

TK-690H(B)

SERVICE MANUAL

REVISED

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This service manual applies to products with 30500001 or subsequent serial numbers. (KCH-10 and KCH-11 are applicable to the productions June 2001 and after.)

In terms of the products with the serial numbers earlier than 30500001, refer to the TK-690H(B) service manual as per part No. B51-8460-00.

TK-690H(B)



KCH-10



KCH-11



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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 this publication date. Changes which may occur after publication are covered by either Service Bulletins or Manual Revisions, which 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, and 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 if someone is within two feet (0.6 meter) of the antenna.
- DO NOT transmit until all RF connectors are secure and any open connectors are properly terminated.
- SHUT OFF this equipment when near electrical blasting caps or while in an explosive atmosphere.
- All equipment should be properly grounded before power-up for safe operation.
- This equipment should be serviced by only qualified technicians.

GENERAL

PRE-INSTALLATION CONSIDERATIONS

1. UNPACKING

Unpack the radio from its shipping container and check for accessory items. If any item is missing, please contact KENWOOD immediately.

2. LICENSING REQUIREMENTS

Federal regulations require a station license for each radio installation (mobile or base) be obtained by the equipment owner. The licensee is responsible for ensuring transmitter power, frequency, and deviation are within the limits permitted by the station license.

Transmitter adjustments may be performed only by a licensed technician holding an FCC first, second or general class commercial radiotelephone operator's license. There is no license required to install or operate the radio.

3. PRE-INSTALLATION CHECKOUT

3-1. Introduction

Each radio is adjusted and tested before shipment. However, it is recommended that receiver and transmitter operation be checked for proper operation before installation.

3-2. Testing

The radio should be tested complete with all cabling and accessories as they will be connected in the final installation. Transmitter frequency, deviation, and power output should be checked, as should receiver sensitivity, squelch operation, and audio output. QT equipment operation should be verified.

4. PLANNING THE INSTALLATION

4-1. General

Inspect the vehicle and determine how and where the radio antenna and accessories will be mounted.

Plan cable runs for protection against pinching or crushing wiring, and radio installation to prevent overheating.

4-2. Antenna

The favored location for an antenna is in the center of a large, flat conductive area, usually at the roof center. The trunk lid is preferred, bond the trunk lid and vehicle chassis using ground straps to ensure the lid is at chassis ground.

4-3. Radio

The universal mount bracket allows the radio to be mounted in a variety of ways. Be sure the mounting surface is adequate to support the radio's weight. Allow sufficient space around the radio for air cooling. Position the radio close enough to the vehicle operator to permit easy access to the controls when driving.

4-4. DC Power and wiring

1. This radio may be installed in negative ground electrical systems only. Reverse polarity will cause the cable fuse to blow. Check the vehicle ground polarity before installation to prevent wasted time and effort.
2. Connect the positive power lead directly to the vehicle battery positive terminal. Connecting the Positive lead to any other positive voltage source in the vehicle is not recommended.
3. The cable provided with the radio is sufficient to handle the maximum radio current demand. If the cable must be extended, be sure the additional wire is sufficient for the current to be carried and length of the added lead.

5. INSTALLATION PLANNING – CONTROL STATIONS

5-1. Antenna system

Control station. The antenna system selection depends on many factors and is beyond the scope of this manual. Your KENWOOD dealer can help you select an antenna system that will best serve your particular needs.

5-2. Radio location

Select a convenient location for your control station radio which is as close as practical to the antenna cable entry point. Secondly, use your system's power supply (which supplies the voltage and current required for your system). Make sure sufficient air can flow around the radio and power supply to allow adequate cooling.

SERVICE

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

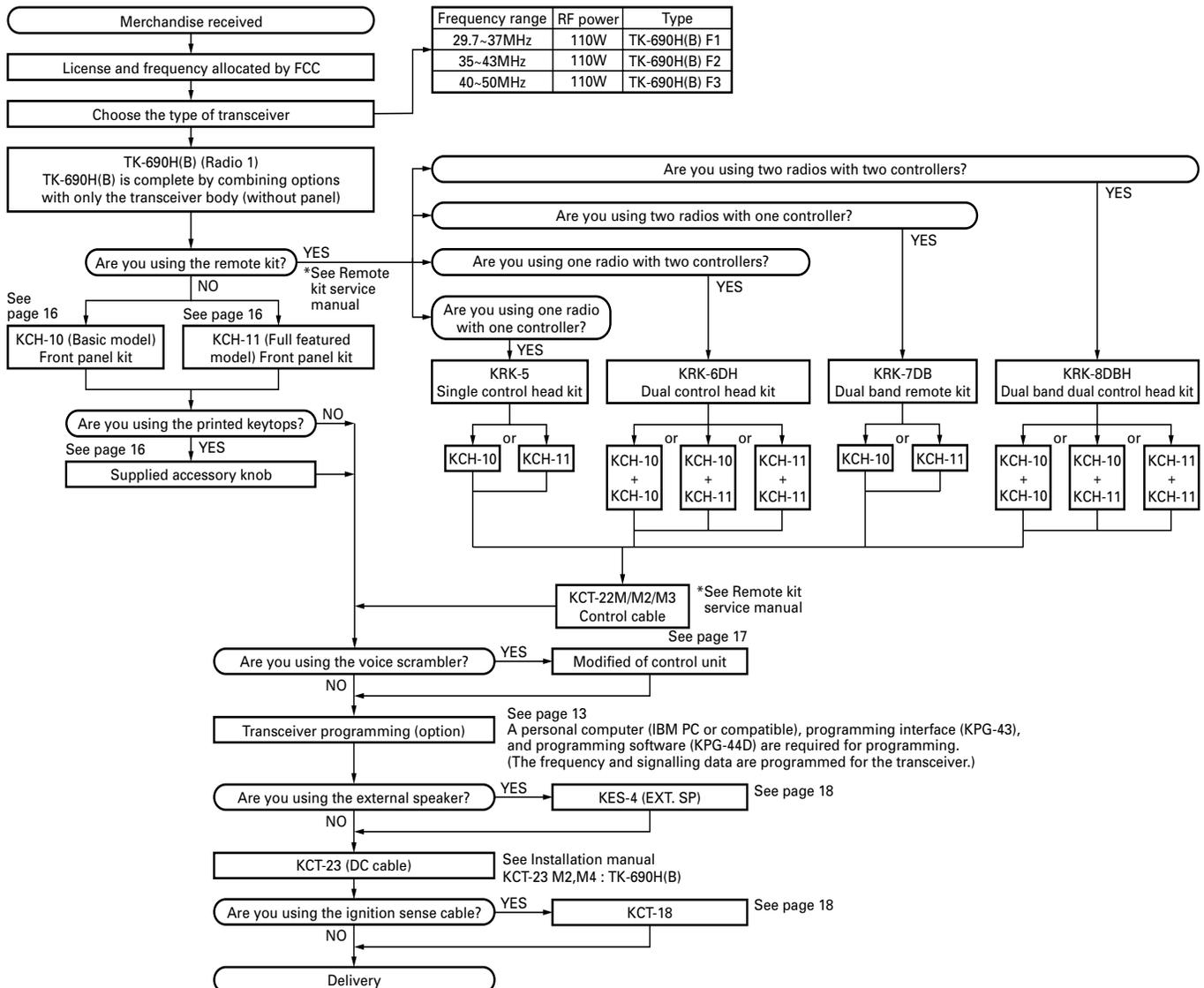
SYSTEM SET-UP

Before Reading About System Set-up

The TK-690H(B) is a transceiver main unit (without a panel or speaker) that you complete by adding options.

The options are classified into three types according to operation and function.

1. Install the front panel kit (controller) directly on a radio to operate it. (Form : Radio + KCH-10/11)
2. Remotely control one radio with one controller. (Form : Radio + KRK-5 + KCH-10/11 + KCT-22M/M2/M3)
3. Remotely control one radio with two controllers. (Form : Radio + KRK-6DH + KCH-10/11 (two) + KCT-22M/M2/M3 (two))
4. Remotely control two radios with one controller. (Form : Radios (two) + KRK-7DB + KCH-10/11 + KCT-22M/M2/M3)
5. Remotely control two radios with two controllers. (Form : Radio (two) + KRK-8DBH + KCH-10/11 (two) + KCT-22M/M2/M3 (two))



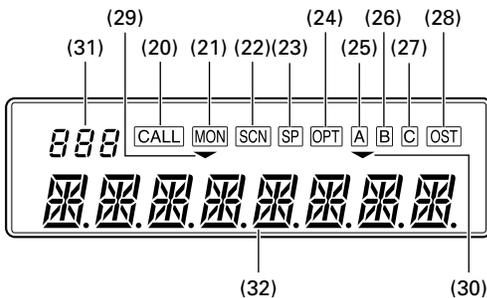
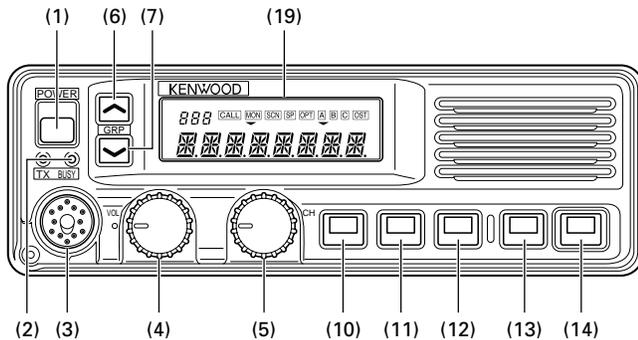
*Service manual parts No. list

Model	Parts No.
KRK-5/6DH	B51-8445-20
KRK-7DB/8DBH	B51-8452-00
	B51-8452-10

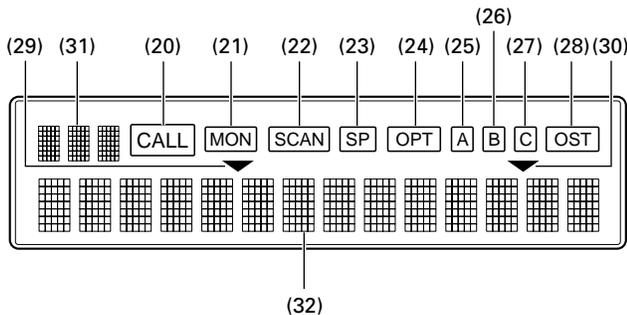
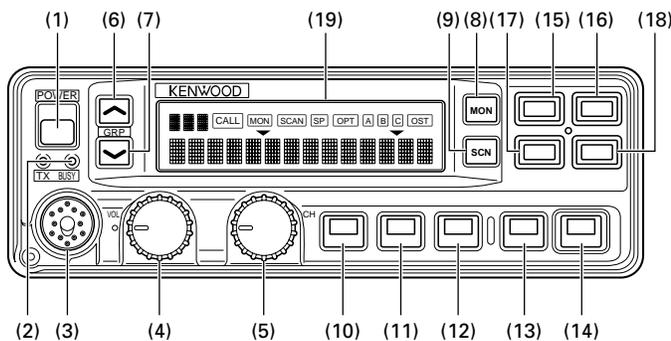
OPERATING FEATURES

1. Controls and Functions

1-1. Basic Function Panel



1-2. Full Function Panel



- (1) POWER Switch
Press to turn the power ON and OFF.
- (2) TX/BUSY Indicator
The TX Indicator (Red LED) shows that you are transmitting.
The BUSY Indicator (Green LED) shows that the channel is in use.
- (3) Microphone Connector
- (4) Volume Knob
To increase the volume level, turn clockwise (CW).
To decrease the volume level, turn counterclockwise (CCW).
- (5) UP/DOWN Knob
The function of this Knob can be programmed by the FPU.

Function	Description	Note
Channel UP/DOWN	Channel selector. To increase the channel, turn CW. To decrease the channel, turn CCW.	Default setting.
Group UP/DOWN	Group selector. To increase the group, turn CW. To decrease the group, turn CCW.	

- (6) GR UP Key, (7) GR DW Key, (8) MON Key, (9) SCN Key, (10)~(18) PF1-9 Key
The function of these Keys can be programmed by the FPU.

Function	Description	Note
[] : Key top name		
No Function	No function.	Default setting of PF1~9.
Monitor [MON]	If [MON] is pressed once while the RADIO is waiting for reception, all signalling* squelch is canceled. If [MON] is held down for 2 seconds, noise squelch is canceled and the audio is unmuted.	Default setting of MON. (Full function panel) all signalling; QT/DQT & 2 TONE/DTMF
Scan [SCN]	Start and stop the scanning sequence.	Default setting of SCN. (Full function panel)
Public Address [PA]	The RADIO works as a PUBLIC ADDRESS amplifier.	
Horn Alert [HA]	When the RADIO receives a the optional signalling calls that are assigned to the channel, the HA relay turns on.	
Talk Around [TA]	Use this function to communicate with other operators directry, without using a repeater.	
Intercom [IC]	Use this function to communicate between the HEAD1 and HEAD2 operator without transmitting.	Dual HEAD configuration only.

OPERATING FEATURES

Function [] : Key top name	Description	Note
Channel Name [AN]	Switches the display between Group-Channel No. and Group channel name.	
Speaker Internal/ External [SP]	Switch the audio output between Internal speaker and PA speaker.	
Delete/ Add [D/A]	Changes the Scan DELETE/ADD setting of each channel or group.	Press and hold [D/A] for more than 2 seconds to toggle a Group DEL and ADD.
Squelch Level [SQL]	Press to enter Squelch Level Adjust Mode. The Squelch level can be adjusted by using the UP/DOWN Knob, or the preprogrammed channel Up/Down key or Group Up/Down key.	
Operator Selectable Tone [OST]	Select signalling from the pre-programmed QT/DQT list.	
Scrambler [OPT]	The optional board on and off.	Install the Scrambler board.
AUX A [AUXA]	Turns AUX A port on and off.	
AUX B [AUXB]	Turns AUX B port on and off.	
AUX C [AUXC]	Turns AUX C port on and off.	
Home Channel (Fixed) [HC]	Switches to the pre-programmed Home Channel.	
Home Channel (Toggle) [HC]	When pressed once, switches to the Home Channel. Press again to returns to the previous channel.	
CH1 Direct [CH1]	Switches to the GR1-CH1 directry.	
CH2 Direct [CH2]	Switches to the GR1-CH2 directry.	
CH3 Direct [CH3]	Switches to the GR1-CH3 directry.	
CH4 Direct [CH4]	Switches to the GR1-CH4 directry.	
CH5 Direct [CH5]	Switches to the GR1-CH5 directry.	
Channel Recall [RCL]	When pressed once, switches to the last called channel. Press again to return to the previous channel.	The [RCL] Key works in Scan Mode only.
Dimmer [DIM]	Use this function to adjust the LCD backlight brightness, Key backlight, TX/BUSY LED, and DTMF Mic Key backlight ON/OFF.	

Function [] : Key top name	Description	Note
Speaker 1-2 Mute [SPM]	Each speaker audio can be manually disabled from the other control head.	Dual HEAD configuration only.
Channel UP [^]	If [^] is pressed once, the channel increases by one step. If [^] is held down for 1 second, the channel increases continuously.	
Channel DOWN [v]	If [v] is pressed once, the channel decreases by one step. If [v] is held down for 1 second, the channel decreases continuously.	
Group UP [^]	If [^] is pressed once, the group increases by one step. If [^] is held down for 1 second, the group increases continuously.	
Group DOWN [v]	If [v] is pressed once, the group decreases by one step. If [v] is held down for 1 second, the group decreases continuously.	
Mobile Relay Station [RPT]	The RADIO works as a repeater.	Dual BAND configuration only.
Emergency Call [EMG]	To start an Emergency Call, press [EMG].	This function needs the ANI board.

(19) LCD Display

	Description	Note
(20) CALL	Flashes when the RADIO is called by proper Optional Signalling (DTMF or 2Tone).	If Signalling has been set "AND", CALL lights after transmitting.
(21) MON	Lights when [MON] is pressed. Signalling squelch is disabled.	
(22) SCN	Indicates when scan mode is enabled.	
(23) SP	Lights when "PA speaker" is selected for audio output.	
(24) OPT	Lights when the optional board*, that is installed inside the RADIO, is enabled.	Optional Board : - Scrambler
(25) A	Lights when [AUXA] is pressed. The PF Port that is programmed with "AUX A" is ON.	
(26) B	Lights when [AUXB] is pressed. The PF Port that is programmed with "AUX B" is ON.	

OPERATING FEATURES

	Description	Note
(27) C	Lights when [AUXC] is pressed. The PF Port that is programmed with "AUX C" is ON.	
(28) OST	Lights when [OST] is pressed, Operator Selectable Tone is enabled.	
(29) ▼ (Group Add Status)	If the selected group is in the multi group scan sequence, the indicator appears at the group.	
(30) ▼ (Channel Add Status)	If the selected channel is in the scan sequence, the indicator appears at the channel.	
(31) • BASIC FUNCTION PANEL 7 SEGMENT display • FULL FUNCTION PANEL DOT MATRIX (S) display	Displays the channel status. P1 : Lights when a PRIORITY 1 channel is shown on the display. P2 : Lights when a PRIORITY 2 channel is shown on the display. PP : Lights when a PRIORITY 1 & 2 channel is shown on the display. HC : Lights when a Home Channel is selected by [HC] key. TA : Lights when the RADIO is in Talk Around mode. RCL : Lights when recall channel is selected by [RCL] key. R1-R15 : Lights when remote channel is selected by PF port.	
(32) • BASIC FUNCTION PANEL 13 SEGMENT display • FULL FUNCTION PANEL DOT MATRIX (L) display	Displays the operating Group-Channel number (Channel display), or name (Alphanumeric display) programmed by the FPU. Also displays the status of some features.	

1-3. Microphone

Press PTT (Push To Talk) to transmit, then speak into the microphone.

2. Receive

- (1) To turn on the RADIO:
Press the Power Switch. The display and graphics illuminate to indicate the RADIO is ON.
- (2) To adjust the volume level:
Turn the Volume Knob CW to increase the volume level.
Turn the Volume Knob CCW to decrease the volume level.
- (3) To select a Group:
Select a Group by rotating the UP/DOWN Knob which has been programmed with "Group UP/DOWN" or by pressing the Keys which have been programmed with "Group UP" and "Group DOWN".
If the "Channel Tracking Function" is enabled, the channel number will not change.
- (4) To Select a Channel:
Select a Channel by rotating the UP/DOWN Knob which has been programmed with "Channel UP/DOWN" or by pressing the keys which have been programmed with "Channel UP" and "Channel DOWN".
- (5) To enter carrier squelch mode:
If you want to monitor a channel, press [MON] Key. If the "OFF HOOK Decode" function has been disabled, you can also enter monitor mode by taking the microphone off HOOK.

3. Transmit

- (1) Normal ON HOOK Scan Mode
First, lift the microphone from the HOOK. The scanning stops temporarily and the OFF HOOK revert channel is displayed. Listen for a few seconds to make certain the channel is not being used.
OFF HOOK Scan MODE
If scanning, pressing the PTT switch will stop the RADIO on the OFF HOOK revert channel and begin transmission immediately.
Not Scan Mode
Pressing PTT starts transmission at the selected channel.
- (2) Press PTT and start speaking. For best results, hold the microphone 1 to 1.5 inches from your mouth. Release PTT when your message is complete. Listen for a response.
- (3) When your conversation is finished, replace the microphone on its hook.

4. Scan Operation

4-1. General

There are two "Mic HOOK" scan modes in which the RADIO can be programmed to operate.

- ON HOOK Scan
Normal method of scanning that requires the microphone to be ON HOOK (hanged on the Mic Hanger) to initiate scan.
- OFF HOOK Scan
The microphone does not have to be ON HOOK to initiate scan or to scan channels.

OPERATING FEATURES

- (1) The scan feature is initiated by pressing the [SCN] Key.
- (2) A single confirmation tone sounds, and scanning starts. If there is only one or no added channels, an error tone will sound and scanning will not start.
- (3) The display shows "SCN" icon, and "SCAN" or the OFF HOOK Revert Channel Number (FPU setting).
- (4) If the RADIO receives a proper signal while scanning, scanning stops temporarily, audio is unmuted, and the channel number or name is displayed.
If either "Priority1" or "Priority2" is programmed and scanning stops at a Normal Channel by receiving a signal, the RADIO watches for a signal on the Priority Channel periodically. When a signal exists on the Priority Channel, the channel will change from the Normal Channel to Priority Channel.
If both "Priority1" and "Priority2" are programmed and scanning stops at the Priority2 Channel by receiving a signal, the RADIO watches a signal on the Priority1 Channel periodically. When a signal exists on the Priority1 Channel, the channel will change from the Priority2 Channel to the Priority1 Channel.
If there is no Priority Channel programmed, the scanning stops at a channel and receives only that channel.
- (5) If the [SCN] Key pressed again, Scan Mode ends at the revert channel, and two confirmation tones sound.

4-2. To Delete Undesired Channels

To temporarily delete undesirable channels, press [D/A] Key while the channel is displayed, and scanning resumes. (To temporarily delete Priority Channel 1 or 2, set the "Priority Temporary D/A" function to "YES".)

You can't delete a channel in Scan Mode under the following conditions:

- Priority Scan
There is only channel beside the Priority Channel in the scan sequence.
- Non-priority Scan
There are only 2 channels in the scan sequence. To restore the original scan sequence, either turn scan off and on or turn the RADIO off and on.

4-3. To Enter Carrier Squelch Scan While Scan is On

If you have pressed the [MON] Key, the MON indicator is turned on and the RADIO operates in carrier squelch scan.

5. Adding Channels and Groups to the Scan Sequence

- (1) Channels
To add the currently displayed channel to the scan sequence, press [D/A] Key. The CH ADD indicator (▼) lights, and the channel is added to the scan sequence.
- (2) Groups
To add the currently displayed group of channels to the scan sequence, hold down the [D/A] Key for 2 seconds. The GR ADD indicator (▼) lights, and the group is added to the scan sequence.

6. Deleting Channels and Groups from the Scan Sequence

- (1) Channels
To delete a channel from the scan sequence press [D/A] Key. The CH ADD indicator (▼) goes off, and the channel is deleted from the scan sequence.
- (2) Groups
To delete the currently displayed group of channels from the scan sequence, hold down [D/A] Key for 2 seconds. The GR ADD indicator (▼) goes off, and all the channels in the group are deleted from the multi group scan sequence.

7. Operator Selectable Priority

- (1) Operator Selectable Priority1
If Priority1 has been set to "Operator Selectable", you can set the currently displayed channel as Priority1.
To set the currently displayed channel as Priority1, hold down the [SCN] Key and press the [MON] Key three times.
- (2) Operator Selectable Priority2
If Priority2 has been set to "Operator Selectable" you can set the currently displayed channel as Priority2.
To set the currently displayed channel as Priority2, hold down the [SCN] Key and press the [MON] Key twice.

8. Talk Around (TA)

Talk Around is useful when you are close to other mobiles you want to talk to, or are outside the range of your repeater system.

Press the [TA] Key. A confirmation tone sounds, and "TA" (BASIC Panel : 7 segment, FULL Panel : DOT MATRIX (S)) is displayed. You can communicate without using a repeater.

To use a repeater, press [TA] again. A confirmation tone sounds, and "TA" goes off.

9. Horn Alert (HA)

If you are called from the base station using 2Tone/DTMF while you are away from your transceiver, you will be alerted by the vehicle horn or some other type of external alert. To turn the horn alert function on, press the [HA] Key. A confirmation tone sounds, and the display shows HORN ALERT (or HA).

If [HA] is pressed again, the horn alert function is turned off.

OPERATING FEATURES

10. Public Address (PA)

Public Address amplifies the microphone audio, and outputs it through a PA speaker. PA is activated by pressing the [PA] Key. A confirmation tone sounds, and the display shows PUBLIC ADDRESS (or PA). PA can be activated at anytime (scanning or non-scanning).

The RADIO continues to scan & receive calls while in PA mode. Pressing PTT activates PA, and will override an incoming call at anytime ; however, no RADIO transmission takes place. If [PA] is pressed again, a confirmation tone will sound, the display will return to the normal channel or SCAN display, and the PA function will turn off.

11. Speaker Internal/External (SP)

SP amplifies the received audio from the RADIO and outputs it through a PA speaker. SP is activated by pressing the [SP] Key. A confirmation tone sounds and the SP icon is displayed. SP can be activated at anytime (scanning or non-scanning).

The RADIO transmits and operates normally while SP is activated, but all received calls will be output through the PA speaker. If [SP] is pressed again, a confirmation tone sounds, the SP icon goes off and the SP function will turn off.

12. Channel Name (AN)

This function switches the 13-segment display (BASIC Panel) or DOT MATRIX (L) display (FULL Panel) between alphanumeric and Group-Channel number.

If you want to change from alphanumeric display to channel display, press [AN] Key. A confirmation tone sounds, and the alphanumeric display changes to the channel display.

If [AN] is pressed again, a confirmation tone sounds, and the channel display changes back to the alphanumeric display.

13. Intercom (IC) ; Dual Head Configuration only

Intercom (IC) allows one control head operator to talk to the another control head operator. IC mode is activated by pressing the [IC] Key. A confirmation tone sounds and the display shows INTERCOM. IC can be activated at anytime (scanning or non-scanning).

The RADIO continues to scan & receive calls while in IC mode. Pressing PTT activates IC and will override an incoming call at anytime ; however, no RADIO transmission takes place. If [IC] is pressed again, a confirmation tone sounds, the display returns to the normal channel or SCAN display, and the IC function will turn off.

14. Home Channel (HC)

This feature allows the radio operator to immediately select a pre-determined "Home Channel" by pressing the [HC] Key. HC can be activated as follows.

	CASE1 : HC has been set as "HC (Fixed)"		
	Non-Scan Mode	Scanning	Scan temporary stopping
press [HC] once	Change to Home Channel		
press [HC] again	No effect		
	CASE2 : HC has been set as "HC (Toggle)"		
	Non-Scan Mode	Scanning	Scan temporary stopping
press [HC] once	Change to Home Channel		
press [HC] again	Return to current channel	Change to Revert Channel	Return to current channel

15. Squelch Level (SQL)

This function allows the radio operator to manually adjust the squelch threshold in 16 steps (Level 0~15) via the front panel controls. To adjust the squelch level:

- (1) Press the [SQL] Key. A confirmation tone sounds, and the RADIO enters Squelch Level Adjust Mode. In this mode, all signalings are canceled and audio is unmuted. The display shows SQUELCH XX (or SQL XX). (XX= squelch level)
- (2) Change the squelch level by pressing [^] and [v] Keys, or rotating the UP/DOWN Knob.
- (3) Press [SQL] again. A confirmation tone sounds, the display returns to the normal channel, the level setting is memorized, and Squelch Level Adjust Mode will turn off.

* This feature can be initiated when the RADIO is not in scanning mode.

16. Operator Selectable Tone (OST)

This function allows the radio operator to change the pre-set decode QT/DQT, encode QT/DQT. You can select Dec/Enc OFF or from up to 16 decode/encode pairs (Pair No. 1~16) programmed by the FPU. To select the Dec/Enc pairs:

- (1) Press the [OST] Key. A confirmation tone sounds, and the display shows the OST Name which is memorized in the channel for 2 seconds. The "OST" icon lights, and OST is enabled.
Press [OST] again, and the OST icon goes off and OST is disabled.
- (2) When the [OST] Key is held down, a confirmation tone sounds and the RADIO enters OST Select Mode.
- (3) Select the Dec/Enc pair by pressing the [^] and [v] Keys, or rotating the UP/DOWN Knob. The display shows TONE XX (XX=Dec/Enc pair number) or the OST Name.
- (4) Press [OST] again, a confirmation tone sounds, the display returns to the normal channel, the pair is memorized and OST Mode will turn off.

* You can select a Dec/Enc pair on each channel.

OPERATING FEATURES

17. Option Board (OPT)

If an optional Scrambler board has been installed in the RADIO, Scrambler is activated by pressing the [OPT] Key. A confirmation tone sounds, and the OPT icon is displayed. If [OPT] is pressed again, a confirmation tone sounds, the OPT icon goes off and the Scrambler will turn off.

If [OPT] is held down, the RADIO enters SCR Code Set Mode. A confirmation tone sounds, and the display shows CODE XX (XX=SCR Code). Change the SCR Code by pressing the [^] and [v] Keys, or rotating the UP/DOWN Knob.

Press [OPT] again, a confirmation tone sounds, the display returns to channel (SCR is ON), the SCR Code setting is memorized, then SCR Code Set Mode will turn off.

18. AUX A, AUX B, AUX C

This function switches the accessory PF Output ports which have been programmed with AUX A, AUX B and AUX C.

Press [AUXA] Key. A confirmation tone sounds, the A icon is displayed, and the AUX A Port is switched on (Low level). If [AUXA] is pressed again, a confirmation tone sounds, the A icon goes off and the AUX A Port is switched off (open collector).

In the same way, [AUXB] Key controls the AUX B Port, and [AUXC] Key controls the AUX C Port.

19. Direct Channel Access

This feature allows the radio operator to immediately select CHANNELS 1~5 which are contained in GROUP 1. To select GR1-CH1, press [CH1]. To select GR1-CH2~5, press [CH2] ~ [CH5],

20. Channel Recall (RCL)

This feature is enabled in scan mode.

This feature allows the radio operator to immediately access the last called (Unmuted) channel by pressing [RCL]. The 3-digit display shows "RCL". Press [RCL] again, and the radio returns to the previous channel.

21. Dimmer (DIM)

To adjust the brightness of the display backlight, TX/BUSY LED, panel Keys backlight and microphone keys backlight, press the [DIM] Key.

[DIM] controls the brightness at the same time as follows.

	Display backlight	TX/BUSY LED	Panel Keys backlight	Microphone Keys backlight
Default	High	High	High	High
Press [DIM] once	Medium	↓	↓	↓
Press again	Low	↓	↓	↓
Press again	OFF	OFF	OFF	OFF
Press again	return to High	return to High	return to High	return to High

* The brightness setting is memorized.

22. Speaker 1-2 Mute (SPM)

; Dual Head Configuration only

This feature allows the radio operator to manually disable the speaker audio of another control head.

Press the [SPM] Key, a confirmation tone sounds, and the other head speaker is muted. Both head displays shows X MUTE (X=Muted HEAD number).

This muted condition is canceled by both head keys without PTT and Mic HOOK which is connected to Un-muted head.

23. Mobile Relay Station (RPT)

; DUAL BAND Configuration only

This function allows the radio operator to use the RADIO as a repeater.

- (1) Both "Repeater Channel 1" and "Repeater Channel 2" must be pre-programmed by the FPU. Each channels must be on different bands.
- (2) Press the [RPT] Key, then both the VHF and UHF units move to the repeater channel, and enter Repeater mode. Displays of both heads show "REPEATER".
- (3) If one unit receives a proper signal, the other unit will start transmitting (repeating).
- (4) If the signal stops, the repeat action will stop. If one of the units detects another signal, the repeat action will restart.
- (5) Press [RPT] again, both units return to their previous channels, and exit the Repeater mode. However, during the repeating mode, pressing [RPT] has no effect.

24. Emergency Call (EMG)

If the [EMG] Key is held down, the RADIO enters the Emergency Mode. In the Emergency Mode, the channel changes to the "Emergency Channel (set by the FPU)" internally. The display depends on "Emergency Channel Display" setting, and the Emergency Call (None, DTMF, MSK or ANI board) is transmitted.

If "ANI Board" is selected for the Emergency Type, turn the transceiver off, then turn it on again to recover "Normal Mode".

If "ANI Board" is not selected for the Emergency Type, press and hold [EMG] key to recover "Normal Mode".

OPERATING FEATURES

25. Busy Channel Lockout (BCL), BCL Override

The Busy Channel Lockout function prevents interference with other stations that may be using the same channel.

While the selected channel is in use, pressing PTT causes the RADIO to sound a warning tone, and transmission is inhibited. To stop the warning tone, release PTT.

If BCL Override has been enabled, pressing PTT within 500msec again will cancel BCL, and transmission is enabled.

26. 2TONE Signalling

2Tone signalling opens the squelch only when the RADIO receives a proper 2Tone code that is the same as the pre-programmed 2Tone for the channel. When the RADIO receives a 2Tone code, the CALL icon flashes.

If Transpond has been programmed, the RADIO will return an acknowledgment signal automatically after receiving the 2Tone code.

If Call Alert has been programmed, an Alert Tone sounds after receiving a 2Tone code. You can configure "Normal" (an alert tone beeps once) or "Continuous" (an alert tone beeps every 5 seconds) for the Call Alert. Unmute condition is canceled and the CALL icon goes off when ; (1) pressing the [MON] Key, (2) hanging the microphone on its hook, (3) muting continues for 10 seconds. (If "Auto Reset" has been programmed)

27. DTMF Signalling

DTMF Signalling opens the squelch only when the RADIO receives a proper DTMF code that is the same as the pre-programmed "Primary Code (Individual ; 1~7digits)" or "Secondary Code (Group ; 1~7digits)". When the RADIO receives a correct code, the CALL icon flashes.

If Transpond has been programmed, the RADIO will return an acknowledgment signal automatically after receiving the DTMF code.

If Call Alert has been programmed, an Alert Tone sounds after receiving a DTMF code. You can configure "Normal" (an alert tone beeps once) or "Continuous" (an alert tone beeps every 5 seconds) for the Call Alert. Unmute condition is canceled and the CALL icon goes off when ; (1) pressing the [MON] Key, (2) hanging the microphone on its hook, (3) muting continues for 10 seconds (If "Auto Reset" has been programmed), and (4) receiving reset code. (Primary code + "#" or secondary code + "#")

28. Time Out Timer

(Possible to configure to each group)

The Time Out Timer function interrupts continuous transmission after a specified time elapses.

Holding down PTT for longer than the programmed time causes the RADIO to stop transmitting and sound a warning tone. To stop the warning tone, release PTT.

29. Signalling AND/OR

(Possible to configure to each group)

The RADIO will be unmuted with a combination of QT/DQT and 2Tone/DTMF. The AND/OR setting works as follows.

29-1. AND

The audio is unmuted when the RADIO receives the correct QT/DQT and 2Tone/DTMF. After transmitting, 2Tone/DTMF will be canceled.

29-2. OR

The audio is unmuted when the RADIO receives the correct QT/DQT. 2Tone/DTMF is used just as an individual call or group call.

30. Off Hook Decode

If the OFF HOOK Decode function has been enabled, removing and replacing the microphone on the HOOK has no effect for decoding QT/DQT and 2Tone/DTMF.

31. TX Audio Monitor

; Dual Head Configuration only

This function allows the radio operator to hear another operator's voice which is transmitted through another control head.

If the TX Audio Monitor function is set to "w/Talk Interrupt" and one operator is transmitting, the other operator's control head displays "INTERCOM" and he/she can speak to the transmitting control head by pressing PTT.

32. Roll Over/Dead End

32-1. Roll Over

When [^] (CH UP) is pressed, or the CH UP/DOWN Knob is turned CW from the Maximum channel, the channel changes to the Minimum channel.

When [v] (CH DOWN) is pressed, or the CH UP/DOWN Knob is turned CCW from the Minimum channel, the channel changes to the Maximum channel.

32-2. Dead End

When [^] (GR UP) is pressed, or the GR UP/DOWN Knob is turned CW from the Maximum group, the group doesn't change.

When [^] (CH UP) is pressed, or the CH UP/DOWN Knob is turned CW from the Maximum channel, the channel doesn't change.

When [v] (GR DOWN) is pressed, or the GR UP/DOWN Knob is turned CCW from the Minimum group, the group doesn't change.

When [v] (CH DOWN) is pressed, or the CH UP/DOWN Knob is turned CCW from the Minimum channel, the channel doesn't change.

OPERATING FEATURES

33. Minimum Volume

When the Volume Knob is adjusted fully counterclockwise, the audio level is set to the Minimum Volume level which is programmed by the FPU.

34. Dead Beat Disable (DBD)

If the RADIO receives a DBD Code (1~7digits), the RADIO returns an acknowledgment signal automatically, and transmission is disabled. This TX INHIBIT condition is memorized.

If the RADIO receives a DBD Reset Code (DBD Code + #), the RADIO returns an acknowledgment signal automatically, and transmission is Enabled.

35. ANI Board

The ANI board contains functions which you can use. To use the function, you select that function on the ANI board.

36. Accessory Programmable Function Port (PF Port)

The RADIO has 13 PF Ports.

HEAD (12 pin) : PF Input Port 2, PF Output Port 2

DECK (Dsub 25 pin) : PF Input Port 5, PF Output Port 4

Each Port can be programmed with a function from next Table.

36-1. PF Input Port

External HOOK	Open → OFF HOOK, Low → ON HOOK
CH Select A	The Channel changes to Remote Channel
CH Select B	1~15. If CH Select A~D are set "H" or "Open", the channel is selected by using the [^]/[v] keys or UP/DOWN Knob. (User Channel)
CH Select C	
CH Select D	
External PTT	Open → PTT OFF, Low → PTT ON
Scan	Open → Scan OFF, Low → Scan ON
Home Channel	Open → Current Channel, Low → Home Channel
Light Sense	Open → LCD Backlight is controlled by [DIM], Low → LCD Backlight is set "Low"
Repeater SW	Open → Repeater inactive, Low → Repeater Active * Dual BAND configuration only
External Monitor	Open → Monitor OFF, Low → Monitor ON

36-2. PF Output Port

AUX A	Pressing [AUXA] once → Low, Pressing [A] [AUXA] again → OPEN-COLLECTOR
AUX B	Pressing [AUXB] once → Low, Pressing [B] [AUXB] again → OPEN-COLLECTOR
AUX C	Pressing [AUXC] once → Low, Pressing [C] [AUXC] again → OPEN-COLLECTOR
TOR	Receiving correct QT/DQT → Low, Not receiving correct QT/DQT → OPEN-COLLECTOR
COR	BUSY → Low, Not BUSY → OPEN-COLLECTOR

37. Timed Power Off

This function works as "Automatic Power Switch Off".

Timed Power Off timer starts from the ignition-off. After the timer expires, the RADIO will automatically turn off. The timer will be reset if the ignition is turned on and off.

This function requires ignition-sense. Connect the ignition-line to the 9-pin connector which is located at the rear of the RADIO.

After the timer expires, you can turn the transceiver on again with 2 methods below.

- 1) Timed power off function (Default)
Press the power switch.
- 2) Ignition function & Timed power off function
Turn the ignition on.

38. Emergency

- **Active tone**
Automatic transmission period in the emergency mode.
- **Interval Time**
Interval time between the automatic transmissions.
- **Duration of Locator Tone 1**
Duration of an alert tone before the automatic transmission is performed.
- **Duration of Locator Tone 2**
Duration of an alert tone after the automatic transmission is performed.
- **Emergency Channel Display**
Setting for the display in the emergency mode.
The transceiver can be programmed to display "EMERGENCY" channel name when it is in emergency mode.
If you set to "off" by KPG-44D the transceiver shows selected group/channel/status before entering to the emergency mode however the transceiver is in an emergency mode.

OPERATING FEATURES

- **Emergency Mode Type**
Speaker mute on or off in the emergency mode.
- **Emergency Type**
Select an Emergency code format from DTMF, MSK, ANI board or OFF (Disabled).
- **Emergency DTMF ID**
The emergency DTMF ID code when you select DTMF in the emergency type.
- **Emergency Call Fleet**
The emergency fleet number when you select MSK in the emergency type.
- **Emergency Call ID**
The ID number when you select MSK in the above emergency type.

39. MSK PTT ID

- **Side Tone**
A tone to notify the voice transmission is allowed after sending the MSK PTT ID (Connect ID).
- **Fleet (Own)**
- **ID (Own)**
Configure the Fleet/ID of the MSK PTT ID (Fleet Sync Format).
- **Data TX Mod. Delay**
Delay time of transmitting the MSK ID after the transceiver enters the transmission mode.

40. Power On Text

To display the Power on text for approximately 2 seconds when the transceiver is turned on.

41. Data Programming (PC Mode)

41-1. Preparation and Connection

TK-690H transceiver is programmed by using a personal computer, programming interface cable KPG-43, and programming software KPG-44D.

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

41-2. Programming Interface Cable KPG-43 Description

The KPG-43 is required to interface TK-690H to the computer. It has a circuit in its D-sub 25 pin connector case that converts RS-232C logic level to TTL level.

KPG-43 is used to connect between TK-690H microphone connector and RS-232C serial port of computer.

41-3. Programming Software KPG-44D Description

KPG-44D is the programming software for TK-690H supplied on a 3.5" floppy disk. This software runs under MS-DOS version 3.1 or later on an IBM-PC/XT, AT, or PS2 or compatible machine.

The data can be input to or read from TK-690H and edited on the screen. The programmed or edited data can be printed out. It is also possible to tune the transceiver.

We recommend that install KPG-44D for example to harddisk first then use it.

KPG-44D instruction manual part No. : B62-1011-XX.

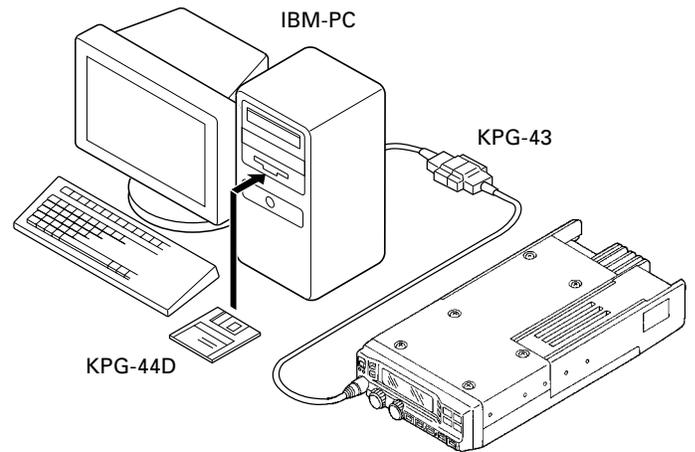
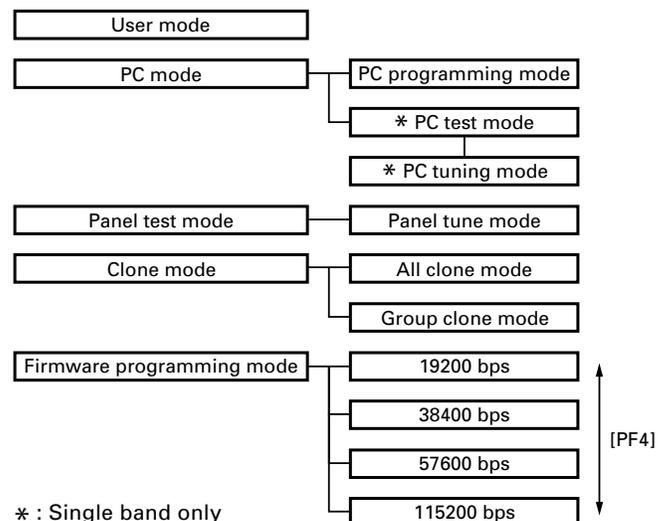


Fig. 1

42. Mode



OPERATING FEATURES

Mode	Function
User mode	Customer use this mode
PC mode	Communication between the radio and PC (IBM compatible). It requires the KPG-44D.
Panel test mode (Refer to ADJUSTMENT)	Dealer uses to check the fundamental characteristics.
Panel tune mode (Refer to ADJUSTMENT)	Dealer uses to tune the radio.
Clone mode	Programmed data is transferred from one transceiver to another by using a cloning cable.
Firmware programming mode	Re-write the firmware of the flash ROM. Note : When programming the firmware, it is best to copy the data from the floppy disk to your hard disk, then from the hard disk to the CPU. Directly copying from the floppy disk to the CPU may not work because the access speed is too slow.

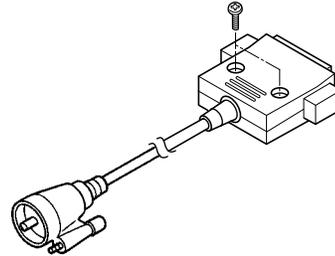
42-1. How to Enter Each Mode

Mode	Operation
User mode	Power on
PC mode	Connect the PC and turn the power on. Then the radio can be controlled by the FPU.
Panel test mode	Hold down the [PF1] key, turn the radio power on.
Panel tune mode	Press the [GR ^] key from the panel test mode.
Clone mode	Hold down the [PF5] key, turn the radio power on.
Firmware programming mode	Hold down the [PF2] key, turn the radio power on.

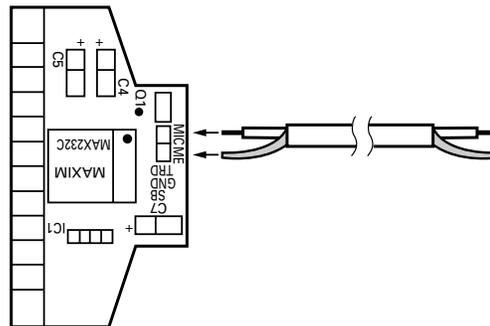
43. PC Tuning Mode

When making adjustment while in PC tuning mode, modify the KPG-43 programming interface cable as described below.

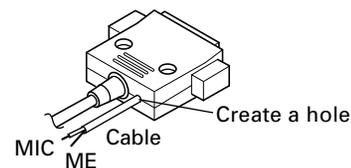
1. Remove the two screws from the plug cover, then lift the cover from the plug.



2. Solder the lead wire onto the MIC tab on the PCB, and the ground wire onto the ME tab.



3. Create a hole in the casing (as shown in the illustration) then fit the cable into the hole. Replace the cover and secure it using the two screws.

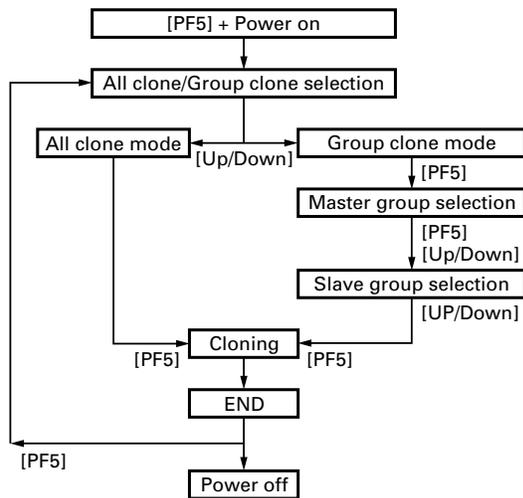


OPERATING FEATURES

44. Clone Modes

There are two clone modes : "All Clone Mode", in which all data programmed in one transceiver with the "FPU" is copied to another transceiver, and "Group Clone Mode", in which group data in one transceiver is copied to a group in another transceiver.

The cloning operation is performed from the master side transceiver.



44-1. To Enter the Clone Mode and Connect Transceivers

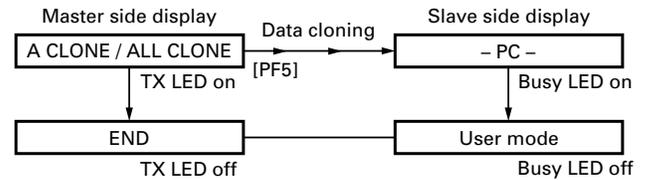
- Hold down the [PF5] key and turn on the power switch on the master side transceiver.
Turn on the power switch on the slave side transceiver as usual.
- Connect the master and slave side transceivers with a cloning cable.

44-2. All Clone

- Enter the All Clone Mode from the clone mode with the [Up/down] knob.
- Press the [PF5] key to start cloning.

44-3. Group Clone

- Enter the group clone mode from the clone mode with [Up/Down] knob.
- Press the [PF5] key to enter the master group select mode. Select the master group with [Up/Down] knob.



- Press the [PF5] key to enter the slave group select mode. Select the slave group with [Up/Down] knob.
- Press the [PF5] key to start cloning.

Note : The transceiver does not enter the clone mode if it is disabled with the FPU. To clone the transceiver both transceivers must be same. If the panels, frequency ranges, optional board are different, they cannot be cloned.

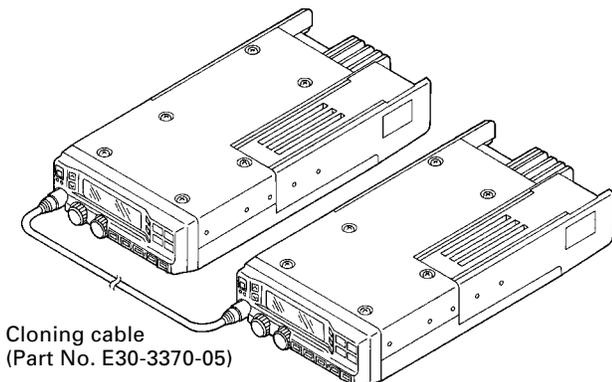
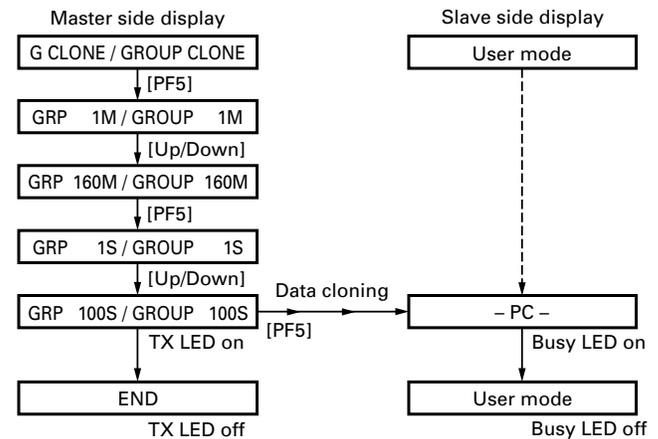


Fig. 2

INSTALLATION

1. Contents

- Front panel kit (KCH-10, KCH-11)
Description and use of the knob supplied with the KCH-10/11
- Optional voice scrambler function
Voice scrambler use and connection
- Optional ANI function
ANI board connection
- Ignition sense cable (KCT-18)
Description of the ignition function and timed power off function and connection
- External speaker (KES-4)
KES-4 connection method and modification for increasing the speaker output of the control head
- Horn alert function
Modification for changing the function of the ACC terminal for horn alert
- Accessory terminal function
Description and use of D-SUB 25-pin ACC terminals, "MI/DI" and "SB"
- Connection with remote kit
Modification of the radio to use KRK-5, KRK-6DH, KRK-7DB, or KRK-8DBH

2. Front Panel Kit (KCH-10, KCH-11)

2-2. Connection with TK-690H(B)

1. Remove the upper and lower halves of the case of the TK-690H(B).
2. Connect the lead (W501) with a connector of the control unit (X57-560 B/2) to CN1 of the KCH-10 or KCH-11.
3. Install the KCH-10 or KCH-11 on the radio using the screws (N32-3006-46) (❶) supplied with the front panel kit. Take care not to get the lead between the KCH-10 or KCH-11 and an edge of the case. (You can install the panel upside down if necessary to install the radio.)
4. Reinstall the upper and lower halves of the case.
5. Connection the short plug for the accessory connector (9-pins) on the rear of the radio.

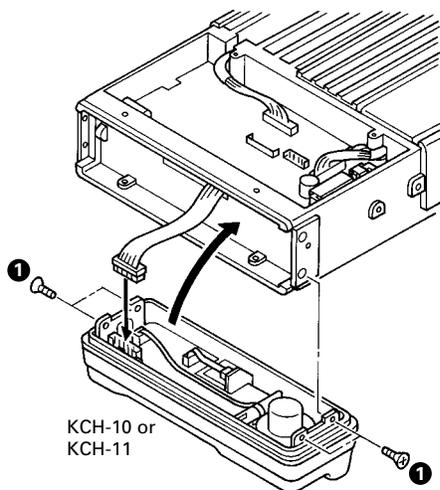


Fig. 1

2-3. Install the accessory knobs

When a function is set by the programming software (KPG-44D), the key legend can be changed by inserting the accessory knobs into PF1 to PF9 of the KCH-11 (PF1 to PF5 : KCH-10). The accessory contains a set of 30 knobs : AN, D/A, DIM, HA, HC, IC, MON, OPT, OST, PA, RCL, RPT, SCN, SP, SPM, SQ, TA, ^, v, CH1, CH2, CH3, CH4, CH5, AUX A, AUX B, AUX C, EMG, and blank.

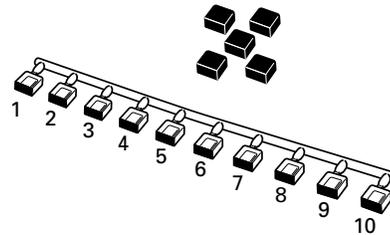
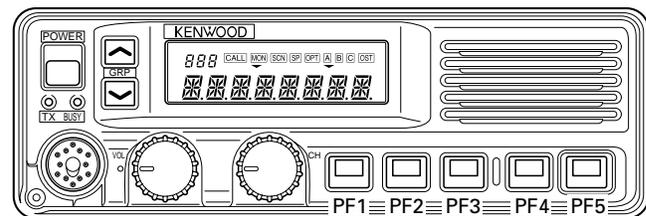


Fig. 2

No.	K29-5276-*3	K29-5277-*3	K29-5305-*3
1	AN	RCL	CH1
2	D/A	RPT	CH2
3	DIM	SCN	CH3
4	HA	SP	CH4
5	HC	SPM	CH5
6	IC	SQ	AUX A
7	MON	TA	AUX B
8	OPT	^	AUX C
9	OST	v	EMG
10	PA	No printing	

KCH-10



KCH-11

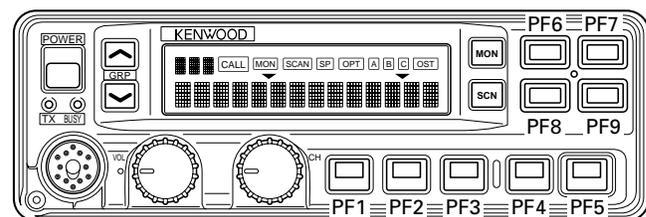


Fig. 3

INSTALLATION

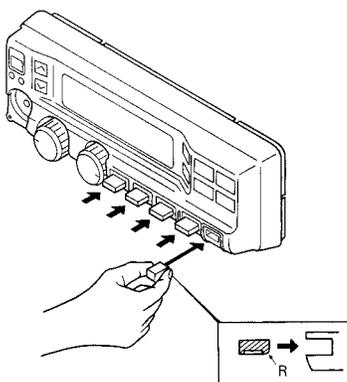


Fig. 4-1 Knob insertion

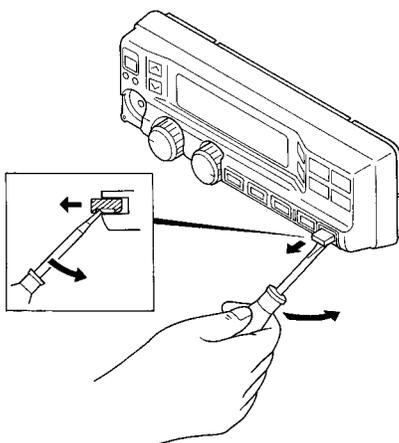


Fig. 4-2 Knob removal

3. Optional Voice Scrambler Function

The optional voice scrambler function can be used by two methods.

1. Assign this function to the OPT key by using the programming software (KPG-44D).
When the OPT key is pressed, the **[OPT]** indicator comes on, and the optional (scrambler) function is enabled. When the key is pressed again, the **[OPT]** indicator goes off and the function is disabled.
2. Assign the optional scrambler function to each channel by using the programming software (KPG-44D). The optional scrambler function can be used without pressing the OPT key.

3-1. Code setting

The code can be set by two methods.

1. Hold down the OPT key to enter the code setting mode. Codes 1 to 16 will be displayed. Set a code by turning the [Up/Down] knob. When the OPT key is pressed again, the code setting mode terminates.
2. Set a code for each channel by using the programming software (KPG-44D).

3-2. Voice scrambler board connection

• Modification

1. Remove the upper half of the case of the TK-690H(B).
2. Remove R515 and R604 on the control unit (X57-560 B/2) (Refer to page 21).

• Connection

The functions of pins of CN508 on the control unit (X57-560 B/2) are shown in the figure.

Join the CN508 connector to the voice scrambler board via the E37-0808-05 connector cable.

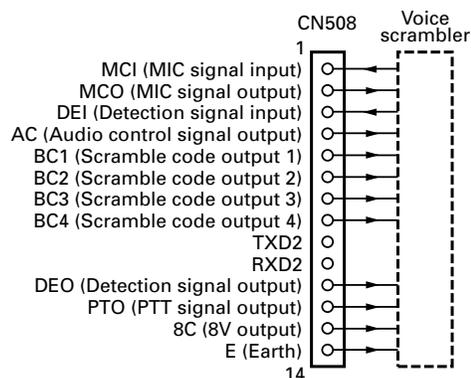


Fig. 5

4. Optional ANI Function

• Connection

Join the CN507 connector to the ANI board via the E37-0809-05 connector cable, and the CN508 connector to the ANI board via the E37-0808-05 connector cable.

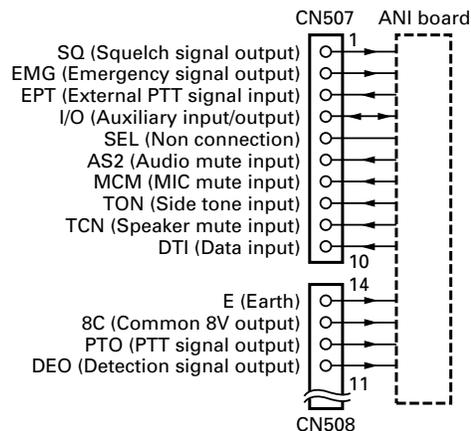


Fig. 6

INSTALLATION

5. Ignition Sense Cable (KCT-18)

The KCT-18 is an optional cable to use the following functions:

5-1. Ignition function

The ignition function allows you to turn the transceiver's power on and off with the ignition key of your car. When you are driving with the ignition key on, the horn alert function is disabled.

5-2. Timed power off function

The timed power off function turns the transceiver's power off the time specified with the programming software (KPG-44D) after the ignition key is turned off. When you are driving with the ignition key on, the horn alert function is disabled.

The ignition sense function and the timed power off function can be used at the same time.

5-3. Modification

• If the TK-690H(B) and KCH-10 or KCH-11 are used

1. Remove the short plug from the accessory connector (9 pins) on the back of the transceiver.
2. Insert the KCT-18 into pin 1 (IGN).
3. Remove the upper half of the case of the TK-690H(B).
4. Set jumper resistors (0 ohm), R504, R506, R742 and R743, on the control unit (X57-560 B/2) as shown in Table 1 (Refer to page 21).
5. Reinstall the upper half of the case.

• When the remote kit is used

If the accessory connector (9 pins) on the rear of the transceiver is available, use the method described above. (If the KRK-7DB or KRK-8DBH is used, use the accessory connector (9 pins) on the back of radio 1.)

If the accessory connector (12 pins) on the back of the control head is used:

1. Remove the plug from the accessory connector (12 pins) on the back of the control head.
2. Cut off the end of the rubber cap (accessory), insert the KCT-18 into the cap, and insert it into pin 1 (IGN) of the short plug.
3. Install the short plug and rubber cap on the connector on the rear of the control head, then clamp the bottom of the rubber cap with the supplied tie wrap.
4. Remove the upper half of the case of the TK-690H(B).
5. Set jumper resistors (0 ohm), R504, R506, R742 and R743, on the control unit (X57-560 B/2) as shown in Table 1 (Refer to page 21).
6. Reinstall the upper half of the case.

Note : If the KCT-18 is used for the KRK-8DBH, use the 9-pin plug on the back of radio 1 or the 12-pin plug on the back of head 1. The plugs on radio 2 and head 2 cannot be used. If the KCT-18 is used for the KRK-7DB, use the 9-pin plug on the back of radio 1 or the 12-pin plug on the back of the head. The plug on radio 2 cannot be used.

Available function when KCT-18 is connected	R504	R506	R742	R743
Horn alert function OFF during driving, Timed power off function (Default)	Present	Absent	Present	Absent
Horn alert function OFF during driving, Ignition function	Absent	Present	Present	Absent
None (The transceiver cannot be turned on.)	Absent	Absent	Present	Absent
HA function OFF during driving, Ignition function & Timed power off function	Present	Absent	Absent	Present

Table 1 R504, R506, R742 and R743 setup chart (Refer to page 21)

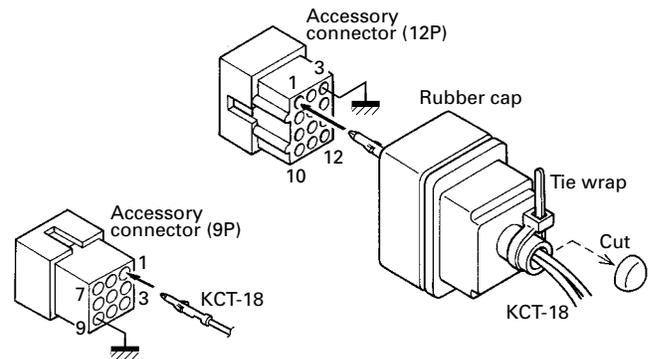


Fig. 7

6. External Speaker (KES-4)

The speaker output from the TK-690H(B) is as follows:

1. The KCH-10 has a built-in speaker (3W/8 ohms).
2. The KCH-11 does not have a built-in speaker.
3. The external speaker output from the accessory connector (9 pins) on the back of the transceiver is 13W/4 ohms. Use the KES-4.
4. The speaker output from the accessory connector (12 pins) on the back of the control head is 2W/4 ohms. If the remote kit (KRK-5, KRK-6DH, KRK-7DB or KRK-8DBH) is used, use the KSP-1A or KES-4. If the KSP-1A is used, do not attempt to modify the transceiver to increase the audio output.

Note : Since the TK-690H(B) uses a BTL audio amplifier, do not ground the speaker output pin.

INSTALLATION

6-1. Connection for the KES-4 with the TK-690H(B)

- **When taking the AF output from the accessory connector (9-pin) on the rear of the radio**

The following tools are required for changing the connector.

Extracting tool

the following extracting tool is recommended :
Molex Inc. Order No. : 11-03-0002

1. Remove the connector with jumper from the external speaker connector on the rear panel of the radio (Fig. 8-1).

Note : Save the jumper, which is required when the radio is used without the external speaker.

2. Remove the terminals with the jumper from the connector housing holes number 3 and 6 using the extracting tool.

Removing the jumper lead (Fig. 8-2)

- 1) Insert the extracting tool (11-03-0002) into the connector while pushing the jumper lead in the direction of (a).
 - 2) Push the extracting tool into collapse the barbs of the crimp terminal.
 - 3) Pull out the lead while continuing to push the extracting tool in the direction (b).
3. Reinsert the terminal with the black and white stripe lead into hole number 2, and the terminal with the black lead into hole number 6 (Fig. 8-3).
 4. Attach the connector to the external speaker connector on the radio.

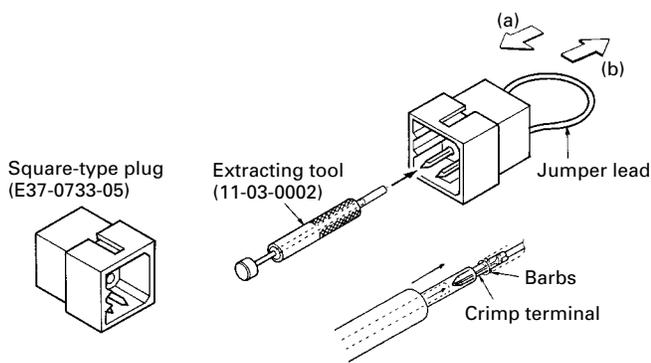


Fig. 8-1

Fig. 8-2

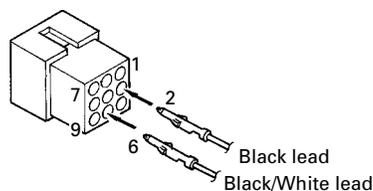


Fig. 8-3

6-2. Connection for the KES-4 with the remote kit (KRK-5, KRK-6DH, KRK-7DB, KRK-8DBH)

- **When output is from the 12-pin accessory connector on the rear of the control head : remote operation**

• Modification of plug (12-pin)

1. Remove the plug from the accessory connector (12-pins) on the rear of the control head.
2. Cut off the end of the rubber cap, insert the KES-4 speaker cable into the cap, and insert it into pins 10 and 11.
3. Install the plug and rubber cap on the accessory connector on the rear of the control head, then clamp the bottom of the rubber cap with the supplied tie wrap.

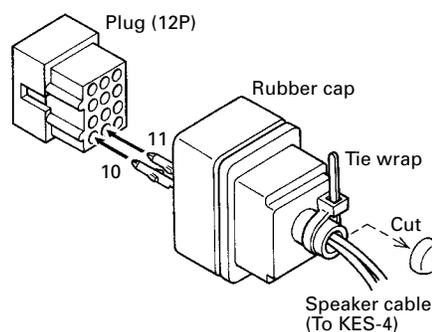


Fig. 9

• If the KCH-10 is used

If the KSP-1A or KES-4 is connected to the 12-pin accessory connector, cut the internal speaker wire at the base of the speaker.

If the internal speaker is used, cut the wire connected to pins 10 and 11 of the 12-pins accessory connector at the base of the connector (Fig. 10).

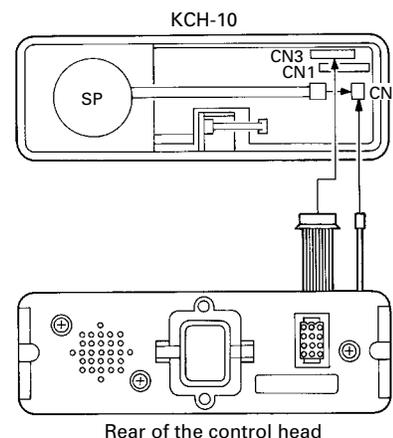


Fig. 10

INSTALLATION

6-3. Modification to increase the audio output of the control head

The speaker output can be increased to 13W by moving jumper resistor (0 ohm) R628 on the control unit (X57-560 B/2) to R627. In this case, the KCH-10 internal speaker cannot be used because the maximum input (3W) of the internal speaker is exceeded. Therefore, use the KES-4.

Note : Even if the KRK-6DH is modified in this way, the audio output of head 2 cannot be increased. To increase the audio output of head 2 of the KRK-8DBH, modify radio 2 in the same manner.

6-4. Use as public address speaker

1. Remove the short plug from the 9-pin accessory connector on the rear of the radio. (Remove the jumpers as described in Section 5-1.)
2. Insert the KES-4 speaker leads into pins 7 and 8.
3. If you remove jumper shorting pins 3 and 6, the 20W PA (public address) voice signal is output from pins 7 and 8. (Only when the PA or SP switch is on.)
4. If you use the radio with pins 3 and 6 shorted, the internal speaker is available (when the KCH-10 is used). The KCH-11 does not contain a speaker.

Note : Relation ship between accessory connector (9-pins) connection and speaker output.
 When pins 3 and 6 are shorted ; The 3W internal speaker is used (KCH-10 only).
 When pins 3 and 6 are open and output is from pins 7 and 8 ; The 20W external speaker is used.

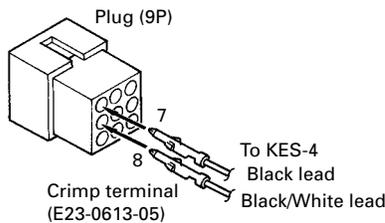


Fig. 11

7. Horn Alert Function

The HR1 pin of the accessory connector (9-pin) on the rear of the transceiver is an open collector and the maximum current is 100mA. The maximum available current can be increased to 1A by installing a relay.

1. Remove the upper half of the case of the TK-690H(B).
2. Move jumper resistor (0 ohm) R691 on the control unit (X57-560 B/2) to R692. To make the HR2 pin, remove R692 (Refer to page 21).
3. Remove screws and erect the PC board. Install and solder relay K501 (Part No. : S76-0407-05).
4. Reinstall the PC board and the upper half of the case.

	Default	Modification 1	Modification 2
R690	Present	Present	Absent
R691	Present	Absent	Absent
R692	Absent	Present	Present
State			

Table 2 (Refer to page 21)

8. Accessory Terminal Function

8-1. 25-pin accessory terminal

• Pin 13

MI/DI (MIC Signal Input/Output or Data Audio Input)
 This pin has one of the two functions listed in Table 3 by setting jumper resistors (0 ohm) R640 and R641 on the control unit (X57-560 B/2). (Refer to page 21).

1) MIC signal input/output

This pin is directly connected to the MIC input pin of the transceiver, so it has the same function as the MIC input pin. When the input is 5mV/3 kHz, DEV (600 ohms) modulation is obtained. The MIC input is output from the transceiver panel as it is.

2) Data audio input

The signal from this pin passes through the LPF (fc: about 10kHz), is summed with the MIC AMP output, and goes to the modulator. Therefore, it is not preemphasized.

• Pin 14

SB (DC Power Output After Power Switch)
 The maximum output (13.4V / 0.5A) can be obtained by modifying the control unit as follows:
 Short the land of the print pattern near CN505 of the control unit (X57-560 B/2).

R640	R641	Function
Present	Absent	MIC signal input/output
Absent	Present	DATA audio input : Default

Table3 (Refer to page 21)

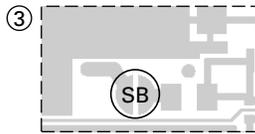
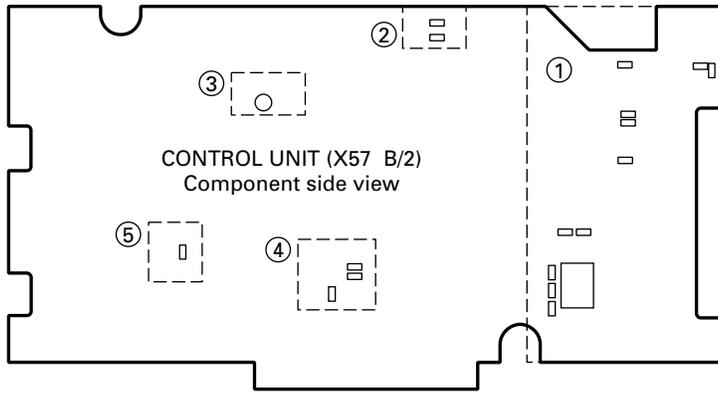
9. Connection with the Remote Kit

When the KRK-5, KRK-6DH, KRK-7DB or KRK-8DBH is used, set chip resistors and transistors as shown in the table below.

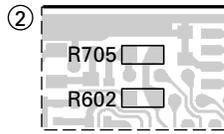
	KRK-5	KRK-6DH	KRK-7DB	KRK-8DBH
Radio 1	Unnecessary			
Radio 2	-		Remove R546 and R661 Move R602 to R705.	

Table 4 (Refer to page 21)

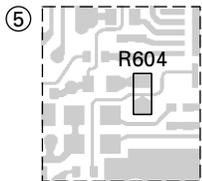
INSTALLATION



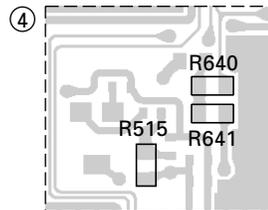
Accessory terminal function (Page 20)



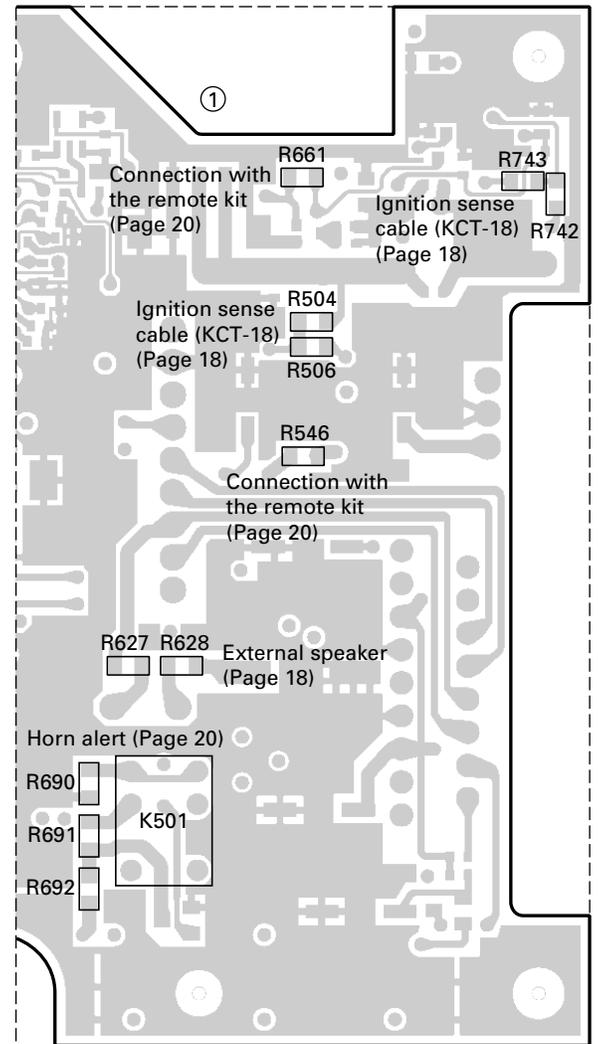
Connection with the remote kit (Page 20)



Voice Scrambler (Page 17)



R515 : Voice Scrambler (Page 17)
R640,641 : Accessory terminal function (Page 20)



DISASSEMBLY FOR REPAIR

1. Removing the Case and Shield Cover

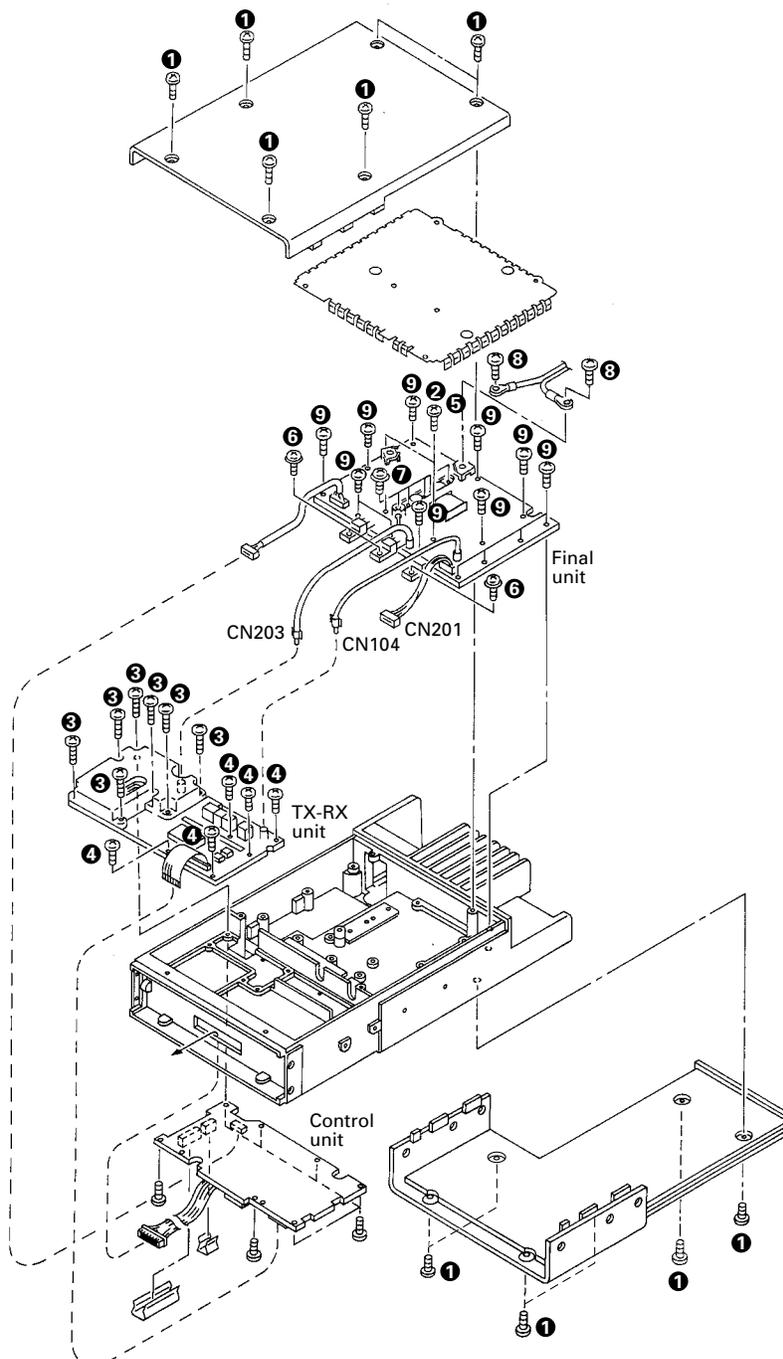
1. Remove the 12 screws (❶), and remove the upper and lower halves of the case. (Remove the 6 screws holding the upper half and the 6 screws holding the lower half.)

2. Removing the TX-RX Unit (X57-560 A/2)

1. Remove the 7 screws (❸), and remove the PLL shield case.
2. Remove the connector (CN201) and coaxial plugs (CN104, CN203) from the final unit, and remove the flat cable (CN202) upwards from the control unit (CN502).
3. Remove the 5 screws (❹).

3. Removing the Final Unit (X45-355)

1. Remove the 2 screws (❺).
2. Remove the 3 screws (❻) holding the power module and transistor to the frame.
3. Desolder two transistors.
4. Remove the 1 screw (❼) holding TH1.
5. Remove the 4 screws (❼) holding the final transistor.
6. Remove the 2 screws (❸) holding the lead terminal from DC connector (4P) on the rear.
7. Remove the 13 screws (❾) holding the PC board.
8. Desolder W3 on the antenna connector.



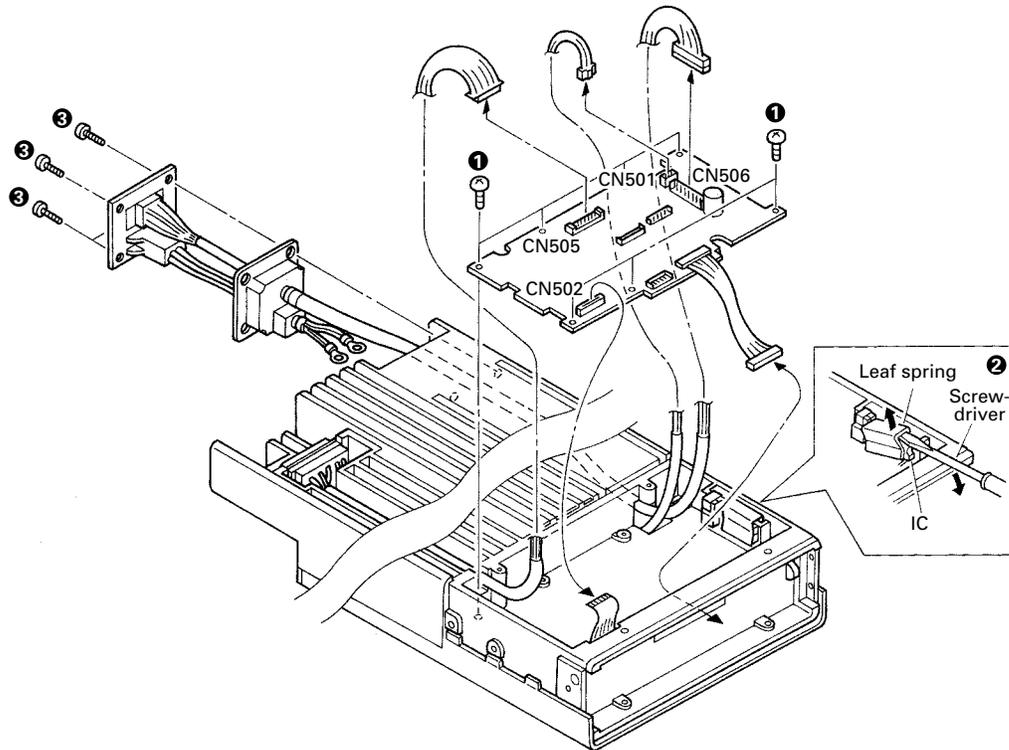
DISASSEMBLY FOR REPAIR

4. Removing the Control Unit (X57-560 B/2)

1. Remove the 8 screws (❶).
2. With a screwdriver, remove the 2 leaf springs holding the ICs to the frame (❷).
3. Remove the flat cable (CN502).
4. Remove the 2 connectors CN501 and CN506.
5. Remove the connector (CN505) from D-sub connector (25P) on the rear.

5. Removing the Accessory Connector on the Rear

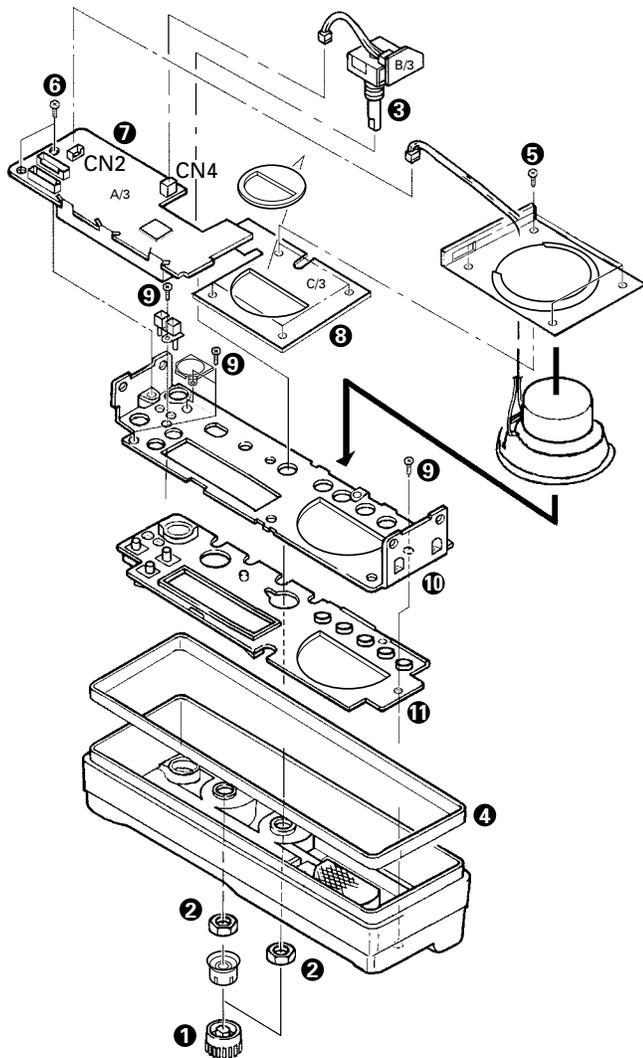
1. Confirm that the screw holding +DC cable (red) and the screw holding -DC cable (black) of the final unit are removed, and that CN506 of the control unit (X57-560 B/2) is disconnected. Remove the 4 screws on the rear (❸).
2. Pull out the connector. (Take the connector terminals out through the opening in the frame.)



DISASSEMBLY FOR REPAIR

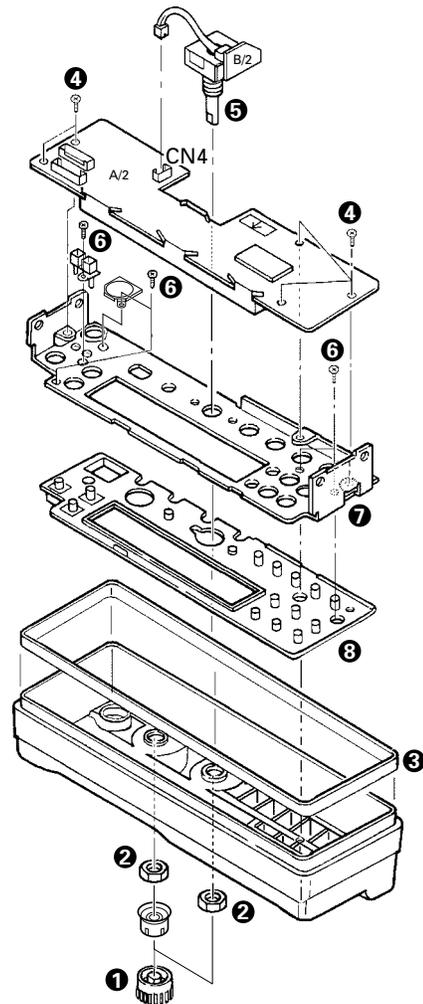
6. Disassembly of the Display Unit (X54-3190) : KCH-10

1. Pull out the VOL and UP/DOWN knobs (❶).
2. Remove the 2 hexagonal nuts (❷).
3. Disconnect the 2 connectors (CN2 and CN4) of the display unit (X54-3190 A/3). You can remove the UP/DOWN encoder (❸).
4. Remove the waterproof seal (❹).
5. Remove the 4 screws (❺) holding the speaker and PC board fitting.
6. Remove the 3 screws (❻). You can remove the display units (X54-3190 A/3 and C/3) (❼ and ❽).
7. Remove the 3 screws (❾), and remove the sub-panel (❿) and keytop (⓫).



7. Disassembly of the Display Unit (X54-3200) : KCH-11

1. Pull out the VOL and UP/DOWN knobs (❶).
2. Remove the 2 hexagonal nuts (❷).
3. Remove the waterproof seal (❸).
4. Disconnect the connector (CN4) of the display unit (X54-3200 A/2), and remove the 5 screws (❹). you can remove the up/down encoder (❺) and display unit.
5. Remove the 4 screws (❻), and remove the sub-panel (❼) and keytop (❽).



CIRCUIT DESCRIPTION

1. Transmitter Circuit

1-1. Microphone amplifier section (X57 B/2)

The audio input from the microphone is attenuated by VR501 and passes through the active high-pass filter (pre-emphasis circuit) in IC505, the compressor circuit in IC504, the IDC (limiter circuit) in IC505, the summing amplifier circuit in IC510, the active low-pass filter in IC510, the summing amplifier circuit in IC513, and the D/A converter in IC512, and is output from the CN502 to the CN202. Q504 is used as a microphone mute switch.

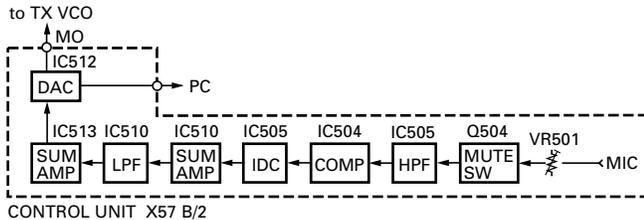


Fig. 1

1-2. Modulation section (X57 A/2)

The signal from the MO terminal of the CN202 goes to D305 in the VCO, and the VCO is directly modulated. The transmit signal output from the VCO passes through switch D306, is amplified by Q203, and is output from the CN203 to the CN1.

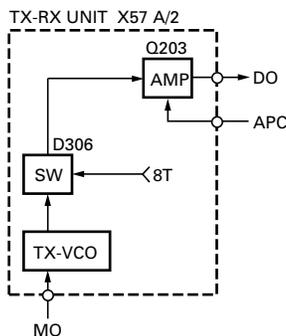


Fig. 2

1-4. Final amplifier section (X45)

The signal from the DO terminal of the CN1 is applied to drive two transistors Q1 and Q5, and the output is divided into two signals which are amplified by Q6 and Q7. The signals are mixed and the resulting signal is fed through transmit/receive switching diode; D2, D3, D4 and D10, low-pass filter, and CM coupler to the antenna connector.

CM coupler is a coil for detecting traveling and reflected waves. Traveling waves are detected by D9 and fed through the APC control to differential amplifiers Q8, which compare the signal level with the reference voltage of PC tuned.

The output is amplified by DC amplifier Q7 to control APC DC amplifier Q6. Q7 controls the power supply voltage for pre-drive amplifier Q203 on the TX-RX unit (X57-560 A/2), keeping the transmitter output constant. To protect the transmitter power amplifier stages, there are two protection circuits which one is against abnormal antenna loading and the other is against overheating.

If an abnormal antenna load is connected, the reflected wave level increases. Reflected waves are detected by D6, D5 and the output level is fed to the differential amplifier Q8, leading to the transmitter output power being reduced in the way already described. If an abnormal high temperature is detected by the thermistor TH1, DC SW Q2 is made to reduce the reference voltage of the PC tuned. This also leads to the transmitter output power being reduced. Antenna switching is done by four diodes; D2, D3, D4 and D10 with 8T.

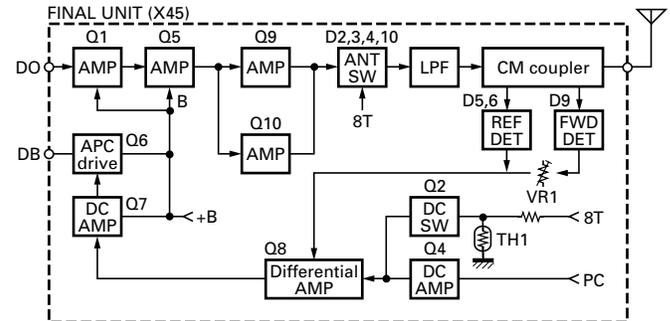


Fig. 3

2. Receiver Circuit

The incoming received signal from the antenna socket passes through the low-pass filter, the transmit/receive switching diodes (D2, D3, D4 and D10), and the second low-pass filter, then is fed to CN104 in the TX-RX unit.

The signal passes through the band-pass filter in the TX-RX unit, is amplified by RF amplifier Q101 and Q102, then passes through the second band-pass filter (BPF). The tuned varactor BPF (L101, L102, L104 and L105) changes the cut-off frequency according to the receive frequency.

After the signal has passed through the BPF, it enters RX first mixer Q110 to Q113. The local signal (received frequency + 10.7MHz) from the PLL also enters the first mixer. The first mixer is a double-balanced type consisting of four FETs, which converts the receive signal to the 10.7MHz first IF signal.

The 10.7MHz IF signal passes through NB (noise blanker) unit A102 and IF amplifier Q103, and enters NB gate Q105 and Q106. The pulse noise in the IF signal is detected by the NB unit, and removed by the NB gate. The IF signal passes through the monolithic crystal filter (XF101), IF amplifier Q301, monolithic crystal filter (XF102), and enters FM IF system IC (IC101).

The signal is heterodyned again to 455kHz using the second local signal generated by the crystal oscillator (11.155MHz), at the second mixer in IC101. The second IF signal is filtered by CF101 and CF102 (ceramic filter), amplified by limiting amplifiers in IC101, and is detected as an FM signal.

The output AF signal from IC101, then passes through the control unit's HPF and D/A converter IC. After entering the AF power amplifier (IC522), the signal is output from the speaker.

CIRCUIT DESCRIPTION

Item	Rating
Nominal center frequency	10.7MHz
Pass bandwidth	7.5kHz or more at 3dB
Attenuation bandwidth	±25kHz or less at 40dB
Ripple	1.0dB or less
Insertion loss	2.5dB or less
Guaranteed attenuation	80dB or more at fo±1000kHz
Terminating impedance	3.0kΩ / 1.5pF

**Table 1 Crystal filter (L71-0534-05)
(TX-RX unit XF101)**

Item	Rating
Nominal center frequency	10.7MHz
Pass bandwidth	±7.5kHz or more at 3dB
Attenuation bandwidth	±25kHz or less at 18dB
Ripple	0.5dB or less
Insertion loss	2.0dB or less
Guaranteed attenuation	40dB or more at fo±1000kHz
Terminating impedance	3.0kΩ / 2.5pF

**Table 2 Crystal filter (L71-0533-05)
(TX-RX unit XF102)**

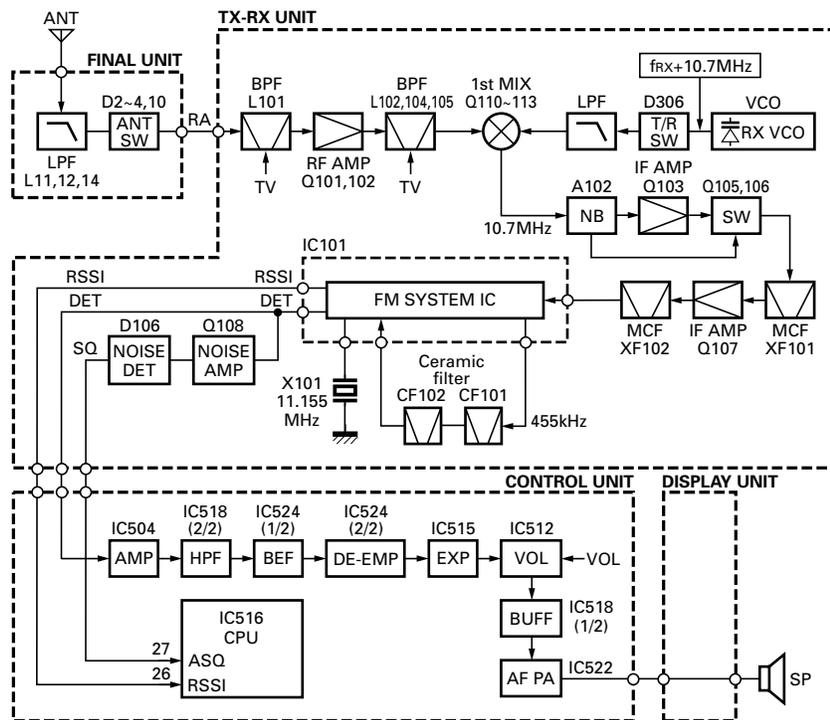


Fig. 4 Receiver circuit

3. Squelch Circuit

The output from IC101 enters FM IC again, then passed through a band-pass filter. The noise component output from IC101 is amplified by Q108 and rectified by D106 to produce a DC voltage corresponding to the noise level.

The DC voltage is sent to the analog port of the CPU (IC516/pin 27). And IC101 output a DC voltage (RSSI) corresponding to the input of the IF amplifier. The CPU reads the RSSI signal via pin 26. IC101 determines whether to output sounds from the speaker by comparing the input voltage of pin 27 with the present value.

Only during scan, the RSSI DC voltage is used together with the noise wave detection pin's DC voltage (pin 27).

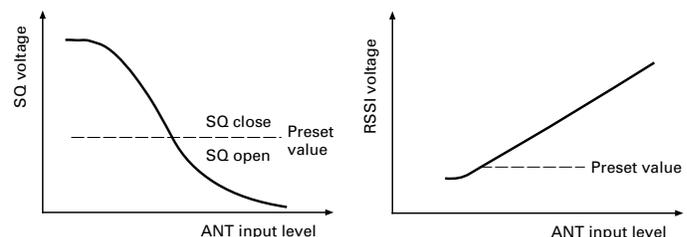


Fig. 5 Squelch and RSSI voltage vs ANT input level

CIRCUIT DESCRIPTION

4. RX BPF (L101,102,104,105)

The signals are then fed into band-pass filter that uses varactor diode tuning to reject unwanted signal components, and is fed to the 1st mixer.

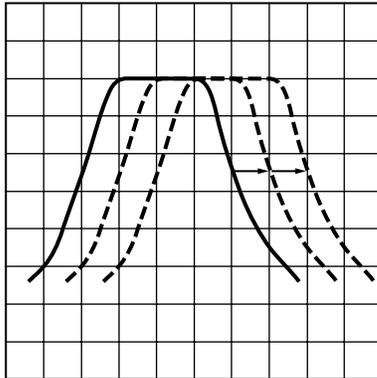


Fig. 6

5. VCO/PLL Circuit

The VCO of TK-690H(B) consists of two VCO circuits which one oscillates the transmit signal with Q306 and the other does the first local receive signal with Q307.

Each oscillators are switched by turning the source line for Q308, Q309 and Q310 on and off. The signal output of the VCO is amplified by the buffer amplifier Q311 and divided into two signals which one is amplified by Q313 and the other is done by Q312. The signal from Q313 passes through D306 which is transmit/receive switch, is amplified by Q203, and is output from the CN203.

The signal from Q312 passes through the low-pass filter and is applied to IC301 which is PLL frequency synthesizer with VCXO ; X301. The VCXO of which the frequency stability is within 5.0ppm (temperature range of -30 to $+60^{\circ}\text{C}$) generates 16.8MHz. The PLL-IC consists of three modulus prescaler, fractional divider, reference divider, digital phase comparator with charge pump output.

This PLL-IC is Fractional-N type synthesizer and performs is 25kHz reference signal which is fifth of the channel step (5kHz). The input signal from the pins 5 and 8 of the PLL-IC is divided down to the 25kHz and compared at digital phase comparator.

The pulsed output signal of the digital phase comparator is applied to the charge pump and transformed into DC signal. The DC signal from the pin 14 of the PLL-IC passes through the active low-pass filter (loop filter), is applied to the VCO and controls to keep the frequency of the VCO.

The serial data (DT, CP, EP) from the microprocessor IC516 is input to the PLL-IC. And PLL lock condition is always monitored by the pin 28 (UL) of IC516.

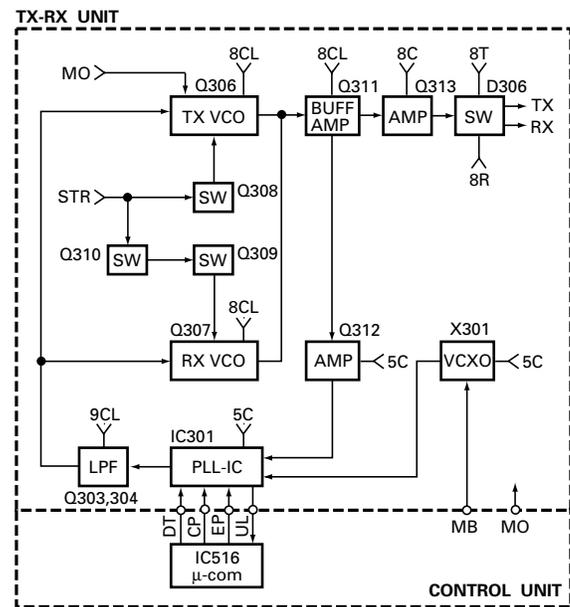


Fig. 7 VCO/PLL circuit

6. Control Circuit

The control unit consists of microprocessor IC and its peripheral circuits. It controls the TX-RX unit and transfers data to and from the control unit. The CPU (IC516) mainly performs the following :

- 1) Switching between transmission and reception according to the PTT signal input.
- 2) Reading channel, frequency, and program data from the memory circuit.
- 3) Sending frequency data to the PLL.
- 4) Turning the squelch on and off according to the voltage from the squelch circuit.
- 5) Controlling the audio mute circuit according to input decode data.
- 6) Sending encode data (QT, DQT).
- 7) Sending data to the D/A converter.

6-1. Memory circuit

A flash memory (IC519) with a capacity of 2Mbits contains the transceiver control program for the CPU (IC516) and data such as transceiver channels and operating features.

This program can be easily written from an external devices. Data, such as DTMF memories and operating status, tuning data are programmed into the EEPROM (IC514).

6-2. Shift register

IC517 and IC523 are an interface IC for I/O port expansion. It is used to expand the CPU (IC516) output ports.

CIRCUIT DESCRIPTION

6-3. D/A converter

IC512 is used as a conventional semi-fixed-resistor converter. It sets the following :

- 1) RX sensitivity
- 2) Transmission power
- 3) Modulation level
- 4) Audio power
- 5) Frequency

6-4. Power supply circuit

D507 is a protection diode for the excess voltage.

- 1) Turning the transceiver on/off with a power switch. Each time you press the power switch, the IC501 output is alternated. The output is feed through Q501, Q503 to turn Q519 on. The power source is always supplied to the IGN terminal. If 24V DC is supplied to the transceiver by mistake, Q502 is turned on then Q503 and Q519 are turned off to protect the transceiver (turned off).
- 2) Turning the transceiver on with a power switch, then turning the transceiver off with the Timed Power Off (TPO) function. POF is controlled by CPU's TPO function. POF is to turn the transceiver off. The POF logic signal is feed through Q507 and Q506 then 8 pin of IC501 to turn the transceiver off.
- 3) Turning the transceiver on with IGN SENS, then turning the transceiver off with TPO function. If IGN is turned on, Q543 and Q542 are turned on then the IC501 detects the change. IC501 outputs the signal to turn Q541 off, then Q503 and Q519 are turned on. When POF is detected by 6 pin of IC501, Q541 is turned on then Q503 and Q519 are turned off.

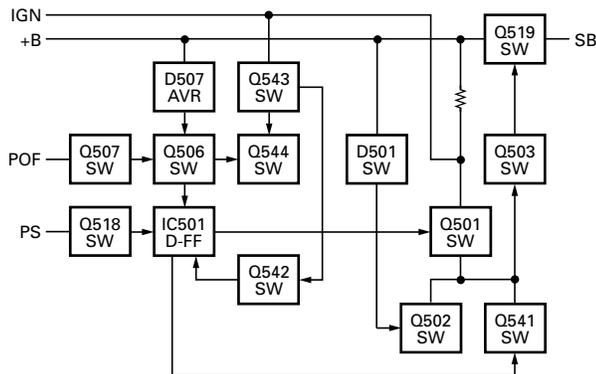


Fig. 8 Power supply circuit

7. Signalling Circuit

7-1. Encode

• QT, DQT

The CPU (IC516) transmits the encode data selected by the program. The data items are output from CPU pin 34.

The signal from this pin passes through the CR low-pass filter and goes to the summing amplifier (IC510) in the microphone amplifier.

• DTMF

The DTMF-encoder (IC511) transmits the encode data. The encode data is passed to the D/A converter (IC512) for DTMF deviation adjustment, and goes to IC505 in the IDC circuit of the microphone amplifier.

7-2. Decode

• QT, DQT

The demodulated signal from CN502 pin 5 is amplified by IC521 and passes through a low-pass filter (IC502) to remove audio components. The signal is input to pin 25 of the CPU. The CPU digitizes this signal, and decodes the signal.

• 2 TONE

The demodulated signal from CN502 pin 5 is amplified by IC504 and passes through a high-pass filter (IC518) and a band-elimination filter (IC524) to remove QT and DQT.

This signal is amplified by IC521 and inputs pin 91 of the CPU.

• DTMF

The demodulated signal from CN502 pin 5 is amplified by IC504 and passes through a high-pass filter (IC518) and band-elimination filter (IC524) to remove QT and DQT.

This signal inputs pin 1 of the DTMF decoder (IC525).

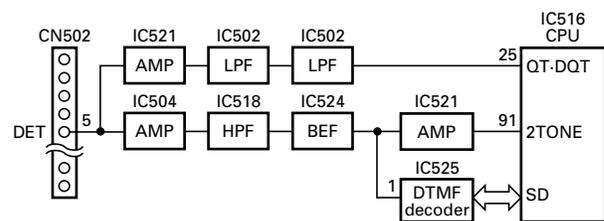


Fig. 9 Decode

CIRCUIT DESCRIPTION

8. Display Unit

The optional display unit (front panel unit) for the TK-690H(B) comes in two models : KCH-10 and KCH-11

8-1. KCH-10

This display unit consists of a CPU (IC4) containing the LCD driver, a reset IC (IC2), 5V AVR (IC1), EEPROM (IC3), and other components.

• Encoder

Channels are changed by the rotary encoder (ENC). The up/down pulses from the rotary encoder enter the CPU (IC4), and converted to a serial data signal, and are sent to the control unit.

• Power supply

Power is supplied to the CPU by converting SB from the control unit to 5V by IC1. And SB is supplied to the LED for backlight.

• CPU (containing LCD driver)

The on/off signals of keys other than the power switch, and the PTT and HOOK signals, are converted to serial data and sent to the control unit. Data is displayed on the 13-segments, 8-digits LCD and 7-segments, 3-digits LCD by the built-in LCD driver.

• Dimmer function

From the control of the CPU's DM1/DM2 port, you can switch the LCD/KEY backlight, busy/TX LED, or the optional KMC-28 key backlight as shown in the following table.

Dimmer setting	LCD	KEY	Busy/TX	KMC-28
H	H	ON	ON	ON
M	M	ON	ON	ON
L	L	ON	ON	ON
OFF	OFF	OFF	OFF	OFF

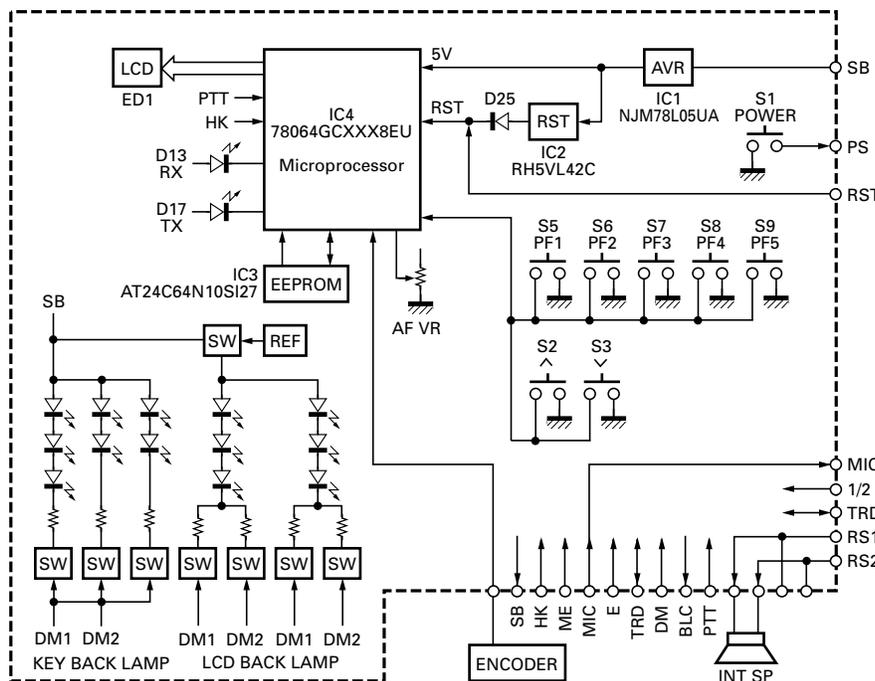


Fig. 10 KCH-10 block diagram

CIRCUIT DESCRIPTION

8-2. KCH-11

This display unit consists of a CPU (IC4) a reset IC (IC2), 5V AVR (IC1), EEPROM (IC3), and other components.

• Encoder

Channels are changed by the rotary encoder (ENC). The up/down pulses from the rotary encoder enter the CPU (IC4), and converted to a serial data signal, and are sent to the control unit.

• Power supply

Power is supplied to the CPU by converting SB from the control unit to 5V by IC1. And SB is supplied for the LED of backlight.

• CPU

The on/off signals of keys other than the power switch, and the PTT and HOOK signals, are converted to serial data and sent to the control unit. Data is displayed on the 14-digits and 3-digits dot matrix alphanumeric display.

• Dimmer function

From the control of the CPU's DM1/DM2 port, you can switch the LCD/KEY backlight, busy/TX LED, or the optional KMC-28 key backlight as shown in the following table.

Dimmer setting	LCD	KEY	Busy/TX	KMC-28
H	H	ON	ON	ON
M	M	ON	ON	ON
L	L	ON	ON	ON
OFF	OFF	OFF	OFF	OFF

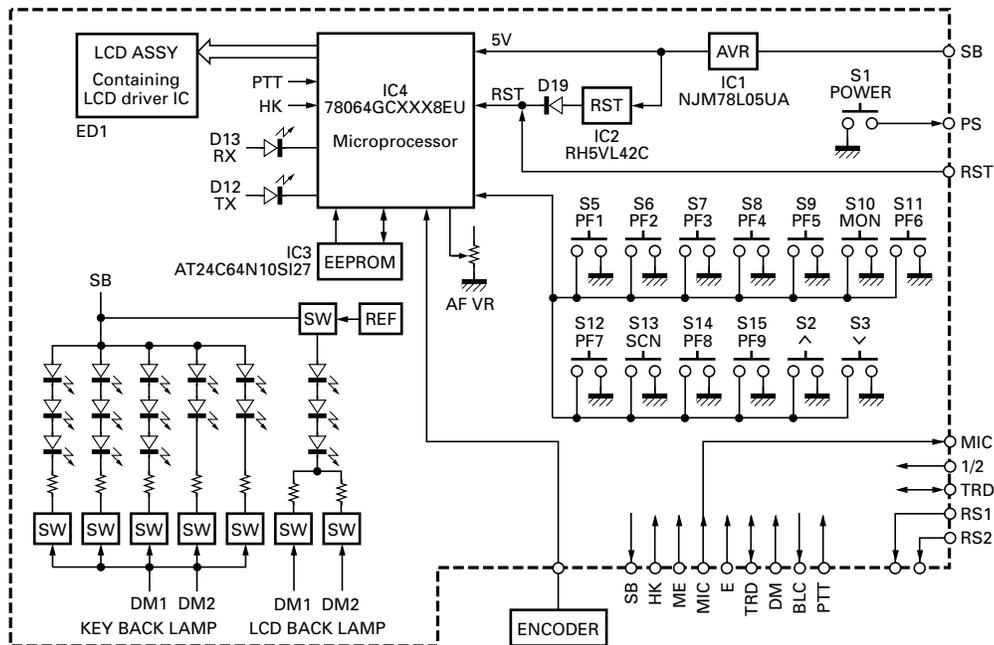


Fig. 11 KCH-11 block diagram

SEMICONDUCTOR DATA

Microprocessor : 784214GCXX8EU (Control Unit IC516)

• Terminal function

Pin No.	Pin name	I/O	Action	Pin No.	Pin name	I/O	Action
1	FCLR	O	Modem FCLR	40	RXD1	I	Serial interface RXD
2	CK	O	Common CLOCK	41	TXD1	O	Serial interface TXD
3	EM	O	D/A converter CS	42	STB	O	Modem STB
4	MSKE	O	Modem MSKE	43	EC1	O	Shift register1 (Control) CS
5	DIN	O	Modem DIN	44	EI	O	Shift register (Interface) CS
6	EP	O	PLL LE	45	SEL	I/O	GE-STAR I/O
7	SCL	O	DTMF encoder CLOCK	46	EPT	I	GE-STAR EPT
8	SDT	O	DTMF encoder DATA	47	EMG	O	GE-STAR EMG
9	VDD		+5V	48~71			Flash ROM access port
10,11	X2, X1		X'tal	72	VSS		GND
12	VSS		GND	73~74			Flash ROM access port
13	XT2		Open	75			Flash ROM (4Mbit) access port
14	XT1		GND	76			Not used.
15	RESET		CPU reset	77~78			Flash ROM access port
16	TEST	I	Serial interface TEST	79	POF	O	Timed Power OFF.
17	TRD	I	Modem TRD	80			Not used.
18	RTM	I	Modem RTM	81	VDD		+5V
19	STD	I	DTMF decoder STD	82	EN2	O	D/A converter (Interface) CS
20	EC2	O	Shift register 2 (Control) CS	83	CLK	O	EEPROM CLOCK
21	DT	O	Common DATA	84	SDA	I/O	EEPROM DATA
22	ACK	O	DTMF decoder CLOCK	85	RSV1	O	Reserved
23	AVDD		+5V	86	AI1	I	Acc PF Input 1
24	AVREF0		+5V	87	AI2	I	Acc PF Input 2
25	TI	I	QT/DQT IN	88	AI4	I	Acc PF Input 4
26	RSI	I	RSSI IN	89	AI3	I	Acc PF Input 3
27	ASQ	I	Analog squelch IN	90	AI5	I	Acc PF Input 5
28	UL	I	PLL UNLOCK	91	2TN	I	2tone pulse IN
29	SD	I	DTMF decoder SD	92	KEY	O	TX power SW
30	RDT	I	Modem RDT	93	SQ	O	Acc SQ OUT L : BUSY, H : Not BUSY
31	RSV2	I	Reserved	94	TEST		GND
32	IGN	I	Ignition IN	95	AO1	O	Acc PF Output 1
33	AVSS		GND	96	AO2	O	Acc PF Output 2
34	TO	O	QT/DQT OUT	97	AO3	O	Acc PF Output 3
35	CP	O	PLL CLOCK	98	AO4	O	Acc PF Output 4
36	AVREF1		+5V	99	1/2	I	Deck 1/2 L : Deck 1, H : Deck 2
37	RXD2	I	Acc RXD	100	SFT	O	Beat shift
38	TXD2	O	Acc TXD				
39	ES	O	Shift register (TX/RX) CS				

SEMICONDUCTOR DATA

Microprocessor : 78064GCXXX8EU (Display Unit IC4)

• Terminal function

Pin No.	Pin name	I/O	Action
1	PTT	I	MIC PTT L : ON, H : OFF
2	K5	I	[MON] key L : ON, H : OFF
3	K6	I	[PF6] key L : ON, H : OFF
4	K7	I	[PF1] key L : ON, H : OFF
5	K8	I	[PF2] key (Full) L : ON, H : OFF
6	K9	I	[PF3] key (Full) L : ON, H : OFF
7	K10	I	[PF7] key (Full) L : ON, H : OFF
8	AVDD	-	+5V
9	AVREF	-	+5V
10	RED	O	TX LED (Red) L : ON, H : OFF
11	GRN	O	BUSY LED (Green) L : ON, H : OFF
12	E	-	GND
13	DM1	O	Backlight (Dimmer)
14	DM2	O	Backlight (Dimmer)
15		I	Not used
16	K11	I	[SCN] key (Full) L : ON, H : OFF
17	K12	I	[PF8] key (Full) L : ON, H : OFF
18	K13	I	[PF9] key (Full) L : ON, H : OFF
19	K1	I	[PF4] key L : ON, H : OFF
20	K2	I	[PF5] key L : ON, H : OFF
21	1/2	I	HEAD 1/2 jumper HEAD 1 : Jumper installed, HEAD 2 : Jumper removed
22	B/F	I	Panel type Jumper Basic panel : Jumper installed. Full panel : Jumper removed
23~26	COM0~3	O	LCD drive common 0~3
27	BIAS		LCD drive bias
28~30	VLC0~2		LCD drive power supply
31	VSS		GND
32~67	S0~35	O	LCD drive segment 0~35
68	S36	O	LCD drive segment 36 (Basic)
	CE		DOT matrix driver CE (Full)
69	S37	O	LCD drive segment 37 (Basic)
	CL		DOT matrix driver CL (Full)
70	S38	O	LCD drive segment 38 (Basic)
	DI		DOT matrix driver DI (Full)
71	S39	O	LCD drive segment 39 (Basic)
	DO	I	DOT matrix driver DO (Full)
72	SCK	O	EEPROM serial clock
73	SDT	I/O	EEPROM serial data

Pin No.	Pin name	I/O	Action
74			Not used
75	RXD	I	Serial interface RXD
76	TXD	O	Serial interface TXD
77			Not used
78		-	GND
79	X2	-	X'tal 4.19MHz
80	X1	-	X'tal 4.19MHz
81	VDD	-	+5V
82,83			Not used
84	RST	-	Reset
85	END	I	Encoder data
86	K3	I	[GR ^] Key L : ON, H : OFF
87	K4	I	[GR v] Key L : ON, H : OFF
88	ENI	I	Encoder interrupt
89	TEST	I	Serial interface test
90	AO2	O	Programable AUX output B
91	AO1	O	Programable AUX output A
92	AI2	I	Programable AUX input B
93	AI1	I	Programable AUX input A
94	BLC	O	MIC backlight ON/OFF L : ON, H : OFF
95,96			Not used
97	DM	I	DTMF MIC key pad data input
98	HK	I	MIC hook L : ON, H : OFF
99	AVSS	-	GND
100	VOL	I	AF volume

Shift Register Output : BU4094BCF

• Shift register 1 on control unit (IC523)

Pin No.	Port	Name	Action
4	Q1	PTO	GE-STAR/Scrambler PTO
5	Q2	BC4	Scrambler BC4
6	Q3	BC3	Scrambler BC3
7	Q4	BC2	Scrambler BC2
14	Q5	AC	Scrambler AC
13	Q6	BC1	Scrambler BC1
12	Q7	HR	Acc HR
11	Q8		Not used

SEMICONDUCTOR DATA

• Shift register 2 on control unit (IC517)

Pin No.	Port	Name	Action
4	Q1	MM	MIC mute H : Mute, L : Unmute
5	Q2	AS	Audio line SW RX BPF↔DE-EMP
6	Q3	DS	DET line SW DET↔RX BPF
7	Q4	AM1	Audio mute 1
14	Q5	RG1	Modem RG1
13	Q6	RG2	Modem RG2
12	Q7	MS	MOD line SW MIC AMP↔RX BPF
11	Q8	AM2	Audio mute 2

• Shift register on TX-RX (IC201)

Pin No.	Port	Name	Action
4	Q1	STR	TX/RX VCO SW
5	Q2		Not used
6	Q3		Not used
7	Q4		Not used
14	Q5	8R	8R SW
13	Q6	NB	Noise blanker SW
12	Q7		Not used
11	Q8		Not used

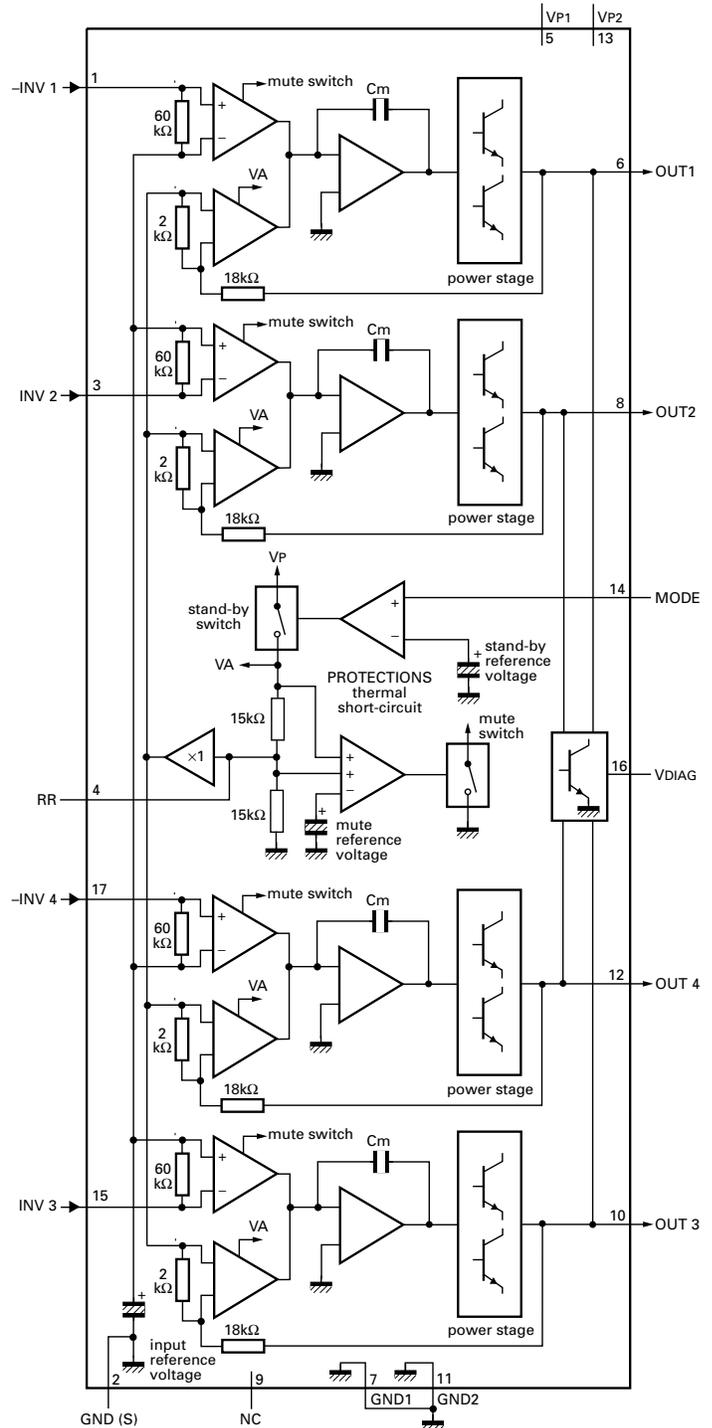
Audio Power Amplifier

: TDA8561Q (Control Unit IC522)

• Terminal description

Pin No.	Symbol	Description
1	-INV1	Non-inverting input 1
2	GND (S)	Signal ground
3	INV 2	Inverting input 2
4	RR	Supply voltage ripple rejection
5	VP1	Supply voltage
6	OUT 1	Output 1
7	GND1	Power ground 1
8	OUT 2	Output 2
9	NC	Not connected
10	OUT 3	Output 3
11	GND2	Power ground 2
12	OUT 4	Output 4
13	VP2	Supply voltage
14	MODE	Mode select switch input
15	INV 3	Inverting input 3
16	VDIAG	Diagnostic output
17	-INV 4	Non-inverting input 4

• Block diagram



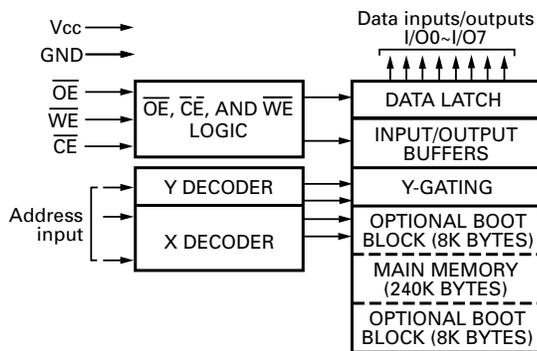
SEMICONDUCTOR DATA / DESCRIPTION OF COMPONENTS

Flash ROM : AT29C020-90TI (Control Unit IC519)

• Terminal description

Pin Name	Function
A0~A17	Addresses
\overline{CE}	Chip enable
\overline{OE}	Output enable
\overline{WE}	Write enable
I/O0~I/O7	Data inputs/outputs
NC	No connect

• Block diagram



Final Unit (X45-3550-XX)

-10 : K -11 : K2 -12 : K3

Ref. No.	Use/Function	Operation/Condition
Q1	TX drive amplifier	
Q2	DC amplifier	APC controller
Q3,4	DC switch	
Q5	TX drive amplifier	
Q6	APC controller	
Q7	DC amplifier	APC controller
Q8	APC comparator	APC controller
Q9	Final amplifier	
Q10	Final amplifier	
Q11	DC switch	
D1	Temperature compensation	
D2~4	Antenna switch	
D5	Protector	
D6	Reflected wave rectification	
D7	Surge absorption	
D8	Protection of reverse connection	
D9	Forward wave rectification	
D10	Antenna switch	

Final Amplifier : 2SC2694 (Final Unit Q9, Q10)

• Absolute maximum ratings

Tc= 25°C unless otherwise noted

Symbol	Parameter	Condition	Rating
Vcbo	Collector-base voltage		35V
Vebo	Emitter-base voltage		4V
Vceo	Collector-emitter voltage	RBE = ∞	17V
Ic	Collector current		20A
Pc	Collector dissipation		140W
Tj	Junction temperature		175°C
Tstg	Storage temperature		-55 to 175°C

TX-RX Unit (X57-5600-XX) (A/2)

-10 : K -11 : K2 -12 : K3

Ref. No.	Use/Function	Operation/Condition
IC101	FM IC	1, 2 : Oscillator (11.155MHz) 3 : Mixer output 4 : Vcc 5 : IF input (455kHz) 7 : Noise filter output 8 : Noise filter input 9 : DET output (AF OUT) 10 : Quad input 12 : RSSI output 16 : Input (10.7MHz)
IC201	Shift register	
IC202	AVR	Input : 8V Output : 5V
IC203	AVR	Input : SB Output : 9V

DESCRIPTION OF COMPONENTS

Ref. No.	Use/Function	Operation/Condition
IC301	PLL IC	1 : CP 2 : DT 3 : EP 4 : Vss 5 : Fin 7 : Vcc 8 : REFin (16.8MHz) 14 : Charge pump output 18 : UL ("H" when lock) 20 : VDD (5V)
Q101,102	1st amplifier	RX frequency
Q103	IF amplifier	10.7MHz
Q105,106	NB gate	
Q107	IF amplifier	10.7MHz
Q108	SQL amplifier	(Noise amplifier)
Q110~113	RX 1st mixer	
Q114	NB switch	On when NB on
Q115	DC switch	On when TX
Q201	8T switch	8V when TX
Q202	8T switch	On when TX
Q203	TX pre-drive amplifier	
Q204	8R switch	On when RX
Q205	8R switch	8V when RX
Q301	Ripple filter	8CL
Q302	Ripple filter	9CL
Q303,304	Loop filter	
Q306	OSC	TX-VCO
Q307	OSC	RX-VCO
Q308	DC switch	On when TX
Q309	DC switch	On when RX
Q310	DC switch	Off when RX
Q311	Buffer amplifier	
Q312,313	Amplifier	
D102~105	BPF tuning	Vari-cap tuning
D106	Noise detector	
D107	DC switch	On when TX
D301	Frequency controller	TX-VCO
D302	Frequency controller	RX-VCO
D303	Frequency controller	TX-VCO
D304	Frequency controller	RX-VCO
D305	Modulator	
D306	RF switch	TX/RX

Control Unit (X57-5600-XX) (B/2)

-10 : K -11 : K2 -12 : K3

Ref. No.	Use/Function	Operation/Condition
IC501	D FF	

Ref. No.	Use/Function	Operation/Condition
IC502	LPF	
IC503	AVR	Input : SB, Output : 8V
IC504	Audio processor	
IC505	HPF/IDC	
IC506	AVR	Input : 8V, Output : 5V
IC508	Limiter/Buffer amplifier	
IC509	Buffer amplifier	
IC510	Summing amplifier/LPF	
IC511	DTMF encoder	
IC512	D/A converter	
IC513	LPF/Summing amplifier	
IC514	EEPROM	
IC515	Analog switch	
IC516	CPU	
IC517	Shift register	
IC518	Buffer amplifier	
IC519	Flash ROM	
IC520	NOR gate	
IC521	Buffer amplifier/ Amplifier	
IC522	Audio power amplifier	
IC523	Shift register	
IC524	Buffer amplifier/ De-emphasis	
IC525	DTMF decoder	
IC526	Amplifier	
Q501	DC switch	
Q502	DC switch	On when 18V or more
Q503	DC switch	On when the power switch on
Q504	Muting switch	MIC mute
Q505	DC switch	
Q506,507	DC switch	Timed power off switch
Q509	DC switch	Off when P/A
Q510	DC switch	Off when EXT SP
Q511	DC switch	Off when INT SP
Q512	DC switch	Off when RX busy
Q513	DC switch	
Q514	Muting switch	On when AF mute
Q516,517	DC switch	On when on signalling code
Q518	DC switch	On when push the power switch
Q519	Power switch	On when the power switch on
Q520	DC switch	On when horn alert
Q522	Beat shift switch	On when beat shift

DESCRIPTION OF COMPONENTS

Ref. No.	Use/Function	Operation/Condition
Q523	DC switch	Serial data inverter
Q524	DC switch	Serial data transmitter
Q525	DC switch	
Q533~540	DC switch	On when output port on
Q541	DC switch	On when timed power off
Q542,543	DC switch	IGN switch
Q544	DC switch	Timed power off switch
D501	Voltage reference	Protection of high voltage
D502	Reverse current prevention	
D503	Surge absorption	
D504	Voltage reference	
D505,506	DC switch	
D507	Voltage reference	
D508	DC switch	
D511	DC switch	
D512	Reverse current prevention	
D513~517	Surge absorption	
D519	Surge absorption	
D521	Surge absorption	
D523,524	Surge absorption	
D526,527	Surge absorption	
D528,529	Reverse current prevention	

Display Unit (X54-3190-20) : KCH-10

Ref. No.	Use/Function	Operation/Condition
IC1	AVR	Input : SB Output : 5V
IC2	Reset	
IC3	EEPROM	
IC4	CPU/LCD driver	
Q1	9V AVR	
Q3	DC switch	Dimmer "Hi", "Low" : ON
Q4	DC switch	Λ , v key lighting : ON
Q5	DC switch	Dimmer "Hi", "Mid" : ON
Q6	DC switch	Dimmer "Hi", "Low" : ON
Q7	DC switch	Dimmer "Hi", "Mid" : ON
Q9	DC switch	"PF1", "PF2", "PF3" key lighting : ON

Ref. No.	Use/Function	Operation/Condition
Q11	DC switch	"PF4", "PF5" key lighting : ON
Q12,13	TRD switch	
Q14,15	DC switch	On when output port on
D1,2	Surge absorption	
D5	Voltage reference	
D6~11	LCD backlight	
D12	BUSY LED	
D13	TX LED	
D16,17	Surge absorption	
D19~21	Surge absorption	
D24	DC switch	Key lighting : ON
D25	DC switch	

Display Unit (X54-3200-20) : KCH-11

Ref. No.	Use/Function	Operation/Condition
IC1	AVR	Input : SB Output : 5V
IC2	Reset	
IC3	EEPROM	
IC4	CPU	
Q1	9V AVR	
Q2	DC switch	Λ , v key lighting : ON
Q3	DC switch	Dimmer "Hi", "Low" : ON
Q4	DC switch	"MON", "PF6", "PF7" key lighting : ON
Q5	DC switch	"PF1", "PF2", "PF3" key lighting : ON
Q6	DC switch	Dimmer "Hi", "Mid" : ON
Q7	DC switch	"SCN", "PF8", "PF9" key lighting : ON
Q8	DC switch	"PF4", "PF5" key lighting : ON
Q9,10	TRD switch	
Q14,15	DC switch	On when output port on
D1,2	Surge absorption	
D5	Voltage reference	
D6	BUSY LED	
D7	TX LED	
D11,12	Surge absorption	
D14~16	Surge absorption	
D18	DC switch	Key lighting : ON
D19	DC switch	

PARTS LIST

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

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

TK-690H(B)
FINAL UNIT (X45-3550-XX)

Ref. No.	Address	New parts	Parts No.	Description	Desti-nation	Ref. No.	Address	New parts	Parts No.	Description	Desti-nation
TK-690H(B)						FINAL UNIT (X45-3550-XX) -10 : K -11 : K2 -12 : K3					
1	3B		A01-2163-01	CABINET (UPPER)		C1			CK73FB1H472K	CHIP C 4700PF	K
2	1A		A01-2164-01	CABINET (LOWER)		C3-5			CK73FB1H472K	CHIP C 4700PF	K
3	2B		A10-1389-01	CHASSIS		C6			CK73FB1E104K	CHIP C 0.10UF	K
6	3A,3B		B42-2455-04	STICKER (M4X8 MAX)		C7,8			CK73FB1H472K	CHIP C 4700PF	K
7	1G		B46-0470-00	WARRANTY CARD ACSY		C9			C90-2020-05	ELECTRO 15UF	25WV
8	1G		B62-0970-10	INSTRUCTION MANUAL		C10			CK73FB1H102K	CHIP C 1000PF	K
9	2B	*	B72-1471-24	MODEL NAME PLATE	K	C11,12			CK73FB1H472K	CHIP C 4700PF	K
9	2B	*	B72-1472-24	MODEL NAME PLATE	K2	C13			C92-0729-05	ELECTRO 330UF	25WV
9	2B	*	B72-1473-24	MODEL NAME PLATE	K3	C14			CK73FB1H472K	CHIP C 4700PF	K
11	2B		E04-0167-05	RF COAXIAL PECEPTACLE (M)		C15			CK73FB1E104K	CHIP C 0.10UF	K
13	2A		E31-3301-05	LEAD WIRE WITH MINIPIN PLUG (RA/DO)		C16			CK73FB1H471K	CHIP C 470PF	K
14	2B		E37-0709-05	LEAD WIRE WITH CONNECTOR (ACC : 9P)		C17			CC73FCH1H471J	CHIP C 470PF	J
15	2B		E37-0731-05	LEAD WIRE WITH CONNECTOR (DC : 2P)		C17			CK73FB1H331K	CHIP C 330PF	K
16	2B,2H		E37-0733-05	SHORT PLUG (SP) ACSY		C18			CC73FCH1H101J	CHIP C 100PF	J
17	2B		E37-0773-25	LEAD WIRE WITH CONNECTOR (D-SUB : 25P)		C18			CK73FB1H101J	CHIP C 100PF	J
18	3A		E37-0776-05	FLAT CABLE (CONT-TX : 18P)		C19			C92-0726-05	ELECTRO 47UF	25WV
23	2B		F09-0445-05	CAP (D-SUB)		C20			C93-0603-05	CHIP C 1000PF	K
24	1B		F10-1488-02	SHIELDING PLATE (FINAL)		C21			C93-0571-05	CHIP C 82PF	J
22	1H		F29-0472-04	INSULATING COVER ACSY		C21			C93-0572-05	CHIP C 100PF	J
27	3A		G02-0709-04	FLAT SPRING (AUDIO AMP)		C22			C92-0736-05	ELECTRO 10UF	50WV
28	3A		G02-0715-04	FLAT SPRING (AVR)		C23			CK73FB1H102K	CHIP C 1000PF	K
29	2B		G53-0715-03	PACKING (DC,ACC)		C24			CK73FB1H472K	CHIP C 4700PF	K
32	3B		G53-0871-03	PACKING (CABINET UPPER)		C25			C93-0568-05	CHIP C 47PF	J
33	1A		G53-0872-03	PACKING (CABINET LOWER)		C25			C93-0570-05	CHIP C 68PF	J
35	1G		H02-0604-03	INNER PACKING CASE		C26-29			CK73FB1H472K	CHIP C 4700PF	K
36	2H		H10-6617-11	POLYSTYRENE FOAMED FIXTURE		C30			C93-0568-05	CHIP C 47PF	J
37	1H		H11-0815-04	POLYSTYRENE FOAMED BOARD		C30			C93-0570-05	CHIP C 68PF	J
38	2H		H11-0853-04	POLYSTYRENE FOAMED BOARD		C30			CK73FB1H472K	CHIP C 4700PF	K
39	2G		H11-0892-04	POLYSTYRENE FOAMED BOARD		C30			C93-0568-05	CHIP C 47PF	J
40	2G		H12-1410-04	PACKING FIXTURE		C30			C93-0571-05	CHIP C 82PF	J
41	2H		H12-1442-04	PACKING FIXTURE		C31			CK73FB1E104K	CHIP C 0.10UF	K
42	2G		H13-1066-04	CARTON BOARD		C32			CK73FB1E104K	CHIP C 0.10UF	K
44	1H		H25-0103-04	PROTECTION BAG (125/250/0.07)		C32			C92-0726-05	ELECTRO 47UF	25WV
45	1G		H25-0724-04	PROTECTION BAG (300/500/0.07)		C33			CK73FB1H472K	CHIP C 4700PF	K
43	1H		H25-2063-04	PROTECTION BAG (80/120/0.03)		C34		*	C93-0600-05	CHIP C 560PF	K
46	3H		H52-1378-02	ITEM CARTON CASE		C34			C93-0603-05	CHIP C 1000PF	K
47	2B		J21-8347-04	HARDWARE FIXTURE (DC,ACC)		C35,36		*	C93-0683-05	CERAMIC 4700PF	K
50	1H		J61-0307-05	BAND ACSY		C37,38			CM73F2H121J	CHIP C 120PF	J
M	2B		N09-2292-05	HEXAGON HEAD SCREW		C37,38			CM73F2H161J	CHIP C 160PF	J
N	1A,3B		N33-3006-45	OVAL HEAD MACHINE SCREW		C37,38			CM73F2H181J	CHIP C 180PF	J
O	1B		N35-3006-46	BINDING HEAD MACHINE SCREW		C39			C92-0726-05	ELECTRO 47UF	25WV
P	2A,2B		N67-3008-46	PAN HEAD SEMS SCREW W		C43,44			CK73FB1H472K	CHIP C 4700PF	K
Q	1A,1B		N68-4006-46	PAN HEAD SEMS SCREW A		C45			CM73F2H120J	CHIP C 12PF	J
R	2A,3B		N87-2606-46	BRAZIER HEAD TAPTITE SCREW		C45			CM73F2H560J	CHIP C 56PF	J
S	2A		N87-2612-46	BRAZIER HEAD TAPTITE SCREW		C46			CK73FB1H472K	CHIP C 4700PF	K
T	2B		N87-3008-46	BRAZIER HEAD TAPTITE SCREW		C47			CK73FB1E104K	CHIP C 0.10UF	K
59	2H		N99-0365-05	SCREW SET ACSY		C48			C93-0684-05	CERAMIC 6800PF	K
						C49,50			CK73FB1H472K	CHIP C 4700PF	K
						C51			C93-0684-05	CERAMIC 6800PF	K
						C52			C93-0570-05	CHIP C 68PF	J
						C52			C93-0571-05	CHIP C 82PF	J
						C53			CM73F2H390J	CHIP C 39PF	J
						C53			CM73F2H820J	CHIP C 82PF	J
						C54			CM73F2H040D	CHIP C 4.0PF	D
						C54			CM73F2H080D	CHIP C 8.0PF	D
						C55			CM73F2H101J	CHIP C 100PF	J
						C55			CM73F2H121J	CHIP C 120PF	J
						C55			CM73F2H181J	CHIP C 180PF	J
						C56			CM73F2H220J	CHIP C 22PF	J

PARTS LIST

FINAL UNIT (X45-3550-XX)

Ref. No.	Address	New parts	Parts No.	Description	Destination	Ref. No.	Address	New parts	Parts No.	Description	Destination
C56			CM73F2H270J	CHIP C 27PF J	K3	L14			L34-1256-05	AIR-CORE COIL	K3
C57			CC73FCH1H680J	CHIP C 68PF J	K3	L14			L34-1259-05	AIR-CORE COIL	K,K2
C57			CC73FCH1H820J	CHIP C 82PF J	K,K2	L15			L40-5675-34	SMALL FIXED INDUCTOR (56NH)	K
C58			CM73F2H101J	CHIP C 100PF J	K2	L15			L40-6875-34	SMALL FIXED INDUCTOR (68NH)	K2,K3
C58			CM73F2H121J	CHIP C 120PF J	K	L16			L40-2205-34	SMALL FIXED INDUCTOR (22UH)	
C59			CM73F2H470J	CHIP C 47PF J	K,K2	L17		*	L39-1420-15	TOROIDAL COIL	
C59			CM73F2H820J	CHIP C 82PF J	K3	L18			L40-2205-34	SMALL FIXED INDUCTOR (22UH)	
C60			CC73FCH1H330J	CHIP C 33PF J	K2						
C60			CC73FCH1H560J	CHIP C 56PF J	K,K3	R1			RK73FB2A151J	CHIP R 150 J 1/10W	K,K3
C61			CM73F2H390J	CHIP C 39PF J	K2	R1			RK73FB2A181J	CHIP R 180 J 1/10W	K2
C61			CM73F2H470J	CHIP C 47PF J	K3	R2			RK73FB2A270J	CHIP R 27 J 1/10W	K2
C61			CM73F2H510J	CHIP C 51PF J	K	R2			RK73FB2A390J	CHIP R 39 J 1/10W	K,K3
C62			CC73FCH1H121J	CHIP C 120PF J	K2	R3			RK73FB2A151J	CHIP R 150 J 1/10W	K,K3
C62			CC73FCH1H151J	CHIP C 150PF J	K	R3			RK73FB2A181J	CHIP R 180 J 1/10W	K2
C62			CC73FCH1H820J	CHIP C 82PF J	K3	R4			R92-0699-05	CHIP R 10 J 1/2W	K
C63			CM73F2H390J	CHIP C 39PF J	K3	R5			R92-1261-05	CHIP R 150 J 1/2W	
C63			CM73F2H820J	CHIP C 82PF J	K,K2	R6			RK73FB2A271J	CHIP R 270 J 1/10W	
C64			CE04EW1E102M	ELECTRO 1000UF 25WV		R7			RK73FB2A223J	CHIP R 22K J 1/10W	
C65			CC73FCH1H330J	CHIP C 33PF J	K2	R8			R92-1245-05	CHIP R 47 J 1/2W	
C65			CC73FCH1H560J	CHIP C 56PF J	K,K3	R9			RK73FB2A103J	CHIP R 10K J 1/10W	
C66			CM73F2H020C	CHIP C 2.0PF C		R10			R92-0699-05	CHIP R 10 J 1/2W	K
C67			CC73FCH1H820J	CHIP C 82PF J		R11			RK73FB2A471J	CHIP R 470 J 1/10W	
C68			CK73FB1H472K	CHIP C 4700PF K		R12			RS14DB3F101J	FL-PROOF RS 100 J 3W	
C70			CK73FB1H472K	CHIP C 4700PF K		R13			R92-0685-05	CHIP R 22 J 1/2W	
C71			CK73FB1H102K	CHIP C 1000PF K		R14			RK73FB2A471J	CHIP R 470 J 1/10W	
C72,73			CK73FB1H472K	CHIP C 4700PF K		R15			RK73FB2A222J	CHIP R 2.2K J 1/10W	
C74			CM73F2H020C	CHIP C 2.0PF C		R16			RK73FB2A122J	CHIP R 1.2K J 1/10W	
C75			CC73FCH1H680J	CHIP C 68PF J		R17			RK73FB2A101J	CHIP R 100 J 1/10W	
C76			CK73FB1H472K	CHIP C 4700PF K		R18,19			RS14DB3F4R7J	FL-PROOF RS 4.7 J 3W	
C77,78			CK73FB1H103K	CHIP C 0.010UF K		R20			RK73FB2A562J	CHIP R 5.6K J 1/10W	
C79,80			CK73FB1E104K	CHIP C 0.10UF K		R21,22			RS14DB3F221J	FL-PROOF RS 220 J 3W	
C81			CK73FB1H103K	CHIP C 0.010UF K		R23,24			RS14DB3A4R7J	FL-PROOF RS 4.7 J 1W	
C82			CK73FB1E104K	CHIP C 0.10UF K		R25,26			RS14DB3F221J	FL-PROOF RS 220 J 3W	
C83			CK73FB1H103K	CHIP C 0.010UF K		R27			R92-1253-05	CHIP R 82 J 1/2W	
C84,85			CM73F2H161J	CHIP C 160PF J	K2	R28			R92-0670-05	CHIP R 0 OHM	
CN1			E04-0154-05	PIN SOCKET		R29-31			RK73FB2A270J	CHIP R 27 J 1/10W	K,K2
CN4,5			E23-1116-05	RELAY TERMINAL		R29-31			RK73FB2A330J	CHIP R 33 J 1/10W	K3
CN6			E04-0154-05	PIN SOCKET		R32			RK73FB2A220J	CHIP R 22 J 1/10W	
W1			E37-0783-05	PROCESSED LEAD WIRE		R33			RK73FB2A472J	CHIP R 4.7K J 1/10W	
W4			E37-0706-05	LEAD WIRE WITH CONNECTOR		R34			R92-1245-05	CHIP R 47 J 1/2W	
W5			E37-0701-05	LEAD WIRE WITH CONNECTOR		R35			R92-1061-05	JUMPER REST 0 OHM	
A1	1B		F10-2277-04	SHIELDING PLATE		R110			R92-0670-05	CHIP R 0 OHM	K
-			L92-0125-05	TROIDAL CORE		R111			R92-0670-05	CHIP R 0 OHM	K2
L1			L40-1095-34	SMALL FIXED INDUCTOR (1UH)		R112			R92-0670-05	CHIP R 0 OHM	K3
L2			L34-0908-05	AIR-CORE COIL		VR1			R12-6423-05	TRIMMING POT. (10K)	
L3			L34-1039-05	AIR-CORE COIL		D1			1SS184	DIODE	
L4			L33-0666-05	CHOKE COIL		D2,3			MA4PH633	DIODE	
L5			L39-1211-25	TOROIDAL COIL		D4			MI809	DIODE	
L6			L39-1213-25	TOROIDAL COIL		D4			XB15A709	DIODE	
L7			L39-1214-25	TOROIDAL COIL	K	D5			1SS184	DIODE	
L7			L39-1215-25	TOROIDAL COIL	K3	D6			HSM88AS	DIODE	
L7			L39-1239-05	TOROIDAL COIL	K2	D7			22ZR-10D	SURGE ABSORBER	
L8			L33-0625-15	TOROIDAL COIL		D8			SG-5L(R)	DIODE	
L9		*	L40-1001-41	SMALL FIXED INDUCTOR (10UH)		D9			HSM88AS	DIODE	
L10,11			L34-1150-05	AIR-CORE COIL	K,K2	D10			MI809	DIODE	
L10,11			L34-1241-05	AIR-CORE COIL	K3	D10			XB15A709	DIODE	
L12			L34-1151-05	AIR-CORE COIL	K3	Q1			2SC1971	TRANSISTOR	
L12			L34-1241-05	AIR-CORE COIL	K,K2	Q2			2SC2712(Y)	TRANSISTOR	
						Q3			DTC114EK	DIGITAL TRANSISTOR	
						Q4			2SC2712(Y)	TRANSISTOR	

PARTS LIST

FINAL UNIT (X45-3550-XX)
TX-RX UNIT (X57-5600-XX)

Ref. No.	Address	New parts	Parts No.	Description	Desti-nation	Ref. No.	Address	New parts	Parts No.	Description	Desti-nation
Q5			2SC1972	TRANSISTOR		C140			CC73GCH1H331J	CHIP C 330PF J	
Q6			2SD2531	TRANSISTOR		C141			CK73GB1E103K	CHIP C 0.010UF K	
Q7			2SA1162(Y)	TRANSISTOR		C142			CC73GCH1H470J	CHIP C 47PF J	
Q8			FMW1	TRANSISTOR		C143			CC73GCH1H181J	CHIP C 180PF J	
Q9,10			2SC2694	TRANSISTOR		C144			CK73GB1E103K	CHIP C 0.010UF K	
Q11			2SC2712(Y)	TRANSISTOR		C145			CK73GB1H102K	CHIP C 1000PF K	
TH1			PTH9M04BC471TS	THERMISTOR		C146			CC73GCH1H221J	CHIP C 220PF J	K3
TX-RX UNIT (X57-5600-XX) -10 : K -11 : K2 -12 : K3						C147			CC73GCH1H270J	CHIP C 27PF J	
C101			CC73GCH1H180J	CHIP C 18PF J		C148			CK73GB1H103K	CHIP C 0.010UF K	
C102			CK73GB1E103K	CHIP C 0.010UF K		C149			CC73GCH1H221J	CHIP C 220PF J	
C103-106			CK73GB1H103K	CHIP C 0.010UF K		C150			CK73GB1H102K	CHIP C 1000PF K	
C107			CC73GCH1H060D	CHIP C 6.0PF D	K3	C151			CC73GCH1H050C	CHIP C 5.0PF C	
C108			CC73GCH1H030C	CHIP C 3.0PF C	K,K2	C152			CC73GCH1H331J	CHIP C 330PF J	
C108			CC73GCH1H040C	CHIP C 4.0PF C	K3	C153			CC73GCH1H101J	CHIP C 100PF J	
C109			CC73GCH1H040C	CHIP C 4.0PF C	K2	C154			CK73GB1H102K	CHIP C 1000PF K	
C109			CC73GCH1H080D	CHIP C 8.0PF D	K,K3	C155			CC73GCH1H090D	CHIP C 9.0PF D	
C110			CC73GCH1H030C	CHIP C 3.0PF C	K,K2	C156			CC73GCH1H390J	CHIP C 39PF J	
C110			CC73GCH1H040C	CHIP C 4.0PF C	K3	C157			CC73GCH1H090D	CHIP C 9.0PF D	
C111			CK73GB1H103K	CHIP C 0.010UF K		C158-160			CK73GB1H103K	CHIP C 0.010UF K	
C112			CK73GB1H040C	CHIP C 4.0PF C	K2	C161			CC73GCH1H560J	CHIP C 56PF J	
C112			CC73GCH1H080D	CHIP C 8.0PF D	K,K3	C162			CC73GCH1H820J	CHIP C 82PF J	
C113			CK73GB1H103K	CHIP C 0.010UF K		C163			CK73GB1C104K	CHIP C 0.10UF K	
C114			CC73GCH1H820J	CHIP C 82PF J		C164			CK73GB1H103K	CHIP C 0.010UF K	
C115			CK73GB1H152K	CHIP C 1500PF K		C166			C92-0606-05	CHIP-TAN 4.7UF 10WV	
C116			CK73GB1H103K	CHIP C 0.010UF K		C167			CK73GB1C104K	CHIP C 0.10UF K	
C117			CC73GCH1H560J	CHIP C 56PF J		C168			CC73GCH1H820J	CHIP C 82PF J	
C118			CC73GCH1H220J	CHIP C 22PF J	K	C169			CK73FB1E104K	CHIP C 0.10UF K	
C118			CC73GCH1H470J	CHIP C 47PF J	K2,K3	C170-172			CK73GB1H102K	CHIP C 1000PF K	
C119			CC73GCH1H390J	CHIP C 39PF J		C173			CK73GB1H472K	CHIP C 4700PF K	
C120			CC73GCH1H050C	CHIP C 5.0PF C	K3	C174			CK73GB1H681K	CHIP C 680PF K	
C120			CC73GCH1H120J	CHIP C 12PF J	K2	C175			CK73GB1H102K	CHIP C 1000PF K	
C120			CC73GCH1H220J	CHIP C 22PF J	K	C176			CK73GB1C333K	CHIP C 0.033UF K	
C121			CC73GCH1H470J	CHIP C 47PF J	K	C177			CK73FB1C334K	CHIP C 0.33UF K	
C121			CC73GCH1H820J	CHIP C 82PF J	K3	C181-183			CK73GB1H103K	CHIP C 0.010UF K	
C121,122			CC73GCH1H101J	CHIP C 100PF J	K2	C185,186			CC73GCH1H090D	CHIP C 9.0PF D	
C122			CC73GCH1H101J	CHIP C 100PF J	K,K3	C189			CC73GCH1H060D	CHIP C 6.0PF D	
C123			CC73GCH1H100D	CHIP C 10PF D	K3	C190			CC73GCH1H180J	CHIP C 18PF J	
C123			CC73GCH1H120J	CHIP C 12PF J	K2	C192-194			CK73GB1H103K	CHIP C 0.010UF K	
C123			CC73GCH1H220J	CHIP C 22PF J	K	C197,198			CK73GB1H103K	CHIP C 0.010UF K	
C124			CC73GCH1H101J	CHIP C 100PF J	K2	C201			CK73GB1H103K	CHIP C 0.010UF K	
C124			CC73GCH1H470J	CHIP C 47PF J	K	C202			CC73GCH1H101J	CHIP C 100PF J	
C124			CC73GCH1H680J	CHIP C 68PF J	K3	C203			C92-0044-05	CHIP-ELE 47UF 10WV	
C125			CC73GCH1H331J	CHIP C 330PF J		C204			C92-0578-05	CHIP-ELE 22UF 16WV	
C126			CC73GCH1H100D	CHIP C 10PF D	K3	C205			CK73GB1H102K	CHIP C 1000PF K	
C126			CC73GCH1H120J	CHIP C 12PF J	K2	C206			CK73GB1H103K	CHIP C 0.010UF K	
C126,127			CC73GCH1H220J	CHIP C 22PF J	K	C206,207			CK73GB1H103K	CHIP C 0.010UF K	
C127			CC73GCH1H330J	CHIP C 33PF J	K3	C208			CK73GB1H102K	CHIP C 1000PF K	
C127			CC73GCH1H470J	CHIP C 47PF J	K2	C209			CK73GB1H103K	CHIP C 0.010UF K	
C128,129			CC73GCH1H221J	CHIP C 220PF J		C210			CK73FB1E104K	CHIP C 0.10UF K	
C130			CK73GB1H103K	CHIP C 0.010UF K		C211			C92-0008-05	CHIP-TAN 3.3UF 16WV	
C131			CK73FB1E473K	CHIP C 0.047UF K		C212			CK73GB1H102K	CHIP C 1000PF K	
C132			CC73GCH1H331J	CHIP C 330PF J		C213			CK73GB1H103K	CHIP C 0.010UF K	
C133			CC73GCH1H181J	CHIP C 180PF J		C214			CC73FCH1H101J	CHIP C 100PF J	
C134			CC73GCH1H101J	CHIP C 100PF J		C215			CK73GB1H102K	CHIP C 1000PF K	
C135			CK73GB1H103K	CHIP C 0.010UF K		C216			C92-0044-05	CHIP-ELE 47UF 10WV	
C136,137			CC73GCH1H271J	CHIP C 270PF J		C217			CK73GB1H103K	CHIP C 0.010UF K	
C138			CK73GB1H102K	CHIP C 1000PF K		C218			CK73FB1E104K	CHIP C 0.10UF K	
C139			CK73FB1E473K	CHIP C 0.047UF K		C219-222			CK73GB1H103K	CHIP C 0.010UF K	
						C223			CK73GB1H102K	CHIP C 1000PF K	
						C301			C92-0560-05	CHIP-TAN 10UF 6.3WV	

PARTS LIST

TX-RX UNIT (X57-5600-XX)

Ref. No.	Address	New parts	Parts No.	Description	Destination	Ref. No.	Address	New parts	Parts No.	Description	Destination
C302-304			CK73GB1H102K	CHIP C 1000PF K		C384			CK73GB1C473K	CHIP C 0.047UF K	K2
C305			CK73GB1H103K	CHIP C 0.010UF K		C384			CK73GB1C683K	CHIP C 0.068UF K	K,K3
C306			CK73GB1H102K	CHIP C 1000PF K		C501			CC73GCH1H101J	CHIP C 100PF J	
C307			CC73GCH1H390J	CHIP C 39PF J	K3	C524			CK73GB1H102K	CHIP C 1000PF K	
C307			CC73GCH1H560J	CHIP C 56PF J	K2	C525			CK73FB1E683K	CHIP C 0.068UF K	
C307			CC73GCH1H820J	CHIP C 82PF J	K	C526,527			CK73GB1H471K	CHIP C 470PF K	
C308			CC73GCH1H220J	CHIP C 22PF J		C528			CC73GCH1H101J	CHIP C 100PF J	
C309			CK73FB1E104K	CHIP C 0.10UF K		C529			C92-0585-05	CHIP-TAN 4.7UF 16WV	
C310			CC73GCH1H121J	CHIP C 120PF J	K2	C530			CK73GB1E123K	CHIP C 0.012UF K	
C310			CC73GCH1H151J	CHIP C 150PF J	K	C531			C92-0560-05	CHIP-TAN 10UF 6.3WV	
C310			CC73GCH1H820J	CHIP C 82PF J	K3	C532			CK73GB1H222K	CHIP C 2200PF K	
C311,312			CK73GB1H103K	CHIP C 0.010UF K		C533			C92-0560-05	CHIP-TAN 10UF 6.3WV	
C313			CK73FB1E104K	CHIP C 0.10UF K		C534			CK73FB1E104K	CHIP C 0.10UF K	
C314			CC73GCH1H220J	CHIP C 22PF J		C535			C92-0560-05	CHIP-TAN 10UF 6.3WV	
C315			CC73GCH1H390J	CHIP C 39PF J	K3	C536,537			CK73FB1E104K	CHIP C 0.10UF K	
C315			CC73GCH1H560J	CHIP C 56PF J	K2	C538			CK73GB1E223K	CHIP C 0.022UF K	
C315			CC73GCH1H820J	CHIP C 82PF J	K	C539			CC73GCH1H470J	CHIP C 47PF J	
C316			C92-0633-05	CHIP-TAN 22UF 10WV		C540			CK73FB1E104K	CHIP C 0.10UF K	
C317			C90-4016-05	ELECTRO 47UF 16WV		C541			CK73GB1H102K	CHIP C 1000PF K	
C318			C92-0555-05	CHIP-TAN 0.047UF 35WV		C542			CK73FB1E104K	CHIP C 0.10UF K	
C319			C92-1341-05	ELECTRO 100UF 16WV		C543			CK73GB1H102K	CHIP C 1000PF K	
C320			C90-4016-05	ELECTRO 47UF 16WV		C544			CC73GCH1H121J	CHIP C 120PF J	
C321,322			CK73GB1H103K	CHIP C 0.010UF K		C545			CK73GB1H103K	CHIP C 0.010UF K	
C323,324			C92-0519-05	CHIP-TAN 1.0UF 25WV		C546			CK73FB1E104K	CHIP C 0.10UF K	
C327			C92-0519-05	CHIP-TAN 1.0UF 25WV		C547			CK73GB1E223K	CHIP C 0.022UF K	
C328-331			CK73GB1H103K	CHIP C 0.010UF K		C548			C92-0507-05	CHIP-TAN 4.7UF 6.3WV	
C332			CC73GCH1H390J	CHIP C 39PF J	K	C549			CK73GB1H222K	CHIP C 2200PF K	
C332			CC73GCH1H470J	CHIP C 47PF J	K2	C550			CK73FB1E104K	CHIP C 0.10UF K	
C332			CC73GCH1H820J	CHIP C 82PF J	K3	C551			CK73FB1E333K	CHIP C 0.033UF K	
C333			CC73GCH1H390J	CHIP C 39PF J	K3	C552			CC73GCH1H470J	CHIP C 47PF J	
C333			CC73GCH1H560J	CHIP C 56PF J	K2	C553,554			CK73FB1E104K	CHIP C 0.10UF K	
C333			CC73GCH1H680J	CHIP C 68PF J	K	C555			CK73GB1H102K	CHIP C 1000PF K	
C334			C92-0606-05	CHIP-TAN 4.7UF 10WV		C557			CK73GB1E223K	CHIP C 0.022UF K	
C335			CC73GCH1H390J	CHIP C 39PF J		C558			C92-0507-05	CHIP-TAN 4.7UF 6.3WV	
C336			CC73GCH1H101J	CHIP C 100PF J		C559			C92-0036-05	CHIP-ELE 4.7UF 16WV	
C337			CC73GCH1H030C	CHIP C 3.0PF C	K	C562			CK73GB1H103K	CHIP C 0.010UF K	
C337			CC73GCH1H060D	CHIP C 6.0PF D	K3	C563			CK73GB1H102K	CHIP C 1000PF K	
C337,338			CC73GCH1H120J	CHIP C 12PF J	K2	C565			C92-0003-05	CHIP-TAN 0.47UF 25WV	
C338			CC73GCH1H150J	CHIP C 15PF J	K	C566			CC73GCH1H100D	CHIP C 10PF D	
C338,339			CC73GCH1H020C	CHIP C 2.0PF C	K3	C567			CK73GB1E223K	CHIP C 0.022UF K	
C339			CC73GCH1H020C	CHIP C 2.0PF C	K,K2	C568			CK73GB1H102K	CHIP C 1000PF K	
C340-343			CC73GCH1H470J	CHIP C 47PF J		C570			C92-0036-05	CHIP-ELE 4.7UF 16WV	
C344-347			CK73GB1H103K	CHIP C 0.010UF K		C571			C92-0585-05	CHIP-TAN 4.7UF 16WV	
C348,349			CC73GCH1H040C	CHIP C 4.0PF C		C572,573			CC73GCH1H030C	CHIP C 3.0PF C	
C350,351			CK73GB1H102K	CHIP C 1000PF K		C574			CK73GB1H472K	CHIP C 4700PF K	
C352			CK73GB1H103K	CHIP C 0.010UF K		C575			C92-0628-05	CHIP-TAN 10UF 10WV	
C353			CC73GCH1H101J	CHIP C 100PF J		C576			CC73GCH1H470J	CHIP C 47PF J	
C354			CC73GCH1H680J	CHIP C 68PF J		C578			C92-0507-05	CHIP-TAN 4.7UF 6.3WV	
C355			CC73GCH1H101J	CHIP C 100PF J		C579			CK73GB1H472K	CHIP C 4700PF K	
C356			CC73GCH1H680J	CHIP C 68PF J		C580-582			CK73GB1H102K	CHIP C 1000PF K	
C357-360			CK73GB1H102K	CHIP C 1000PF K		C583			C92-0546-05	CHIP-TAN 68UF 6.3WV	
C361,362			CK73GB1H103K	CHIP C 0.010UF K		C584			CK73FB1E104K	CHIP C 0.10UF K	
C363			CK73GB1H102K	CHIP C 1000PF K		C585			CC73FCH1H751J	CHIP C 750PF J	
C369			CK73GB1H103K	CHIP C 0.010UF K	K	C586			CC73GCH1H180J	CHIP C 18PF J	
C373			CK73FB1E224K	CHIP C 0.22UF K		C587			CK73GB1H122K	CHIP C 1200PF K	
C374			CK73FB1E104K	CHIP C 0.10UF K		C588			CC73GCH1H070D	CHIP C 7.0PF D	
C376,377			CK73GB1H103K	CHIP C 0.010UF K		C589			CC73GCH1H181J	CHIP C 180PF J	
C378			CK73FB1E224K	CHIP C 0.22UF K		C590			CK73GB1H332K	CHIP C 3300PF K	
C381,382			CK73GB1H103K	CHIP C 0.010UF K		C591			CC73GCH1H180J	CHIP C 18PF J	
C383			CK73FB1E224K	CHIP C 0.22UF K		C592			CK73GB1H102K	CHIP C 1000PF K	

PARTS LIST

TX-RX UNIT (X57-5600-XX)

Ref. No.	Address	New parts	Parts No.	Description	Desti-nation	Ref. No.	Address	New parts	Parts No.	Description	Desti-nation
C593			C92-0633-05	CHIP-TAN 22UF 10WV		CN101			E04-0154-05	PIN SOCKET	
C594			CK73GB1H103K	CHIP C 0.010UF K		CN102,103			E40-5538-05	PIN ASSY	
C595-597			CK73GB1H102K	CHIP C 1000PF K		CN104			E04-0154-05	PIN SOCKET	
C598,599			CK73FB1E104K	CHIP C 0.10UF K		CN201			E40-5752-05	PIN ASSY	
C600			C92-0507-05	CHIP-TAN 4.7UF 6.3WV		CN202			E40-5978-05	FLAT CABLE CONNECTOR	
C601			CK73GB1H102K	CHIP C 1000PF K		CN203			E04-0154-05	PIN SOCKET	
C602			CK73GB1H562K	CHIP C 5600PF K		CN501			E40-5703-05	PIN ASSY	
C603			CK73GB1H102K	CHIP C 1000PF K		CN502			E40-5978-05	FLAT CABLE CONNECTOR	
C604,605			CK73GB1H562K	CHIP C 5600PF K		CN504			E40-5661-05	PIN ASSY SOCKET	
C606			C92-0507-05	CHIP-TAN 4.7UF 6.3WV		CN505			E40-5960-05	PIN ASSY	
C607			CK73GB1H102K	CHIP C 1000PF K		CN506			E40-5066-05	PIN ASSY	
C608			CK73GB1H332J	CHIP C 3300PF J		CN507			E40-5751-05	PIN ASSY	
C609			CK73GB1H272J	CHIP C 2700PF J		CN508			E40-5701-05	PIN ASSY	
C610			CK73FB1E104K	CHIP C 0.10UF K		W501			E37-0707-05	LEAD WIRE WITH CONNECTOR	
C611			CK73GB1H272J	CHIP C 2700PF J		F501			F53-0128-05	FUSE (0.5A)	
C612			C92-1341-05	ELECTRO 100UF 16WV		F502			F53-0108-05	FUSE (1.8A)	
C613			C92-0040-05	CHIP-ELE 47UF 16WV		CD101			L79-1701-05	TUNING COIL	
C614			CK73GB1H102K	CHIP C 1000PF K		CF101,102			L72-0916-05	CERAMIC FILTER (455KHZ)	
C615			CK73GB1H272J	CHIP C 2700PF J		L101,102			L34-4296-05	COIL	K,K2
C616			CK73GB1H103K	CHIP C 0.010UF K		L101,102			L34-4297-05	COIL	K3
C617			CK73FB1E104K	CHIP C 0.10UF K		L103			L40-1005-34	SMALL FIXED INDUCTOR (10UH)	
C618			CK73GB1H272J	CHIP C 2700PF J		L104,105			L34-4296-05	COIL	K,K2
C619			C92-0721-05	ELECTRO 330UF 25WV		L104,105			L34-4297-05	COIL	K3
C620			CK73GB1H103K	CHIP C 0.010UF K		L106			L40-1585-34	SMALL FIXED INDUCTOR (150NH)	
C621			CK73FB1E104K	CHIP C 0.10UF K		L107			L40-3995-34	SMALL FIXED INDUCTOR (3.9UH)	
C622			CK73GB1H102K	CHIP C 1000PF K		L108			L40-1285-34	SMALL FIXED INDUCTOR (120NH)	K3
C623			C92-0040-05	CHIP-ELE 47UF 16WV		L108			L40-1585-34	SMALL FIXED INDUCTOR (150NH)	K,K2
C624			CK73GB1H102K	CHIP C 1000PF K		L109			L40-2785-34	SMALL FIXED INDUCTOR (270NH)	
C625			CK73GB1H103K	CHIP C 0.010UF K		L110			L40-1285-34	SMALL FIXED INDUCTOR (120NH)	K3
C626			C92-0004-05	CHIP-TAN 1.0UF 16WV		L110			L40-1585-34	SMALL FIXED INDUCTOR (150NH)	K,K2
C627,628			CK73FB1E104K	CHIP C 0.10UF K		L111			L40-6885-34	SMALL FIXED INDUCTOR (680NH)	
C629,630			CK73GB1H102K	CHIP C 1000PF K		L112			L40-1285-34	SMALL FIXED INDUCTOR (120NH)	K3
C631			CC73GCH1H101J	CHIP C 100PF J		L112			L40-1585-34	SMALL FIXED INDUCTOR (150NH)	K,K2
C632-639			CK73GB1H102K	CHIP C 1000PF K		L113			L40-1095-34	SMALL FIXED INDUCTOR (1UH)	
C640			C92-0560-05	CHIP-TAN 10UF 6.3WV		L114,115			L40-1295-34	SMALL FIXED INDUCTOR (1.2UH)	
C641,642			CK73FB1E104K	CHIP C 0.10UF K		L116			L40-2205-34	SMALL FIXED INDUCTOR (22UH)	
C666-680			CC73GCH1H101J	CHIP C 100PF J		L117			L40-1295-34	SMALL FIXED INDUCTOR (1.2UH)	
C681			CK73GB1H102K	CHIP C 1000PF K		L118			L40-2285-48	SMALL FIXED INDUCTOR (220NH)	K3
C682,683			CC73GCH1H101J	CHIP C 100PF J		L119			L40-1295-34	SMALL FIXED INDUCTOR (1.2UH)	
C684			CK73GB1H102K	CHIP C 1000PF K		L120			L40-1095-34	SMALL FIXED INDUCTOR (1UH)	
C685			CC73GCH1H101J	CHIP C 100PF J		L121			L40-6885-34	SMALL FIXED INDUCTOR (680NH)	
C686			CK73GB1H102K	CHIP C 1000PF K		L122			L40-2785-34	SMALL FIXED INDUCTOR (270NH)	
C687			CK73GB1H103K	CHIP C 0.010UF K		L123			L39-1272-05	TOROIDAL COIL	
C688			CC73GCH1H221J	CHIP C 220PF J		L124			L34-4216-05	COIL	
C689			CC73GCH1H101J	CHIP C 100PF J		L125			L40-6895-34	SMALL FIXED INDUCTOR (6.8UH)	
C690			CK73FB1E104K	CHIP C 0.10UF K		L126			L39-1272-05	TOROIDAL COIL	
C691,692			CC73GCH1H101J	CHIP C 100PF J		L127			L40-4705-34	SMALL FIXED INDUCTOR (47UH)	
C693			CK73GB1H103K	CHIP C 0.010UF K		L128,129			L30-0534-05	COIL	
C694			C92-0633-05	CHIP-TAN 22UF 10WV		L130			L40-6805-34	SMALL FIXED INDUCTOR (68UH)	
C695			CC73GCH1H101J	CHIP C 100PF J		L131-133			L34-4561-05	COIL	
C696			C92-0628-05	CHIP-TAN 10UF 10WV		L135			L40-2795-34	SMALL FIXED INDUCTOR (2.7UH)	
C697			CK73GB1H103K	CHIP C 0.010UF K		L201			L40-3905-34	SMALL FIXED INDUCTOR (39UH)	
C698-701			C92-0560-05	CHIP-TAN 10UF 6.3WV		L301,302			L40-1285-34	SMALL FIXED INDUCTOR (120NH)	K2,K3
C703			CK73FB1E104K	CHIP C 0.10UF K		L301,302			L40-1585-34	SMALL FIXED INDUCTOR (150NH)	K
C704			CK73GB1H103K	CHIP C 0.010UF K		L303,304			L40-5605-34	SMALL FIXED INDUCTOR (56UH)	
C705			C92-0519-05	CHIP-TAN 1.0UF 25WV		L305			L34-4290-05	COIL	K
C712			CK73GB1E473J	CHIP C 0.047UF J		L305			L34-4291-05	COIL	K2
C713			C92-0003-05	CHIP-TAN 0.47UF 25WV		L305			L34-4292-05	COIL	K3
TC301,302			C05-0393-05	CERAMIC TRIMMER CAP (8PF)		L306			L34-4293-05	COIL	K2

PARTS LIST

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Ref. No.	Address	New parts	Parts No.	Description	Destination	Ref. No.	Address	New parts	Parts No.	Description	Destination
L306			L34-4294-05	COIL	K	R167			RK73GB1J474J	CHIP R 470K J 1/16W	
L306			L34-4295-05	COIL	K3	R168			RK73GB1J101J	CHIP R 100 J 1/16W	
L307			L40-3985-34	SMALL FIXED INDUCTOR (390NH)		R201			RK73GB1J102J	CHIP R 1.0K J 1/16W	
L308,309			L40-2285-34	SMALL FIXED INDUCTOR (220NH)		R202			RK73GB1J561J	CHIP R 560 J 1/16W	
L310			L40-4705-34	SMALL FIXED INDUCTOR (47UH)		R203			RK73GB1J472J	CHIP R 4.7K J 1/16W	
L311			L40-3385-34	SMALL FIXED INDUCTOR (330NH)		R204			RK73GB1J101J	CHIP R 100 J 1/16W	K2
L312			L92-0148-05	FERRITE CHIP		R205			RK73GB1J332J	CHIP R 3.3K J 1/16W	
L313,314			L40-5605-34	SMALL FIXED INDUCTOR (56UH)		R206			RK73GB1J473J	CHIP R 47K J 1/16W	
L501,502			L40-1005-34	SMALL FIXED INDUCTOR (10UH)		R207			RK73FB2A100J	CHIP R 10 J 1/10W	
X101			L77-1294-05	CRYSTAL RESONATOR (11.155MHZ)		R208			RK73GB1J473J	CHIP R 47K J 1/16W	
X301		*	L77-1873-05	VCXO (16.8MHZ)		R209			R92-0685-05	CHIP R 22 J 1/2W	
X501			L77-1708-05	CRYSTAL RESONATOR (3.579545MHZ)		R210			RK73GB1J472J	CHIP R 4.7K J 1/16W	
X502			L77-1863-05	CRYSTAL RESONATOR (12.0MHZ)		R211			RK73FB2A821J	CHIP R 820 J 1/10W	
XF101			L71-0534-05	CRYSTAL FILTER (10.7MHZ)		R212,213			RK73FB2A100J	CHIP R 10 J 1/10W	
XF102			L71-0533-05	CRYSTAL FILTER (10.7MHZ)		R214			RK73FB2A821J	CHIP R 820 J 1/10W	
R10			R92-1252-05	CHIP R 0 OHM	K	R301			RK73GB1J220J	CHIP R 22 J 1/16W	
R11			R92-1252-05	CHIP R 0 OHM	K2	R302-305			RK73GB1J103J	CHIP R 10K J 1/16W	
R12			R92-1252-05	CHIP R 0 OHM	K3	R306			R92-1252-05	CHIP R 0 OHM	
R101			RK73GB1J104J	CHIP R 100K J 1/16W		R307			RK73GB1J560J	CHIP R 56 J 1/16W	
R102			RK73GB1J680J	CHIP R 68 J 1/16W		R309,310			RK73GB1J220J	CHIP R 22 J 1/16W	
R103			RK73GB1J104J	CHIP R 100K J 1/16W		R311,312			RK73GB1J100J	CHIP R 10 J 1/16W	
R104-106			RK73GB1J103J	CHIP R 10K J 1/16W		R313,314			RK73GB1J152J	CHIP R 1.5K J 1/16W	
R107			R92-1252-05	CHIP R 0 OHM		R315			RK73GB1J682J	CHIP R 6.8K J 1/16W	
R108			RK73GB1J821J	CHIP R 820 J 1/16W		R316			RK73GB1J183J	CHIP R 18K J 1/16W	
R109			RK73GB1J5R6J	CHIP R 5.6 J 1/16W		R317,318			RK73GB1J101J	CHIP R 100 J 1/16W	
R110			RK73GB1J821J	CHIP R 820 J 1/16W		R319			RK73GB1J222J	CHIP R 2.2K J 1/16W	
R111			RK73GB1J470J	CHIP R 47 J 1/16W		R320			RK73GB1J474J	CHIP R 470K J 1/16W	
R112			RK73GB1J271J	CHIP R 270 J 1/16W		R321,322			R92-1252-05	CHIP R 0 OHM	
R113			RK73GB1J180J	CHIP R 18 J 1/16W		R323			RK73FB2A392J	CHIP R 3.9K J 1/10W	
R114			RK73GB1J271J	CHIP R 270 J 1/16W		R324			RK73GB1J221J	CHIP R 220 J 1/16W	
R116			RK73GB1J222J	CHIP R 2.2K J 1/16W		R325,326			R92-1252-05	CHIP R 0 OHM	
R117			RK73GB1J151J	CHIP R 150 J 1/16W		R327			RK73GB1J102J	CHIP R 1.0K J 1/16W	
R118			RK73GB1J102J	CHIP R 1.0K J 1/16W		R328			R92-1252-05	CHIP R 0 OHM	K
R119			RK73GB1J103J	CHIP R 10K J 1/16W		R328,329			R92-1252-05	CHIP R 0 OHM	K2,K3
R120			R92-1252-05	CHIP R 0 OHM		R329			RK73GB1J101J	CHIP R 100 J 1/16W	K
R121			RK73GB1J103J	CHIP R 10K J 1/16W		R330-332			RK73GB1J103J	CHIP R 10K J 1/16W	
R122			RK73GB1J561J	CHIP R 560 J 1/16W		R333			RK73GB1J104J	CHIP R 100K J 1/16W	
R126			RK73GB1J822J	CHIP R 8.2K J 1/16W		R334			RK73GB1J561J	CHIP R 560 J 1/16W	
R128,129			RK73GB1J222J	CHIP R 2.2K J 1/16W		R334,335			RK73GB1J471J	CHIP R 470 J 1/16W	K
R130			RK73GB1J103J	CHIP R 10K J 1/16W		R335			RK73GB1J471J	CHIP R 470 J 1/16W	K2,K3
R132			RK73GB1J272J	CHIP R 2.7K J 1/16W		R336,337			RK73GB1J472J	CHIP R 4.7K J 1/16W	K
R133			R92-1252-05	CHIP R 0 OHM		R338			RK73GB1J470J	CHIP R 47 J 1/16W	
R134			RK73GB1J334J	CHIP R 330K J 1/16W		R339			RK73GB1J472J	CHIP R 4.7K J 1/16W	
R136			RK73GB1J332J	CHIP R 3.3K J 1/16W		R340			RK73GB1J470J	CHIP R 47 J 1/16W	
R137			RK73GB1J331J	CHIP R 330 J 1/16W		R341,342			RK73GB1J472J	CHIP R 4.7K J 1/16W	
R138			RK73GB1J152J	CHIP R 1.5K J 1/16W		R343,344			RK73GB1J223J	CHIP R 22K J 1/16W	
R139			RK73GB1J154J	CHIP R 150K J 1/16W		R345			RK73GB1J330J	CHIP R 33 J 1/16W	
R140			RK73GB1J332J	CHIP R 3.3K J 1/16W		R346			RK73GB1J101J	CHIP R 100 J 1/16W	
R141			RK73GB1J331J	CHIP R 330 J 1/16W		R347			RK73GB1J221J	CHIP R 220 J 1/16W	
R142			RK73GB1J332J	CHIP R 3.3K J 1/16W		R348,349			RK73GB1J223J	CHIP R 22K J 1/16W	
R144			RK73GB1J104J	CHIP R 100K J 1/16W		R350			RK73GB1J330J	CHIP R 33 J 1/16W	
R145			RK73GB1J823J	CHIP R 82K J 1/16W		R351			RK73GB1J122J	CHIP R 1.2K J 1/16W	K2,K3
R146,147			RK73GB1J271J	CHIP R 270 J 1/16W		R351			RK73GB1J471J	CHIP R 470 J 1/16W	K
R148,149			RK73GB1J103J	CHIP R 10K J 1/16W		R352			R92-1252-05	CHIP R 0 OHM	
R150-153			RK73GB1J100J	CHIP R 10 J 1/16W		R353			RK73GB1J101J	CHIP R 100 J 1/16W	
R154			RK73GB1J103J	CHIP R 10K J 1/16W		R354			RK73GB1J122J	CHIP R 1.2K J 1/16W	
R155			RK73GB1J563J	CHIP R 56K J 1/16W		R355			RK73GB1J471J	CHIP R 470 J 1/16W	
R162,163			RK73GB1J152J	CHIP R 1.5K J 1/16W		R356			RK73GB1J221J	CHIP R 220 J 1/16W	
R164,165			RK73GB1J560J	CHIP R 56 J 1/16W		R357			RK73FB2A470J	CHIP R 47 J 1/10W	
R166			RK73GB1J102J	CHIP R 1.0K J 1/16W		R358			RK73GB1J102J	CHIP R 1.0K J 1/16W	

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Ref. No.	Address	New parts	Parts No.	Description	Destination	Ref. No.	Address	New parts	Parts No.	Description	Destination
R359			RK73GB1J820J	CHIP R 82 J 1/16W	K	R577			RK73GB1J122J	CHIP R 1.2K J 1/16W	
R359			R92-1252-05	CHIP R 0 OHM	K2,K3	R578			RK73GB1J102J	CHIP R 1.0K J 1/16W	
R366			RK73GB1J152J	CHIP R 1.5K J 1/16W	K	R579,580			RK73GB1J823J	CHIP R 82K J 1/16W	
R366,367			RK73GB1J102J	CHIP R 1.0K J 1/16W	K2,K3	R581,582			RK73GB1J683J	CHIP R 68K J 1/16W	
R367			RK73GB1J102J	CHIP R 1.0K J 1/16W	K	R583			R92-0670-05	CHIP R 0 OHM	
R501			RK73GB1J333J	CHIP R 33K J 1/16W		R584			RK73GB1J333J	CHIP R 33K J 1/16W	
R502			RK73GB1J471J	CHIP R 470 J 1/16W		R586			RK73GB1J104J	CHIP R 100K J 1/16W	
R504			R92-0670-05	CHIP R 0 OHM		R587			R92-0670-05	CHIP R 0 OHM	
R505			RK73GB1J103J	CHIP R 10K J 1/16W		R588			RK73GB1J473J	CHIP R 47K J 1/16W	
R507			RK73GB1J223J	CHIP R 22K J 1/16W		R589			RK73GB1J223J	CHIP R 22K J 1/16W	
R508			RK73GB1J102J	CHIP R 1.0K J 1/16W		R591,592			RK73GB1J124J	CHIP R 120K J 1/16W	
R509-511			RK73GB1J473J	CHIP R 47K J 1/16W		R594-597			RK73GB1J473J	CHIP R 47K J 1/16W	
R512			RK73GB1J184J	CHIP R 180K J 1/16W		R598			RK73GB1J332J	CHIP R 3.3K J 1/16W	
R513			RK73GB1J223J	CHIP R 22K J 1/16W		R599,600			RK73GB1J473J	CHIP R 47K J 1/16W	
R514			RK73GB1J184J	CHIP R 180K J 1/16W		R601			RK73GB1J472J	CHIP R 4.7K J 1/16W	
R515			R92-0670-05	CHIP R 0 OHM		R602			RK73FB2A473J	CHIP R 47K J 1/10W	
R516,517			RK73GB1J104J	CHIP R 100K J 1/16W		R603			RK73GB1J103J	CHIP R 10K J 1/16W	
R518			RK73GB1J181J	CHIP R 180 J 1/16W		R604			R92-0670-05	CHIP R 0 OHM	
R519			RK73GB1J393J	CHIP R 39K J 1/16W		R605			RK73GB1J333J	CHIP R 33K J 1/16W	
R520			RK73GB1J154J	CHIP R 150K J 1/16W		R606			RK73GB1J154J	CHIP R 150K J 1/16W	
R521			RK73GB1J102J	CHIP R 1.0K J 1/16W		R607			R92-1252-05	CHIP R 0 OHM	
R522			RK73GB1J104J	CHIP R 100K J 1/16W		R608			RK73GB1J123J	CHIP R 12K J 1/16W	
R523			RK73GB1J474J	CHIP R 470K J 1/16W		R609			RK73GB1J153J	CHIP R 15K J 1/16W	
R524			RK73GB1J224J	CHIP R 220K J 1/16W		R611			RK73GB1J474J	CHIP R 470K J 1/16W	
R525			RK73GB1J472J	CHIP R 4.7K J 1/16W		R612			RK73GB1J823J	CHIP R 82K J 1/16W	
R526			RK73GB1J104J	CHIP R 100K J 1/16W		R613			RK73GB1J393J	CHIP R 39K J 1/16W	
R527			RK73GB1J223J	CHIP R 22K J 1/16W		R615			RK73GB1J122J	CHIP R 1.2K J 1/16W	
R528			RK73GB1J104J	CHIP R 100K J 1/16W		R616			RK73GB1J152J	CHIP R 1.5K J 1/16W	
R529,530			RK73GB1J334J	CHIP R 330K J 1/16W		R617			RN73GH1J274D	CHIP R 270K D 1/16W	
R531			RK73GB1J154J	CHIP R 150K J 1/16W		R618			RN73GH1J334D	CHIP R 330K D 1/16W	
R532			RK73GB1J474J	CHIP R 470K J 1/16W		R619,620			RN73GH1J274D	CHIP R 270K D 1/16W	
R533			RN73GH1J473D	CHIP R 47K D 1/16W		R621			RK73GB1J472J	CHIP R 4.7K J 1/16W	
R534			RN73GH1J563D	CHIP R 56K D 1/16W		R622			RK73GB1J473J	CHIP R 47K J 1/16W	
R535			RK73GB1J103J	CHIP R 10K J 1/16W		R623			RN73GH1J274D	CHIP R 270K D 1/16W	
R536			RK73GB1J681J	CHIP R 680 J 1/16W		R624			RK73GB1J103J	CHIP R 10K J 1/16W	
R537			RK73GB1J472J	CHIP R 4.7K J 1/16W		R625			RK73GB1J684J	CHIP R 680K J 1/16W	
R539			RK73GB1J561J	CHIP R 560 J 1/16W		R626			RK73GB1J822J	CHIP R 8.2K J 1/16W	
R541			R92-0670-05	CHIP R 0 OHM		R627			RN73GH1J274D	CHIP R 270K D 1/16W	
R542			RK73GB1J470J	CHIP R 47 J 1/16W		R628			R92-0670-05	CHIP R 0 OHM	
R543			RK73GB1J220J	CHIP R 22 J 1/16W		R629			RN73GH1J563D	CHIP R 56K D 1/16W	
R545			RK73GB1J564J	CHIP R 560K J 1/16W		R630			RN73GH1J473D	CHIP R 47K D 1/16W	
R546			R92-0670-05	CHIP R 0 OHM		R631			RK73GB1J104J	CHIP R 100K J 1/16W	
R547			R92-1252-05	CHIP R 0 OHM		R632			RK73GB1J102J	CHIP R 1.0K J 1/16W	
R549			RK73GB1J153J	CHIP R 15K J 1/16W		R633,634			RK73GB1J103J	CHIP R 10K J 1/16W	
R552			RK73GB1J101J	CHIP R 100 J 1/16W		R635			R92-0670-05	CHIP R 0 OHM	
R553			RK73GB1J682J	CHIP R 6.8K J 1/16W		R636			RK73GB1J104J	CHIP R 100K J 1/16W	
R557,558			RK73GB1J104J	CHIP R 100K J 1/16W		R638			RK73GB1J223J	CHIP R 22K J 1/16W	
R559			RK73GB1J224J	CHIP R 220K J 1/16W		R639			RK73GB1J473J	CHIP R 47K J 1/16W	
R562			RK73GB1J274J	CHIP R 270K J 1/16W		R641			R92-0670-05	CHIP R 0 OHM	
R563			RK73GB1J104J	CHIP R 100K J 1/16W		R642-648			RK73FB2A102J	CHIP R 1.0K J 1/10W	
R564			RK73GB1J474J	CHIP R 470K J 1/16W		R652			RK73FB2A102J	CHIP R 1.0K J 1/10W	
R565			RK73GB1J123J	CHIP R 12K J 1/16W		R654-656			RK73FB2A102J	CHIP R 1.0K J 1/10W	
R566			RK73GB1J153J	CHIP R 15K J 1/16W		R657			R92-0670-05	CHIP R 0 OHM	
R567			RK73GB1J224J	CHIP R 220K J 1/16W		R658			RK73GB1J473J	CHIP R 47K J 1/16W	
R568			R92-1252-05	CHIP R 0 OHM		R659			RK73GB1J333J	CHIP R 33K J 1/16W	
R570			RK73GB1J223J	CHIP R 22K J 1/16W		R661			R92-0670-05	CHIP R 0 OHM	
R572			RK73GB1J104J	CHIP R 100K J 1/16W		R662			RK73GB1J472J	CHIP R 4.7K J 1/16W	
R573			RK73GB1J274J	CHIP R 270K J 1/16W		R663			RK73GB1J473J	CHIP R 47K J 1/16W	
R574			RK73GB1J102J	CHIP R 1.0K J 1/16W		R664			RK73GB1J333J	CHIP R 33K J 1/16W	
R575,576			RK73GB1J104J	CHIP R 100K J 1/16W		R665			RK73GB1J104J	CHIP R 100K J 1/16W	

PARTS LIST

TX-RX UNIT (X57-5600-XX)

Ref. No.	Address	New parts	Parts No.	Description	Destination	Ref. No.	Address	New parts	Parts No.	Description	Destination
R666,667			R92-0670-05	CHIP R 0 OHM		D519			DA204U	DIODE	
R668			R92-1252-05	CHIP R 0 OHM		D521			DA204U	DIODE	
R670			R92-0670-05	CHIP R 0 OHM		D523,524			DA204U	DIODE	
R671			RK73GB1J683J	CHIP R 68K J 1/16W		D526,527			DA204U	DIODE	
R672			RK73GB1J473J	CHIP R 47K J 1/16W		D528,529			1SS355	DIODE	
R674,675			RK73GB1J472J	CHIP R 4.7K J 1/16W		IC101			TA31136FN	IC (FM IC)	
R676			RK73GB1J473J	CHIP R 47K J 1/16W		IC201			BU4094BCF	IC (SHIFT REGISTER)	
R677			RK73GB1J472J	CHIP R 4.7K J 1/16W		IC202			NJM78L05UA	IC (AVR)	
R678,679			RK73GB1J332J	CHIP R 3.3K J 1/16W		IC203			AN8009M	IC (AVR)	
R680			RK73GB1J104J	CHIP R 100K J 1/16W		IC301			SA7025DK	IC (PLL IC)	
R690,691			R92-0670-05	CHIP R 0 OHM		IC501			TC4013BF(N)	IC (D FF)	
R693			RK73GB1J103J	CHIP R 10K J 1/16W		IC502			NJM4558M	IC (LPF)	
R695			R92-1252-05	CHIP R 0 OHM		IC503			TA7808S	IC (AVR)	
R697			R92-1252-05	CHIP R 0 OHM		IC504			TC35453F	IC (AUDIO PROCESSOR)	
R698			RK73GB1J472J	CHIP R 4.7K J 1/16W		IC505			NJM4558M	IC (HPF/IDC)	
R699			R92-1252-05	CHIP R 0 OHM		IC506			L78LR05B-FA	IC (AVR)	
R700			RK73GB1J220J	CHIP R 22 J 1/16W		IC508			NJM4558M	IC (LIMITER/BUFFER AMP)	
R701			RK73GB1J103J	CHIP R 10K J 1/16W		IC509			MC33172D	IC (BUFFER AMP)	
R702			RK73GB1J472J	CHIP R 4.7K J 1/16W		IC510			NJM4558M	IC (SUMMING AMP/LPF)	
R703			RK73GB1J473J	CHIP R 47K J 1/16W		IC511			PCD3312CT	IC (DTMF ENCODER)	
R706			R92-0670-05	CHIP R 0 OHM		IC512			M62364FP	IC (D/A CONVERTER)	
R707-713			RK73GB1J474J	CHIP R 470K J 1/16W		IC513			NJM4558M	IC (LPF/SUMMING AMP)	
R714			RK73GB1J104J	CHIP R 100K J 1/16W		IC514			AT24C64N10SI27	IC (EEPROM)	
R715			RK73GB1J474J	CHIP R 470K J 1/16W		IC515			BU4066BCF	IC (ANALOG SWITCH)	
R716			RK73GB1J104J	CHIP R 100K J 1/16W		IC516			784214GC0518EU	IC (CPU)	
R717			RK73GB1J102J	CHIP R 1.0K J 1/16W		IC517			BU4094BCF	IC (SHIFT REGISTER)	
R718			RK73GB1J333J	CHIP R 33K J 1/16W		IC518			NJM4558M	IC (BUFFER AMP)	
R719			RS14DB3D2R2J	FL-PROOF RS 2.2 J 2W		IC519			AT29C020-90T1	IC (FLASH ROM)	
R720			RK73GB1J474J	CHIP R 470K J 1/16W		IC520			TC7S02F	IC (NOR GATE)	
R721			RK73GB1J224J	CHIP R 220K J 1/16W		IC521			NJM4558M	IC (BUFFER AMP)	
R725			R92-0670-05	CHIP R 0 OHM		IC522			TDA8561Q	IC (AUDIO POWER AMP)	
R728			R92-1252-05	CHIP R 0 OHM		IC523			BU4094BCF	IC (SHIFT REGISTER)	
R729-736			RK73GB1J472J	CHIP R 4.7K J 1/16W		IC524			NJM4558M	IC (BUFFER AMP/DE-EMPHASIS)	
R737			RK73GB1J824J	CHIP R 820K J 1/16W		IC525			LC73872M	IC (DTMF DECODER)	
R738			RK73GB1J684J	CHIP R 680K J 1/16W		IC526			TA75S01F	IC (AMP)	
R739			R92-1252-05	CHIP R 0 OHM		Q101,102			2SK520(K43)	FET	
R740,741			RK73GB1J103J	CHIP R 10K J 1/16W		Q103			2SK508NV(K52)	FET	
R742			R92-0670-05	CHIP R 0 OHM		Q105,106			2SK508NV(K52)	FET	
R744			RK73GB1J104J	CHIP R 100K J 1/16W		Q107			2SC4215(Y)	TRANSISTOR	
R745,746			R92-1252-05	CHIP R 0 OHM		Q108			2SC4617(S)	TRANSISTOR	
R747			R92-0670-05	CHIP R 0 OHM		Q110-113			2SK508NV(K52)	FET	
R748			R92-1252-05	CHIP R 0 OHM		Q114			DTC144EUA	DIGITAL TRANSISTOR	
VR501			R12-6417-05	TRIMMING POT. (1K)		Q115			2SK1824	FET	
D102-105			1SV228	VARIABLE CAPACITANCE DIODE		Q201			2SB1132(Q,R)	TRANSISTOR	
D106			MA716	DIODE		Q202			DTC114EUA	DIGITAL TRANSISTOR	
D107			1SS355	DIODE		Q203			2SC2954	TRANSISTOR	
D301-304			1SV228	VARIABLE CAPACITANCE DIODE		Q204			DTC114EUA	DIGITAL TRANSISTOR	
D305			1SV214	VARIABLE CAPACITANCE DIODE		Q205			2SB1132(Q,R)	TRANSISTOR	
D306			DAN235K	DIODE		Q301,302			2SC4116(GR)	TRANSISTOR	
D501			02CZ18(X,Y)	ZENER DIODE		Q303,304			2SC3722K(S)	TRANSISTOR	
D502,503			1SS355	DIODE		Q306,307			2SK508NV(K52)	FET	
D504			02CZ5.6(X,Y)	ZENER DIODE		Q308,309			2SC4116(Y)	TRANSISTOR	
D505			1SS355	DIODE		Q310			DTC144EUA	DIGITAL TRANSISTOR	
D506			1SS301	DIODE		Q311,312			2SC4215(Y)	TRANSISTOR	
D507			02CZ15(X,Y)	ZENER DIODE		Q313			2SC3357	TRANSISTOR	
D508			1SS355	DIODE		Q501			DTA114EUA	DIGITAL TRANSISTOR	
D511			1SS301	DIODE		Q502,503			DTC114EUA	DIGITAL TRANSISTOR	
D512			1SS355	DIODE		Q504			DTC363EK	DIGITAL TRANSISTOR	
D513-517			DA204U	DIODE		Q505			DTC144EUA	DIGITAL TRANSISTOR	
						Q506			DTA114YUA	DIGITAL TRANSISTOR	

PARTS LIST

TX-RX UNIT (X57-5600-XX)
NB (X58-4610-10)
KCH-10

Ref. No.	Address	New parts	Parts No.	Description	Destination
Q507			DTC114YUA	DIGITAL TRANSISTOR	
Q509-513			DTC144EUA	DIGITAL TRANSISTOR	
Q514			DTA144TKA	DIGITAL TRANSISTOR	
Q516			DTA114TUA	DIGITAL TRANSISTOR	
Q517			DTC144EUA	DIGITAL TRANSISTOR	
Q518			DTA114EUA	DIGITAL TRANSISTOR	
Q519			2SJ506(S)	FET	
Q520			DTD114EK	DIGITAL TRANSISTOR	
Q522			2SC4215(Y)	TRANSISTOR	
Q523,524			DTC114TU	DIGITAL TRANSISTOR	
Q525			DTC144EUA	DIGITAL TRANSISTOR	
Q533-536			DTC144EUA	DIGITAL TRANSISTOR	
Q537-540			DTD114EK	DIGITAL TRANSISTOR	
Q541			DTA114EUA	DIGITAL TRANSISTOR	
Q542			DTA114EUA	DIGITAL TRANSISTOR	
Q543,544			DTC114EUA	DIGITAL TRANSISTOR	
TH101			157-503-53006	THERMISTOR	
NB (X58-4610-10)					
C1			CK73GB1H103K	CHIP C 0.010UF K	
C2			C92-0543-05	CHIP-TAN 3.3UF 10WV	
C3			CK73FB1E104K	CHIP C 0.10UF K	
C4			CC73GCH1H680J	CHIP C 68PF J	
C5			C92-0543-05	CHIP-TAN 3.3UF 10WV	
C6,7			CK73GB1H103K	CHIP C 0.010UF K	
C8			CC73GCH1H220J	CHIP C 22PF J	
C9			CK73GB1H103K	CHIP C 0.010UF K	
C10			CC73GCH1H470J	CHIP C 47PF J	
C11			CK73GB1H103K	CHIP C 0.010UF K	
C12			CK73GB1H102K	CHIP C 1000PF K	
C13,14			CK73FB1E104K	CHIP C 0.10UF K	
C15			CK73GB1H103K	CHIP C 0.010UF K	
C16			CC73GCH1H220J	CHIP C 22PF J	
C17			CK73GB1H102K	CHIP C 1000PF K	
C18			C92-0543-05	CHIP-TAN 3.3UF 10WV	
C19			CK73GB1H102K	CHIP C 1000PF K	
C20			CC73GCH1H221J	CHIP C 220PF J	
C21			CC73GCH1H680J	CHIP C 68PF J	
C22-24			CK73GB1H103K	CHIP C 0.010UF K	
C25			CC73GCH1H221J	CHIP C 220PF J	
CN1,2			E40-6007-05	PIN ASSY	
L1			L40-1005-34	SMALL FIXED INDUCTOR (10UH)	
L2			L40-5695-34	SMALL FIXED INDUCTOR (5.6UH)	
L3			L40-1015-34	SMALL FIXED INDUCTOR (100UH)	
L4			L40-5695-34	SMALL FIXED INDUCTOR (5.6UH)	
R1			R92-1252-05	CHIP R 0 OHM	
R2			RK73GB1J104J	CHIP R 100K J 1/16W	
R3			RK73GB1J103J	CHIP R 10K J 1/16W	
R4			RK73GB1J104J	CHIP R 100K J 1/16W	
R5			RK73GB1J333J	CHIP R 33K J 1/16W	
R6			RK73GB1J101J	CHIP R 100 J 1/16W	
R7			RK73GB1J102J	CHIP R 1.0K J 1/16W	
R8			RK73GB1J471J	CHIP R 470 J 1/16W	
R9			RK73GB1J330J	CHIP R 33 J 1/16W	
R10			RK73GB1J563J	CHIP R 56K J 1/16W	
R11			RK73GB1J684J	CHIP R 680K J 1/16W	
R12			RK73GB1J102J	CHIP R 1.0K J 1/16W	
R13			RK73GB1J104J	CHIP R 100K J 1/16W	
R14			RK73GB1J223J	CHIP R 22K J 1/16W	
R15			RK73GB1J103J	CHIP R 10K J 1/16W	
R16			RK73GB1J562J	CHIP R 5.6K J 1/16W	
R17			RK73GB1J151J	CHIP R 150 J 1/16W	
R18			RK73GB1J102J	CHIP R 1.0K J 1/16W	
R19			RK73GB1J562J	CHIP R 5.6K J 1/16W	
R20			RK73GB1J273J	CHIP R 27K J 1/16W	
R21			RK73GB1J334J	CHIP R 330K J 1/16W	
R22			RK73GB1J104J	CHIP R 100K J 1/16W	
R23			RK73GB1J684J	CHIP R 680K J 1/16W	
R24			RK73GB1J222J	CHIP R 2.2K J 1/16W	
R25			RK73GB1J223J	CHIP R 22K J 1/16W	
R26			RK73GB1J103J	CHIP R 10K J 1/16W	
R27			RK73GB1J102J	CHIP R 1.0K J 1/16W	
R28			RK73GB1J101J	CHIP R 100 J 1/16W	
R29			RK73GB1J103J	CHIP R 10K J 1/16W	
R30			RK73GB1J101J	CHIP R 100 J 1/16W	
R31,32			RK73GB1J102J	CHIP R 1.0K J 1/16W	
R33			RK73GB1J823J	CHIP R 82K J 1/16W	
D1			1SS184	DIODE	
IC1			MC1350D	IC (IF AMP)	
Q1			3SK131(M)	FET	
Q2			2SA1162(Y)	TRANSISTOR	
Q3-6			2SC2712(Y)	TRANSISTOR	
Q7			2SA1162(Y)	TRANSISTOR	
KCH-10					
201	3C		A62-0606-13	PANEL ASSY	
203	1D		E37-0787-05	LEAD WIRE WITH CONNECTOR (SP)	
205	3D		G53-0838-03	PACKING (PANEL ASSY)	
206	1C		G53-0839-14	PACKING (SP)	
207	3C		G53-1523-04	PACKING (VOL)	
208	2J		H10-6622-02	POLYSTYRENE FOAMED FIXTURE	
209	1I		H11-0894-04	POLYSTYRENE FOAMED BOARD	
210	1J		H13-1059-04	CARTON BOARD	
211	1J		H25-0029-04	PROTECTION BAG (60/110/0.07)	
212	2I		H25-0103-04	PROTECTION BAG (125/250/0.07)	
213	2J		H25-0117-04	PROTECTION BAG (80/250/0.07)	
214	3I		H52-1271-02	ITEM CARTON CASE	
217	2C		J21-8417-04	HARDWARE FIXTURE (MIC CONNECTOR)	
216	2C		J39-0625-04	SPACER (TX-BUSY)	
218	3C		K29-4664-04	KNOB (VOL,UP/DOWN)	
219	2J		K29-4704-04	KNOB ACSY	
220	2C		K29-5251-12	KEY TOP	
221	2J		K29-5276-03	KNOB ACSY	
222	2J		K29-5277-03	KNOB ACSY	
223	2J		K29-5305-03	KNOB ACSY	
U	1C		N87-2605-46	BRAZIER HEAD TAPTITE SCREW	
V	1C,1D		N87-2608-46	BRAZIER HEAD TAPTITE SCREW	
W	2C,2D		N87-3006-46	BRAZIER HEAD TAPTITE SCREW	
225	1J		N99-0364-05	SCREW SET ACSY	
227	2D		T07-0265-05	SPEAKER	

PARTS LIST

DISPLAY UNIT (X54-3190-20) : KCH-10
KCH-11

Ref. No.	Address	New parts	Parts No.	Description	Destination
DISPLAY UNIT (X54-3190-20) : KCH-10					
-			B11-1148-14	ILLUMINATION GUIDE	
-			B11-1149-04	FILTER	
D6-11			B30-2140-05	LED (YEL)	
D12			B30-2194-05	LED (GREEN)	
D13			B30-2193-05	LED (RED)	
ED1			B38-0800-05	LCD	
C11			CC73GCH1H101J	CHIP C 100PF J	
C17			CC73GCH1H101J	CHIP C 100PF J	
C20			CK73GB1H102K	CHIP C 1000PF K	
C22			CK73GB1E103K	CHIP C 0.010UF K	
C23,24			CC73GCH1H101J	CHIP C 100PF J	
C25			CK73GB1E103K	CHIP C 0.010UF K	
C27			CK73GB1E223K	CHIP C 0.022UF K	
C28,29			CK73GB1E103K	CHIP C 0.010UF K	
C30			CC73GCH1H101J	CHIP C 100PF J	
C32			CC73GCH1H101J	CHIP C 100PF J	
C35-37			CK73GB1E103K	CHIP C 0.010UF K	
C43-47			CC73GCH1H101J	CHIP C 100PF J	
C48-50			CK73GB1H102K	CHIP C 1000PF K	
-			E29-1192-04	INTER CONNECTOR	
CN1			E40-5953-05	PIN ASSY	
CN2			E40-5704-05	PIN ASSY	
CN3			E40-5952-05	PIN ASSY	
CN4			E40-5738-05	PIN ASSY	
CN5			E40-5957-05	PIN ASSY SOCKET	
CN6			E40-5958-05	PIN ASSY	
J1			E56-0410-15	RF COAXIAL RECEPTACLE (MIC CONNECTOR)	
W1			E37-0703-05	LEAD WIRE WITH CONNECTOR	
X1			L78-0043-05	RESONATOR (4.19MHZ)	
R1,2			RK73GB1J102J	CHIP R 1.0K J 1/16W	
R5			RK73FB2A561J	CHIP R 560 J 1/10W	
R7			RK73FB2A331J	CHIP R 330 J 1/10W	
R8			R92-2023-05	CHIP R 820 J 1/2W	
R9			RK73FB2A181J	CHIP R 180 J 1/10W	
R10			R92-0670-05	CHIP R 0 OHM	
R11			RK73FB2A331J	CHIP R 330 J 1/10W	
R12			RK73FB2A181J	CHIP R 180 J 1/10W	
R13,14			RK73GB1J102J	CHIP R 1.0K J 1/16W	
R15			RK73FB2A151J	CHIP R 150 J 1/10W	
R16			RK73GB1J103J	CHIP R 10K J 1/16W	
R17			RK73GB1J331J	CHIP R 330 J 1/16W	
R18			R92-1281-05	FUSE R 4.7 J 1/4W	
R21			RK73GB1J473J	CHIP R 47K J 1/16W	
R23			RK73GB1J473J	CHIP R 47K J 1/16W	
R24			RK73GB1J101J	CHIP R 100 J 1/16W	
R26			RK73GB1J102J	CHIP R 1.0K J 1/16W	
R29-33			RK73GB1J102J	CHIP R 1.0K J 1/16W	
R34,35			RK73GB1J473J	CHIP R 47K J 1/16W	
R36			RK73GB1J102J	CHIP R 1.0K J 1/16W	
R38			R92-1252-05	CHIP R 0 OHM	
R39,40			RK73GB1J102J	CHIP R 1.0K J 1/16W	
R41-43			RK73GB1J473J	CHIP R 47K J 1/16W	
R45			R92-2063-05	CHIP R 680 J 1/2W	
R47			R92-2023-05	CHIP R 820 J 1/2W	
R48			RK73GB1J472J	CHIP R 4.7K J 1/16W	
R49-51			RK73GB1J473J	CHIP R 47K J 1/16W	
KCH-11					
R52			RK73GB1J822J	CHIP R 8.2K J 1/16W	
R54			RK73GB1J103J	CHIP R 10K J 1/16W	
R55			RK73GB1J682J	CHIP R 6.8K J 1/16W	
R67			R92-1252-05	CHIP R 0 OHM	
VR1			R31-0607-05	VARIABLE RESISTOR (10K)	
S1			S40-1420-05	TACT SWITCH	
S2,3			S70-0410-15	TACT SWITCH	
S5-9			S70-0410-15	TACT SWITCH	
D1,2			DA204U	DIODE	
D5			O2C29.1(X,Y)	ZENER DIODE	
D16,17			DA204U	DIODE	
D19-21			DA204U	DIODE	
D24			1SS301	DIODE	
D25			MA2S111	DIODE	
IC1			NJM78L05UA	IC (AVR)	
IC2			RH5VL42C	IC (RESET)	
IC3			AT24C64N10SI27	IC (EEPROM)	
IC4			78064GCA458EU	IC (CPU/LCD DRIVER)	
Q1			2SC2873(Y)	TRANSISTOR	
Q3-7			DTC144EU	DIGITAL TRANSISTOR	
Q9			DTC144EU	DIGITAL TRANSISTOR	
Q11			DTC144EU	DIGITAL TRANSISTOR	
Q12,13			DTC114TU	DIGITAL TRANSISTOR	
Q14,15			DTD114EK	DIGITAL TRANSISTOR	
S4			W02-0393-05	ENCODER	
301	3E		A62-0607-13	PANEL ASSY	
303	3F		G53-0838-03	PACKING (PANEL ASSY)	
304	3E		G53-1523-04	PACKING (VOL)	
305	2L		H10-6622-02	POLYSTYRENE FOAMED FIXTURE	
306	1K		H11-0894-04	POLYSTYRENE FOAMED BOARD	
307	1L		H13-1059-04	CARTON BOARD	
308	2L		H25-0029-04	PROTECTION BAG (60/110/0.07)	
309	2K		H25-0103-04	PROTECTION BAG (125/250/0.07)	
310	2L		H25-0117-04	PROTECTION BAG (80/250/0.07)	
311	3K		H52-1271-02	ITEM CARTON CASE	
312	1E		J21-8417-04	HARDWARE FIXTURE (MIC CONNECTOR)	
313	1E		J39-0625-04	SPACER (TX-BUSY)	
315	3E		K29-4664-04	KNOB (VOL,UP/DOWN)	
316	2L		K29-4704-04	KNOB ACSY	
317	2F		K29-5252-12	KEY TOP	
318	2L		K29-5276-03	KNOB ACSY	
319	2L		K29-5277-03	KNOB ACSY	
320	2L		K29-5305-03	KNOB ACSY	
X	1E		N87-2605-46	BRAZIER HEAD TAPTITE SCREW	
Y	1E,1F		N87-2608-46	BRAZIER HEAD TAPTITE SCREW	
Z	1E,2F		N87-3008-46	BRAZIER HEAD TAPTITE SCREW	
322	1L		N99-0364-05	SCREW SET ACSY	

PARTS LIST

DISPLAY UNIT (X54-3200-20) : KCH-11

Ref. No.	Address	New parts	Parts No.	Description	Destination	Ref. No.	Address	New parts	Parts No.	Description	Destination
DISPLAY UNIT (X54-3200-20) : KCH-11											
D6			B30-2194-05	LED (GREEN)		VR1			R31-0607-05	VARIABLE RESISTOR (10K)	
D7			B30-2193-05	LED (RED)		S1			S40-1420-05	TACT SWITCH	
ED1			B38-0801-15	LCD ASSY		S2,3			S70-0410-15	TACT SWITCH	
						S5-15			S70-0410-15	TACT SWITCH	
C9			CC73GCH1H101J	CHIP C 100PF J		D1,2			DA204U	DIODE	
C14			CC73GCH1H101J	CHIP C 100PF J		D5			02CZ9.1(X,Y)	ZENER DIODE	
C20			CK73GB1H102K	CHIP C 1000PF K		D11,12			DA204U	DIODE	
C22			CK73GB1E103K	CHIP C 0.010UF K		D14-16			DA204U	DIODE	
C23,24			CC73GCH1H101J	CHIP C 100PF J		D18			1SS301	DIODE	
C25			CK73GB1E103K	CHIP C 0.010UF K		D19			MA2S111	DIODE	
C27			CK73GB1E223K	CHIP C 0.022UF K		IC1			NJM78L05UA	IC (AVR)	
C28,29			CK73GB1E103K	CHIP C 0.010UF K		IC2			RH5VL42C	IC (RESET)	
C30			CC73GCH1H101J	CHIP C 100PF J		IC3			AT24C64N10SI27	IC (EEPROM)	
C32			CC73GCH1H101J	CHIP C 100PF J		IC4			78064GCA458EU	IC (CPU)	
C35,36			CK73GB1E103K	CHIP C 0.010UF K		Q1			2SC2873(Y)	TRANSISTOR	
C40			CK73GB1E103K	CHIP C 0.010UF K		Q2-8			DTC144EU	DIGITAL TRANSISTOR	
C50-60			CC73GCH1H101J	CHIP C 100PF J		Q9,10			DTC114TU	DIGITAL TRANSISTOR	
C61-67			CK73GB1H102K	CHIP C 1000PF K		Q14,15			DTD114EK	DIGITAL TRANSISTOR	
CN1			E40-5953-05	PIN ASSY		S4			W02-0393-05	ENCODER	
CN2			E40-5704-05	PIN ASSY							
CN3			E40-5952-05	PIN ASSY							
CN4			E40-5738-05	PIN ASSY							
CN5			E40-5823-05	FLAT CABLE CONNECTOR							
J1			E56-0410-15	RF COAXIAL RECEPTACLE (MIC CONNECTOR)							
W1			E37-0703-05	LEAD WIRE WITH CONNECTOR							
X1			L78-0043-05	RESONATOR (4.19MHZ)							
R1,2			RK73GB1J102J	CHIP R 1.0K J 1/16W							
R5			RK73FB2A561J	CHIP R 560 J 1/10W							
R6			R92-2023-05	CHIP R 820 J 1/2W							
R7			R92-0670-05	CHIP R 0 OHM							
R8,9			RK73GB1J102J	CHIP R 1.0K J 1/16W							
R10			RK73FB2A151J	CHIP R 150 J 1/10W							
R11			RK73GB1J103J	CHIP R 10K J 1/16W							
R12			RK73GB1J331J	CHIP R 330 J 1/16W							
R13			R92-1281-05	FUSE R 4.7 J 1/4W							
R14			RK73GB1J473J	CHIP R 47K J 1/16W							
R16			RK73GB1J473J	CHIP R 47K J 1/16W							
R19,20			RK73GB1J473J	CHIP R 47K J 1/16W							
R21			RK73GB1J102J	CHIP R 1.0K J 1/16W							
R22			RK73GB1J101J	CHIP R 100 J 1/16W							
R24			RK73GB1J102J	CHIP R 1.0K J 1/16W							
R26			RK73GB1J472J	CHIP R 4.7K J 1/16W							
R28-32			RK73GB1J102J	CHIP R 1.0K J 1/16W							
R33,34			RK73GB1J473J	CHIP R 47K J 1/16W							
R35			RK73GB1J102J	CHIP R 1.0K J 1/16W							
R37,38			RK73GB1J102J	CHIP R 1.0K J 1/16W							
R39			RK73FB2A331J	CHIP R 330 J 1/10W							
R40,41			R92-2063-05	CHIP R 680 J 1/2W							
R42			RK73FB2A181J	CHIP R 180 J 1/10W							
R43			R92-2063-05	CHIP R 680 J 1/2W							
R44			R92-2023-05	CHIP R 820 J 1/2W							
R45-56			RK73GB1J473J	CHIP R 47K J 1/16W							
R57-62			RK73GB1J102J	CHIP R 1.0K J 1/16W							
R63			RK73GB1J473J	CHIP R 47K J 1/16W							
R65			RK73GB1J103J	CHIP R 10K J 1/16W							
R66			RK73GB1J682J	CHIP R 6.8K J 1/16W							
R67			R92-1252-05	CHIP R 0 OHM							

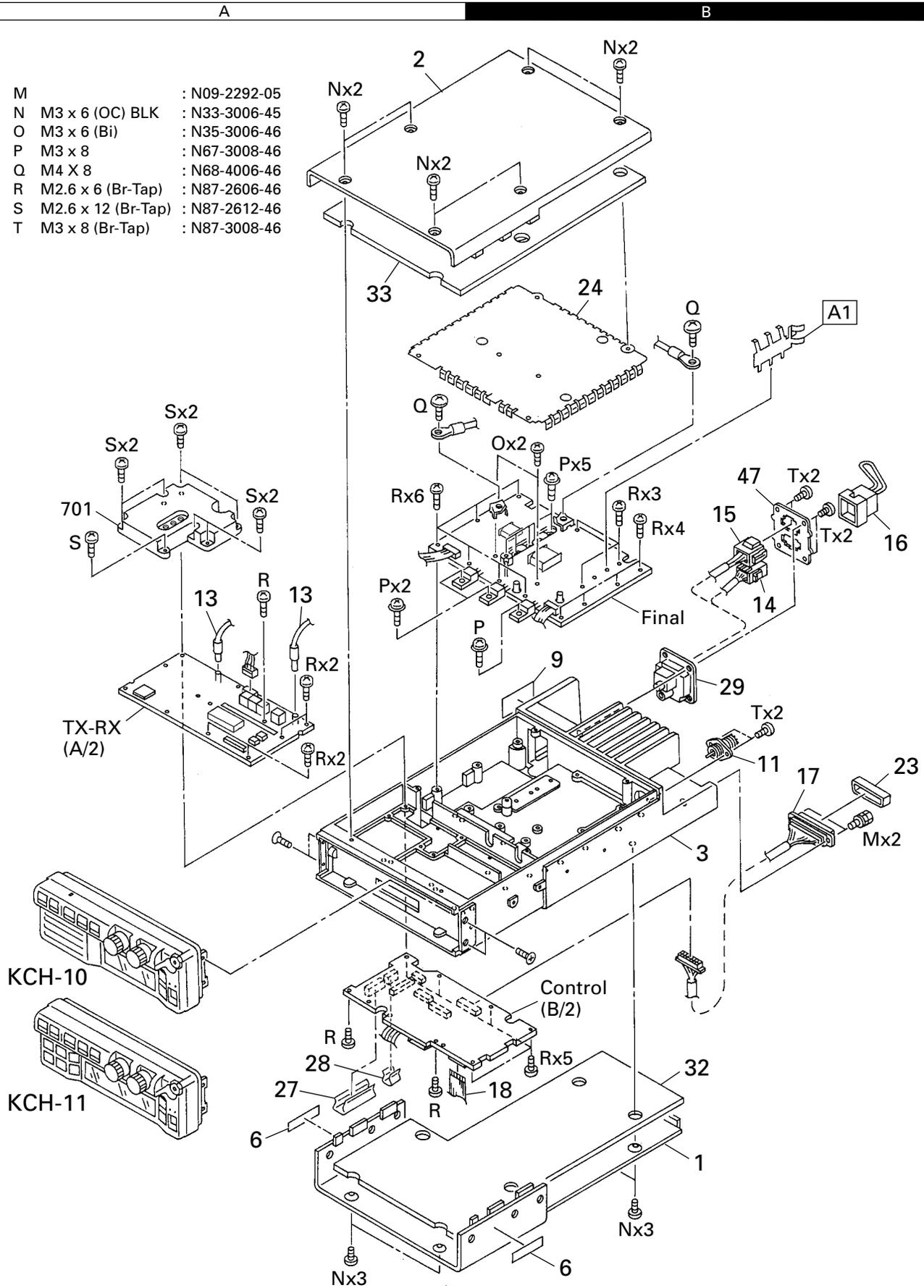
EXPLODED VIEW

- | | | |
|---|--------------------|---------------|
| M | : | N09-2292-05 |
| N | M3 x 6 (OC) BLK | : N33-3006-45 |
| O | M3 x 6 (Bi) | : N35-3006-46 |
| P | M3 x 8 | : N67-3008-46 |
| Q | M4 X 8 | : N68-4006-46 |
| R | M2.6 x 6 (Br-Tap) | : N87-2606-46 |
| S | M2.6 x 12 (Br-Tap) | : N87-2612-46 |
| T | M3 x 8 (Br-Tap) | : N87-3008-46 |

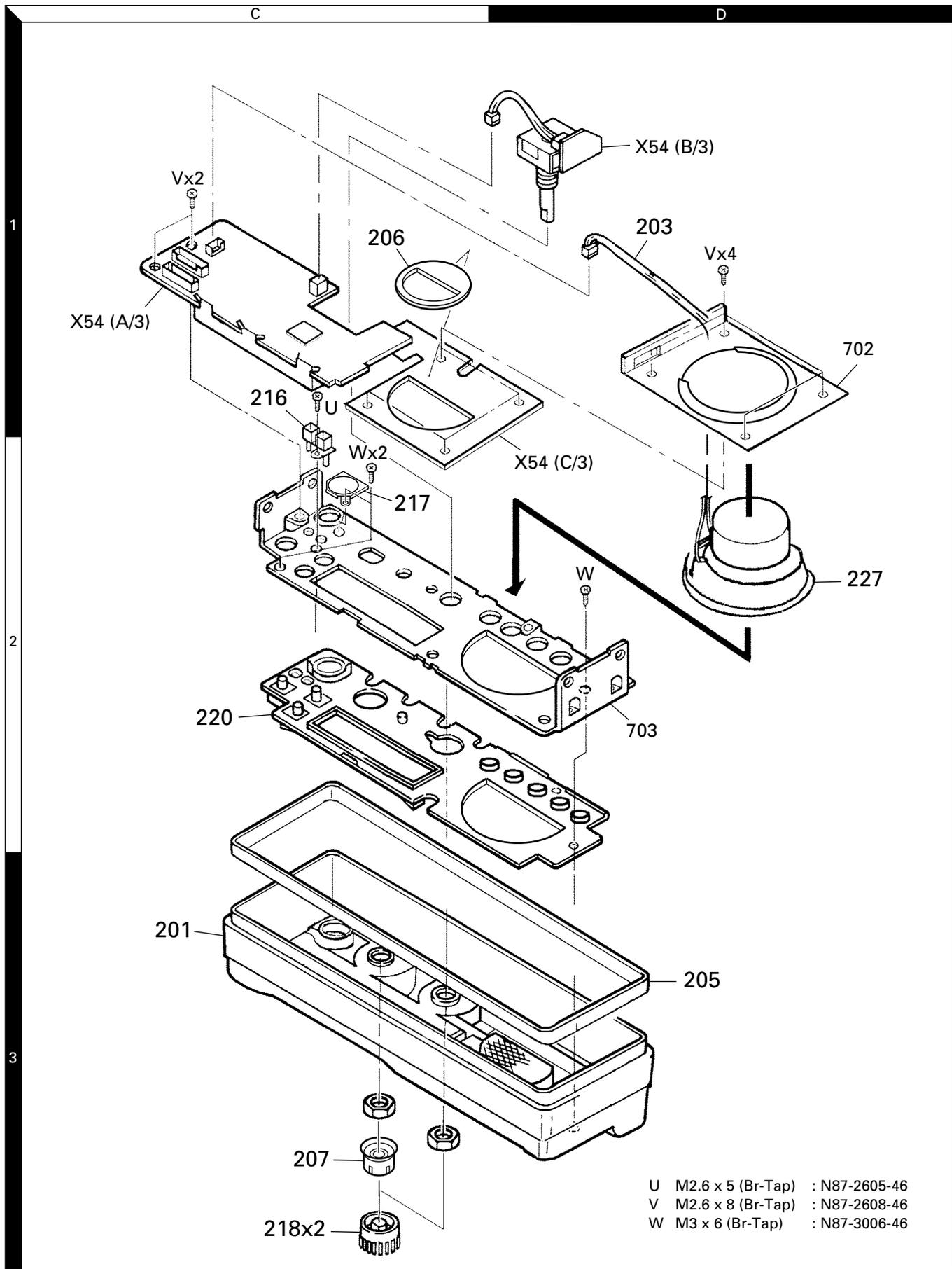
1

2

3

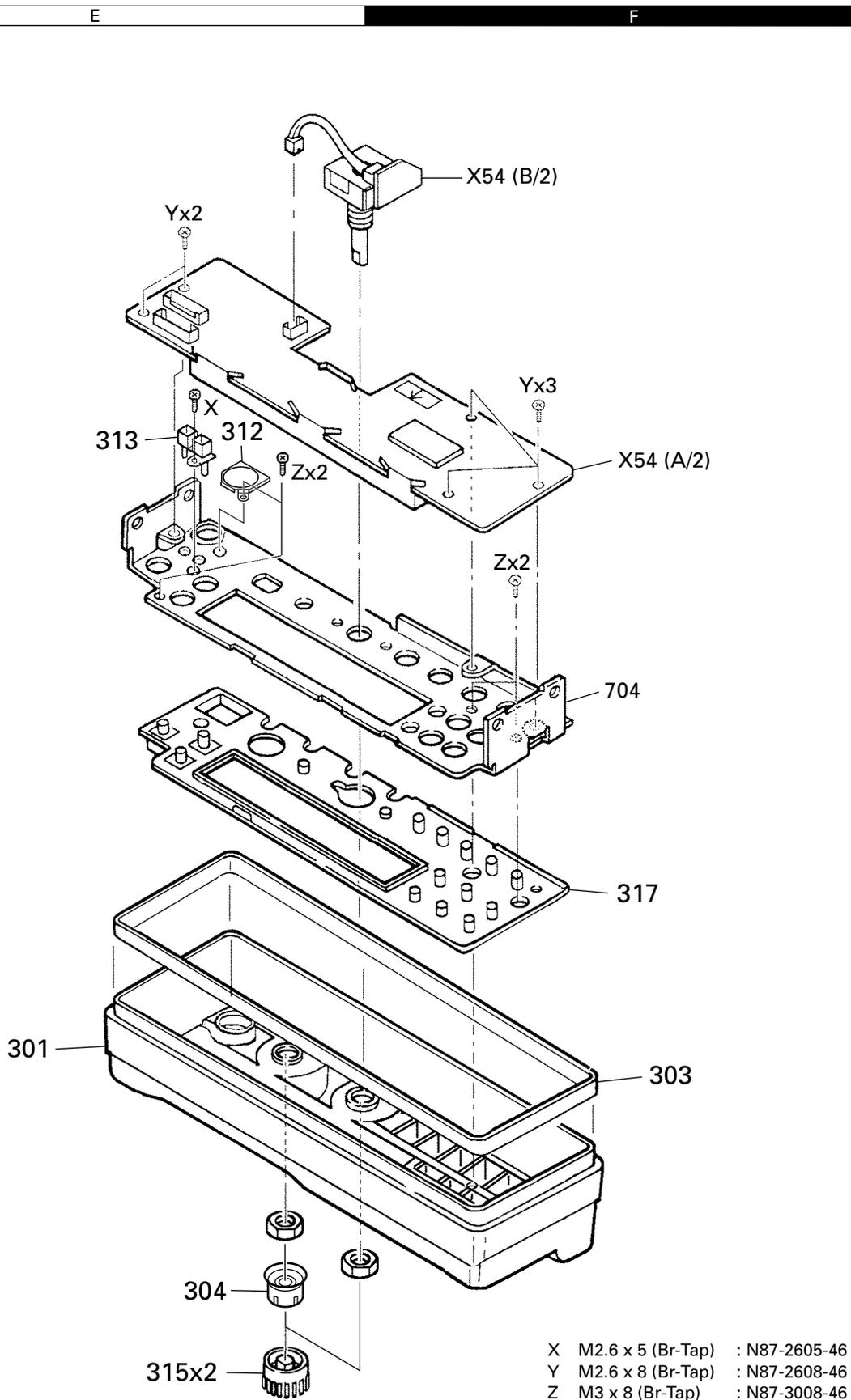


EXPLODED VIEW (KCH-10)

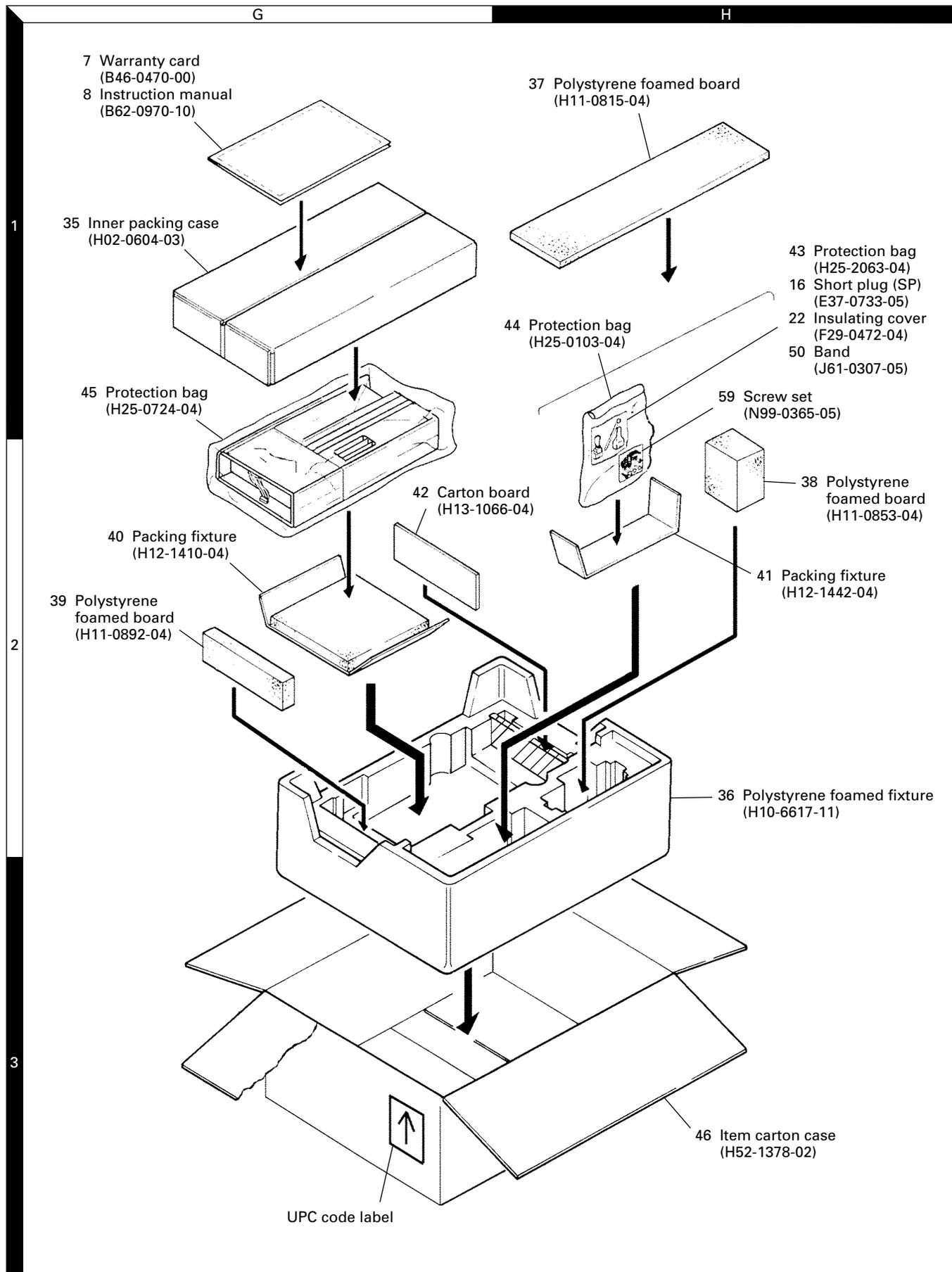


Parts with the exploded numbers larger than 700 are not supplied.

EXPLODED VIEW (KCH-11)



PACKING

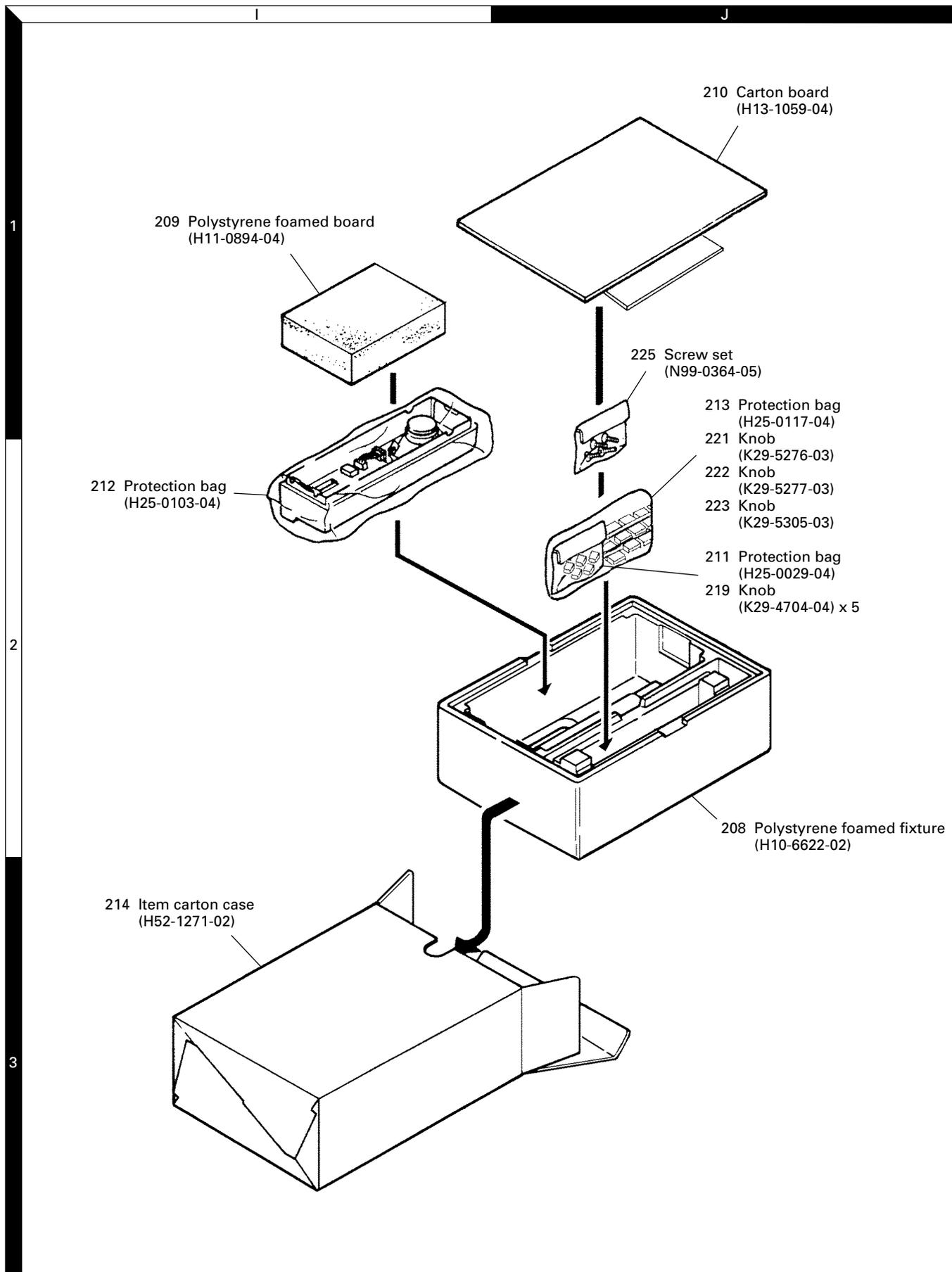


1

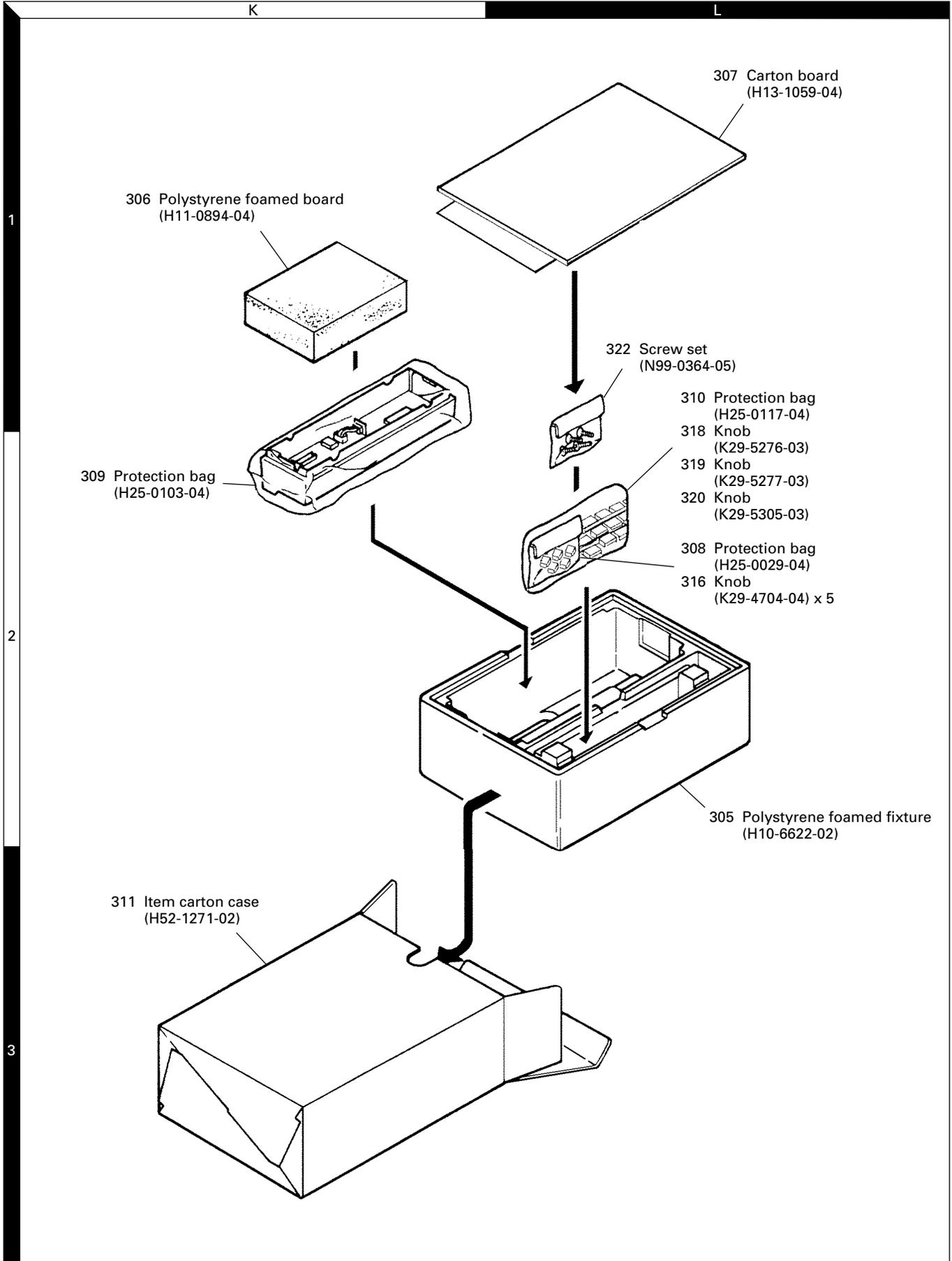
2

3

PACKING (KCH-10)



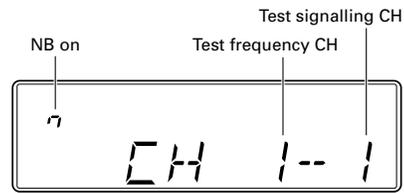
PACKING (KCH-11)



ADJUSTMENT

Key Functions in Panel Test Mode and Panel Tune Mode

Knob/Key	Test mode	Tune mode
GRP UP	Test mode/Tune mode changeover	
GRP DOWN	Monitor ON/OFF	
UP/DOWN	NB ON/OFF	
PF1	Frequency CH down	Tuning item down
PF2	Frequency CH up	Tuning item up
PF3	Signalling CH down	Tuning value down
PF4	Signalling CH up	Tuning value up
PF5	Not used	Tuning value backup

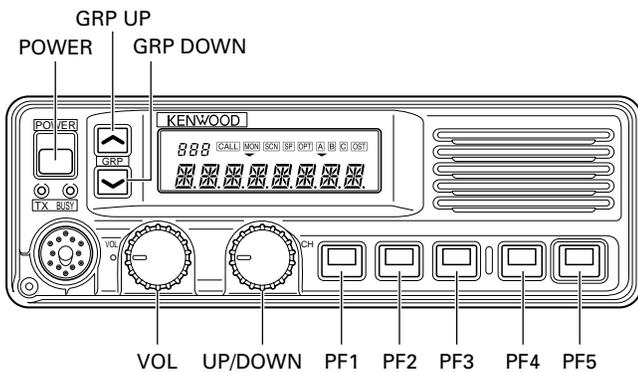


Note : When a key other than GRP down is pressed, the optional signalling is reset.

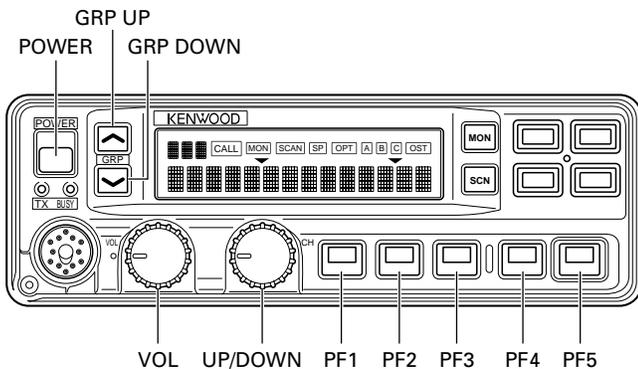
• Test frequency channel (MHz)

CH	K		K2		K3	
	TX	RX	TX	RX	TX	RX
1 (Center)	33.300	33.400	39.000	39.100	45.000	45.100
2 (Low)	29.700	29.800	35.000	35.100	40.000	40.100
3 (High)	37.000	36.900	43.000	42.900	50.000	49.900
4	33.300	33.300	39.000	39.000	45.000	45.000
5	33.500	33.500	39.200	39.200	45.200	45.200
6	33.700	33.700	39.400	39.400	45.400	45.400

Basic function panel



Full function panel



Panel Test Mode

The transceiver's transmission output, receive sensitivity, and other items are measured and QT, DQT, 2tone and DTMF signaling is decoded in this mode.

• To enter the panel test mode

Hold down [PF1] and turn the power switch on to enter this mode. The test frequency channel and test signalling channel will be displayed.

• Test signalling channel

CH No.	Encode tone	Decode tone
1	None	None
2	100Hz square wave	None
3	QT 67.0Hz	QT 67.0Hz
4	QT 151.4Hz	QT 151.4Hz
5	QT 250.3Hz	QT 250.3Hz
6	DQT 023N	DQT 023N
7	Single tone 1633Hz	2 tone 321.7/928.1Hz
8	DTMF [9]	DTMF [159]
9	MSK	None

Panel Tune Mode

The transceiver is adjusted in this mode.

• To enter the panel tune mode

Press the [GRP ^] key in the panel test mode.

In this mode, QT and DQT signalling is decoded, but 2tone and DTMF signalling is not decoded.

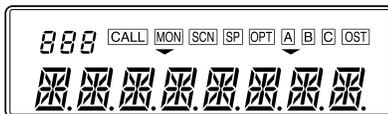
The adjustment items, the frequency and signalling, other than the maximum deviation and sensitivity, return to the values that were effective for the test frequency channel and test signalling channel before entering the panel tune mode.

ADJUSTMENT

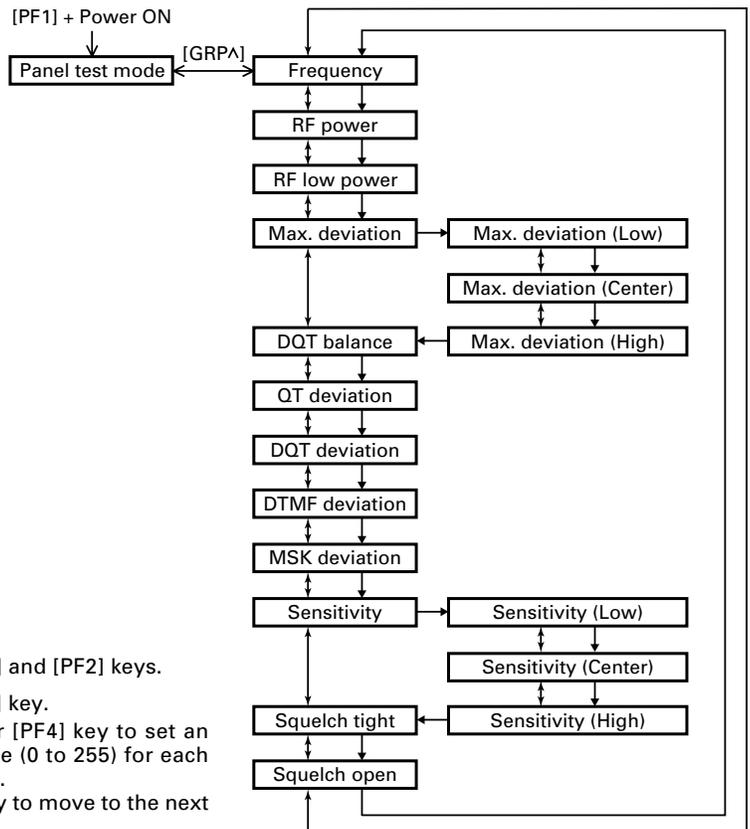
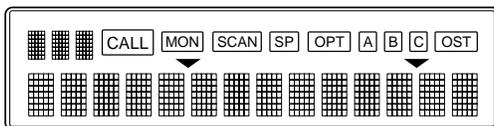
• Tuning item and display (XXX : 0~255)

Tuning item	Basic display	Full display	Note
Frequency	FREQ_XXX	FREQUENCY_XXX_	
RF power	_POW_XXX	POWER_ _ _ _XXX_	
RF low power	LPOW_XXX	LOW_POWER_XXX_	
Max. deviation	MXDV_XXX	MAX_DEV_ _ _XXX_	
Max. deviation (Low)	MXDV_XXX	MAX_DEV_ _ _XXX_	Three digits on the upper left side: " _ _ L" Transmission and reception at the low edge
Max. deviation (Center)	MXDV_XXX	MAX_DEV_ _ _XXX_	Three digits on the upper left side: " _ _ C" Transmission and reception at the center
Max. deviation (High)	MXDV_XXX	MAX_DEV_ _ _XXX_	Three digits on the upper left side: " _ _ H" Transmission and reception at the high edge
DQT balance	BLNC_XXX	DQT_BLNCE_XXX_	
QT deviation	QTDV_XXX	QT_DEV_ _ _XXX_	
DQT deviation	DQDV_XXX	DQT_DEV_ _ _XXX_	
DTMF deviation	DTDV_XXX	DTMF_DEV_ _XXX_	
MSK deviation	MSDV_XXX	MSK_DEV_ _ _XXX_	
Sensitivity	SENS_XXX	RX_SENSE_ _XXX_	
Sensitivity (Low)	SENS_XXX	RX_SENSE_ _XXX_	Three digits on the upper left side: " _ _ L" Transmission and reception at the low edge
Sensitivity (Center)	SENS_XXX	RX_SENSE_ _XXX_	Three digits on the upper left side: " _ _ C" Transmission and reception at the center
Sensitivity (High)	SENS_XXX	RX_SENSE_ _XXX_	Three digits on the upper left side: " _ _ H" Transmission and reception at the high edge
Squelch tight point	SQ_T_XXX	SQL_TIGHT_XXX_	
Squelch open point	SQ_O_XXX	SQL_OPEN_ _XXX_	

Basic display



Full display



↑ : Use the [PF1] and [PF2] keys.
 ↓ : Use the [PF5] key.
 Use the [PF3] or [PF4] key to set an adjustment value (0 to 255) for each adjustment item.
 Use the [PF5] key to move to the next item.

ADJUSTMENT

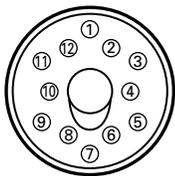
Test Equipment Required for Alignment

No.	Test Equipment	Major Specifications
1	Standard Signal Generator (SSG)	Frequency Range: 50kHz to 500MHz. Modulation: Frequency modulation and external modulation. Output: 0.1μV to greater than 1mV.
2	Power Meter	Input Impedance: 50Ω. Operation Frequency: 50MHz or less. Measurement Capability: Vicinity of 200W.
3	Deviation Meter	Frequency Range: 29.7 to 50.0MHz.
4	Digital Volt Meter (DVM)	Measuring Range: 1 to 20V DC. Accuracy: High input impedance for minimum circuit loading.
5	Oscilloscope	DC through 30MHz.
6	High sensitivity Frequency Counter	Frequency Range: 10Hz to 200MHz. Frequency Stability: 0.2ppm or less.
7	Ammeter	30A.
8	AF Volt Meter (AF VTVM)	Frequency Range: 50Hz to 10kHz. Voltage Range: 3mV to 3V.
9	Audio Generator (AG)	Frequency Range: 50Hz to 5kHz or more. Output: 0 to 1V.
10	Distortion Meter	Capability: 3% or less at 1kHz. Input Level: 50mV to 10Vrms.
11	Voltmeter	Measuring Range: 10 to 1.5V DC or less. Input Impedance: 50kΩ/V or greater.
12	4Ω Dummy Load	Approx. 4Ω 30W.
13	Regulated Power Supply	(Adjustable from 9 to 17V, 30A). Useful if ammeter equipped.

Caution

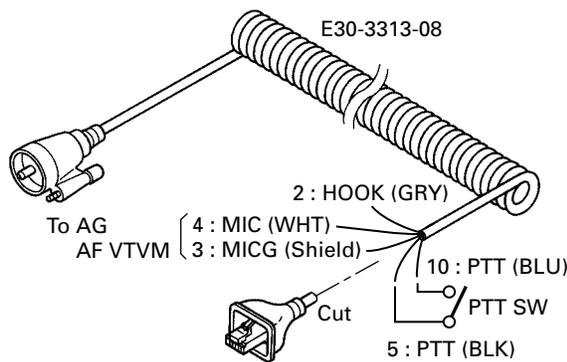
Since the RX AF output is a BTL output, there is a DC Component. Isolate this with a capacitor or transformer as shown in the figure.

MIC connector (Front view)

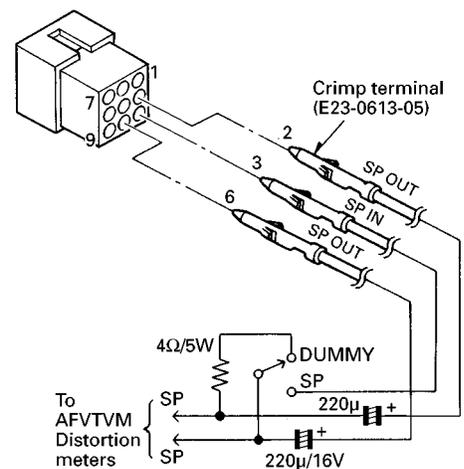


- 1 : SB
- 2 : HOOK
- 3 : MICG
- 4 : MIC
- 5 : Earth
- 6 : TRD
- 7 : NC
- 8 : DM
- 9 : BLC
- 10 : PTT
- 11 : NC
- 12 : NC

Test cable for microphone input

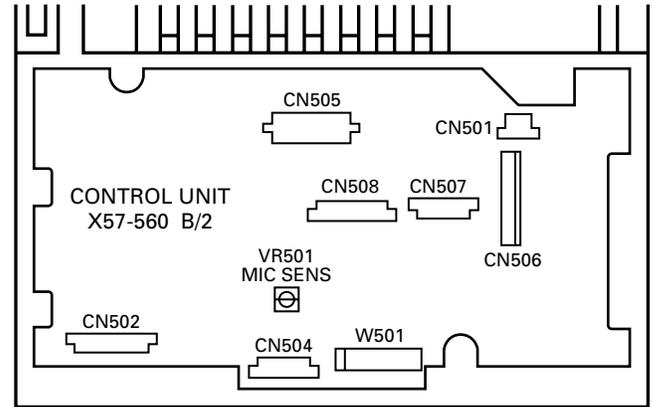
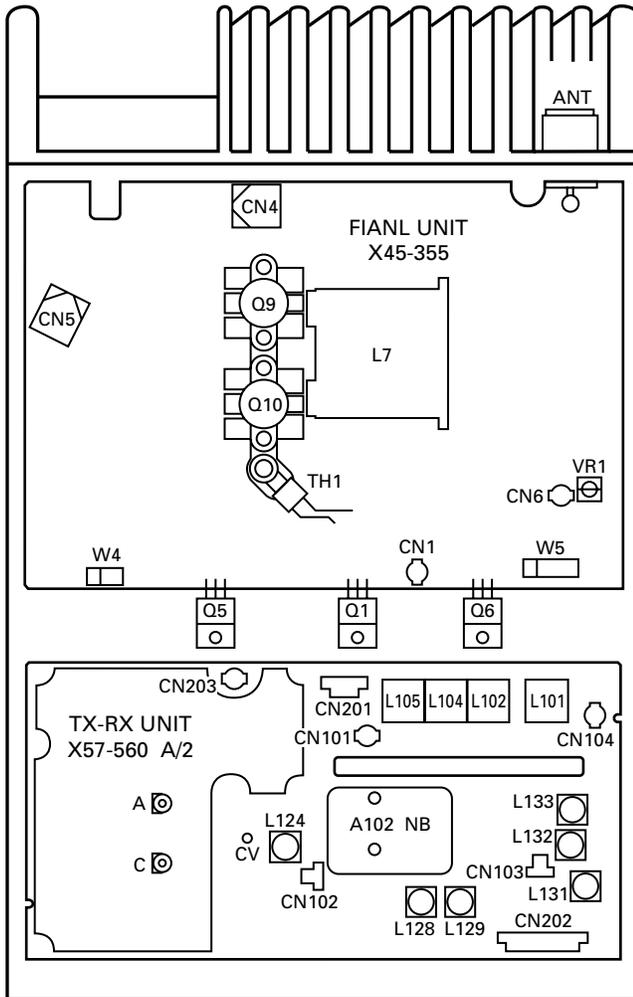


Test cable for speaker output



ADJUSTMENT

Adjustment Points



Common Section

Item	Condition	Measurement			Adjustment			Specifications/Remarks																																																																																				
		Test-equipment	Unit	Terminal	Unit	Parts	Method																																																																																					
1. Frequency list	<ul style="list-style-type: none"> Frequency range (MHz) K : 29.7~37.0 K2 : 35.0~43.0 K3 : 40.0~50.0 Adjustment frequency (MHz) 							<ul style="list-style-type: none"> Signalling 																																																																																				
	<table border="1"> <thead> <tr> <th rowspan="2">CH</th> <th colspan="2">K</th> <th colspan="2">K2</th> <th colspan="2">K3</th> </tr> <tr> <th>TX</th> <th>RX</th> <th>TX</th> <th>RX</th> <th>TX</th> <th>RX</th> </tr> </thead> <tbody> <tr> <td>1 (Center)</td> <td>33.300</td> <td>33.400</td> <td>39.000</td> <td>39.100</td> <td>45.000</td> <td>45.100</td> </tr> <tr> <td>2 (Low)</td> <td>29.700</td> <td>29.800</td> <td>35.000</td> <td>35.100</td> <td>40.000</td> <td>40.100</td> </tr> <tr> <td>3 (High)</td> <td>37.000</td> <td>36.900</td> <td>43.000</td> <td>42.900</td> <td>50.000</td> <td>49.900</td> </tr> <tr> <td>4</td> <td>33.300</td> <td>33.300</td> <td>39.000</td> <td>39.000</td> <td>45.000</td> <td>45.000</td> </tr> <tr> <td>5</td> <td>33.500</td> <td>33.500</td> <td>39.200</td> <td>39.200</td> <td>45.200</td> <td>45.200</td> </tr> <tr> <td>6</td> <td>33.700</td> <td>33.700</td> <td>39.400</td> <td>39.400</td> <td>45.400</td> <td>45.400</td> </tr> </tbody> </table>	CH	K		K2		K3		TX	RX	TX	RX	TX	RX	1 (Center)	33.300	33.400	39.000	39.100	45.000	45.100	2 (Low)	29.700	29.800	35.000	35.100	40.000	40.100	3 (High)	37.000	36.900	43.000	42.900	50.000	49.900	4	33.300	33.300	39.000	39.000	45.000	45.000	5	33.500	33.500	39.200	39.200	45.200	45.200	6	33.700	33.700	39.400	39.400	45.400	45.400						<table border="1"> <thead> <tr> <th>CH No.</th> <th>Encode tone</th> <th>Decode tone</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>None</td> <td>None</td> </tr> <tr> <td>2</td> <td>100Hz square wave</td> <td>None</td> </tr> <tr> <td>3</td> <td>QT 67.0Hz</td> <td>QT 67.0Hz</td> </tr> <tr> <td>4</td> <td>QT 151.4Hz</td> <td>QT 151.4Hz</td> </tr> <tr> <td>5</td> <td>QT 250.3Hz</td> <td>QT 250.3Hz</td> </tr> <tr> <td>6</td> <td>DQT 023N</td> <td>DQT 023N</td> </tr> <tr> <td>7</td> <td>Single tone 1633Hz</td> <td>2 tone 321.7/928.1Hz</td> </tr> <tr> <td>8</td> <td>DTMF [9]</td> <td>DTMF [159]</td> </tr> <tr> <td>9</td> <td>MSK</td> <td>None</td> </tr> </tbody> </table>	CH No.	Encode tone	Decode tone	1	None	None	2	100Hz square wave	None	3	QT 67.0Hz	QT 67.0Hz	4	QT 151.4Hz	QT 151.4Hz	5	QT 250.3Hz	QT 250.3Hz	6	DQT 023N	DQT 023N	7	Single tone 1633Hz	2 tone 321.7/928.1Hz	8	DTMF [9]	DTMF [159]	9	MSK	None
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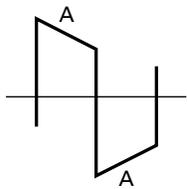
ADJUSTMENT

Item	Condition	Measurement			Adjustment			Specifications/Remarks	
		Test-equipment	Unit	Terminal	Unit	Parts	Method		
2. Setting	<ul style="list-style-type: none"> Receiver section The indicated SSG output level are for maximum output. Whenever there is no modulation designation, standard modulation (MOD : 1kHz, DEV : 3kHz) <p>Connect the front panel (KCH-10 or KCH-11) to the transceiver's body.</p>								
3. PLL lock voltage	1) CH-SIG : 3-1 2) CH-SIG : 3-1 PTT : ON 3) CH-SIG : 2-1 4) CH-SIG : 2-1 PTT : ON	DC VM Power meter	TX-RX (A/2)	CV	TX-RX (A/2)	A (TC302) C (TC301)	1.5V Check	±0.1V 8.0V or less	
4. Transmit frequency	1) CH-SIG : 1-1 Select FREQ_XXX in tune mode PTT : ON	Power meter f. counter	Rear	ANT	Panel	PF3 key PF4 key	CH-1 frequency	K : ±50Hz K2 : ±60Hz K3 : ±70Hz	
5. BPF	1) CH-SIG : 2-1 Spectrum analyzer Span : 50MHz Scale : 5dB div Tracking generator Output : -20dBm	Spectrum analyzer Tracking generator	TX-RX (A/2) Rear	CN101 ANT	TX-RX (A/2)	L101 L102 L104 L105	Adjust the coils in the following order : L101, L102, L104, L105		
K Adjust it so it is almost symmetrical (±1MHz), and so the gain is maximum.				K2 Adjust it so it is almost symmetrical (±2MHz), and so the gain is maximum.				K3 Adjust it so it is almost symmetrical (±2MHz), and so the gain is maximum.	

ADJUSTMENT

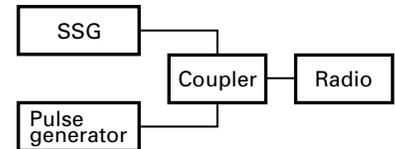
Item	Condition	Measurement			Adjustment			Specifications/Remarks
		Test-equipment	Unit	Terminal	Unit	Parts	Method	
6. MCF	1) CH-SIG : 1-1 Spectrum analyzer Span : 25kHz Scale : 2dB div Center frequency : 10.70MHz Tracking generator Output : -20dBm	Spectrum analyzer Tracking generator	TX-RX (A/2)	CN103 CN102	TX-RX (A/2)	L133 L132 L131 L129 L128	Adjust it so it is almost symmetrical, and so the gain is maximum. Adjust the coils in the following order : L133, L132, L131, L129, L128.	
7. Distortion	1) CH-SIG : 1-1 SSG output : -53dBm/501μV AF output : 1V/4Ω	SSG Distortion meter AF VTVM Oscilloscope 4Ω dummy load	Rear	ANT EXT.SP			Check	3% or less If the distortion value exceeds 3%, you must adjust L129 to obtain a minimum distortion value.
8. RF power (High power)	1) CH-SIG : 1-1 Select _POW_XXX in tune mode PTT : ON	Power meter Ammeter	Rear	ANT	Final	VR1	Maximum clockwise 110W adj.	115W or more 110W±5W, 20A or less
(Low power)	1) CH-SIG : 1-1 Select LPOW_XXX in tune mode PTT : ON				Panel	PF3 key PF4 key	Check 45W adj.	110W±1W 45W±1W
9. Maximum deviation	1) Select __L MXDV_XXX in tune mode PTT : ON Deviation meter filter HPF : OFF LPF : 15kHz De-emphasis : OFF AG : 1kHz/50mV 2) Select __C MXDV_XXX in tune mode PTT : ON 3) Select __H MXDV_XXX in tune mode PTT : ON	Power meter Deviation meter AF VTVM AG Oscilloscope	Rear Panel	ANT MIC	Panel	PF3 key PF4 key	±4.05kHz	±0.05kHz
10. MIC sensitivity	1) CH-SIG : 1-1 PTT : ON Deviation meter filter HPF : OFF LPF : 15kHz De-emphasis : OFF AG : 1kHz/5mV				TX-RX (B/2)	VR501	Check	2.75~3.25kHz

ADJUSTMENT

Item	Condition	Measurement			Adjustment			Specifications/Remarks		
		Test-equipment	Unit	Terminal	Unit	Parts	Method			
11. DQT balance	1) CH-SIG : 1-2 Select BLNC_XXX in tune mode PTT : ON Deviation meter filter HPF : OFF LPF : 3kHz De-emphasis : OFF	Power meter Deviation meter AF VTVM AG Oscilloscope	Rear	ANT	Panel	PF3 key PF4 key	Make the demodulation waveform neat.	Flat the a parts. 		
12. QT deviation	1) CH-SIG : 1-4 Select QTDV_XXX in tune mode PTT : ON Deviation meter filter HPF : OFF LPF : 3kHz De-emphasis : OFF		Panel	MIN					±0.75kHz	±0.05kHz
13. DQT deviation	1) CH-SIG : 1-6 Select DQDV_XXX in tune mode PTT : ON Deviation meter filter HPF : OFF LPF : 3kHz De-emphasis : OFF		±0.75kHz	±0.05kHz						
14. DTMF deviation	1) CH-SIG : 1-8 Select DTDV_XXX in tune mode PTT : ON Deviation meter filter HPF : OFF LPF : 15kHz De-emphasis : OFF		±3.0kHz	±0.1kHz						
15. MSK deviation	1) CH-SIG : 1-9 Select MSDV_XXX in tune mode PTT : ON Deviation meter filter HPF : OFF LPF : 15kHz De-emphasis : OFF		±3.0kHz	±0.1kHz						
16. Sensitivity	1) Select __L SENS_XXX in tune mode SSG output : -116dBm/0.35μV AF output : 1V/4Ω		SSG AF VTVM Distortion meter Oscilloscope 4Ω dummy load	Rear					ANT	Panel
	2) Select __C SENS_XXX in tune mode			EXT.SP	TX-RX (A/2)					
	3) Select __H SENS_XXX in tune mode									

ADJUSTMENT

Item	Condition	Measurement			Adjustment			Specifications/Remarks
		Test-equipment	Unit	Terminal	Unit	Parts	Method	
17. Squelch tight point	1) CH-SIG : 1-1 Select SQ_T_XXX in tune mode SSG output : Value when 6dB is added from the sensitivity value of 12dB SINAD. Up/down knob : Set the NB on	SSG AF VTVM Distortion meter Oscilloscope 4Ω dummy load	Rear	ANT EXT.SP	Panel	PF3 key PF4 key	Adjust to point of opening squelch	Set the value to 255. Adjust the SSG output to "Condition". Then, decrease the value to the point of opening the squelch.
18. Squelch open point	1) CH-SIG : 1-1 Select SQ_O_XXX in tune mode SSG output : Value when 3dB is subtracted from the sensitivity value of 12dB SINAD. Up/down knob : Set the NB on							
	2) SSG output : OFF						Check	Squelch must be closed.
19. NB	1) Output : -109dBm/0.8μV Pulse generator Output : 0.5Vp-p/50Ω Cycle : 100μsec Pulse width : 10ns Up/down knob : Set the NB on	SSG Pluse generator Distortion meter Oscilloscope AF VTVM	Rear	ANT EXT.SP			Check	SINAD 12dB or more.



TERMINAL FUNCTION

Connector No.	Terminal No.	Terminal Name	I/O	Terminal Function
FINAL UNIT (X45-3550-XX)				
CN1 To TX-RX unit	1	DO	I	Transmission drive input. Coaxial connector.
CN4	1	E	-	Earth.
CN5	1	+B	I	Power supply input (13.4V±15%).
CN6 To TX-RX unit	1	RA	O	Receiver signal output. Coaxial connector.
W4 To Control unit	1 2 3	E +B +B	- O O	Earth. Power supply output (13.4V±15%). Power supply output (13.4V±15%).
W5 To TX-RX unit	1 2 3 4 5	DB E 8R 8T PC	O - I I I	Transmission drive control voltage output (APC). Earth. 8V input during reception. 8V input during transmission. TX power control signal input.
TX-RX UNIT (X57-5600-XX) (A/2)				
CN104 To Final unit	1	RA	I	Receiver signal input. Coaxial connector.
CN201 To Final unit	1 2 3 4 5	PC 8T 8R E DB	O O O - I	TX power control signal output. 8V output during transmissioin. 8V output during reception. Earth. Transmission drive control voltage input (APC).
CN202 To Control unit	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18	NC UL EP CP MO MB SB DT ES CK KEY 8C E DET SQL RSI TV PC	- O I I I I I I I I I I O O O O I O O I I	Not used. Lock detect output for PLL. "H" : Lock, "L" : Unlock ENABLE input for PLL. CLOCK input for PLL. Modulation signal input for VCO. Modulation and frequency control signal input for VCXO. Power output after power switch (13.4V±15%). DATA input. ENABLE input for shift register. CLOCK input for shift register. KEY signal input. "H" : TX Common 8V (8V±5%). Earth. Detection signal output. Squelch signal output. RSSI signal output. Tuning voltage signal input for RX BPF. TX power control signal input.
CN203 To Final unit	1	DO	O	Transmission drive output. Coaxial connector.

Connector No.	Terminal No.	Terminal Name	I/O	Terminal Function
CONTROL UNIT (X57-5600-XX) (B/2)				
W501 To Display unit	1 2 3 4 5 6 7 8 9 10 11	RS2 RS1 SB IGN PS TRD 1/2 RST E MIC ME	O O O I I I/O O O - I -	Output for remote speaker. Output for remote speaker. Power output after power switch (13.4V±15%). Ignition input. Power swith control signal input. TX data output/RX data input. Remote head 1 signal output. RESET signal output. Earth. MIC signal input. MIC earth.
CN501 To Final unit	1 2 3	+B +B E	I I -	Power supply input (13.4V±15%). Power supply input (13.4V±15%). Earth.
CN502 To TX-RX unit	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18	PC TV RSI SQL DET E 8C KEY CK ES DT SB MB MO CP EP UL NC	O O I I I - O O O O O O O O O O I -	TX power control signal output. Tuning voltage signal output for RX BPF. RSSI signal input. Squelch signal input. Detection signal input. Earth Common 8V (8V±5%). KEY signal output. "H" : TX CLOCK output for shift register. ENABLE output for shift register. DATA output. Power output after power switch (13.4V±15%). Modulation and frequency control signal output for VCXO. Modulation signal output for VCO. CLOCK output for PLL. ENABLE output for PLL. Lock detect input for PLL. "H" : Lock, "L" : Unlock. Not used.
CN504 To Control cable (Remote kit)	1 2 3 4 5 6 7 8 9 10	AFO DE3 E EI CK DT RST 5C PSC CS	O I/O - O O O I/O O I/O O	RX audio signal output for head 2. Detection signal input from Radio 2. Earth ENABLE output for shift register. CLOCK output for shift register. DATA output for shift register. RESET signal output for Radio 2. Common 5V (5V±5%). Power switch control signal input/output. Chip select output for D/A converter.
CN505 To Acc 25 pin D-sub connector	1 2 3 4 5 6 7 8 9 10 11 12 13	RSI NC (SB) AI1 RSV1 AI2 RSV2 AI3 AFO AI4 E AI5 DEO E	O O I O I I I O I - I O -	RSSI signal output. Non connection. Auxiliary input 1 (FPU selectable). Reserved Auxiliary input 2 (FPU selectable). Reserved. Auxiliary input 3 (FPU selectable). RX audio signal output. Auxiliary input 4 (FPU selectable). Earth. Auxiliary input 5 (FPU selectable). Detector signal output. Earth.

TERMINAL FUNCTION

Connector No.	Terminal No.	Terminal Name	I/O	Terminal Function	Connector No.	Terminal No.	Terminal Name	I/O	Terminal Function
	14	AO1	O	Auxiliary output 1 (FPU selectable).	DISPLAY UNIT (X54-3190-20) : KCH-10 (X54-3200-20) : KCH-11				
	15	AO2	O	Auxiliary output 2 (FPU selectable).					
	16	AO3	O	Auxiliary output 3 (FPU selectable).	CN1	1	ME	-	MIC earth.
	17	TXD2	O	Serial data output.	To	2	MIC	O	MIC signal output.
	18	AO4	O	Auxiliary output 4 (FPU selectable).	Control	3	E	-	Earth.
	19	RXD2	I	Serial data input.	unit	4	RST	I	RESET signal input.
	20	SQ	O	Squelch signal output. "H" : Busy, "L" : Not busy		5	1/2	I	Remote head 1/2 signal input. "L" : Head 1, "H" : Head 2
	21	TXS	O	TX sense signal output. "H" : TX, "L" : Another		6	TRD	I/O	TX data output/RX data input.
	22	SPM	I	Speaker mute signal input. "H" : Mute on		7	PS	O	Power switch control signal output.
	23	MCM	I	MIC mute signal input. "H" : Mute on		8	IGN	O	Ignition sense output.
	24	ME	-	MIC earth.		9	SB	I	Power input after power switch (13.4V±15%).
	25	MI/DI	I	Mic/Data signal input 1. (Default : DI)		10	RS1	I	Remote speaker input.
	26~30	-	-	Non connection.		11	RS2	I	Remote speaker input.
CN506 To Acc 9 pin connector	1	IGN	I	Ignition sense input.	CN2	1	RS1	O	Remote speaker output.
	2	E	-	Earth.	To	2	RS2	O	Remote speaker output.
	3	HR1	O	Horn alert signal output 1.	Remote speaker				
	4	HR2	O	Horn alert signal output 2.	CN3	1	IGN	I	Ignition sense input.
	5	OS1	O	BTL output for external speaker B (PA).	To Acc	2	SB	O	Power output after power switch (13.4V±15%).
	6	OS2	O	BTL output for external speaker B (PA).	12 pin connector	3	E	-	Earth.
	7	ES2	O	BTL output for external speaker A.		4	MIC	I	MIC signal input.
	8	ES1	O	BTL output for external speaker A.		5	ME	-	MIC earth.
	9	RS1	I	Remote speaker switch.		6	AI1	I	Auxiliary input 1 (FPU selectable).
CN507 To ANI board	1	SQ	O	Squelch signal output. "H" : Busy, "L" : No signal		7	AI2	I	Auxiliary input 2 (FPU selectable).
	2	EMG	O	Emergency signal output.		8	AO1	O	Auxiliary output 1 (FPU selectable).
	3	EPT	I	External PTT signal input.		9	AO2	O	Auxiliary output 2 (FPU selectable).
	4	IO	I/O	Auxiliary input/output.	J1 (MIC jack)	1	SB	O	Power output after power switch (13.4V±15%)
	5	SEL	-	Non connection.		2	HK	I	Hook signal input. "L" : On hook, "H" : Off hook
	6	AS2	I	Audio mute input. "HiZ" : No change, "L" : Mute		3	ME	-	MIC earth.
	7	MCM	I	MIC mute input. "HiZ" : No change, "L" : Mute		4	MIC	I	MIC signal input.
	8	TON	I	Sidetone input.		5	E	-	Earth.
	9	TCN	I	Speaker mute input. "HiZ" : No change, "L" : Unmute		6	TRD	I/O	TX data output/RX data input.
	10	DTI	I	Data input.		7	NC	-	Not used.
CN508 To voice scrambler	1	MCI	I	MIC signal input.		8	DM	I/O	Serial data input/output for keypad MIC.
	2	MCO	O	MIC signal output.		9	BLC	O	MIC backlight control signal output. "H" : On, "L" : Off
	3	DEI	I	Detection signal input.		10	PTT	I	PTT signal input. "L" : TX, "OPEN" : RX
	4	AC	O	Audio control signal output. "H" : OPT SW off, "L" : On		11	NC	-	Not used.
	5	BC1	O	Scramble code output.		12	NC	-	Not used.
	6	BC2	O	Scramble code output.					
	7	BC3	O	Scramble code output.					
	8	BC4	O	Scramble code output.					
	9	TXD2	O	TX data output 2.					
	10	RXD2	I	RX data input 2.					
	11	DEO	O	Detection signal output.					
	12	PTO	O	PTT signal output.					
	13	8C	O	Common 8V output.					
	14	E	-	Earth.					

TERMINAL FUNCTION

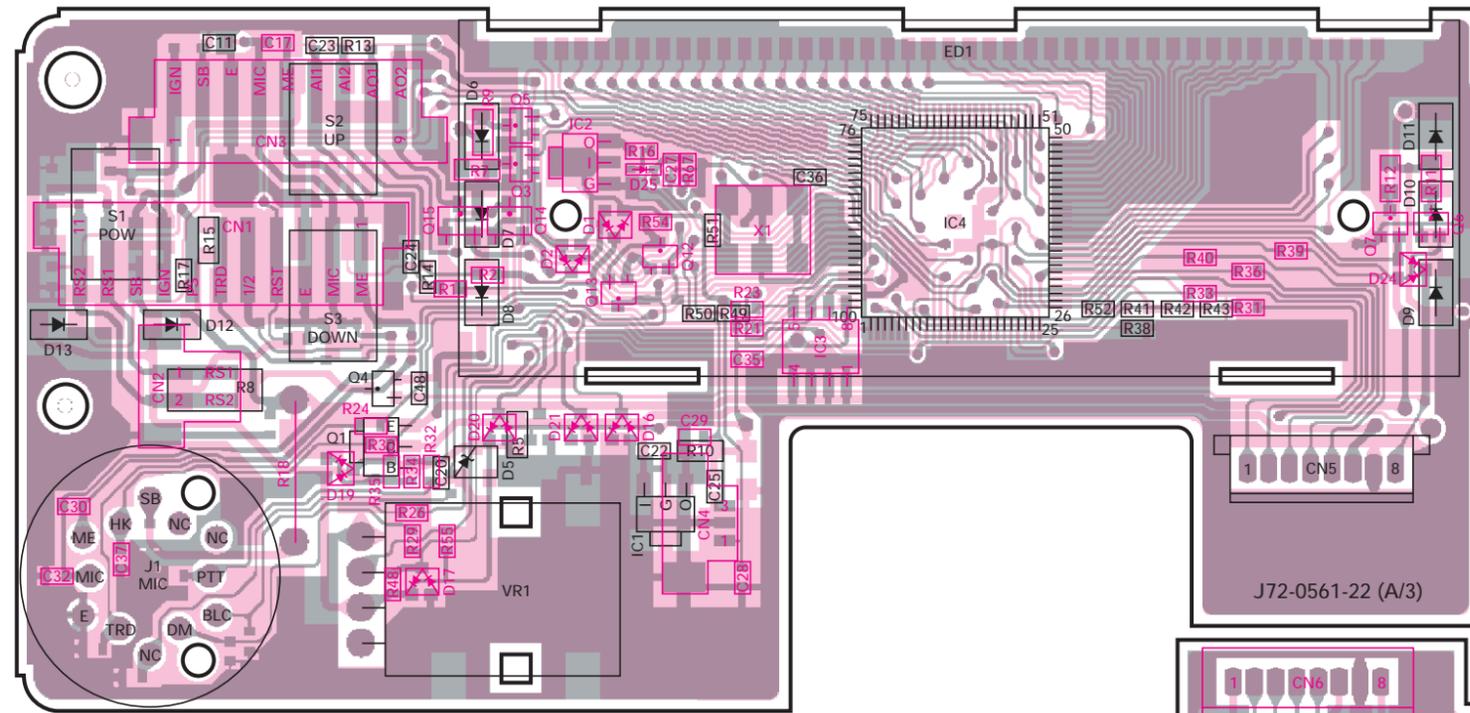
Connector No.	Terminal No.	Terminal Name	I/O	Terminal Function												
Acc 25 pin D-sub connector																
	1	RSI	O	RSSI signal output. <div style="text-align: center;"> <p>RSSI vs ANT input (Typical value)</p> <table border="1"> <caption>Data points from RSSI vs ANT input graph</caption> <thead> <tr> <th>ANT input level [dBm]</th> <th>RSSI [V]</th> </tr> </thead> <tbody> <tr> <td>-130</td> <td>0.6</td> </tr> <tr> <td>-120</td> <td>0.8</td> </tr> <tr> <td>-110</td> <td>1.0</td> </tr> <tr> <td>-100</td> <td>1.2</td> </tr> <tr> <td>-90</td> <td>1.5</td> </tr> </tbody> </table> </div>	ANT input level [dBm]	RSSI [V]	-130	0.6	-120	0.8	-110	1.0	-100	1.2	-90	1.5
ANT input level [dBm]	RSSI [V]															
-130	0.6															
-120	0.8															
-110	1.0															
-100	1.2															
-90	1.5															
	2	AI1	I	Auxiliary input 1 (FPU selectable).												
	3	AI2	I	Auxiliary input 2 (FPU selectable).												
	4	AI3	I	Auxiliary input 3 (FPU selectable).												
	5	AI4	I	Auxiliary input 4 (FPU selectable).												
	6	AI5	I	Auxiliary input 5 (FPU selectable).												
	7	E	-	Earth												
	8	AO2	O	Auxiliary output 1 (FPU selectable).												
	9	TXD2	O	Serial data output.												
	10	RXD2	I	Serial data input.												
	11	TXS	O	TX sense signal output. "H" : TX, "L" : Another												
	12	MCM	I	MIC mute signal input. "L" : Mute on, "H" : No change												
	13	MI/DI	I	MIC/Data signal input 1. (Default : DI) Input impedance DI : 10kΩ or more MI : 600Ω Coupling DI : DC coupling MI : DC coupling Frequency response DI : ~9.6kHz +1/-3dB (1kHz=0dB) MI : Compliance with TIA/EIA-603 Deviation DI : 60% deviation or more. (1kHz 2.5Vp-p input) MI : 60% deviation (1kHz 5mV±1.5mV input)												
	14	NC (SB)	O	Non connection. (SB : 13.4V 0.5A max. Refer to page 20)												
	15	RSV1	-	Reserved.												
	16	RSV2	-	Reserved.												
	17	AFO	O	RX audio signal output (Same as CN504 pin No.1) RX condition : RX audio output. Output level 125mVrms. (Standard modulation) PA condition : MIC output. Output level 300mVrms. (1kHz 5mV input)												
	18	E	-	Earth												
	19	DEO	O	Detector signal output. Output impedance 1kΩ or less Coupling DC coupling												

Connector No.	Terminal No.	Terminal Name	I/O	Terminal Function
				Output level : 100mVrms (Standard modulation) Output frequency response : 300~4.8kHz +1/-5dB (1kHz=0dB)
	20	AO1	O	Auxiliary output 1 (FPU selectable).
	21	AO3	O	Auxiliary output 3 (FPU selectable).
	22	AO4	O	Auxiliary output 4 (FPU selectable).
	23	SQ	O	Squelch signal output. "L" : Busy, "H" : Not busy
	24	SPM	I	Speaker mute signal input. "L" : Mute on
	25	ME	-	MIC earth.

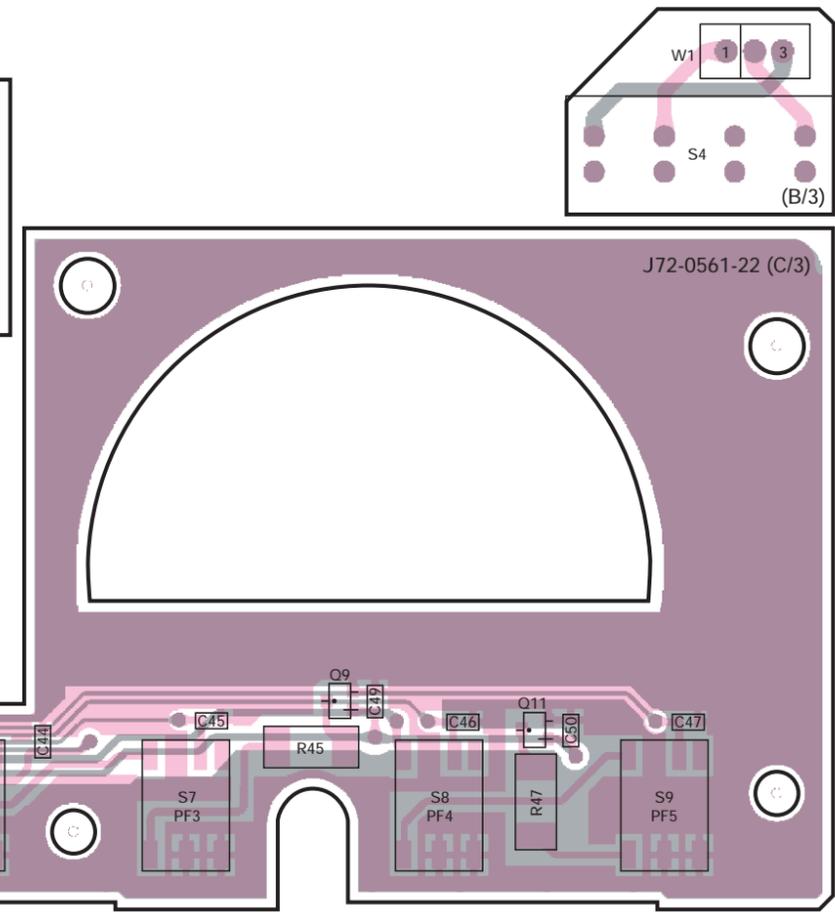
Acc 9 pin connector				
	1	IGN	I	Ignition sense input.
	2	ES2	O	BTL output for external speaker A.
	3	RS1	I	Remote speaker switch
	4	HR1	O	Horn alert signal output 1.
	5	HR2	O	Horn alert signal output 2.
	6	ES1	O	BTL output for external speaker A.
	7	OS1	O	BTL output for external speaker B (PA).
	8	OS2	O	BTL output for external speaker B (PA).
	9	E	-	Earth.

Acc 12 pin connector (Remote kit)				
	1	IGN	I	Ignition sense input.
	2	SB	O	Power output after power switch (13.4V±15%).
	3	E	-	Earth.
	4	MIC	I	MIC signal input.
	5	ME	-	MIC earth.
	6	AI1	I	Auxiliary input 1 (FPU selectable).
	7	AI2	I	Auxiliary input 2 (FPU selectable).
	8	AO1	O	Auxiliary output 1 (FPU selectable).
	9	AO2	O	Auxiliary output 2 (FPU selectable).
	10	RS1	O	Remote speaker output.
	11	RS2	O	Remote speaker output.
	12	-	-	Non connection.

DISPLAY UNIT (X54-3190-20) Component side view : KCH-10

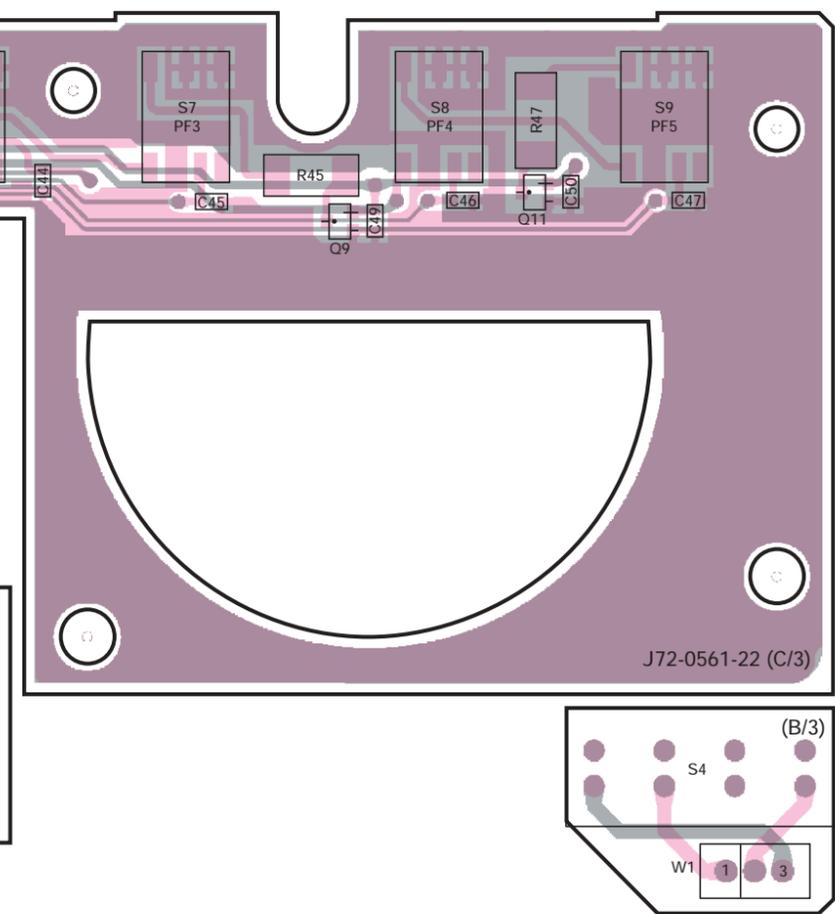
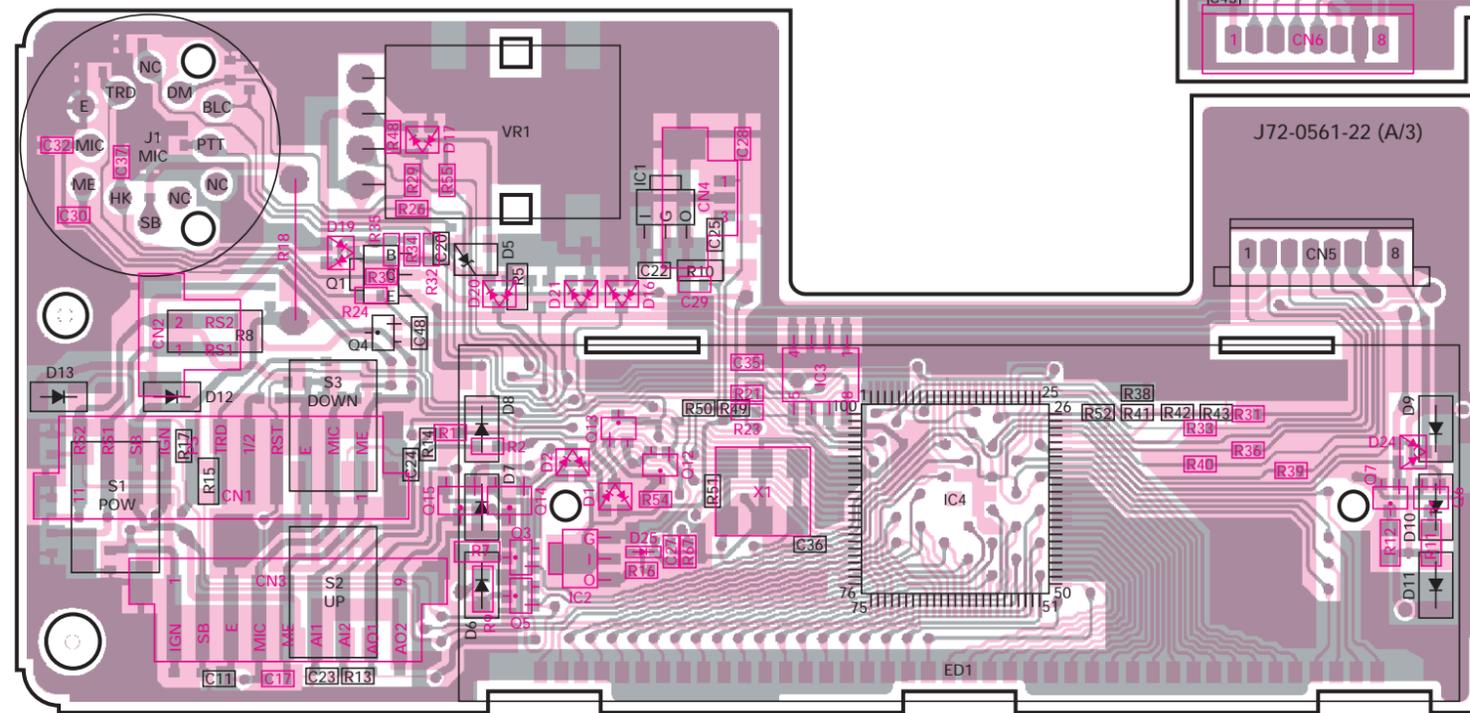


PC BOARD VIEWS TK-690H(B)



Component side
Foil side

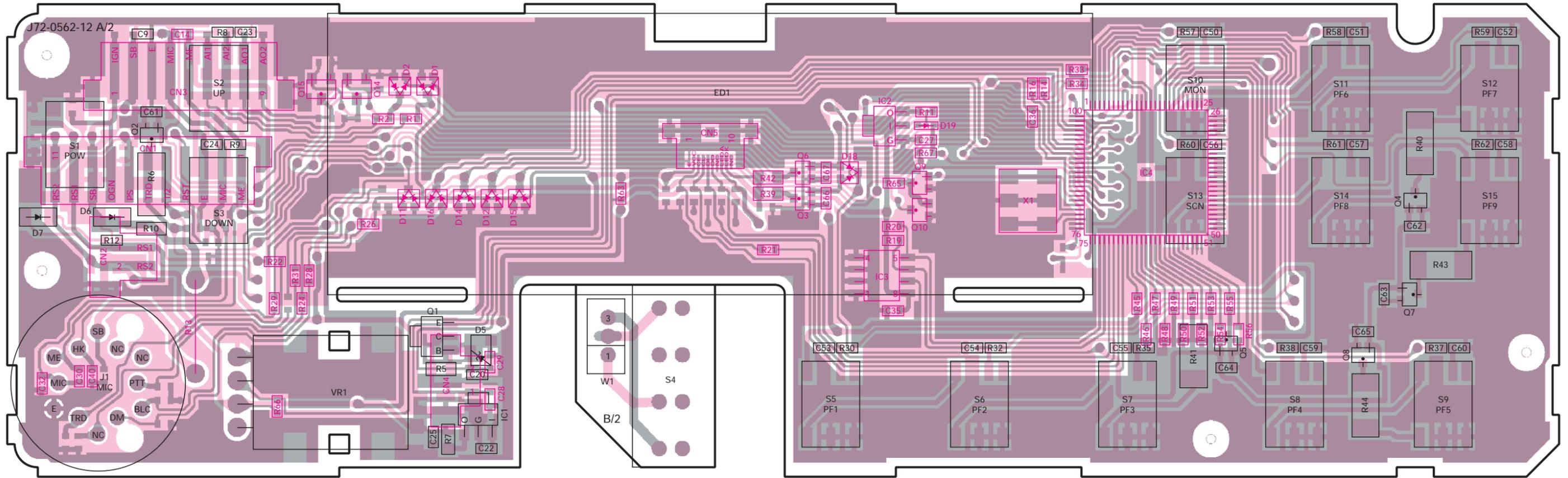
DISPLAY UNIT (X54-3190-20) Foil side view : KCH-10



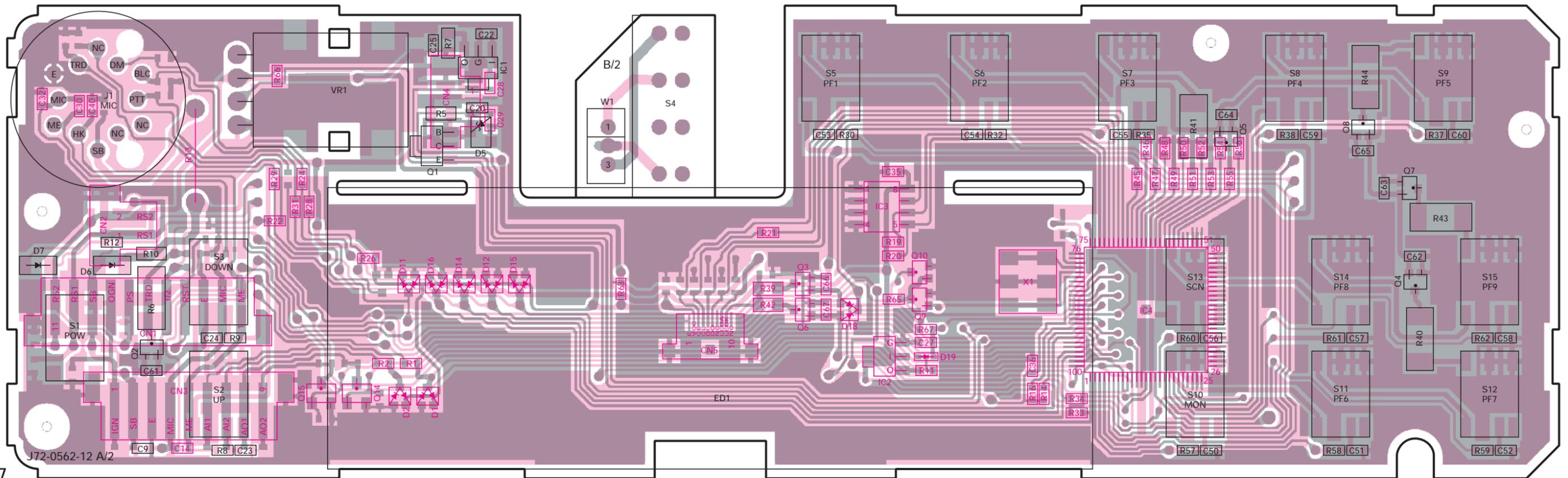
TK-690H(B) PC BOARD VIEWS

Component side
Foil side

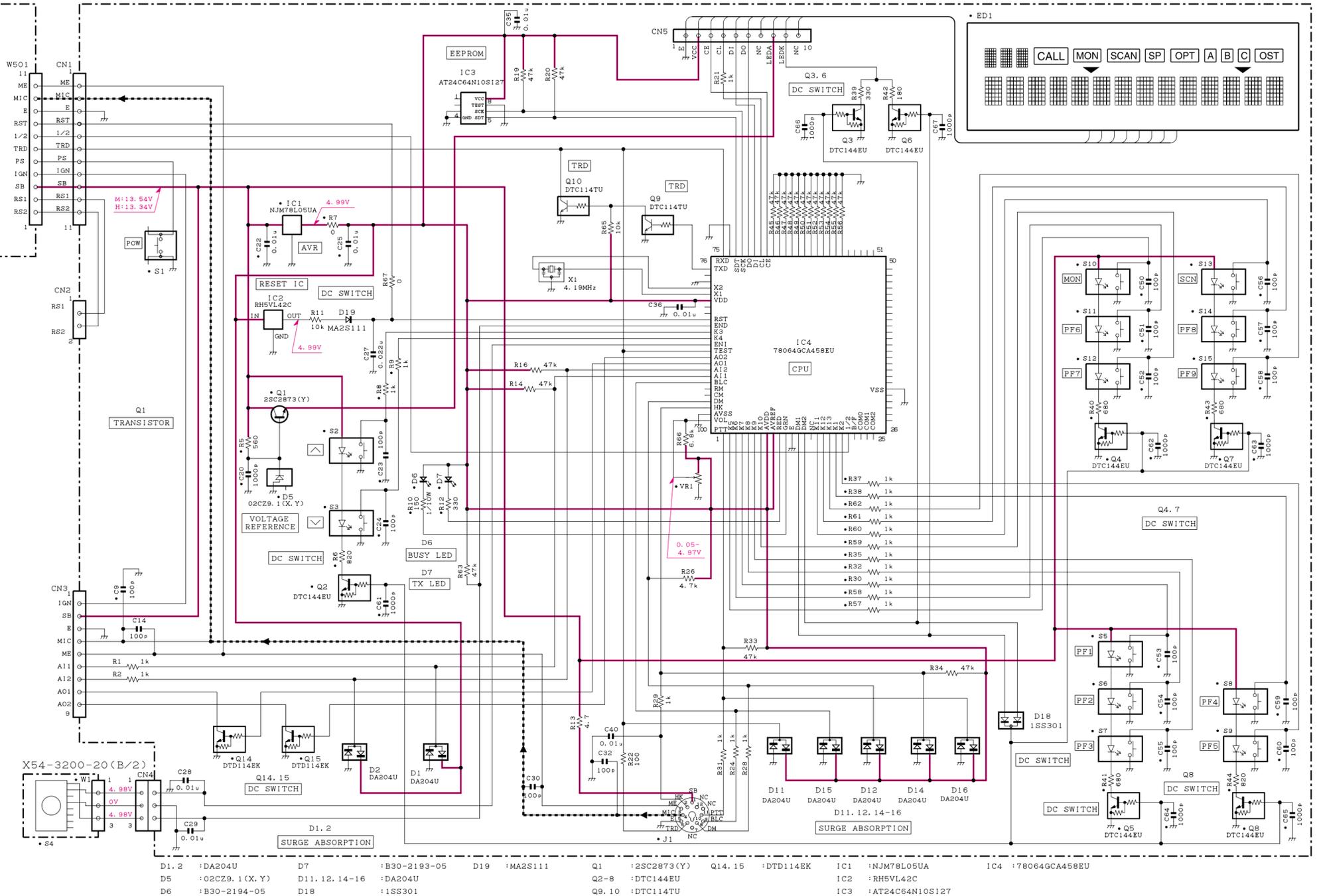
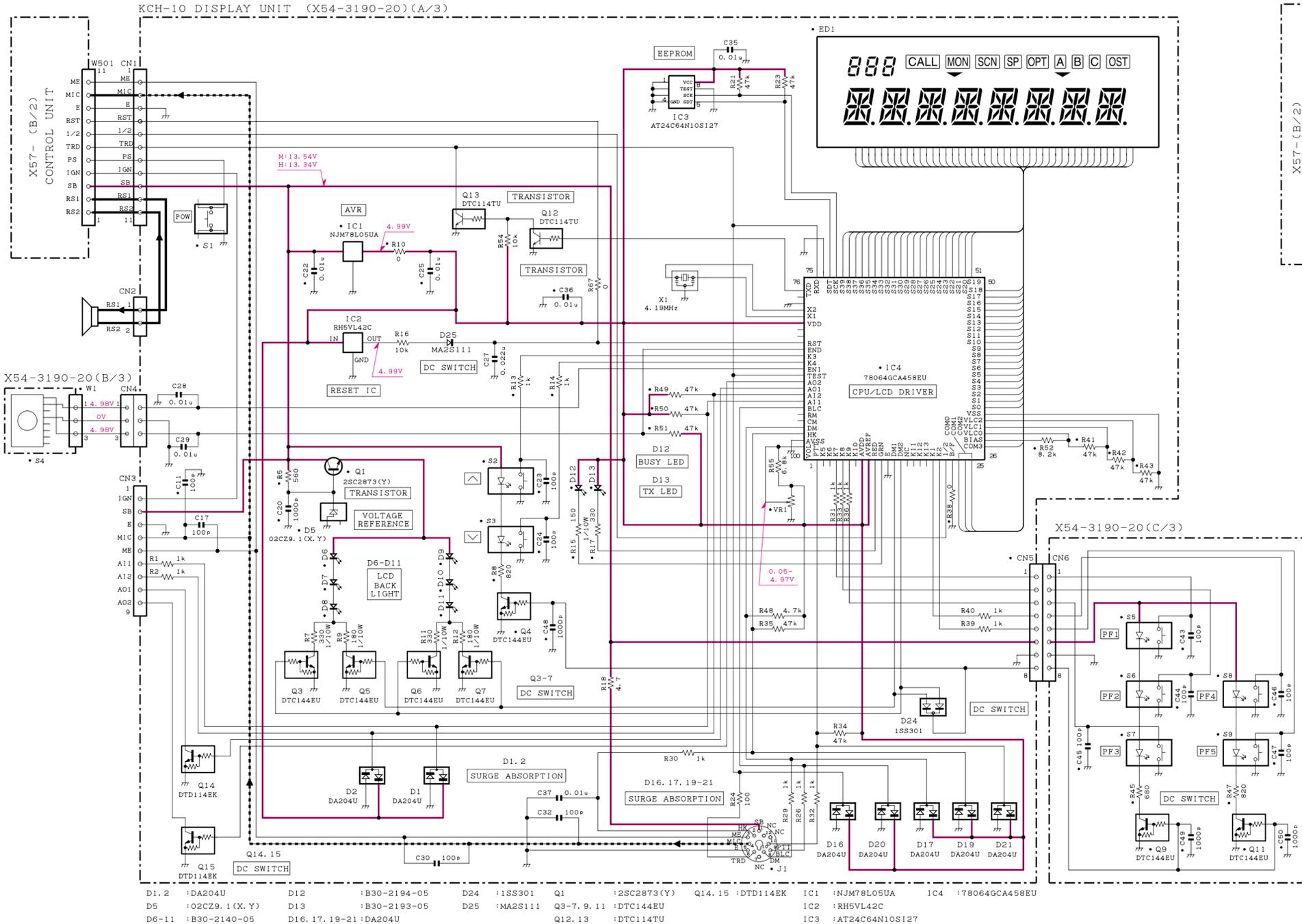
DISPLAY UNIT (X54-3200-20) Component side view : KCH-11



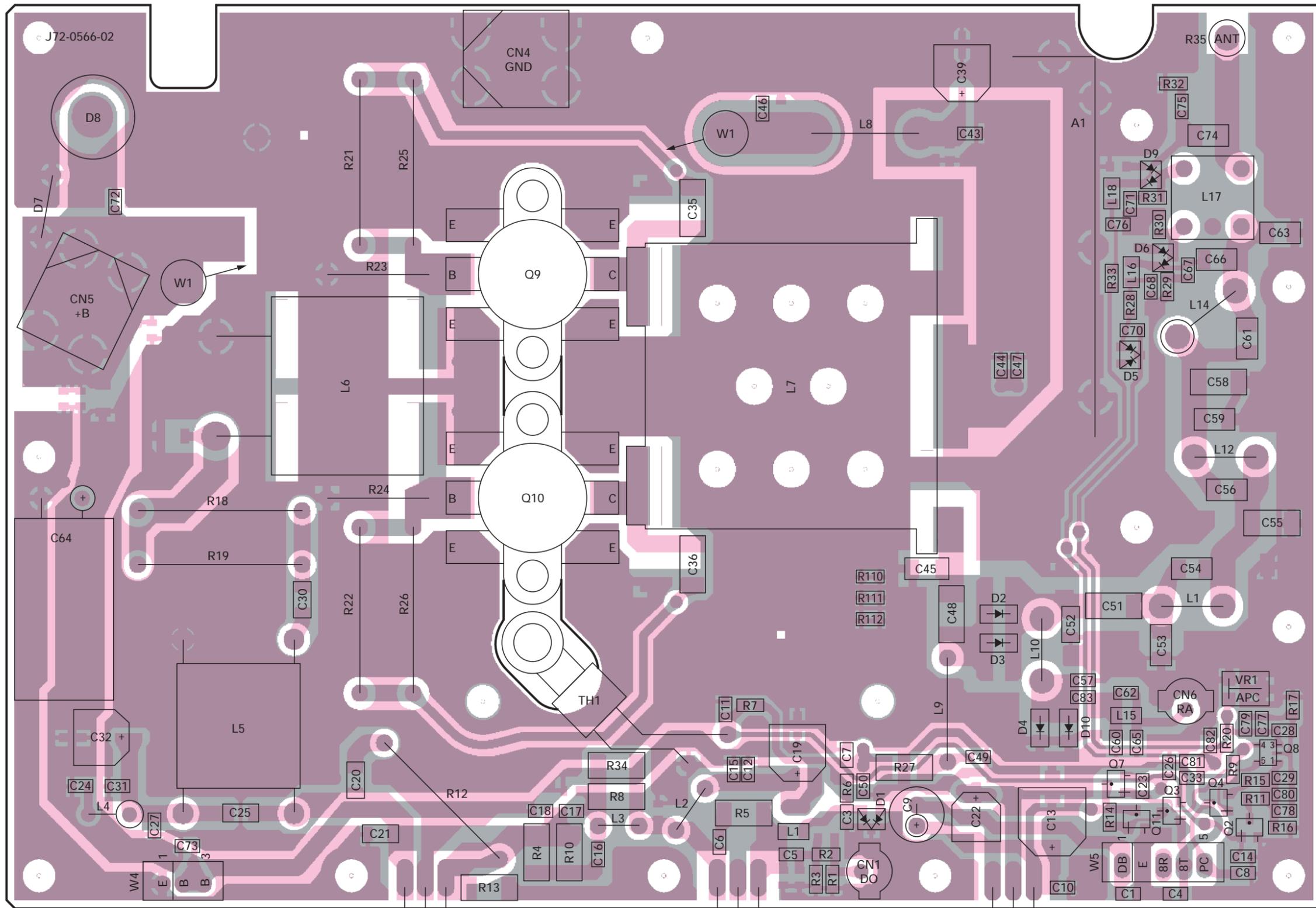
DISPLAY UNIT (X54-3200-20) Foil side view : KCH-11



Note : Components marked with a dot (·) are parts of pattern 1.



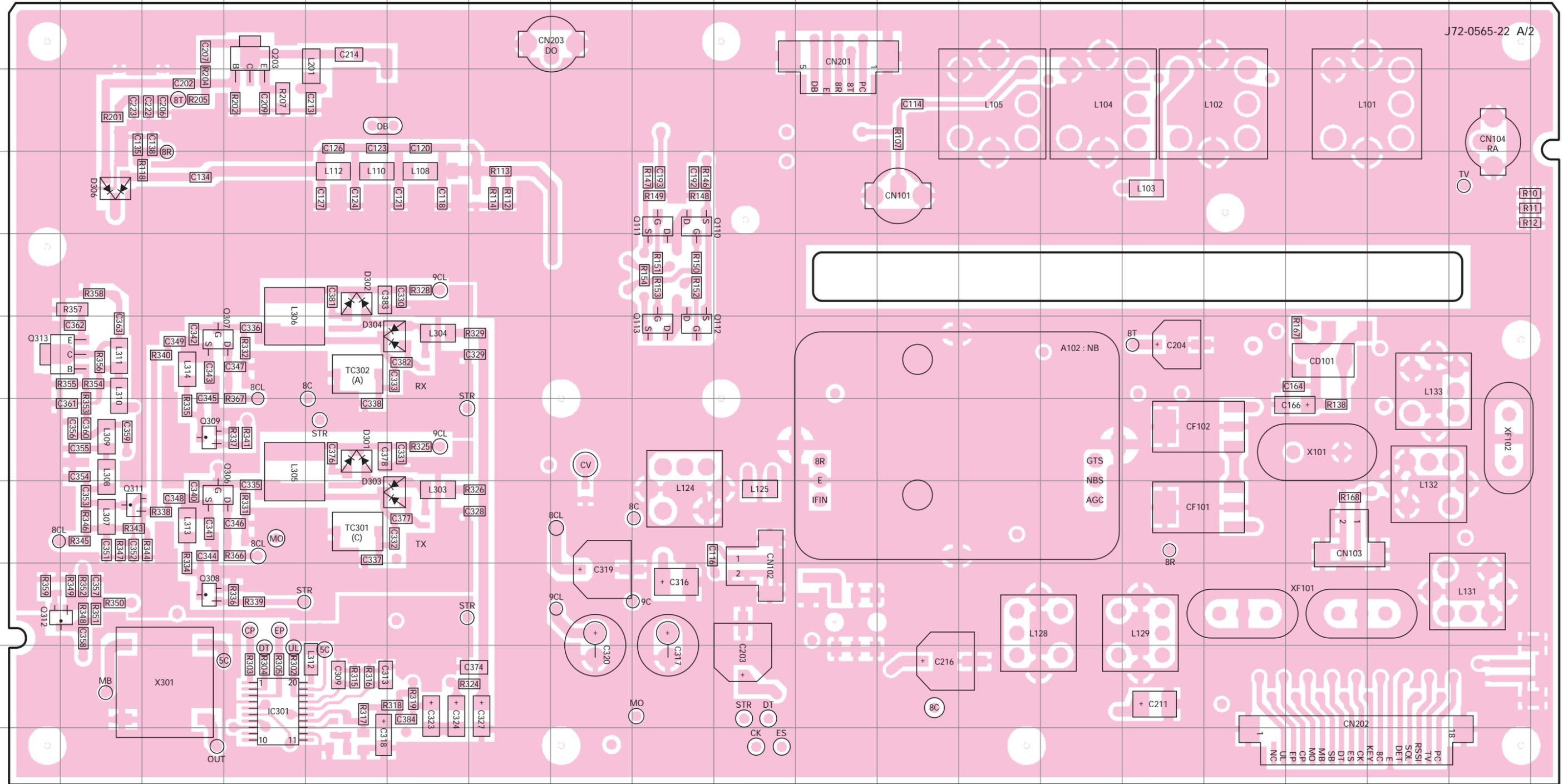
FINAL UNIT (X45-3550-XX) -10 : K -11 : K2 -12 : K3 Component side view



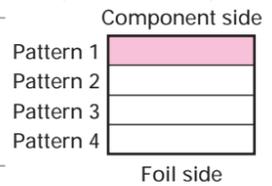
Component side
Foil side

TK-690H(B) PC BOARD VIEW

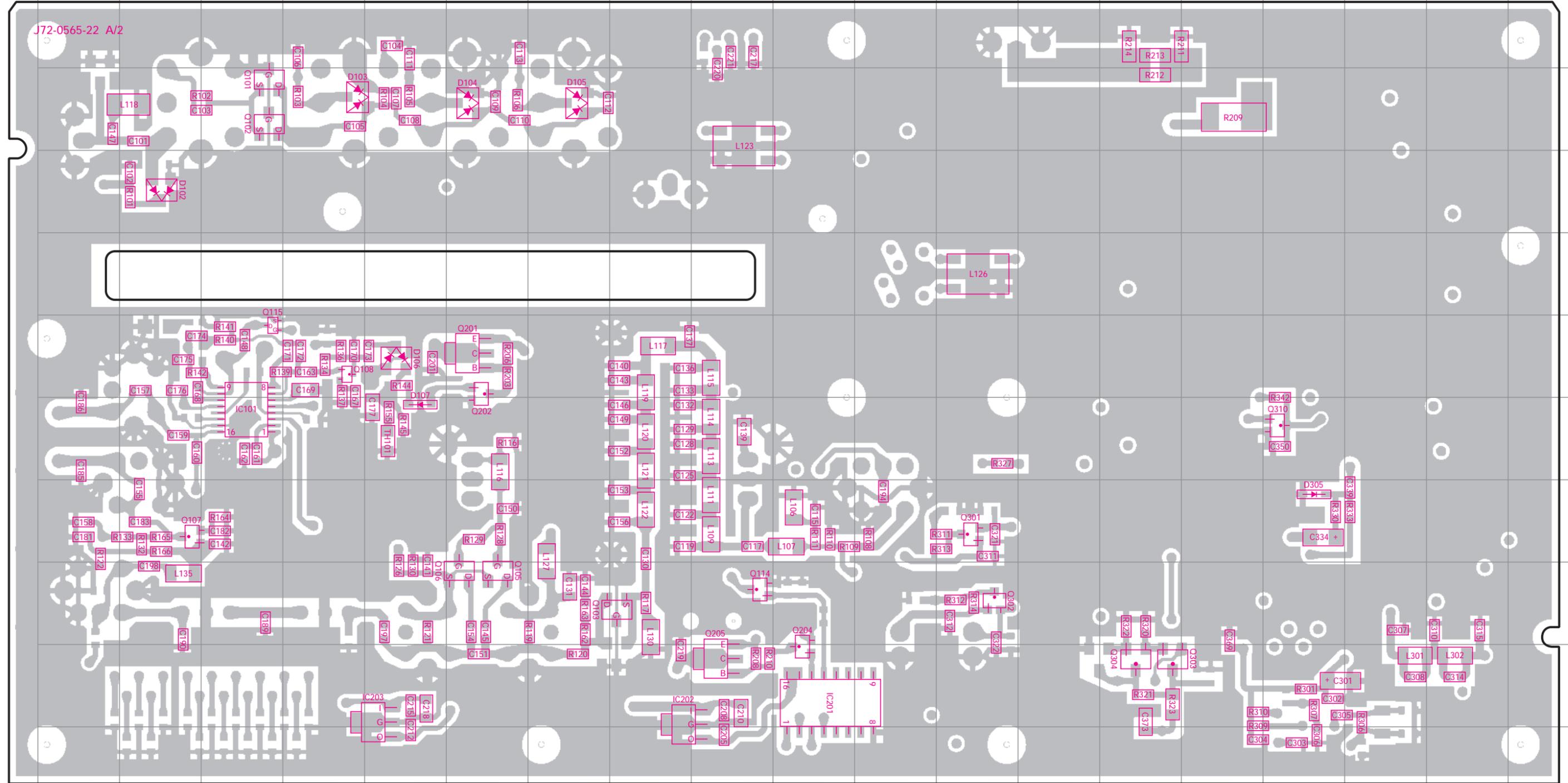
TX-RX UNIT (X57-5600-XX) (A/2) -10 : K -11 : K2 -12 : K3 Component side view



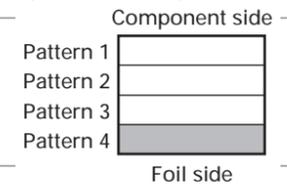
Ref No.	Address	Ref No.	Address	Ref No.	Address
IC301	10D	Q307	6C	D302	5E
Q110	4I	Q308	9C	D303	8F
Q111	4I	Q309	7C	D304	6F
Q112	6I	Q311	8B	D306	4B
Q113	6I	Q312	9B		
Q203	2D	Q313	6B		
Q306	8C	D301	7E		



TX-RX UNIT (X57-5600-XX) (A/2) -10 : K -11 : K2 -12 : K3 Foil side view

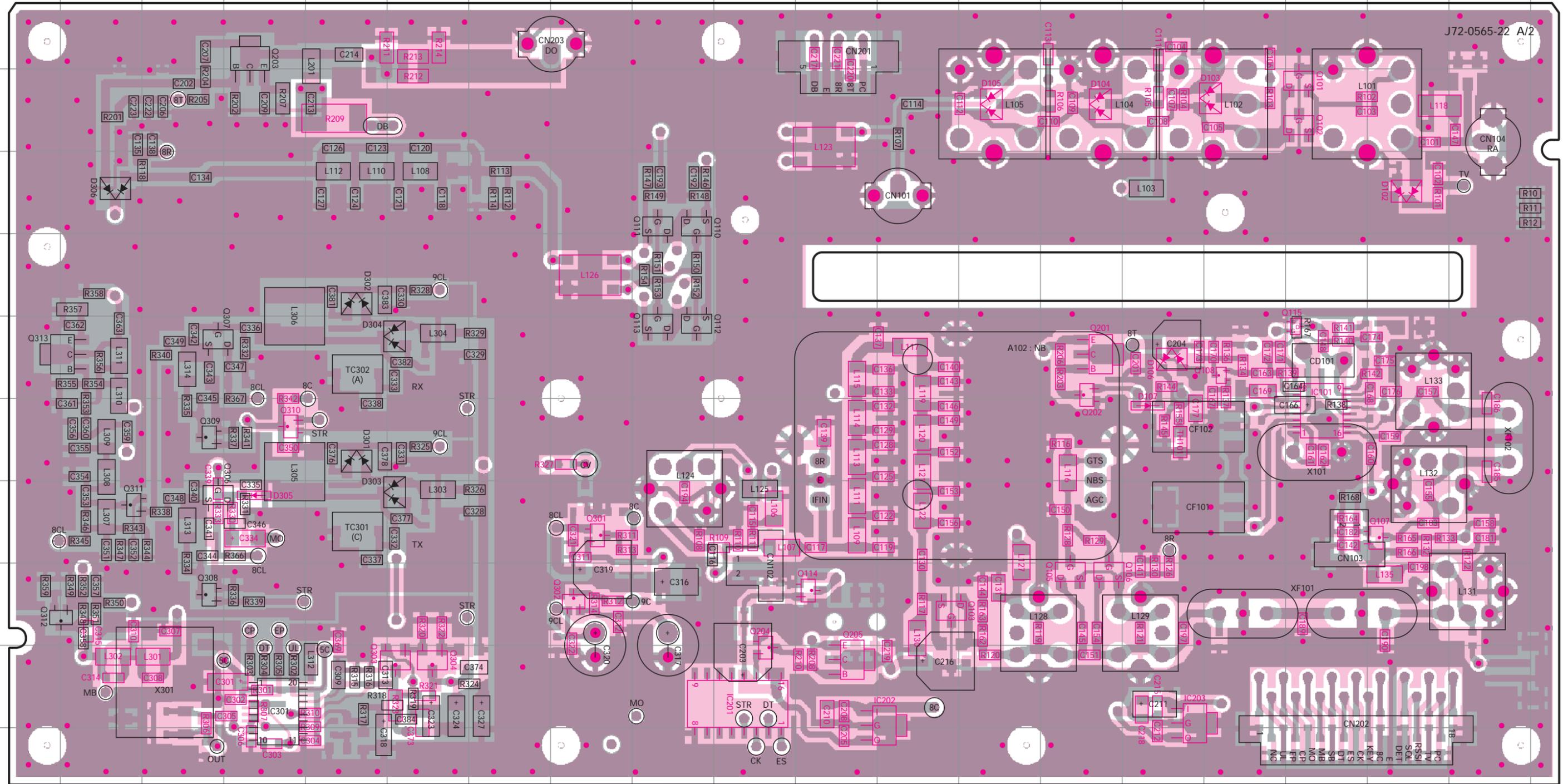


Ref No.	Address								
IC101	7C	Q105	9F	Q202	6F	Q310	7P	D305	8P
IC201	10J	Q106	9F	Q204	10J	D102	4B		
IC202	10H	Q107	8B	Q205	10I	D103	3D		
IC203	10E	Q108	6D	Q301	8L	D104	3F		
Q101	3C	Q114	9I	Q302	9L	D105	3G		
Q102	3C	Q115	6C	Q303	10N	D106	6E		
Q103	9H	Q201	6F	Q304	10N	D107	7E		

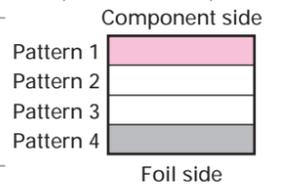


TK-690H(B) PC BOARD VIEW

TX-RX UNIT (X57-5600-XX) (A/2) -10 : K -11 : K2 -12 : K3 Component side view + Foil side

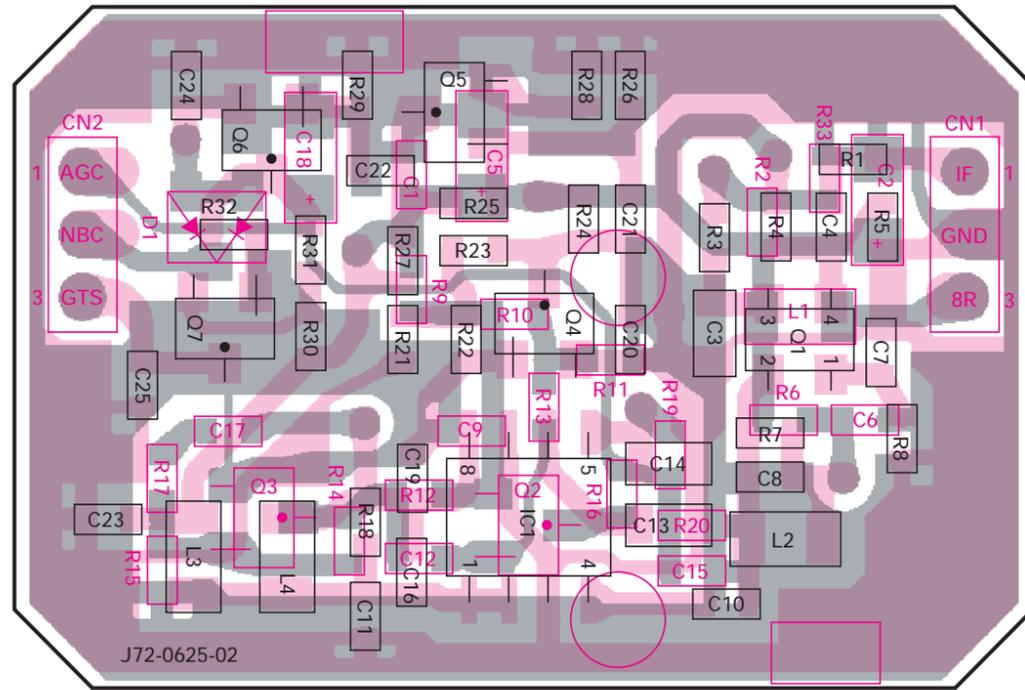


Ref No.	Address												
IC101	7Q	Q103	9L	Q112	6I	Q204	10J	Q307	6C	D102	4R	D302	5E
IC201	10J	Q105	9N	Q113	6I	Q205	10K	Q308	9C	D103	3P	D303	8F
IC202	10L	Q106	9N	Q114	9K	Q301	8H	Q309	7C	D104	3N	D304	6F
IC203	10O	Q107	8R	Q115	6Q	Q302	9H	Q310	7D	D105	3M	D305	8D
IC301	10D	Q108	6P	Q201	6N	Q303	10F	Q311	8B	D106	6O	D306	4B
Q101	3Q	Q110	4I	Q202	6N	Q304	10F	Q312	9B	D107	7O		
Q102	3Q	Q111	4I	Q203	2D	Q306	8C	Q313	6B	D301	7E		

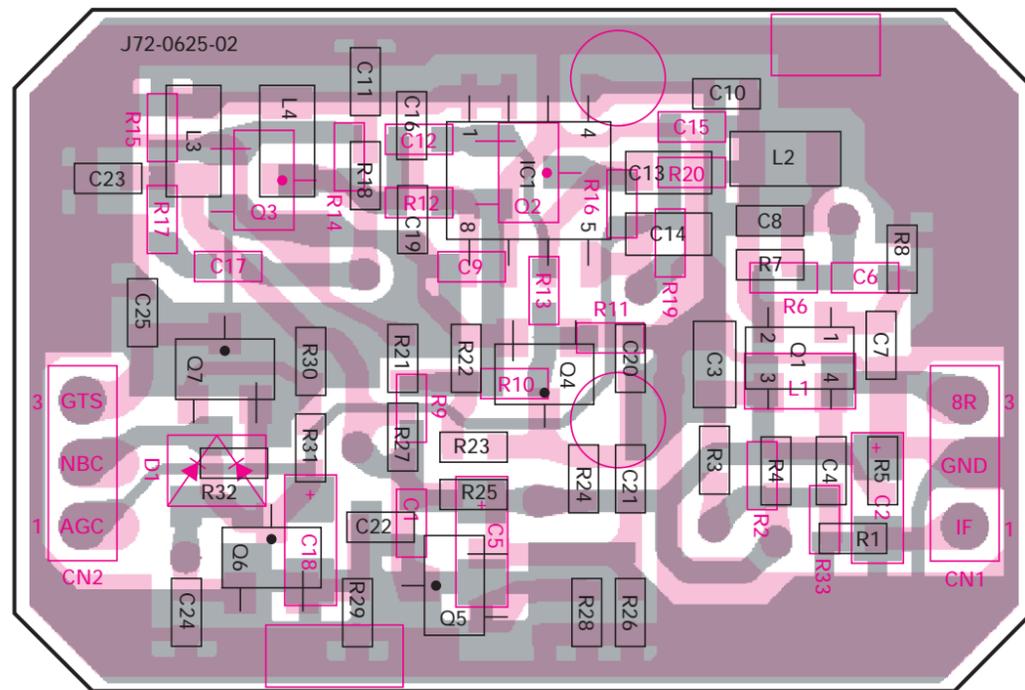


● Connect 1 and 4

NB (X58-4610-10) Component side view



NB (X58-4610-10) Foil side view

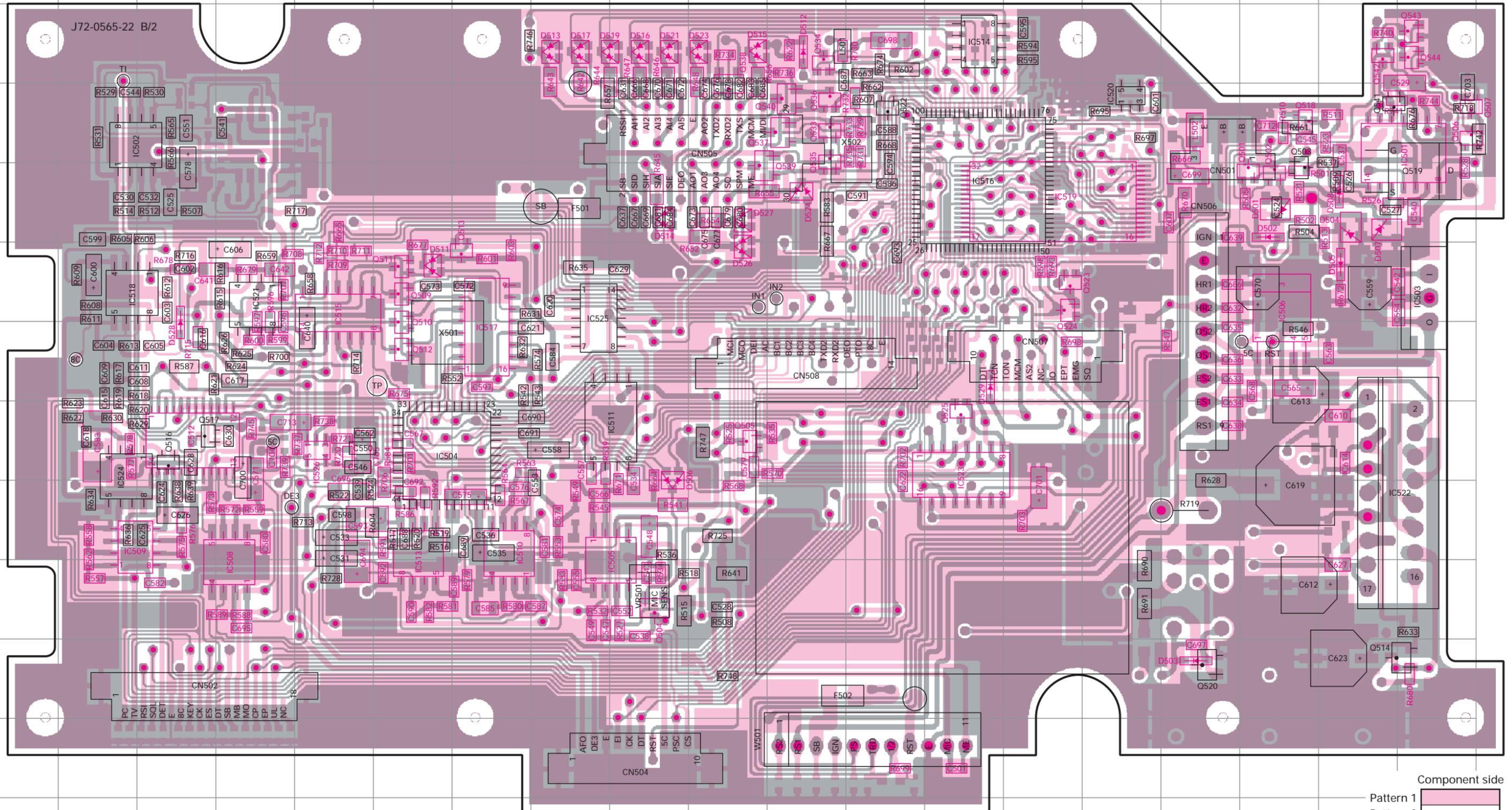


Component side
Foil side

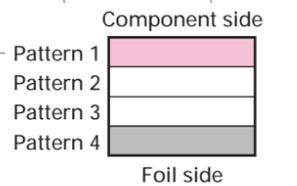
DTC114EK DTC114TU DTC114YUA DTC144EU DTC363EK DTD114EK 2SA1162 2SC2712	2SC3722K 2SC4116 2SC4215 2SC4617	2SJ506	AT24C64N10SI27 NJM4558M	TDA8561Q	DA204U DTA114YUA HSM88AS
2SB1132 2SC2873 2SC2954 2SC3357	TA7808S	MC33172D	SA7025DK	DAN235K	
FMW1	NJM78L05UA RH5VL42C	MC1350D	M62364FP	MA716	
DTA114EUA DTA114TUA DTA144TKA	DTC114EUA DTC144EUA	L78LR05B-FA	TC4013BF	AT29C020-90TI	02CZ15 02CZ5.6 02CZ18 02CZ9.1
3SK131	AN8009M	LC73872M	TC35453F	1SS301	
2SK508NV 2SK520	TC7S02F	BU4066BCF	78064GCA458EU 784214GC0518EU		
2SK1824	TA75S01F	BU4094BCF	2SC2694		
2SC1971 2SC1972	PCD3312CT	TA31136FN	2SD2531		

TK-690H(B) PC BOARD VIEW

CONTROL UNIT (X57-5600-XX) (B/2) -10 : K -11 : K2 -12 : K3 Component side view + Foil side



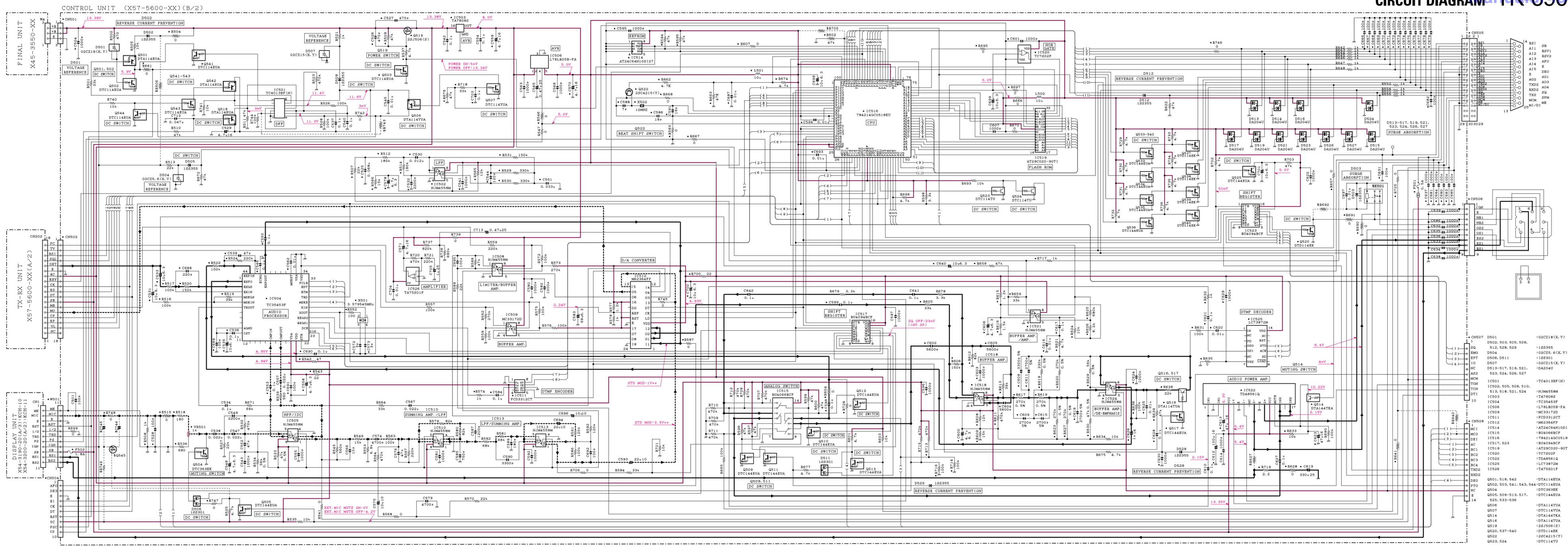
Ref No.	Address																						
IC501	3S	IC509	8B	IC516	4M	IC523	7M	Q504	9I	Q512	6F	Q520	10P	Q535	3K	Q542	2R	D505	5R	D514	4I	D524	4K
IC502	3B	IC510	8G	IC517	6G	IC524	7B	Q505	7J	Q513	5G	Q522	3L	Q536	3K	Q543	2S	D506	7I	D515	2J	D526	5J
IC503	5S	IC511	7I	IC518	5B	IC525	5H	Q506	3S	Q514	10S	Q523	5N	Q537	3K	Q544	2S	D507	4R	D516	2I	D527	4J
IC504	7F	IC512	7C	IC519	4N	IC526	7E	Q507	3S	Q516	7C	Q524	5N	Q538	2J	D501	4Q	D508	4R	D517	2H	D528	6C
IC505	9I	IC513	8F	IC520	3O	Q501	4Q	Q509	5F	Q517	7C	Q525	7M	Q539	4J	D502	4Q	D511	5F	D519	2I	D529	6M
IC506	5Q	IC514	2M	IC521	5D	Q502	4Q	Q510	6F	Q518	3Q	Q533	3K	Q540	3K	D503	10P	D512	2K	D521	2I		
IC508	9D	IC515	5E	IC522	8S	Q503	4Q	Q511	5F	Q519	4S	Q534	2K	Q541	3R	D504	4R	D513	2H	D523	2J		



● Connect 1 and 4

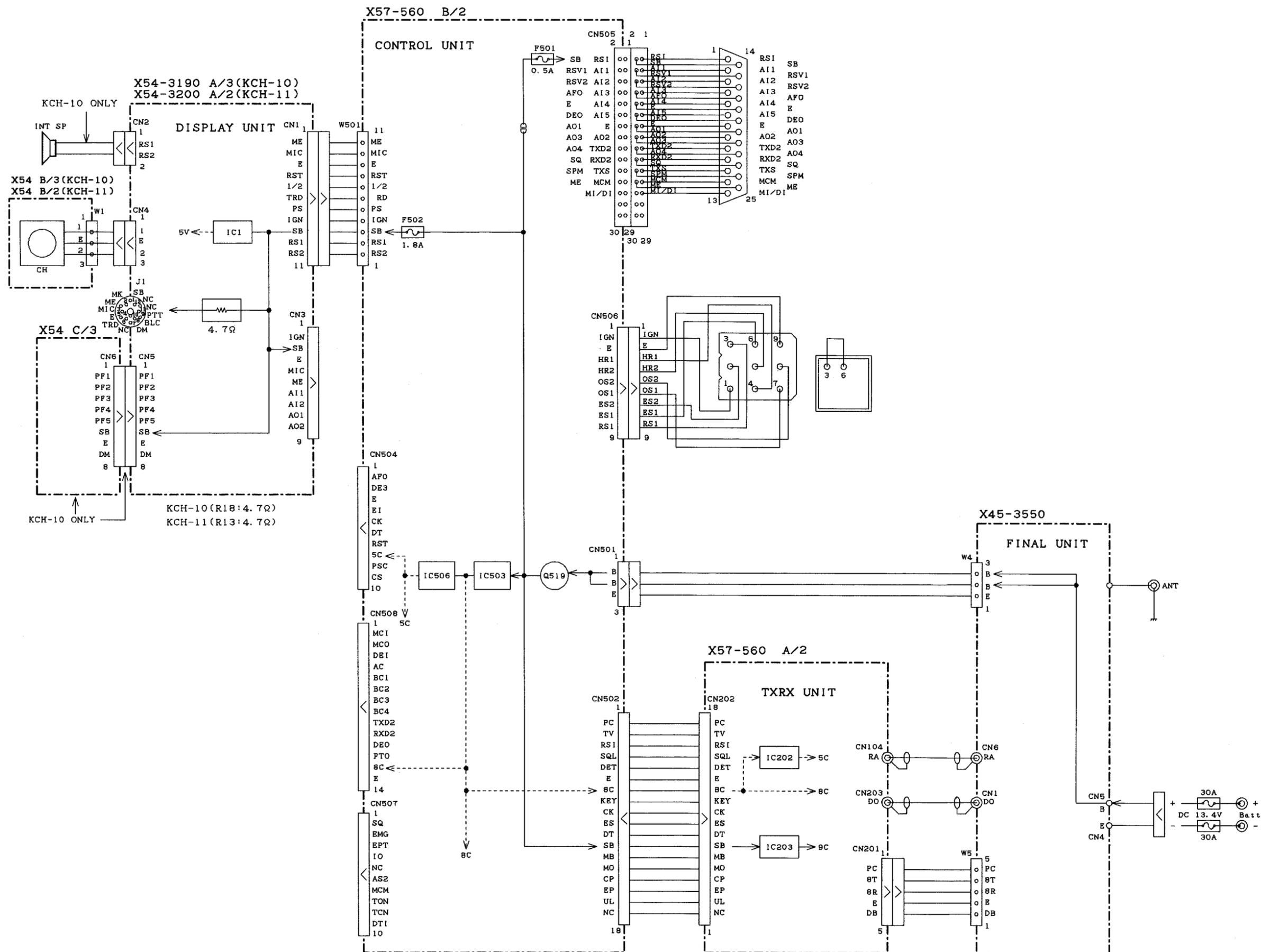
Note : Components marked with a dot (·) are parts of pattern 1.

CIRCUIT DIAGRAM TK-690H(B)



TK-690H(B) TK-690H(B)

WIRING



SPECIFICATIONS

GENERAL

Frequency Range	K : 29.7~37.0MHz	K2 : 35.0~43.0MHz	K3 : 40.0~50.0MHz
Number of Channels	160 channels		
Channel Spacing	20kHz (PLL channel step : 5kHz)		
Operating Voltage	13.4V DC±15% negative ground		
Current Drain	0.6A on standby 2.2A on receive 25A on transmit		
Duty Cycle	Transmit 20%		
Frequency Stability	±0.0005% (-30°C to +60°C)		
Operating Temperature Range	-30°C to +60°C (-22°F to +140°F)		
Dimensions & Weight	7.01" (178mm) W x 2.36" (60mm) H x 12.88" (327mm) D, 7.92lbs (3.6kg)		

RECEIVER (Measurements made per EIA standard EIA/TIA-240-D)

Antenna Impedance	50Ω		
Sensitivity	12dB SINAD : 0.25μV, 20dB Quieting : 0.35μV		
Selectivity	85dB		
Intermodulation	80dB		
Spurious and Image Rejection	90dB		
Audio Output	13W at 4Ω less than 5% distortion (12W at 4Ω less than 3% distortion)		
Band Spread	K : 7.3MHz	K2 : 8.0MHz	K3 : 10.0MHz

TRANSMITTER (Measurements made per EIA standard EIA-152-C)

RF Power Output	110W adjustable to 45W		
Antenna Impedance	50Ω		
Spurious Response	80dB		
Type of Emission	16K0F3E		
FM Hum and Noise	55dB		
Microphone Impedance	600Ω		
Audio Distortion	Less than 2% at 1000Hz		
Band Spread	K : 7.3MHz	K2 : 8.0MHz	K3 : 10.0MHz

KENWOOD follows a policy of continuous advancement in development. For this reason, specifications may be changed without notice.

APPLICABLE (MIL-STD)

Military Standard	Method/Procedures		
	810C	810D	810E
Low Pressure	500.1/Procedure I	500.2/Procedure I, II	500.3/Procedure I, II
High temperature	501.1/Procedure I, II	501.2/Procedure I, II Cat, A1	501.3/Procedure I, II Cat, A1
Low Temperature	502.1/Procedure I	502.2/Procedure I, II Cat, C1	502.3/Procedure I, II Cat, C1
Temperature Shock	503.1/Procedure I	503.2/Procedure I Cat, A1,C1	503.3/Procedure I Cat, A1,C1
Solar Radiation	505.1/Procedure I	505.2/Procedure I	505.3/Procedure I
Rain (Procedure I : Control head only)	506.1/Procedure I, II	506.2/Procedure I, II	506.3/Procedure I, II
Humidity	507.1/Procedure II	507.2/Procedure II	507.3/Procedure II
Salt Fog	509.1/Procedure I	509.2/Procedure I	509.3/Procedure I
Dust	510.1/Procedure I	510.2/Procedure I	510.3/Procedure I
Vibration	514.2/Procedure VII, X	514.3/Procedure I Cat, 8	514.4/Procedure I Cat, 8
Shock	516.2/Procedure I, II, V	516.3/Procedure I, IV	516.4/Procedure I, IV

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