VHF FM TRANSCEIVER
TK-7185
SERVICE MANUAL
ADDENDUM

KENWOOD
Kenwood Corporation

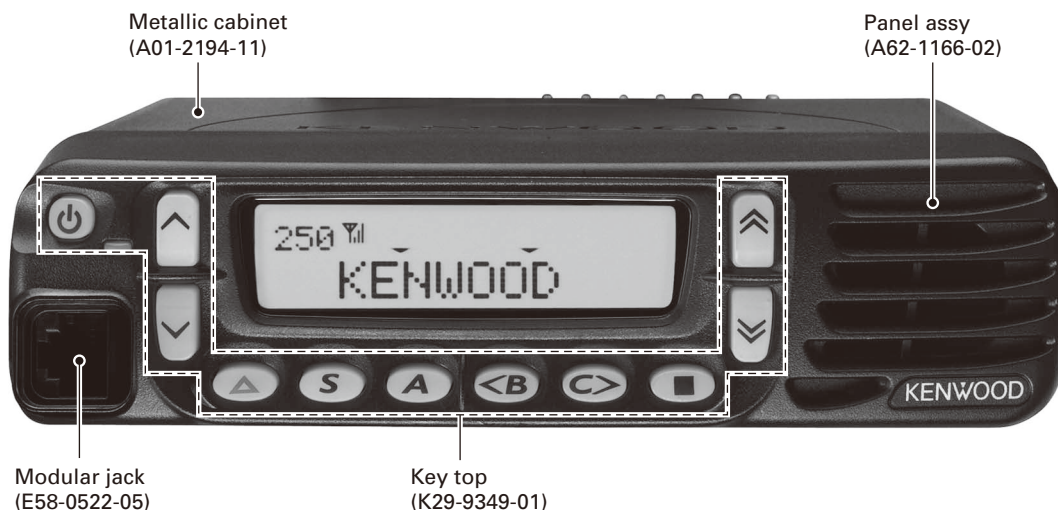# 5 Tone Version

Use this service manual together with the following service manual.
• TK-7185 service manual (B51-8843-00)

Metallic cabinet
(A01-2194-11)

Panel assy
(A62-1166-02)

Modular jack
(E58-0522-05)

Key top
(K29-9349-01)

CONTENTS

This product complies with the **RoHS** directive for the European market.

This product uses Lead Free solder.

TK-7185

Document Copyrights

Disclaimer

Firmware Copyrights

Note

You must use KPG-92D version 1.50 or later for this transceiver. KPG-92D versions earlier than version 1.50 will not work properly.

SYSTEM SET-UP

Merchandise received

Choose the type of transceiver

Frequency range	RF power	Type
217~270MHz	25W	TK-7185 E

Are you using the remote kit? — **YES** → KRK-10 — See page 9. (Option)

NO

Are you using the ignition sense cable? — **YES** → KCT-46 — See page 7. (Option)

NO

Transceiver programming

See page 4.
A personal computer (IBM PC or compatible), programming interface (KPG-46/46A), and programming software (KPG-92D) are required for programming.
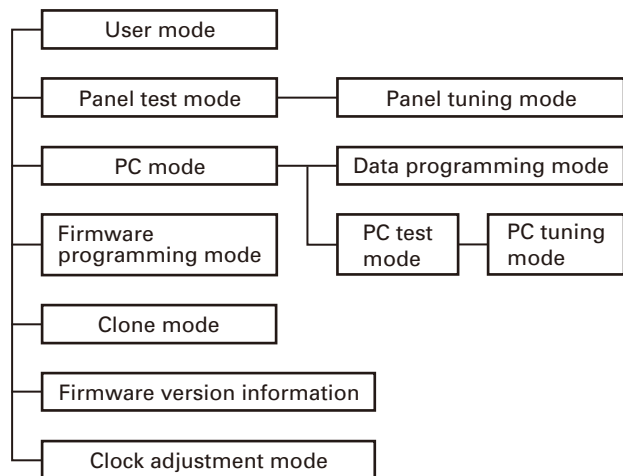
Are you using the radio interface cable? — **YES** → KCT-40 — See page 7. (Option)

NO

KCT-36 Extension cable (Option)

KGP-2A Modem GPS receiver or KGP-2B Modem GPS controller (Option)

or

KDS-100 Mobile data terminal (Option)

Are you using the public address? — **YES** → KAP-2 — See page 8. (Option)

NO

Are you using the voice guide & storage unit? — **YES** → VGS-1 — See page 10. (Option)

NO

Are you using the external speaker? — **YES** → KES-3 or KES-5 External speaker (Option) — See page 11. When the KAP-2 is installed in the transceiver, the KES-5 can be installed.

NO

Are you using the keypad microphone? — **YES** → KMC-32 or KMC-36 (Option) Desk top microphone KMC-9C

NO

Delivery

TK-7185

REALIGNMENT

1. Modes

```
┌─────────────────────────────┐
│        User mode            │
└─────────────────────────────┘

┌─────────────────────┐      ┌─────────────────────┐
│   Panel test mode   │──────│  Panel tuning mode  │
└─────────────────────┘      └─────────────────────┘

┌─────────────────────┐      ┌─────────────────────────┐
│      PC mode        │──────│  Data programming mode  │
└─────────────────────┘      └─────────────────────────┘

┌─────────────────────┐      ┌─────────────┐  ┌─────────────┐
│     Firmware        │      │  PC test    │──│  PC tuning  │
│  programming mode   │      │   mode      │  │   mode      │
└─────────────────────┘      └─────────────┘  └─────────────┘

┌─────────────────────┐
│     Clone mode      │
└─────────────────────┘

┌─────────────────────────────┐
│ Firmware version information │
└─────────────────────────────┘

┌─────────────────────────────┐
│    Clock adjustment mode     │
└─────────────────────────────┘
```

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 test.
PC tuning mode	Used to tune 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.
Clone mode	Used to transfer programming data from one transceiver to another.
Firmware version information	Used to confirm the internal firmware version.
Clock adjustment mode	Used by the dealer to adjust date and time.

2. How to Enter Each Mode

Mode	Operation
User mode	Power ON
Panel test mode	[A] + Power ON
PC mode	Received commands from PC
Panel tuning mode	[Panel test mode] + [S]
Firmware programming mode	[S] + Power ON
Clone mode	[B] + Power ON
Firmware version information	[△] + Power ON
Clock adjustment mode	[C] + Power ON

3. Panel Test Mode

Setting method refer to ADJUSTMENT.

4. Panel Tuning Mode

Setting method refer to ADJUSTMENT.

5. PC Mode

5-1. Preface

The transceiver is programmed by using a personal computer, programming interface (KPG-46/46A), USB adapter (KCT-53U) and programming software (KPG-92D).

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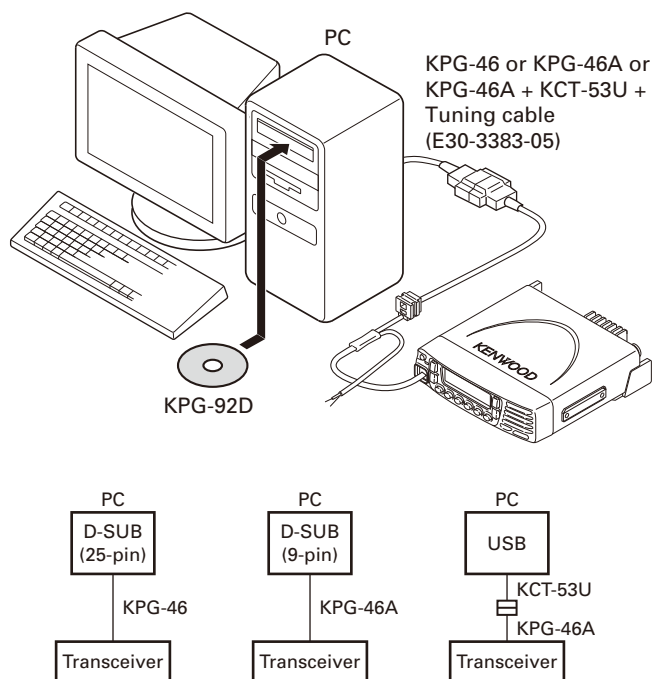

PC

KPG-46 or KPG-46A or KPG-46A + KCT-53U + Tuning cable (E30-3383-05)

KPG-92D

Fig. 1

5-2. Connection procedure

1. Connect the transceiver to the computer using the interface cable and USB adapter (When the interface cable is KPG-46A, the KCT-53U can be used.).

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.

REALIGNMENT

2. When the POWER switch on, user mode can be entered immediately. When PC sends command the transceiver enter PC mode, and "PROGRAM" is displayed on the LCD.
When data transmitting from transceiver, the red LED is lights.
When data receiving to transceiver, the green LED is lights.

Note:
The data stored in the computer must match the "Model Name" when it is written into the flash memory.

5-3. KPG-46/KPG-46A description (PC programming interface cable: Option)
The KPG-46/46A is required to interface the transceiver to the computer. It has a circuit in its D-sub connector (KPG-46: 25-pin, KPG-46A: 9-pin) case that converts the RS-232C logic level to the TTL level.
The KPG-46/46A connects the 8-pin microphone connector of the transceiver to the RS-232C serial port of the computer.

5-4. KCT-53U description (USB adapter: Option)
The KCT-53U is a cable which connects the KPG-46A 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.

5-5. Programming software KPG-92D description
The KPG-92D 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.

6. Firmware Programming Mode

6-1. Preface
Flash memory is mounted on the transceiver. 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.)

6-2. Connection procedure
Connect the transceiver to the personal computer (IBM PC or compatible) using the interface cable (KPG-46/46A) and USB adapter (KCT-53U: when the interface cable is KPG-46A, the KCT-53U can be used.). (Connection is the same as in the PC Mode.)

Note:
You can only program firmware from the 8-pin microphone connector on the front panel. Using the 25-pin logic interface on the rear panel will not work.

6-3. Programming
1. Start up the firmware programming software (Fpro.exe (ver. 4.02 or later)). The Fpro.exe exists in the KPG-92D installed holder.
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. Turn the transceiver power ON with the [S] key held down. Then, the orange LED on the transceiver lights and "PROG 115200" is displayed.
5. Check the connection between the transceiver and the personal computer, and make sure that the transceiver is in the Program mode.
6. Press write button in the window. When the transceiver starts to receive data, the [PG] display is blinking.
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.

Note:
This mode cannot be entered if the Firmware Programming mode is set to Disable in the Programming software.

6-4. Function
1. If you press the [■] key while "PROG 115200" 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 [■] key again while "PROG 19200" is displayed, the display changes to "PROG 38400" (The LED lights red and orange alternatively). If you press the [■] key again while "PROG 38400" is displayed, the display changes to "PROG 57600" (The LED blinks orange). If you press the [■] key again while "PROG 57600" is displayed, the display returns to "PROG 115200" (The LED lights orange).
2. If you press the [△] key while "PROG 115200" is displayed, the checksum is calculated, and a result is displayed. If you press the [△] key again while the checksum is displayed, "PROG 115200" is redisplayed.

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

7. Clone Mode
Programming data can be transferred from one transceiver to another by connecting them via their 8-pin microphone connectors. The operation is as follows (the transmit transceiver is the source and the receive transceiver is a target).

The following data cannot be cloned.
• Tuning data
• Embedded message with password
• Model name data

TK-7185

REALIGNMENT

1. Turn the source transceiver power ON with the [B] key held down. 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 password.
3.
   • **How to enter the password with the microphone keypad;**
   If you press a key while "CLONE LOCK" is displayed, the number that was pressed is displayed on the transceiver. Each press of the key shifts the display in order to the left. When you enter the password and press the [✳] key, "CLONE MODE" is displayed if the entered password is correct. If the password is incorrect, "CLONE LOCK" is redisplayed.
   • **How to enter the password with the [⋀] and [⋁] keys;**
   If the [⋀] and [⋁] keys is pressed while "CLONE LOCK" is displayed, numbers (0 to 9) are displayed flashing. When you press the [C] key, the currently selected number is determined. If you press the [S] key after entering the password in this procedure, "CLONE MODE" is displayed if the entered password is correct. If the password is incorrect, "CLONE LOCK" is redisplayed.
4. Power ON the target transceiver.
5. Connect the cloning cable (Part No. E30-3382-05) to the modular microphone jacks on the source and target.
6. Press the [S] key on the source while the source displays "CLONE MODE". The data of the source is sent to the target. While the target is receiving the data, "PRO-GRAM" is displayed. When cloning of 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 [S] key on the source is pressed while the source displays "END", the source displays "CLONE MODE". Carry out the operation in step 4 to 6.

Notes:
• Only the same models can be cloned together.
• Cannot be cloned if the overwrite password is programmed to the target.
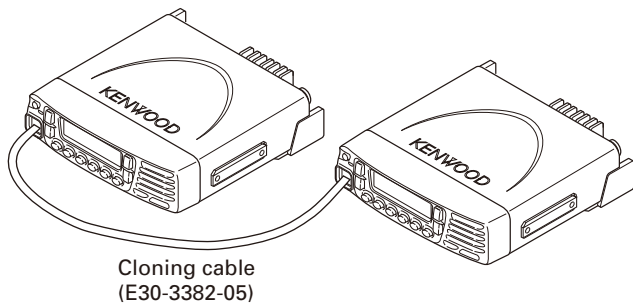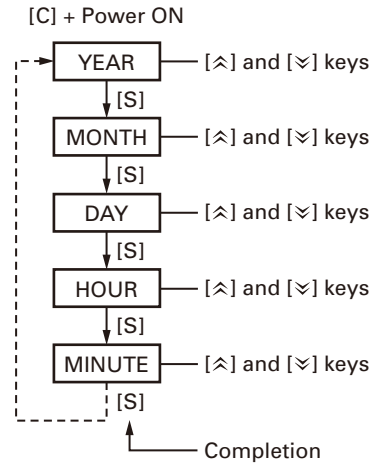

Cloning cable
(E30-3382-05)

Fig. 2

8. Firmware Version Information

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

9. Clock Adjustment Mode

9-1. Flow chart of operation

[C] + Power ON

YEAR	[⋀] and [⋁] keys
[S]	
MONTH	[⋀] and [⋁] keys
[S]	
DAY	[⋀] and [⋁] keys
[S]	
HOUR	[⋀] and [⋁] keys
[S]	
MINUTE	[⋀] and [⋁] keys
[S]	

Completion

INSTALLATION

1. Ignition Sense Cable (KCT-46: Option)

The KCT-46 is an optional cable for enabling the ignition function. The ignition function lets you turn the power to the transceiver on and off with the car ignition key.

1-1. Connecting the KCT-46 cable to the transceiver

1. Open the KCT-46 fuse holder and insert a mini blade fuse (3A). (①)
2. While holding a clear protective cover, remove the black cap at the end of the yellow cable (ignition sense cable) of the transceiver. (②)
3. Connect the plug of the KCT-46 to the yellow cable terminal of the transceiver. (③)
4. Connect the other end of the KCT-46 to the ignition line of the car. (④)

Note: You must setup using the KPG-92D.

KDS-100, KGP-2A,
KGP-2B or through
KCT-36 extension cable

Fig. 2
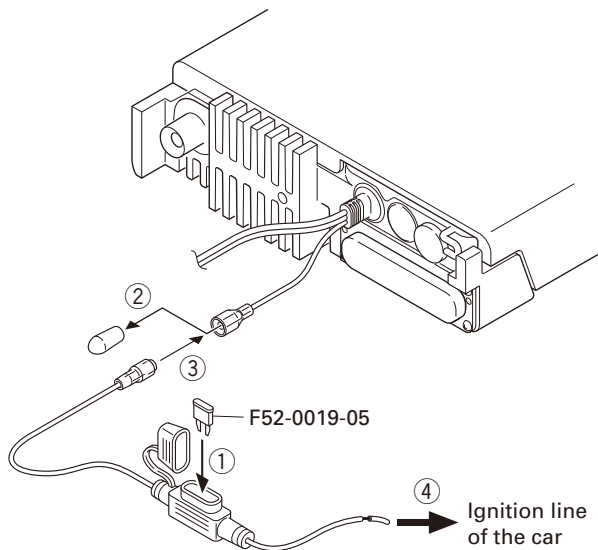

F52-0019-05

④ → Ignition line of the car

Fig. 1

2. Radio Interface Cable (KCT-40: Option)

The KCT-40 connection cable kit is used to connect the transceiver to the KDS-100 (Mobile data terminal), KGP-2A (Modem GPS receiver), KGP-2B (Modem GPS controller) or through the KCT-36 extension cable.

2-1. Connecting the KCT-40 cable to the transceiver

1. Remove the D-sub cap on the rear of the transceiver. (①)
2. Connect the D-sub connector of the KCT-40 to the D-sub 25-pin terminal of the transceiver. (②)
3. Connect the 15-pin connector of the KCT-40 to a KDS-100, KGP-2A, KGP-2B or through a KCT-36 extension cable. (③)

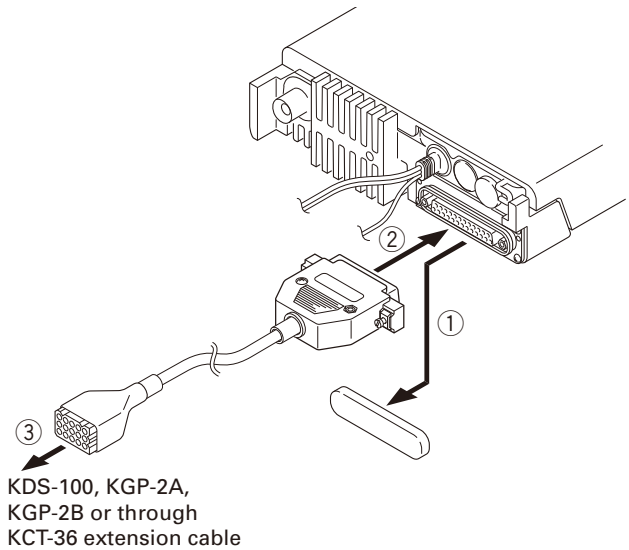**Note:** You must setup using the KPG-92D.

2-2. Terminal function

D-sub 25-pin Pin No.	TK-7185 Function	Molex 15-pin Pin No.	KDS-100 Function	KGP-2A/2B Function
1	-	-	-	-
2	-	-	-	-
3	-	-	-	-
4	-	-	-	-
5	DI	5	DO	DO
6	-	-	-	-
7	GND	3	GND	GND
8	AIO8	9	TXS/LOK	TXS/LOK
9	TXD2	15	RXD	RXD
10	RXD2	14	TXD	TXD
11	-	-	-	-
12	AIO7	11	MM	MM
13	AIO6	6	PTT	PTT
14	SB	1	SB	SB
15	-	-	-	-
16	-	-	-	-
17	-	-	-	-
18	-	-	-	-
19	DEO	4	DI	DI
20	AIO5	8	SQ	SQ
21	AIO4	10	AM	AM
22	AIO3	13	-	DISP OFF
23	AIO2	12	-	-
24	AIO1	7	DTC	DTC
25	-	-	-	-

TK-7185

INSTALLATION

3. Horn Alert/P.A. Relay Unit (KAP-2: Option)

The Horn alert (max. 2A drive), Public address and External speaker function are enabled by installing the KAP-2 in the transceiver.

3-1. Installing the KAP-2 unit in the transceiver (The kit A is not used in the KAP-2 accessories)

1. Remove the cabinet, top packing and shielding plate of the transceiver.
2. Set the KAP-2 relay unit jumper pins according to the purpose of use.
3. Remove the 6-pin jumper connector inserted in the TX-RX unit (B/3) connector (CN428). (①)
4. Insert one side of the lead wire with connector (E37-1114-05) into the relay unit connector (CN3) (②) and the other side into the TX-RX unit (B/3) connector (CN428) (③).

5. Place the relay unit at the position shown in Figure 3-2 and secure it to the chassis with a screw.
6. Remove the cap on the rear of the chassis by pushing it from the inside with your finger. (④)
7. Pass the 6-pin connector of the cable (E37-1113-15) through the chassis hole (⑤) and insert the bush into the chassis hole.
8. Rotate the bush of the cable 90 degrees counterclockwise as viewed from the rear of the chassis. (⑥)
9. Insert the 6-pin connector of the cable into the connector (CN2) of the KAP-2 relay unit. (⑦)
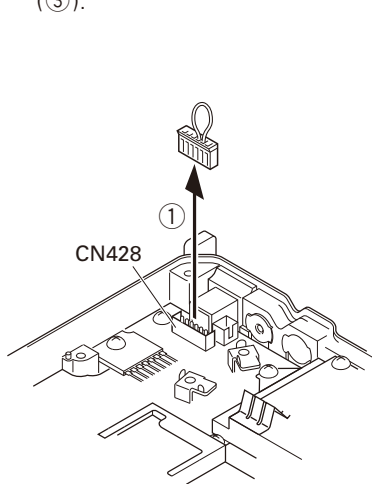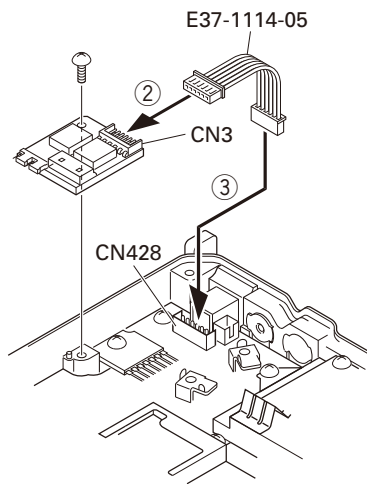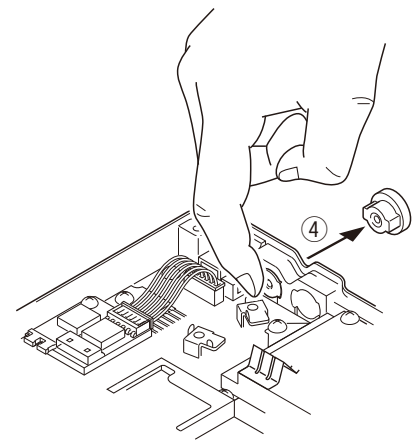
Note: You must setup using the KPG-92D.

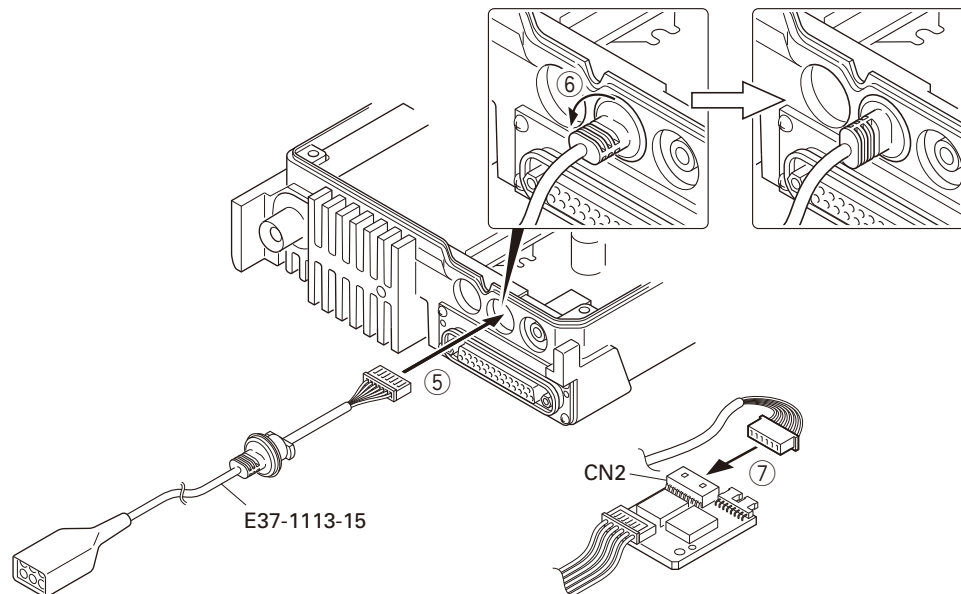**Fig. 3-1**

Fig. 3-2

Fig. 3-3

Fig. 3-4

INSTALLATION

4. Control Head Remote Kit (KRK-10: Option)

The KRK-10 remote kit is used to remotely operate the transceiver.

4-1. Installing the KRK-10 kit to the transceiver

1. Remove the front panel from the transceiver.
2. Install the KRK-10 main panel onto the transceiver.
3. Install the KRK-10 rear panel onto the front panel.
4. Connect the KRK-10 main panel to the rear panel with the cable.

■ Remove the front panel from the transceiver

1. Lift the two tabs of the panel on the bottom of the transceiver with a flat-head screwdriver (①) and remove the panel from the chassis (②).
   Note: Confirm that the tabs of the speaker hardware fixture and holder is securely fitted in the front panel.
2. Remove the flat cable from the connector (CN902) of the display unit of the panel. (③)
3. Fold the black line of the flat cable (in three parts) as shown in Figure 4-2. (④, ⑤, ⑥)
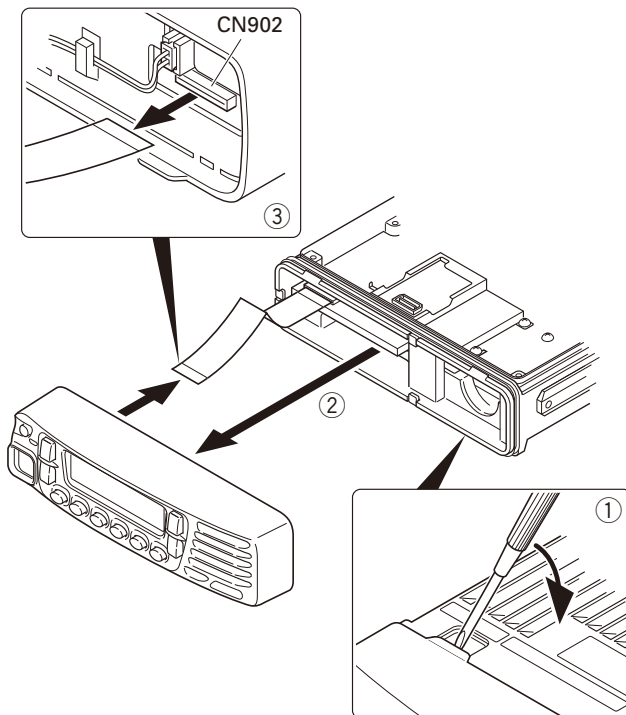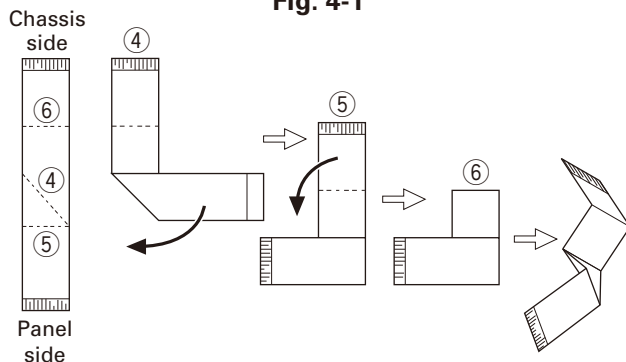

Fig. 4-1

Fig. 4-2

■ Install the KRK-10 main panel onto the transceiver

4. Insert the flat cable that was removed in step 2 above into the connector (CN1) of the interface unit (A/2) of the KRK-10 main panel (A62-1101-11). (⑦)
   Note: The terminal side of the flat cable must face down when inserting the flat cable into the connector.
5. Fit the main panel with four tabs onto the front of the chassis. (⑧)
   Note: When installing the main panel onto the front of the chassis, hold down the flat cable with your fingers to prevent it from being caught.
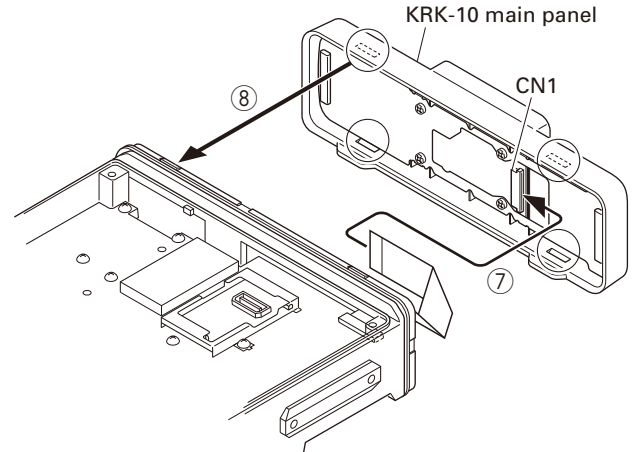

Fig. 4-3

■ Install the KRK-10 rear panel onto the front panel

6. Insert the flat cable attached to the interface unit (B/2) of the KRK-10 rear panel (A82-0056-21) into the connector (CN902) of the display unit of the panel (⑨). (The flat cable has been pre-inserted in the connector (CN2) of the rear panel at the time of shipping.)
   Note: The terminal side of the flat cable must face down when inserting the flat cable into the connector.
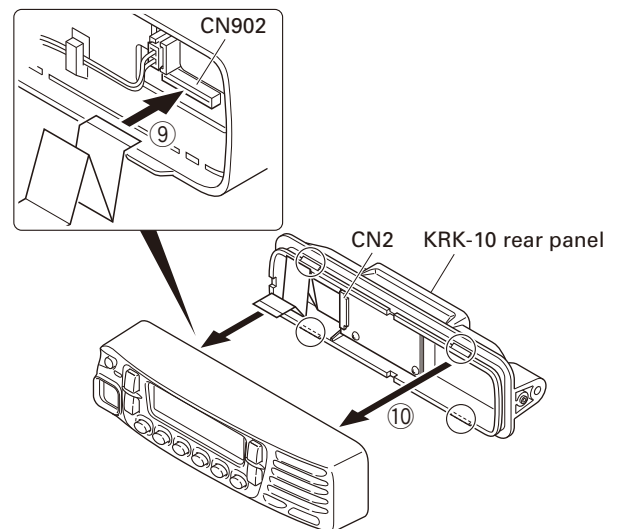7. Fit the four tabs of the rear panel into the front panel. (⑩)

Fig. 4-4

TK-7185

INSTALLATION

■ **Connect the KRK-10 main panel to the rear panel with the cable**

8. Insert one 14-pin connector of the cable (E30-7514-15) into the connector (CN3) of the interface unit (A/2) of the main panel. (⑪)
   Note: Insert the connector that has a sticker onto the cable to the connector of the main panel.

9. Secure the cable bush on the main panel and fit the waterproof packing (orange) (⑫) securely over top.
10. Install the molded cover (⑬) over the connector on the main panel and secure it with two screws (⑭).
11. Insert the other 14-pin connector of the cable into the connector (CN4) of the interface unit (B/2) of the rear panel. (⑮)
12. Secure the cable bush on the rear panel and fit the waterproof packing (orange) (⑯) securely over top.
13. Install the molded cover (⑰) over the connector on the rear panel and secure it with two screws (⑱).

Note: A cable can be connected from the left side as shown in the Figure 4-5 or from right side.
However, the 14-pin connector must be connected to correct direction.
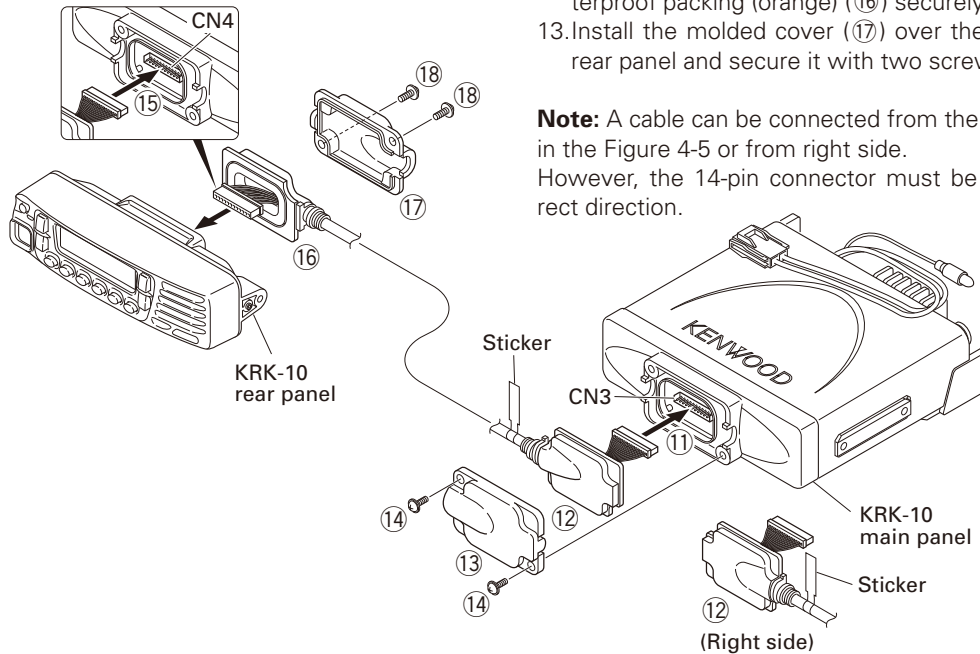
Fig. 4-5

5. Voice Guide & Storage Unit (VGS-1: Option)

Note: Because the VGS-1 is a non-RoHS product, it is not sold in the European market.

5-1. Installing the VGS-1 unit in the transceiver

1. Remove the cabinet, top packing and shielding plate of the transceiver.
2. Attach two cushions to VGS-1 as shown in Figure 5. (①)
   Note: Be sure not to cover the connector with the bottom cushion.
3. Insert the VGS-1 connector (CN1) into the TX-RX unit (B/3) connector (CN403). (②)

Note: You must setup using the KPG-92D.

① Cushion (G13-1994-04) 20 x 30 x 12 mm
VGS-1
Cushion (G13-1992-04) 21 x 21 x 2.5 mm

Fig. 5

INSTALLATION

6. External Speaker (Option)

6-1. KES-3

The KES-3 is an external speaker for the 3.5-mm-diameter speaker jack.

■ Connection Procedure

1. Connect the KES-3 to the 3.5-mm-diameter speaker jack on the rear of the transceiver.
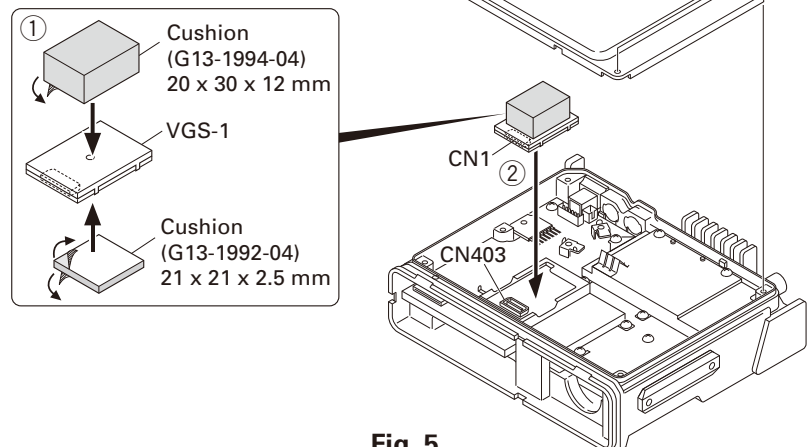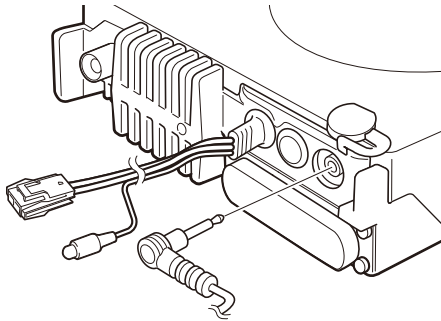

Fig. 6-1

6-2. KES-5

External speaker KES-5 can be installed for KAP-2. If KES-5 is installed, it can be set by changing the CN1 short pin from pins 4 and 5 to pins 5 and 6 on the KAP-2.

KAP-2 CN1 Connect	Set Up
4-5	INT. SP or KES-3
5-6	KES-5

When you use the KES-5, plug the short pin to pins 5 and 6 on the KAP-2.

When you use the INT. SP or KES-3, plug the short pin to pins 4 and 5 on the KAP-2.

KAP-2 unit
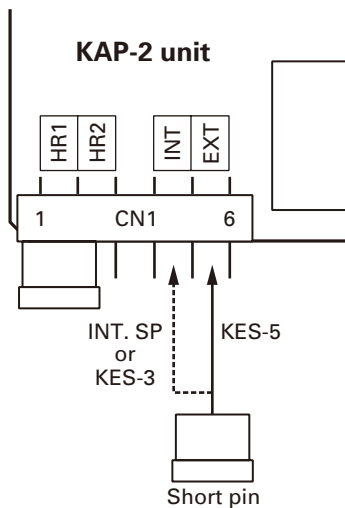
Fig. 6-2

■ Connection Procedure

Insert the crimp terminal into the Square plug supplied with the KAP-2.

Black/White lead
4
5
Square plug (E59-0419-05)
Black lead
Insulating cover (F29-0481-15)
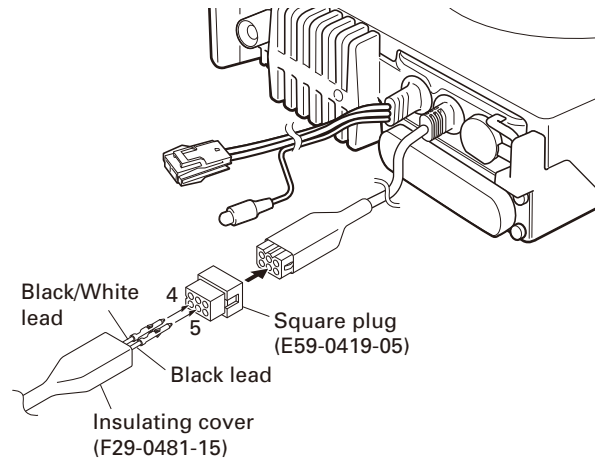
Fig. 6-3

■ KAP-2 Cable (E37-1113-15) 6-pin Connector
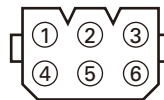
Pin No.	Color	Name
1	Red	HR2
2	Blue	GND
3	Yellow	OSP
4	Green	ESP
5	Brown	GND
6	Black	HR1

TK-7185

7. Voice Scrambler Board Connection

1. Remove the front panel from the transceiver.
2. Solder each lead of the scrambler board to a necessary location of each landing on the component side of the TX-RX unit (B/3).
3. Wrap the scrambler board in a cushion and install it on the front of the chassis as shown in Figure 8-2.

Note: You must setup using the KPG-92D.

TX-RX unit (B/3)
Solder land

GND (GND)
RXD1
TXD1 (PTT)
TXD2
RXD2
OPT1 (CODE SELECT1)
OPT3 (CODE SELECT2)
OPT4 (ECHO PTT)
OPT5 (CODE SELECT8)
5E
DTI
TCTL
TXO (TX OUT)
AUDIH
OPT2 (SCRAMBLE)
STON
RXEO (RX OUT)
TXI (TX IN)
RXEI (RX IN)
OPT6 (CODE SELECT4)
8C (+V)

Voice scrambler board
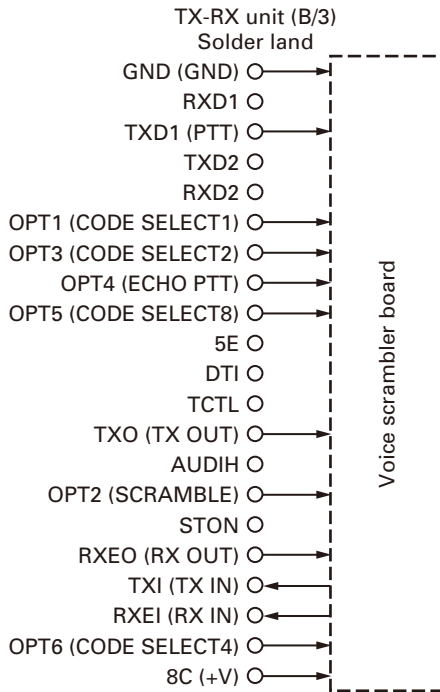
Fig. 7

8. ANI Board Connection

1. Remove the front panel from the transceiver.
2. Solder each lead of the ANI board to a necessary location of each landing on the component side of the TX-RX unit (B/3).
3. Wrap the scrambler board in a cushion and install it on the front of the chassis as shown in Figure 8-2.

Note: You must setup using the KPG-92D.

TX-RX unit (B/3)
Solder land

GND (A–)
RXD1
TXD1
TXD2
RXD2
OPT1 (CH BUSY)
OPT3 (KEY)
OPT4 (PTT)
OPT5 (EMERGENCY)
5E (A+)
DTI (DATA OUT)
TCTL (TONE CTRL)
TXO
AUDIH (AUDIO INHIB)
OPT2 (AUX I/O)
STON (SIDE TONE)
RXEO
TXI
RXEI
OPT6
8C

ANI board

Fig. 8-1

ANI board

3M double coated cushion
No. 4008 (or No.4408)
25 x 110 mm

Voice scrambler board
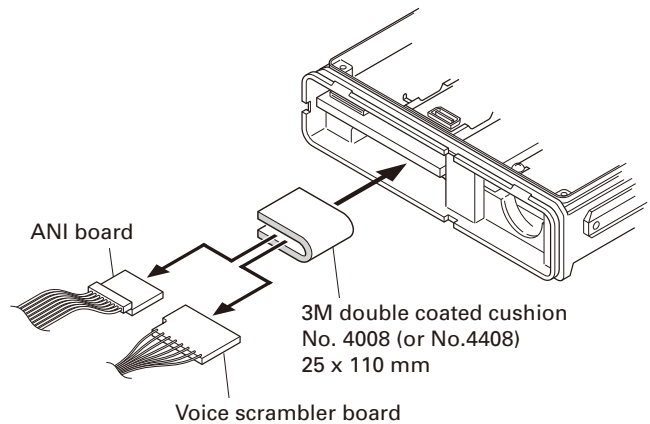
Fig. 8-2

INSTALLATION

9. GPS Receiver Connection

9-1. Installing the GPS receiver

1. Remove the cabinet, top packing and shielding plate of the transceiver.
2. Remove the front panel from the transceiver.
3. Attach two cushions to the top of the GPS receiver.
4. Attach the GPS receiver to the shield case with two cushions as shown in Figure 9-2.
5. Solder each lead of the GPS receiver to a necessary location of each landing on the component side of the TX-RX unit (B/3).
6. Place the GPS antenna cable in the hollow at the rear of the chassis. (Fig. 9-2 ①)
   Note: If the GPS receiver is installed, cut the base of the convex tab of the top packing with a pair of nippers, or similar tool. (Fig. 9-3 ②)
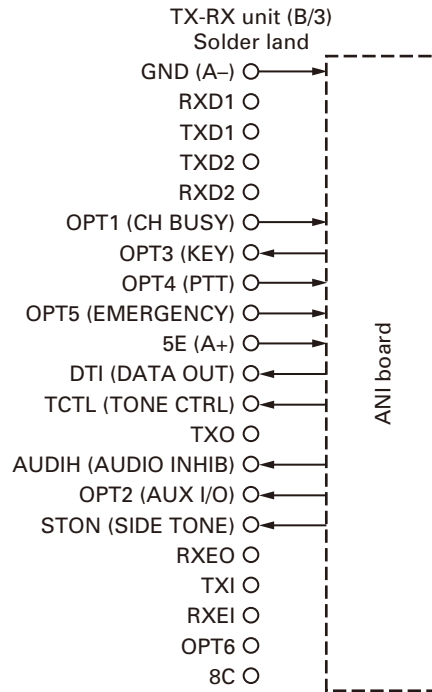   If the convex tab of the top packing is cut off, the water proofing property is no longer guaranteed.

Note: You must setup using the KPG-92D.

TX-RX unit (B/3)
Solder land

GND (GND)
RXD1 (DATA OUT1)*1
TXD1
TXD2
RXD2 (DATA OUT1)*1
OPT1
OPT3
OPT4
OPT5
5E (+5V)
DTI
TCTL
TXO
AUDIH
OPT2
STON
RXEO
TXI
RXEI
OPT6
8C

GPS receiver

*1: Depending on the connected optional accessory, the DATA OUT1 may connect to either RXD1 or RXD2.

Fig. 9-1

3M Double coated cushion
No. 4016 (or No. 4416)
30 x 25 mm

GPS receiver

3M Double coated cushion
No. 4016 (or No. 4416)
30 x 25 mm

①

Fig. 9-2

②

Fig. 9-3

TK-7185
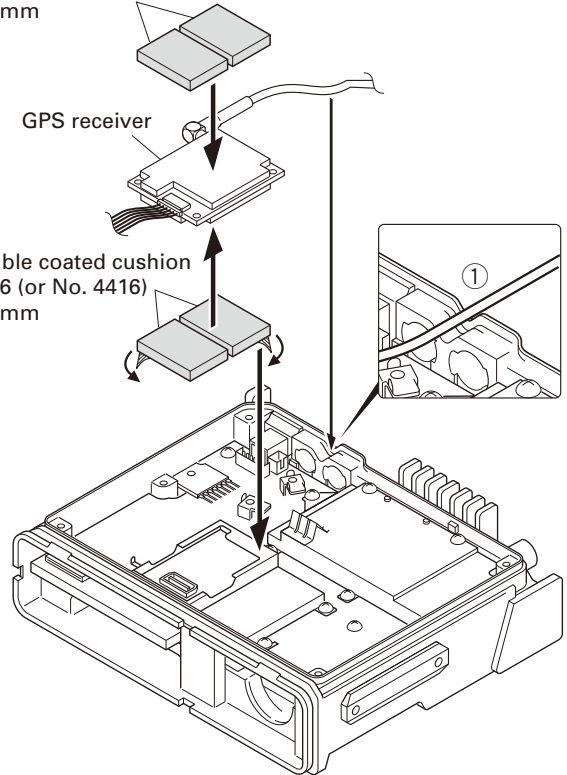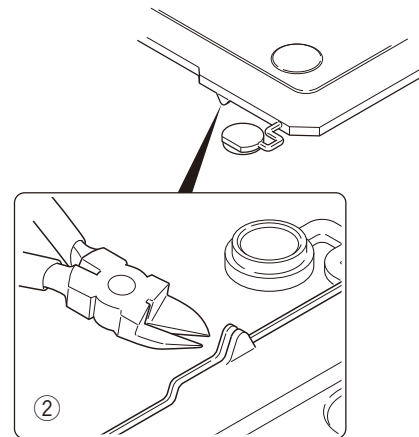
9-2. Installing the GPS receiver together with the VGS-1
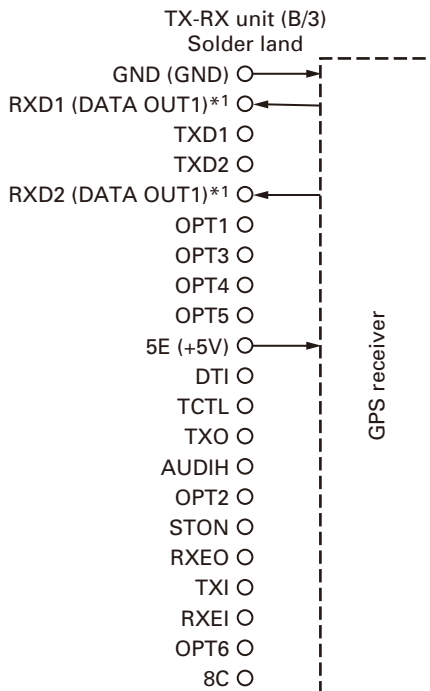
1. Remove the cabinet, top packing and shielding plate of the transceiver.
2. Remove the front panel from the transceiver.
3. Attach a cushion to the bottom of the VGS-1 as shown in Figure 9-5.
   Note: Be sure not to cover the connector with the cushion.
4. Insert the VGS-1 connector (CN1) into the TX-RX unit (B/3) connector (CN403).
5. Perform step 3 to 6 of "9-1. Installing the GPS receiver" described on page 13.

Note: You must setup using the KPG-92D.

TX-RX unit (B/3)
Solder land

GND (GND)
RXD1
TXD1
TXD2
RXD2 (DATA OUT1)
OPT1
OPT3
OPT4
OPT5
5E (+5V)
DTI
TCTL
TXO
AUDIH
OPT2
STON
RXEO
TXI
RXEI
OPT6
8C

GPS receiver

Fig. 9-4

GPS receiver

VGS-1

CN1

CN403

Fig. 9-5

ADJUSTMENT

Controls

Power switch
Volume Up/Down key
LCD
Channel Up/Down key

Modular MIC jack
Programmable function keys

Panel Test Mode

■ Test mode operation features

This transceiver has a test mode. **To enter test mode, press and hold the [A] key while turning the transceiver power ON. Before the transceiver enters test mode, the frequency version information appears on the LCD momentarily.** Test mode can be inhibited by programming. To exit test mode, turn the transceiver power OFF. The following functions are available in test mode.

■ Key operation

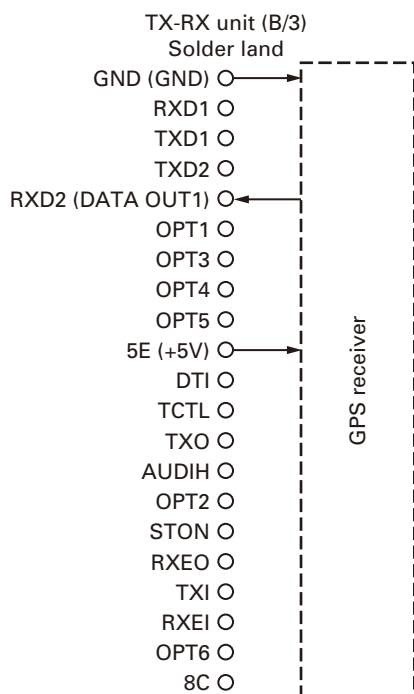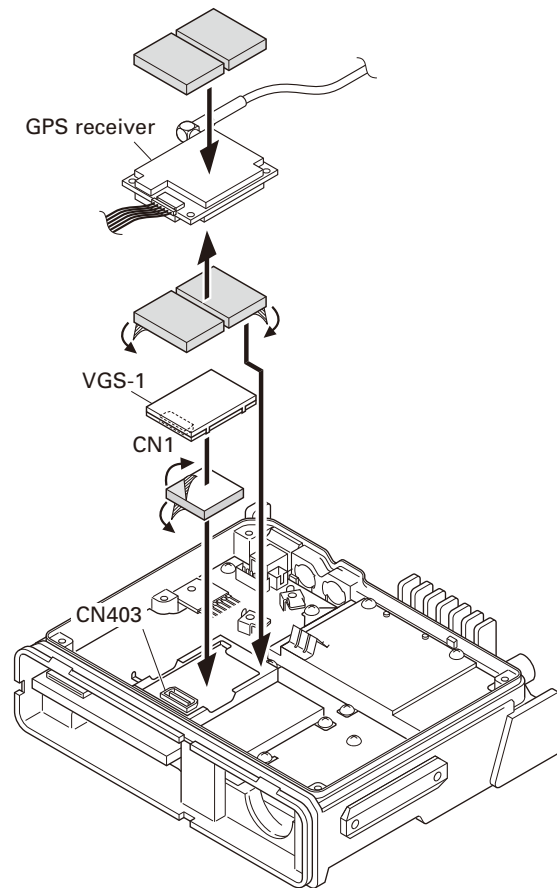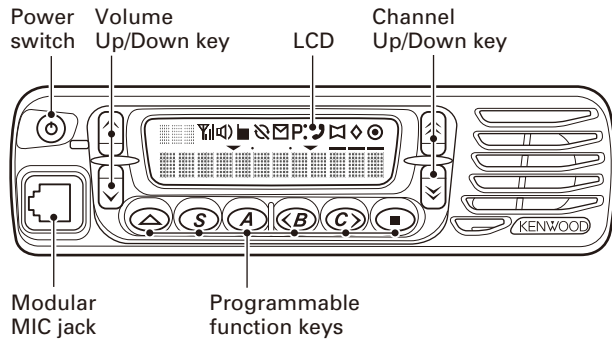| Key	"FNC" not appears	
	Function	Display
[S]	Shifts to Panel tuning mode	-
[A]	Function on	"FNC" appears
[B]	MSK 1200bps and 2400bps	2400bps: ✉ icon appears
[C]	Test signaling CH up	Signaling No.
[⌃]/[⌄]	Test frequency CH up/down	Channel No.
[∧]/[∨]	Volume up/down	-
[△]	Squelch on/off	🔊
[■]	Narrow/Wide	Narrow: "n", Wide: "w"
Microphone key		
[PTT]	Transmit	-
[0] to [9] and [A], [B], [C], [D], [#], [*]	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
[S]	High power / Low power	Low: ⊐ icon appears
[A]	Function off	-
[B]	Compander on/off	On: ♪ icon appears
[C]	Beat shift on/off	On: ◊ icon appears
[⌃]/[⌄]	Function off	-
[∧]/[∨]	Function off	-
[△]	Squelch level 0	On: P° icon appears
[■]	LCD all lights	LCD all point appears
Microphone key		
[PTT]	Transmit	-
[0] to [9] and [A], [B], [C], [D], [#], [*]	Function off	-

Note:
If a [S], [A], [B], [C] key is pressed during transmission, the DTMF corresponding to the key that was pressed is sent.

• **LED indicator**
Red LED   Lights during transmission.
Green LED   Lights when there is carrier.

• **Sub LCD indicator**
"FNC"   Appears at function on.

• **LCD display in panel test mode**

$$n \_ \_ \_ 1 \_ - \_ \_ 1 \_ \_$$

n : Narrow
w : Wide
Channel No.
Signaling No.
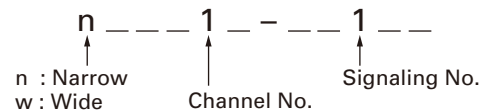
■ Frequency and Signaling

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**

CH	RX (MHz)	TX (MHz)
1	243.55000	243.60000
2	217.05000	217.10000
3	269.95000	269.90000
4	243.50000	243.50000
5	243.70000	243.70000
6	243.90000	243.90000
7~16	-	-

TK-7185

ADJUSTMENT

• Test signaling

No.	RX	TX
1	None	None
2	None	100Hz Square Wave
3	LTR Data: AREA=0, GOTO=12 HOME=12 ID=47, FREE=25	LTR Data: AREA=0, GOTO=12 HOME=12 ID=47, FREE=25
4	QT: 67.0Hz	QT: 67.0Hz
5	QT: 151.4Hz	QT: 151.4Hz
6	QT: 210.7Hz	QT: 210.7Hz
7	QT: 254.1Hz	QT: 254.1Hz
8	DQT: D023N	DQT: D023N
9	DQT: D754I	DQT: D754I
10	DTMF: 159D	DTMF: 159D
11	None	DTMF Code 9
12	2-tone: A: 304.7Hz B: 3106.0Hz	2-tone: A: 304.7Hz B: 3106.0Hz
13	Single Tone: 979.9Hz	Single Tone: 979.9Hz
14	None	Single Tone: 1000Hz
15	5-tone (CCIR 12345)	5-tone (CCIR 12345)
16	None	MSK
17	MSK: Preamble: 0xAAAA Sync: 0x23EB Data: 0x230960C6AAAA CRC: 0xC4D7	MSK: Preamble: 0xAAAA Sync: 0x23EB Data: 0x230960C6AAAA CRC: 0xC4D7

Note: The "LTR signaling" and "2-tone signaling" cannot be used, please skip them.

Panel Tuning 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 transceiver 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 place transceiver in tuning mode)

Press [S] key, now in tuning mode. Use [B] key to write tuning data through tuning modes, and [⋏]/[⋎] to adjust tuning requirements (1 to 256 appears on LCD).

Use [C] key to select the adjustment item through tuning modes. Use [A] key to adjust 3 or 5 reference level adjustments, and use [■] key to switch between Wide/Narrow.

Channel appears on LCD. Set channel according to tuning requirements.

• LCD display in panel tuning mode

n _ _ B A L _ _ _ 2 5 6

n : Narrow
w : Wide
Adjustment item
Adjustment value (1~256)
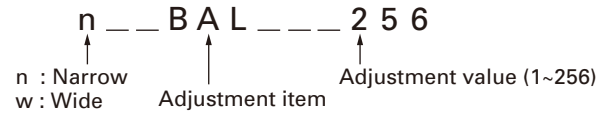
■ Key operation

Key	Function	
	Push	Hold (1 second)
[S]	End of panel tuning mode	-
[A]	To enter 3 or 5 reference level adjustments	-
[B]	Writes the adjustment value	-
[C]	Go to next adjustment item	Back to last adjustment item
[⋏]/[⋎]	Adjustment value up/down	Continuation up/down
[∧]/[∨]	Volume level up/down	Continuation up/down
[△]	Squelch on/off	-
[■]	Selects Narrow, Wide	-

■ 3 or 5 reference level adjustments frequency

Tuning point	RX (MHz)	TX (MHz)
Low	217.05000	217.10000
Low'	230.35000	230.40000
Center	243.55000	243.60000
High'	256.85000	256.90000
High	269.95000	269.90000

■ Adjustment item and Display
(✻✻✻: 1~256, MSK only: 1~64)

Order	Adjustment item	Display
1	Frequency	F R E Q _ _ ✻✻✻
2	Shift 1	S H F T 1 _ ✻✻✻
3	Shift 2	S H F T 2 _ ✻✻✻
4	Max high power	M H P W R _ ✻✻✻
5	Max low power	M L P W R _ ✻✻✻
6	High power	H P W R _ _ ✻✻✻
7	Low power	L P W R _ _ ✻✻✻
8	DQT balance	B A L _ _ _ ✻✻✻
9	Max deviation	D E V _ _ _ ✻✻✻
10	QT deviation	Q T _ _ _ _ ✻✻✻
11	DQT deviation	D Q T _ _ _ ✻✻✻
12	LTR deviation	L T R _ _ _ ✻✻✻
13	DTMF deviation	D T M F _ _ ✻✻✻
14	MSK deviation	M S K _ _ _ _ ✻✻
15	Tone deviation	T O N E _ _ ✻✻✻
16	Sensitivity 1	S E N S 1 _ ✻✻✻
17	Squelch	S Q L _ _ _ ✻✻✻
18	Low RSSI	L R S S I _ ✻✻✻
19	Squelch tight	S Q L T _ _ ✻✻✻
20	High RSSI	H R S S I _ ✻✻✻

ADJUSTMENT

■ Flow chart

Note: The "LTR deviation" cannot be used, please skip this item.

TK-7185
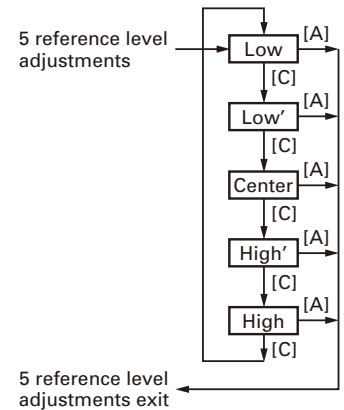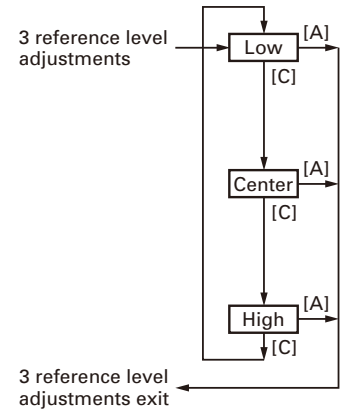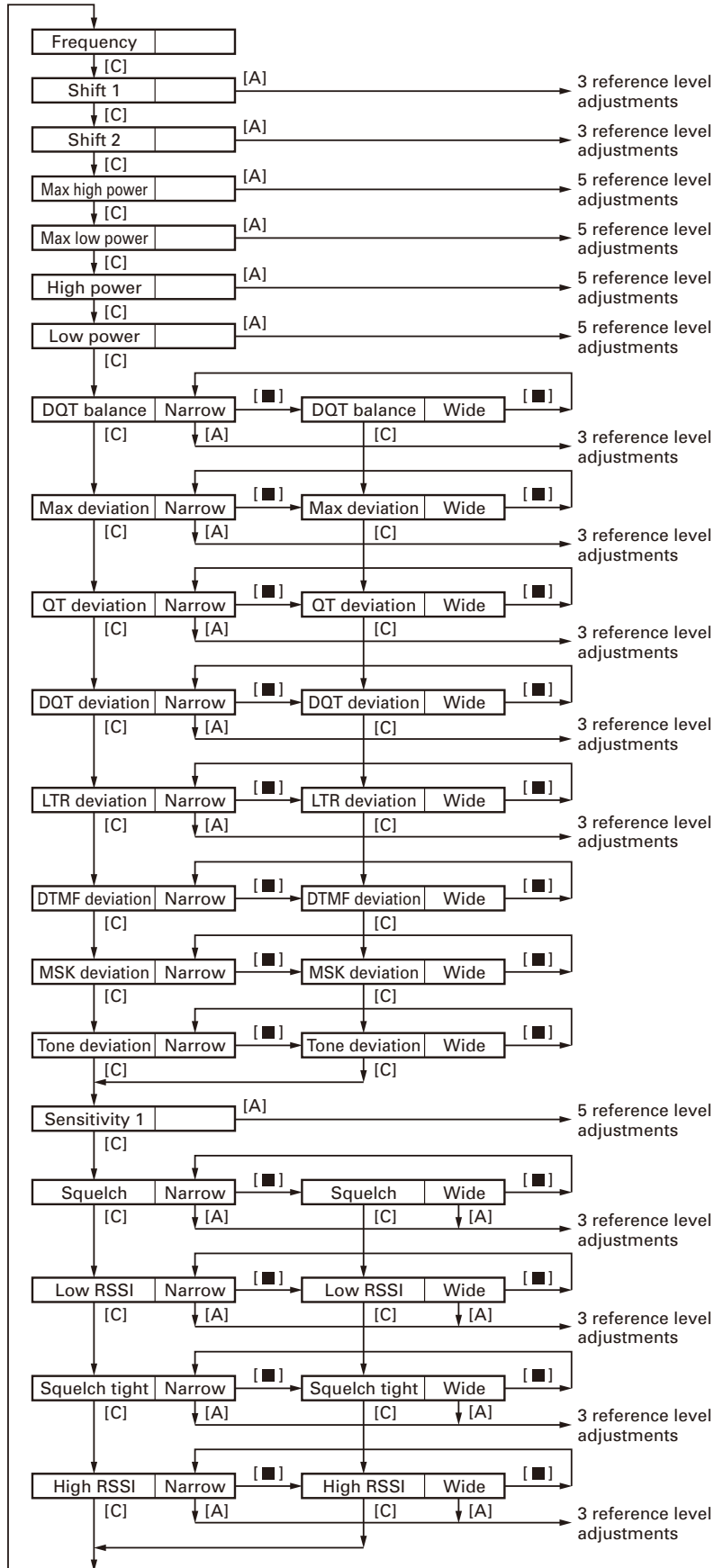
ADJUSTMENT

Test Equipment Required for Alignment

Test Equipment		Major Specifications
1. Standard Signal Generator (SSG)	Frequency Range Modulation Output	217 to 270MHz Frequency modulation and external modulation 0.1µV to greater than 1mV
2. Power Meter	Input Impedance Operation Frequency Measurement Range	50Ω 217 to 270MHz or more Vicinity of 50W
3. Deviation Meter	Frequency Range	217 to 270MHz
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 600MHz 0.2ppm or less
7. Ammeter		13A or more
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 0 to 1V
10. Distortion Meter	Capability Input Level	3% or less at 1kHz 50mV to 10Vrms
11. Voltmeter	Measuring Range Input Impedance	10 to 1.5V DC or less 50kΩ/V or greater
12. 4Ω Dummy Load		Approx. 4Ω, 20W
13. Regulated Power Supply		13.2V, approx. 20A (adjustable from 9 to 20V) Useful if ammeter equipped

Test cable for microphone input (E30-3360-28)

① GREEN		①
② RED		②
③ BLACK	E	③
④ BLUE	PTT	④
⑤ SHIELD	MIC-E	⑤
⑥ WHITE	MIC	⑥
⑦ GRAY	HK	⑦
⑧ YELLOW		⑧
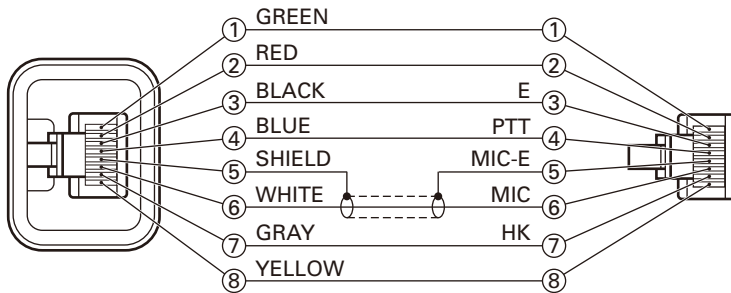
Tuning cable (E30-3383-05)

Adapter cable (E30-3383-05) is required for injecting an audio if PC tuning is used.
See "PC Mode" section for the connection.

Lead wire⊕
Shield wire⊖
MIC
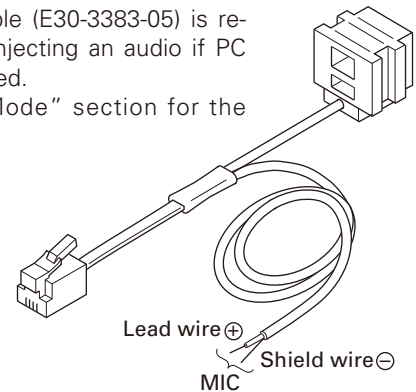
MIC connector (Front panel view)

1 : BLC
2 : +B
3 : GND
4 : PTT/TXD (PC serial data from radio)
5 : MICE
6 : MIC
7 : HOOK/RXD (PC serial data to radio)
8 : DM

ADJUSTMENT

Common Section

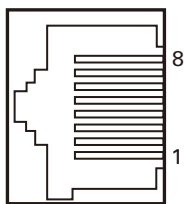| Item	Condition	Measurement			Adjustment			Specifications / Remarks
		Test-equipment	Unit	Terminal	Unit	Parts	Method	
1. Setting	1) Power supply voltage DC power supply terminal : 13.2V 2) SSG standard modulation [Wide] MOD: 1kHz, DEV: 3kHz [Narrow] MOD: 1kHz, DEV: 1.5kHz							
2. VCO lock voltage • RX	**[Panel test mode]** 1) CH-Sig: 3-1	Power meter	Rear panel	ANT	TX-RX (B/3)	TC301	8.0V	±0.1V
	2) CH-Sig: 2-1	DVM	TX-RX (B/3)	CV			Check	1.9V±0.5V
• TX	**[Panel tuning mode] LPWR*** 3) CH-Sig: 3-1 PTT: ON				TX-RX (B/3)	TC302	8.0V	±0.1V
	4) CH-Sig: 2-1 PTT: ON						Check	1.2V±0.5V

* TX can be continued on unlock condition in panel tuning mode.

Transmitter Section (E market model skips adjustment of LTR deviation)

Item	Condition	Measurement			Adjustment			Specifications / Remarks
		Test-equipment	Unit	Terminal	Unit	Parts	Method	
1. Frequency adjust	1) Adj item: [FREQ] Adjust: [∗∗∗] PTT: ON	f. counter	Rear panel	ANT	Front panel	[⌃],[⌄]	Center frequency ±50Hz	**Note:** After replacing the VCXO (X301) align frequency.
2. Frequency shift 1 adjust	1) Adj item: [SHFT1] Adjust: [∗∗∗] 2) Adj item: [L SHFT1] → [C SHFT1] → [H SHFT1] Adjust: [∗∗∗] PTT: ON						[L SHFT1] Low frequency+1.25kHz [C SHFT1] Center frequency+1.25kHz [H SHFT1] High frequency+1.25kHz	±50Hz
3. Frequency shift 2 adjust	1) Adj item: [SHFT2] Adjust: [∗∗∗] 2) Adj item: [L SHFT2] → [C SHFT2] → [H SHFT2] Adjust: [∗∗∗] PTT: ON						[L SHFT2] Low frequency+2.5kHz [C SHFT2] Center frequency+2.5kHz [H SHFT2] High frequency+2.5kHz	±50Hz
4. Max high power adjust	1) Adj item: [MHPWR] Adjust: [∗∗∗] 2) Adj item: [L MHPWR] → [L' MHPWR] → [C MHPWR] → [H' MHPWR] → [H MHPWR] Adjust: [∗∗∗] PTT: ON	Power meter					28W	±3W **CAUTION!** Do not attempt to adjust the transceiver's transmit output power beyond its specifications. If the transceiver is adjusted beyond the specifications, it may cause deterioration of the parts reliability and the output power may be lowered suddenly and unstable. The transceiver may be also extremely hot.

TK-7185

ADJUSTMENT

Item	Condition	Measurement			Adjustment			Specifications / Remarks
		Test-equipment	Unit	Terminal	Unit	Parts	Method	
5. Max low power adjust	1) Adj item: [MLPWR] Adjust: [∗∗∗] 2) Adj item: [L MLPWR] → [L' MLPWR] → [C MLPWR] → [H' MLPWR] → [H MLPWR] Adjust: [∗∗∗] PTT: ON	Power meter	Rear panel	ANT	Front panel	[⌃],[⌄]	15W	±1W **CAUTION!** Do not attempt to adjust the transceiver's transmit output power beyond its specifications. If the transceiver is adjusted beyond the specifications, it may cause deterioration of the parts reliability and the output power may be lowered suddenly and unstable. The transceiver may be also extremely hot.
6. High power adjust	1) Adj item: [HPWR] Adjust: [∗∗∗] 2) Adj item: [L HPWR] → [L' HPWR] → [C HPWR] → [H' HPWR] → [H HPWR] Adjust: [∗∗∗] PTT: ON	Power meter Ammeter					25W	±1W 9A or less
7. High power check	**[Panel test mode]** 1) CH-Sig: 1-1 PTT: ON						Check	22.5~27.5W 9A or less
	2) CH-Sig: 2-1 PTT: ON							
	3) CH-Sig: 3-1 PTT: ON							
8. Low power adjust	1) Adj item: [LPWR] Adjust: [∗∗∗] 2) Adj item: [L LPWR] → [L' LPWR] → [C LPWR] → [H' LPWR] → [H LPWR] Adjust: [∗∗∗] PTT: ON				Front panel	[⌃],[⌄]	5.0W	±0.5W 5A or less
9. Low power check	**[Panel test mode]** 1) CH-Sig: 1-1 Set low power (Push [S]) PTT: ON						Check	3.5~6.5W 5A or less
	2) CH-Sig: 2-1 PTT: ON							
	3) CH-Sig: 3-1 PTT: ON							

ADJUSTMENT

Item	Condition	Measurement			Adjustment			Specifications / Remarks
		Test-equipment	Unit	Terminal	Unit	Parts	Method	

10. DQT balance adjust
 	
• Narrow
	1) Adj item: [n BAL]
	Adjust: [∗∗∗]
	Deviation meter filter
	  LPF: 3kHz
	  HPF: OFF
	2) Adj item: [nL BAL] →
	[nC BAL] → [nH BAL]
	Adjust: [∗∗∗]
	PTT: ON
		Power meter
		
		Deviation meter
		Oscilloscope
		AG
		AF VTVM
			Rear panel
			
			Front panel
				ANT
				
				Modular MIC jack
					Front panel	[⌃],[⌄]	Make the demodu-lation waves into square waves.	

• Wide	3) Adj item: [w BAL] Adjust: [∗∗∗] PTT: ON							

11. Max DEV adjust
 	
• Narrow
	1) Adj item: [n DEV]
	Adjust: [∗∗∗]
	AG: 1kHz/50mV at MIC terminal
	Deviation meter filter
	  LPF: 15kHz
	  HPF: OFF
	2) Adj item: [nL DEV] →
	[nC DEV] → [nH DEV]
	Adjust: [∗∗∗]
	PTT: ON
							2.10kHz
							(According to the larger +, −)
								±0.05kHz

• Wide	3) Adj item: [w DEV] Adjust: [∗∗∗] PTT: ON						4.20kHz (According to the larger +, −)	±0.10kHz
12. MIC sensitivity check (Wide only)	[Panel test mode] 1) CH-Sig: 1-1 AG: 1kHz/5mV at MIC terminal PTT: ON						Check	2.5~3.5kHz

13. QT deviation adjust
 	
• Narrow
	1) Adj item: [n QT]
	Adjust: [∗∗∗]
	Deviation meter filter
	  LPF: 3kHz
	  HPF: OFF
	2) Adj item: [nL QT] →
	[nC QT] → [nH QT]
	Adjust: [∗∗∗]
	PTT: ON
					Front panel	[⌃],[⌄]	0.35kHz	±0.05kHz

• Wide	3) Adj item: [w QT] Adjust: [∗∗∗] PTT: ON						0.75kHz	±0.10kHz

14. DQT deviation adjust
 	
• Narrow
	1) Adj item: [n DQT]
	Adjust: [∗∗∗]
	Deviation meter filter
	  LPF: 3kHz
	  HPF: OFF
	2) Adj item: [nL DQT] →
	[nC DQT] → [nH DQT]
	Adjust: [∗∗∗]
	PTT: ON
							0.35kHz	±0.05kHz

• Wide	3) Adj item: [w DQT] Adjust: [∗∗∗] PTT: ON						0.75kHz	±0.10kHz

TK-7185

ADJUSTMENT

Item	Condition	Measurement			Adjustment			Specifications / Remarks
		Test-equipment	Unit	Terminal	Unit	Parts	Method	
15. LTR deviation adjust • Narrow	1) Adj item: [n LTR] 　Adjust: [∗∗∗] 　Deviation meter filter 　　LPF: 3kHz 　　HPF: OFF 2) Adj item: [nL LTR] → 　[nC LTR] → [nH LTR] 　Adjust: [∗∗∗] 　PTT: ON	Power meter Deviation meter Oscilloscope AG AF VTVM	Rear panel Front panel	ANT Modular MIC jack	Front panel	[⌃],[⌄]	0.75kHz	±0.1kHz
• Wide	2) Adj item: [w LTR] 　Adjust: [∗∗∗] 　PTT: ON						1.0kHz	±0.1kHz
16. DTMF deviation adjust • Narrow	1) Adj item: [n DTMF] 　Adjust: [∗∗∗] 　Deviation meter filter 　　LPF: 15kHz 　　HPF: OFF 　PTT: ON						1.5kHz	±0.1kHz
• Wide	2) Adj item: [w DTMF] 　Adjust: [∗∗∗] 　PTT: ON						3.0kHz	±0.1kHz
17. MSK deviation adjust • Narrow	1) Adj item: [n MSK] 　Adjust: [∗∗] 　Deviation meter filter 　　LPF: 15kHz 　　HPF: OFF 　PTT: ON						1.5kHz	±0.1kHz
• Wide	2) Adj item: [w MSK] 　Adjust: [∗∗] 　PTT: ON						3.0kHz	±0.1kHz
18. TONE deviation adjust • Narrow	1) Adj item: [n TONE] 　Adjust: [∗∗∗] 　Deviation meter filter 　　LPF: 15kHz 　　HPF: OFF 　PTT: ON						1.5kHz	±0.1kHz
• Wide	2) Adj item: [w TONE] 　Adjust: [∗∗∗] 　PTT: ON						3.0kHz	±0.1kHz

ADJUSTMENT

Receiver Section

Item	Condition	Measurement			Adjustment			Specifications / Remarks
		Test-equipment	Unit	Terminal	Unit	Parts	Method	
1. Sensitivity adjust	1) Adj item: [SENS1] Adjust: [∗∗∗] 2) Adj item: [L SENS1] → [L' SENS1] → [C SENS1] → [H' SENS1] → [H SENS1] Adjust: [∗∗∗]	SSG AF VTVM Oscilloscope	Rear panel	ANT EXT. SP	Front panel	[⌃],[⌄]	Enter the following adjustment values to the transceiver by pressing [⌃] and [⌄] keys. [L SENS1]: 135 [L' SENS1]: 155 [C SENS1]: 175 [H' SENS1]: 200 [H SENS1]: 240 After setting the adjustment value, press [B] key. The adjustment value will be stored in memory.	**Note:** After replacing the EE-PROM (IC401) align sensitivity.
2. Sensitivity check	**[Panel test mode]** 1) CH-Sig: 1-1 SSG output Wide: –117dBm (0.32µV) (MOD: 1kHz/±3kHz) Narrow: –116dBm (0.35µV) (MOD: 1kHz/±1.5kHz)						Check	12dB SINAD or more
3. Squelch (Preset) adjust • Narrow	1) Adj item: [n SQL] Adjust: [∗∗∗] SSG output: 12dB SINAD level (MOD: 1kHz/±1.5kHz)						After input signal from SSG, press [B] key. That numeric will be stored in memory.	After adjusting SQL, check SQL open/close. SSG 12dB SINAD level + 4dB : Open SSG 12dB SINAD level – 6dB : Close [nC SQL] MOD 1kHz/±1.5kHz [wC SQL] MOD 1kHz/±3.0kHz
	2) Adj item: [nL SQL] → [nC SQL] → [nH SQL] Adjust: [∗∗∗]							
• Wide	3) Adj item: [w SQL] Adjust: [∗∗∗] SSG output: 12dB SINAD level (MOD: 1kHz/±3.0kHz)							
	4) Adj item: [wL SQL] → [wC SQL] → [wH SQL] Adjust: [∗∗∗]							
4. Low RSSI adjust • Narrow	1) Adj item: [n LRSSI] Adjust: [∗∗∗] SSG output: 12dB SINAD level (MOD: 1kHz/±1.5kHz)						After input signal from SSG, press [B] key. That numeric will be stored in memory.	The following erroneous performance may occur if any irregular RSSI adjustment, such as pressing the [B] key assigned for determination when it is the ANT OPEN state, is performed. • The antenna bar (Yiil) cannot appear correctly. • Scan does not stop.
	2) Adj item: [nL LRSSI] → [nC LRSSI] → [nH LRSSI] Adjust: [∗∗∗]							
• Wide	3) Adj item: [w LRSSI] Adjust: [∗∗∗] SSG output: 12dB SINAD level (MOD: 1kHz/±3.0kHz)							
	4) Adj item: [wL LRSSI] → [wC LRSSI] → [wH LRSSI] Adjust: [∗∗∗]							

TK-7185

ADJUSTMENT

Item	Condition	Measurement			Adjustment			Specifications / Remarks
		Test-equipment	Unit	Terminal	Unit	Parts	Method	
5. Squelch (Tight) adjust • Narrow	1) Adj item: [n SQLT] Adjust: [∗∗∗] SSG output : 12dB SINAD+5dB level (MOD: 1kHz/±1.5kHz)	SSG AF VTVM Oscilloscope	Rear panel	ANT EXT. SP			After input signal from SSG, press [B] key. That numeric will be stored in memory.	After adjusting SQL, check SQL open/close. SSG 12dB SINAD level +10dB : Open SSG 12dB SINAD level : Close [nC SQLT] MOD 1kHz/±1.5kHz [wC SQLT] MOD 1kHz/±3.0kHz
	2) Adj item: [nL SQLT] → [nC SQLT] → [nH SQLT] Adjust: [∗∗∗]							
• Wide	3) Adj item: [w SQLT] Adjust: [∗∗∗] SSG output : 12dB SINAD+5dB level (MOD: 1kHz/±3.0kHz)							
	4) Adj item: [wL SQLT] → [wC SQLT] → [wH SQLT] Adjust: [∗∗∗]							
6. High RSSI adjust • Narrow	1) Adj item: [n HRSSI] Adjust: [∗∗∗] SSG output: –70dBm (MOD: 1kHz/±1.5kHz)						After input signal from SSG, press [B] key. That numeric will be stored in memory.	The following erroneous performance may occur if any irregular RSSI adjustment, such as pressing the [B] key assigned for determination when it is the ANT OPEN state, is performed. • The antenna bar (📶) cannot appear correctly. • Scan does not stop.
	2) Adj item: [nL HRSSI] → [nC HRSSI] → [nH HRSSI] Adjust: [∗∗∗]							
• Wide	3) Adj item: [w HRSSI] Adjust: [∗∗∗] SSG output: –70dBm (MOD: 1kHz/±3.0kHz)							
	4) Adj item: [wL HRSSI] → [wC HRSSI] → [wH HRSSI] Adjust: [∗∗∗]							

Adjustment Points

TX-RX UNIT (B/3)
Component side view

TX-RX UNIT (B/3)
Foil side view

TERMINAL FUNCTION

Display unit (X54-3480-10)

Pin No.	Name	Description
CN901 (to internal speaker)		
1	GND	Ground
2	SPO	Speaker output
CN902 (to TX-RX unit B/3 CN429)		
1	SPO	Speaker input
2	SPO	Speaker input
3	SPO	Speaker input
4	SPO	Speaker input
5	SPO	Speaker input
6	SPO	Speaker input
7	GND	Ground
8	8C	8V input
9	SB	Power input of switched power supply
10	SB	Power input of switched power supply
11	NC	No connection
12	PSW	Detection signal output of power switch
13	GND	Ground
14	GND	Ground
15	MIC	MIC signal output
16	ME	MIC ground
17	GND	Ground
18	PSENS	Detection signal output of display unit
19	RST2	Reset signal input
20	GND	Ground
21	GND	Ground
22	GND	Ground
23	GND	Ground
24	SHIFT/MODEL	Control signal input of beat-shift function
25	NC	No connection
26	5C	5V output
27	TXD	Serial data signal input
28	RXD	Serial data signal output
29	GND	Ground
30	GND	Ground
J901 (MIC jack)		
1	BLC	MIC backlight control
2	SB	DC 13.2V±15%, 200mA typ.
3	E	Ground
4	PTT/TXD	PTT : PTT input, TXD : Serial data output
5	ME	MIC ground

Pin No.	Name	Description
6	MIC	MIC signal input
7	HOOK/RXD	HOOK : Hook detection, RXD : Serial data input
8	DM	MIC data detection

TX-RX unit (X57-6982-72) (A/3)

Pin No.	Name	Description
CN701 (to TX-RX unit B/3 CN427)		
1	AUXIO6	AUX input/output 6
2	AUXIO7	AUX input/output 7
3	AUXIO1	AUX input/output 1
4	AUXIO2	AUX input/output 2
5	RXD2	Serial data output 2
6	AUXIO3	AUX input/output 3
7	TXD2	Serial data input 2
8	AUXIO4	AUX input/output 4
9	AUXIO8	AUX input/output 8
10	AUXIO5	AUX input/output 5
11	AUXIO9	AUX input/output 9
12	AUXO1	AUX input 1
13	TXD1	Serial data input 1
14	AUXO2	AUX input 2
15	RXD1	Serial data output 1
16	GND	Ground
17	ME	MIC ground
18	MI2	External MIC output
19	DEO	Detected signal input
20	GND	Ground
21	5C	5V
22	DI	Data signal output
23	AFO	RX filtered audio input
24	SB	Power input after power switch
25	SB	Power input after power switch
26	SB	Power input after power switch
27	SB	Power input after power switch
28	SB	Power input after power switch
29	SB	Power input after power switch
30	NC	No connection
J701 (ACC 25-pin)		
1	NC	No connection

TK-7185

TERMINAL FUNCTION

Pin No.	Name	Description
2	RXD1	Serial data input 1. RS-232C level. Input voltage range : ±30V max. L≤0.4V, H≥2.4V, Zi≥5kΩ
3	TXD1	Serial data output 1. RS-232C level. L≤–5V, H≥5V/3kΩ load, Zo≤2kΩ
4	AUXI/O9	AUX input/output 9. Active low with 47kΩ pull-up to 5V
5	DI	Data signal input. 2.0Vp-p typ.
6	MI2	External MIC input (DC-coupled)
7	GND	Ground
8	AUXI/O8	AUX input/output 8. Same as AUXI/O9
9	TXD2	Serial data output 2. TTL level. L≤0.7V, H≥4.2V/25kΩ load, Zo≤1kΩ
10	RXD2	Serial data input 2. TTL level. Input voltage range : +5/0V max. L≤0.8V, H≥4.2V
11	GND	Ground
12	AUXI/O7	AUX input/output 7. Same as AUXI/O9
13	AUXI/O6	AUX input/output 6. Same as AUXI/O9
14	SB	Power output after power switch. DC13.2V±15%, 2.0A max.
15	AUXO2	AUX output 2. Open collector (500mA max.) (Default none) L≤0.3V
16	AUXO1	AUX output 1. Same as AUXO2
17	AFO	RX filtered audio output (DC-coupled). AF low level output. Wide : 700mVp-p typ. Narrow : 700mVp-p typ. (Standard modulation)
18	GND	Ground
19	DEO	Detected signal output (DC-coupled). 740mVp-p typ.
20	AUXI/O5	AUX input/output 5. Same as AUXI/O9
21	AUXI/O4	AUX input/output 4. Same as AUXI/O9
22	AUXI/O3	AUX input/output 3. Same as AUXI/O9
23	AUXI/O2	AUX input/output 2. Same as AUXI/O9
24	AUXI/O1	AUX input/output 1. Same as AUXI/O9
25	ME	MIC ground

TX-RX unit (X57-6982-72) (B/3)

Pin No.	Name	Description
	CN301 (to TX-RX unit C/3)	
1	REF	Reference signal output to the PLL IC
2	Fin	Complementary signal output to the PLL IC
3	CPGND	Ground
4	5C	5V output
5	GND	Ground

Pin No.	Name	Description
6	CP	Signal input from charge pump block in the PLL IC
	CN302 (to TX-RX unit C/3)	
1	UL	Control signal input form the PLL IC
2	PLE	Control signal output to the PLL IC
3	DT	Control signal output to the PLL IC
4	PCK	Control signal output to the PLL IC
5	GND	Ground
6	DGND	Ground
	CN403 (to VGS-1)	
1	OPT1	VGS busy signal input. Option board I/F 1. Output : L≤0.45V, H≥4.7V/25kΩ load Input : L≤1.0V, H≥4.0V, Input voltage : 0V~5.0V
2	OPT3	VGS playback signal input. Option board I/F 3. Output : L≤0.45V, H≥4.7V/25kΩ load Input : L≤1.0V, H≥4.0V, Input voltage : 0V~5.0V
3	RXD1	Serial data input. Input : L≤1.0V, H≥4.0V, Input voltage : 0V~5.0V
4	TXD1	Serial data output / PTT singanl output (Scrambler board). Output : L≤0.45V, H≥4.7V/25kΩ load
5	CLK	Serial clock output
6	OPT4	VGS enable output. Option board I/F 4. Output : L≤0.45V, H≥4.7V/25kΩ load
7	USEL	UART speed select output. L : 19200bps fixed
8	OPT5	VGS reset signal output. Option board I/F 5. Output : L≤0.45V, H≥4.7V/25kΩ load
9	DGND	Ground
10	AGND	Ground
11	AI	VGS audio input. Zin≥10kΩ, 1Vp-p max, Input Voltage : 0V~5.0V
12	AO	VGS audio output. Zo≤10kΩ
13	AGND	Ground
14	5E	5V power supply output. 78mA max.
15	STON	Side tone input. 1kHz, 5Vp-p
16	DTI	Data signal input. Zin≥22kΩ, 600±200mVp-p
17	TCTL	Speaker mute signal input. Input : L≤1.0V, H≥4.0V, Input voltage : 0V~5.0V
18	NC	No connection
19	AUDIH	MIC mute signal input
20	OPT2	Option board I/F 2. Output : L≤0.45V, H≥4.7V/25kΩ load Input : L≤1.0V, H≥4.0V, Input voltage : 0V~5.0V

TERMINAL FUNCTION

Pin No.	Name	Description
21	TXO	MIC signal output (AC coupled) before pre-emphasis. Zo>2.2kΩ, 130±50mVp-p typ.
22	RXEO	Audio signal output (DC coupled) after de-emphasis. Zo>30kΩ, 1±0.3Vp-p typ.
23	RXEI	Audio signal input (DC coupled) after de-emphasis. Zin>15kΩ, 1±0.3Vp-p typ.
24	TXI	MIC signal input (AC coupled) before pre-emphasis. Zin>22kΩ, 500±50mVp-p typ.
25	OPT6	Option board I/F 6. Output : L≤0.45V, H≥4.7V/25kΩ load
26	8C	Power input after power switch. 8.0V typ, 100mA max.
CN427 (to TX-RX unit A/3 CN701)		
1	NC	No connection
2	SB	Power output after power switch
3	SB	Power output after power switch
4	SB	Power output after power switch
5	SB	Power output after power switch
6	SB	Power output after power switch
7	SB	Power output after power switch
8	AFO	RX filtered audio output
9	DI	Data signal input
10	5C	5V
11	GND	Ground
12	DEO	Detected signal output
13	MI2	External MIC input
14	ME	MIC ground
15	GND	Ground
16	RXD1	Serial data input 1
17	AUXO2	AUX output 2
18	TXD1	Serial data output 1
19	AUXO1	AUX output 1
20	AUXIO9	AUX input/output 9
21	AUXIO5	AUX input/output 5
22	AUXIO8	AUX input/output 8
23	AUXIO4	AUX input/output 4
24	TXD2	Serial data output 2
25	AUXIO3	AUX input/output 3
26	RXD2	Serial data input 2
27	AUXIO2	AUX input/output 2
28	AUXIO1	AUX input/output 1
29	AUXIO7	AUX input/output 7
30	AUXIO6	AUX input/output 6

Pin No.	Name	Description
CN428		
1	SB	Power output of switched power supply
2	SPI	Speaker output
3	SPO	Speaker input
4	PA	Control signal output of PA function
5	HOR	Control signal output of Horn alert function
6	GND	Ground
CN429 (to Display unit CN902)		
1	(DM)	Reserve
2	GND	Ground
3	RXD	Serial data signal input
4	TXD	Serial data signal output
5	NC	No connection
6	5C	5V output
7	SHIFT/MODEL	Control signal output of beat-shift function
8	GND	Ground
9	(LCDDO)	Reserve
10	(LCDDI)	Reserve
11	(LCDCLK)	Reserve
12	RST2	Reset signal output
13	PSENS	Detection signal input of display unit
14	GND	Ground
15	ME	MIC ground
16	MIC	MIC signal input
17	GND	Ground
18	GND	Ground
19	PSW	Detection signal input of power switch
20	NC	No connection
21	SB	Power output of switched power supply
22	SB	Power output of switched power supply
23	8C	8V output
24	GND	Ground
25	SPO	Speaker output
26	SPO	Speaker output
27	SPO	Speaker output
28	SPO	Speaker output
29	SPO	Speaker output
30	SPO	Speaker output
CN804		
1	IGN	Ignition sense input
2	GND	Ground

TK-7185

TERMINAL FUNCTION

Solder Land

Name	Description
to ANI board	
GND (A–)	Ground
OPT1 (CH BUSY)	TX sense signal output. Conv. L: TX, H: Not TX L≤0.45V, H≥4.7V/25kΩ load
OPT3 (KEY)	TX control signal input. Active low. L≤1.0V, H≥: 4.0V, Input voltage 0V~5.0V
OPT4 (PTT)	PTT signal output. L: TX, H: Not TX L≤0.45V, H≥4.7V/25kΩ load
OPT5 (EMERGENCY)	Emergency signal output. L: Emergency function is operated, H: Emergency function is not operated L≤0.45V, H≥4.7V/25kΩ load
5E (A+)	5V power supply (78mA max.)
DTI (DATA OUT)	Data signal input. Zin>22kΩ, 600±200mVp-p (Standard modulation)
TCTL (TONE CTRL)	Speaker mute signal input. H: Unmute L≤0.8V, H≥4.2V, Input voltage: 0V~5.0V
AUDIH (AUDIO INHIB)	MIC mute signal input. L: Mute
OPT2 (AUX I/O)	Emergency signal input. Active low. L≤1.0V, H≥: 4.0V, Input voltage 0V~5.0V
STON (SIDE TONE)	Side tone input. 1kHz, 5Vp-p
to Scrambler board	
GND (GND)	Ground
TXD1 (PTT)	PTT signal output. L: TX, H: Not TX L≤0.45V, H≥4.7V/25kΩ load (PTT signal input) Active low. L≤1.0V, H≥4.0V, Input voltage: 0V~5.0V
OPT1 (CODE SELECT1)	Scramble code signal output 1. L≤0.45V, H≥4.7V/25kΩ load

Name	Description
OPT3 (CODE SELECT2)	Scramble code signal output 2. L≤0.45V, H≥4.7V/25kΩ load
OPT4 (ECHO PTT)	Echo PTT signal output. L: TX, H: Not TX L≤0.45V, H≥4.7V/25kΩ load
OPT5 (CODE SELECT8)	Scramble code signal output 4. L≤0.45V, H≥4.7V/25kΩ load
TXO (TX OUT)	MIC signal output (AC coupled) before pre-emphasis. Zo>2.2kΩ, 130±50mVp-p typ. (Standard modulation)
OPT2 (SCRAMBLE)	Scrambler control signal output. L: ON, H: OFF. L≤0.45V, H≥4.7V/25kΩ load
RXEO (RX OUT)	Audio signal output (DC coupled) after de-emphasis. Zo>30kΩ, 1±0.3Vp-p typ. (Standard modulation)
TXI (TX IN)	MIC signal input (AC coupled) before pre-emphasis. Zin>2.2kΩ, 130±50mVp-p typ. (Standard modulation)
RXEI (RX IN)	Audio signal input (DC coupled) after de-emphasis. Zin>15kΩ, 1±0.3Vp-p typ. (Standard modulation)
OPT6 (CODE SELECT4)	Scramble code signal output 3. L≤0.45V, H≥4.7V/25kΩ load
8C (+V)	8V AVR output. 8.0V typ, 100mA max.
to GPS receiver	
GND (GND)	Ground
RXD1*1 (DATA OUT1)	Data output
RXD2*1 (DATA OUT1)	Data output
5E (+5V)	5V

*1: Depending on the connected optional accessory, the DATA OUT1 may connect to either RXD1 or RXD2.