	H	L	H	L	H
KNB-6	H	H	L	L	H
KNB-7	L	L	H	L	L
KNB-9A	H	H	L	L	H

Table 3

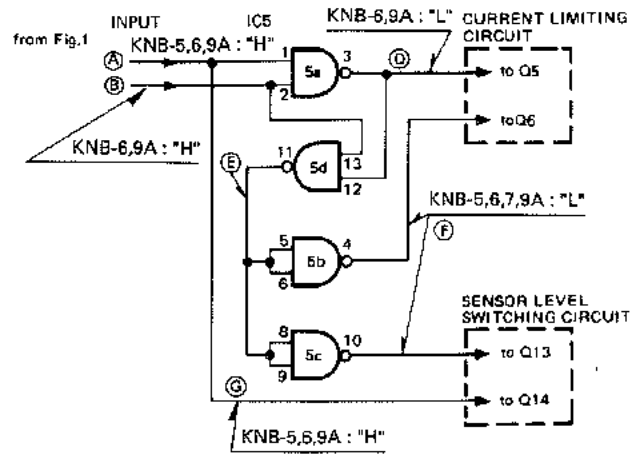


Fig. 3 Battery recognition circuit block diagram

Charging current limiting circuit

This circuit receives the output of the battery recognition circuit and limits the charging current according to the type (current capacity) of battery. The charging current ICR is detected as a voltage drop across R1 (0.15Ω), which is provided to pin 3 of the operational amplifier IC4 (1/2) : LA6393S. Pin 4 receives a reference voltage (VREF) used as a comparison standard for limiting the charging current. The VREF is charged by ON and OFF of Q5 and Q6 (See Table 4).

	Q5	Q6	VREF	ICR MAX
KNB-5	OFF	OFF	0.25V	1.7A
KNB-6	ON	OFF	0.36V	2.4A
KNB-7	OFF	OFF	0.25V	1.7A
KNB-9A	ON	OFF	0.36V	2.4A

Table 4

Pin 2 of IC4 : LA6393S provides "L" output when $V_{REF} < V_{CR}$, stopping the operation of the chopper regulator (IC1 : STK772B) and reducing the charging current. The charging current is limited by the formula :

$$ICR \text{ MAX (A)} = V_{REF} \text{ (V)} / 0.15 \text{ (}\Omega\text{)}$$

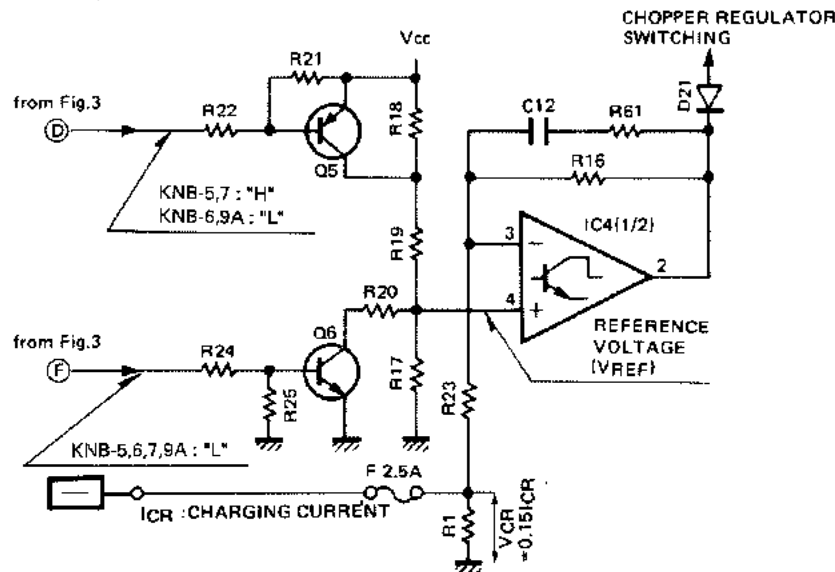


Fig. 4 Charging current limiting circuit block diagram

KSC-7 (RAPID CHARGER)

• Sensor level switching circuit

This circuit receives the output of the battery recognition circuit and aligns the voltage supplied to the charging status detect circuit according to the battery type (voltage) so that they are nearly equal at completion of charging.

	SHIFT Es (V)	Q11	Q12
KNB-5	2.0	OFF	ON
KNB-6	2.0	OFF	ON
KNB-7	7.6	OFF	OFF
KNB-9A	2.0	OFF	ON

Table 5

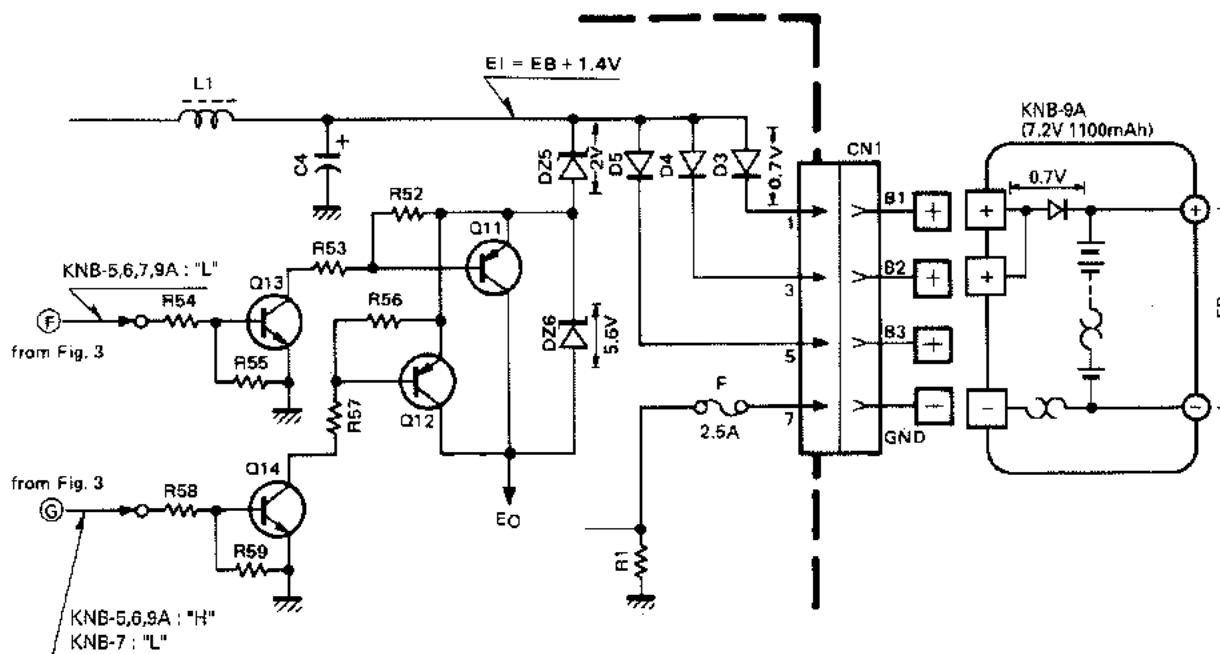


Fig. 5 Sensor level switching circuit block diagram

The pin voltages while the Ni-Cd battery is charging are approximately 1.2 times the voltages at the completion of charging (See Figure 6).

The battery terminal voltage EB is as follows :

Approximately 14.4V for the KNB-7

Approximately 8.6V for the KNB-5, 6, 9A

The charging line voltage EI is the EB voltage plus a 1.4V voltage drop added by a diode.

$$EI = EB + 1.4V \dots \dots \dots (1)$$

The EI voltage is output with a level shift as the voltage EO to the charging status detect circuit via Zener diode DZ6 and diodes D17 and D18. The amount of the shift is controlled by switching Q11 : 2SA608E and Q12 : 2SA608E on and off (See Table 5). If Eq. (1) is substituted into EO in Table 5, the results are :

$$\text{KNB-5, 6, 9A : } EO = EB - 6.2V$$

$$\text{KNB-7 : } EO = EB - 0.6V$$

At the completion of charging the value is approximately 8V.

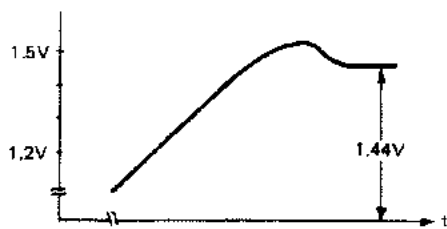


Fig. 6 The pin voltages while the Ni-Cd battery is charging

KSC-7 (RAPID CHARGER)

Charging status detect circuit

This circuit detects the completion of charging and outputs a signal to stop charging. When no battery pack is inserted or charging is completed, a High ("H") Reset signal is applied to D15. When a battery is inserted the Reset signal applied to D15 is cleared. When the Reset signal is cleared, pin 4 of IC2: KCH-1003 holds the reset state due to the charge in C8 for the duration of the R46 and C8 time constant, then goes "L" to clear the reset state. Pins 8 and 9 of IC2 receive divided portions of the battery voltage.

These inputs are tracked as the charging is performed in the long-term memory capacitor "MD". As the Ni-Cd battery charges, the battery voltage reaches a peak, then declines (See Figure 6). The MD stores the peak voltage, which is compared with the divided voltages at pins 8 and 9. When the difference ΔV is the same, a "L" signal is output from pin 11 to indicate that charging is complete. The signal indicating completion of charging is applied to the charging status memory circuit.

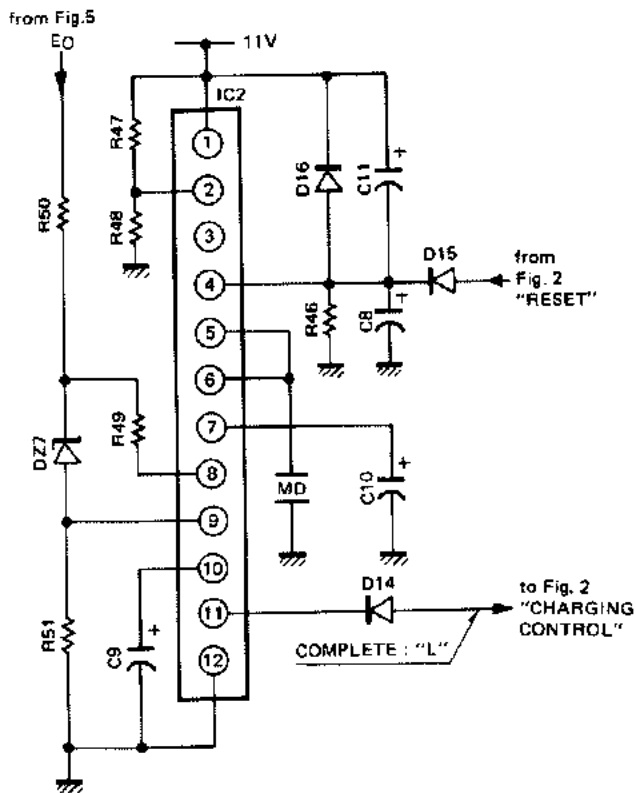


Fig. 7 Charging status detect circuit block diagram

Timer circuit

Battery defects may result in charging continuing indefinitely without completion, so this timer outputs a signal that stops charging approximately 1.7 hours after charging begins. When charging begins and the Reset signal is cleared at pin 3, IC3: AN6780 begins counting. At the first count of 16384 pin 6 goes from "H" to "L".

The output from pin 6 is connected to the Stop input (pin 2), so the output of IC3 is held in the "L" state until IC3 receives another Reset signal (for example, when the battery is removed).

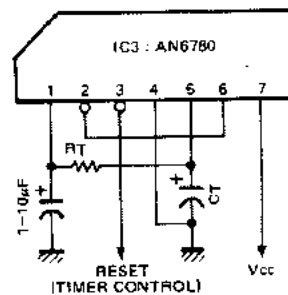


Fig. 8 Timer circuit block diagram

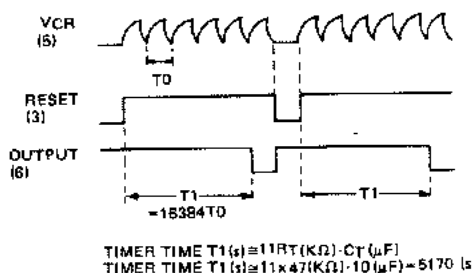


Fig. 9

Voltage comparator circuit

This circuit monitors the output (EO) of the sensor level switching circuit and indirectly detects abnormal conditions in the battery pack connected to the charging terminal. When the EO voltage falls to 5.2V or lower, the charging control line goes "L" to halt charging.

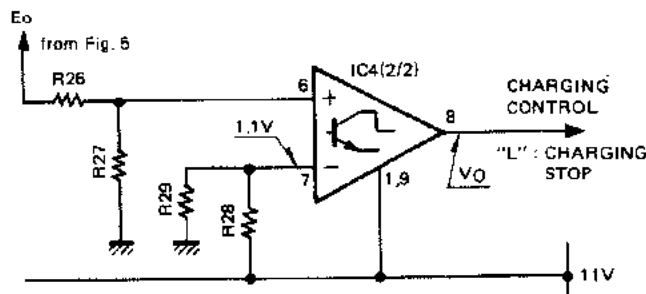


Fig. 10 Voltage comparator circuit block diagram



Fig. 11

KSC-7 (RAPID CHARGER)

* New Parts

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.

KSC-7 Parts List

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名 / 規格	Desti- nation 仕向	Re- marks 備考
KSC-7						
1	1A		A02-0816-08	CASE		
2	1A,1B		A02-0817-05	BATTERY POCKET		
3	1B		B46-0418-10	WARRANTY CARD		
4	1B		B50-8186-08	INSTRUCTION MANUAL (KSC-4/5)		
5	1B		E23-0604-05	TERMINAL		
6	2A		E30-2038-08	AC CORD		
8	2B		H01-8129-08	ITEM CARTON CASE		
9	2B		H10-2584-02	POLYSTYRENE FOAMED FIXTURE (L)		2
10	2B		H10-2585-02	POLYSTYRENE FOAMED FIXTURE (R)		3
11	3A		J02-0439-05	FOOT		4
12	3A		J39-0424-05	SPACER		3
T1	2A		L01-8081-08	POWER TRANSFORMER (AC120V)	K,M2	7
T1	2A		L01-8112-08	POWER TRANSFORMER (AC220V)	M	19
A	3A		N30-3006-41	MACHINE SCREW (M3 X 6)		5
B	2A,1B		N34-4006-46	MACHINE SCREW (M4 X 6 Tr)		10
C	2A,1B		N35-4006-45	MACHINE SCREW (M4 X 6 Bi) BLK		12
D	2A		N87-3008-46	TAPTITE SCREW (φ3 X 8 Br)		14
E	1A		N89-3008-45	TAPTITE SCREW (φ3 X 8 Bi) BLK		15
7	3B		W02-0819-05	CHARGE CONTROL UNIT		16
CHARGE CONTROL UNIT (W02-0819-05)						
C1			CE04EW1V222M	ELECTRO 2200μF 35WV		35
C2			CE04EW1C470M	ELECTRO 47μF 16WV		33
C3			CE04EW1H010M	ELECTRO 1μF 50WV		71
C4			CE04EW1E471M	ELECTRO 470μF 25WV		75
C5,6			CE04EW1C100M	ELECTRO 10μF 16WV		77
C7			CE04EW1A101M	ELECTRO 100μF 10WV		79
C8			CE04EW1C100M	ELECTRO 10μF 16WV		87
C9,10			CE04EW0J101M	ELECTRO 100μF 6.3WV		31
C11			CE04EW1C330M	ELECTRO 33μF 16WV		31
C12			CK45B1H102K	CERAMIC 0.001μF 50WV		91
C14			CE04EW1H010M	ELECTRO 1μF 50WV		91
C15			C91-0757-05	CERAMIC 0.001μF K		92
C16-18			CK45F1H103Z	CERAMIC 0.01μF Z		03
MD			C91-1038-08	ELECTRO		06
F1			F06-2522-05	FUSE (2.5A)	M,M2	07
F1			F06-2523-05	FUSE (2.5A)	K	ER

E: Scandinavia & Europe H: Audio Club K: USA P: Canada W: Europe

U: PX (Far East, Hawaii) T: England M: Other Areas

UE: AAFES (Europe) X: Australia

⚠ indicates safety critical components.

KSC-7 (RAPID CHARGER)

× New Parts

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Teile ohne Parts No. werden nicht geliefert.

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名 / 規格	Desti- nation 仕 向	Re- marks 備考
L1			L33-0694-08	CHOKE COIL (470 μ H)		
R1			R92-0683-08	FL-PROOF 0.15 Ω 4W		
R2			RD14CB2E202J	RD 2K 1/4W		
R3			RD14BB2E302J	RD 3K 1/4W		
R4,5			RD14CB2E103J	RD 10K 1/4W		
R6-9			RD14BB2E103J	RD 10K 1/4W		
R10-12			RD14BB2E202J	RD 2K 1/4W		
R13			RD14BB2E303J	RD 30K 1/4W		
R14,15			RD14CB2E303J	RD 30K 1/4W		
R16			RD14CB2E204J	RD 200K 1/4W		
R17			RD14CB2E391J	RD 390 1/4W		
R18			RD14CB2E362J	RD 3.6K 1/4W		
R19			RD14CB2E113J	RD 11K 1/4W		
R20			RD14BB2E102J	RD 1K 1/4W		
R21			RD14CB2E203J	RD 20K 1/4W		
R22			RD14BB2E203J	RD 20K 1/4W		
R23			RD14BB2E512J	RD 5.1K 1/4W		
R24			RD14BB2E203J	RD 20K 1/4W		
R25			RD14CB2E103J	RD 10K 1/4W		
R26			RD14BB2E103J	RD 10K 1/4W		
R27			RD14CB2E272J	RD 2.7K 1/4W		
R28			RD14CB2E912J	RD 9.1K 1/4W		
R29			RD14CB2E102J	RD 1K 1/4W		
R30			RD14BB2E563J	RD 56K 1/4W		
R31			RD14BB2E202J	RD 2K 1/4W		
R32			RD14CB2E204J	RD 200K 1/4W		
R33			RD14BB2E103J	RD 10K 1/4W		
R34			RD14BB2E682J	RD 6.8K 1/4W		
R35			RD14CB2E203J	RD 20K 1/4W		
R36			RD14BB2E303J	RD 30K 1/4W		
R37			RD14CB2E203J	RD 20K 1/4W		
R38			RD14CB2E103J	RD 10K 1/4W		
R39			RD14BB2E103J	RD 10K 1/4W		
R40			RD14BB2E162J	RD 1.6K 1/4W		
R42			RD14CB2E103J	RD 10K 1/4W		
R43			RD14BB2E203J	RD 20K 1/4W		
R44,45			RD14CB2E103J	RD 10K 1/4W		
R46			RD14CB2E825J	RD 8.2M 1/4W		
R47			RD14CB2E104J	RD 100K 1/4W		
R48			RD14CB2E122J	RD 1.2K 1/4W		
R49			RD14BB2E563J	RD 56K 1/4W		

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U: PX (Far East, Hawaii) T: England M: Other Areas

UE: AAFES (Europe) X: Australia

⚠ indicates safety critical components.

KSC-7 (RAPID CHARGER)

* New Parts

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

Teile ohne Parts No. werden nicht geliefert.

Ref. No. 参照番号	Address 位 置	New Parts 新	Parts No. 部 品 番 号	Description 部 品 名 / 規 格	Desti- nation 仕 向	Re- marks 備 考
R50			RD14BB2E431J	RD 430 1/4W		
R51			RD14CB2E130J	RD 13 1/4W		
R52			RD14CB2E203J	RD 20K 1/4W		
R53,54			RD14BB2E203J	RD 20K 1/4W		
R55			RD14CB2E103J	RD 10K 1/4W		
R56-58			RD14BB2E203J	RD 20K 1/4W		
R59			RD14CB2E103J	RD 10K 1/4W		
R61			RD14CB2E104J	RD 100K 1/4W		
R62			RD14CB2E103J	RD 10K 1/4W		
R63			RD14BB2E302J	RD 3K 1/4W		
R64			RD14BB2E431J	RD 430 1/4W		2
D1-5			DSA26B	DIODE		3
D6-16			DS442	DIODE		4
D19-21			DS442	DIODE		3
DZ1			GZA11Y	ZENER DIODE (11V)		5
DZ2-4			GZA10Z	ZENER DIODE (10V)		7
DZ5			GZA2.0X	ZENER DIODE (2V)		9
DZ6			GZA5.6X	ZENER DIODE (5.6V)		5
DZ7			GZA7.5Y	ZENER DIODE (7.5V)		0
DZ8			GZA3.0X	ZENER DIODE (3V)		2
IC1			STK772B	IC (CHOPPER REGULATOR)		4
IC2			KCH-1003	IC (VOLTAGE SENSOR)		5
IC3			AN6780	IC (TIMER)		6
IC4			LA6393S	IC (DUAL OP IC)		3
IC5			LC4011B	IC (QUADRUPLE NAND GATE)		
Q1			2SD600F,KF	TRANSISTOR		5
Q2-5			2SA608E,F	TRANSISTOR		3
Q6			2SC536E,F	TRANSISTOR		1
Q7			2SA608E,F	TRANSISTOR		5
Q8-10			2SC536E,F	TRANSISTOR		7
Q11,12			2SA608E,F	TRANSISTOR		9
Q13,14			2SC536E,F	TRANSISTOR		7
LED1	2A		SLP-540D	LED (RED/GRN)		1
						1
						2
						3
						6
						7
						R

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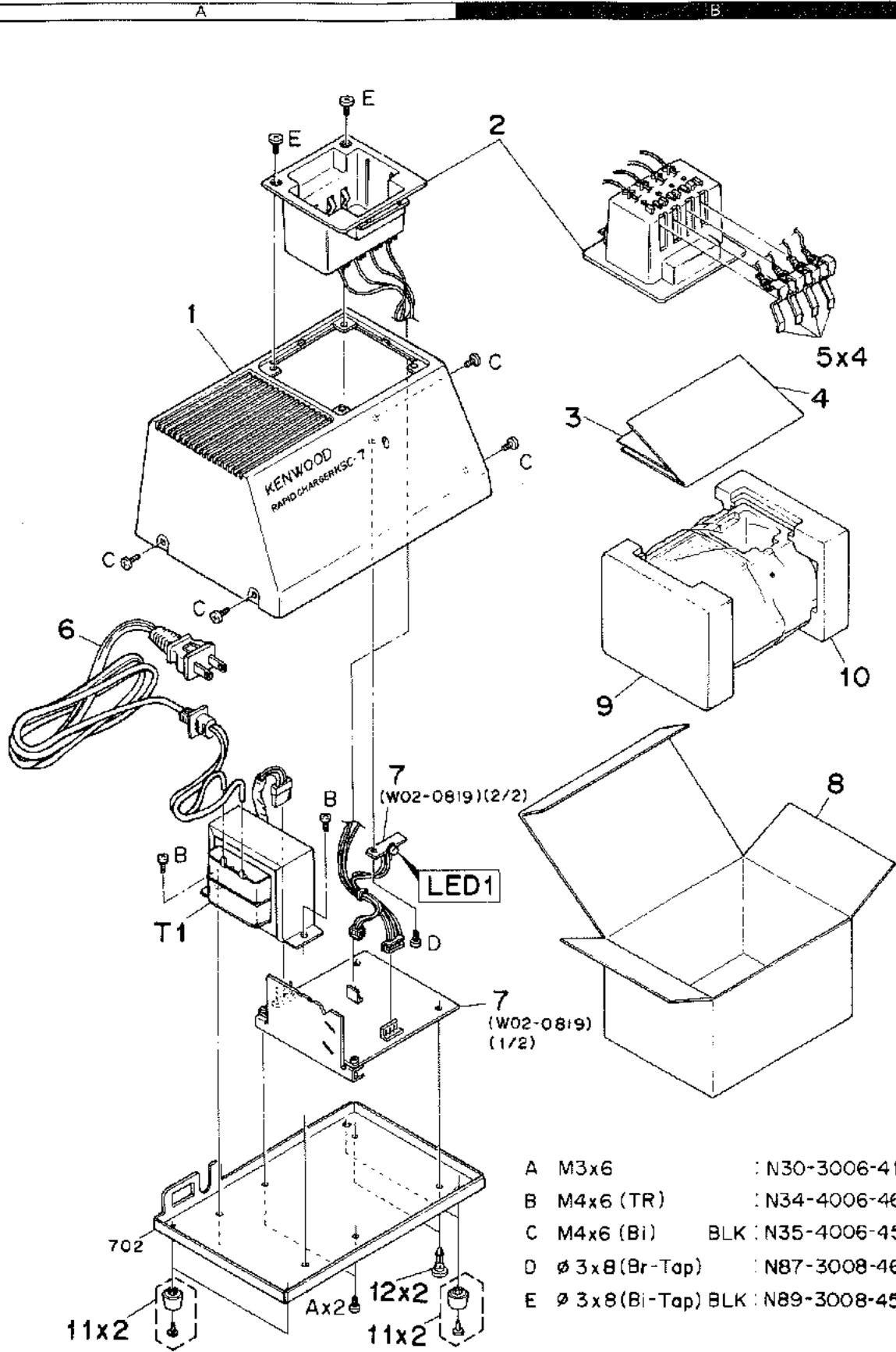
U: PX(Far East Hawaii) T: England M: Other Areas

UE: AAFES(Europe) X: Australia

⚠ indicates safety critical components.

KSC-7 (RAPID CHARGER)

KSC-7 Exploded View/Packing



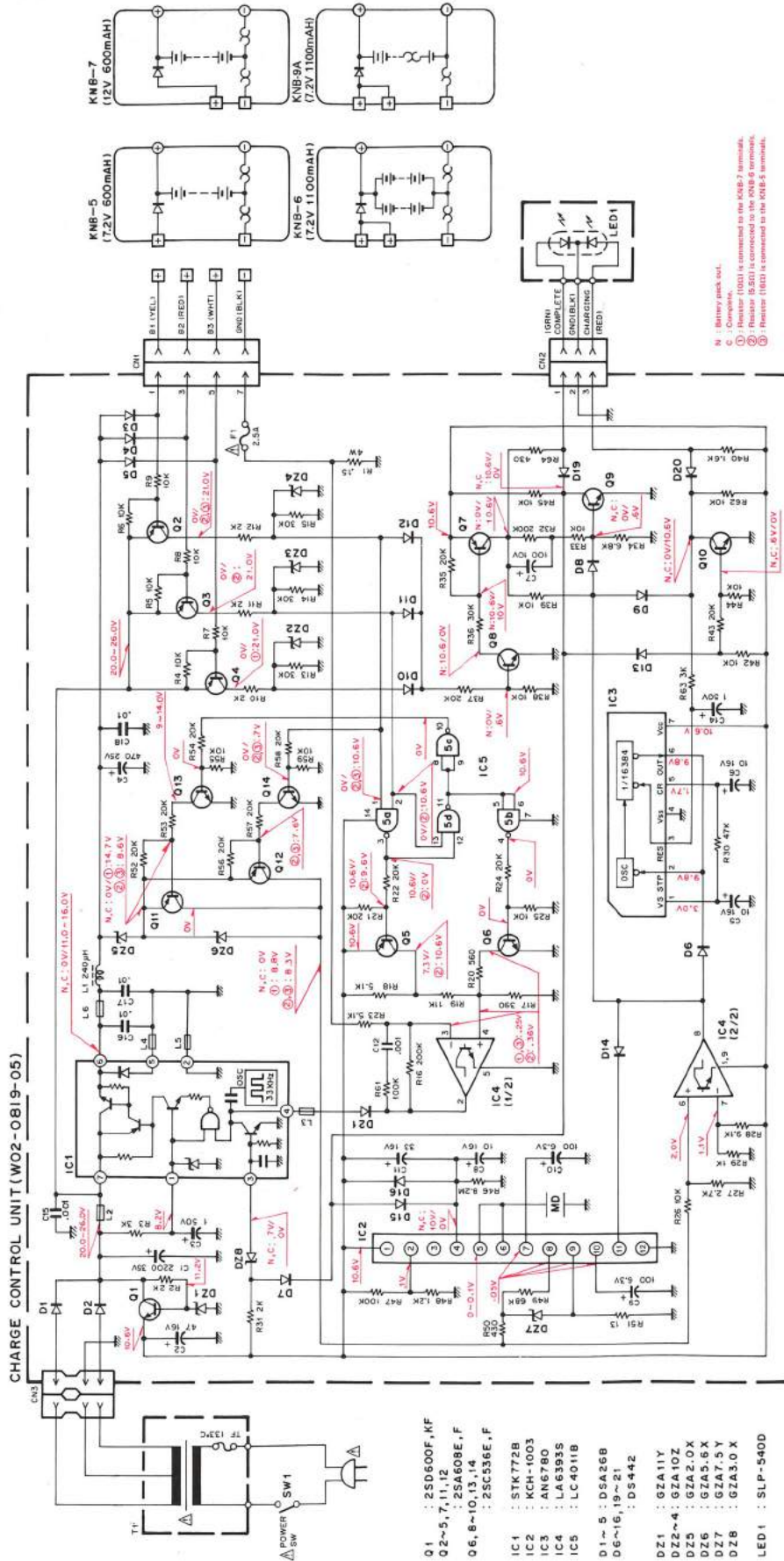
- | | | | |
|---|----------------|-------|-------------|
| A | M3x6 | : | N30-3006-41 |
| B | M4x6 (TR) | : | N34-4006-46 |
| C | M4x6 (Bl) | BLK : | N35-4006-45 |
| D | ∅ 3x8 (Br-Tap) | : | N87-3008-46 |
| E | ∅ 3x8 (Bi-Tap) | BLK : | N89-3008-45 |

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

Q1 : 25
IC1 : S
D1-5
DZ1 :
2SA60
2SA60

KSC-7 (RAPID CHARGER)

KSC-7 Circuit Diagram



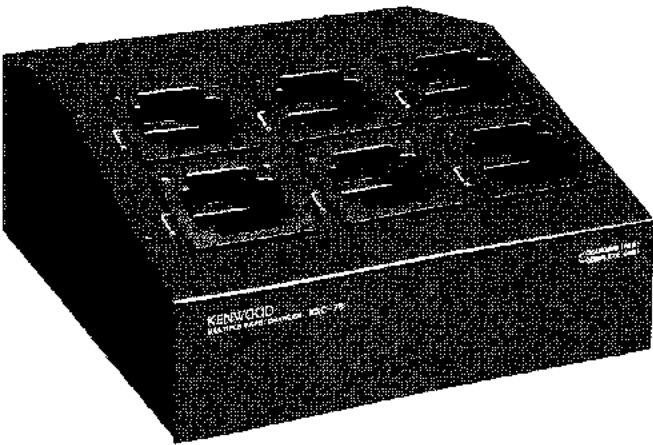
KSC

KSC

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KSC-76 (MULTIPLE RAPID CHARGER)

KSC-76 External View



Dimension (Body only)
12.68" (322mm) W x 14.25" (362mm) D x 5.67" (144mm) H

KSC-76 Parts List

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名 / 規格	Desti- nation 仕 向	Re- marks 備考
1	1A		A02-0817-05	BATTERY POCKET		
2	3A		A10-1283-01	CHASSIS		
3	2A		A20-2661-01	PANEL		
4	2A		A23-1496-03	REAR PANEL		
B	1A		B30-0853-05	LED		
9	2A		B40-3819-04	MODEL NAME PLATE	KM2	
9	2A		B40-3820-04	MODEL NAME PLATE	M	
11	2A		B41-0658-14	CAUTION LABEL		
			B46-0418-10	WARRANTY CARD	K	
			B50-8233-00	INSTRUCTION MANUAL		
15	1A		E23-0604-05	TERMINAL		
16	2B		E30-0780-05	AC POWER CORD		
			H01-8187-04	ITEM CARTON BOX		
			H10-2623-11	POLYSTYRENE FOAMED FIXTURE(L)		
			H10-2629-11	POLYSTYRENE FOAMED FIXTURE(R)		
			H20-1403-03	PROTECTION COVER (KSC-76)		
30	3A		J02-0323-05	FOOT		
32	1A		J19-1423-05	LEAD HOLDER		
33	3A		J39-0424-05	SPACER		
34	2B		J42-0083-05	POWER CORD BUSHING		
38	2A		L01-8015-05	POWER TRANSFORMER (220V)	MM2	
38	2A		L01-8061-05	POWER TRANSFORMER (120V)	K	
A	3A		N35-3006-41	BINDING HEAD MACHINE SCREW		
B	3A		N89-3008-45	BINDING HEAD TAPTITE SCREW		
C	2A		N09-0631-05	SCREW		
42	3A		W02-0819-05	PCB UNIT		

E: Scandinavia & Europe K: USA P: Canada W: Europe

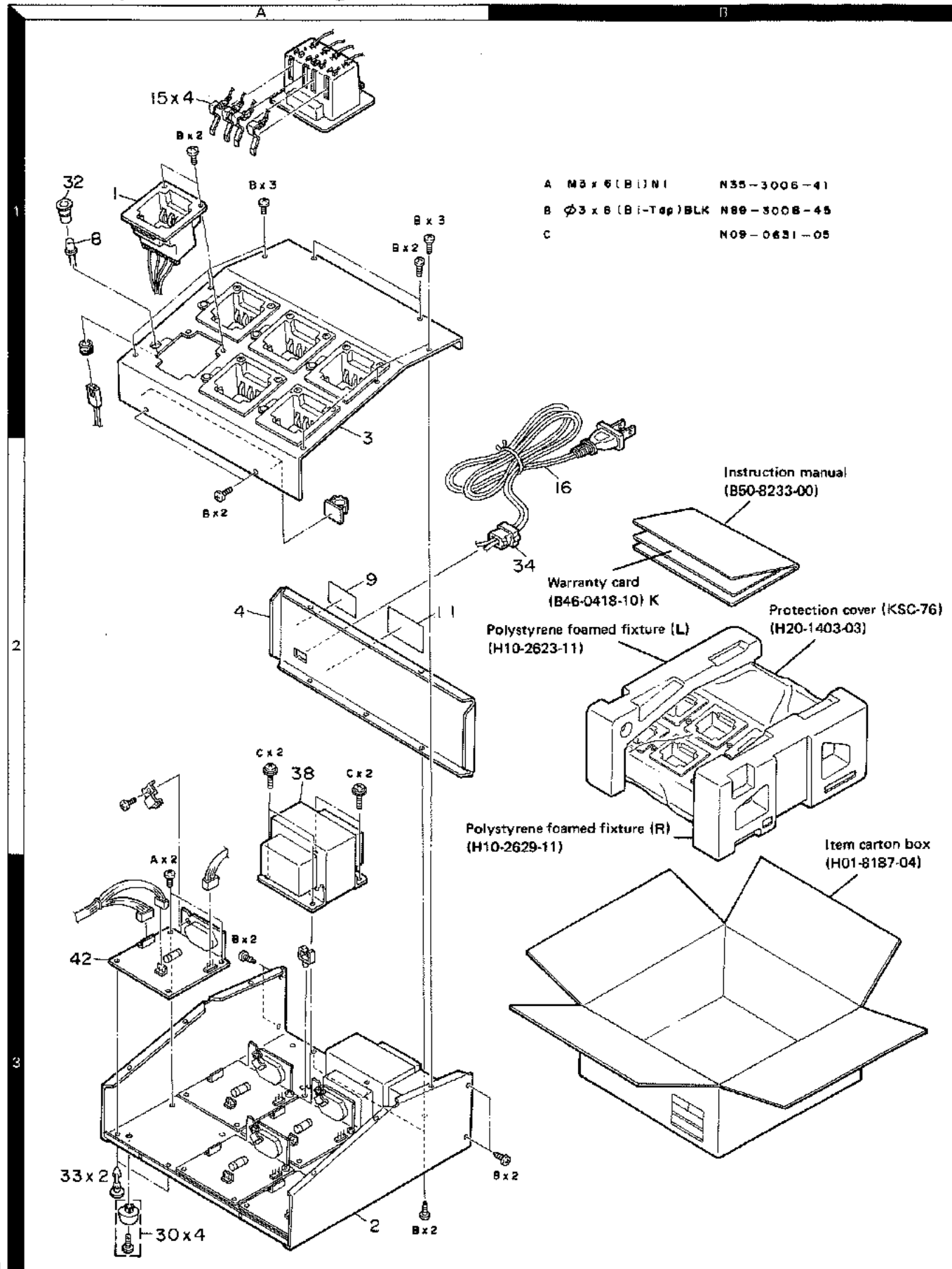
U: PX(Far East, Hawaii) T: England M: Other Areas

UE: AAFES(Europe) X: Australia

▲ indicates safety critical components.

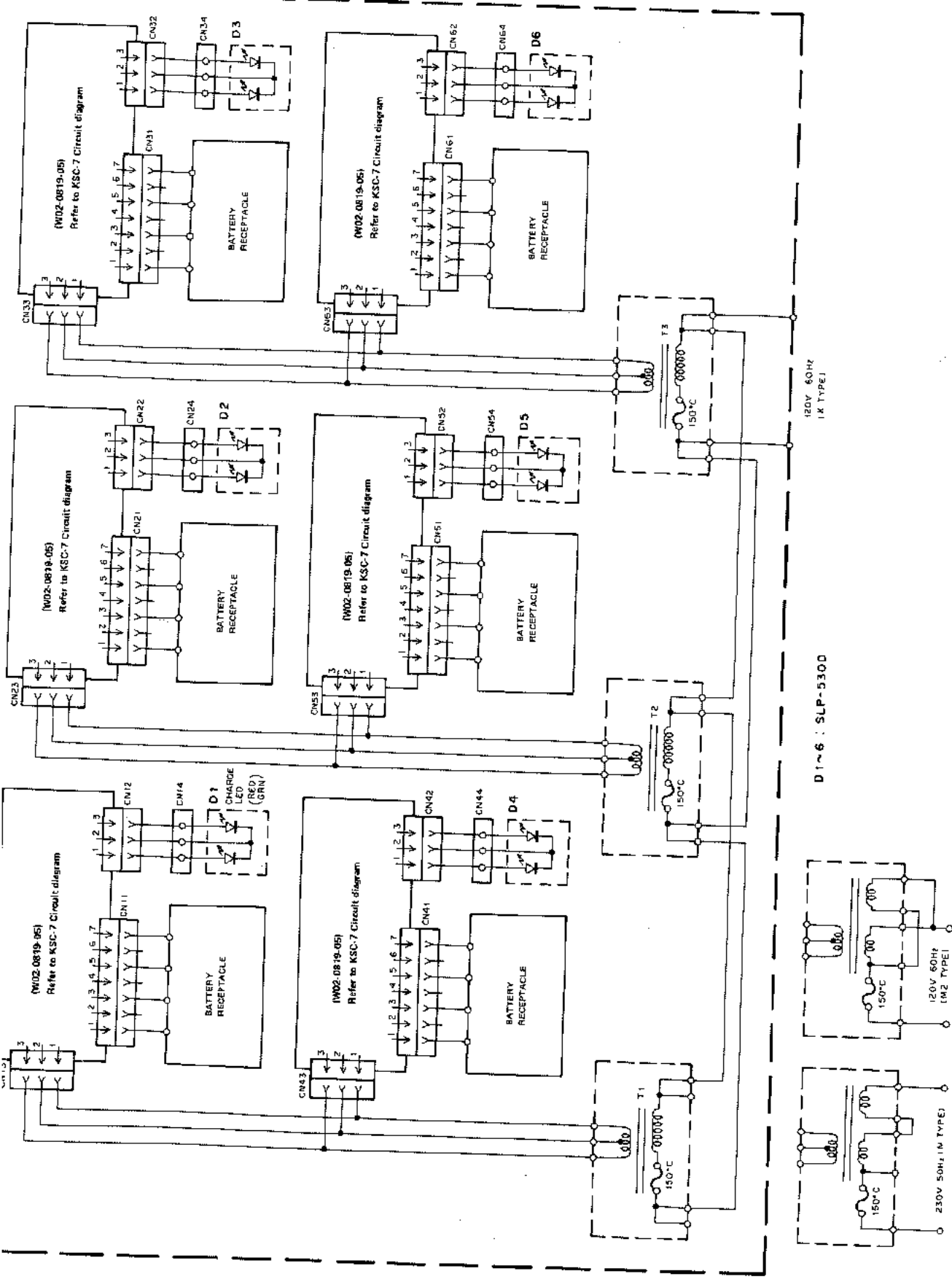
KSC-76 (MULTIPLE RAPID CHARGER)

KSC-76 Exploded View/Packing



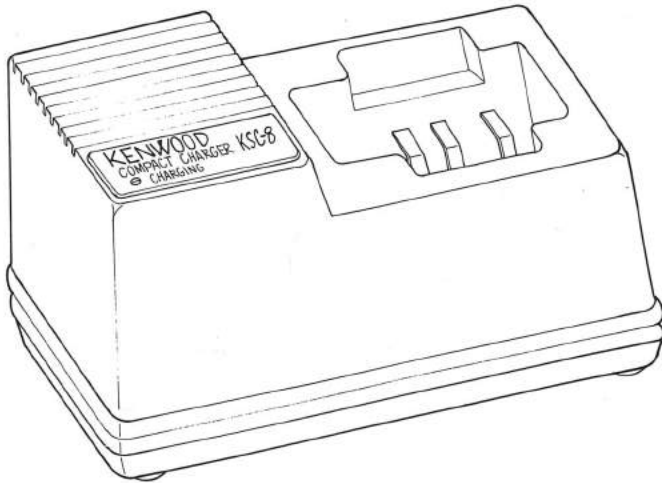
KSC-76 (MULTIPLE RAPID CHARGER)

KSC-76 Circuit Diagram



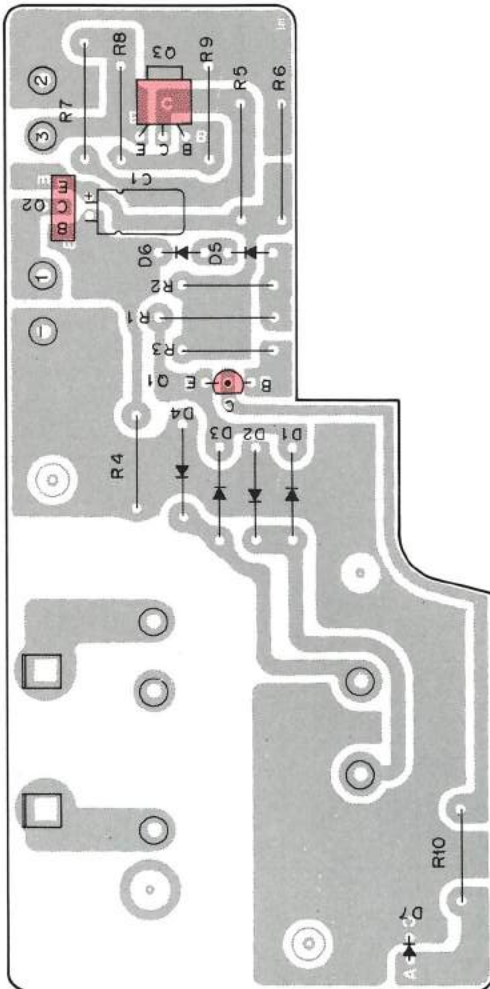
KSC-8 (COMPACT CHARGER)

KSC-8 External View



Dimension (Body only)
2.95" (75mm) W x 5.12" (130mm) D x 2.38" (60.5mm) H

KSC-8 PC Board View

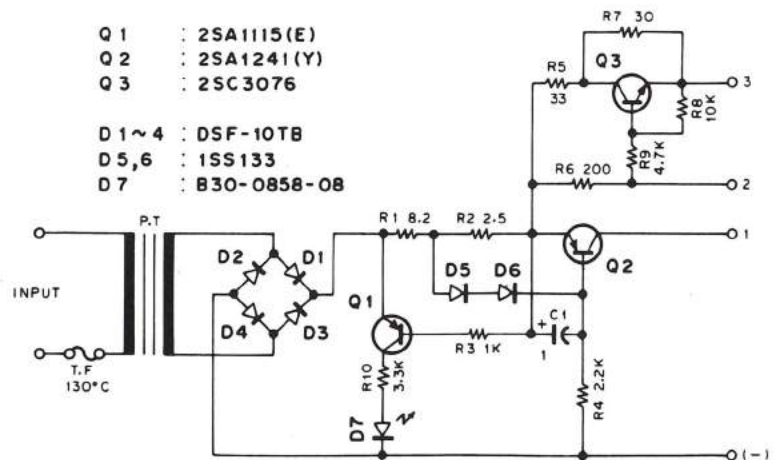


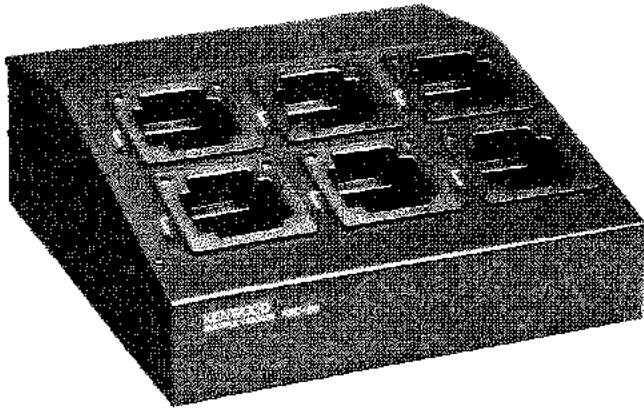
KSC-8 Parts List

* : New Parts

Ref. No.	New Parts	Parts No.	Description
D7		A02-0830-08	Case (Upper)
		A02-0832-08	Case (Lower)
		B30-0858-08	LED SR615D
		B50-8205-08	Instruction manual
		B40-3791-08	Model name plate K,M2
		B40-3792-08	Model name palte M
		B41-0667-08	Caution label
		E30-2097-08	AC power cord
		L01-8027-08	Power transformer 220V M
		L01-8111-08	Power transformer 120V K,M2
	W02-0805-05	Module	
Q1		2SA1115(E)	Transistor
Q2		2SA1241(Y)	Transistor
Q3		2SC3076	Transistor
D1-4		DSF-10TB	Diode
D5,6		1SS133	Diode

KSC-8 Circuit Diagram



KSC-86 (MULTIPLE CHARGER)**SC-86 External View**

Dimension (Body only)

12.60" (320mm) W x 13.07" (332mm) D x 4.80" (122mm) H

SC-86 Parts List

Ref. No. 参照番号	Address 位置	New Parts	Parts No. 部品番号	Description 部品名 / 规格	Desti- nation 仕向	Re- marks 備考
1	1A		A02-0817-05	BATTERY POCKET		
2	3A		A10-1290-01	CHASSIS		
3	2A		A20-2662-01	PANEL		
4	2A		A23-1497-03	REAR PANEL		
8	1A		B30-0854-05	LED		
9	2A		B40-3821-04	MODEL NAME PLATE	KM2	
9	2A		B40-3822-04	MODEL NAME PLATE	M	
11	2A		B41-0658-14	CAUTION LABEL		
			B46-0418-10	WARRANTY CARD	K	
			B50-8233-00	INSTRUCTION MANUAL		
14	3A		E22-0271-05	TERMINAL BOARD		
15	1A		E23-0604-05	TERMINAL		
16	2B		E30-0780-05	AC POWER CORD		
20	2A		F20-1007-04	INSULATING BOARD		
25	3A		G13-0897-04	FORMED PLATE		
			G13-0811-04	FORMED PLATE (ACCESSORY)		
			H01-8188-04	ITEM CARTON BOX		
			H10-2605-11	POLYSTYRENE FOAMED FIXTURE(L)		
			H10-2606-11	POLYSTYRENE FOAMED FIXTURE(R)		
			H20-1414-03	PROTECTION COVER (KSC-86)		
			H25-0077-03	PROTECTION BAG (ACCESSORY)		
30	3A		J02-0439-05	FOOT		
32	1A		J19-1423-05	LED HOLDER		
33	2A		J21-4238-04	MOUNTING HARDWARE		
34	2B		J42-0083-05	POWER CORD BUSHING		
			J02-0437-04	FOOT (ACCESSORY)		
			J19-1417-04	HOLDER (ACCESSORY)		
38	2A		L01-8027-05	POWER TRANSFORMER (220V)	M	
38	2A		L01-8111-05	POWER TRANSFORMER (120V)	KM2	
			N09-0694-05	SCREW (ACCESSORY)		
			N35-3008-41	BINDING HEAD MACHINE SCREW		
A	2A, 3A		N89-3008-41	BINDING HEAD TAPTITE SCREW		
B	3A		N89-3008-45	BINDING HEAD TAPTITE SCREW(PCB		
C	2A		N89-2612-46	BINDING HEAD TAPTITE SCREW		
42	2A		W02-0805-05	PCB UNIT		

E: Scandinavia & Europe K: USA P: Canada W: Europe

U: PX(Far East, Hawaii) T: England M: Other Areas

UE: AAFES(Europe) X: Australia

▲ indicates safety critical components.

KSC-86 (MULTIPLE CHARGER)

KSC-86 Exploded View/Packing

- A $\phi 3 \times 8$ (Bl-Tap) NI N89-3008-41
- B $\phi 3 \times 8$ (Bl-Tap) BLK N89-3008-45
- C $\phi 2.6 \times 12$ (Bl-Tap) N89-2612-46

* Protection bag (Accessory)
(H25-0077-03)

- Binding head machine screw
(N35-3008-41)x8
- Holder (Accessory)
(J19-1417-04)x2
- Screw (Accessory)
(N09-0694-05)x2
- Foot (Accessory)
(J02-0437-04)x2
- Formed plate
(G13-0811-04)x2

Instruction manual
(B50-8233-00)

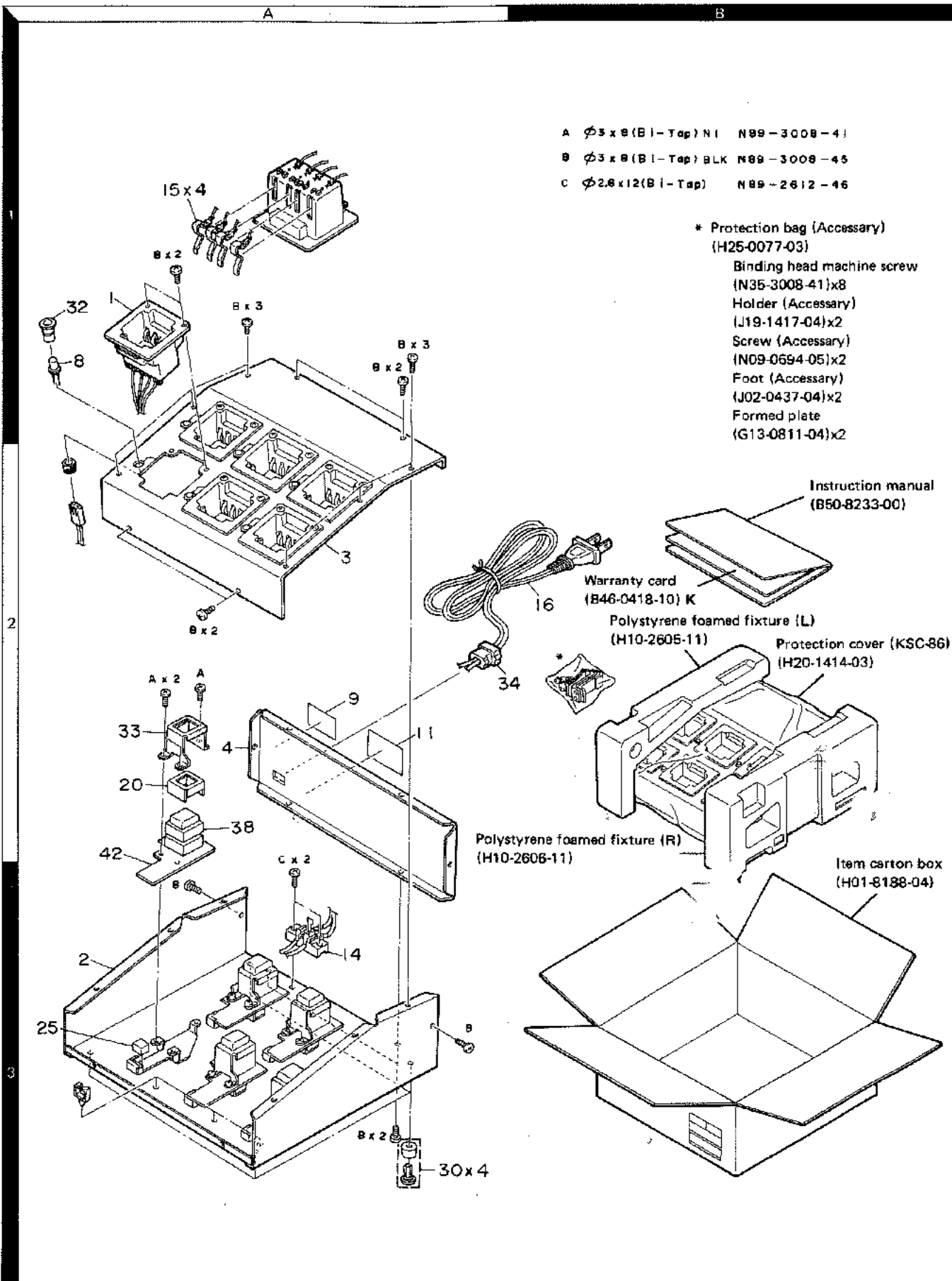
Warranty card
(B46-0418-10) K

Polystyrene foamed fixture (L)
(H10-2605-11)

Protection cover (KSC-86)
(H20-1414-03)

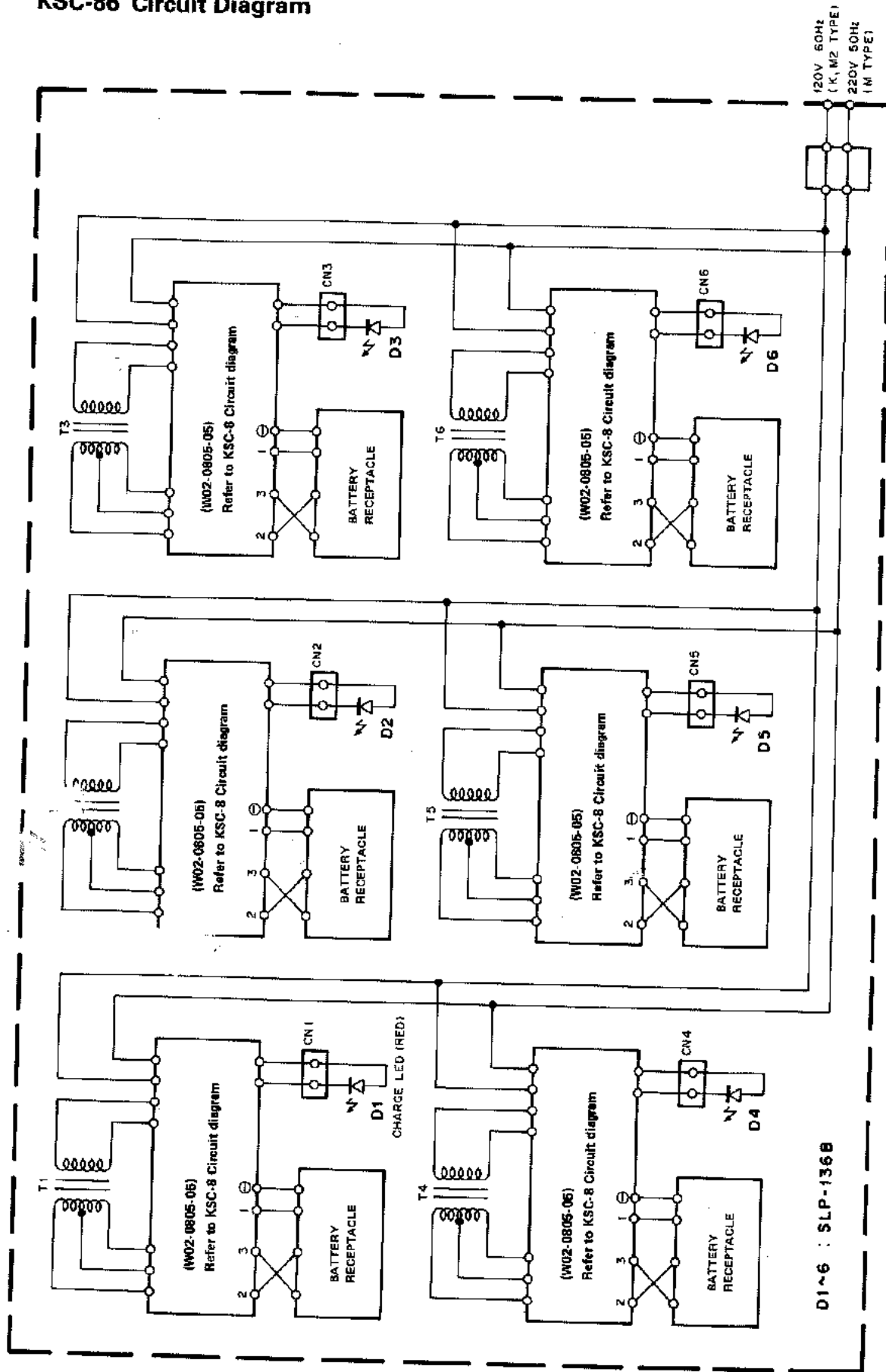
Polystyrene foamed fixture (R)
(H10-2606-11)

Item carton box
(H01-8188-04)



KSC-86 (MULTIPLE CHARGER)

KSC-86 Circuit Diagram



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SPECIFICATIONS

GENERAL

Frequency Range	
RX	935 to 941MHz
TX	896 to 902MHz (935 to 941MHz : Talk-Around)
Systems	16 systems
Groups	10 groups
Channels	20 channels per system (Trunked) 10 channels per system (Conventional)
Channel Spacing	12.5kHz (PLL channel step 12.5kHz)
Battery Voltage	DC 7.5V
Battery Life	More than 8 hours at 5-5-90 duty cycle with KNB-9A battery
Temperature Range	-30°C to +60°C (-22°F to +140°F)
Dimensions and Weight	
With KNB-9A (1100mAh battery)	7.20" (183mm) H x 2.44" (62mm) W x 1.34" (34mm) D, 1.21lbs (550g)

RECEIVER

(Measurements made per EIA standard EIA-316-B)

RF Input Impedance	50Ω
Sensitivity	
EIA 12dB SINAD	0.35μV
Modulation Acceptance	±3.5kHz
Selectivity	-63dB
Intermodulation	-60dB
Spurious (Except for 1F1/2)	-70dB
Frequency Stability	±0.00015% (-30°C to +60°C)
Frequency Spread	6MHz
Audio Power Output	500mW at less than 5%/8Ω distortion

TRANSMITTER

(Measurements made per EIA standard EIA-316-B)

RF Power Output	
High	2.5W (Except for Talk-Around)
Low	1W
RF Output Impedance	50Ω
Spurious	-60dB
Modulation	11K0F3E, 11K0F1D, 10K5F2D
FM Moise	-40dB
Audio Distortion	5.0% at 0.3 to 3kHz
Frequency Stability	±0.00015% (-30°C to +60°C)
Frequency Spread	45MHz

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