HANDHELD CONTROL HEAD

KCH-16

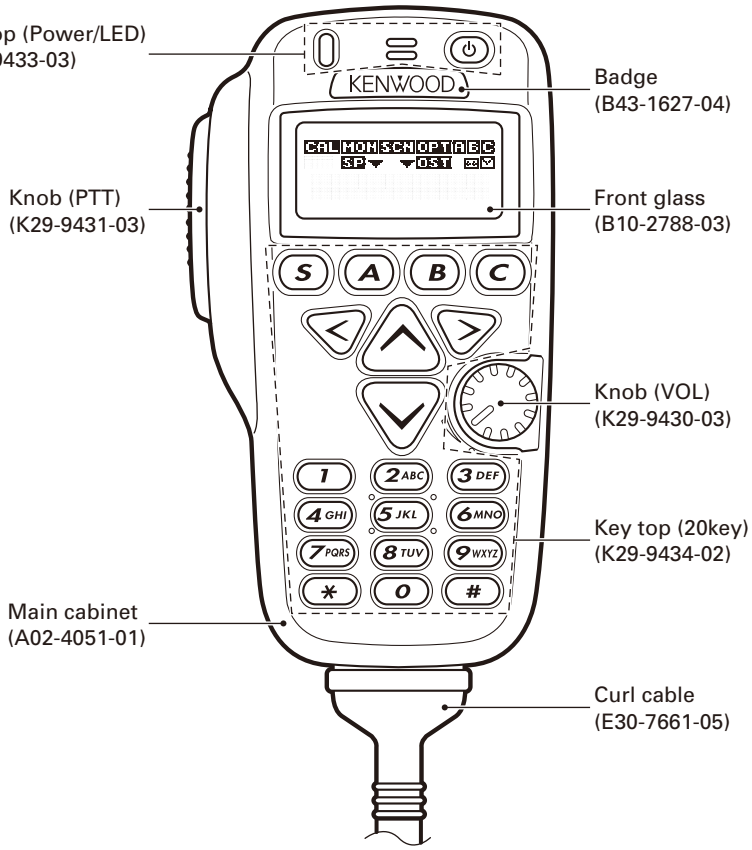
SERVICE MANUAL

KENWOOD

Kenwood Corporation

B51-8834-00 (N) 632

This KCH-16 service manual contains the service manual information of the KRK-11.



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LF

This product uses Lead Free solder.

GENERAL

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Note

You must use KPG-95D version 5.30 or later for this KCH-16. KPG-95D versions earlier than version 5.30 will not work properly.

Service Manual parts numbers for equipment relative to the KCH-16

Model	Parts Number	Remarks
TK-5710(B)/5710H(B)	B51-8727-10	VHF P25 transceiver
TK-5810(B)	B51-8780-00	UHF P25 transceiver
TK-5810H(B)	B51-8797-00	UHF P25 transceiver
KRK-6DH	B51-8445-20	Dual control head kit
KCH-14/15	B51-8728-00	Front panel kit

SYSTEM SET-UP

Before Reading About System Set-up

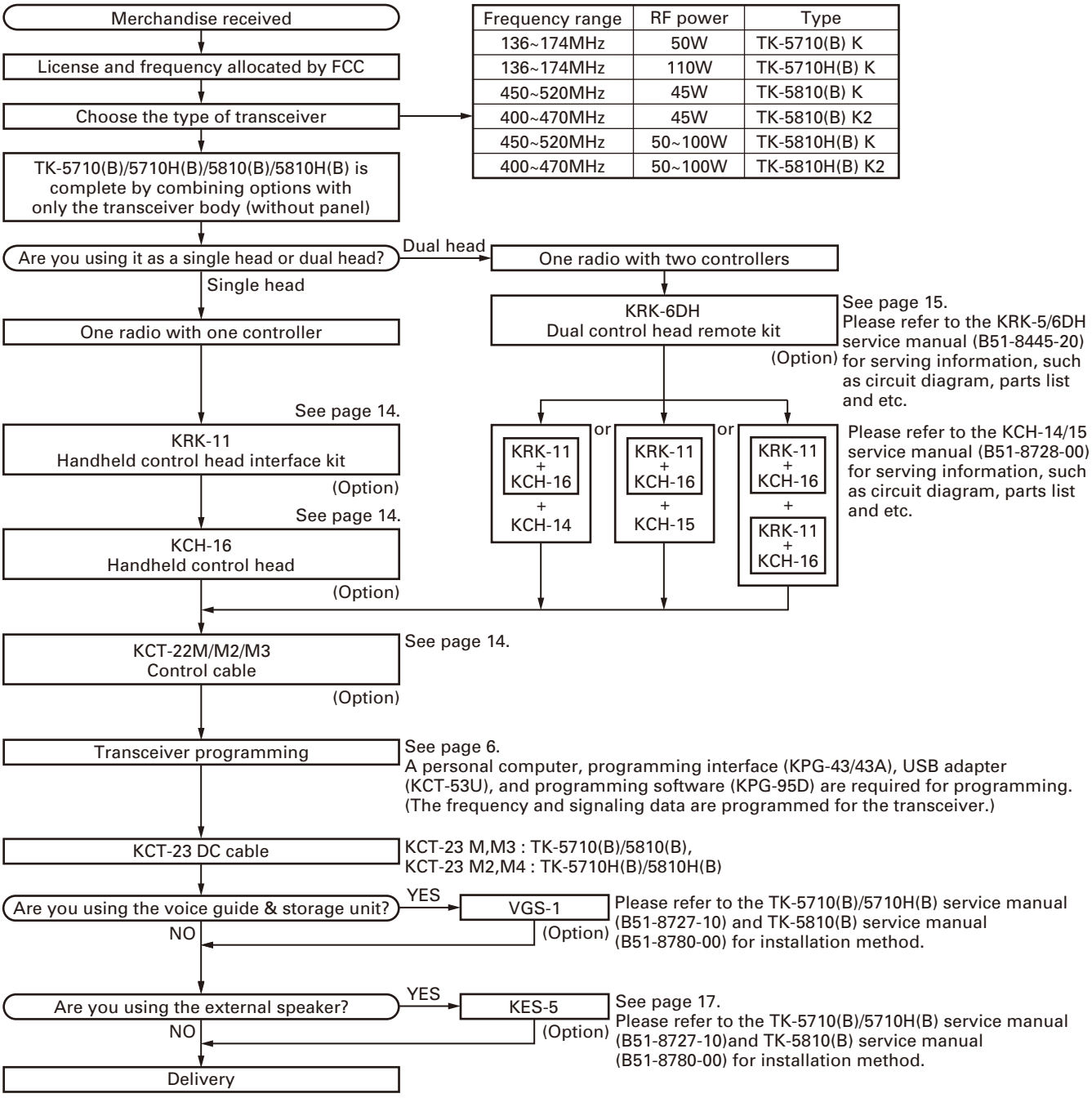
The TK-5710(B)/5710H(B)/5810(B)/5810H(B) is a transceiver main unit (without a panel or speaker) that you complete by adding options.

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

1. Remotely control one radio with one controller. (Form: Radio + KRK-11 + KCH-16 + KCT-22M/M2/M3)
2. Remotely control one radio with two controllers. (Form 1*1: Radio + KRK-6DH + KRK-11 + KCH-16 + KCH-14/15 + KCT-22M/M2/M3 (two), Form 2*2: Radio + KRK-6DH + KRK-11 (two) + KCH-16 (two) + KCT-22M/M2/M3 (two))

*1: Generally connect the KCH-16 to Head 1 side.
*2: It is necessary to perform modification of "2-4. Modification of the KCH-16 (Head 2 side)" described on page 16 if you use the KCH-16 on the Head 2 side.

Frequency range	RF power	Type
136~174MHz	50W	TK-5710(B) K
136~174MHz	110W	TK-5710H(B) K
450~520MHz	45W	TK-5810(B) K
400~470MHz	45W	TK-5810(B) K2
450~520MHz	50~100W	TK-5810H(B) K
400~470MHz	50~100W	TK-5810H(B) K2

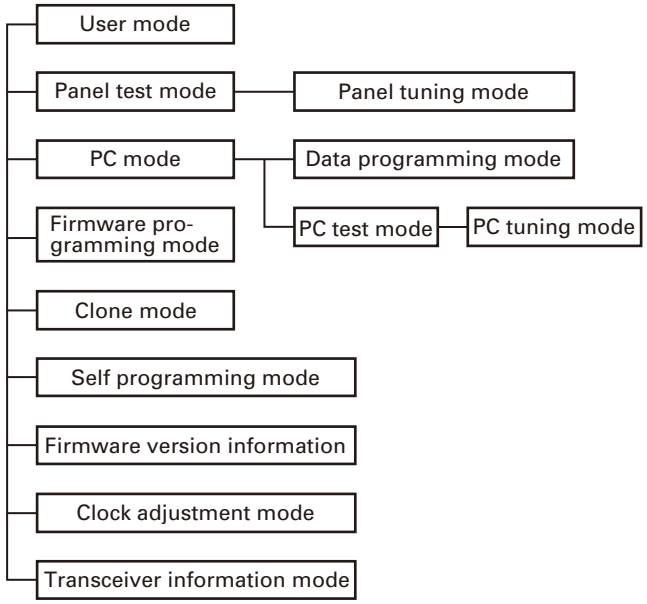


REALIGNMENT

The mode when the KCH-16 Handheld control head is connected with the TK-5710/5710H/5810/5810H transceiver via the KRK-11 Interface box and KRK-11 Panel assembly is described below.

1. Modes

● **Transceiver (TK-5710/5710H/5810/5810H)**



Mode	Function
User mode	For normal use.
Panel test mode	Used by the dealer to check the fundamental characteristics.
Panel tuning mode	Used by the dealer to tune the transceiver.
PC mode	Used for communication between the transceiver and PC (IBM compatible).
Data programming mode	Used to read and write frequency data and other features to and from the transceiver.
PC test mode	Used to check the transceiver using the PC. This feature is included in the FPU. See panel tuning.
Firmware programming mode	Used when changing the main program of the flash memory of the transceiver.
Clone mode	Used to transfer programming data from one transceiver to another.
Self programming mode	You can program the frequency, signaling and other functions using only the transceiver.
Firmware version information	Used to confirm the internal firmware version.
Clock adjustment mode	Used by the dealer to adjust date and time.
Transceiver information mode	Used to confirm the transceiver firmware version.

● **KCH-16**

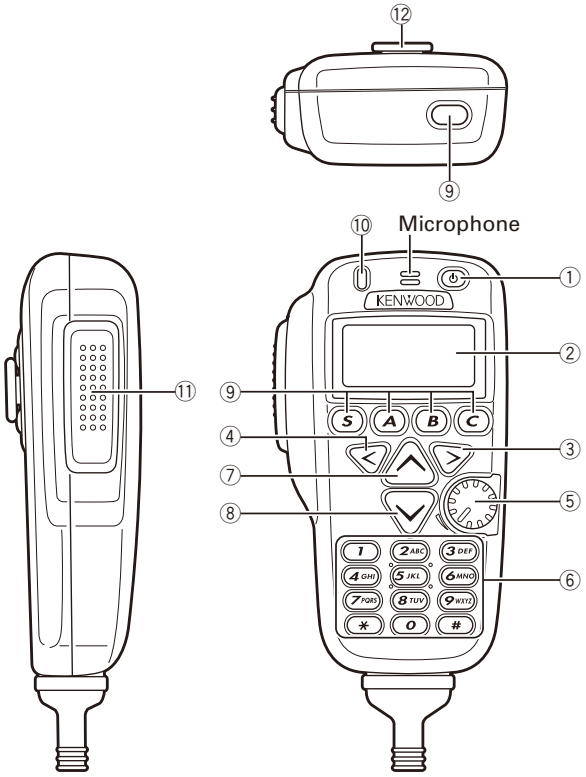
Mode	Function
KCH-16 Firmware programming mode	Used when changing the main program of the flash memory of the KCH-16.

REALIGNMENT

2. How to Enter Each Mode

Mode	Operation
User mode	Power ON
Panel test mode	[S] + Power ON
PC mode	Received commands from PC
Panel tuning mode	[Panel test mode] + [>]
Firmware programming mode	[A] + Power ON
Clone mode	[Orange] + Power ON
Self programming mode	[>] + Power ON
Firmware version information	[B] + Power ON
Clock adjustment mode	[C] + Power ON
Transceiver information mode	[S] + [B] + Power ON
KCH-16 Firmware programming mode	[*] + [#] + Power ON

3. Getting Acquainted



① Power ⏻ switch
Press to switch the transceiver ON. Press and hold for approximately 1 second to switch the transceiver OFF.

② Display

③ Right (Zone Up) > key
Press to increase the zone number (Default setting). Also press to increase setting adjustments.

④ Left (Zone Down) < key
Press to decrease the zone number (Default setting). Also press to decrease setting adjustments.

⑤ VOL (Volume) control
Rotate clockwise to increase the volume level. Rotate counterclockwise to decrease the volume level.

⑥ DTMF keypad
Press the keys on the keypad to make DTMF calls.
The default setting is None (no function).

⑦ Up (Channel Up) ∧ key : PF 6 (Programmable Function) key
Press to increase the channel number (Default setting). Your dealer can also enable the CH key to be used when making setting adjustments, as an optional method for using the Right > key.

⑧ Down (Channel Down) ∨ key :PF 7 (Programmable Function) key
Press to decrease the channel number (Default setting). Your dealer can also enable the CH key to be used when making setting adjustments, as an optional method for using the Left < key.

⑨ S / A / B / C / Orange (Programmable Function) keys
Press to activate their programmable functions.
The default setting is None (no function).

⑩ TX/ BUSY indicator
The TX/ BUSY indicator lights red while transmitting and green while receiving.

⑪ PTT (Push-To-Talk) switch
Press and hold this switch, then speak into the microphone to call a station.

⑫ HOOK

● Key name (function) comparison (in regards to the KCH-14/ KCH-15)

	KCH-14	KCH-15	KCH-16
GRP ∧ (Zone Up)	GRP ∧ (Zone Up)	GRP ∧ (Zone Up)	Right (Zone Up) >
GRP ∨ (Zone Down)	GRP ∨ (Zone Down)	GRP ∨ (Zone Down)	Left (Zone Down) <
CH (Channel)	CH (Channel Up/Down)	CH(Channel Up/Down)	
MON (Monitor)		MON (Monitor)	
SCN (Scan)		SCN (Scan)	
PF 1	PF 1 (None)	PF 1 (None)	S (None)
PF 2	PF 2 (None)	PF 2 (None)	A (None)
PF 3	PF 3 (None)	PF 3 (None)	B (None)
PF 4	PF 4 (None)	PF 4 (None)	C (None)
PF 5	PF 5 (None)	PF 5 (None)	Orange (None)
PF 6		PF 6 (None)	Up (Channel Up) ∧
PF 7		PF 7 (None)	Down (Channel Down) ∨
PF 8		PF 8 (None)	
PF 9		PF 9 (None)	

4. Panel Test Mode

Setting method refer to ADJUSTMENT.

5. Panel Tuning Mode

Setting method refer to ADJUSTMENT.

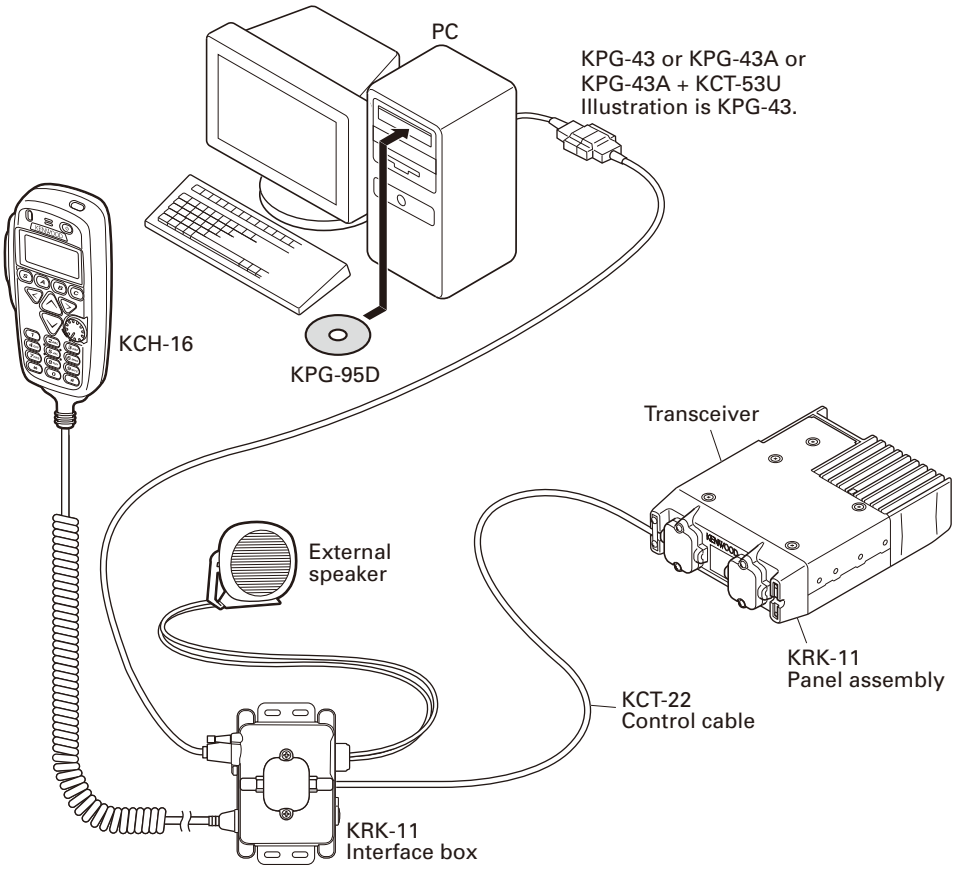
REALIGNMENT

6. PC Mode

6-1. Preface

The TK-5710/5710H/5810/5810H transceiver and the KCH-16 are programmed using a personal computer, programming interface (KPG-43/43A), USB adapter (KCT-53U), programming software (KPG-95D), Interface box (KRK-11), control cable (KCT-22) and Panel assembly (KRK-11).

Figure 1 shows the setup of a PC for programming.



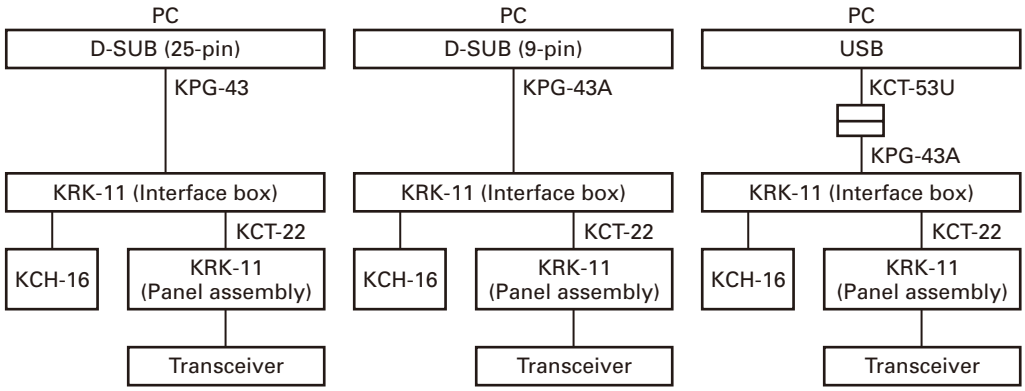


Fig. 1

REALIGNMENT

6-2. Connection procedure

1. Connect the Panel assembly (KRK-11) to the transceiver (TK-5710/5710H/5810/5810H).
2. Connect the Interface box (KRK-11) to the Panel assembly (KRK-11) using the control cable (KCT-22). (Refer to "1-2. Connecting the KRK-11 Panel assembly and Interface box using the KCT-22 control cable" on page 14 for installation details.)
3. Connect the KCH-16 cable to the Interface box.
4. Connect the Interface box to the computer using the interface cable (KPG-43/43A) and USB adapter (KCT-53U : the KCT-53U can be used with the KPG-43A interface cable.)

   Notes:
   - You must install the KCT-53U driver in the computer to use the USB adapter (KCT-53U).
   - When using the USB adapter (KCT-53U) for the first time, plug the KCT-53U into a USB port on the computer with the computer power ON.
5. When the POWER is on, you can immediately enter user mode. When the PC sends a command to the transceiver, it enters PC mode and "PROGRAM" is displayed on the LCD.

   When data is transmitting from the transceiver, the red LED lights.

   When data is receiving by the transceiver, the green LED lights.

   Note:

   The data stored in the computer must match the "Model Name and Market Code" when it is written into the EEPROM and flash memory.

6-3. KPG-43/KPG-43A description (PC programming interface cable: Option)

The KPG-43/43A is required to connect the KRK-11 (Interface box) to the computer. It has a circuit in its D-sub connector (KPG-43: 25-pin, KPG-43A : 9-pin) case that converts the RS-232C logic level to the TTL level.

The KPG-43/43A connects the programming connector of the KRK-11 (Interface box) to the RS-232C serial port of the computer.

6-4. KCT-53U description (USB adapter: Option)

The KCT-53U is a cable which connects the KPG-43A to a USB port on a computer.

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

6-5. Programming software KPG-95D description

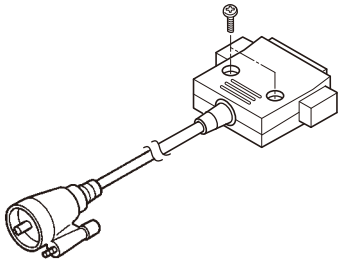
The KPG-95D is the programming software for the transceiver supplied on a CD-ROM. This software runs under MS-Windows 98, ME, Windows 2000, XP or Vista (32-bit) on an IBM-PC or compatible machine.

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

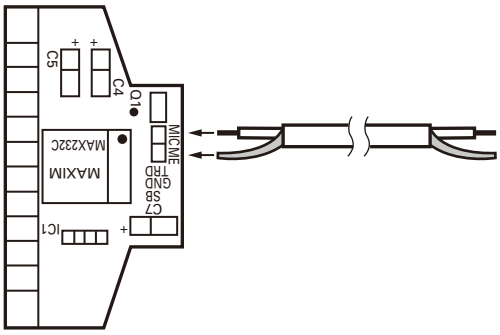
7. PC Tuning Mode

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

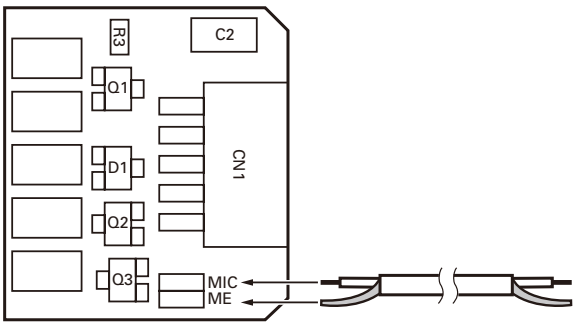
1. Remove the two screws from the plug cover, then lift the cover from the plug.



2. Solder the lead wire onto the MIC tab on the PCB, and the ground wire onto the ME tab.
   - KPG-43

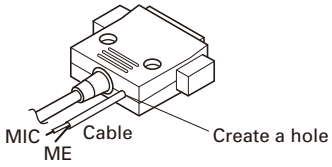


   - KPG-43A



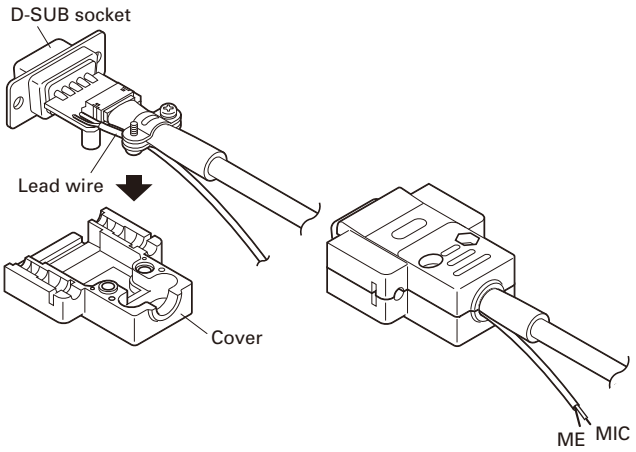
3.
   - KPG-43

   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.



REALIGNMENT

• KPG-43A
Install the D-SUB socket into the cover after aligning the lead wire as shown in the figure.
Replace the cover and secure it using the two screws.



8. Firmware Programming Mode (for transceiver)

8-1. Preface

Flash memory is mounted on the transceiver (TK-5710/5710H/5810/5810H).

This allows the transceiver to be upgraded when new features are released in the future. (For details on how to obtain the firmware, contact Customer Service.)

8-2. Connection procedure

1. Connect the Panel assembly (KRK-11) to the transceiver (TK-5710/5710H/5810/5810H).
2. Connect the Interface box (KRK-11) to the Panel assembly (KRK-11) using the control cable (KCT-22). (Refer to "1-2. Connecting the KRK-11 Panel assembly and Interface box using the KCT-22 control cable" on page 14 for installation details.)
3. Connect the KCH-16 cable to the Interface box.
4. Connect the Interface box to the computer using the interface cable (KPG-43/43A) and USB adapter (KCT-53U : the KCT-53U can be used with the KPG-43A interface cable.). (Connection is the same as in PC Mode.)

8-3. Programming

1. Start up the firmware programming software (Fpro.exe (ver. 3.06a or later)): the Fpro.exe software is in the installed KPG-95D (ver. 5.30 or later) folder.
2. Set the communications speed (normally, 115200 bps) and communications port in the configuration item.
3. Set the firmware to be updated by File name item.
4. Press and hold the [A] key while turning the transceiver power ON. Then, the orange LED on the transceiver lights and "PROG 115200" is displayed.
5. Check the connection between the transceiver, Interface box (KRK-11), Panel assembly (KRK-11) and the personal computer, and make sure that the transceiver is in the Program mode.
6. Press the "write" button in the window. When the transceiver starts to receive data, the [PG] display blinks.
7. If writing ends successfully, the checksum is calculated and a result is displayed.
8. If you want to continue programming other transceivers, repeat steps 4 to 7.

Notes:

- This mode cannot be entered if the Firmware Programming mode is set to Disable in the Programming software.
- TK-5710/5710H (Hardware version 1.0):
  These transceivers use firmware versions 1.00 to 2.99.
  If you attempt to use firmware versions F3.00 or later, a "Check connection" error message will appear on the LCD.
- TK-5710/5710H (Hardware version 2.0):
  These transceivers use firmware versions F3.00 or later.
  If you attempt to use firmware versions 1.00 to 2.99, a "Check connection" error message will appear on the LCD.
- TK-5810/5810H:
  These transceivers use firmware versions F4.00 or later.
  When using firmware versions earlier than version F4.00, a "Check connection" error message will appear on the LCD. Firmware versions earlier than version F4.00 will not write to the transceiver.

8-4. Baud rate change

1. If you press the [C] key while "PROG 115200" is displayed, the display changes to "PROG 57600" (the LED blinks orange). If you press the [C] key again while "PROG 57600" is displayed, the display changes to "PROG 19200" (the LED blinks green) to indicate that the write speed is low speed (19200 bps). If you press the [C] key again while "PROG 19200" is displayed, the display returns to "PROG 115200" (the LED lights orange).
2. If you press the [Orange] key while "PROG 115200" is displayed, the checksum is calculated, and a result is displayed. If you press the [Orange] key again while the checksum is displayed, "PROG 115200" is redisplayed.

Note: Normally, write in the high-speed mode.

9. Clone Mode

Programming data can be transferred from one transceiver to another by connecting them via their microphone jacks. The operation is as follows (the transmitting transceiver is the source and the receiving transceiver is a target).

The following data cannot be cloned.

- Tuning data
- Embedded message with password
- Model name data
- ESN (Electronic Serial Number) data
- Network file data (P25)

REALIGNMENT

1. Press and hold the [Orange] key while turning the transceiver power ON. If the Read authorization password is set to the transceiver, the transceiver displays "CLONE LOCK". If the password is not set, the transceiver displays "CLONE MODE".
2. When you enter the correct password, and "CLONE MODE" is displayed, the transceiver can be used as the cloning source. The following describes how to enter the read authorization password.
3.

• How to enter the read authorization password using the DTMF keypad of the KCH-16;

If one of keys 0 to 9 is pressed while "CLONE LOCK" is displayed, the pressed number is displayed on the LCD. Each press of the key shifts the display in order to the left.

If you press the [#] key, the least digit of the password is deleted.

When you enter the password and press the [S] and [*] keys, "CLONE MODE" is displayed if the entered password is correct. If the password is incorrect, "CLONE LOCK" is redisplayed.

4. Turn the target transceiver power ON.
5. Connect the cloning cable (part No. E30-3370-05) to the microphone jacks of the target transceiver and the programming connector of the Interface box (KRK-11).
6. Press the [A] key on the source transceiver while "CLONE MODE" is displayed.
   The data of the source is sent to the target.
   While the target is receiving the data, "PROGRAM" is displayed. When cloning of the data is completed, the source displays "END", and the target automatically operates in the User mode. The target can then be operated by the same program as the source.
7. The other target can be continuously cloned. When the [A] key on the source is pressed while the source displays "END", the source displays "CLONE MODE".
   Carry out the operations in steps 4 to 6.

Notes:

- Cannot be cloned if the overwrite password is programmed to the target.
- Cannot be cloned if the checksum in the Network File area of the source transceiver and the target transceiver is different.
- "Model Name and Market Code", "Head Configuration" and "Head Type" must be same to clone the transceiver. However, combinations of KCH-15 and KCH-16 can be cloned. In addition, you may be unable to clone the transceiver depending on the enhanced features settings. (Refer to the FPU for the enhanced features details.)
- Under certain conditions, clone mode cannot be activated even if the clone mode of the source transceiver is set to enable. Refer to the FPU for more details.

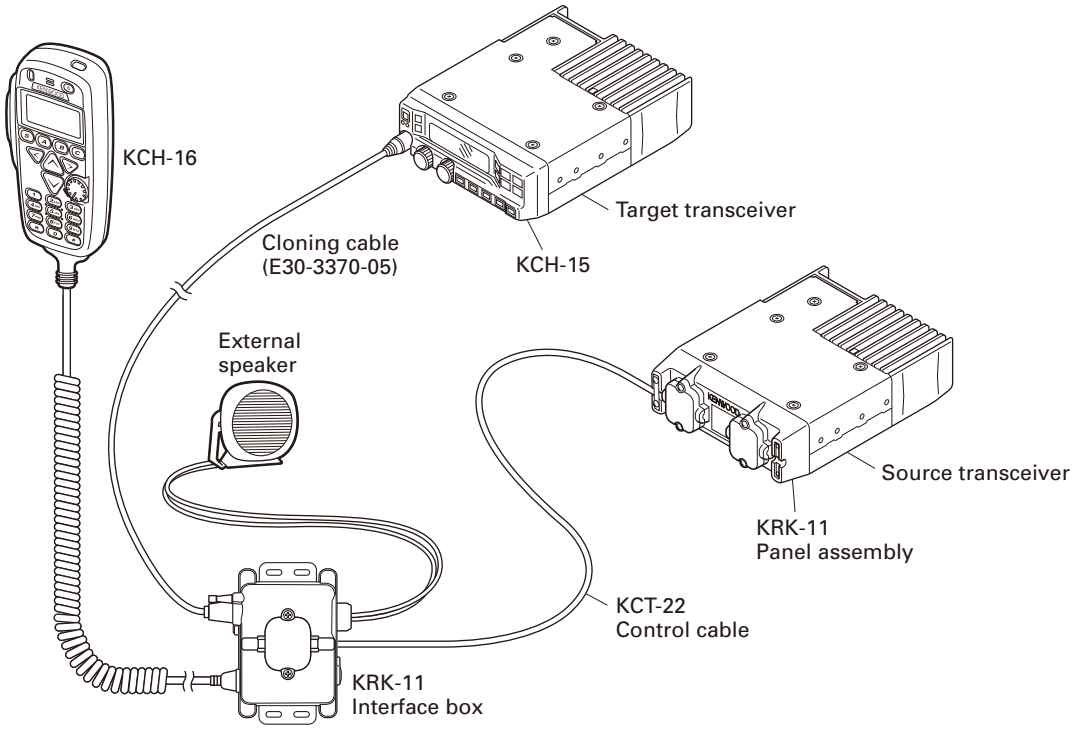
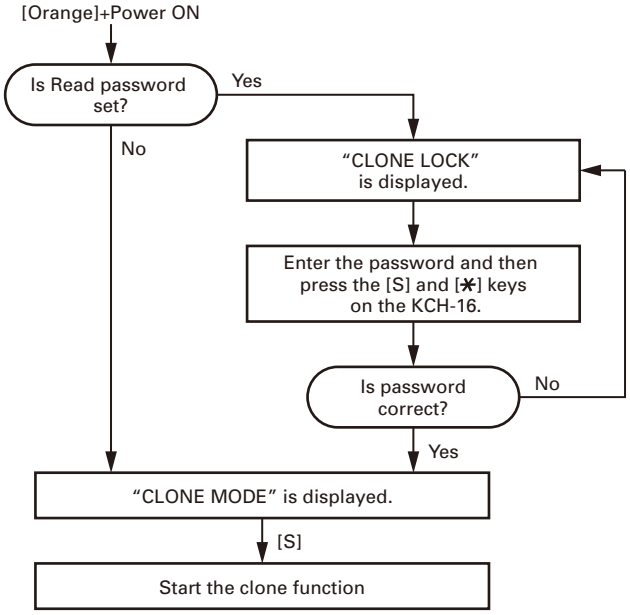


Fig. 2

REALIGNMENT

● **Flow Chart (Source transceiver)**



● **Clone operation depending on hardware and firmware versions (TK-5710/5710H only)**

When Clone is executed between transceivers using different versions of hardware and firmware, the Clone operation is as follows.

• Cloning between transceivers using hardware version 1

Source transceiver (Hardware version 1.0)		Target transceiver (Hardware version 1.0)	Clone operation
Firmware Version		Firamware Version	
~V1.04	→	~V1.04	Yes
		V1.05~V2.99	No
V1.05~V2.99	→	~V1.04	No
		V1.05~V2.99	Yes

Yes : Cloning is possible
No : Cloning is not possible

• Cloning from hardware version 1 to hardware version 2

Source transceiver (Hardware version 1.0)		Target transceiver (Hardware version 2.0)	Clone operation
Firmware Version		Firamware Version	
~V1.04	→	F3.00~	No
V1.05~V2.99	→	F3.00~	Yes

Yes : Cloning is possible
No : Cloning is not possible

Note:
Under certain conditions, cloning cannot be performed even if you are using a proper hardware and firmware combination. Refer to the FPU for more details.

10. Self Programming Mode

Write mode for frequency data and signaling etc. To be used ONLY by the authorized service person maintaining the user's equipment. After programming, reset the FPU to the "Self- Programming" disabled mode. Transceivers CANNOT be delivered to the end-user in the self-programming mode.

The following setup items in the channels programmed by the FPU can be changed using the self-programming mode. The addition of new channels and the deletion of channels that have already been programmed by the FPU cannot be performed using the self-programming mode.

- RX Frequency
- TX Frequency
- Channel Type
- TX Mode (When the channel type is selected "MIXED".)
- Channel Spacing
- RX Signaling
- TX Signaling
- RX NAC
- TX NAC
- Talkgroup List No.

Note:
The personality will be also changed when the abovementioned items are changed. (Refer to the FPU for the personality details.)

10-1. Enter to the self programming mode

Press and hold the [>] key while turning the transceiver power ON. Ignoring whether the Read authorization password is set or not, "PASSWORD" appears.

If the Read authorization password is not set to the transceiver, "SELF PG MODE" is displayed on the LCD when the [A] key is pressed while "PASSWORD" is displayed.

If the password is set to the transceiver, "SELF PG MODE" is displayed on the LCD when you enter the correct password while "PASSWORD" is displayed.

For the password input method, see "9. Clone Mode" step 3 described on page 9.

Note :
This mode (self programming mode) cannot be set when it has been disabled with the FPU.

10-2. Data writing

If the [C] key is pressed while Zone/Channel mode is displayed, new data is written into memory. "WRITING" is displayed while the transceiver is writing data.

REALIGNMENT

The setup items for self programming mode are as follows.

No.	Setup item	Display	Remarks
1	Select Zone/Channel	** - ***	Zone: 1~50, Channel: 1~250
2	RX Frequency	***.*****MHz	Receive frequency
3	TX Frequency	***.*****MHz	Transmit frequency
4	Channel Type	TYPE	ANALOG/P25/MIXED
5	TX Mode	MODE	ANALOG/P25
6	Channel Spacing	SPACE	25.0kHz/12.5kHz (When the Channel type is selected "ANALOG" or "MIXED".) P25 12.5kHz/12.5kHz (When the Channel type is selected "P25".)
7	RX Signaling	RX-SIG	Receive QT/DQT
8	TX Signaling	TX-SIG	Transmit QT/DQT
9	RX NAC	RX-NAC***	000~FFF (Hexadecimal) Note: "F7F" cannot be set.
10	TX NAC	TX-NAC***	000~FFF (Hexadecimal) Note: "F7E" and "F7F" cannot be set.
11	Talkgroup List No.	None	When you do not want to set the Talkgroup list number to the transceiver.
		***	Talkgroup list number (1~250) (When the Talkgroup list name is not set to the transceiver.)
		**********	Talkgroup list name (12 digits) (When the Talkgroup list name is set to the transceiver.)

● Key operation

Normal mode

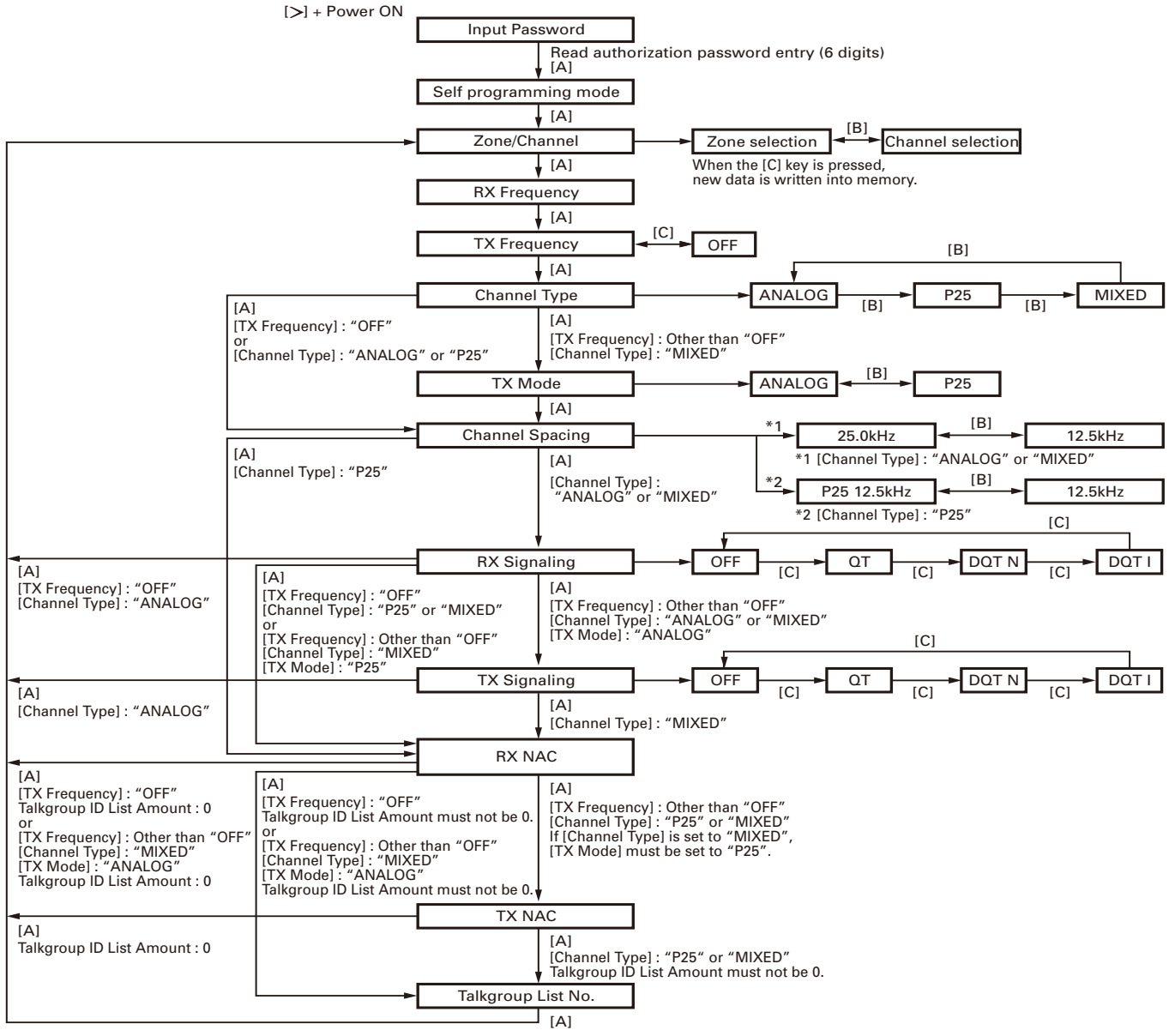
Item / Key	Zone-Channel	RX Frequency	TX Frequency	Channel Type	TX Mode	Channel Spacing	RX Signaling	TX Signaling	RX NAC	TX NAC	TG List No.
[S]	Unused										
[A]	Go to the next item										
[B]	Zone/ Channel switching	2.5kHz/5kHz/ 6.25kHz/7.5kHz/1MHz step switching		ANALOG/ P25/ MIXED switching	ANALOG/ P25 switching	Channel Spacing switching	1step/Standard switching		Delete the least digit from the current number (Press and hold to delete all numbers.)		Unused
[C]	Data Writing	Unused	ON/OFF switching	Unused			QT/DQT(N)/DQT(I)/ OFF switching		Unused		
[Orange]	Unused										
[∧]/[∨]	Zone/ Channel up/ down	1step up/down		Unused			Signaling up/down		Increment/Decrement a number in the specified digit		TG List number up/down
[>]	Zone/ Channel up	1step up		Unused			Signaling up		Determine the least digit		TG List number up
[<]	Zone/ Channel down	1step down		Unused			Signaling down		Unused		TG List number down
Keypad ([0] to [9])	Unused	Go to the keypad input mode		Unused			Go to the keypad input mode		Add a digit to the current number		Unused
Keypad ([✱])	Unused										
Keypad ([#])	Unused								Delete the least digit from the current number (Press and hold to delete all numbers.)		Unused
PTT	Unused								[PTT] + [2]: "A" [PTT] + [5]: "B" [PTT] + [8]: "C" [PTT] + [0]: "D" [PTT] + [#]: "E" [PTT] + [✱]: "F"		Unused

REALIGNMENT

Keypad input mode

Item / Key	RX Frequency	TX Frequency	RX Signaling	TX Signaling
[S]	Cancel the keypad input mode (Return to the normal mode)			
[A]	Cancel the keypad input mode (Return to the normal mode)			
[B]	Delete the least digit from the current number (Press and hold to delete all numbers.)			
[C]	Unused	ON/OFF switching	QT/DQT(N)/DQT(I)/OFF switching	
[Orange]	Unused			
[∧]/[∨]	Unused			
[>]	Unused			
[<]	Unused			
Keypad ([0] to [9])	Add a digit to the current number (Return to the normal mode automatically if all digit are entered.)			
Keypad ([✱])	Cancel the keypad input mode (Return to the normal mode)			
Keypad ([#])	Delete the least digit from the current number (Press and hold to delete all numbers.)			
PTT	Unused			

● Self programming mode flow chart



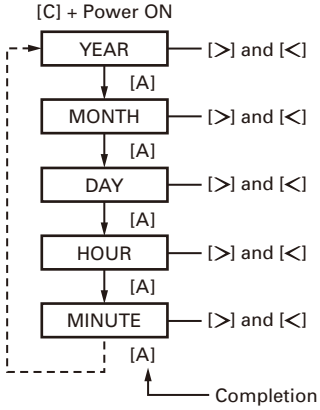
REALIGNMENT

11. Firmware Version Information

Press and hold the [B] key while turning the transceiver power ON and then keep pressing and holding the [B] key, the firmware version information appears on the LCD.

12. Clock Adjustment Mode

12-1. Flow chart of operation



13. Transceiver Information Mode

Use this function to confirm the transceiver firmware version.

1. Press and hold the [S] and [B] keys while turning the transceiver power ON.
2. The transceiver firmware version appears on the LCD.
3. Use the [∧] and [∨] keys to select the confirmation items.
4. To exit the transceiver information mode, turn the transceiver power OFF.

14. KCH-16 Firmware Programming Mode

14-1. Preface

Flash memory is mounted on the KCH-16.

This allows the KCH-16 to be upgraded when new features are released in the future. (For details on how to obtain the firmware, contact Customer Service.)

14-2. Connection procedure

Connect the same way as described in "6-2. Connection procedure" on page 7.

14-3. Programming

1. Start up the firmware programming software (Fpro.exe (ver. 3.06a or later)): the Fpro.exe software is in the installed KPG-95D (ver. 5.30 or later) folder.
2. Set the communications speed (**19200 bps**) and communications port in the configuration item.
3. Set the firmware to be updated by File name item.
4. Press and hold the [*] and [#] keys while turning the KCH-16 power ON. Then, the green LED on the KCH-16 blinks and "PROG 19200 H" is displayed.
5. Check the connection between the transceiver, the KRK-11 (Interface box), the KRK-11 (Panel assembly) and the personal computer, and make sure that the KCH-16 is in the Program mode.
6. Press the "write" button in the window. When the KCH-16 starts to receive data, the [PG] display blinks.
7. If writing ends successfully, the checksum is calculated and a result is displayed.
8. If you want to continue programming other KCH-16, repeat steps 4 to 7.

Notes:

- Before entering KCH-16 Firmware programming mode, be sure to set the Firmware Programming Mode of the FPU to "enable", in order to correctly rewrite the firmware update.
- The baud rate of the KCH-16 Firmware programming mode is fixed at 19200bps. This baud rate cannot be changed.
- In order to enter KCH-16 Firmware programming mode, you must use the key operations of the KCH-16.
- The side set to KCH-16 Firmware programming mode becomes effective when used with two KCH-16's (Dual head).
  * It is necessary to perform modification of "2-4. Modification of the KCH-16 (Head 2 side)" described on page 16 if you use the KCH-16 on the Head 2 side.
- When the Firmware of the transceiver is transferred from Fpro in the KCH-16 Firmware programming mode, ensure that the Firmware of the transceiver is rewritten (the baud rate of the transceiver firmware matches the baud rate of the KCH-16 firmware).
- In the Dual head configuration, when rewriting the KCH-16 firmware with the Head in one side, It is not abnormal operation though the display of the Head (KCH-14, KCH-15 or KCH-16) on the other side may become strange.

14-4. Function

1. If you press the [Orange] key while "PROG 19200 H" is displayed, the checksum is calculated, and a result is displayed on the KCH-16.
   If you press the [Orange] key again while the checksum is displayed, "PROG 19200 H" is redisplayed.

INSTALLATION

1. Transceiver (TK-5710/5710H/5810/5810H)

The KRK-16 Handheld control head is used to remotely operate the transceiver (TK-5710/5710H/5810/5810H).

■ Using the transceiver with one KCH-16 (For use with a single head)

1-1. Installing the KRK-11 Panel assembly onto the transceiver

1. Remove the upper and lower cases of the transceiver.
2. Insert the lead wire with connector (W700) from the transceiver control unit (X53-412) to the connector (CN4) of the KRK-11 Panel assembly.
3. Install the KRK-11 Panel assembly onto the transceiver using four screws (①).

   Note:

   Take care that the lead wire with connector (W700) is not caught when fitting the KRK-11 Panel assembly onto the transceiver.

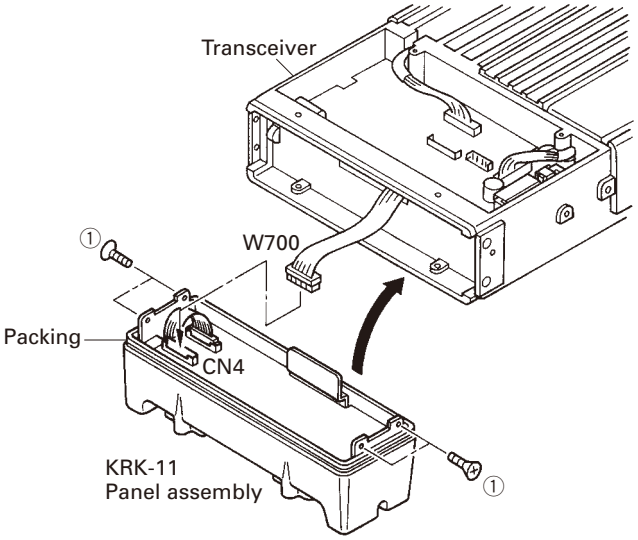


Fig. 1-1-1

4. Affixing the sheet (G11-4379-04) for waterproofing (Fig. 1-1-2).
   (1) Remove the cover paper from the sheet (②).
   (2) Affix the sheet while taking note of the position of the three parts as shown in Fig.1-1-2 (③).
   Firmly affix the sheet to the chassis by pushing the double-coated tape with your fingers.
   (3) Repeat step (2) to affix the sheet to the other side of chassis.

   Note:

   The sheet cannot be reused. Affix a new sheet when you removed the sheet.
5. Reassemble the upper case and lower case of the transceiver. (Refer to the TK-5710(B)/5710H(B) service manual (B51-8727-10) (pages 25 and 26) or the TK-5810(B) service manual (B51-8780-00) (page 23).)

   Note:

   Take care that the sheet (G11-4379-04) does not peel off when installing the upper/lower case.

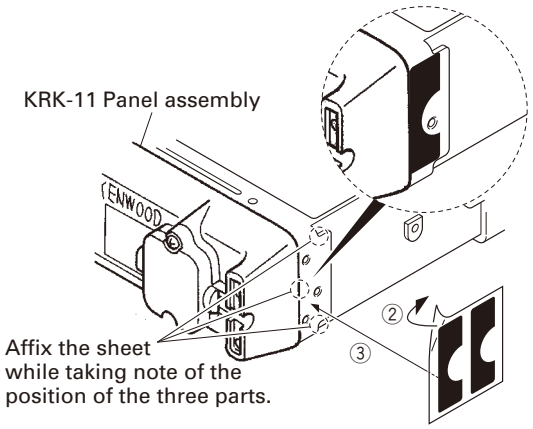


Fig. 1-1-2

1-2. Connecting the KRK-11 Panel assembly and Interface box using the KCT-22 control cable

1. Insert one connector of the control cable to the transceiver (with KRK-11 Panel assembly) and the other to the KRK-11 Interface box.
   Connect each GND cable with each GND terminal of the KRK-11 Panel assembly and KRK-11 Interface box using the screw (①) supplied with the control cable.
2. Secure the one connector of the control cable to the KRK-11 Panel assembly using two screws (②) according to the installation condition of the transceiver.
3. Secure the control cable to the KRK-11 Panel assembly with the cable fitting (J21-4354-04) and the two screws (③) supplied with the KRK-11.
4. Secure the other connector of the control cable to the KRK-11 Interface box using two screws (④) in the same way.

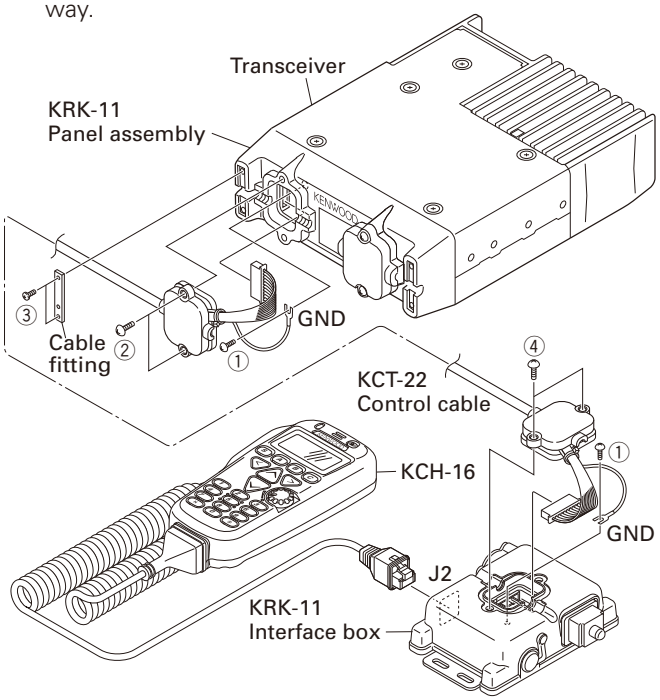


Fig. 1-2

INSTALLATION

1-3. Connecting the KCH-16 cable to the KRK-11 Interface box.

1. Connect the 8-pin connector of the KCH-16 cable to the control connector (J2) of the KRK-11 Interface box.

■ Using the transceiver with two KCH-16's (For use with dual heads)

2-1. Installing the KRK-6DH main panel onto the transceiver

1. Remove the upper and lower cases of the transceiver.
2. Insert the lead wire with connector (W700) from the transceiver control unit (X53-412) to the connector (CN4) of the KRK-6DH main panel.
   Insert the lead wire with connector (W104) from the KRK-6DH main panel to the connector (CN724) of the transceiver.
3. Install the KRK-6DH main panel on the transceiver using four screws (①).
   Note:
   Take care that the lead wire with connector (W700) is not caught when fitting the KRK-6DH main panel onto the transceiver.

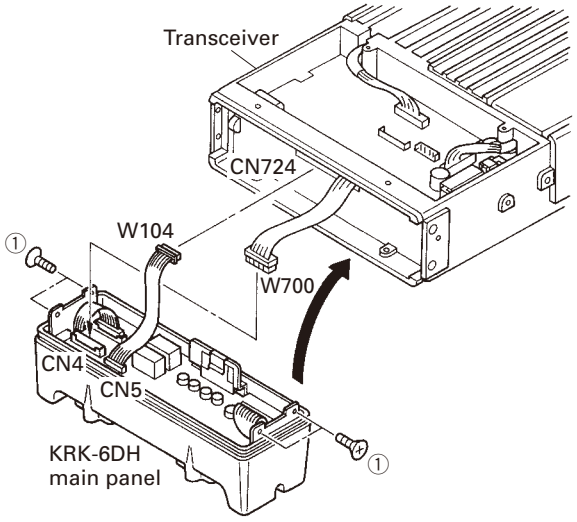


Fig. 2-1-1

4. Affixing the sheet (G11-4379-04) for waterproofing (Fig. 2-1-2).
   (1) Remove the cover paper of the sheet (②).
   (2) Affix the sheet while taking note of the position of the three parts as shown in Fig.2-1-2 (③).
   Firmly affix the sheet to the chassis by pushing the double-coated tape with your fingers.
   (3) Repeat step (2) to affix the sheet to the other side of chassis.
   Note:
   Take care that the sheet (G11-4379-04) does not peel off when installing the upper/lower case.
5. Reassemble the upper case and lower case of the transceiver. (Refer to the TK-5710(B)/5710H(B) service manual (B51-8727-10) (pages 25 and 26) or the TK-5810(B) service manual (B51-8780-00) (page 23).)
   Note:
   Take care that the sheet (G11-4379-04) is not peeled off when installing the upper/lower case.

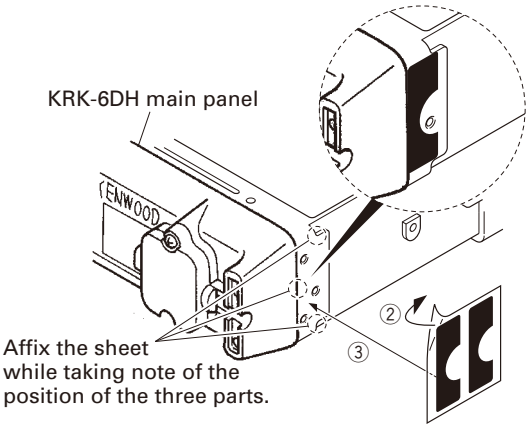


Fig. 2-1-2

2-2. Connecting the KRK-6DH main panel and KRK-11 Interface box using the KCT-22 control cable

1. Use two KCT-22 control cables. Insert one connector of the first control cable to the transceiver (with KRK-6DH Head 1 side) and the other to the KRK-11 Interface box 1. Insert one connector of the second control cable to the transceiver (with KRK-6DH Head 2 side) and the other to the KRK-11 Interface box 2.
   Connect each GND cable to each GND terminal of the KRK-6DH Head 1/Head 2 and KRK-11 Interface box 1/ Interface box 2 using the screw (①) supplied with each control cable.
2. Secure the one connector of each control cable to the KRK-6DH main panel Head 1/Head 2 using two screws (②) according to the installation condition of the transceiver.
3. Pass the control cables through the grooves at both ends of the KRK-6DH main panel and secure the control cables to the KRK-6DH with the cable fitting (J21-4354-04) and the two screws (③) supplied with the KRK-6DH.
4. Secure the other connector of the control cable to the KRK-11 Interface box 1/Interface box 2 with two screws (④) in the same way.

INSTALLATION

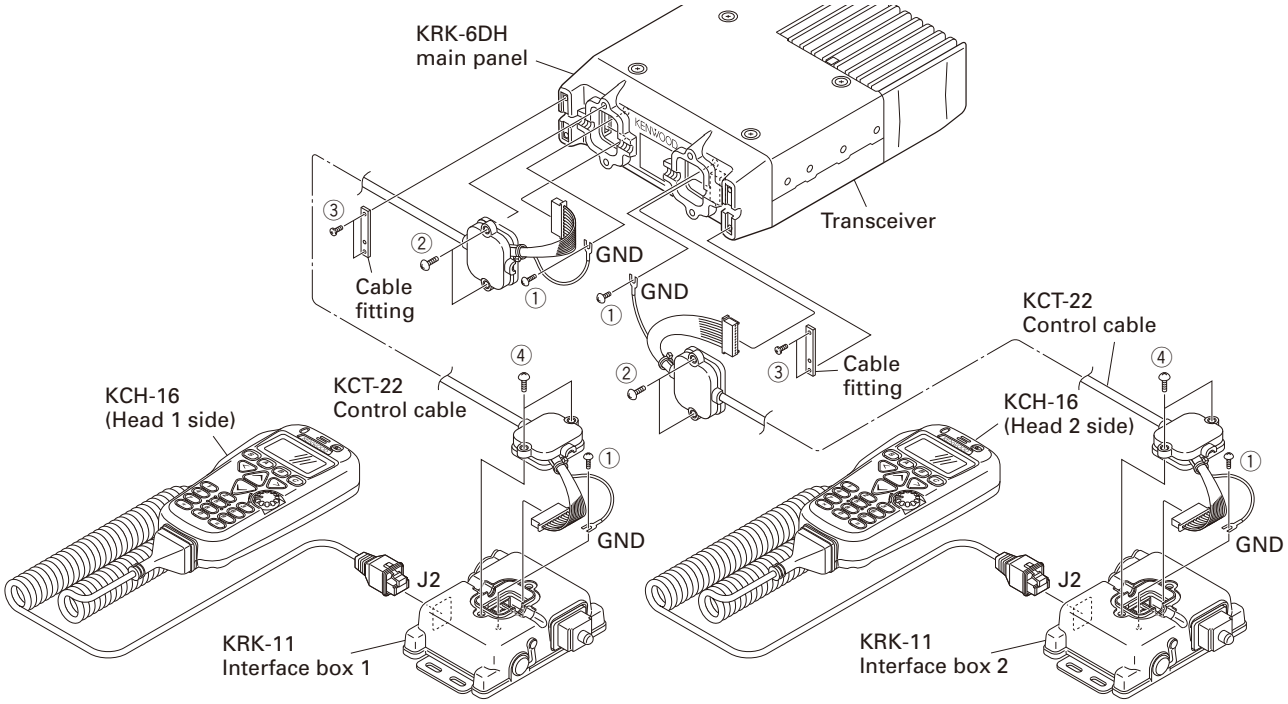


Fig. 2-2

2-3. Connecting the KCH-16 (Head 1 side)/KCH-16 (Head 2 side) cable to the KRK-11 Interface box 1/Interface box 2

1. Connect the 8-pin connectors of the KCH-16 (Head 1 side)/KCH-16 (Head 2 side) cable to the control connectors (J2) of the the KRK-11 Interface box 1/Interface box 2.

Note:

When you use it as a dual head (combinations of KCH-16 and KCH-14/15 etc.), Generally connect the KCH-16 to Head 1 side. The KCH-16 is set to the Head 1 side by factory default.

It is necessary to perform modification of "2-4. Modification of the KCH-16 (Head 2 side)" if you use the KCH-16 on the Head 2 side.

2-4. Modification of the KCH-16 (Head 2 side)

Perform the modification of KCH-16 (Head 2 side) as follows.

1. Remove the chip resistor (R90).
2. Place the chip resistor (removed in step 1) on the R84 land pattern.

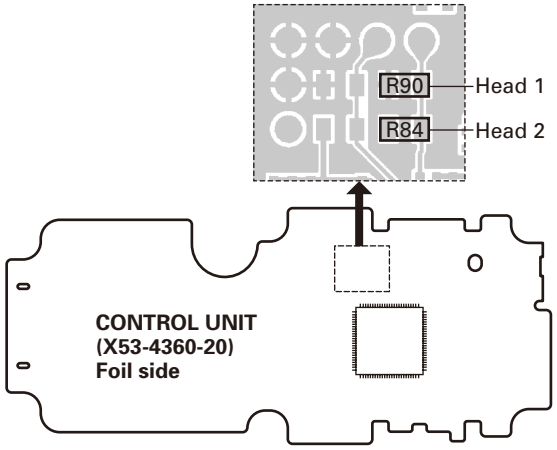


Fig. 2-4

Note:

Connect the KCH-16 for Head 1 to the Head 1 side, and the KCH-16 changed for Head 2 to the Head 2 side correctly, respectively.

When the KCH-16 for Head 1 is connected to the Head 2 side, or the KCH-16 changed for Head 2 is connected with the Head 1 side, take care that voice is not be transmitted even if the PTT switch is pressed and that the key operations do not operate correctly.

INSTALLATION

3. External Speaker (KES-5: Option)

The speaker output from the KCH-16 is as follows:

1. The external speaker output from the accessory connector (6-pin) on the KRK-11 Interface box is 12W/4 ohms. Use the KES-5.

Note:
Since the transceiver uses a BTL audio amplifier, do not ground the speaker output pin.

3-1. Connecting the KES-5 external speaker to the KRK-11 interface box

1. Remove the rubber cap from the KRK-11 interface box.
2. Cut off the end of the rubber cap, insert the KES-5 speaker cable into the cap, and insert it into pins 4 and 5 of the square plug.
3. Connect the square plug and rubber cap to the accessory connector (6-pin) on the KRK-11 interface box, then clamp the bottom of the rubber cap with the supplied tie wrap.

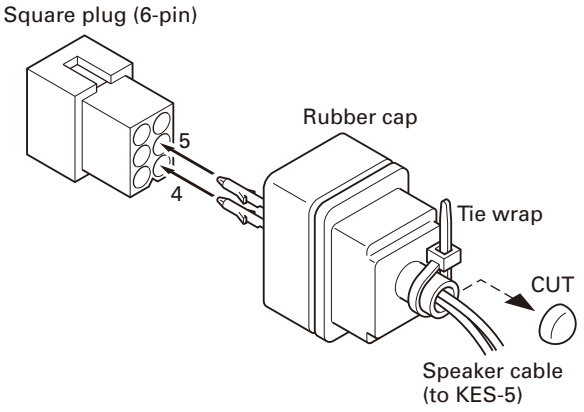


Fig. 3-1

4. Ignition Sense Cable (KCT-18: Option)

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

• 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.

• Timed power-off function

The timed power-off function turns the transceiver's power off at the time specified with the programming software (KPG-95D) 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.

4-1. Connecting the KCT-18 cable to the KRK-11 interface box

1. Remove the rubber cap from the KRK-11 interface box.
2. Cut off the end of the rubber cap, insert the KCT-18 lead terminal into the rubber cap, and insert it into pin 1 (IGN) of the square plug.
3. Connect the square plug and rubber cap to the accessory connector (6-pin) on the KRK-11 interface box, then clamp the bottom of the rubber cap with the supplied tie wrap.

Note: You must setup using the KPG-95D.

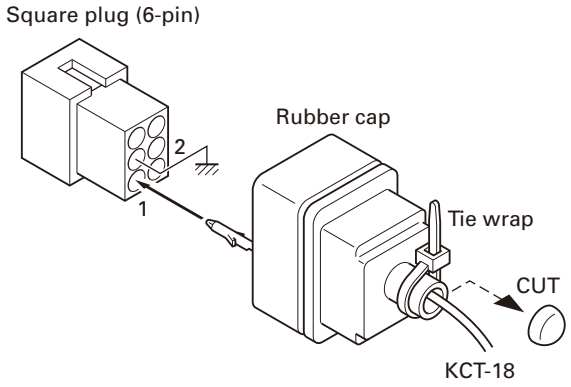


Fig. 4-1

DISASSEMBLY FOR REPAIR

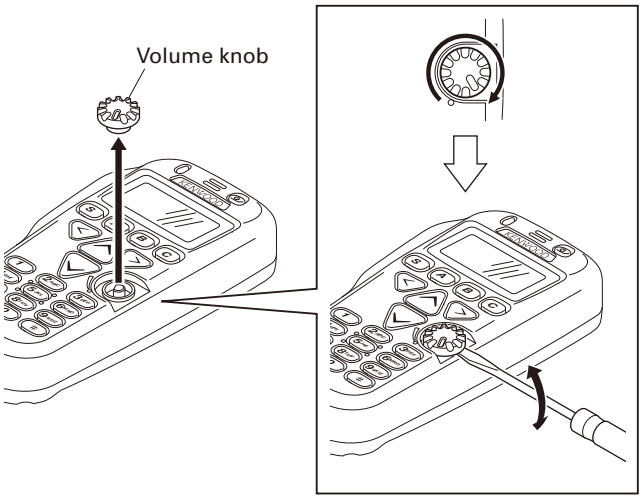
Precautions for Disassembly

■ Removing the case packing (G53-1805-02)

Remove the case packing from the front case slowly, so as not to stress the MIC2 lead wires.

■ Removing the volume knob (K29-9430-03)

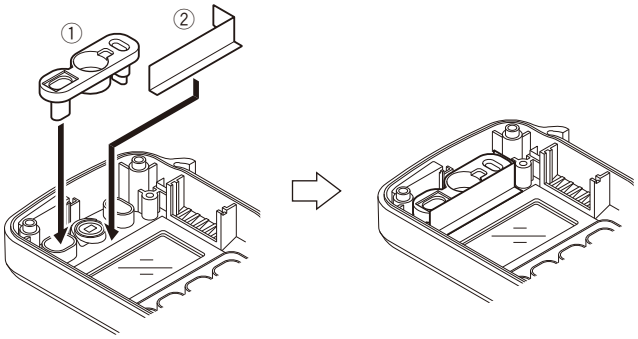
1. Rotate the volume knob fully clockwise.
2. Insert a flat-head screwdriver between the volume knob and the case.
   Note: Use a flat-head screwdriver with a blade thickness of 0.5mm or less.
3. Remove the volume knob while prying the flat-head screwdriver up and down.
   Note: Remove the volume knob carefully, as there is a possibility of damaging the case.



Precautions for Reassembly

■ Installing the power switch key top (K29-9433-03) and shading board (F15-1017-04)

1. Insert the power switch key top ① onto the case.
2. Insert the shading board ② onto the case.



3. Mount the Control unit onto the case.

CIRCUIT DESCRIPTION / COMPONENTS DESCRIPTION

1. Power supply

Power is supplied to the CPU by converting SB from the transceiver, via the KRK-11, to 5V by IC4. Additionally, SB is supplied to the LED for the backlight.

2. 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 transceiver via the KRK-11.

Data is displayed on the 14-digit and 3-digit dot matrix alphanumeric displays.

3. LCD

The LCD is controlled using the bus lines on the connector (CN1) of the Control unit (X53-436). It corrects the LCD contrast voltage using VR2.

4. Key detection circuit

Keys are detected using the key scan circuit in IC9. The KEYI signals that are normally pulled up go low when any key is pressed.

5. LCD brightness function

From the control of the CPU's DM1/DM2 port, you can switch the LCD backlight as shown in the following table:

LCD brightness setting	LCD	KEY
H	H	ON
M	M	ON
L	L	ON
OFF	OFF	OFF

6. Noise cancelling microphone circuit

The two signals from INT MIC (Main & Sub) are input to the positive (+) input (Sub) and to the negative (–) input (Main) of IC3. If the same signal is input to both the Main and Sub, the Main signal is canceled at the output of IC3 (pin 7). In other words, if noise from a nearby source, not directly connected to the transceiver, enters the Main and Sub inputs, it is canceled out.

When a signal is only input to the Main and there is no signal at the Sub, the Main signal is output as is, from IC3 (pin 7). In other words, only the voice audio of the operator in close proximity to the Main MIC is input to the Main, and that voice signal is output from IC3 (pin 7).

CONTROL UNIT (X53-4360-20)

Ref. No.	Part name	Description
IC1	IC	Voltage doubling inverter
IC2	IC	LCD contrast
IC3	IC	MIC AMP
IC4	IC	5V AVR
IC5,6	IC	Bus switch
IC8	IC	3.3V AVR
IC9	IC	CPU
Q1	Transistor	9V AVR
Q2,3	Transistor	LCD/12key backlight switch
Q4	FET	LCD/12key backlight switch
Q5	FET	LCD reset switch
Q6	Transistor	LCD backlight switch
Q7,8	Transistor	Hook switch
Q9	FET	DC switch
Q10,11	Transistor	TRD switch
Q12,13	Transistor	PF key backlight switch
Q14	Transistor	BUSY LED switch
Q15	Transistor	TX LED switch
D1	Varistor	Current protection
D2	Zener diode	Voltage reference
D3	Diode	Voltage reference
D6,7	LED	LCD backlight
D8	Varistor	Surge absorption
D9,10	LED	LCD backlight
D11~14	LED	12key backlight
D17~20	Diode	12key control
D21	Diode	DC switch
D24~31	LED	PF key backlight
D32	LED	BUSY LED red
D33	LED	BUSY LED green
D34	LED	TX LED red
D35	LED	TX LED green

SEMICONDUCTOR DATA

CPU: 3062LFGPUKCTA (Control unit IC9)

Pin No.	Port Name	I/O	Function
1	KEYI0	I	Key matrix input 0
2	KEYO3	O	Key matrix output 3
3	KEYO2	O	Key matrix output 2
4	KEYO1	O	Key matrix output 1
5	KEYO0	O	Key matrix output 0
6	BYTE	I	+5V (H: 8bit bus)
7	CNVSS	-	Pull down
8	NC	-	Not used
9	SFT	O	Beat shift (H: ON)
10	RESET	I	CPU reset
11	XOUT	O	14.7456MHz clock output
12	VSS	-	GND
13	XIN	I	14.7456MHz clock input
14	VCC	-	+5V
15	NMI	I	Not used
16	NC	-	Not used
17	INT 1	-	Not used
18	INT 0	I	RXD interrupt
19	PTT	I	PTT (L: ON)
20	LCONT	O	LCD Contrast (H: ON)
21	HOOK	I	HOOK (L: ON)
22	KVL	I	KVL3000 (L: Connect)
23~26	NC	-	Not used
27	RXD2	I	Serial interface from Deck (Open drain)
28	TXD2	O	Serial interface to Deck (Open drain)
29	TXD	-	Not used
30	RXD	-	Not used
31	SCLK	-	Not used
32	BUSY	-	Not used
33	EEPDT	-	Not used
34	EEPCL	-	Not used
35,36	NC	-	Not used
37	RDY	-	Not used
38	ALE	-	Not used
39	EPM	-	Not used
40	HLDA	-	Not used
41	BCLK	-	Not used
42	RD	-	Not used

Pin No.	Port Name	I/O	Function
43	BHE	-	Not used
44	WR	O	LCD driver bus WR
45	DM2	O	Display backlight control 2
46	DM1	O	Display backlight control 1
47	LCDRST	O	LCD driver reset
48	CS0	-	LCD driver bus CS
49	BUSYR	O	BUSY LED Red (H: ON)
50	BUSY	O	BUSY LED Green (H: ON)
51	TX	O	TX LED Red (H: ON)
52	TXG	O	TX LED Green (H: ON)
53~59	A15~A9	-	Not used
60	VCC	-	+5V
61	A8	-	Not used
62	VSS	-	GND
63~69	A7~A1	-	Not used
70	A0	O	LCD driver bus A0
71	PF4	I	[C] key
72	PF3	I	[B] key
73	PF2	I	[A] key
74	PF1	I	[S] key
75,76	NC	-	Not used
77	EDN	I	[∨] key
78	EUP	I	[∧] key
79~86	D7~D0	I/O	LCD driver data bus
87,88	NC	-	Not used
89	ZDN	I	[<] key
90	ZUP	I	[>] key
91	PF5	I	[Orange] key
92	1/2	I	Head 1/2 check (L: Head 1)
93	VOL	I	Volume control
94	AVSS	-	GND
95	B/F	I	Basic/Full panel check (H: Full panel (KCH-16))
96	VREF	-	+5V
97	AVCC	-	+5V
98	TEST	I	LCD check mode (H: Normal mode)
99	KEYI2	I	Key matrix input 2
100	KEYI1	I	Key matrix input 1

PARTS LIST

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

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

KCH-16 (Y61-3400-20)
CONTROL UNIT (X53-4360-20)

Ref. No.	Address	New parts	Parts No.	Description	Destination
KCH-16					
1	1B	✻	A02-4051-01	MAIN CABINET	
3	1A	✻	B10-2788-03	FRONT GLASS	
4	2A		B11-1853-24	FILTER (LCD)	
5	2A		B11-1854-02	ILLUMINATION GUIDE (LCD)	
6	2A		B38-0923-05	LCD ASSY	
7	1A	✻	B43-1627-04	BADGE (KENWOOD)	
8	1D	✻	B62-2101-00	INSTRUCTION MANUAL	
9	3B	✻	B72-2524-04	MODEL NAME-PLATE	
11	2B	✻	E30-7661-05	CURL CABLE	
12	1A,2A		E37-0674-15	LEAD WIRE WITH CONNECTOR (PTT)	
13	1B		E37-1217-05	LEAD WIRE WITH CONNECTOR (VOL)	
15	1A	✻	F15-1017-04	SHADE (ABOVE LCD)	
17	1A	✻	G01-4563-04	COIL SPRING (PTT)	
18	1B		G09-0440-05	KNOB SPRING (VOL)	
19	1A,2A	✻	G10-1393-04	FIBROUS SHEET (ECM)	
20	1A	✻	G13-2268-04	CUSHION (FRONT GLASS)	
21	2A		G53-1609-14	PACKING (NOICAN ECM)	
22	1B		G53-1768-04	PACKING (VOL,O-RING)	
23	1B	✻	G53-1804-04	PACKING (VOL)	
24	2B	✻	G53-1805-02	PACKING (CASE)	
26	2C		J19-5482-05	HANGER ACCESSORY	
27	1A	✻	J21-8600-04	MOUNTING HARDWARE (ORANGE KEY)	
28	1A,2A	✻	J30-1305-04	SPACER (ECM)	
29	1A,2A		J99-0714-04	ADHESIVE SHEET (LCD)	
31	1B	✻	K29-9430-03	KNOB (VOL)	
32	1A	✻	K29-9431-03	KNOB (PTT)	
33	1A	✻	K29-9432-03	KEY TOP (ORANGE KEY)	
34	1A	✻	K29-9433-03	KEY TOP (POWER/LED)	
35	1B	✻	K29-9434-02	KEY TOP (20KEY)	
36	1A	✻	K29-9435-04	BUTTON KNOB (PTT)	
A	1B		N14-0584-14	CIRCULAR NUT (VOL)	
C	2A,2B		N80-2005-48	PAN HEAD TAPTITE SCREW	
D	3A,3B	✻	N80-3012-43	PAN HEAD TAPTITE SCREW	
38	3A	✻	X60-3880-20	REAR PANEL ASSY	
CONTROL UNIT (X53-4360-20)					
D6,7			B30-2215-05	LED	
D9,10			B30-2215-05	LED	
D11-14			B30-2050-05	LED	
D33,35			B30-2292-05	LED	
D32,34			B30-2317-05	LED	
D24-31			B30-2050-05	LED	
C1			CS77AP1C2R2M	CHIP TNTL 2.2UF 16WV	
C2,3			CC73HCH1H101J	CHIP C 100PF J	
C4			CK73HB0J105K	CHIP C 1.0UF K	
C5			CC73HCH1H101J	CHIP C 100PF J	
C6			CS77AP1C2R2M	CHIP TNTL 2.2UF 16WV	
C7			CK73HB1H102K	CHIP C 1000PF K	
C8			CK73HB1A104K	CHIP C 0.10UF K	
C9			CK73GB1H102K	CHIP C 1000PF K	
C10			CK73HB1H102K	CHIP C 1000PF K	
C11			CC73HCH1H101J	CHIP C 100PF J	
C12			CK73GB1C104K	CHIP C 0.10UF K	
C13,14			CK73GB1E105K	CHIP C 1.0UF K	
C15			CS77AP1C2R2M	CHIP TNTL 2.2UF 16WV	
C16-19			CK73GB1E105K	CHIP C 1.0UF K	
C20			CK73HB1A104K	CHIP C 0.10UF K	
C21			CC73GCH1H470J	CHIP C 47PF J	
C22			CK73GB1C104K	CHIP C 0.10UF K	
C23,24			CK73HB1A104K	CHIP C 0.10UF K	
C25		✻	CK73GB0J106M	CHIP C 10UF M	
C26			CS77AA1A100M	CHIP TNTL 10UF 10WV	
C27			CK73HB1H471K	CHIP C 470PF K	
C28		✻	CK73GB0J106M	CHIP C 10UF M	
C29			CK73HB1A104K	CHIP C 0.10UF K	
C30			CK73HB0J105K	CHIP C 1.0UF K	
C31			CC73HCH1H101J	CHIP C 100PF J	
C32,33			CK73HB1H471K	CHIP C 470PF K	
C34			CC73HCH1H101J	CHIP C 100PF J	
C35			CK73HB1A104K	CHIP C 0.10UF K	
C36			CC73HCH1H221J	CHIP C 220PF J	
C38			CK73HB0J105K	CHIP C 1.0UF K	
C39			CK73HB1E103K	CHIP C 0.010UF K	
C40			CC73HCH1H101J	CHIP C 100PF J	
C42			CK73HB1E223K	CHIP C 0.022UF K	
C43			CK73HB1A104K	CHIP C 0.10UF K	
C44			CK73HB1H102K	CHIP C 1000PF K	
C45			CK73HB1A104K	CHIP C 0.10UF K	
C46			CK73HB0J105K	CHIP C 1.0UF K	
C47			CC73HCH1H101J	CHIP C 100PF J	
C48			CK73HB1H471K	CHIP C 470PF K	
C49			CC73HCH1H030C	CHIP C 3.0PF C	
C50,51			CC73HCH1H150J	CHIP C 15PF J	
C52,53			CK73GB1C104K	CHIP C 0.10UF K	
C54			CK73GB1H102K	CHIP C 1000PF K	
C55			CK73GB1C104K	CHIP C 0.10UF K	
C56			CK73GB1H102K	CHIP C 1000PF K	
C57,58			CC73HCH1H101J	CHIP C 100PF J	
C59,60			CK73HB1H102K	CHIP C 1000PF K	
C61,62			CC73HCH1H101J	CHIP C 100PF J	
C63-66			CK73HB1H102K	CHIP C 1000PF K	
C67-71			CC73HCH1H101J	CHIP C 100PF J	
C73,74			CK73HB1E103K	CHIP C 0.010UF K	
C80		✻	CK73GB0J106M	CHIP C 10UF M	
C81			CK73GB1A105K	CHIP C 1.0UF K	
C84			CK73HB1E103K	CHIP C 0.010UF K	
C88			CK73HB1A104K	CHIP C 0.10UF K	
C93			CK73HB1H471K	CHIP C 470PF K	
C117			CK73HB1H471K	CHIP C 470PF K	
CN1			E40-6755-05	FLAT CABLE CONNECTOR	
CN2			E40-6762-05	FLAT CABLE CONNECTOR	
CN3			E41-2539-05	PIN ASSY	

PARTS LIST

CONTROL UNIT (X53-4360-20)

Ref. No.	Address	New parts	Parts No.	Description	Destination
CN4			E41-1487-05	PIN ASSY	
CN5			E41-2539-05	PIN ASSY	
J2			E58-0475-05	MODULAR JACK	
L1			L92-0155-05	CHIP FERRITE	
L2			L92-0162-05	BEADS CORE	
L3			L92-0140-05	CHIP FERRITE	
L4			L92-0162-05	BEADS CORE	
L5			L92-0451-05	CHIP FERRITE	
X1			L77-1956-05	CRYSTAL RESONATOR (14.7456MHZ)	
CP1-4			RK75HA1JR00J	CHIP-COM 0.00 J 1/16W	
R1			RK73HB1J123J	CHIP R 12K J 1/16W	
R2,3			RK73HB1J103J	CHIP R 10K J 1/16W	
R4			RK73HB1J104J	CHIP R 100K J 1/16W	
R5			RK73HB1J561J	CHIP R 560 J 1/16W	
R6			RK73HB1J470J	CHIP R 47 J 1/16W	
R7			RK73HB1J105J	CHIP R 1.0M J 1/16W	
R8			RK73HB1J222J	CHIP R 2.2K J 1/16W	
R9			RK73GB2A000J	CHIP R 0.0 J 1/10W	
R10			RK73HB1J100J	CHIP R 10 J 1/16W	
R11			RK73GB2A123J	CHIP R 12K J 1/10W	
R12			RK73HB1J101J	CHIP R 100 J 1/16W	
R13			RK73HB1J683J	CHIP R 68K J 1/16W	
R14,15			RK73HB1J000J	CHIP R 0.0 J 1/16W	
R16			RK73GB2A000J	CHIP R 0.0 J 1/10W	
R17			RK73HB1J333J	CHIP R 33K J 1/16W	
R18			RK73HB1J273J	CHIP R 27K J 1/16W	
R19			RK73HB1J222J	CHIP R 2.2K J 1/16W	
R20			RK73HB1J000J	CHIP R 0.0 J 1/16W	
R21			RK73HB1J272J	CHIP R 2.7K J 1/16W	
R22-29			RK73HB1J103J	CHIP R 10K J 1/16W	
R30			RK73HB1J331J	CHIP R 330 J 1/16W	
R31,32			RK73HB1J102J	CHIP R 1.0K J 1/16W	
R33			RK73HB1J472J	CHIP R 4.7K J 1/16W	
R34			RK73HB1J474J	CHIP R 470K J 1/16W	
R35,36			RK73HB1J103J	CHIP R 10K J 1/16W	
R37			RK73HB1J102J	CHIP R 1.0K J 1/16W	
R38			RK73HB1J103J	CHIP R 10K J 1/16W	
R39,40			RK73HB1J000J	CHIP R 0.0 J 1/16W	
R41			RK73HB1J473J	CHIP R 47K J 1/16W	
R42,43			RK73GB2A101J	CHIP R 100 J 1/10W	
R45			RK73HB1J000J	CHIP R 0.0 J 1/16W	
R46			RK73GB2A121J	CHIP R 120 J 1/10W	
R47			RK73GB2A331J	CHIP R 330 J 1/10W	
R48			RK73HB1J472J	CHIP R 4.7K J 1/16W	
R49			RK73GB2A000J	CHIP R 0.0 J 1/10W	
R50			RK73HB1J000J	CHIP R 0.0 J 1/16W	
R52			RK73HB1J473J	CHIP R 47K J 1/16W	
R53			RK73GB2A121J	CHIP R 120 J 1/10W	
R54			RK73GB2A681J	CHIP R 680 J 1/10W	
R55			RK73HB1J104J	CHIP R 100K J 1/16W	
R56			RK73HB1J273J	CHIP R 27K J 1/16W	
R57,58			RK73HB1J000J	CHIP R 0.0 J 1/16W	
R59			RK73GB2A000J	CHIP R 0.0 J 1/10W	
R61,62			RK73HB1J474J	CHIP R 470K J 1/16W	
R63			RK73HB1J102J	CHIP R 1.0K J 1/16W	
R64-66			RK73HB1J473J	CHIP R 47K J 1/16W	
R67			RK73GB2A220J	CHIP R 22 J 1/10W	
R68,69			RK73HB1J473J	CHIP R 47K J 1/16W	
R70,71			RK73HB1J104J	CHIP R 100K J 1/16W	
R72			RK73HB1J000J	CHIP R 0.0 J 1/16W	
R73			RK73HB1J104J	CHIP R 100K J 1/16W	
R74			RK73HB1J102J	CHIP R 1.0K J 1/16W	
R75			RK73GB2A821J	CHIP R 820 J 1/10W	
R76			RK73HB1J000J	CHIP R 0.0 J 1/16W	
R77			RK73HB1J102J	CHIP R 1.0K J 1/16W	
R78			RK73GB2A000J	CHIP R 0.0 J 1/10W	
R79			RK73HB1J103J	CHIP R 10K J 1/16W	
R80			RK73HB1J473J	CHIP R 47K J 1/16W	
R83			RK73GB2A821J	CHIP R 820 J 1/10W	
R85			RK73HB1J103J	CHIP R 10K J 1/16W	
R86			RK73HB1J473J	CHIP R 47K J 1/16W	
R87			RK73FB2B473J	CHIP R 47K J 1/8W	
R89			RK73GB2A102J	CHIP R 1.0K J 1/10W	
R90			RK73FB2B473J	CHIP R 47K J 1/8W	
R91			RK73HB1J222J	CHIP R 2.2K J 1/16W	
R92			RK73HB1J473J	CHIP R 47K J 1/16W	
R93-99			RK73HB1J471J	CHIP R 470 J 1/16W	
R100-108			RK73HB1J473J	CHIP R 47K J 1/16W	
R109,110			RK73EB2E152J	CHIP R 1.5K J 1/4W	
R111			RK73FB2B102J	CHIP R 1.0K J 1/8W	
R112			RK73FB2B561J	CHIP R 560 J 1/8W	
R113,114			RK73EB2E152J	CHIP R 1.5K J 1/4W	
R115			RK73FB2B102J	CHIP R 1.0K J 1/8W	
R116			RK73FB2B561J	CHIP R 560 J 1/8W	
R117,118			RK73GB2A102J	CHIP R 1.0K J 1/10W	
R124			RK73GB2A000J	CHIP R 0.0 J 1/10W	
R133-136			RK73HB1J000J	CHIP R 0.0 J 1/16W	
R137,138			RK73HB1J473J	CHIP R 47K J 1/16W	
R140			RK73HB1J000J	CHIP R 0.0 J 1/16W	
R141			RK73HB1J101J	CHIP R 100 J 1/16W	
R143-149			RK73HB1J102J	CHIP R 1.0K J 1/16W	
R150			RK73HB1J223J	CHIP R 22K J 1/16W	
R151			RK73HB1J474J	CHIP R 470K J 1/16W	
R152			RK73GB2A103J	CHIP R 10K J 1/10W	
VR1	1B	✻	R31-0672-05	VARIABLE RESISTOR (VOL)	
VR2			R32-0684-05	SEMI FIXED VARIABLE RESISTOR (47K)	
S2		✻	S70-0460-15	TACT SWITCH	
S3-14			S70-0509-05	TACT SWITCH	
S15-22			S70-0485-05	TACT SWITCH	
S23			S70-0483-05	TACT SWITCH	
S24			S70-0485-05	TACT SWITCH	
MIC1	1A		T91-0651-15	MIC ELEMENT	
MIC2	2A		T91-0651-15	MIC ELEMENT	
D1			MINISMDC020F	VARISTOR	
D2			02CZ9.1(X,Y)F	ZENER DIODE	
D3			MA2S111-F	DIODE	
D8			AVRM16270MABB	VARISTOR	
D17-20			1SS388F	DIODE	
D21			1SS301F	DIODE	
IC1			LM2682MMX	MOS-IC	
IC2			LMC7101BIM5	MOS-IC	
IC3			NJM2904V-ZB	MOS-IC	
IC4			TA7805FQ	MOS-IC	
IC5			TC74LCX245FK	MOS-IC	
IC6			TC7WZ245FK-F	MOS-IC	
IC8			XC6204B332M	MOS-IC	
IC9		✻	3062LFGPUKCTA	MICROCONTROLLER IC	
Q1			2SC2873(Y)F	TRANSISTOR	

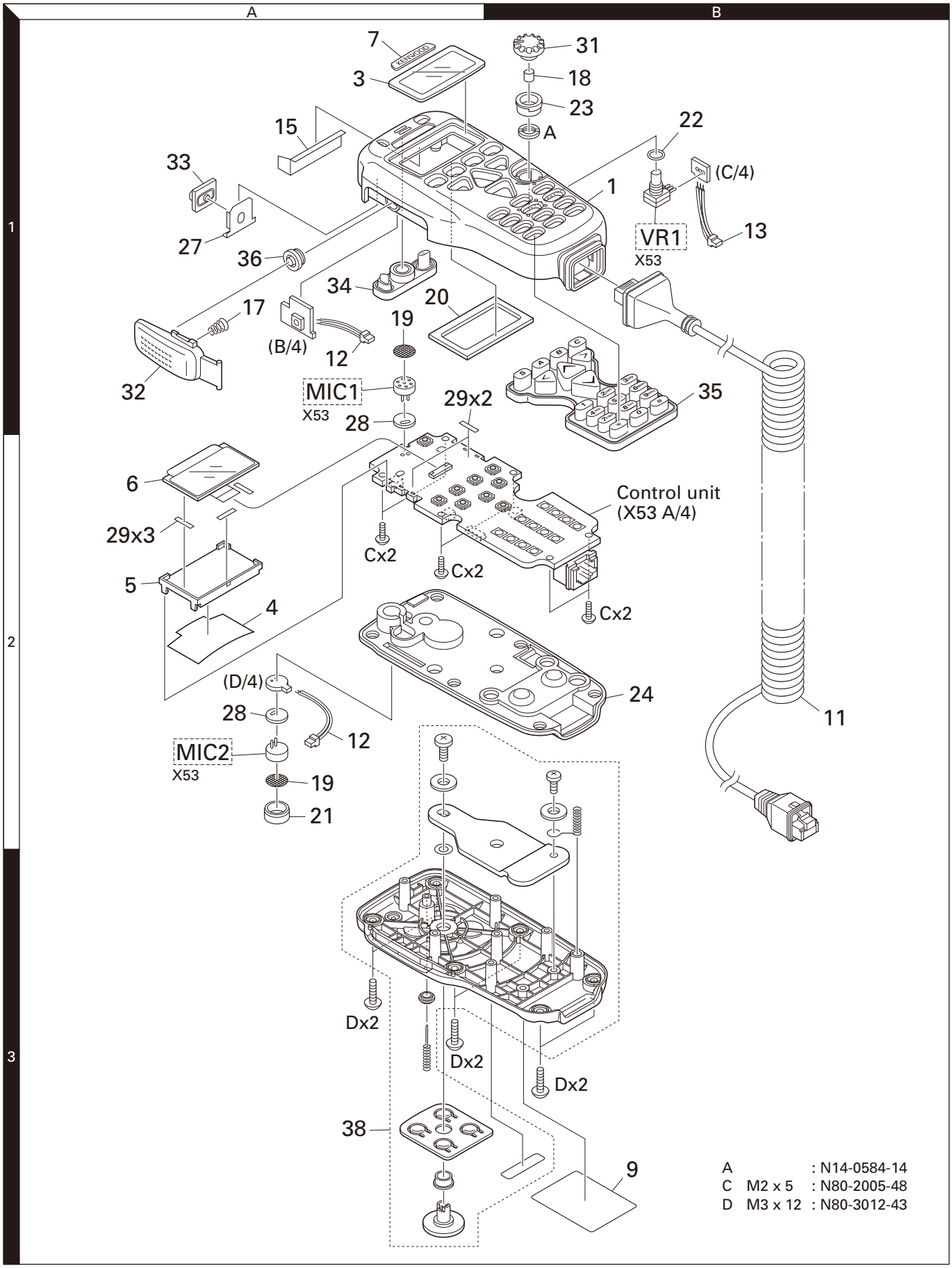
PARTS LIST

CONTROL UNIT (X53-4360-20)

Ref. No.	Address	New parts	Parts No.	Description	Destination
Q2			2SC4617(S)	TRANSISTOR	
Q3			12A02CH	TRANSISTOR	
Q4			SSM3K15TE(F)	FET	
Q5			UPA672T-A	FET	
Q6			UMG4N	TRANSISTOR	
Q7,8			DTC144EE	DIGITAL TRANSISTOR	
Q9			2SK1824-A	FET	
Q10,11			DTC114TE	DIGITAL TRANSISTOR	
Q12-15			UMG4N	TRANSISTOR	
TH1			ERTJ0EV104H	THERMISTOR	

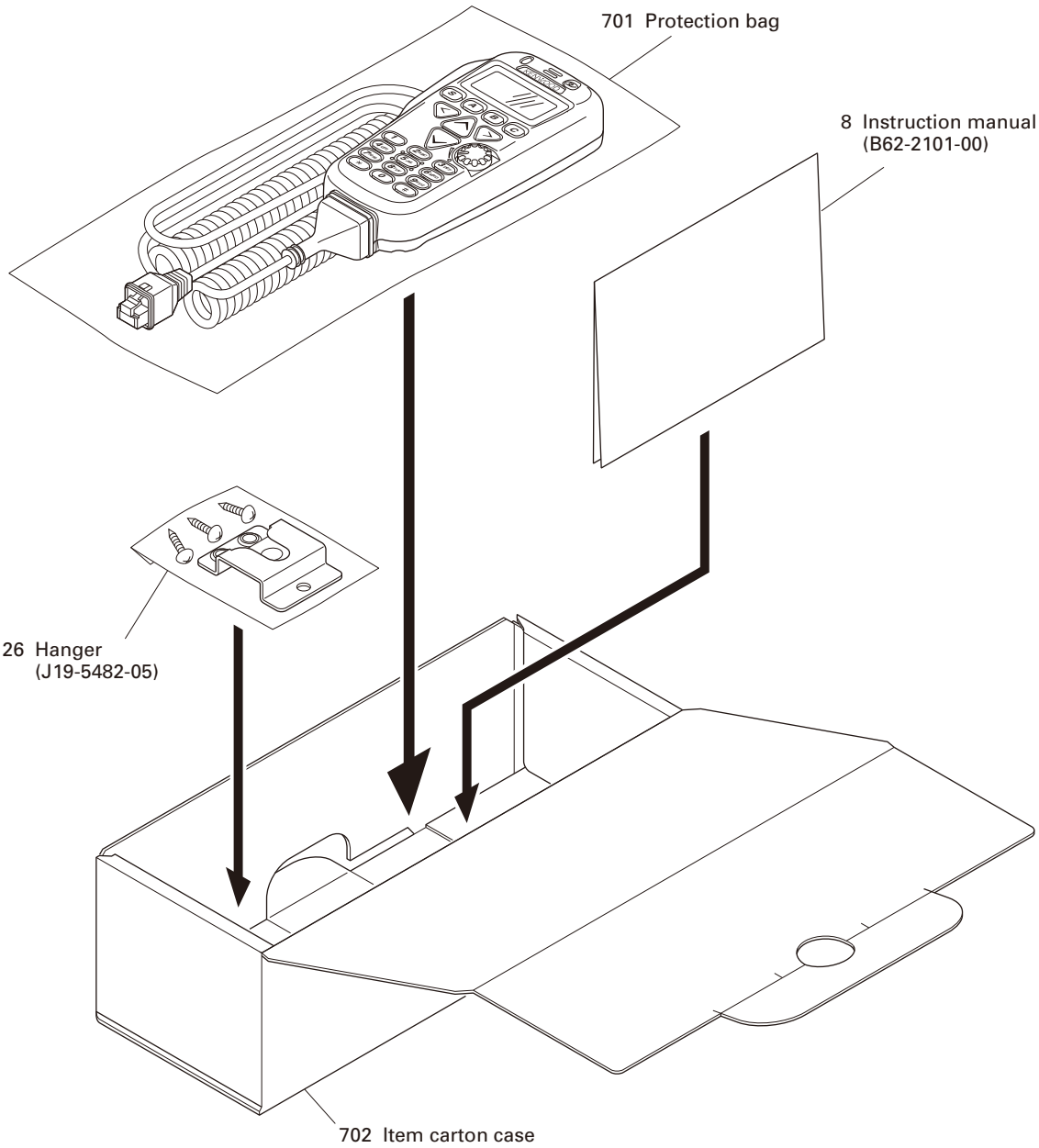
Ref. No.	Address	New parts	Parts No.	Description	Destination

EXPLODED VIEW



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

PACKING



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

ADJUSTMENT

KCH-16 Operation Check Method

You can confirm whether the KCH-16 operates normally by performing the following operation checks:

1. Key/ Volume/ Hook/ LCD display/ LED/ LCD brightness operation check
2. Microphone operation check

■ System requirements

- PC (Windows 2000/ XP/ Vista (32-bit))
- Programming interface (KPG-43/43A)
- USB adapter (KCT-53U): the KCT-53U driver runs under Windows 2000 or XP. Use the KCT-53U as necessary.
- Firmware programming software (Fpro.exe (ver. 3.06a or later)): the Fpro.exe software is in the installed KPG-95D (ver. 5.30 or later) folder.
- KCH-16 service firmware (W05-1424-00)
- JIG Box (X60-3890-20)
- DC power supply (Set the voltage to 13.4V.)
- Oscilloscope
- Audio cable - BNC

■ Connection procedure

Connect a PC, programming interface (KPG-43/43A), USB adapter (KCT-53U), programming software (KPG-95D), JIG Box (X60-3890-20), DC power supply, oscilloscope and audio cable - BNC as shown in Figure 1.

1) Connect the KCH-16 cable to the JIG Box.
2) Connect the JIG Box to the PC using the interface cable (KPG-43/43A) and USB adapter (KCT-53U: the KCT-53U can be used with the KPG-43A interface cable.)
3) Connect the power cable of the JIG Box to the DC power supply.
4) Connect the JIG Box to the oscilloscope using the audio cable - BNC.

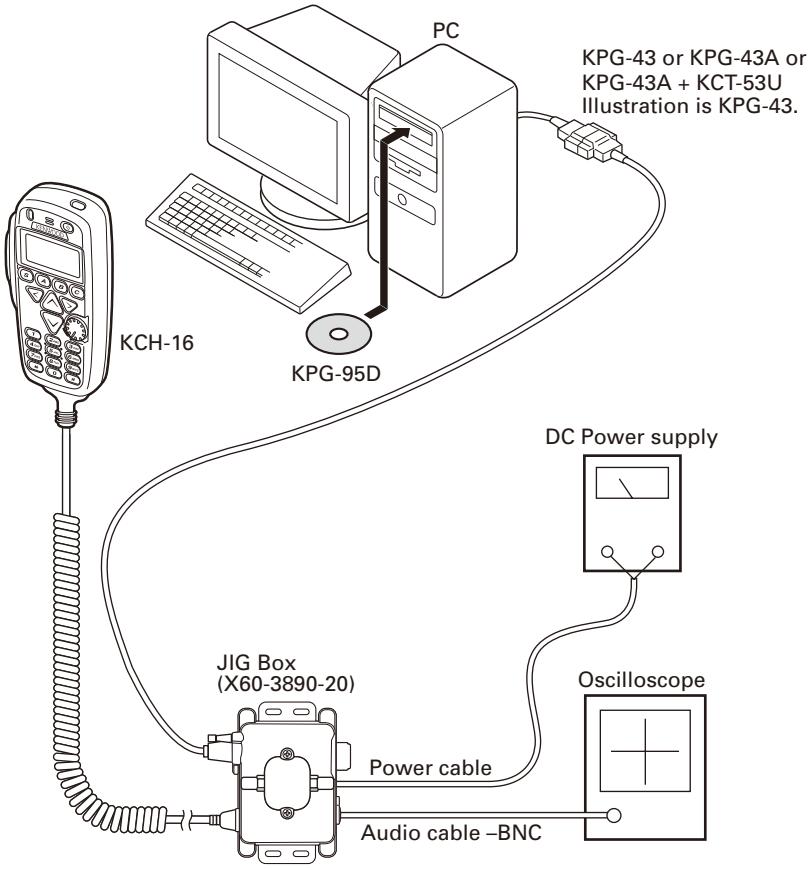
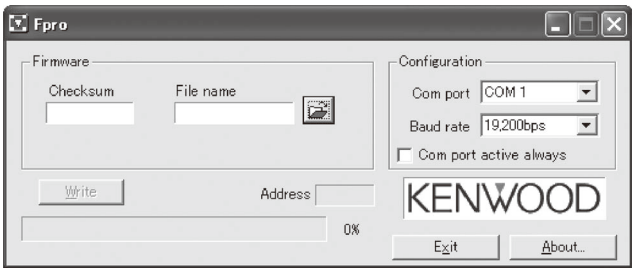


Fig. 1

ADJUSTMENT

■ Operation procedure

1) Start up the firmware programming software (Fpro.exe (ver. 3.06a or later)).



2) Set the communications speed (**19200 bps**) and communications port in the configuration item.
3) Set the KCH-16 service firmware to be rewritten by File name item.
4) Turn ON the output of the DC power supply while pressing and holding the [✱] and [#] keys. "PROG 19200 H" is displayed.
5) Press the "write" button in the window. When the KCH-16 starts to receive data, the [PG] display blinks.
6) If writing ends successfully, the checksum is calculated and a result is displayed.
7) Turn it ON after turning OFF the output of the DC power supply.
8) The KCH-16 LCD all lights. If nothing is operated, the state of all lighting is continued.
9) **Check the Key/ Volume/ Hook/ LCD display/ LED/ LCD brightness operation.**
   Confirm the operation as shown in Table 1 when each key is pressed, released, the volume is rotated or the hook is turned on and off. However, the operation of the power switch cannot be confirmed.
10) **Check the Microphone operation.**
    Confirm the waveforms can be observed according to the voice when KCH-16 is talked to while observing the oscilloscope.
11) Write the user firmware according to the following procedures after confirming the microphone operation of step 10.
    ① In the Fpro.exe window, set the user firmware to be rewritten by the File name item.
    ② Turn OFF the output of the DC power supply.
    ③ Carry out the operations in steps 4 to 6.

Table 1

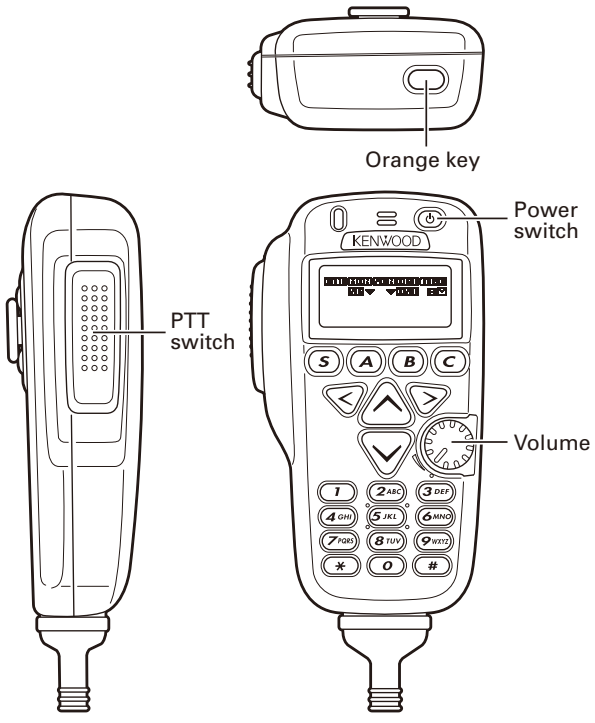
Event		Main LCD	Sub LCD	TX LED		BUSY LED		LCD Brightness			
				Red	Green	Red	Green	High	Mid	Low	Off
Power	On	*1	*1					✓			
[S] Key	Press	PF 1 Key ON	Blank	✓				✓			
	Release	PF 1 Key OFF		✓				✓			
[A] Key	Press	PF 2 Key ON	Blank		✓			✓			
	Release	PF 2 Key OFF			✓			✓			
[B] Key	Press	PF 3 Key ON	Blank			✓		✓			
	Release	PF 3 Key OFF				✓		✓			
[C] Key	Press	PF 4 Key ON	Blank				✓	✓			
	Release	PF 4 Key OFF					✓	✓			
[Orange] Key	Press	PF 5 Key ON	Blank					✓			
	Release	PF 5 Key OFF						✓			
[<] Key	Press	Left Key ON	Blank					✓			
	Release	Left Key OFF						✓			
[>] Key	Press	Right Key ON	Blank						✓		
	Release	Right Key OFF							✓		
[﹀] Key	Press	Down Key ON	Blank							✓	
	Release	Down Key OFF								✓	
[∧] Key	Press	Up Key ON	Blank								✓
	Release	Up Key OFF									✓
[1] Key	Press	DTMF 1 Key ON	Blank					✓			
	Release	DTMF 1 Key OFF						✓			
[2] Key	Press	DTMF 2 Key ON	Blank					✓			
	Release	DTMF 2 Key OFF						✓			
[3] Key	Press	DTMF 3 Key ON	Blank					✓			
	Release	DTMF 3 Key OFF						✓			
[4] Key	Press	DTMF 4 Key ON	Blank					✓			
	Release	DTMF 4 Key OFF						✓			

ADJUSTMENT

Event		Main LCD	Sub LCD	TX LED		BUSY LED		LCD Brightness			
				Red	Green	Red	Green	High	Mid	Low	Off
[5] Key	Press	DTMF 5 Key ON	Blank					✓			
	Release	DTMF 5 Key OFF						✓			
[6] Key	Press	DTMF 6 Key ON	Blank					✓			
	Release	DTMF 6 Key OFF						✓			
[7] Key	Press	DTMF 7 Key ON	Blank					✓			
	Release	DTMF 7 Key OFF						✓			
[8] Key	Press	DTMF 8 Key ON	Blank					✓			
	Release	DTMF 8 Key OFF						✓			
[9] Key	Press	DTMF 9 Key ON	Blank					✓			
	Release	DTMF 9 Key OFF						✓			
[*] Key	Press	DTMF * Key ON	Blank					✓			
	Release	DTMF * Key OFF						✓			
[0] Key	Press	DTMF 0 Key ON	Blank					✓			
	Release	DTMF 0 Key OFF						✓			
[#] key	Press	DTMF # Key ON	Blank					✓			
	Release	DTMF # Key OFF						✓			
[Hook]	On	Hook ON	Blank					✓			
	Off	Hook OFF						✓			
[PTT]	Press	PTT ON	Blank					✓			
	Release	PTT OFF						✓			
[Volume] *2	Change	Volume ▮▮	Blank					✓			

*1: To confirm the lack of the dot, LCD all lights is performed.
*2: The volume value (▮▮) displayed on the main LCD is displayed by 256 stages (00 to FF).

Controls



● **Key name (function) comparison (in regards to the KCH-14/ KCH-15)**

	KCH-14	KCH-15	KCH-16
GRP ∧ (Zone Up)	GRP ∧ (Zone Up)	GRP ∧ (Zone Up)	Right (Zone Up) >
GRP ∨ (Zone Down)	GRP ∨ (Zone Down)	GRP ∨ (Zone Down)	Left (Zone Down) <
CH (Channel)	CH (Channel Up/Down)	CH(Channel Up/Down)	
MON (Monitor)		MON (Monitor)	
SCN (Scan)		SCN (Scan)	
PF 1	PF 1 (None)	PF 1 (None)	S (None)
PF 2	PF 2 (None)	PF 2 (None)	A (None)
PF 3	PF 3 (None)	PF 3 (None)	B (None)
PF 4	PF 4 (None)	PF 4 (None)	C (None)
PF 5	PF 5 (None)	PF 5 (None)	Orange (None)
PF 6		PF 6 (None)	Up (Channel Up) ∧
PF 7		PF 7 (None)	Down (Channel Down) ∨
PF 8		PF 8 (None)	
PF 9		PF 9 (None)	

ADJUSTMENT

Note:

Because the key name of the KCH-16 is different from the KCH-14/15, when using the KCH-16, the panel test mode, panel tuning mode, adjustment method, etc., of the TK-5710/5710H/5810/5810H is described.

Furthermore, in the adjustment methods (pages 39 to 54), key names that relate to that of the KCH-16 are listed in shaded boxes.

Panel Test Mode

■ Test mode operation features

This transceiver has a test mode. **To enter test mode, press and hold the [S] key while turning the transceiver power ON.** Test mode can be inhibited by programming. To exit test mode, turn the transceiver power OFF.

- When the panel test mode is activated, the last used channel and signaling numbers are displayed. When the panel test mode is activated for the first time, the channel and signaling numbers are 1.
- If test signaling 20 (Tone Test Pattern) is selected, the result of Bit Error Rate (BER) calculation is displayed on the LCD. The BER value is also output from the serial port.

■ Key operation

Key	"FNC" not appears	
	Function	Display
[∧], [∨]	Wide/Narrow/P25	Wide: "W" appears Narrow: "N" appears P25: "A" appears
[>]	Shifts to the Panel tuning mode	-
[<]	Squelch off	MON icon appears
[S]	Push: Test frequency channel down Hold: Test frequency channel continuation down	Channel No.

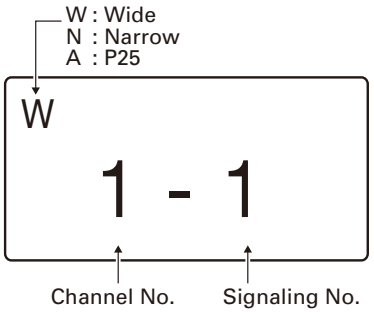
Key	"FNC" not appears	
	Function	Display
[A]	Push: Test frequency channel up Hold: Test frequency channel continuation up	Channel No.
[B]	Push: Test signaling down Hold: Test signaling continuation down	Signaling No.
[C]	Push: Test signaling up Hold: Test signaling continuation up	Signaling No.
[Orange]	Function on	"FNC" appears
[PTT]	Transmit	-
[0] to [9] and [#], [*]	Use as the DTMF keypad. If a key is pressed during transmission, the DTMF corresponding to the key that was presses is sent.	-

Key	"FNC" appears	
	Function	Display
[∧], [∨]	Function off	-
[>]	Squelch level 0	On: ▼ icon appears
[<]	High power/Low power	Low: SP icon appears
[S]	Compander on/off	On: A icon appears
[A]	LCD all lights	LCD all point appears
[B]	MSK 1200bps/2400bps	2400bps: CAL icon appears
[C]	Beat shift on/off	On: OST icon appears
[Orange]	Function off	-
[PTT]	Transmit	-
[0] to [9] and [#], [*]	Function off	-

• LED indicator

Red LED Lights during transmission.
Green LED Lights when there is carrier.

• LCD display in the panel test mode



ADJUSTMENT

• Filter Mode

Display	Condition
W	WIDE (25kHz) Filter
N	NARROW (12.5kHz) Filter
A	P25 (12.5kHz) Filter

■ Frequency and Signaling

The transceiver has been adjusted for the frequencies shown in the following table. When required, readjust them following the adjustment procedure to obtain the frequencies you want in actual operation.

• Test Frequency

TK-5710/5710H

CH	RX (MHz)	TX (MHz)
1	155.10000	155.00000
2	136.10000	136.00000
3	173.80000	173.97500
4	155.00000	155.00000
5	155.20000	155.20000
6	155.40000	155.40000
7	154.90000	154.90000
8	145.40000	145.40000
9	164.40000	164.40000

TK-5810/5810H

CH	K		K2	
	RX (MHz)	TX (MHz)	RX (MHz)	TX (MHz)
1	485.05000	485.10000	435.05000	435.10000
2	450.05000	450.10000	400.05000	400.10000
3	519.95000	519.90000	469.95000	469.90000
4	485.00000	485.00000	435.00000	435.00000
5	485.20000	485.20000	435.20000	435.20000
6	485.40000	485.40000	435.40000	435.40000
7~16	-	-	-	-

• Test Signaling

Signaling No.	RX	TX	P25/ Analog
1	None	None	Analog
2	None	100Hz Square wave	Analog
3	QT 67.0Hz	QT 67.0Hz	Analog
4	QT 151.4Hz	QT 151.4Hz	Analog
5	QT 210.7Hz	QT 210.7Hz	Analog
6	QT 254.1Hz	QT 254.1Hz	Analog
7	DQT 023N	DQT 023N	Analog
8	DQT 445N	DQT 445N	Analog
9	DQT 754I	DQT 754I	Analog
10	DTMF Code "159D"	DTMF Code "159D"	Analog
11	None	DTMF Code "9"	Analog
12	None	1633Hz Single Tone	Analog
13	2-tone: A: 304.7Hz B: 3106.0Hz	2-tone: A: 304.7Hz B: 3106.0Hz	Analog
14	Single Tone: 979.9Hz	Single Tone: 979.9Hz	Analog
15	None	MSK PN Pattern	Analog
16	MSK Sync: 0x052B Data: 0x230960C6AAAA CRC: 0xC4D7	MSK Sync: 0x052B Data: 0x230960C6AAAA CRC: 0xC4D7	Analog
17	NAC 293	NAC 293	P25
18	NAC 023	NAC 023	P25
19	NAC 5EA	NAC 5EA	P25
20	1011Hz Tone Test Pattern	1011Hz Tone Test Pattern	P25
21	NAC 293	Silence Pattern	P25
22	NAC 293	Calibration Pattern	P25
23	NAC 293	Transmitter Test Pattern	P25
24	NAC 293	Symbol Rate Pattern	P25
25	NAC 293	Low Deviation Pattern	P25
26	NAC 293	Fidelity Pattern	P25

Panel Tuning Mode

The transceiver is adjusted in this mode.

■ Preparations for tuning the transceiver

Before attempting to tune the transceiver, connect the unit to a suitable power supply.

Whenever the transmitter is turned, the unit must be connected to a suitable dummy load (i.e. power meter).

The speaker output connector must be terminated with a 4Ω dummy load and connected to an AC voltmeter and an audio distortion meter or a SINAD measurement meter at all times during tuning.

■ Transceiver tuning (To enter tuning mode)

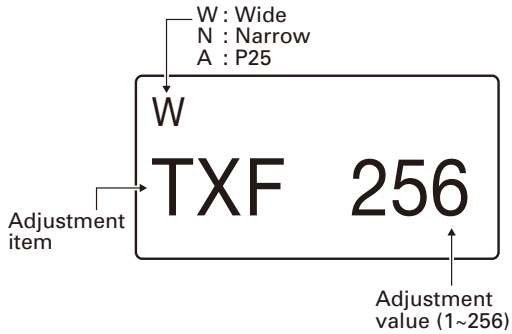
To enter tuning mode, press the [>] key while the transceiver is in test mode.

Use the [Orange] key to write tuning data through tuning modes, and the [B] and [C] keys to adjust tuning requirements (1 to 256 appears on the LCD).

Use the [A] key to select the adjustment item through tuning modes. Use the [<] key to exit 3 or 5 reference level adjustments (TK-5710/5710H) and 3, 5 or 7 reference level adjustments (TK-5810/5810H).

ADJUSTMENT

• LCD display in the panel tuning mode



■ Key operation

Key	Function
[∧], [∨]	Unused
[>]	Exit the panel tuning mode and shift to the panel test mode.
[<]	TK-5710/5710H Exit the 3 or 5 reference level adjustments without backup.
	TK-5810/5810H Exit the 3, 5 or 7 reference level adjustments without backup. If you press the [<] key while the TX assist voltage, RX assist voltage (Upper) and RX assist voltage (Lower) are selected, the 7 reference level adjustment is performed automatically. When the automatic adjustment is completed, the ▼ icon appears on the LCD. Additionally, even if you press the [<] key after entering the 7 reference level adjustment, the automatic adjustment is not performed.
[S]	Back to the last adjustment item (The current adjustment data is cleared.)
[A]	Go to the next adjustment item (The current adjustment data is cleared.)
[B]	Push: Adjustment value down Hold: Adjustment value continuation down
[C]	Push: Adjustment value up Hold: Adjustment value continuation up
[Orange]	TK-5710/5710H Enter the 3 or 5 reference level adjustments.
	TK-5810/5810H Enter the 3, 5 or 7 reference level adjustments.
[PTT]	Transmit

■ 3 or 5 reference level adjustments frequency (TK-5710/5710H)

• Assist voltage adjustments

TX assist voltage

Tuning point	Display	TX (MHz)
Low	L	136.00000
Low'	LC	145.50000
Center	C	155.00000
High'	CH	164.50000
High	H	174.00000

RX assist voltage (Upper)

Tuning point	Display	RX (MHz)
Low	L	204.95000
Low'	LC	209.70000
Center	C	214.45000
High'	CH	219.20000
High	H	223.95000

RX assist voltage (Lower)

Tuning point	Display	RX (MHz)
Low	L	185.95000
Low'	LC	190.70000
Center	C	195.45000
High'	CH	200.20000
High	H	204.94750

• Adjustment items other than assist voltage

Tuning point	Display	RX (MHz)	TX (MHz)
Low	L	136.10000	136.00000
Low'	LC	145.60000	145.50000
Center	C	155.10000	155.00000
High'	CH	164.60000	164.50000
High	H	173.90000	174.00000

■ 3, 5 or 7 reference level adjustments frequency (TK-5810/5810H)

• 3 or 5 reference level adjustments frequency (Adjustment items other than assist voltage)

Tuning point	Display	K		K2	
		RX (MHz)	TX (MHz)	RX (MHz)	TX (MHz)
Low	L	450.10000	450.00000	400.10000	400.00000
Low'	LC	467.60000	467.50000	417.60000	417.50000
Center	C	485.10000	485.00000	435.10000	435.00000
High'	CH	502.60000	502.50000	452.60000	452.50000
High	H	519.90000	519.95000	469.90000	470.00000

• 7 reference level adjustments frequency (Assist voltage adjustments)

TX assist voltage

Tuning point	Display	K	K2
		TX (MHz)	
Low	LLL	450.10000	400.10000
Low''	LL	461.70000	411.70000
Low'	L	473.40000	423.40000
Center	C	485.10000	435.10000
High'	H	496.70000	446.70000
High''	HH	508.30000	458.30000
High	HHH	519.90000	469.90000

ADJUSTMENT

RX assist voltage (Upper)

Tuning point	Display	K	K2
		RX (MHz)	
Low	LLL	485.00000	435.00000
Low''	LL	490.90000	440.90000
Low'	L	496.70000	446.70000
Center	C	502.50000	452.50000
High'	H	508.33000	458.33000
High''	HH	514.16000	464.16000
High	HHH	520.00000	470.00000

RX assist voltage (Lower)

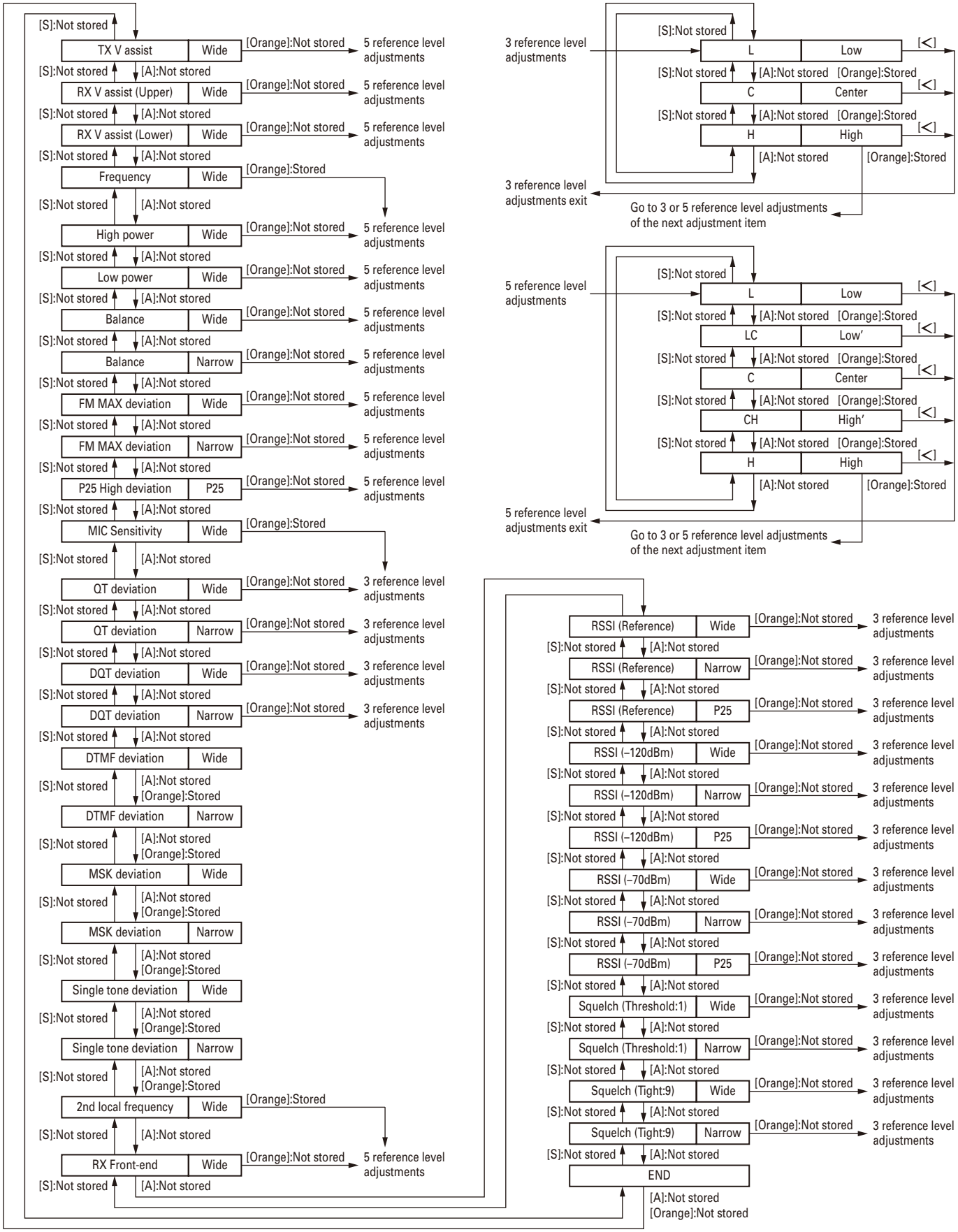
Tuning point	Display	K	K2
		RX (MHz)	
Low	LLL	450.00000	400.00000
Low''	LL	455.90000	405.90000
Low'	L	461.70000	411.70000
Center	C	467.50000	417.50000
High'	H	473.33000	423.33000
High''	HH	479.16000	429.16000
High	HHH	484.99500	434.99500

■ Adjustment item and Display (***: 1~256)

No.	Adjustment item	Display	Wide/Narrow/P25	Tuning point	Note
1	TX assist voltage	VATX ***	Wide	5 (TK-5710/5710H) 7 (TK-5810/5810H)	
2	RX assist voltage (Upper)	VARX u ***	Wide	5 (TK-5710/5710H) 7 (TK-5810/5810H)	
3	RX assist voltage (Lower)	VARX l ***	Wide	5 (TK-5710/5710H) 7 (TK-5810/5810H)	
4	Frequency	TXF ***	Wide	1	
5	High power	HPW ***	Wide	5	
6	Low power	LPW ***	Wide	5	
7	Balance (Wide)	BALW ***	Wide	5	100Hz Square Wave
8	Balance (Narrow)	BALN ***	Narrow	5	100Hz Square Wave
9	FM MAX deviation (Wide)	FMWD ***	Wide	5	
10	FM MAX deviation (Narrow)	FMND ***	Narrow	5	
11	P25 High deviation	HDVA ***	P25	5	Symbol Rate Pattern
12	MIC sensitivity	MIC ***	Wide	1	
13	QT deviation (Wide)	QTW ***	Wide	3	QT: 67Hz
14	QT deviation (Narrow)	QTN ***	Narrow	3	QT: 67Hz
15	DQT deviation (Wide)	DQTW ***	Wide	3	DQT: 023N
16	DQT deviation (Narrow)	DQTN ***	Narrow	3	DQT: 023N
17	DTMF deviation (Wide)	DTMW ***	Wide	1	DTMF Code: 9
18	DTMF deviation (Narrow)	DTMN ***	Narrow	1	DTMF Code: 9
19	MSK deviation (Wide)	MSKW ***	Wide	1	MSK PN Pattern
20	MSK deviation (Narrow)	MSKN ***	Narrow	1	MSK PN Pattern
21	Single tone deviation (Wide)	2TNW ***	Wide	1	Single Tone: 1633Hz
22	Single tone deviation (Narrow)	2TNN ***	Narrow	1	Single Tone: 1633Hz
23	2nd local frequency	SLO ***	Wide	1	
24	RX Front-end	FEND ***	Wide	5	AF unmute
25	RSSI (Reference) (Wide)	RRSI ***	Wide	3	
26	RSSI (Reference) (Narrow)	RRSI ***	Narrow	3	
27	RSSI (Reference) (P25)	RRSI ***	P25	3	
28	RSSI (–120dBm) (Wide)	LRSI ***	Wide	3	
29	RSSI (–120dBm) (Narrow)	LRSI ***	Narrow	3	
30	RSSI (–120dBm) (P25)	LRSI ***	P25	3	
31	RSSI (–70dBm) (Wide)	HRSI ***	Wide	3	
32	RSSI (–70dBm) (Narrow)	HRSI ***	Narrow	3	
33	RSSI (–70dBm) (P25)	HRSI ***	P25	3	
34	Squelch (Threshold: 1) (Wide)	SQOW ***	Wide	3	AF unmute
35	Squelch (Threshold: 1) (Narrow)	SQON ***	Narrow	3	AF unmute
36	Squelch (Tight: 9) (Wide)	SQTW ***	Wide	3	AF unmute
37	Squelch (Tight: 9) (Narrow)	SQTN ***	Narrow	3	AF unmute

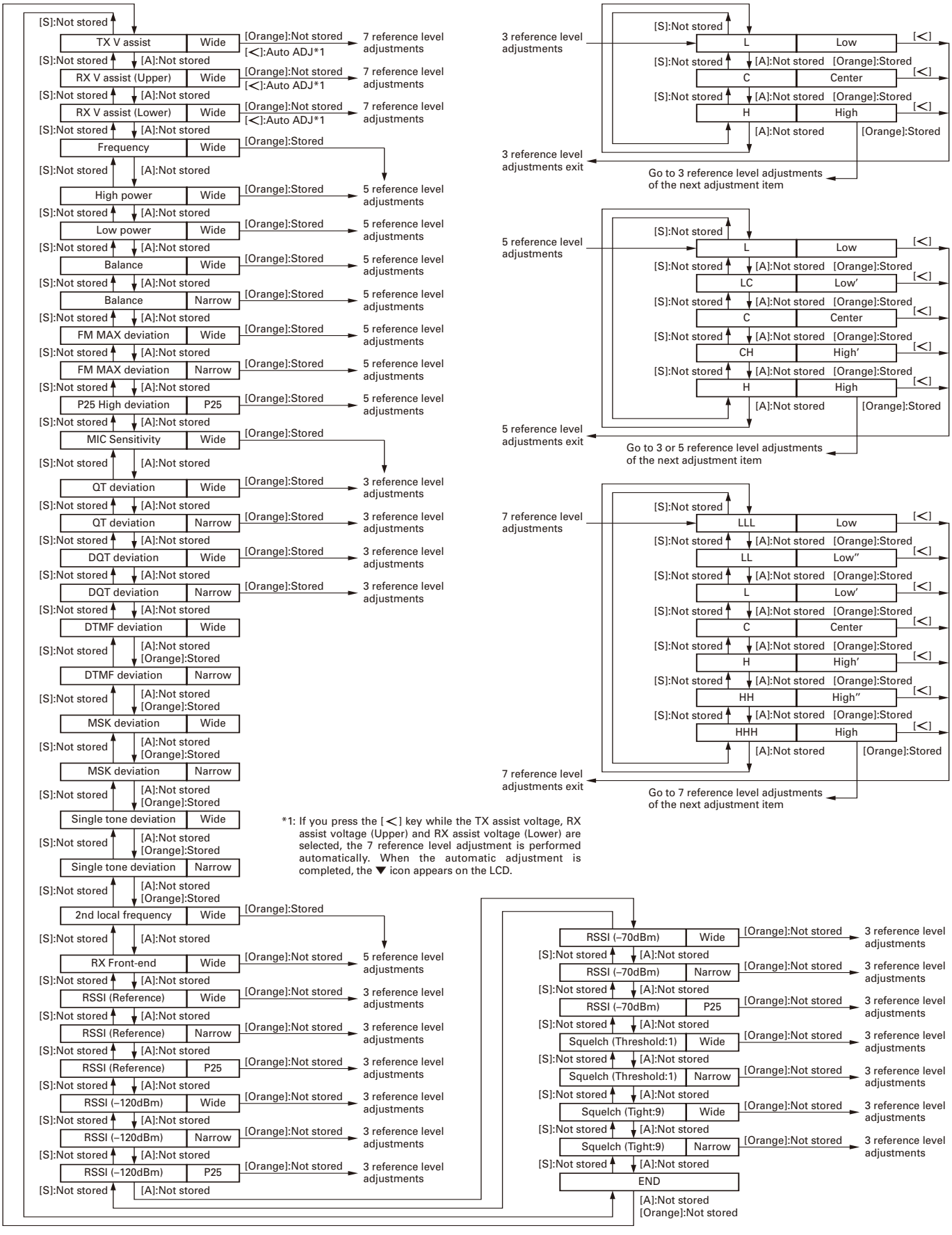
ADJUSTMENT

■ Flow Chart (TK-5710/5710H)



ADJUSTMENT

■ Flow Chart (TK-5810/5810H)



*1: If you press the [<] key while the TX assist voltage, RX assist voltage (Upper) and RX assist voltage (Lower) are selected, the 7 reference level adjustment is performed automatically. When the automatic adjustment is completed, the ▼ icon appears on the LCD.

ADJUSTMENT

BER (Bit Error Rate) Measurement

1. The Panel Test Mode is used to measure the BER (Refer to "Test mode operation features" described on page 29.).
2. Select "20" for test signaling (Refer to "Test Signaling" described on page 30.).
   When "20" is selected for the test signaling, the filter is automatically selected to "P25".
   (If there is no RF input signal, the display shows "500000")
3. Select a filter (Refer to "Filter Mode" described on page 30.).
4. Select a test frequency (Refer to "Test Frequency" described on page 30.).

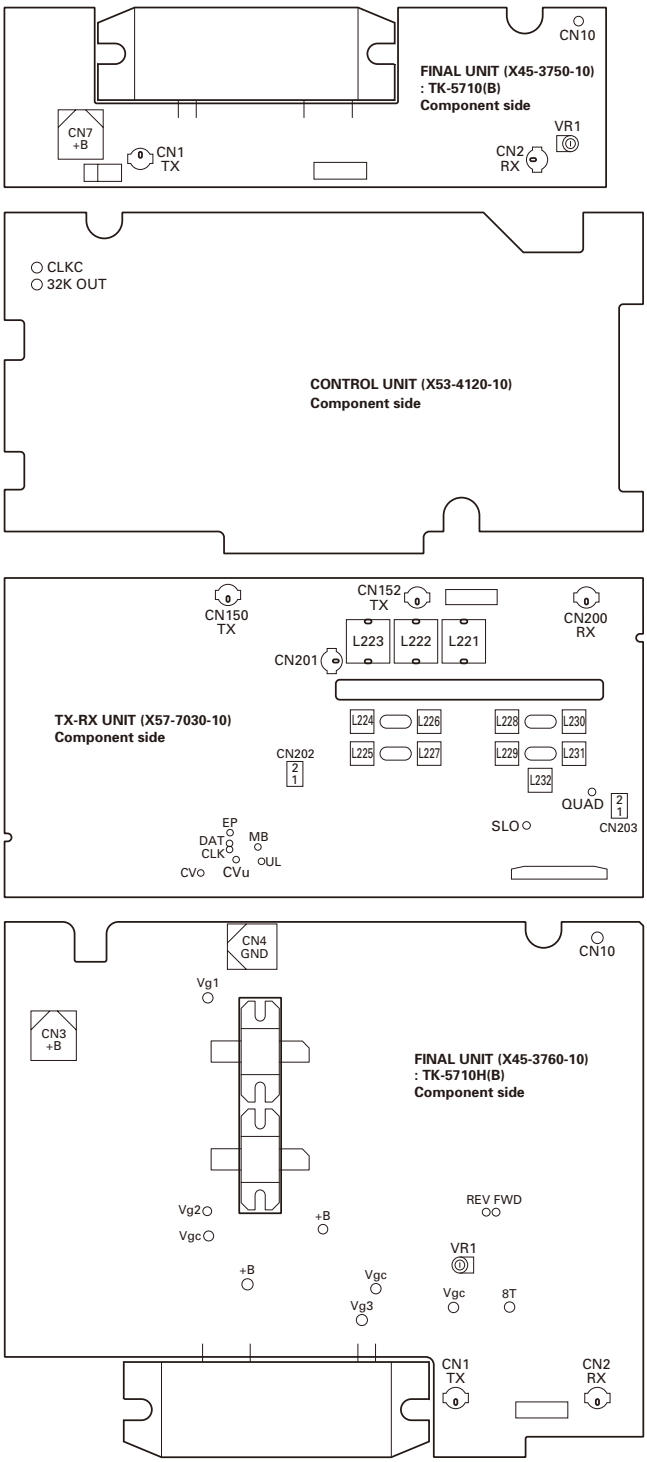
5. Measure the BER (Bit Error Rate) using the digital radio tester. Enter a standard input signal into the transceiver as a standard tone test pattern.
6. Adjust the input signal level to achieve the standard bit error rate (BER).
   (For example, if the BER is 5%, the display shows "050000".)

C4FM (P25) Deviation Adjustment

1. The transceiver adjusts the deviation between High Deviation ±1800Hz for the C4FM (P25).
2. The Symbol Rate Pattern is used when adjusting the High Deviation for the C4FM (P25) (Refer to "Test Signaling" described on page 30.). This test signal has a peak deviation equal to π/2 1800Hz = 2827Hz.

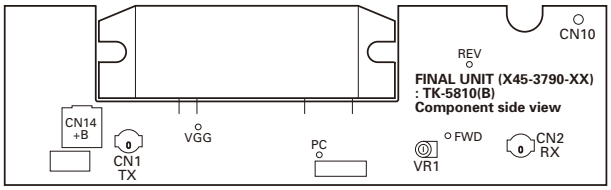
Adjustment Points

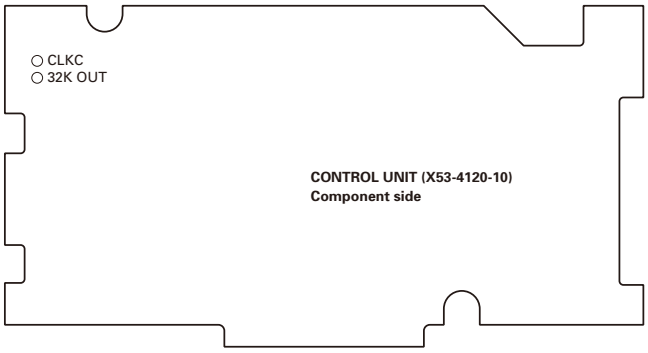
■ TK-5710/5710H

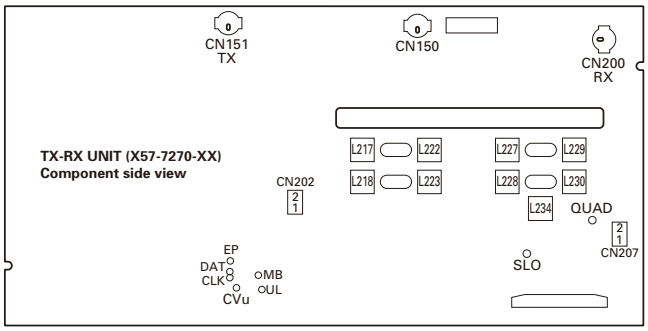


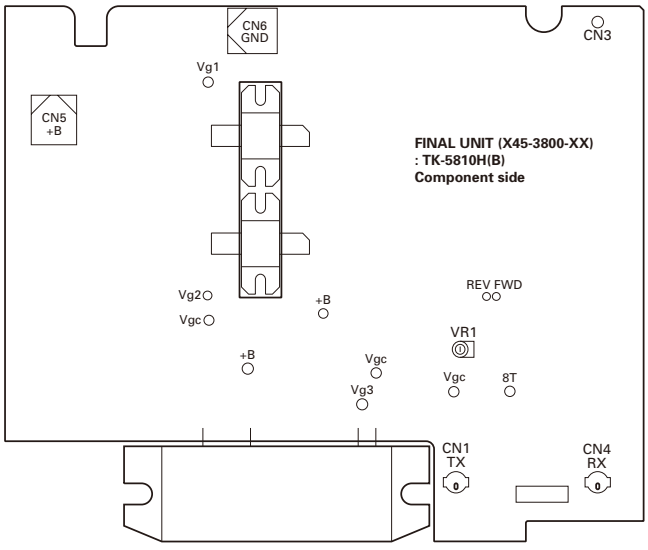
ADJUSTMENT

■ TK-5810/5810H

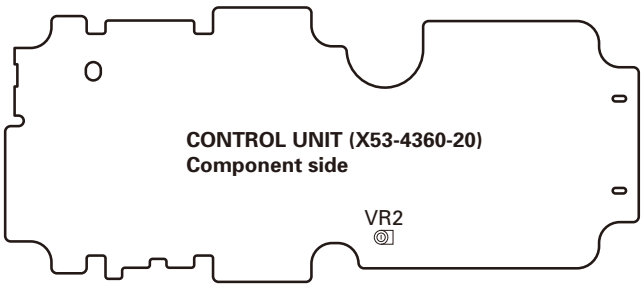








■ KCH-16



ADJUSTMENT

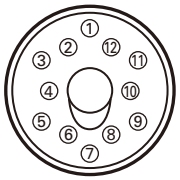
Test Equipment Required for Alignment

Test Equipment	Major Specifications	
1. Standard Signal Generator (SSG)	Frequency Range Modulation Output	136 to 174MHz (TK-5710/5710H), 400 to 520MHz (TK-5810/5810H) Frequency modulation and external modulation –127dBm/0.1μV to greater than –47dBm/1mV
2. Power Meter	Input Impedance Operation Frequency Measurement Range	50Ω 136 to 174MHz or more (TK-5710/5710H) 400 to 520MHz or more (TK-5810/5810H) Vicinity of 200W
3. Deviation Meter	Frequency Range	136 to 174MHz (TK-5710/5710H), 400 to 520MHz (TK-5810/5810H)
4. Digital Volt Meter (DVM)	Measuring Range Input Impedance	1 to 20V DC High input impedance for minimum circuit loading
5. Oscilloscope		DC through 30MHz
6. High Sensitivity Frequency Counter	Frequency Range Frequency Stability	10Hz to 1000MHz 0.2ppm or less
7. Ammeter		30A
8. AF Volt Meter (AF VTVM)	Frequency Range Voltage Range	50Hz to 10kHz 3mV to 3V
9. Audio Generator (AG)	Frequency Range Output	50Hz to 5kHz or more 0 to 1V
10. Distortion Meter	Capability Input Level	3% or less at 1kHz 50mV to 10Vrms
11. Spectrum Analyzer	Measuring Range	DC to 1GHz or more
12. Tracking Generator	Center frequency Output Voltage	50kHz to 600MHz 100mV or more
13. 4Ω Dummy Load		Approx. 4Ω, 30W
14. Regulated Power Supply		13.6V, approx. 30A (adjusted from 9 to 20V) Useful if ammeter equipped

Caution

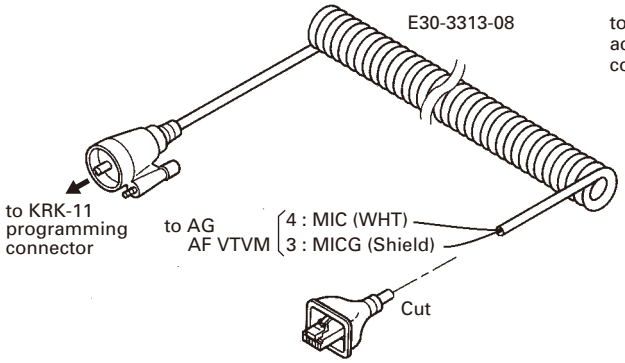
Since the RX AF output is a BTL output, there is a DC Component. Isolate this with a capacitor or transformer as shown in the figure.

KRK-11 (Interface box) programming connector (Front view)

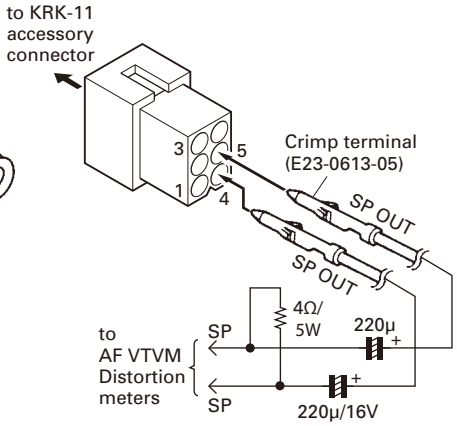


1 : SB	7 : KVL
2 : NC	8 : NC
3 : ME	9 : NC
4 : MIC	10 : NC
5 : E	11 : NC
6 : TRD	12 : NC

Test cable for microphone input



Test cable for speaker output



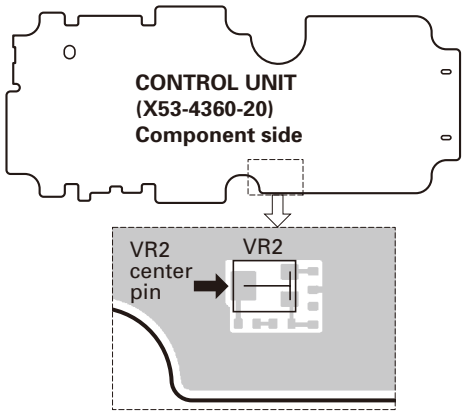
Cable for BPF or MCF adjustment

- E30-3418-05 (for BPF ADJ)
- W05-1000-00 (for MCF ADJ)

ADJUSTMENT

KCH-16

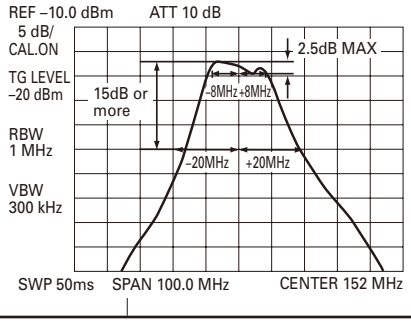
Item	Condition	Measurement			Adjustment			Specifications / Remarks
		Test-equipment	Unit	Terminal	Unit	Parts	Method	
1. Setting	1) Connect the KCH-16 Hand-held control head to the TK-5710(B)/5710H(B)/5810(B)/ 5810H(B) transceiver via the KRK-11 Interface box and KRK-11 Panel assembly. 2) Power supply voltage •TK-5710(B)/5810(B) Power input connector: 13.6V •TK-5710H(B)/5810H(B) Power input connector: 13.4V							
2. LCD contrast		DVM	Control	VR2 center pin	Control	VR2	Adjust the VR2 to obtain the specified voltage.	0.87~0.91V This item is needed when the Control unit or LCD ASSY (B38-0923-05) is replaced.



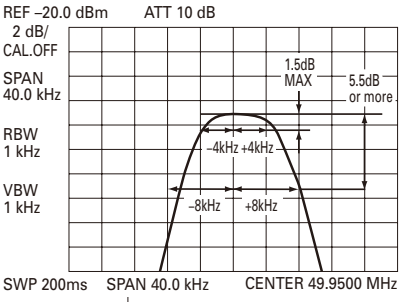
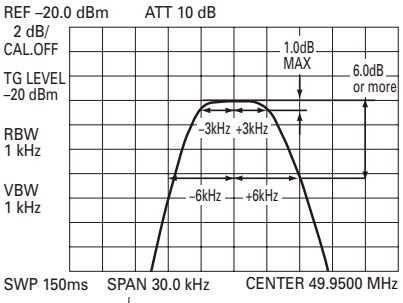
ADJUSTMENT

Note: In the adjustment methods (pages 39 to 54), key names that relate to that of the KCH-16 are listed in shaded boxes.

TK-5710/5710H Common Section

Item	Condition	Measurement			Adjustment			Specifications / Remarks
		Test-equipment	Unit	Terminal	Unit	Parts	Method	
1. Setting	1) Connect the KCH-16 Hand-held control head to the TK-5710(B)/5710H(B) transceiver via the KRK-11 Interface box and KRK-11 Panel assembly. 2) Power supply voltage •TK-5710(B) Power input connector: 13.6V •TK-5710H(B) Power input connector: 13.4V 3) SSG standard modulation [Wide] MOD: 1kHz, DEV: 3kHz [Narrow] MOD: 1kHz, DEV: 1.5kHz							
2. Assist voltage • TX	**[Panel tuning mode]** 1) Adj item: [VATX] Adjust: [***] 2) Adj item: [L VATX]→[LC VATX]→[C VATX]→[CH VATX]→[H VATX] Adjust: [***] PTT: ON Press [Orange] to store the adjustment value after adjustment.	Power meter DVM	Rear panel TX-RX	ANT CVu	Front panel	[B],[C]	Change the adjustment value within the limit of the specified voltage.	1.86V±0.1V When adjusting the assist voltage in PC tuning mode, slide the bar to indicate "VCO Lock Voltage" within 1.8V±0.1V on Meter window.
• RX (Upper)	3) Adj item: [VARX u] Adjust: [***] 4) Adj item: [L VARX u]→[LC VARX u]→[C VARX u]→[CH VARX u]→[H VARX u] Adjust: [***] Press [Orange] to store the adjustment value after adjustment.							
• RX (Lower)	5) Adj item: [VARX l] Adjust: [***] 6) Adj item: [L VARX l]→[LC VARX l]→[C VARX l]→[CH VARX l]→[H VARX l] Adjust: [***] Press [Orange] to store the adjustment value after adjustment.							
3. BPF	**[Panel test mode]** 1) CH-Sig: 1-1 Spectrum analyzer setting Center-f: 152.00MHz Span: 100MHz RBW: 1MHz VBW: 300kHz TG level: –20dBm XdB/div: 5dB Connect the cable (E30-3418-05) to CN201.	Spectrum analyzer Tracking generator	Rear panel TX-RX	ANT CN201	TX-RX	L221 L222 L223	After setting the adjustment value to 110, adjust each coil to get the waveform as shown to the right.	

ADJUSTMENT

Item	Condition	Measurement			Adjustment			Specifications / Remarks
		Test-equipment	Unit	Terminal	Unit	Parts	Method	
4. MCF • Wide	1) CH-Sig: 1-1 Spectrum analyzer setting Center-f: 49.95MHz Span: 40kHz RBW: 1kHz VBW: 1kHz TG level: –20dBm XdB/div: 2dB Connect each cable (W05-1000-00) to CN202 and CN203.	Spectrum analyzer Tracking generator	Rear panel TX-RX	ANT CN202 CN203	TX-RX	L225 L227 L229 L231	Adjust the coils to obtain the waveform as shown to the right. 	
• Narrow	2) Turn the [∧]/[∨] key as "N" (Narrow) appears on the LCD. Spectrum analyzer setting Center-f: 49.95MHz Span: 30kHz RBW: 1kHz VBW: 1kHz TG level: –20dBm XdB/div: 2dB					L224 L226 L228 L230		
5. 2nd local adjust	**[Panel tuning mode]** 1) Adj item: [W SLO] Adjust: [***] Press [Orange] to store the adjustment value after adjustment.	f.counter	TX-RX	SLO	TX-RX	[B],[C]	Change the adjustment value within the limit of the specified frequency.	50.4MHz±70Hz
6. Quadrature coil adjust	**[Panel test mode]** 1) CH-Sig: 1-1 SSG output: –53dBm (501µV) (DEV:OFF)	SSG DVM AF VTVM Dummy load	TX-RX	QUAD EXT.SP	TX-RX	L232	Adjust the coil within the limit of the specified voltage.	1.0V±0.05V
7. RTC oscillation frequency adjust	1) CH-Sig: 1-1	f.counter DVM DC power supply	Control	CLKC 32KOUT		Programming Software: KPG-95D	Adjust the RTC oscillation frequency using the PC tuning mode. Perform the procedures below. 1. Apply 5V DC to the "CLKC" terminal of the control unit (X53-412). 2. Measure the output from the "32KOUT" terminal of the control unit (X53-412) using the calibrated frequency counter. 3. Enter the measured frequency value to "Crystal Oscillation Frequency" of RTC correction in the PC tuning mode and then click [OK] button.	**Note:** It is not necessary to adjust the RTC oscillation frequency under normal adjustments. The RTC oscillation frequency must be checked and adjusted when the 32kHz crystal resonator (X700) is replaced.

ADJUSTMENT

TK-5710/5710H Transmitter Section

Item	Condition	Measurement			Adjustment			Specifications / Remarks
		Test-equipment	Unit	Terminal	Unit	Parts	Method	
1. Frequency adjust *1	**[Panel test mode]** 1) CH-Sig: 3-1 **[Panel tuning mode]** 2) Adj item: [W TXF] Adjust: [***] PTT: ON Press [Orange] to store the adjustment value after adjustment.	f.counter	Rear panel	ANT	Front panel	[B],[C]	Center frequency ±50Hz	**Note:** After replacing the VCXO (X200) align frequency.
2. Max power adjust • TK-5710	**[Panel test mode]** 1) CH-Sig: 1-1 PTT: ON	Power meter Ammeter			Final	VR1	55W	±2W
• TK-5710H	1) CH-Sig: 3-1 PTT: ON						118W	±2W
3. High power adjust • TK-5710	**[Panel tuning mode]** 1) Adj item: [W HPW] Adjust: [***] 2) Adj item: [WL HPW]→[WLC HPW]→[WC HPW]→[WCH HPW]→[WH HPW] Adjust: [***] PTT: ON Press [Orange] to store the adjustment value after adjustment.				Front panel	[B],[C]	50W	±1W 12A or less
• TK-5710H							110W	±2W 25A or less
4. Low power adjust • TK-5710	1) Adj item: [W LPW] Adjust: [***] 2) Adj item: [WL LPW]→[WLC LPW]→[WC LPW]→[WCH LPW]→[WH LPW] Adjust: [***] PTT: ON Press [Orange] to store the adjustment value after adjustment.						5.0W	±0.5W 5A or less
• TK-5710H							50W	±1W 12A or less
5. DQT balance adjust • Wide	1) Adj item: [W BALW] Adjust: [***] Deviation meter filter LPF: 3kHz HPF: OFF 2) Adj item: [WL BALW]→[WLC BALW]→[WC BALW]→[WCH BALW]→[WH BALW] Adjust: [***] PTT: ON Press [Orange] to store the adjustment value after adjustment.	Deviation meter Oscilloscope AG AF VTVM	Rear panel Front panel	ANT MIC jack			Make the demodulation waves into square waves.	
• Narrow	3) Adj item: [N BALN] Adjust: [***] 4) Adj item: [NL BALN]→[NLC BALN]→[NC BALN]→[NCH BALN]→[NH BALN] Adjust: [***] PTT: ON Press [Orange] to store the adjustment value after adjustment.							

*1: The reference oscillator frequency may drift due to shock (jarring the radio) or operating conditions. We strongly recommend that the oscillator be checked each time the radio is serviced, or at least once per year. Maintenance should only be performed under normal temperatures.

ADJUSTMENT

Item	Condition	Measurement			Adjustment			Specifications / Remarks
		Test-equipment	Unit	Terminal	Unit	Parts	Method	
6. Max DEV adjust • Wide	1) Adj item: [W FMWD] Adjust: [∗∗∗] AG: 1kHz/50mV at MIC terminal Deviation meter filter LPF: 15kHz HPF: OFF 2) Adj item: [WL FMWD]→[WLC FMWD]→[WC FMWD]→[WCH FMWD]→[WH FMWD] Adjust: [∗∗∗] PTT: ON Press [Orange] to store the adjustment value after adjustment.	Deviation meter Oscillo-scope AG AF VTVM	Rear panel Front panel	ANT MIC jack	Front panel	[B],[C]	4.05kHz (According to the large +, –)	±50Hz
• Narrow	3) Adj item: [N FMND] Adjust: [∗∗∗] 4) Adj item: [NL FMND]→[NLC FMND]→[NC FMND]→[NCH FMND]→[NH FMND] Adjust: [∗∗∗] PTT: ON Press [Orange] to store the adjustment value after adjustment.						2.0kHz (According to the large +, –)	±50Hz
7. P25 high deviation adjust	1) Adj item: [A HDVA] Adjust: [∗∗∗] Deviation meter filter LPF: 3kHz HPF: OFF 2) Adj item: [AL HDVA]→[ALC HDVA]→[AC HDVA]→[ACH HDVA]→[AH HDVA] Adjust: [∗∗∗] PTT: ON Press [Orange] to store the adjustment value after adjustment.						2827Hz	2771~2883Hz
8. MIC sensitivity check *2	1) Adj item: [MIC] Adjust: [129] PTT: ON Press [Orange] to store the adjustment value after adjustment.		Rear panel	ANT			Adjust AG input to get a standard MOD., 3.0kHz.	5mV±1.5mV
9. QT deviation adjust • Wide	1) Adj item: [W QTW] Adjust: [∗∗∗] Deviation meter filter LPF: 3kHz HPF: OFF 2) Adj item: [WL QTW]→[WC QTW]→[WH QTW] Adjust: [∗∗∗] PTT: ON Press [Orange] to store the adjustment value after adjustment.	Power meter Deviation meter Oscillo-scope AG AF VTVM	Rear panel Front panel	ANT MIC jack	Front panel	[B],[C]	0.75kHz	±50Hz
• Narrow	3) Adj item: [N QTN] Adjust: [∗∗∗] 4) Adj item: [WL QTN]→[WC QTN]→[WH QTN] Adjust: [∗∗∗] PTT: ON Press [Orange] to store the adjustment value after adjustment.						0.35kHz	±25Hz

*2: The MIC sensitivity is related to the Max DEV adjustment. If the Max DEV has been adjusted correctly, the MIC sensitivity must be within 5mV ±1.5mV at adjustment digit "129".

ADJUSTMENT

Item	Condition	Measurement			Adjustment			Specifications / Remarks
		Test-equipment	Unit	Terminal	Unit	Parts	Method	
10. DQT deviation adjust • Wide	1) Adj item: [W DQTW] Adjust: [∗∗∗] Deviation meter filter LPF: 3kHz HPF: OFF 2) Adj item: [WL DQTW]→[WC DQTW]→[WH DQTW] Adjust: [∗∗∗] PTT: ON Press [Orange] to store the adjustment value after adjustment.	Power meter Deviation meter Oscillo-scope AG AF VTVM	Rear panel Front panel	ANT MIC jack	Front panel	[B],[C]	0.75kHz	±50Hz
• Narrow	3) Adj item: [N DQTN] Adjust: [∗∗∗] 4) Adj item: [WL DQTN]→[WC DQTN]→[WH DQTN] Adjust: [∗∗∗] PTT: ON Press [Orange] to store the adjustment value after adjustment.						0.35kHz	±25Hz
11. DTMF deviation adjust •Wide	1) Adj item: [W DTMW] Adjust: [∗∗∗] Deviation meter filter LPF: 15kHz HPF: OFF PTT: ON Press [Orange] to store the adjustment value after adjustment						3.0kHz	±100Hz
• Narrow	2) Adj item: [N DTWN] Adjust: [∗∗∗] PTT: ON Press [Orange] to store the adjustment value after adjustment						1.5kHz	±50Hz
12. MSK deviation adjust • Wide	1) Adj item: [W MSKW] Adjust: [∗∗∗] Deviation meter filter LPF: 15kHz HPF: OFF PTT: ON Press [Orange] to store the adjustment value after adjustment						3.0kHz	±100Hz
• Narrow	2) Adj item: [N MSKN] Adjust: [∗∗∗] PTT: ON Press [Orange] to store the adjustment value after adjustment						1.5kHz	±50Hz
13. Single tone deviation adjust • Wide	1) Adj item: [W 2TNW] Adjust: [∗∗∗] Deviation meter filter LPF: 15kHz HPF: OFF PTT: ON Press [Orange] to store the adjustment value after adjustment						3.0kHz	±100Hz
• Narrow	2) Adj item: [N 2TNN] Adjust: [∗∗∗] PTT: ON Press [Orange] to store the adjustment value after adjustment						1.5kHz	±50Hz

ADJUSTMENT

TK-5710/5710H Receiver Section

Item	Condition	Measurement			Adjustment			Specifications / Remarks
		Test-equipment	Unit	Terminal	Unit	Parts	Method	
1. RX Front-end adjust	**[Panel tuning mode]** 1) Adj item: [W FEND] Adjust: [∗∗∗] 2) Adj item: [WL FEND]→[WLC FEND]→[WC FEND]→[WCH FEND]→[WH FEND]	SSG	Rear panel	ANT	Front panel	[B],[C]	Enter the following adjustment values to the transceiver by pressing [B] and [C] keys. [WL FEND]: 190 [WLC FEND]: 160 [WC FEND]: 110 [WCH FEND]: 65 [WH FEND]: 10 After setting the adjustment value, press [Orange] key. The adjustment value will be stored in memory.	**Note:** After replacing the EEPROM (IC701) align RX Front-end.
2. RSSI (Reference) adjust • Wide	1) Adj item: [W RSSI] Adjust: [∗∗∗] 2) Adj item: [WL RSSI]→[WC RSSI]→[WH RSSI] Adjust: [∗∗∗] SSG output: –125dBm (0.126µV) (MOD: 1kHz/±3kHz)	SSG AF VTVM Oscilloscope	Rear panel	ANT EXT.SP	Front panel	[Orange]	After input signal from SSG, press [Orange] key. That numeric will be stored in memory.	
• Narrow	3) Adj item: [N RSSI] Adjust: [∗∗∗] 4) Adj item: [NL RSSI]→[NC RSSI]→[NH RSSI] Adjust: [∗∗∗] SSG output: –125dBm (0.126µV) (MOD: 1kHz/1.5kHz)							
• P25	5) Adj item: [A RSSI] Adjust: [∗∗∗] 6) Adj item: [AL RSSI]→[AC RSSI]→[AH RSSI] Adjust: [∗∗∗] SSG output: –125dBm (0.126µV)							
3. RSSI (–120dBm) adjust • Wide	1) Adj item: [W LRSI] Adjust: [∗∗∗] 2) Adj item: [WL LRSI]→[WC LRSI]→[WH LRSI] Adjust: [∗∗∗] SSG output: –120dBm (0.22µV) (MOD: 1kHz/±3kHz)							
• Narrow	3) Adj item: [N LRSI] Adjust: [∗∗∗] 4) Adj item: [NL LRSI]→[NC LRSI]→[NH LRSI] Adjust: [∗∗∗] SSG output: –120dBm (0.22µV) (MOD: 1kHz/±1.5kHz)							
• P25	5) Adj item: [A LRSI] Adjust: [∗∗∗] 6) Adj item: [AL LRSI]→[AC LRSI]→[AH LRSI] Adjust: [∗∗∗] SSG output: –120dBm (0.22µV)							

ADJUSTMENT

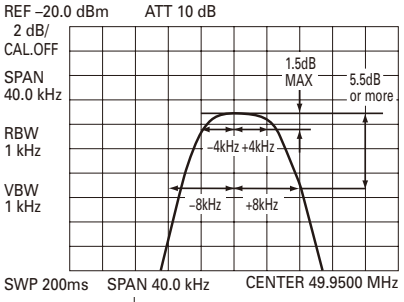
Item	Condition	Measurement			Adjustment			Specifications / Remarks
		Test-equipment	Unit	Terminal	Unit	Parts	Method	
4. RSSI (–70dBm) adjust • Wide	1) Adj item: [W HRSI] Adjust: [***] 2) Adj item: [WL HRSI]→[WC HRSI]→[WH HRSI] Adjust: [***] SSG output: –70dBm (70.8µV) (MOD: 1kHz/±3kHz)	SSG AF VTVM Oscillo-scope	Rear panel	ANT EXT.SP	Front panel	[Orange]	After input signal from SSG, press [Orange] key. That numeric will be stored in memory.	
• Narrow	3) Adj item: [N HRSI] Adjust: [***] 4) Adj item: [NL HRSI]→[NC HRSI]→[NH HRSI] Adjust: [***] SSG output: –70dBm (70.8µV) (MOD: 1kHz/±1.5kHz)							
• P25	5) Adj item: [A HRSI] Adjust: [***] 6) Adj item: [AL HRSI]→[AC HRSI]→[AH HRSI] Adjust: [***] SSG output: –70dBm (70.8µV)							
5. AF level setting	**[Panel test mode]** 1) CH-Sig: 1-1 SSG output: –47dBm (1mV) (MOD: 1kHz/±3kHz)	SSG DVM AF VTVM 4Ω dummy load	Rear panel	ANT EXT.SP	Front panel	Volume Knob	Turn the Volume Knob to obtain 2.0V AF output.	2.0V±0.1V
6. Sensitivity Check • Wide	1) CH-Sig: 1-1 SSG output: –117dBm (0.32µV) (MOD: 1kHz/±3kHz)	SSG AF VTVM Oscillo-scope					Check	12dB SINAD or more
	2) CH-Sig: 2-1							
	3) CH-Sig: 3-1							
• Narrow	4) CH-Sig: 1-1 SSG output: –117dBm (0.32µV) (MOD: 1kHz/±1.5kHz)							
	5) CH-Sig: 2-1							
	6) CH-Sig: 3-1							
7. Squelch (Threshold) adjust • Wide	1) Adj item: [W SQOW] Adjust: [***] 2) Adj item: [WL SQOW]→[WC SQOW]→[WH SQOW] Adjust: [***] SSG output : 12dB SINAD level –3dB (MOD: 1kHz/±3kHz)	SSG AF VTVM Oscillo-scope	Rear panel	ANT EXT.SP	Front panel	[Orange]	After input signal from SSG, press [Orange] key. That numeric will be stored in memory.	After adjusting SQL, check SQL open/close. **[Panel test mode]** 1) CH-Sig: 1-1 SSG 12dB SINAD or less : Open SSG –130dBm (0.07µV) : Close 2) CH-Sig: 2-1 SSG 12dB SINAD or less : Open SSG –130dBm (0.07µV) : Close 3) CH-Sig: 3-1 SSG 12dB SINAD or less : Open SSG –130dBm (0.07µV) : Close

ADJUSTMENT

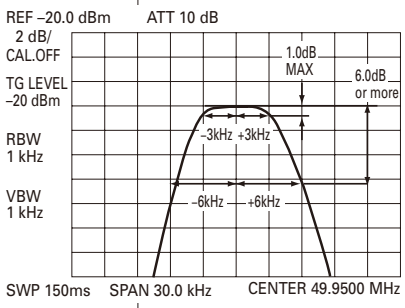
Item	Condition	Measurement			Adjustment			Specifications / Remarks
		Test-equipment	Unit	Terminal	Unit	Parts	Method	
• Narrow	3) Adj item: [N SQON] Adjust: [∗∗∗] SSG output : 12dB SINAD level –3dB (MOD: 1kHz/±1.5kHz)	SSG AF VTVM Oscillo-scope	Rear panel	ANT EXT.SP	Front panel	[Orange]	After input signal from SSG, press [Orange] key. That numeric will be stored in memory.	After adjusting SQL, check SQL open/Close. **[Panel test mode]** 1) CH-Sig: 1-1 SSG 12dB SINAD or less : Open SSG –130dBm (0.07µV) : Close 2) CH-Sig: 2-1 SSG 12dB SINAD or less : Open SSG –130dBm (0.07µV) : Close 3) CH-Sig: 2-1 SSG 12dB SINAD or less : Open SSG –130dBm (0.07µV) : Close
8. Squelch (Tight) adjust • Wide	1) Adj item: [W SQTW] Adjust: [∗∗∗] 2) Adj item: [WL SQTW]→[WC SQTW]→[WH SQTW] Adjust: [∗∗∗] SSG output : 12dB SINAD level +5dB (MOD: 1kHz/±3kHz)							After adjusting SQL, check SQL open/close. **[Panel test mode]** 1) CH-Sig: 1-1 SSG 16dB SINAD or more : Open SSG 12dB SINAND level –4dB : Close 2) CH-Sig: 2-1 SSG 16dB SINAD or more : Open SSG 12dB SINAD level –4dB : Close 3) CH-Sig: 3-1 SSG 16dB SINAD or more : Open SSG 12dB SINAD level –4dB : Close
• Narrow	3) Adj item: [N SQTN] Adjust: [∗∗∗] SSG output : 12dB SINAD level +6dB (MOD: 1kHz/±1.5kHz)							After adjusting SQL, check SQL open/close. **[Panel test mode]** 1) CH-Sig: 1-1 SSG 16dB SINAD or more : Open SSG 12dB SINAND level –4dB : Close 2) CH-Sig: 2-1 SSG 16dB SINAD or more : Open SSG 12dB SINAD level –4dB : Close 3) CH-Sig: 3-1 SSG 16dB SINAD or more : Open SSG 12dB SINAD level –4dB : Close
9. BER (Bit Error Rate) check	**[Panel test mode]** 1) CH-sig: 1-20 SSG output : –117dBm (0.32µV) (C4FM) (1011Hz Tone Test Pattern)	Digital radio tester					Check	5% or less

ADJUSTMENT

TK-5810/5810H Common Section

Item	Condition	Measurement			Adjustment			Specifications / Remarks
		Test-equipment	Unit	Terminal	Unit	Parts	Method	
1. Setting	1) Connect the KCH-16 Hand-held control head to the TK-5810(B)/5810H(B) transceiver via the KRK-11 Interface box and KRK-11 Panel assembly. 2) Power supply voltage •TK-5810(B) Power input connector: 13.6V •TK-5810H(B) Power input connector: 13.4V 3) SSG standard modulation [Wide] MOD: 1kHz, DEV: 3kHz [Narrow] MOD: 1kHz, DEV: 1.5kHz							
2. Assist voltage • TX	**[Panel tuning mode]** 1) Adj item: [VATX] Adjust: [∗∗∗] 2) Adj item: [LLL VATX]→[LL VATX]→[L VATX]→[C VATX]→[H VATX]→[HH VATX]→[HHH VATX] Adjust: [∗∗∗] PTT: ON Press [Orange] to store the adjustment value after adjustment.	Power meter DVM	Rear panel TX-RX	ANT CVu	Front panel	[B],[C]	Change the adjustment value within the limit of the specified voltage.	2.0V±0.1V **K** 2.2V±0.1V **K2** When adjusting the assist voltage in PC tuning mode, slide the bar to indicate "VCO Lock Voltage" within 2.0V±0.1V (**K**), 2.2V±0.1V (**K2**) on Meter window.
• RX (Upper)	3) Adj item: [VARX u] Adjust: [∗∗∗] 4) Adj item: [LLL VARX u]→[LL VARX u]→[L VARX u]→[C VARX u]→[H VARX u]→[HH VARX u]→[HHH VARX u] Adjust: [∗∗∗] Press [Orange] to store the adjustment value after adjustment.							
• RX (Lower)	5) Adj item: [VARX l] Adjust: [∗∗∗] 6) Adj item: [LLL VARX l]→[LL VARX l]→[L VARX l]→[C VARX l]→[H VARX l]→[HH VARX l]→[HHH VARX l] Adjust: [∗∗∗] Press [Orange] to store the adjustment value after adjustment.							
3. MCF • Wide	1) CH-Sig: 1-1 Spectrum analyzer setting Center-f: 49.95MHz Span: 40kHz RBW: 1kHz VBW: 1kHz TG level: –20dBm XdB/div: 2dB Connect each cable (W05-1000-00) to CN202 and CN207.	Spectrum analyzer Tracking generator	Rear panel TX-RX	ANT CN202 CN207	TX-RX	L218 L223 L228 L230	Adjust the coils to obtain the waveform as shown to the right.	

ADJUSTMENT

Item	Condition	Measurement			Adjustment			Specifications / Remarks
		Test-equipment	Unit	Terminal	Unit	Parts	Method	
• Narrow	2) Turn the [∧]/[∨] key as "N" (Narrow) appears on the LCD. Spectrum analyzer setting Center-f: 49.95MHz Span: 30kHz RBW: 1kHz VBW: 1kHz TG level: –20dBm XdB/div: 2dB	Spectrum analyzer Tracking generator	Rear panel TX-RX	ANT CN202 CN207	TX-RX	L217 L222 L227 L229	Adjust the coils to obtain the waveform as shown to the right. 	
4. 2nd local adjust	**[Panel tuning mode]** 1) Adj item: [W SLO] Adjust: [∗∗∗] Press [Orange] to store the adjustment value after adjustment.	f.counter	TX-RX	SLO	TX-RX	[B],[C]	Change the adjustment value within the limit of the specified frequency.	50.4MHz±70Hz
5. Quadrature coil adjust	**[Panel test mode]** 1) CH-Sig: 1-1 SSG output: –53dBm (501µV) (DEV:OFF)	SSG DVM AF VTVM Dummy load	TX-RX	QUAD EXT.SP	TX-RX	L234	Adjust the coil within the limit of the specified voltage.	1.0V±0.05V
6. RTC oscillation frequency adjust	1) CH-Sig: 1-1	f.counter DVM DC power supply	Control	CLKC 32KOUT		Programming Software: KPG-95D	Adjust the RTC oscillation frequency using the PC tuning mode. Perform the procedures below. 1. Apply 5V DC to the "CLKC" terminal of the control unit (X53-412). 2. Measure the output from the "32KOUT" terminal of the control unit (X53-412) using the calibrated frequency counter. 3. Enter the measured frequency value to "Crystal Oscillation Frequency" of RTC correction in the PC tuning mode and then click [OK] button.	**Note:** It is not necessary to adjust the RTC oscillation frequency under normal adjustments. The RTC oscillation frequency must be checked and adjusted when the 32kHz crystal resonator (X700) is replaced.

ADJUSTMENT

TK-5810/5810H Transmitter Section

Item	Condition	Measurement			Adjustment			Specifications / Remarks
		Test-equipment	Unit	Terminal	Unit	Parts	Method	
1. Frequency adjust *3	**[Panel test mode]** 1) CH-Sig: 3-1 **[Panel tuning mode]** 2) Adj item: [W TXF] Adjust: [***] PTT: ON Press [Orange] to store the adjustment value after adjustment.	f.counter	Rear panel	ANT	Front panel	[B],[C]	Center frequency ±50Hz	**Note:** After replacing the VCXO (X200) align frequency.
2. Max power adjust • TK-5810	**[Panel test mode]** 1) CH-Sig: 1-1 PTT: ON	Power meter Ammeter			Final	VR1	50W	±2W
• TK-5810H							107W	±2W
3. High power adjust • TK-5810	**[Panel tuning mode]** 1) Adj item: [W HPW] Adjust: [***] 2) Adj item: [WL HPW]→[WLC HPW]→[WC HPW]→[WCH HPW]→[WH HPW] Adjust: [***] PTT: ON Press [Orange] to store the adjustment value after adjustment.				Front panel	[B],[C]	45W	±1W 14A or less
• TK-5810H **K**							[WL HPW]: 100W [WLC HPW]: 100W [WC HPW]: 100W [WCH HPW]: 100W [WH HPW]: 60W	±1W 28A or less
• TK-5810H **K2**							100W	
4. Low power adjust • TK-5810	1) Adj item: [W LPW] Adjust: [***] 2) Adj item: [WL LPW]→[WLC LPW]→[WC LPW]→[WCH LPW]→[WH LPW] Adjust: [***] PTT: ON Press [Orange] to store the adjustment value after adjustment.						5.0W	±0.5W 5A or less
• TK-5810H							50W	±1W 15A or less
5. DQT balance adjust • Wide	1) Adj item: [W BALW] Adjust: [***] Deviation meter filter LPF: 3kHz HPF: OFF 2) Adj item: [WL BALW]→[WLC BALW]→[WC BALW]→[WCH BALW]→[WH BALW] Adjust: [***] PTT: ON Press [Orange] to store the adjustment value after adjustment.	Deviation meter Oscilloscope AG AF VTVM	Rear panel Front panel	ANT MIC jack			Make the demodulation waves into square waves.	
• Narrow	3) Adj item: [N BALN] Adjust: [***] 4) Adj item: [NL BALN]→[NLC BALN]→[NC BALN]→[NCH BALN]→[NH BALN] Adjust: [***] PTT: ON Press [Orange] to store the adjustment value after adjustment.							

*3: The reference oscillator frequency may drift due to shock (jarring the radio) or operating conditions. We strongly recommend that the oscillator be checked each time the radio is serviced, or at least once per year. Maintenance should only be performed under normal temperatures.

ADJUSTMENT

Item	Condition	Measurement			Adjustment			Specifications / Remarks
		Test-equipment	Unit	Terminal	Unit	Parts	Method	
6. Max DEV adjust • Wide	1) Adj item: [W FMWD] Adjust: [∗∗∗] AG: 1kHz/50mV at MIC terminal Deviation meter filter LPF: 15kHz HPF: OFF 2) Adj item: [WL FMWD]→[WLC FMWD]→[WC FMWD]→[WCH FMWD]→[WH FMWD] Adjust: [∗∗∗] PTT: ON Press [Orange] to store the adjustment value after adjustment.	Deviation meter Oscilloscope AG AF VTVM	Rear panel Front panel	ANT MIC jack	Front panel	[B],[C]	4.05kHz (According to the large +, –)	±50Hz
• Narrow	3) Adj item: [N FMND] Adjust: [∗∗∗] 4) Adj item: [NL FMND]→[NLC FMND]→[NC FMND]→[NCH FMND]→[NH FMND] Adjust: [∗∗∗] PTT: ON Press [Orange] to store the adjustment value after adjustment.						2.0kHz (According to the large +, –)	±50Hz
7. P25 high deviation adjust	1) Adj item: [A HDVA] Adjust: [∗∗∗] Deviation meter filter LPF: 3kHz HPF: OFF 2) Adj item: [AL HDVA]→[ALC HDVA]→[AC HDVA]→[ACH HDVA]→[AH HDVA] Adjust: [∗∗∗] PTT: ON Press [Orange] to store the adjustment value after adjustment.						2827Hz	2771~2883Hz
8. MIC sensitivity check *4	1) Adj item: [MIC] Adjust: [129] PTT: ON Press [Orange] to store the adjustment value after adjustment.		Rear panel	ANT			Adjust AG input to get a standard MOD., 3.0kHz.	5mV±1.5mV
9. QT deviation adjust • Wide	1) Adj item: [W QTW] Adjust: [∗∗∗] Deviation meter filter LPF: 3kHz HPF: OFF 2) Adj item: [WL QTW]→[WC QTW]→[WH QTW] Adjust: [∗∗∗] PTT: ON Press [Orange] to store the adjustment value after adjustment.	Power meter Deviation meter Oscilloscope AG AF VTVM	Rear panel Front panel	ANT MIC jack	Front panel	[B],[C]	0.75kHz	±50Hz
• Narrow	3) Adj item: [N QTN] Adjust: [∗∗∗] 4) Adj item: [WL QTN]→[WC QTN]→[WH QTN] Adjust: [∗∗∗] PTT: ON Press [Orange] to store the adjustment value after adjustment.						0.35kHz	±25Hz

*4: The MIC sensitivity is related to the Max DEV adjustment. If the Max DEV has been adjusted correctly, the MIC sensitivity must be within 5mV ±1.5mV at adjustment digit "129".

ADJUSTMENT

Item	Condition	Measurement			Adjustment			Specifications / Remarks
		Test-equipment	Unit	Terminal	Unit	Parts	Method	
10. DQT deviation adjust • Wide	1) Adj item: [W DQTW] Adjust: [∗∗∗] Deviation meter filter LPF: 3kHz HPF: OFF 2) Adj item: [WL DQTW]→[WC DQTW]→[WH DQTW] Adjust: [∗∗∗] PTT: ON Press [Orange] to store the adjustment value after adjustment.	Power meter Deviation meter Oscillo-scope AG AF VTVM	Rear panel Front panel	ANT MIC jack	Front panel	[B],[C]	0.75kHz	±50Hz
• Narrow	3) Adj item: [N DQTN] Adjust: [∗∗∗] 4) Adj item: [WL DQTN]→[WC DQTN]→[WH DQTN] Adjust: [∗∗∗] PTT: ON Press [Orange] to store the adjustment value after adjustment.						0.35kHz	±25Hz
11. DTMF deviation adjust •Wide	1) Adj item: [W DTMW] Adjust: [∗∗∗] Deviation meter filter LPF: 15kHz HPF: OFF PTT: ON Press [Orange] to store the adjustment value after adjustment						3.0kHz	±100Hz
• Narrow	2) Adj item: [N DTWN] Adjust: [∗∗∗] PTT: ON Press [Orange] to store the adjustment value after adjustment						1.5kHz	±50Hz
12. MSK deviation adjust • Wide	1) Adj item: [W MSKW] Adjust: [∗∗∗] Deviation meter filter LPF: 15kHz HPF: OFF PTT: ON Press [Orange] to store the adjustment value after adjustment						3.0kHz	±100Hz
• Narrow	2) Adj item: [N MSKN] Adjust: [∗∗∗] PTT: ON Press [Orange] to store the adjustment value after adjustment						1.5kHz	±50Hz
13. Single tone deviation adjust • Wide	1) Adj item: [W 2TNW] Adjust: [∗∗∗] Deviation meter filter LPF: 15kHz HPF: OFF PTT: ON Press [Orange] to store the adjustment value after adjustment						3.0kHz	±100Hz
• Narrow	2) Adj item: [N 2TNN] Adjust: [∗∗∗] PTT: ON Press [Orange] to store the adjustment value after adjustment						1.5kHz	±50Hz

ADJUSTMENT

TK-5810/5810H Receiver Section

Item	Condition	Measurement			Adjustment			Specifications / Remarks
		Test-equipment	Unit	Terminal	Unit	Parts	Method	
1. RX Front-end adjust	**[Panel tuning mode]** 1) Adj item: [W FEND] Adjust: [∗∗∗] 2) Adj item: [WL FEND]→[WLC FEND]→[WC FEND]→[WCH FEND]→[WH FEND]	SSG	Rear panel	ANT	Front panel	[B],[C]	Enter the following adjustment values to the transceiver by pressing [B] and [C] keys. [WL FEND]: 210 **K**, 205 **K2** [WLC FEND]:175 **K**, 155 **K2** [WC FEND]: 130 **K**, 115 **K2** [WCH FEND]: 95 **K**, 80 **K2** [WH FEND]: 65 **K**, 50 **K2** After setting the adjustment value, press [Orange] key. The adjustment value will be stored in memory.	**Note:** After replacing the EEPROM (IC701) align RX Front-end.
2. RSSI (Reference) adjust • Wide	1) Adj item: [W RSSI] Adjust: [∗∗∗] 2) Adj item: [WL RSSI]→[WC RSSI]→[WH RSSI] Adjust: [∗∗∗] SSG output: –125dBm (0.126µV) (MOD: 1kHz/±3kHz)	SSG AF VTVM Oscilloscope	Rear panel	ANT EXT.SP	Front panel	[Orange]	After input signal from SSG, press [Orange] key. That numeric will be stored in memory.	
• Narrow	3) Adj item: [N RSSI] Adjust: [∗∗∗] 4) Adj item: [NL RSSI]→[NC RSSI]→[NH RSSI] Adjust: [∗∗∗] SSG output: –125dBm (0.126µV) (MOD: 1kHz/1.5kHz)							
• P25	5) Adj item: [A RSSI] Adjust: [∗∗∗] 6) Adj item: [AL RSSI]→[AC RSSI]→[AH RSSI] Adjust: [∗∗∗] SSG output: –125dBm (0.126µV)							
3. RSSI (–120dBm) adjust • Wide	1) Adj item: [W LRSI] Adjust: [∗∗∗] 2) Adj item: [WL LRSI]→[WC LRSI]→[WH LRSI] Adjust: [∗∗∗] SSG output: –120dBm (0.22µV) (MOD: 1kHz/±3kHz)							
• Narrow	3) Adj item: [N LRSI] Adjust: [∗∗∗] 4) Adj item: [NL LRSI]→[NC LRSI]→[NH LRSI] Adjust: [∗∗∗] SSG output: –120dBm (0.22µV) (MOD: 1kHz/±1.5kHz)							
• P25	5) Adj item: [A LRSI] Adjust: [∗∗∗] 6) Adj item: [AL LRSI]→[AC LRSI]→[AH LRSI] Adjust: [∗∗∗] SSG output: –120dBm (0.22µV)							

ADJUSTMENT

Item	Condition	Measurement			Adjustment			Specifications / Remarks
		Test-equipment	Unit	Terminal	Unit	Parts	Method	
4. RSSI (–70dBm) adjust • Wide	1) Adj item: [W HRSI] Adjust: [***] 2) Adj item: [WL HRSI]→[WC HRSI]→[WH HRSI] Adjust: [***] SSG output: –70dBm (70.8µV) (MOD: 1kHz/±3kHz)	SSG AF VTVM Oscillo-scope	Rear panel	ANT EXT.SP	Front panel	[Orange]	After input signal from SSG, press [Orange] key. That numeric will be stored in memory.	
• Narrow	3) Adj item: [N HRSI] Adjust: [***] 4) Adj item: [NL HRSI]→[NC HRSI]→[NH HRSI] Adjust: [***] SSG output: –70dBm (70.8µV) (MOD: 1kHz/±1.5kHz)							
• P25	5) Adj item: [A HRSI] Adjust: [***] 6) Adj item: [AL HRSI]→[AC HRSI]→[AH HRSI] Adjust: [***] SSG output: –70dBm (70.8µV)							
5. AF level setting	**[Panel test mode]** 1) CH-Sig: 1-1 SSG output: –47dBm (1mV) (MOD: 1kHz/±3kHz)	SSG DVM AF VTVM 4Ω dummy load	Rear panel	ANT EXT.SP	Front panel	Volume Knob	Turn the Volume Knob to obtain 2.0V AF output.	2.0V±0.1V
6. Sensitivity Check • Wide	1) CH-Sig: 1-1 SSG output: –117dBm (0.32µV) (MOD: 1kHz/±3kHz)	SSG AF VTVM Oscillo-scope					Check	12dB SINAD or more
	2) CH-Sig: 2-1							
	3) CH-Sig: 3-1							
• Narrow	4) CH-Sig: 1-1 SSG output: –117dBm (0.32µV) (MOD: 1kHz/±1.5kHz)							
	5) CH-Sig: 2-1							
	6) CH-Sig: 3-1							
7. Squelch (Threshold) adjust • Wide	1) Adj item: [W SQOW] Adjust: [***] 2) Adj item: [WL SQOW]→[WC SQOW]→[WH SQOW] Adjust: [***] SSG output : 12dB SINAD level –3dB (MOD: 1kHz/±3kHz)	SSG AF VTVM Oscillo-scope	Rear panel	ANT EXT.SP	Front panel	[Orange]	After input signal from SSG, press [Orange] key. That numeric will be stored in memory.	After adjusting SQL, check SQL open/close. **[Panel test mode]** 1) CH-Sig: 1-1 SSG 12dB SINAD or less : Open SSG –130dBm (0.07µV) : Close 2) CH-Sig: 2-1 SSG 12dB SINAD or less : Open SSG –130dBm (0.07µV) : Close 3) CH-Sig: 3-1 SSG 12dB SINAD or less : Open SSG –130dBm (0.07µV) : Close

ADJUSTMENT

Item	Condition	Measurement			Adjustment			Specifications / Remarks
		Test-equipment	Unit	Terminal	Unit	Parts	Method	
• Narrow	3) Adj item: [N SQON] Adjust: [∗∗∗] SSG output : 12dB SINAD level –3dB (MOD: 1kHz/±1.5kHz)	SSG AF VTVM Oscillo-scope	Rear panel	ANT EXT.SP	Front panel	[Orange]	After input signal from SSG, press [Orange] key. That numeric will be stored in memory.	After adjusting SQL, check SQL open/Close. **[Panel test mode]** 1) CH-Sig: 1-1 SSG 12dB SINAD or less : Open SSG –130dBm (0.07µV) : Close 2) CH-Sig: 2-1 SSG 12dB SINAD or less : Open SSG –130dBm (0.07µV) : Close 3) CH-Sig: 2-1 SSG 12dB SINAD or less : Open SSG –130dBm (0.07µV) : Close
8. Squelch (Tight) adjust • Wide	1) Adj item: [W SQTW] Adjust: [∗∗∗] 2) Adj item: [WL SQTW]→[WC SQTW]→[WH SQTW] Adjust: [∗∗∗] SSG output : 12dB SINAD level +5dB (MOD: 1kHz/±3kHz)							After adjusting SQL, check SQL open/close. **[Panel test mode]** 1) CH-Sig: 1-1 SSG 16dB SINAD or more : Open SSG 12dB SINAND level –4dB : Close 2) CH-Sig: 2-1 SSG 16dB SINAD or more : Open SSG 12dB SINAD level –4dB : Close 3) CH-Sig: 3-1 SSG 16dB SINAD or more : Open SSG 12dB SINAD level –4dB : Close
• Narrow	3) Adj item: [N SQTN] Adjust: [∗∗∗] SSG output : 12dB SINAD level +6.5dB (MOD: 1kHz/±1.5kHz)							After adjusting SQL, check SQL open/close. **[Panel test mode]** 1) CH-Sig: 1-1 SSG 16dB SINAD or more : Open SSG 12dB SINAND level –4dB : Close 2) CH-Sig: 2-1 SSG 16dB SINAD or more : Open SSG 12dB SINAD level –4dB : Close 3) CH-Sig: 3-1 SSG 16dB SINAD or more : Open SSG 12dB SINAD level –4dB : Close
9. BER (Bit Error Rate) check	**[Panel test mode]** 1) CH-sig: 1-20 SSG output : –117dBm (0.32µV) (C4FM) (1011Hz Tone Test Pattern)	Digital radio tester					Check	5% or less

TERMINAL FUNCTION

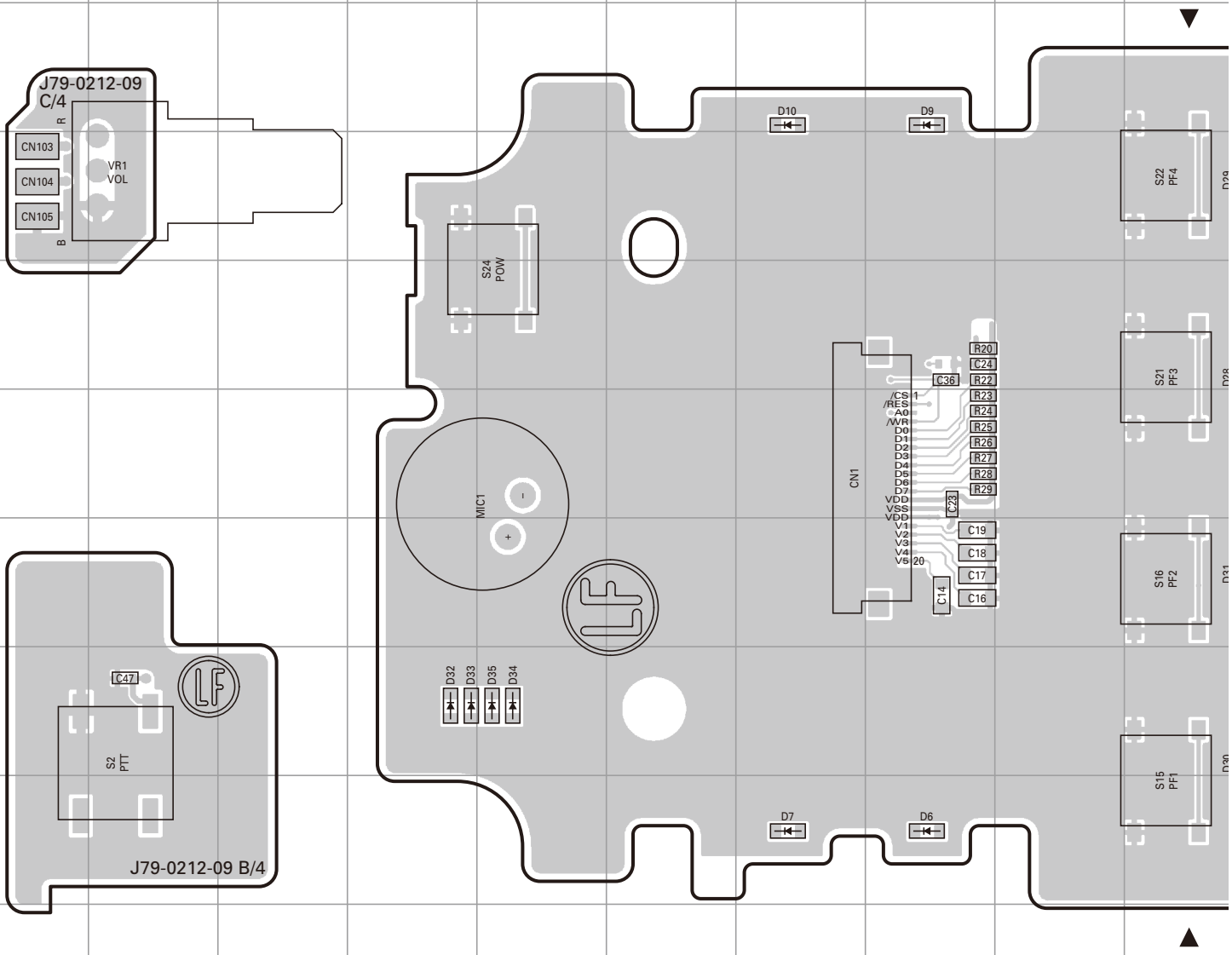
Control unit (X53-4360-20)

Pin No.	Name	I/O	Function
CN1 (to LCD ASSY)			
1	/CS	O	Chip select output
2	/RES	O	LCD reset output
3	A0	O	Address bus 0 output
4	/WR	O	WR bus output
5	D0	I/O	Data bus 0
6	D1	I/O	Data bus 1
7	D2	I/O	Data bus 2
8	D3	I/O	Data bus 3
9	D4	I/O	Data bus 4
10	D5	I/O	Data bus 5
11	D6	I/O	Data bus 6
12	D7	I/O	Data bus 7
13	VDD	O	3.3V LCD power supply output
14	VSS	-	GND
15	VDD	O	3.3V LCD power supply output
16	V1	-	LCD drive power supply
17	V2	-	LCD drive power supply
18	V3	-	LCD drive power supply
19	V4	-	LCD drive power supply
20	V5	O	LCD drive power supply
CN2 (for production)			
1~10			
CN3 (to Control unit B/4 PTT switch)			
1	PTT	I	PTT input
2	GND	-	GND

Pin No.	Name	I/O	Function
CN4 (to Control unit C/4 VOL control)			
1	VOL GND	-	GND for volume level
2	VOL	O	Volume level output for audio control
3	VDD	I	5V for volume level
CN5 (to Control unit D/4 Sub MIC)			
1	ECM	I	Sub MIC input
2	ME	-	MIC GND
J2 (MIC jack)			
1	KVL	I	Detection of KVL3000 Active Low pulled up with 47k. VIH: 4.16~5.10V / VOL: –0.3~0.96V
2	TRD	I/O	Bidirection serial data VIH: 4.16~5.10V / VIL: –0.3~0.96V VOH: 4.80~5.20V / VOL: <0.3V Baud rate: 115200bps Max
3	MIC	O	MIC signal output
4	ME	-	MIC GND
5	PS	O	Power switch signal output SW OFF: 13.0V (typ) SW ON: 0V (typ)
6	E	-	GND
7	SB	I	Switched Battery Voltage: 11.39~15.64V Current: 200mA max
8	RESET	I	Reset signal input Active Low pulled down with 470k. VIH: 4.16~5.10V / VIL: –0.3~0.96V

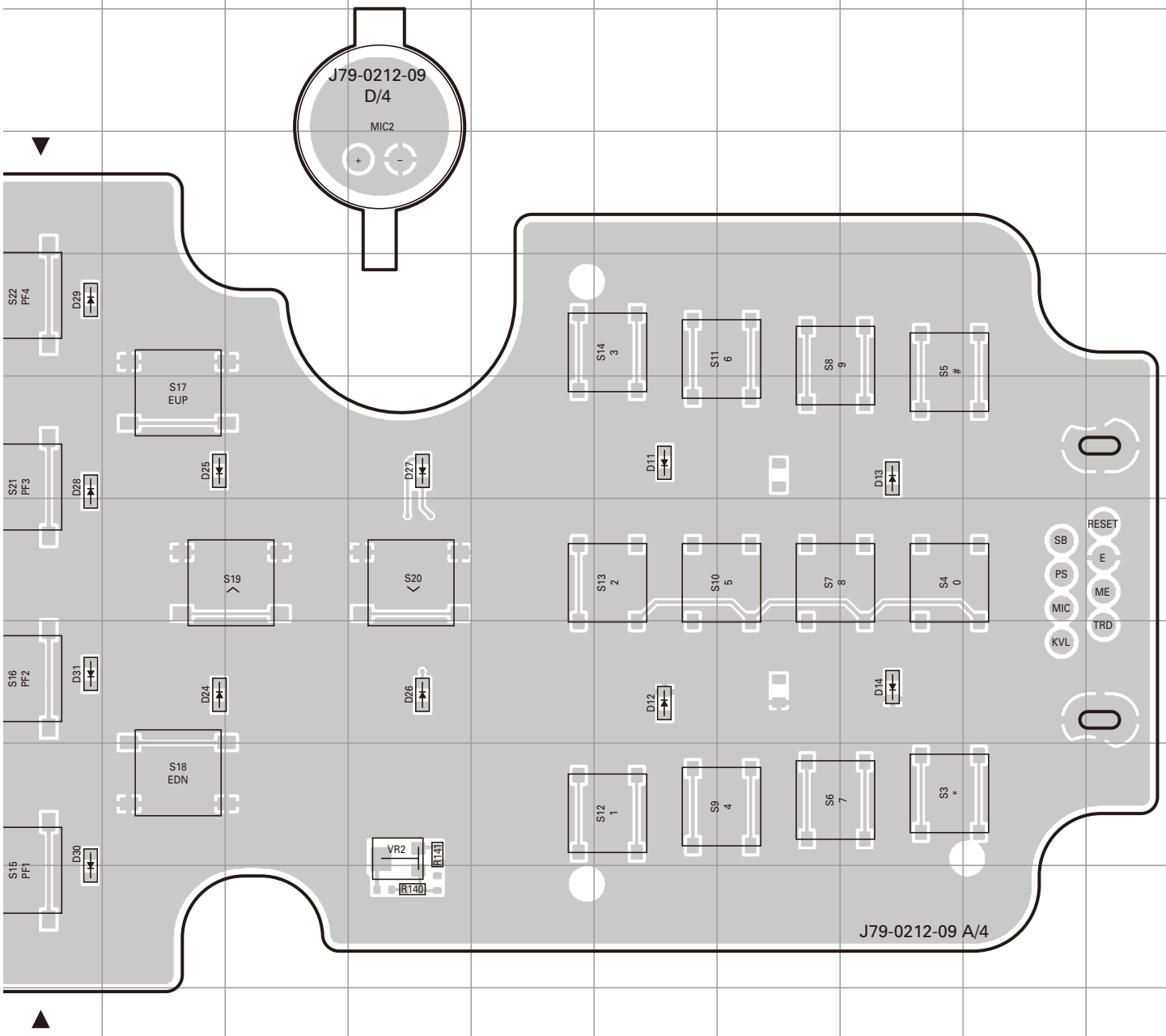
KCH-16 PC BOARD

CONTROL UNIT (X53-4360-20) (A/4, B/4, C/4, D/4)
Component side view (J79-0212-09)



Ref. No.	Address	Ref. No.	Address	Ref. No.	Address	Ref. No.	Address
D6	10H	D13	6Q	D28	6J	D34	9E
D7	10G	D14	8Q	D29	5J	D35	9E
D9	4H	D24	8K	D30	9J		
D10	4G	D25	6K	D31	8J		
D11	6O	D26	8M	D32	9D		
D12	8O	D27	6M	D33	9D		

CONTROL UNIT (X53-4360-20) (A/4, B/4, C/4, D/4)
Component side view (J79-0212-09)



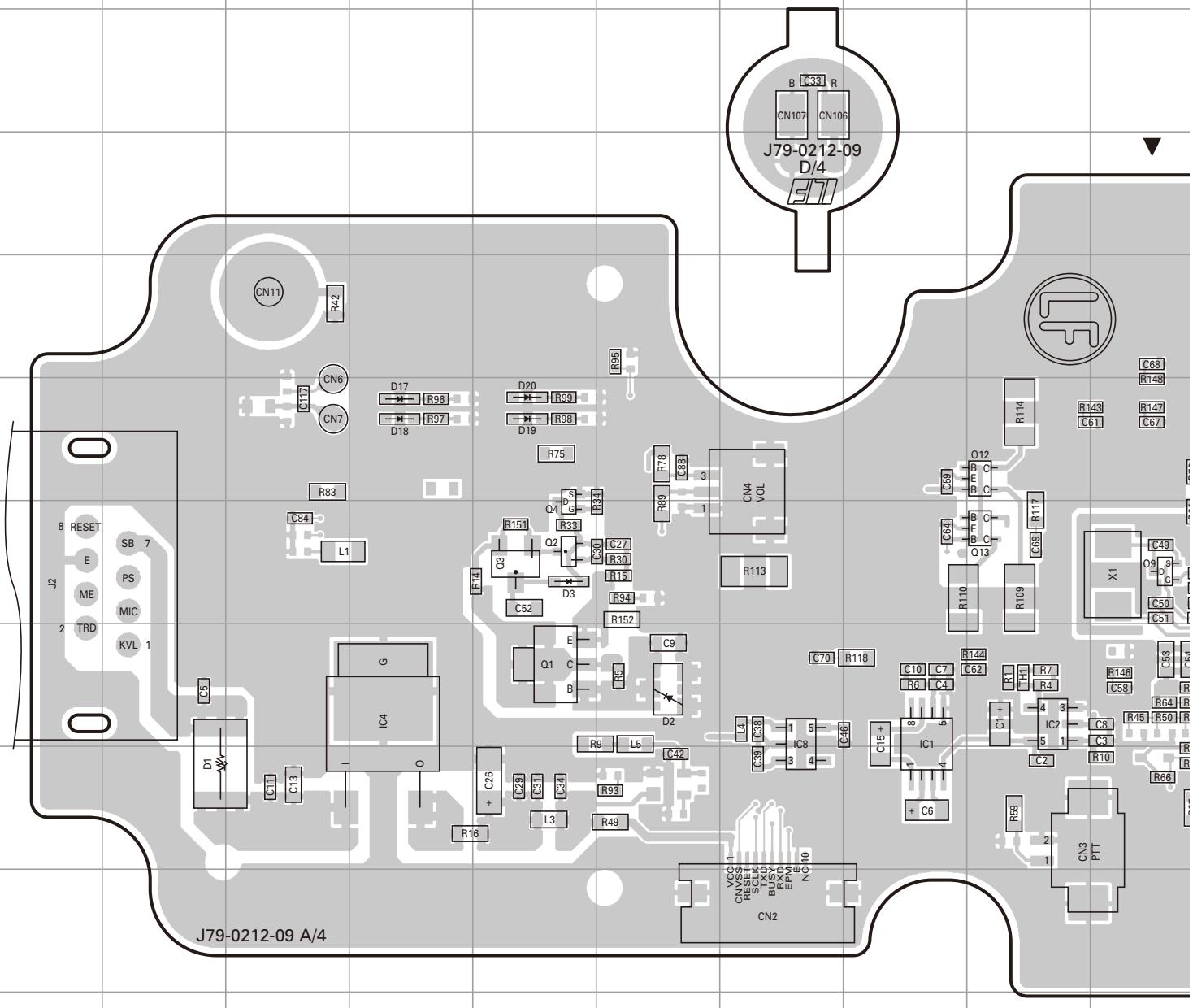
Component side

Layer 1	
Layer 2	
Layer 3	
Layer 4	

Foil side

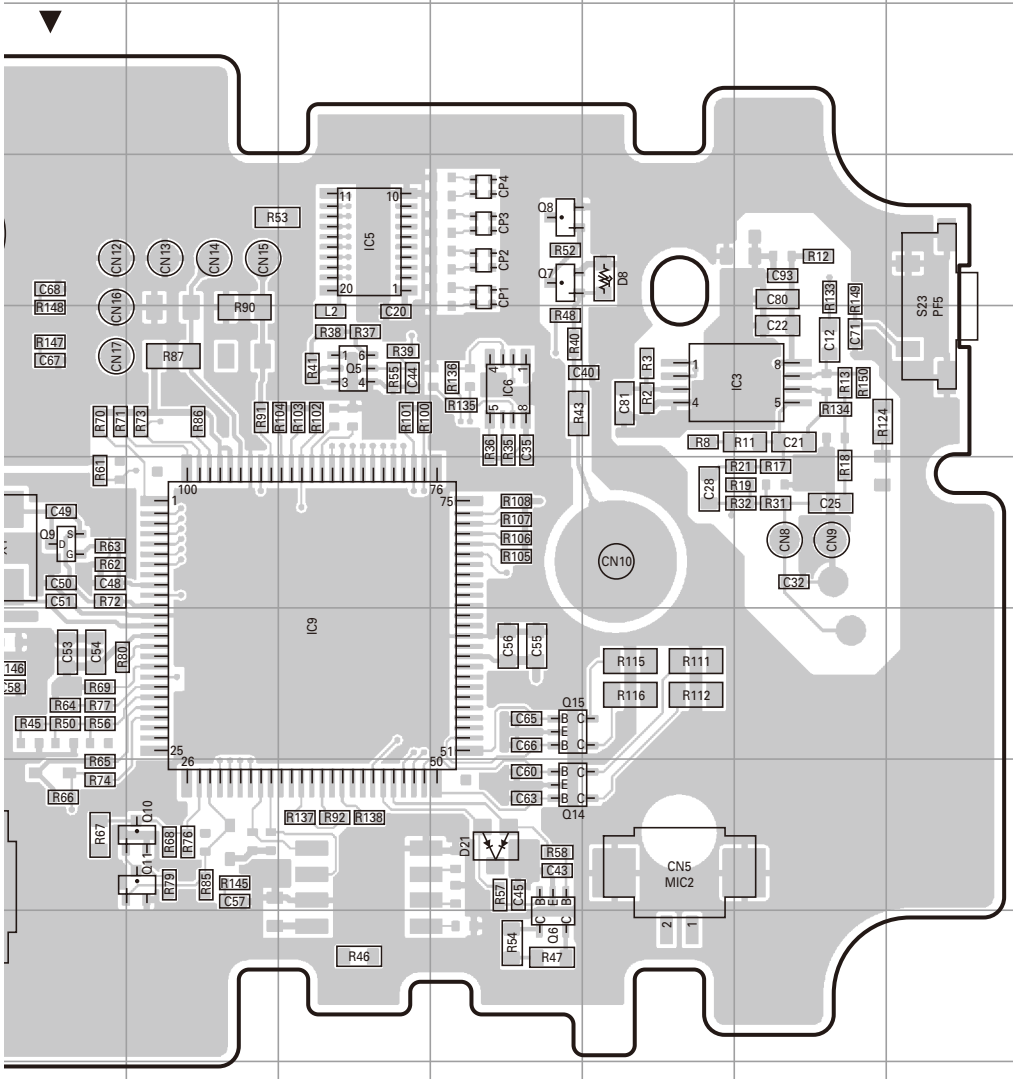
KCH-16 PC BOARD

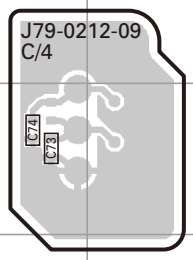
CONTROL UNIT (X53-4360-20) (A/4, B/4, C/4, D/4)
Foil side view (J79-0212-09)

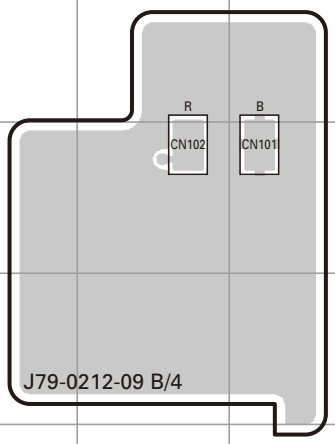


Ref. No.	Address	Ref. No.	Address	Ref. No.	Address	Ref. No.	Address
IC1	8H	Q1	8E	Q9	7J	D2	8F
IC2	8I	Q2	7E	Q10	9K	D3	7E
IC3	6O	Q3	7E	Q11	9K	D8	5N
IC4	8D	Q4	7E	Q12	6I	D17	6D
IC5	5L	Q5	6L	Q13	7I	D18	5D
IC6	6M	Q6	10M	Q14	9M	D19	6E
IC8	8G	Q7	5M	Q15	8M	D20	6E
IC9	8L	Q8	5M	D1	9B	D21	9M

CONTROL UNIT (X53-4360-20) (A/4, B/4, C/4, D/4)
Foil side view (J79-0212-09)





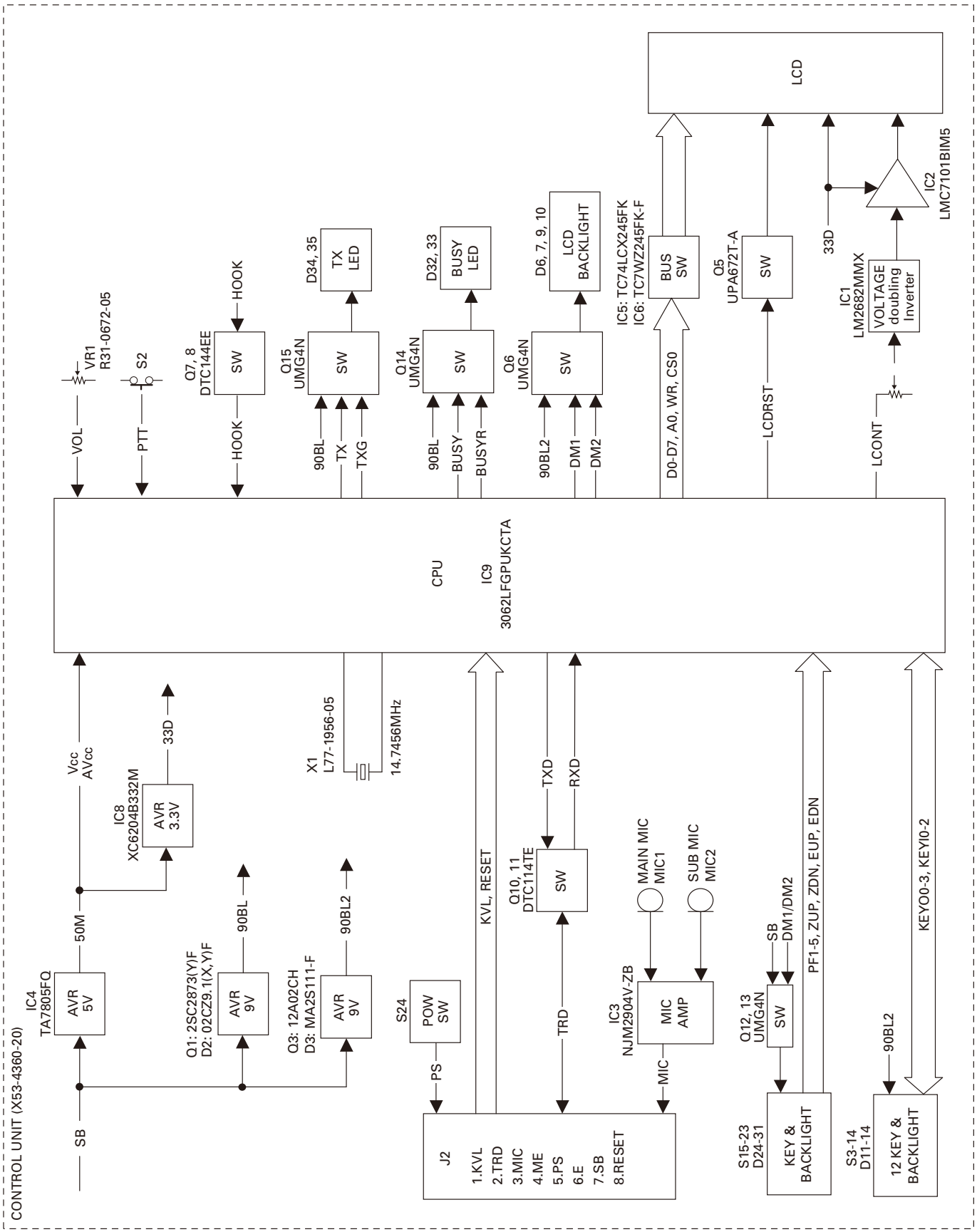


Component side

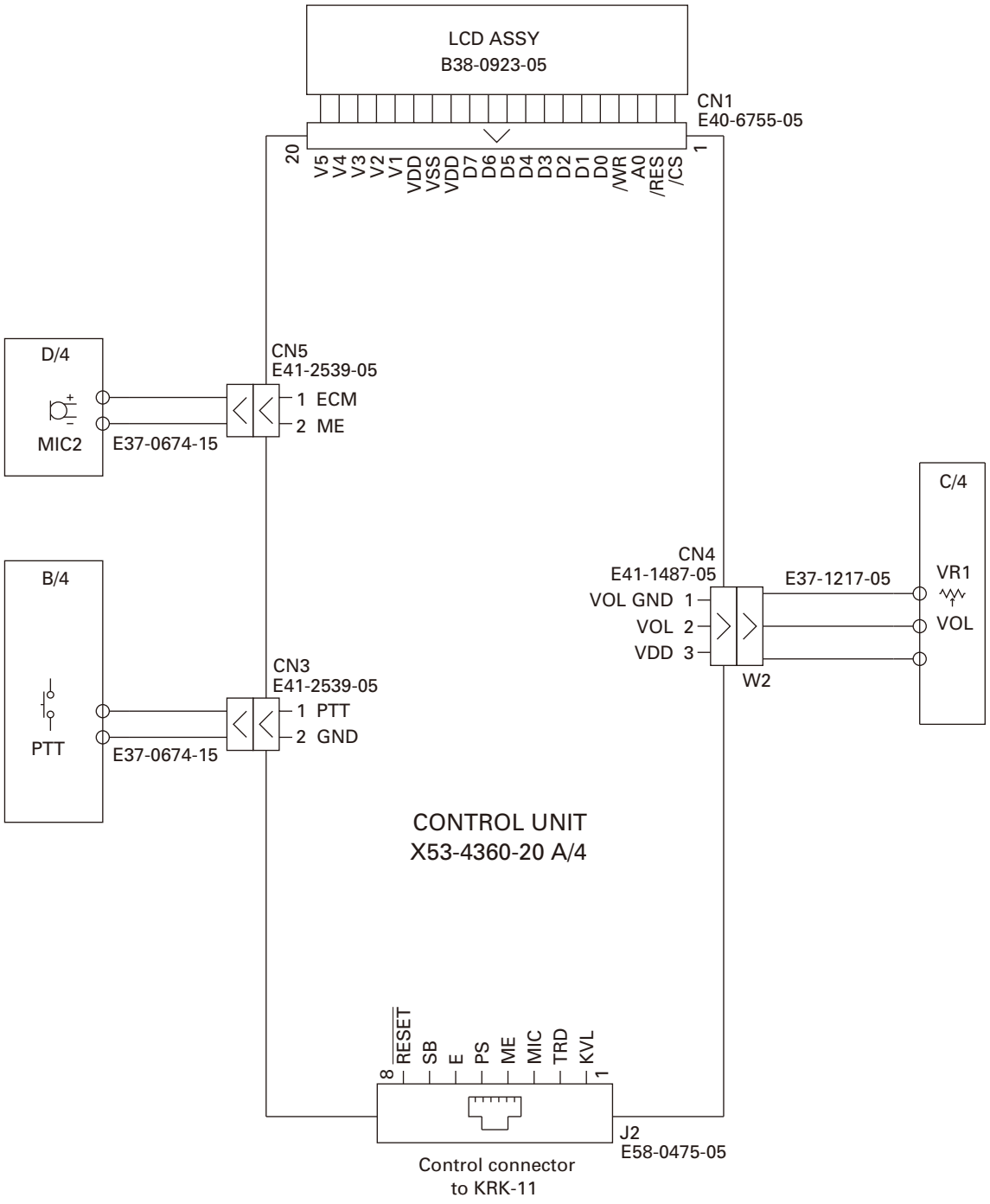
Layer 1	
Layer 2	
Layer 3	
Layer 4	

Foil side

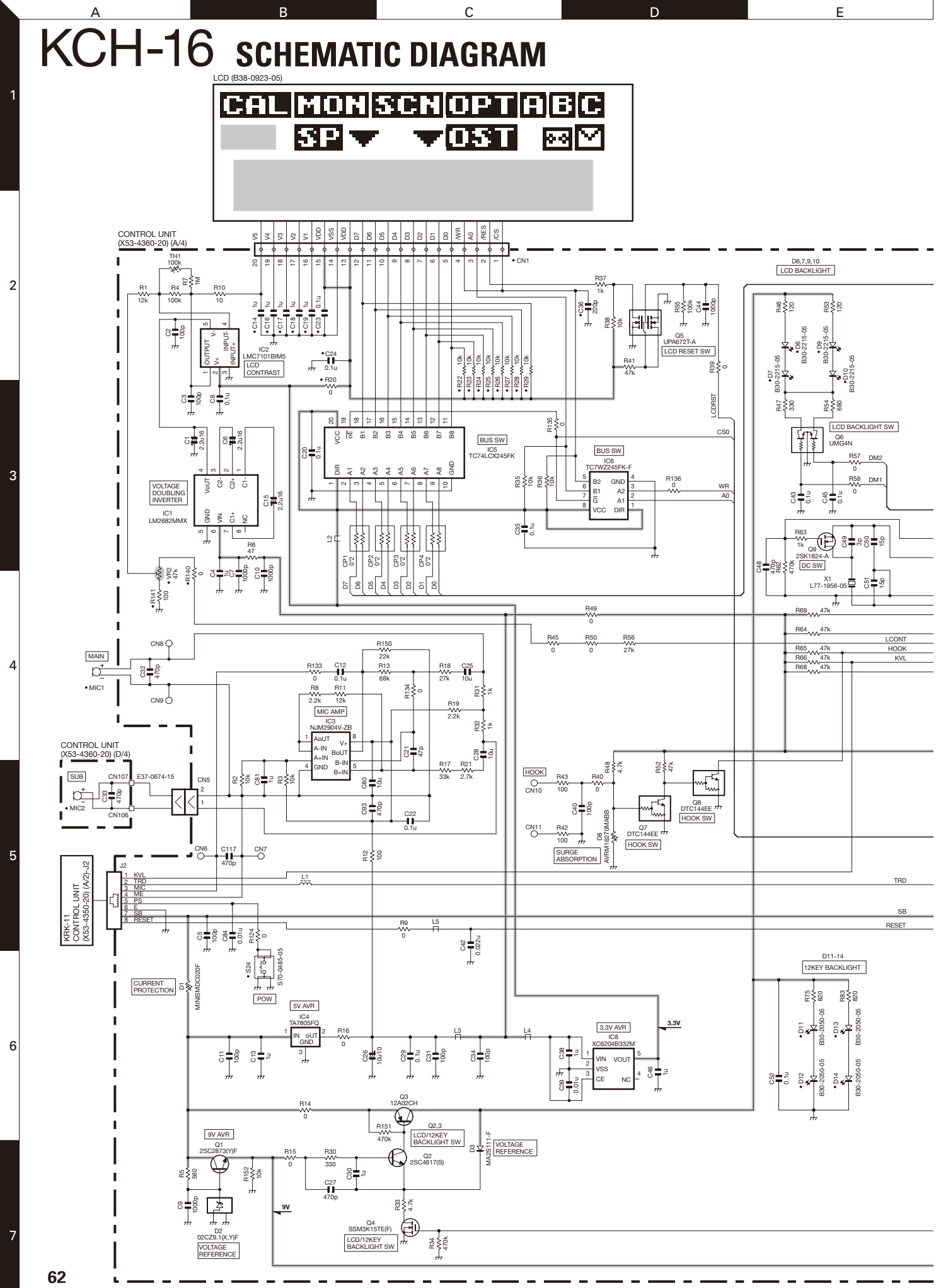
BLOCK DIAGRAM



INTERCONNECTION DIAGRAM

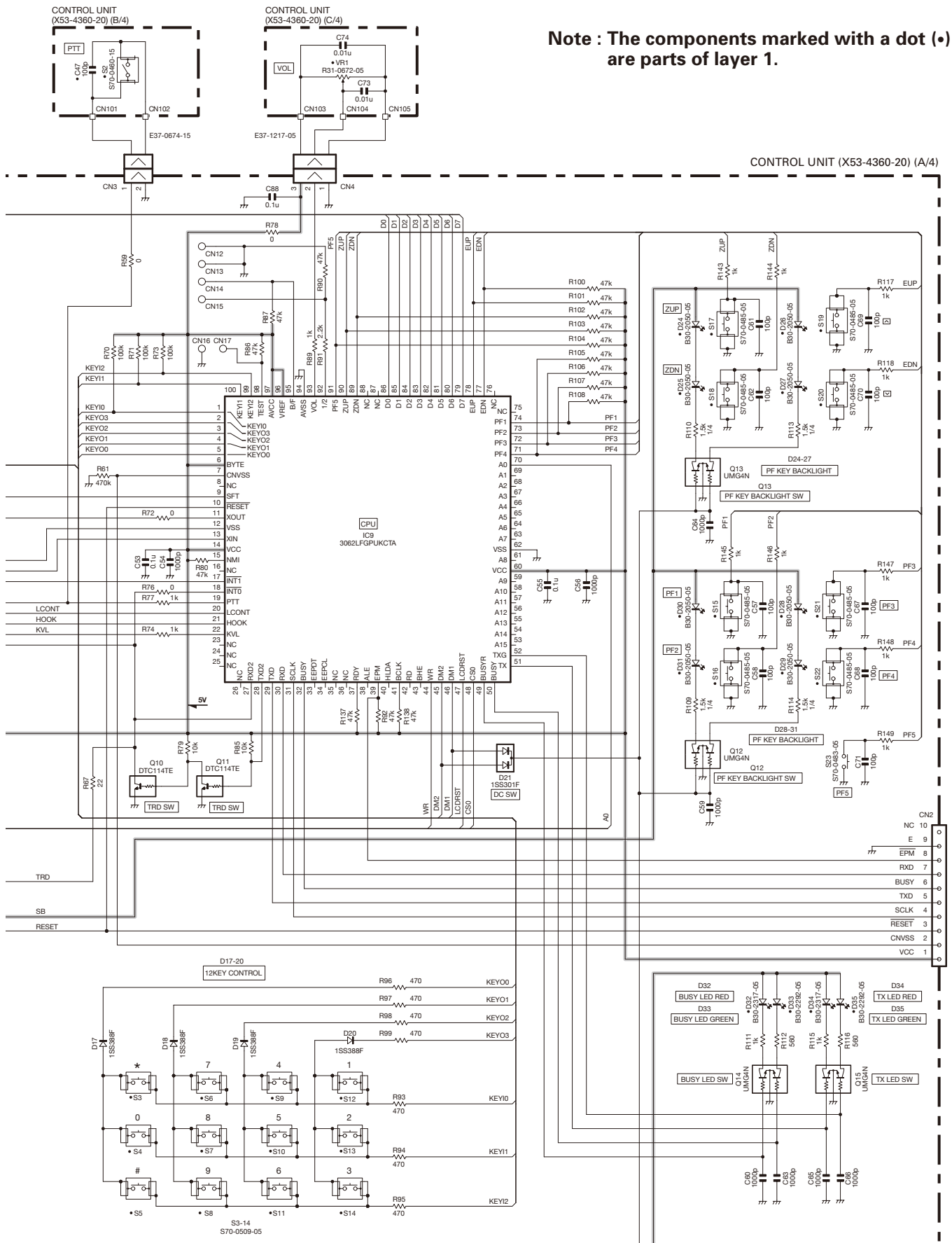


KCH-16 SCHEMATIC DIAGRAM



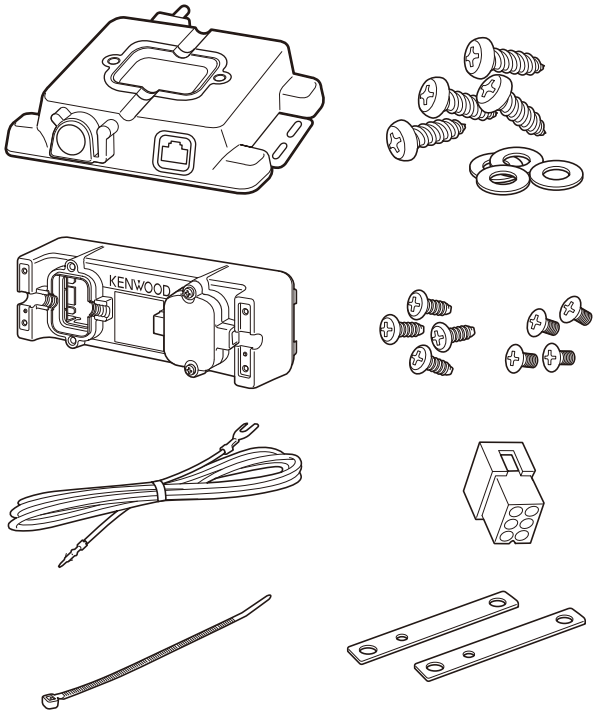
SCHEMATIC DIAGRAM KCH-16

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



OPTIONAL ACCESSORIES: KRK-11 (Handheld Control Head Interface Kit)

External View



Components Description

Interface unit (X46-3240-20)

Ref. No.	Part name	Description
D5	Diode	Reverse protection

Control unit (X53-4350-20)

Ref. No.	Part name	Description
Q1~3	Transistor	Detection switch
D1~5	Varistor	Surge absorption
D6	Varistor	Current protector
D7	Varistor	Surge absorption
D9	Zener diode	Surge absorption

Terminal Function

Interface unit (X46-3240-20)

Pin No.	Name	I/O	Function
CN1 (Remote cable connector)			
1	ME	-	MIC GND
2	MIC	I	MIC signal input
3	E	-	GND
4	RESET	O	Reset signal output
5	1/2	O	Remote head 1 signal output
6	TRD	I/O	Bidirection serial data
7	PS	I	Power switch signal input
8	IGN	I	Ignition sense input
9	SB	O	Switched Battery
10	RS1	O	Audio Amp output signal (Non-invert)
11	RS2	O	Audio Amp output signal (Invert)
CN4 (to Control unit W700 of the TK-5710/5710H/5810/5810H transceiver)			
1	ME	-	MIC GND
2	MIC	O	MIC signal output
3	E	-	GND
4	RESET	I	Reset signal input
5	1/2	-	Not used
6	TRD	I/O	Bidirection serial data
7	PS	O	Power switch signal output
8	IGN	O	Ignition sense output
9	SB	I	Switched Battery
10	RS1	I	Audio Amp input signal (Non-invert)
11	RS2	I	Audio Amp input signal (Invert)

Control unit (X53-4350-20)

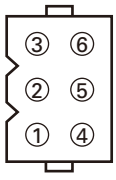
Pin No.	Name	I/O	Function
CN1 (Remote cable connector)			
1	ME	-	MIC GND
2	MIC	O	MIC signal output
3	E	-	GND
4	RESET	I	Reset signal input VIH: 4.16~5.1V, VIL: –0.3~0.96V
5	1/2	I	Head 1 or 2 signal input. OPEN
6	TRD	I/O	Bidirection serial data VIH: 4.16~5.10V / VIL: –0.3~0.96V VOH: 4.80~5.20V / VOL: <0.3V Baud rate: 115200bps Max
7	PS	O	Power switch signal output SW OFF: 13.0V (typ) SW ON: 0V (typ)
8	IGN	O	Ignition sense output Active High. VOH: 13.4V (typ)
9	SB	I	Switched Battery Voltage: 11.39~15.64V Current: 750mA max

OPTIONAL ACCESSORIES: KRK-11 (Handheld Control Head Interface Kit)

Pin No.	Name	I/O	Function
10	RS1	I	Audio output signal (Non-invert) BTL output (RS1-RS2): 12W max (4Ω/3% dist) Allowable Freq: 300~3000Hz
11	RS2	I	Audio output signal (Invert) BTL output (RS1-RS2): 12W max (4Ω/3% dist) Allowable Freq: 300~3000Hz
CN3 (to Accessory connector)			
1	ES1	O	BTL output for external speaker BTL output (ES1-ES2): 12W max (4Ω/3% dist) Allowable Freq: 300~3000Hz
2	ES2	O	BTL output for external speaker BTL output (ES1-ES2): 12W max (4Ω/3% dist) Allowable Freq: 300~3000Hz
3	NC	-	Not used
4	NC	-	Not used
5	IGN	I	Ignition sense input VOH: 13.4V (typ)
6	E	-	GND
CN4 (to Control unit B/2 CN5)			
1	SB	O	Switched Battery
2	E	-	GND
3	ME	-	MIC GND
4	MIC	I	MIC signal input
5	TRD	I/O	Bidirection serial data
6	KVL	I	Detection of KVL3000
CN5 (to Control unit A/2 CN4)			
1	SB	I	Switched Battery
2	E	-	GND
3	ME	-	MIC GND
4	MIC	O	MIC signal output
5	TRD	I/O	Bidirection serial data
6	KVL	O	Detection of KVL3000
J1 (Programming connector)			
1	SB	O	Switched Battery Voltage: 11.39~15.64V Current: 200mA max
2	NC	-	Not used
3	ME	-	MIC GND
4	MIC	I	MIC signal input
5	E	-	GND
6	TRD	I/O	Bidirection serial data VIH: 4.16~5.10V / VIL: <0.96V VOH: 4.80~5.20V / VOL: –0.3~0.96V Baud rate: 115200bps Max
7	KVL	I	Detection of KVL3000 VIH: 4.16~5.10V / VIL: –0.3~0.96V
8~12	NC	-	Not used

Pin No.	Name	I/O	Function
J2 (Control connector)			
1	RESET	O	Reset signal output Active Low pulled down with 470k in KCH-16. VOH: 4.32~4.77V / VOL: <0.2V
2	SB	O	Switched Battery Voltage: 11.39~15.64V Current: 200mA max
3	E	-	GND
4	PS	I	Power switch signal input SW OFF: 13.0V (typ) SW ON: 0V (typ)
5	ME	-	MIC GND
6	MIC	I	MIC signal input
7	TRD	I/O	Bidirection serial data VIH: 4.16~5.10V / VIL: <0.96V VOH: 4.80~5.20V / VOL: <0.3V Baud rate: 115200bps Max
8	KVL	O	Detection of KVL3000 Active Low pulled up with 47k in KCH-16. VOL: –0.3~0.96V
J3 (Optional jack)			
1~3	NC	-	Not used

Accessory connector

Pin No.	Name	I/O	Function
1	IGN	I	Ignition sense input VOH: 13.4V (typ)
2	E	-	GND
3	NC	-	Not used
4	ES1	O	BTL output for external speaker BTL output (ES1-ES2): 12W max (4Ω/3% dist) Allowable Freq: 300~3000Hz
5	ES2	O	BTL output for external speaker BTL output (ES1-ES2): 12W max (4Ω/3% dist) Allowable Freq: 300~3000Hz
6	NC	-	Not used 

OPTIONAL ACCESSORIES: KRK-11 (Handheld Control Head Interface Kit)

Parts List

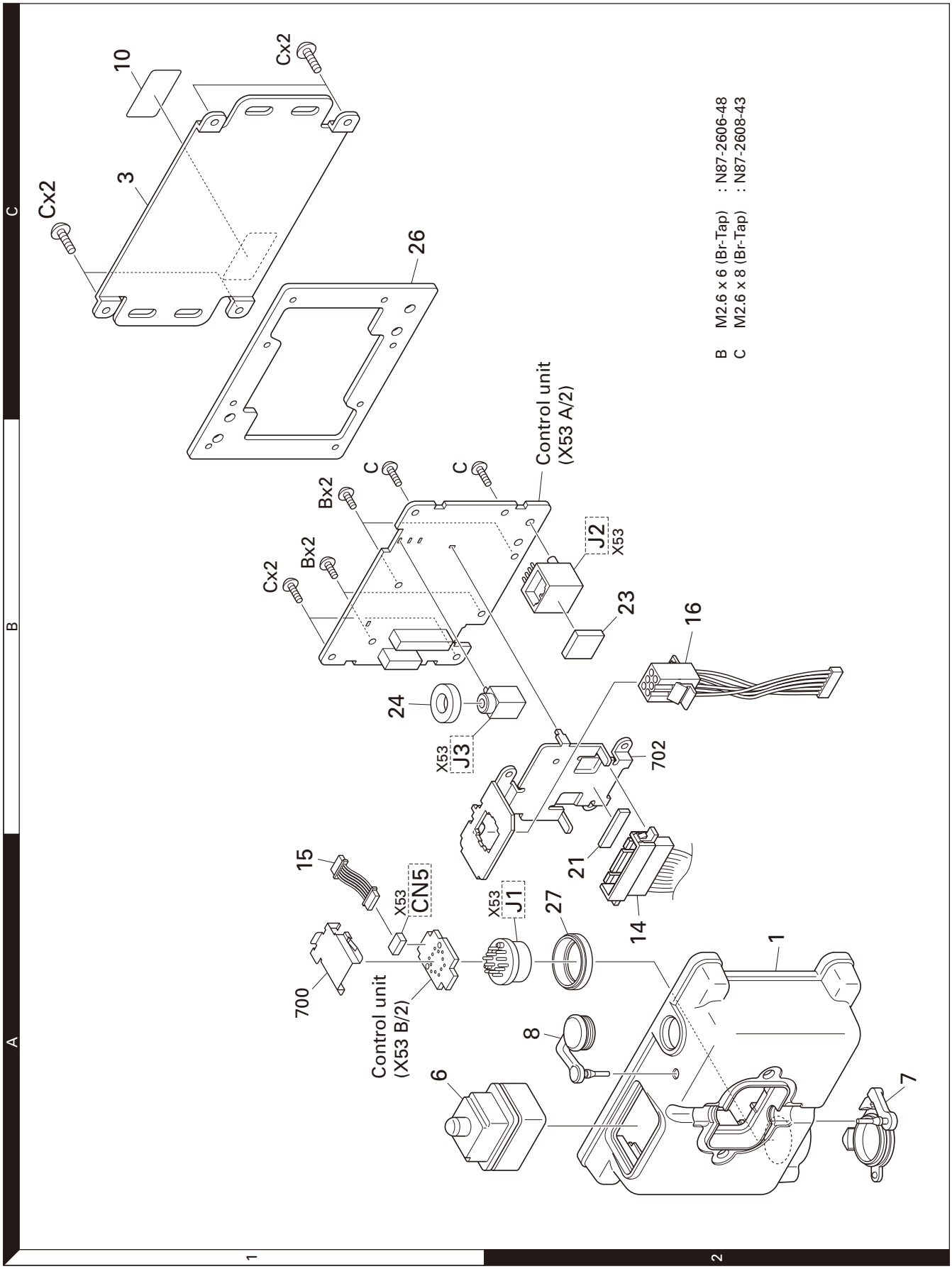
KRK-11 (Y60-4140-20)
INTERFACE UNIT (X46-3240-20)
CONTROL UNIT (X53-4350-20)

Ref. No.	Address	New parts	Parts No.	Description	Destination
KRK-11					
1	2A	✻	A02-4052-01	MAIN CABINET (BOX)	
2	1E		A22-2003-23	SUB PANEL (PANEL)	
3	1C	✻	A40-0660-03	BOTTOM PLATE (BOX)	
4	2E		A62-0608-22	PANEL	
6	1A		B09-0393-04	CAP (BOX:ACC 6P)	
7	2A	✻	B09-0726-03	CAP (BOX:PROG 12P)	
8	2A	✻	B09-0727-03	CAP (BOX:PHONE JACK)	
9	3E	✻	B42-7378-04	STICKER (PANEL)	
10	1C	✻	B42-8245-14	STICKER (BOX)	
11	2G	✻	B62-2102-00	INSTRUCTION MANUAL	
13	2G		E30-3085-05	GROUND WIRE ACCESSORY	
14	2A,2D		E37-0166-25	LEAD WIRE WITH CONNECTOR (11P)	
15	1A	✻	E37-1427-05	LEAD WIRE WITH CONNECTOR (PCB 6P)	
16	2B	✻	E37-1428-05	LEAD WIRE WITH CONNECTOR (ACC 6P)	
17	2G	✻	E59-0426-05	RECTANGULAR PLUG ACCESSORY	
19	3E		F07-1479-13	COVER (PANEL)	
21	2B		G13-0864-04	CUSHION (BOX:11P)	
22	3E		G13-1684-04	CUSHION (PANEL)	
23	2B	✻	G13-2239-04	CUSHION (BOX:MODULAR JACK)	
24	1B	✻	G13-2269-04	CUSHION (BOX:PHONE JACK)	
25	2E		G53-0838-23	PACKING (PANEL)	
26	1C	✻	G53-1807-04	PACKING (BOX:BOTTOM PLATE)	
27	2A	✻	G53-1808-04	PACKING (BOX:PROG 12P)	
29	1G		J21-4354-04	MOUNTING HARDWARE ACCESSORY	
30	2G		J61-0307-05	BAND ACCESSORY	
A	3E		N67-4016-43	PAN HEAD SEMS SCREW	
B	1B,1D,1E		N87-2606-48	BRAZIER HEAD TAPTITE SCREW	
C	1B,1C		N87-2608-43	BRAZIER HEAD TAPTITE SCREW	
D	1D,1E		N87-3008-48	BRAZIER HEAD TAPTITE SCREW	
32	1G		N99-2069-05	SCREW SET (BOX) ACCESSORY	
33	1G	✻	N99-2070-05	SCREW SET (PANEL) ACCESSORY	
INTERFACE UNIT (X46-3240-20)					
C1,2			CK73GB1H102K	CHIP C 1000PF K	
C3			CC73GCH1H101J	CHIP C 100PF J	
C5-7			CK73GB1H102K	CHIP C 1000PF K	
C50			CK73GB1H103K	CHIP C 0.010UF K	
C54			CK73GB1E473J	CHIP C 0.047UF J	
CN1			E41-2674-05	PIN ASSY	
CN4			E41-2674-05	PIN ASSY	
L10,11			L41-1095-33	SMALL FIXED INDUCTOR (1.0UH)	
R33			RK73GB2A000J	CHIP R 0.0 J 1/10W	
R36			RK73GB2A000J	CHIP R 0.0 J 1/10W	
R38			RK73EB2E000J	CHIP R 0.0 J 1/4W	
R42			RK73FB2B000J	CHIP R 0.0 J 1/8W	
R120			RK73GB2A000J	CHIP R 0.0 J 1/10W	
D5			1SS355	DIODE	

Ref. No.	Address	New parts	Parts No.	Description	Destination
CONTROL UNIT (X53-4350-20)					
C1,2			CC73GCH1H101J	CHIP C 100PF J	
C3			CK73GB1H103K	CHIP C 0.010UF K	
C4			CC73GCH1H101J	CHIP C 100PF J	
C5,6			CK73GB1H102K	CHIP C 1000PF K	
C7			CK73GB1E104K	CHIP C 0.10UF K	
C8			CK73GB1H102K	CHIP C 1000PF K	
C9			CC73GCH1H101J	CHIP C 100PF J	
C10			CK73GB1H102K	CHIP C 1000PF K	
C11			CC73GCH1H101J	CHIP C 100PF J	
C12,13			CK73GB1H471K	CHIP C 470PF K	
C14,15			CK73GB1H102K	CHIP C 1000PF K	
C16			CK73GB1H471K	CHIP C 470PF K	
C17			CK73GB1H102K	CHIP C 1000PF K	
C32			CK73GB1H471K	CHIP C 470PF K	
C33			CK73EB1E106K	CHIP C 10UF K	
CN1			E41-2674-05	PIN ASSY	
CN3		✻	E41-2685-05	PIN ASSY	
CN4		✻	E41-2207-05	PIN ASSY	
CN5	1A	✻	E41-2207-05	PIN ASSY	
J1	2A		E56-0410-15	CYLINDRICAL RECEPTACLE	
J2	2B		E58-0523-05	MODULAR JACK	
J3	2B		E11-0425-05	3.5D PHONE JACK (3P)	
L1			L92-0140-05	CHIP FERRITE	
L2,3			L41-1095-33	SMALL FIXED INDUCTOR (1.0UH)	
L4			L92-0155-05	CHIP FERRITE	
L5-8			L92-0179-05	CHIP FERRITE	
R1,2			RK73GB2A000J	CHIP R 0.0 J 1/10W	
R3			RK73GB2A220J	CHIP R 22 J 1/10W	
R4-6			RK73GB2A000J	CHIP R 0.0 J 1/10W	
R7			RK73GB2A182J	CHIP R 1.8K J 1/10W	
R9			RK73GB2A473J	CHIP R 47K J 1/10W	
R10		✻	RK73GB2A823G	CHIP R 82K G 1/10W	
R11			RK73GB2A223J	CHIP R 22K J 1/10W	
D1-5			AVRM16270MABB	VARISTOR	
D6			MINISMDC020F	VARISTOR	
D7			AVRM16270MABB	VARISTOR	
D9			MAYS062	ZENER DIODE	
Q1		✻	DTA123JKA	DIGITAL TRANSISTOR	
Q2,3			DTC123YE	DIGITAL TRANSISTOR	

OPTIONAL ACCESSORIES: KRK-11 (Handheld Control Head Interface Kit)

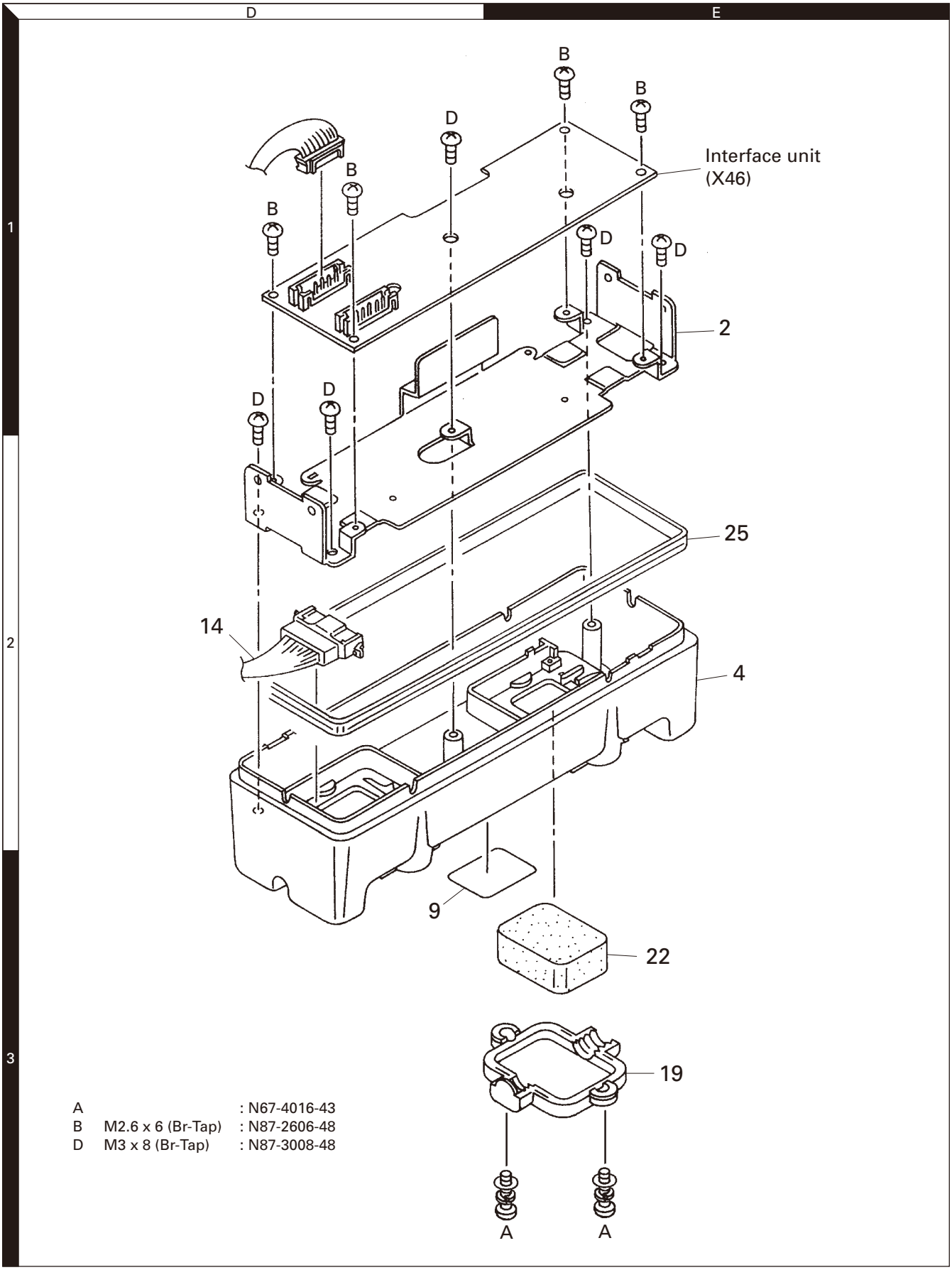
Exploded View (Interface box)



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

OPTIONAL ACCESSORIES: KRK-11 (Handheld Control Head Interface Kit)

Exploded View (Panel assembly)

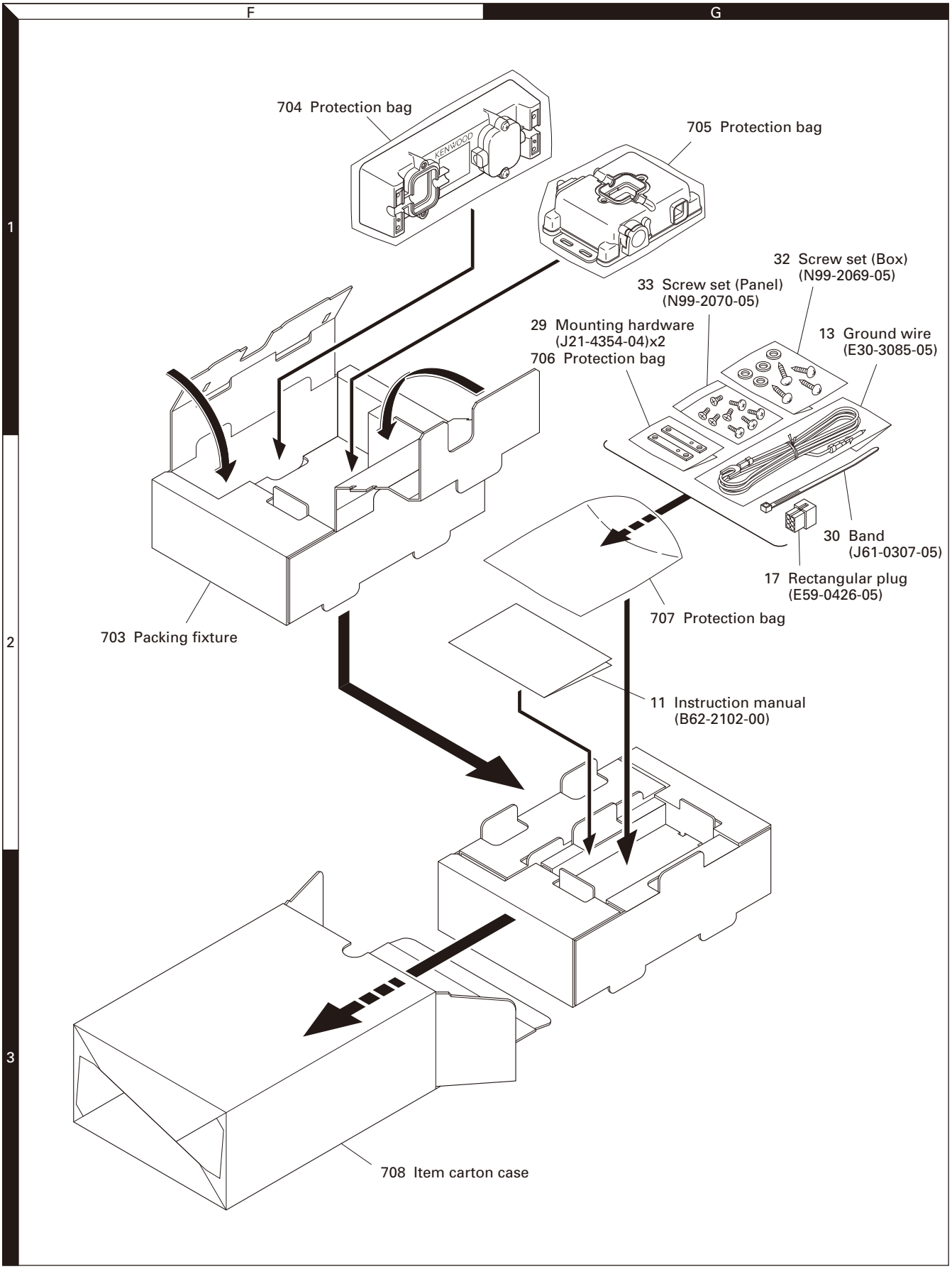


A		: N67-4016-43
B	M2.6 x 6 (Br-Tap)	: N87-2606-48
D	M3 x 8 (Br-Tap)	: N87-3008-48

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

OPTIONAL ACCESSORIES: KRK-11 (Handheld Control Head Interface Kit)

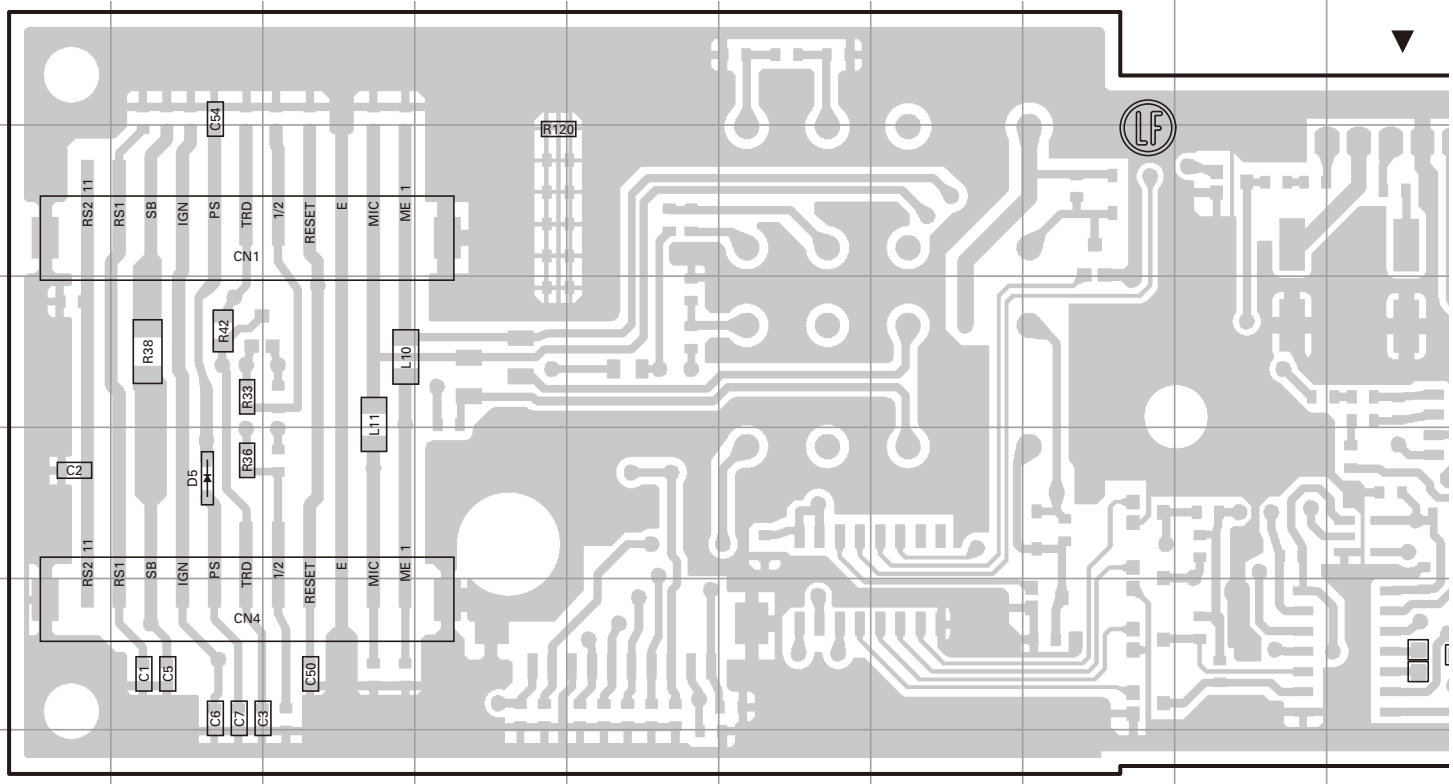
Packing



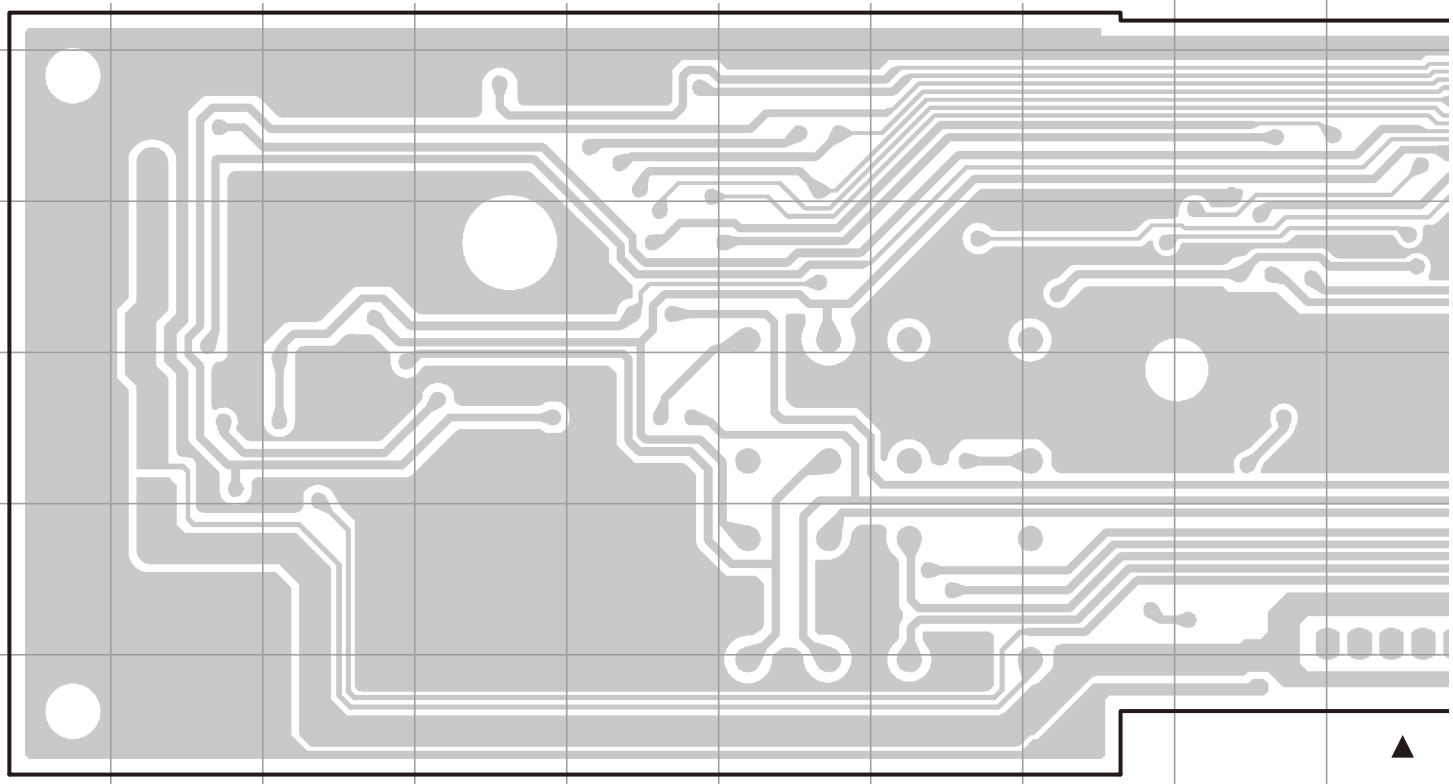
Parts with the exploded numbers larger than 700 are not supplied.

KCH-16 KRK-11 PC BOARD

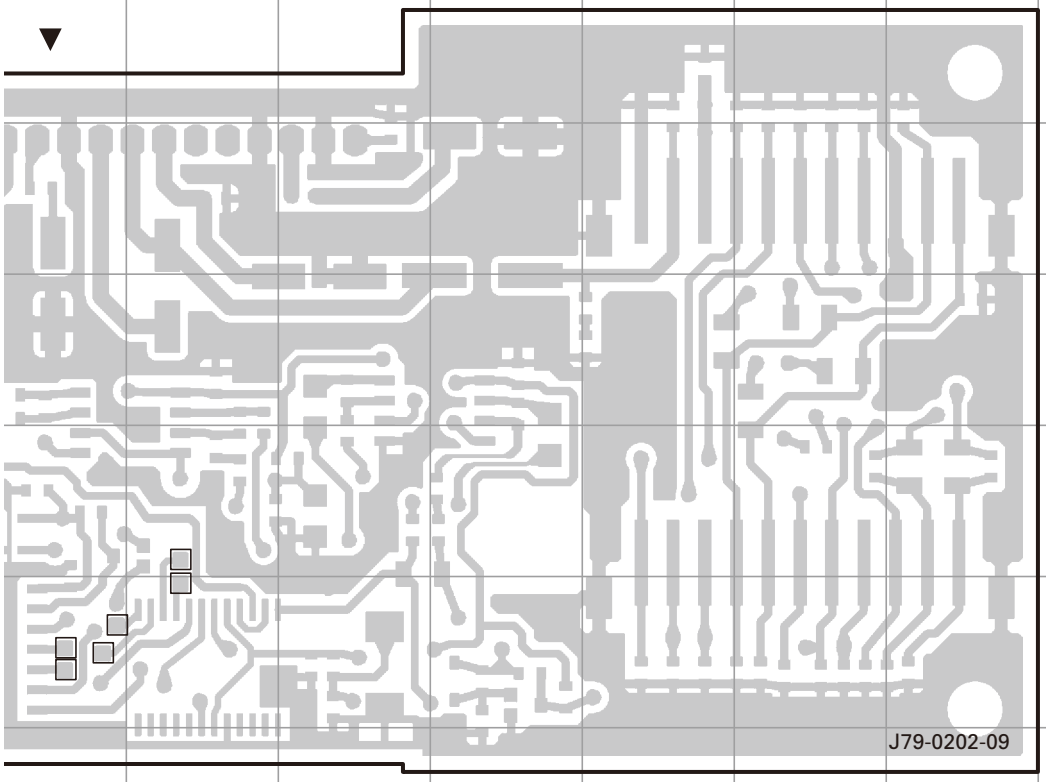
INTERFACE UNIT (X46-3240-20) Component side view (J79-0202-09)



INTERFACE UNIT (X46-3240-20) Foil side view (J79-0202-09)



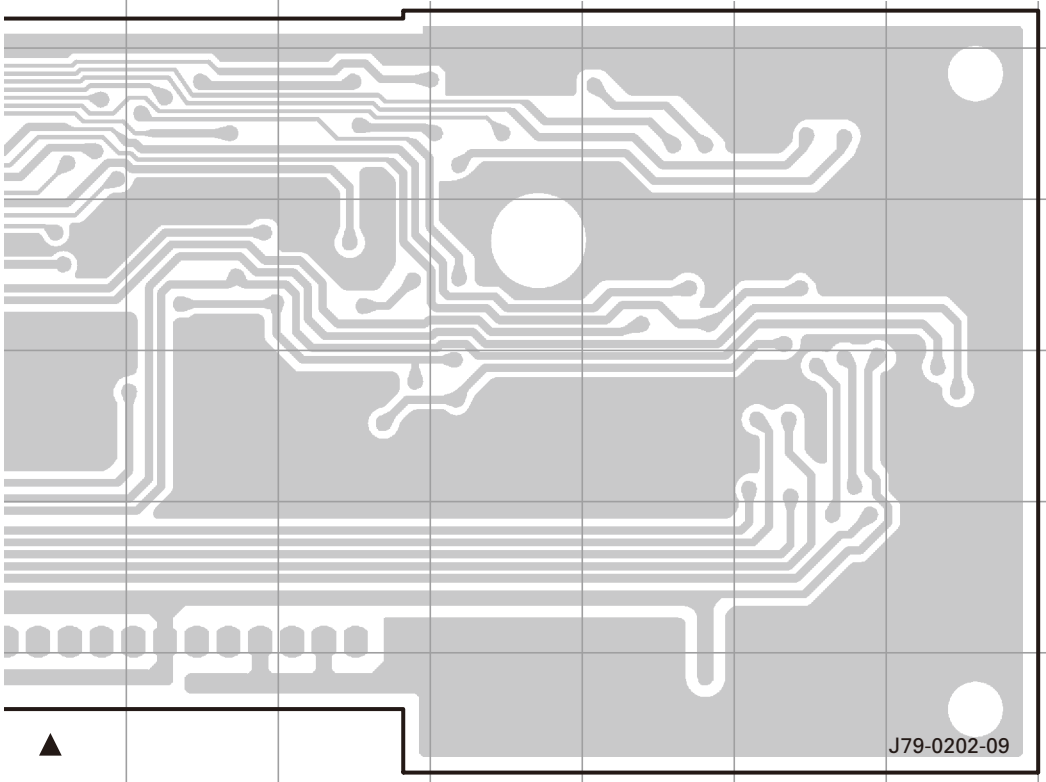
INTERFACE UNIT (X46-3240-20) Component side view (J79-0202-09)



Ref. No.	Address
D5	5B

Component side
Layer 1
Layer 2
Foil side

INTERFACE UNIT (X46-3240-20) Foil side view (J79-0202-09)



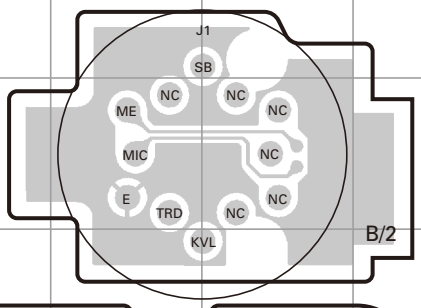
Component side
Layer 1
Layer 2
Foil side

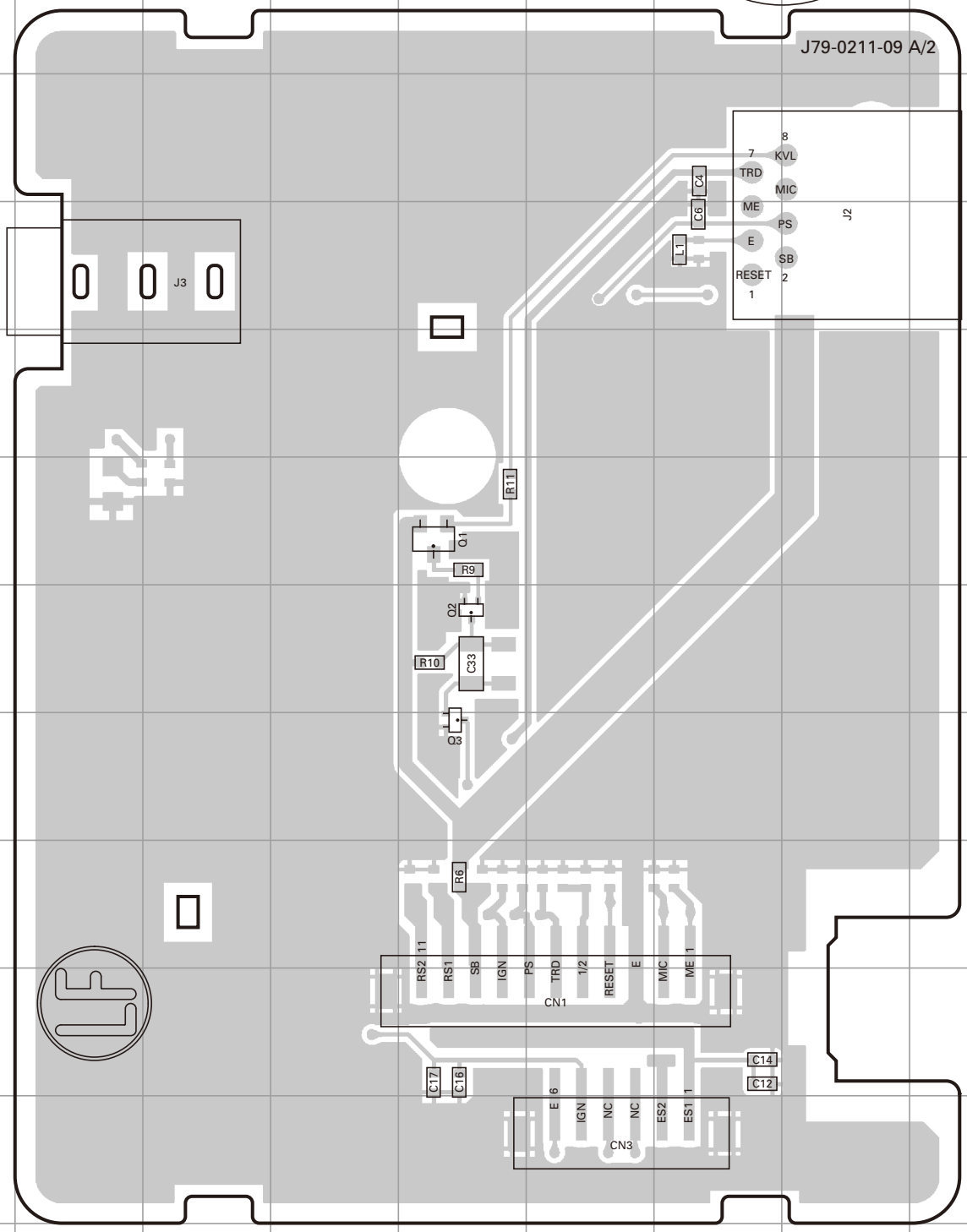
KCH-16 KRK-11 PC BOARD

CONTROL UNIT (X53-4350-20) (A/2, B/2) Component side view (J79-0211-09)

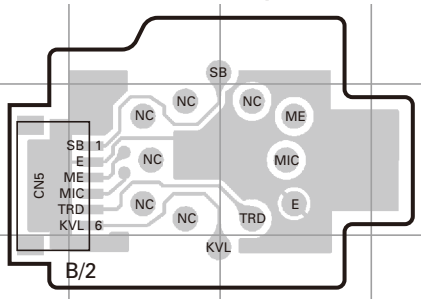
Component side
Layer 1
Layer 2
Foil side

Ref. No.	Address
Q1	8E
Q2	9E
Q3	10E



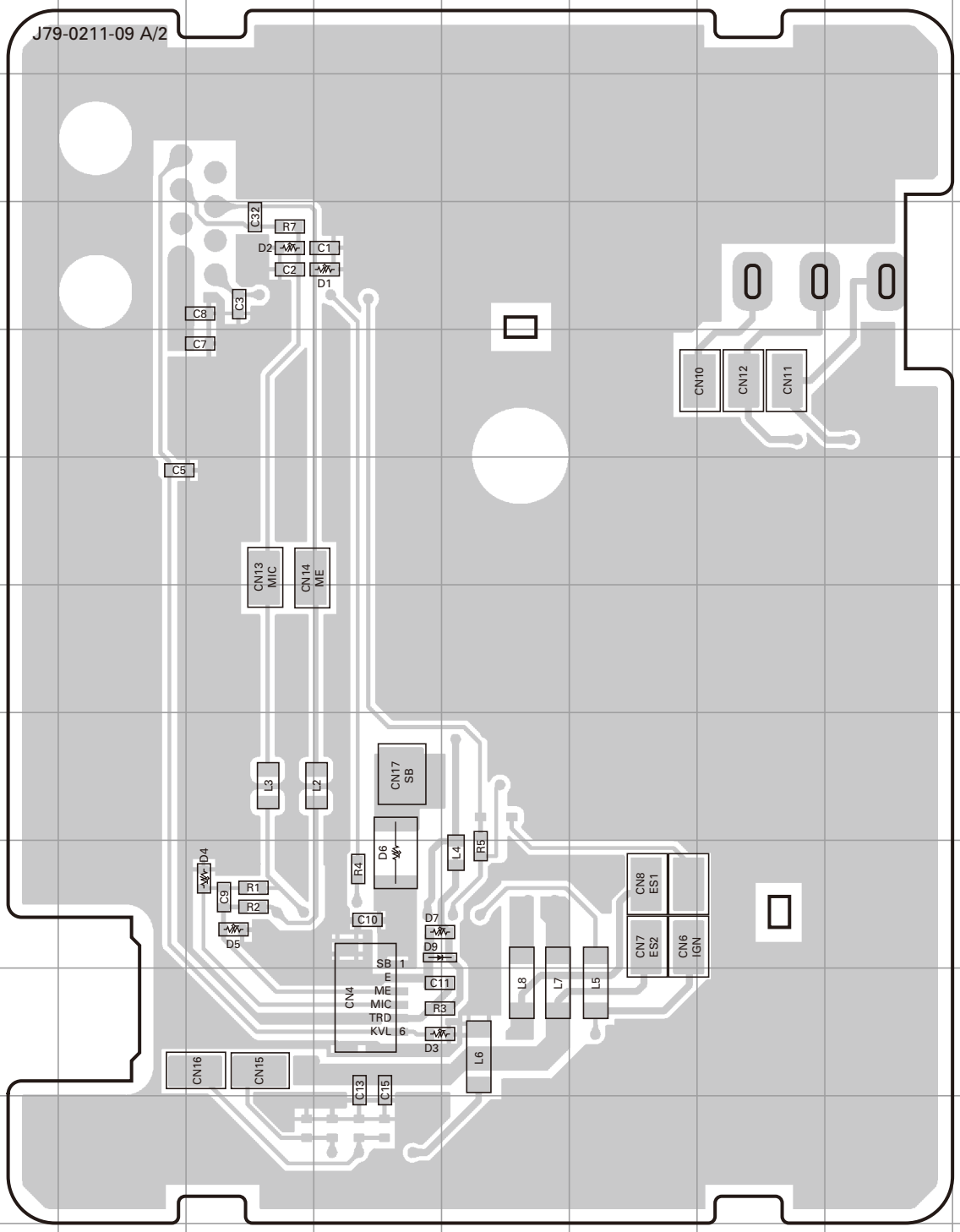


CONTROL UNIT (X53-4350-20) (A/2, B/2) Foil side view (J79-0211-09)

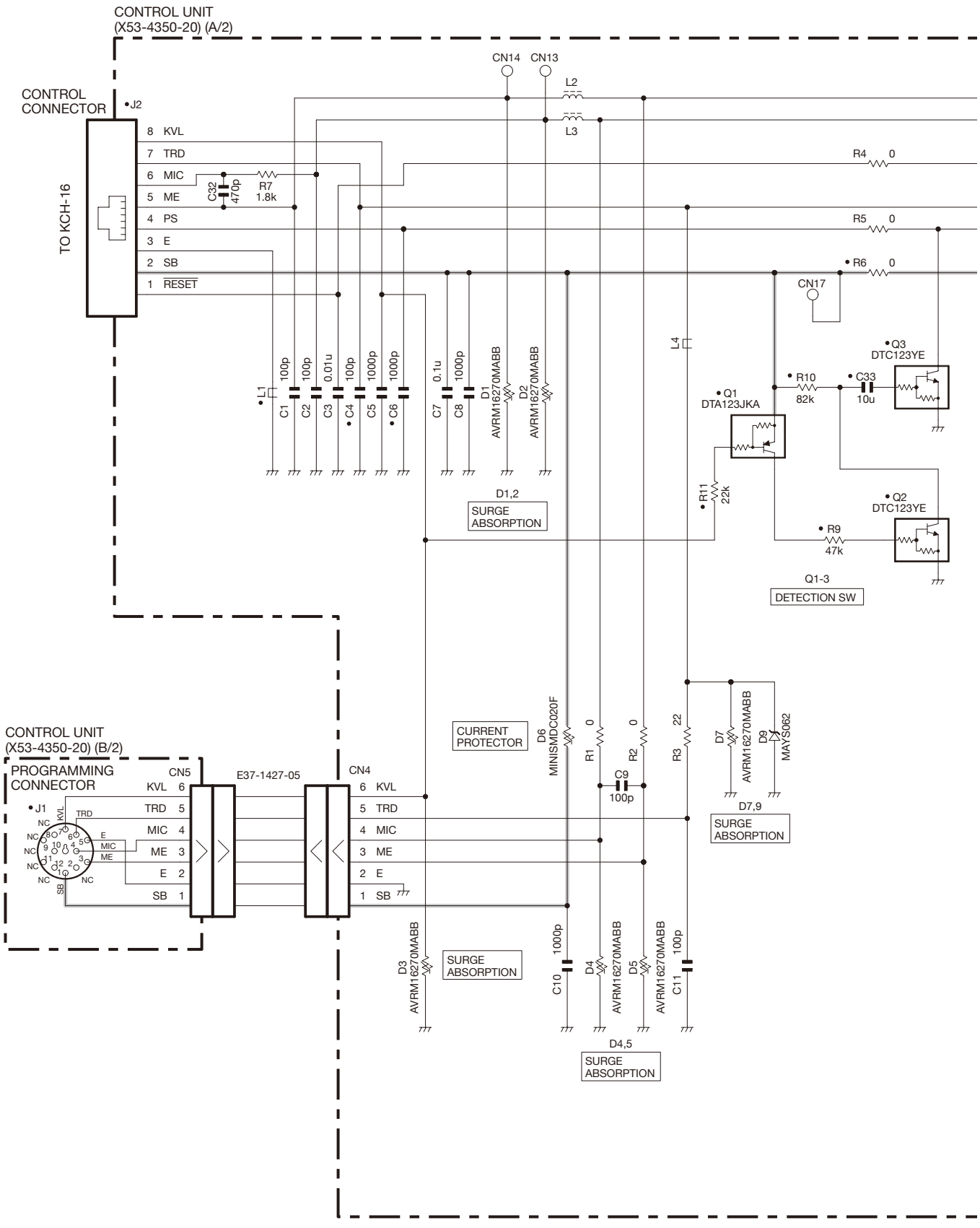


Ref. No.	Address	Ref. No.	Address
D1	6E	D5	11D
D2	6D	D6	11E
D3	12E	D7	11E
D4	11D	D9	11E

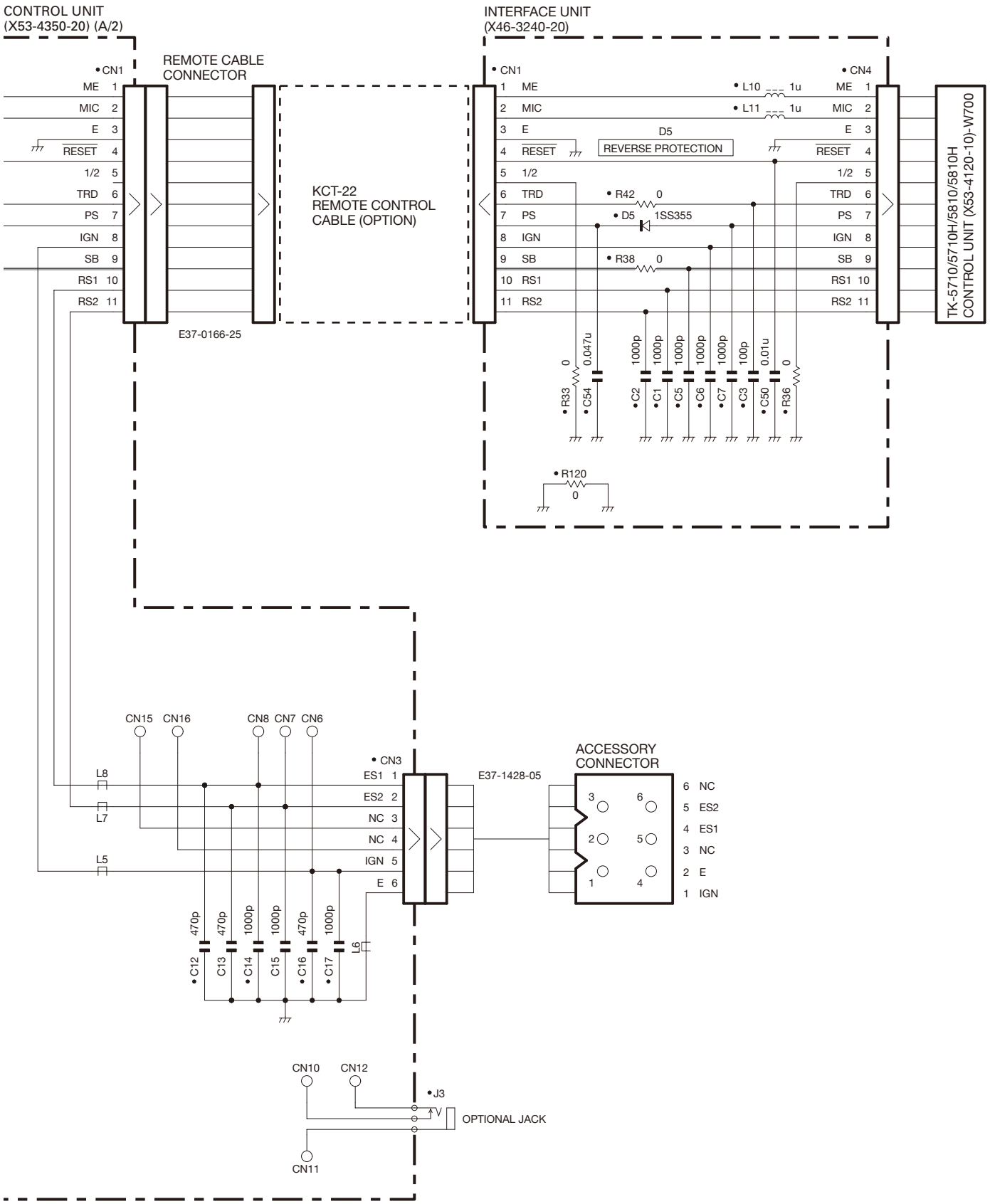
Component side
Layer 1
Layer 2
Foil side



KCH-16 KRK-11 SCHEMATIC DIAGRAM



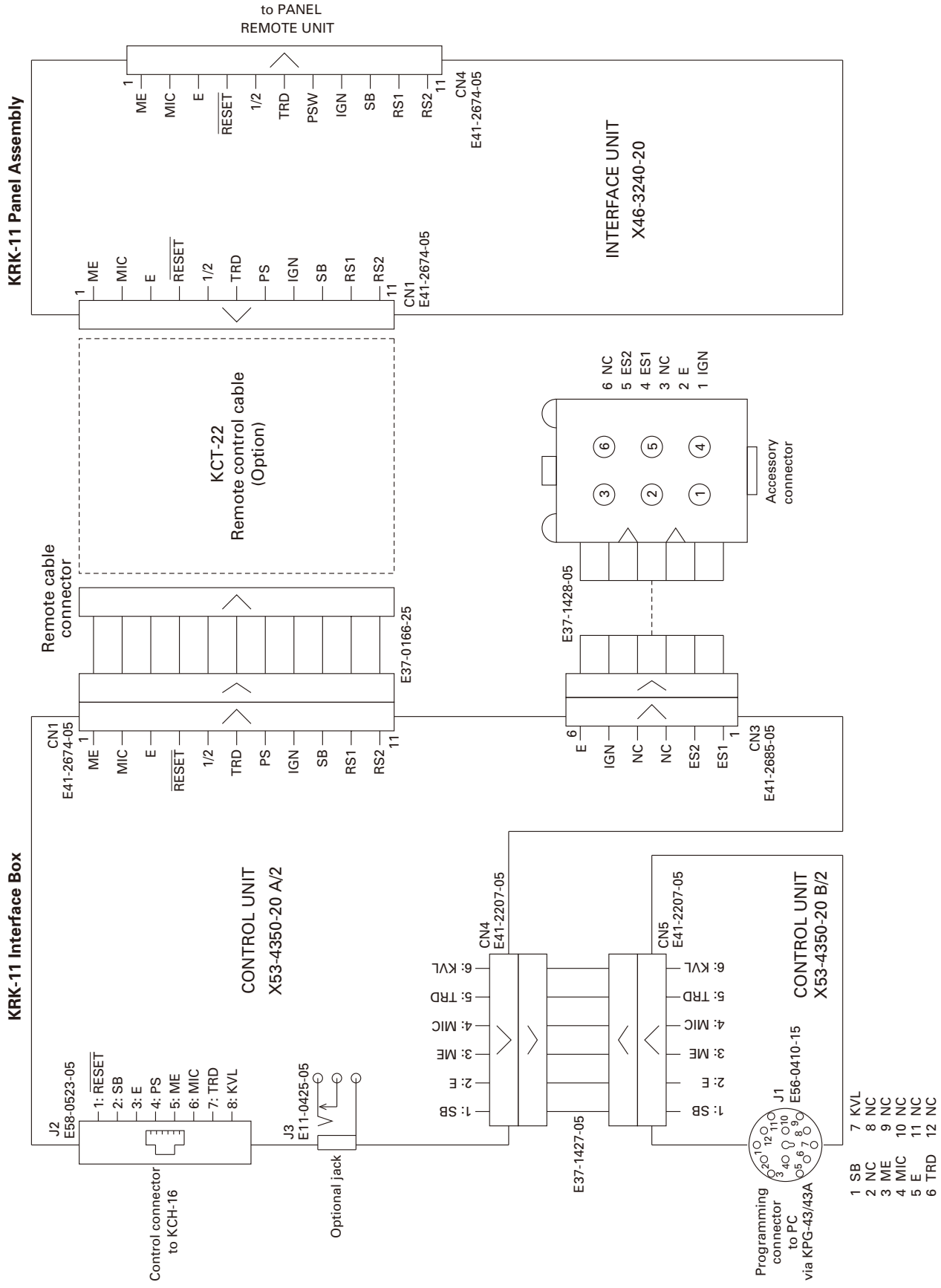
KRK-11 SCHEMATIC DIAGRAM KCH-16



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

OPTIONAL ACCESSORIES: KRK-11 (Handheld Control Head Interface Kit)

Interconnection Diagram



SPECIFICATIONS

■ KCH-16 Specifications

Operating temperature range ..... –30°C to +60°C (–22°F to +140°F)
Microphone impedance ..... 2.2kΩ (Max)
Dimensions (W x H x D)
  without projections ..... 58 x 125 x 31.5 mm (2.3 x 4.9 x 1.2 inches)
  with projections ..... 68 x 125 x 36 mm (2.7 x 4.9 x 1.4 inches)
Weight (Cable included) ..... Approx. 280g / 9.9oz

KCH-16

Kenwood Corporation

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Kenwood Electronics Singapore Pte Ltd

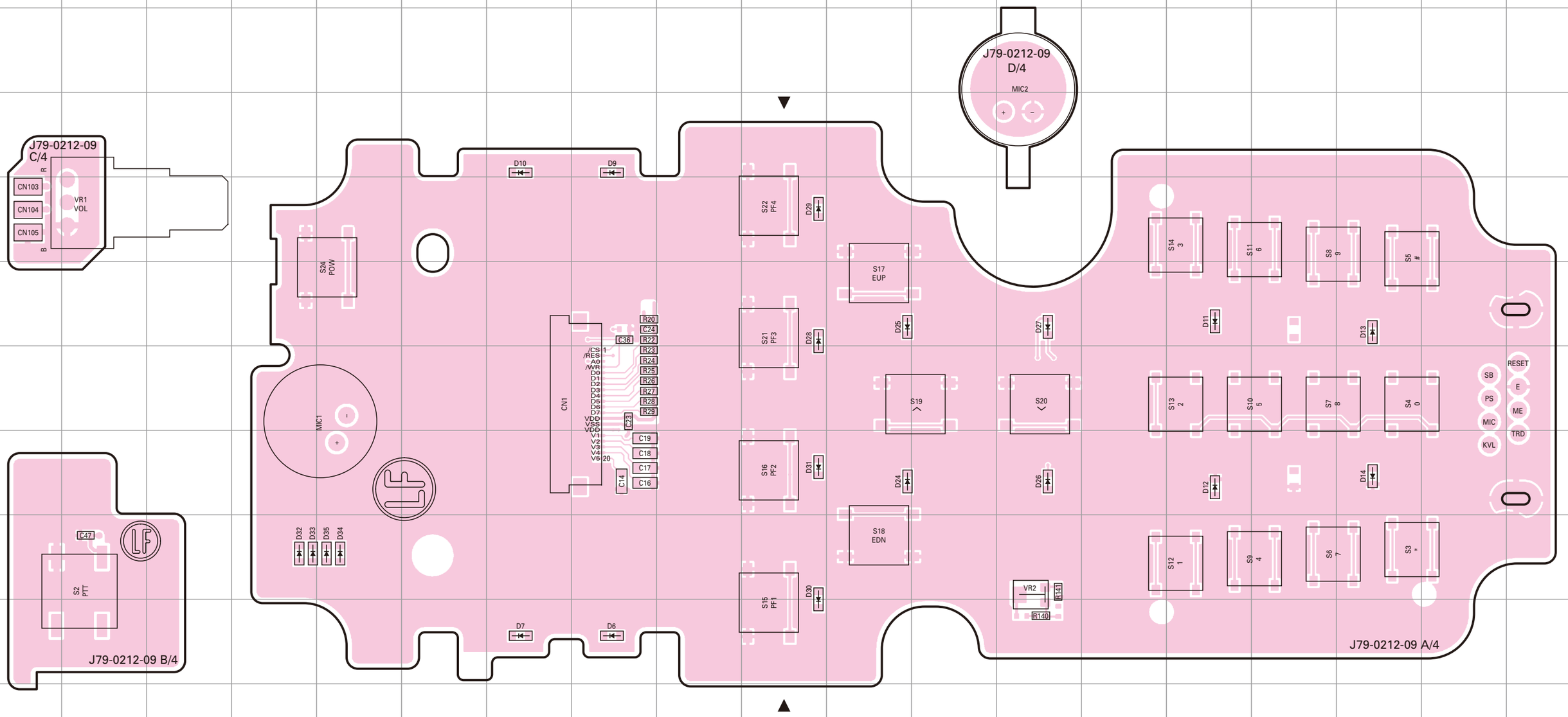
1 Ang Mo Kio Street 63, Singapore 569110

KCH-16 PC BOARD

PC BOARD KCH-16

CONTROL UNIT (X53-4360-20) (A/4, B/4, C/4, D/4)
Component side view (J79-0212-09)

CONTROL UNIT (X53-4360-20) (A/4, B/4, C/4, D/4)
Component side view (J79-0212-09)



Ref. No.	Address	Ref. No.	Address	Ref. No.	Address	Ref. No.	Address
D6	10H	D13	6Q	D28	6J	D34	9E
D7	10G	D14	8Q	D29	5J	D35	9E
D9	4H	D24	8K	D30	9J		
D10	4G	D25	6K	D31	8J		
D11	6O	D26	8M	D32	9D		
D12	8O	D27	6M	D33	9D		

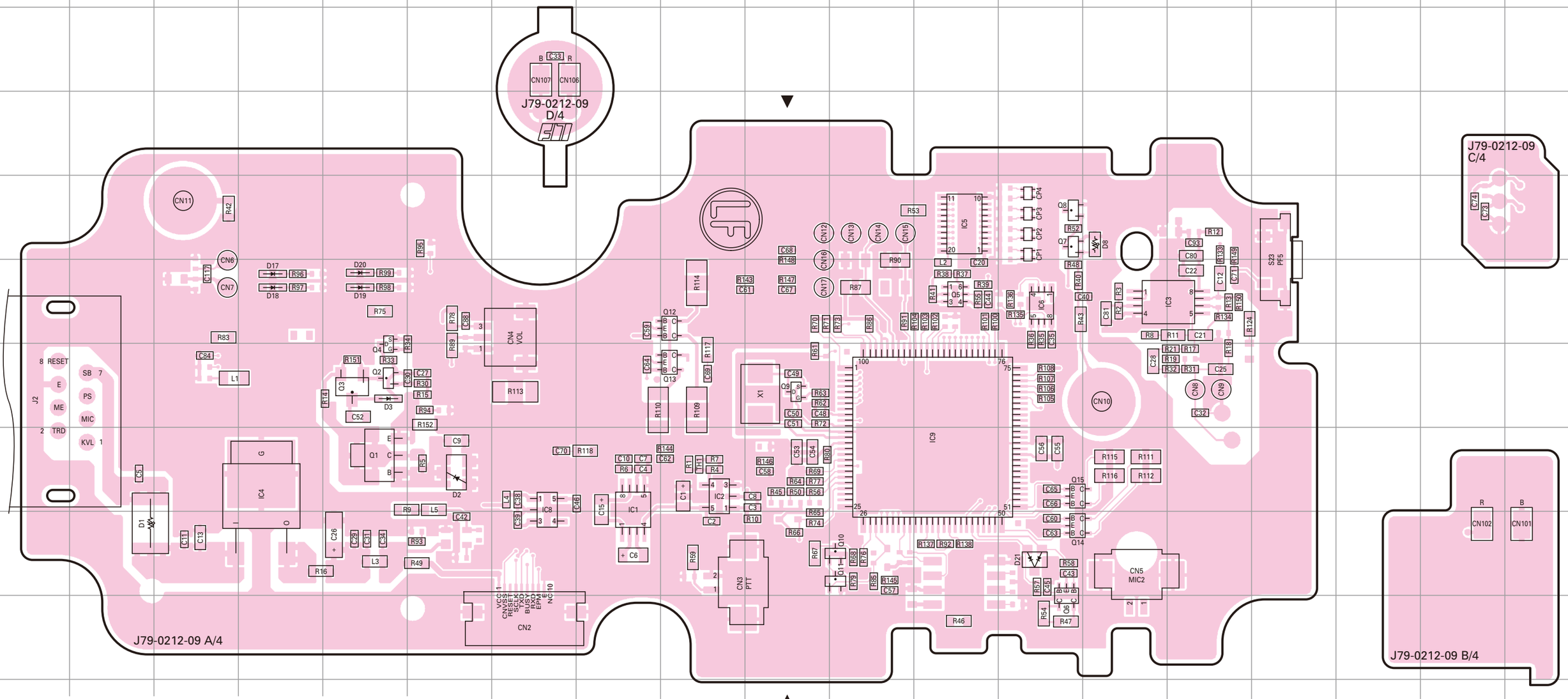
Component side
Layer 1
Layer 2
Layer 3
Layer 4
Foil side

KCH-16 PC BOARD

CONTROL UNIT (X53-4360-20) (A/4, B/4, C/4, D/4)
Foil side view (J79-0212-09)

PC BOARD KCH-16

CONTROL UNIT (X53-4360-20) (A/4, B/4, C/4, D/4)
Foil side view (J79-0212-09)



Ref. No.	Address	Ref. No.	Address	Ref. No.	Address	Ref. No.	Address
IC1	8H	Q1	8E	Q9	7J	D2	8F
IC2	8I	Q2	7E	Q10	9K	D3	7E
IC3	6O	Q3	7E	Q11	9K	D8	5N
IC4	8D	Q4	7E	Q12	6I	D17	6D
IC5	5L	Q5	6L	Q13	7I	D18	5D
IC6	6M	Q6	10M	Q14	9M	D19	6E
IC8	8G	Q7	5M	Q15	8M	D20	6E
IC9	8L	Q8	5M	D1	9B	D21	9M

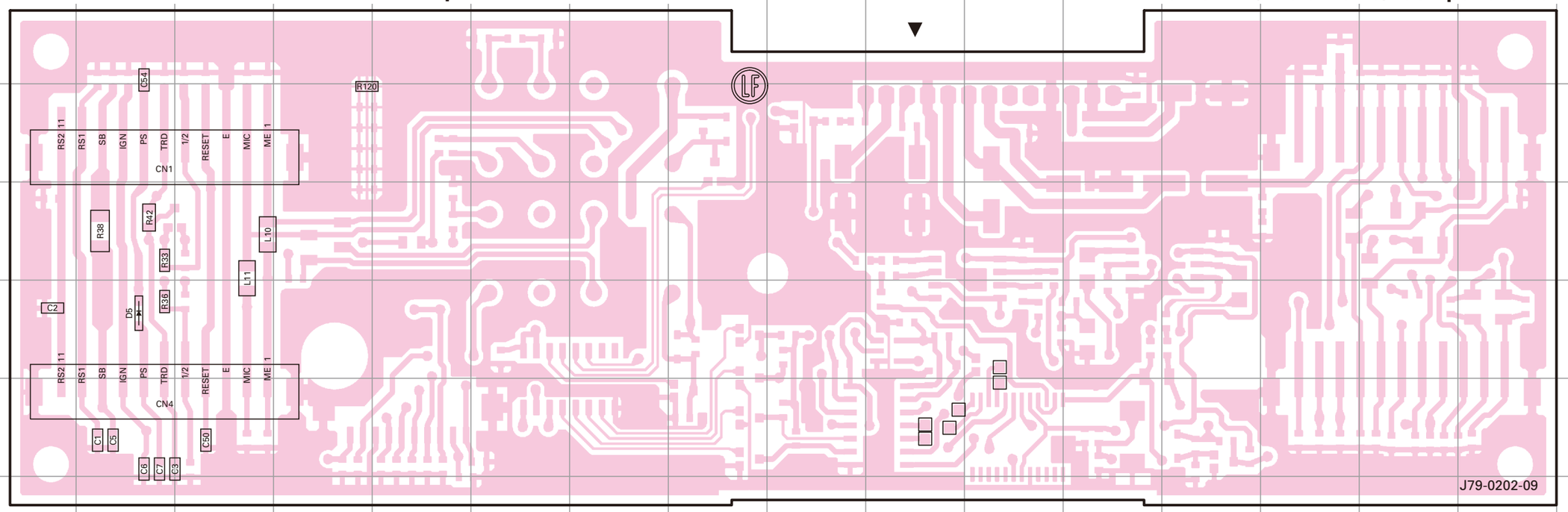
Component side
Layer 1
Layer 2
Layer 3
Layer 4
Foil side

KCH-16 KRK-11 PC BOARD

KRK-11 PC BOARD KCH-16

INTERFACE UNIT (X46-3240-20) Component side view (J79-0202-09)

INTERFACE UNIT (X46-3240-20) Component side view (J79-0202-09)

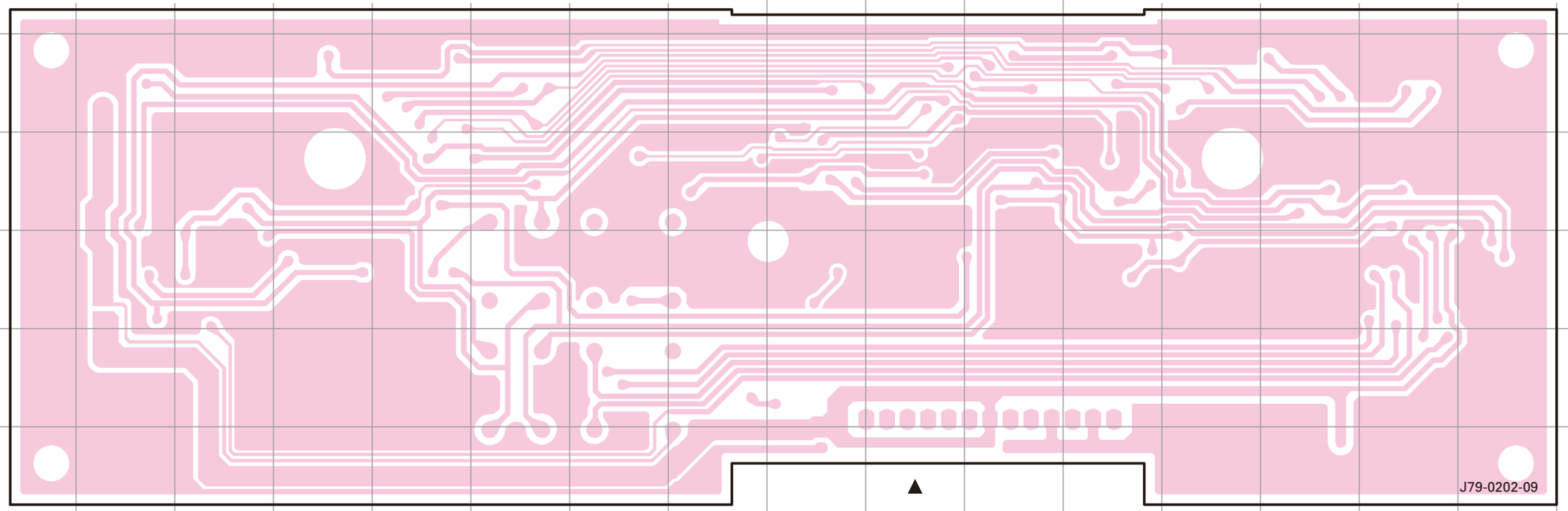


Ref. No.	Address
D5	5B

Component side
Layer 1
Layer 2
Foil side

INTERFACE UNIT (X46-3240-20) Foil side view (J79-0202-09)

INTERFACE UNIT (X46-3240-20) Foil side view (J79-0202-09)



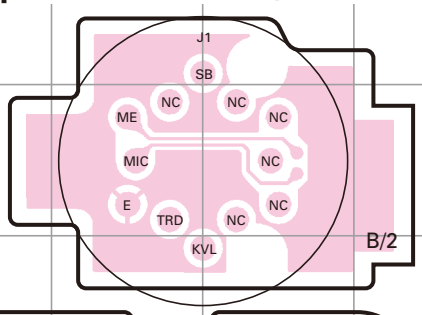
Component side
Layer 1
Layer 2
Foil side

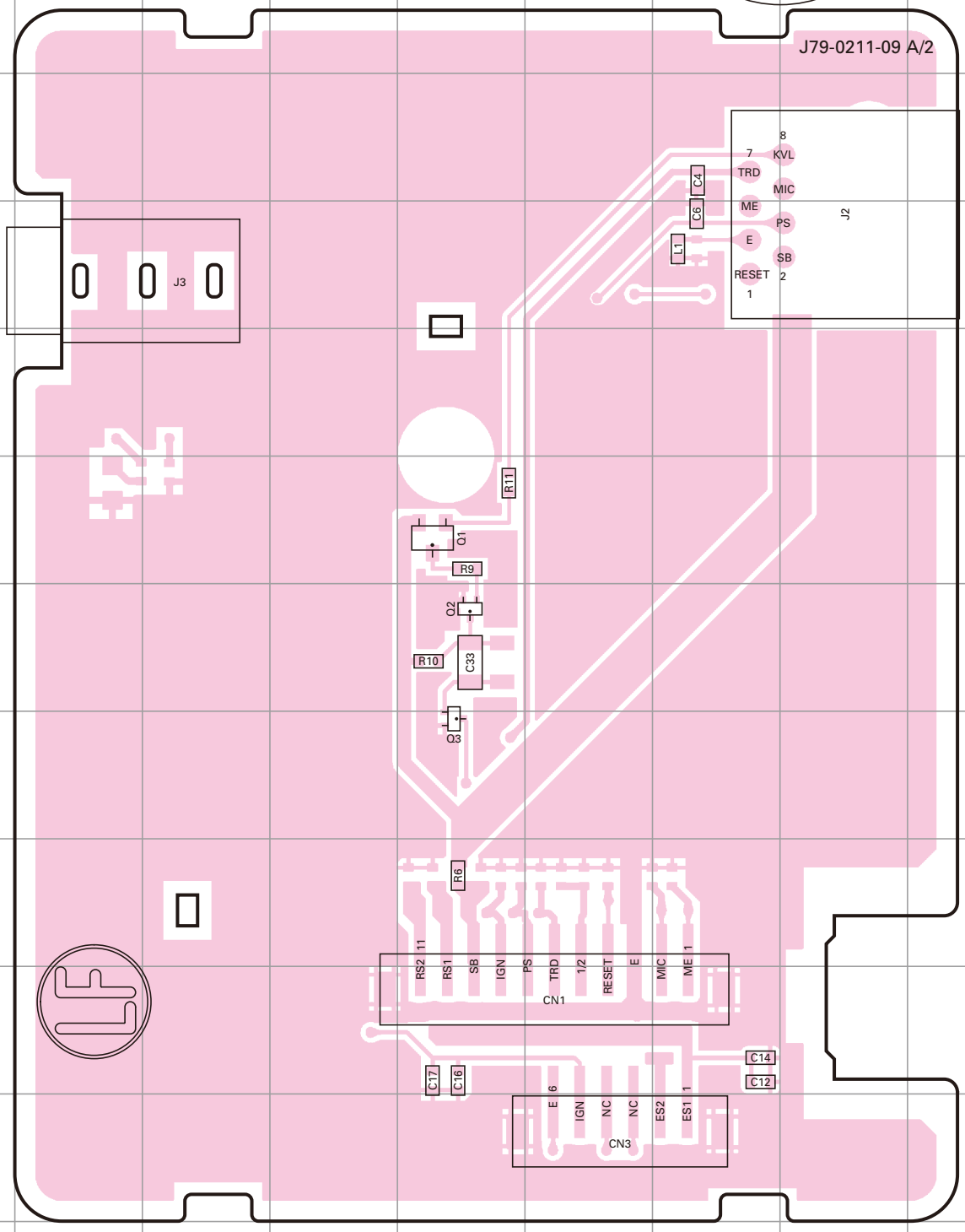
KCH-16 KRK-11 PC BOARD

CONTROL UNIT (X53-4350-20) (A/2, B/2) Component side view (J79-0211-09)

Component side
Layer 1
Layer 2
Foil side

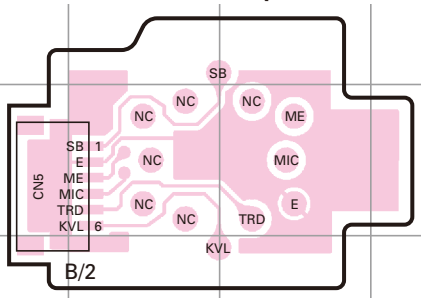
Ref. No.	Address
Q1	8E
Q2	9E
Q3	10E





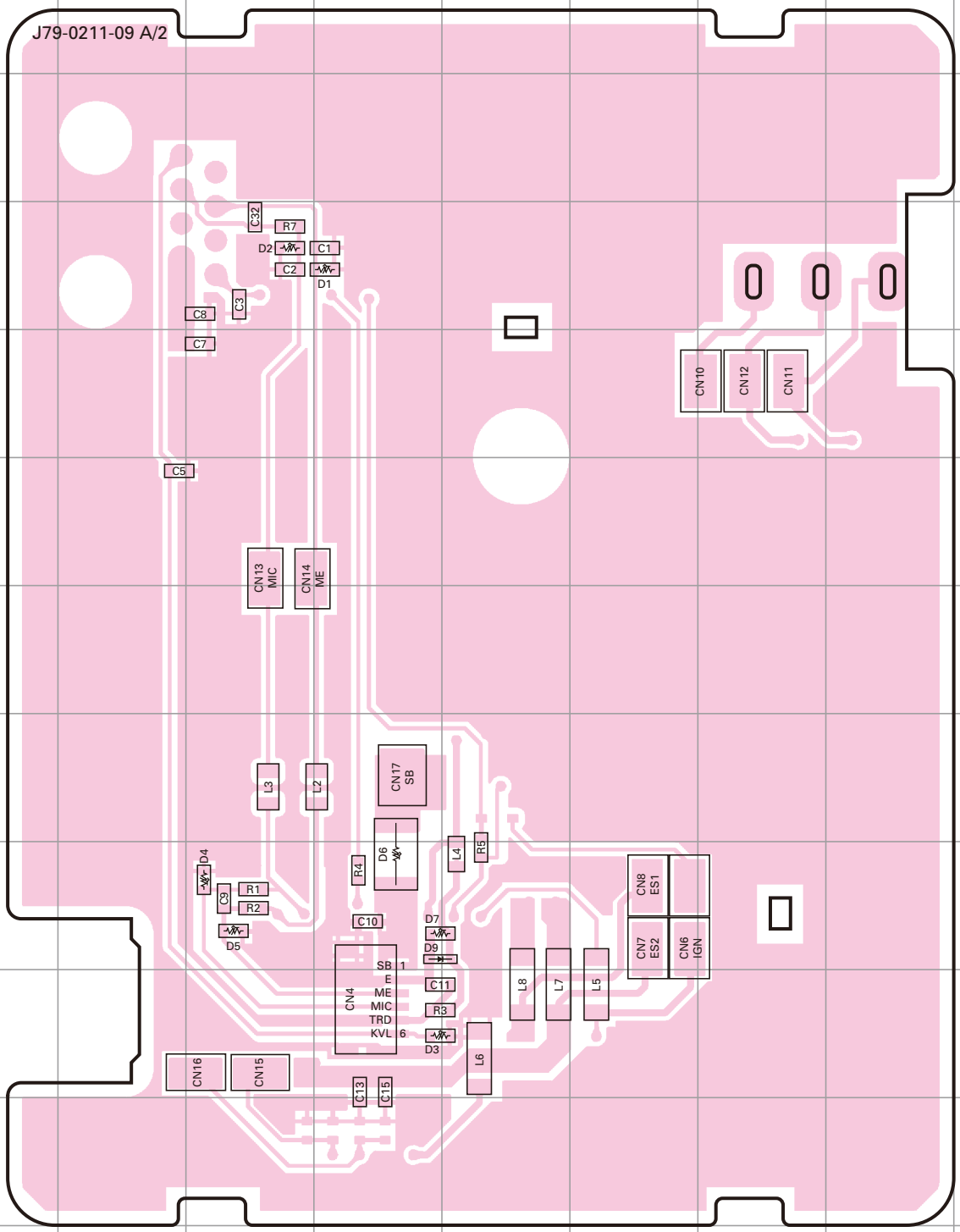
KRK-11 PC BOARD KCH-16

CONTROL UNIT (X53-4350-20) (A/2, B/2) Foil side view (J79-0211-09)



Ref. No.	Address	Ref. No.	Address
D1	6E	D5	11D
D2	6D	D6	11E
D3	12E	D7	11E
D4	11D	D9	11E

Component side
Layer 1
Layer 2
Foil side



LCD (B38-0923-05)

CONTROL UNIT (X53-4360-20) (A/4)

CONTROL UNIT (X53-4360-20) (B/4)

CONTROL UNIT (X53-4360-20) (C/4)

CONTROL UNIT (X53-4360-20) (D/4)

KRK-11 CONTROL UNIT (X53-4350-20) (A/2)-J2

CPU IC9 3062LFGPUKCTA

VOLTAGE DOUBLING INVERTER IC1 LM2682MMX

LCD CONTRAST IC2 LMC7101BIM5

BUS SW IC5 TC74LCX245FK

BUS SW IC6 TC7WZ245FK-F

MIC AMP IC3 NJM2904V-ZB

5V AVR IC4 TA7805FQ

3.3V AVR IC8 XC6204B332M

D6,7,9,10 LCD BACKLIGHT

LCD BACKLIGHT SW Q6 UMG4N

DC SW Q9 2SK1824-A

LCD RESET SW Q5 UPA672T-A

HOOK SW Q7 DTC144EE

HOOK SW Q8 DTC144EE

SURGE ABSORPTION D6 AVRM1620MABB

TRD SW Q10 DTC114TE

TRD SW Q11 DTC114TE

DC SW D21 1SS301F

D11-14 12KEY BACKLIGHT

D17-20 12KEY CONTROL

D1 MINISMDC100F

CURRENT PROTECTION

POW S24 S70-0485-05

9V AVR Q1 2SC2873(Y)F

VOLTAGE REFERENCE D2 02CZ9.1(X,Y)F

LCD/12KEY BACKLIGHT SW Q2 2SC4617(S)

VOLTAGE REFERENCE D3 MAZS111-F

LCD/12KEY BACKLIGHT SW Q3 12A02CH

LCD/12KEY BACKLIGHT SW Q4 SSM3K15TE(F)

D28-31 PF KEY BACKLIGHT Q12 UMG4N

PF KEY BACKLIGHT SW Q12

D24-27 PF KEY BACKLIGHT Q13 UMG4N

PF KEY BACKLIGHT SW Q13

BUSY LED SW Q14 UMG4N

TX LED SW Q15 UMG4N

S3-14 S70-0509-05

CN2

NC	10
E	9
EPM	8
RXD	7
BUSY	6
TXD	5
SCLK	4
RESET	3
CNVSS	2
VCC	1

CONTROL UNIT
(X53-4350-20) (A/2)

CONTROL CONNECTOR
J2
8 KVL
7 TRD
6 MIC
5 ME
4 PS
3 E
2 SB
1 RESET
TO KCH-16

C32 470p
R7 1.8k
R4 0
R5 0
R6 0
CN14 CN13
L2
L3
L4
CN17

L1
C1 100p
C2 100p
C3 0.01u
C4 100p
C5 1000p
C6 1000p
C7 0.1u
C8 1000p
D1 AVRM1627OMABB
D2 AVRM1627OMABB
D1,2 SURGE ABSORPTION

Q1 DTA123JKA
R10 82k
C33 10u
Q3 DTC123YE
R11 22k
R9 47k
Q2 DTC123YE
Q1-3 DETECTION SW

CN1
ME 1
MIC 2
E 3
RESET 4
1/2 5
TRD 6
PS 7
IGN 8
SB 9
RS1 10
RS2 11

REMOTE CABLE CONNECTOR
E37-0166-25
KCT-22
REMOTE CONTROL
CABLE (OPTION)

INTERFACE UNIT
(X46-3240-20)

CN1
1 ME
2 MIC
3 E
4 RESET
5 1/2
6 TRD
7 PS
8 IGN
9 SB
10 RS1
11 RS2

L10 1u
L11 1u
D5 REVERSE PROTECTION
R42 0
D5 1SS355
R38 0

CN4
ME 1
MIC 2
E 3
RESET 4
1/2 5
TRD 6
PS 7
IGN 8
SB 9
RS1 10
RS2 11

TK-5710/5710H/5810/5810H
CONTROL UNIT (X53-4120-10)-W700

R33 0
C54 0.047u
C2 1000p
C1 1000p
C5 1000p
C6 1000p
C7 1000p
C3 100p
C50 0.01u
R36 0
R120 0

CONTROL UNIT
(X53-4350-20) (B/2)

PROGRAMMING CONNECTOR
J1
CN5
KVL 6
TRD 5
MIC 4
ME 3
E 2
SB 1
E37-1427-05
CN4
6 KVL
5 TRD
4 MIC
3 ME
2 E
1 SB

CURRENT PROTECTOR
D6 MINISMDC020F
R1 0
R2 0
R3 22
C9 100p
D7 AVRM1627OMABB
D9 MAYS062
D7,9 SURGE ABSORPTION

D3 AVRM1627OMABB
SURGE ABSORPTION
C10 1000p
D4 AVRM1627OMABB
D5 AVRM1627OMABB
C11 100p
D4,5 SURGE ABSORPTION

CN15 CN16 CN8 CN7 CN6
L8
L7
L5
CN3
ES1 1
ES2 2
NC 3
NC 4
IGN 5
E 6
E37-1428-05
ACCESSORY CONNECTOR
6 NC
5 ES2
4 ES1
3 NC
2 E
1 IGN

C12 470p
C13 470p
C14 1000p
C15 1000p
C16 470p
C17 1000p
L6

CN10 CN12
J3
OPTIONAL JACK
CN11