KENWOOD

NX-5000 series

**Common Function Reference
(Common FUNC)**

CONTENTS

About This Manual

This In-depth manual describes the functions of the transceiver (NX-5200/ NX-5300/ NX-5400/ NX-5700/ NX-5800/ NX-5900) used in common in each of an analog, P25, NXDN, and DMR systems.

This document is created for the product having the following design specifications.

Item	Specifications	How to Verify
Market Code	K, F	Printed or labeled on the packaging and the model name plate on the transceiver.
Firmware Version of the Transceiver	2.20.00	Can be viewed in the **Transceiver Information** dialog box of KPG-D1/ KPG-D1N. Or, firmware version of the transceiver can be viewed by the following ways: **Portable transceiver/ KCH-21R (Handheld Control Head):** Turning the transceiver ON while pressing and holding the **Side 3** key of the transceiver displays the firmware version on the display. **Mobile transceiver (KCH-19 (Basic Panel)/ KCH-20R (Featured Panel)):** Turning the transceiver ON while pressing and holding the **[+]** key causes the firmware version to appear on the display. **Common to Portable and Mobile:** Turning the transceiver ON while pressing and holding the **Menu** ([⎙]) key causes the transceiver to display Radio Mode Selection. Then, if "Transceiver Info" is selected and the **Menu** ([⎙]) key is pressed, the transceiver enters Transceiver Information Mode, and then the firmware version can be viewed.
Version of KPG-D1/ KPG-D1N	V 2.20	Can be viewed in the **About KPG-D1** dialog box or **About KPG-D1N** dialog box of KPG-D1/ KPG-D1N.

K, F: Designed for the North American markets.

Also, the following Radio Feature License is required to use the functions described in this manual:

● **P25 system**

Function Name	Radio Feature License
P25 Conventional [*1]	KWD-5100CV
P25 Phase 1 Trunking	KWD-5101TR
P25 Phase 2 Trunking	KWD-5102TR
P25 OTAP [*2]	KWD-5104AP

[*1] Implemented before factory shipment for the F-type transceiver.

[*2] Implemented before the factory shipment for the K- and F-type transceiver.

● **NXDN system**

Function Name	Radio Feature License
NXDN Conventional [*1]	KWD-5200CV
NXDN Type-C Trunking [*2]	KWD-5201TR
NXDN OTAP [*1]	KWD-5204AP

[*1] Implemented before the factory shipment for the K- and F-type transceiver.

[*2] Implemented before the factory shipment for the K-type transceiver.

● **DMR system**

Function Name	Radio Feature License
DMR Conventional	KWD-5300CV

● **Common**

Function Name	Radio Feature License
4000 Channel	KWD-5000CH
Front Panel Programming	KWD-5001FP
microSD	KWD-5002SD
Bluetooth Serial Port Profile	KWD-5003BT
Multi RF Deck [*1]	KWD-5004MR
Remote Control	KWD-5007RC

[*1] Implemented before the factory shipment.

IMPORTANT NOTICE:

THOSE WHO INTEND TO EXPORT OR RE-EXPORT OR TRANSPORT ANY COMPUTER(S) AND/OR ANY KINDS OF PERIPHERAL DEVICE(S) WITH AES/DES ENCRYPTION SOFTWARE INSTALLED (INCLUDING TRANSCEIVERS WITH ANY SOFTWARE FOR AES/DES ENCRYPTION) OUTSIDE OF A COUNTRY OR REGION WITH SUCH CONTROLS OR RESTRICTIONS MUST FULLY COMPLY WITH ANY EXPORT AND IMPORT LAWS AND REGULATIONS OF THE COUNTRY OR REGION AND OBTAIN ALL REQUIRED AUTHORIZATIONS OR LICENSES IN ADVANCE.

How to Read the In-depth Manual

The In-depth Manual has the following sections.

Common Function Reference (Common FUNC)

Describes the functions common to the transceivers.

Analog Function Reference (Analog FUNC)

Describes the analog functions of the transceiver.

P25 Function Reference (P25 FUNC)

Describes the P25 functions of the transceiver.

NXDN Function Reference (NXDN FUNC)

Describes the NXDN functions of the transceiver.

DMR Function Reference (DMR FUNC)

Describes the DMR functions of the transceiver.

5-tone Function Reference (5-tone FUNC)

Describes the 5-tone functions of the transceiver.

About Notations

The following notations are used in this manual.

[ ]

The characters in [ ] indicate the name of the operating portion of the transceiver and the key of the PC.

" " (Double Quotation Mark)

The characters in " " indicate the name of the functions, buttons, and menus shown on the KPG-D1/ KPG-D1N or the display of the transceiver.

Bold Letters

The characters in bold letters indicate the name of the windows, tabs, checkboxes in KPG-D1/ KPG-D1N and functions assigned to keys on the transceiver.

[ ] + [ ]

This notation is used for describing functions activated by pressing 2 keys on the PC keyboard at the same time. For example, the notation to enter a capitalized A on the PC is **[Shift]** + **[a]** for pressing the **[a]** key while pressing the **[Shift]** key.

PF (Programmable Function) Key

This function is used for describing the key that is assigned with any function. When the Reset function is assigned to the **[A]** key, the **[A]** key is described as the "**Reset** key".

Notations for FPU names

KPG-D1 and KPG-D1N are referred to collectively as "KPG-D1/ D1N" in this document.

About the Notation of the Supported Models

This manual describes the supported models according to the following rules:

Model Name	Notation	
NX-5200	Portable	VHF
NX-5300		UHF
NX-5400		700 MHz/ 800 MHz
NX-5700	Mobile	VHF
NX-5800		UHF
NX-5900		700 MHz/ 800 MHz

About Examples of the Transceiver Display

This manual describes mainly by using the display examples of Portable display if the functions are common to the transceivers. The display examples of Mobile display are also described as needed. Also, the display examples of KCH-19 (Basic Panel) display are mainly used as the display examples for Mobile. The display examples of KCH-20R (Featured Panel) are also used as needed.

Abbreviations Used in This Document

The following abbreviations are used in this in-depth manual. Refer to the abbreviation table below.

Abbreviation	Full Spelling or Meaning
ACK	Acknowledgment
ANR	Active Noise Reduction
AES	Advanced Encryption Standard
AMBE+2	Advanced Multi-Band Excitation
ARC4	Alleged RC4
AUX	Auxiliary
CAI	Common Air Interface
CH	Channel
COM port	Communication port
COR	Carrier-operated Relay
CW	Continuous Wave
DES	Digital Encryption Standard
DFA	Direct Frequency Assignment
DQT	Digital Quiet Talk
DTC	Data Transmission Control
DTMF	Dual Tone Multi-Frequency
ESN	Electronic Serial Number
ETX	The end of Text
FCC	Federal Communications Commission
FPU	Field Programming Unit
GPS	Global Positioning System
HSP	Headset Profile
ID	Identification
LOK	Link OK (connected to the repeater)
MI2	Microphone Input II
Mic	Microphone
NAC	Network Access Code
OST	Operator Selectable Tone
P25	APCO Project 25
PA	Public Address
PF	Programmable Function
PTT	Push-to-Talk
QT	Quiet Talk
RAN	Radio Access Number
RSSI	Received Signal Strength Indication
RTC	Real Time Clock
RX	Receive
STX	Start of Text
TOR	Tone Operated Relay
TOT	Time-out Timer
TX	Transmit
Vocoder	Voice Encoder/ Decoder
VOX	Voice-operated Transmit

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About the Programming Software

Various functions and parameters of the transceiver can be configured by using the KPG-D1/ D1N software. Various functions can be enabled by connecting the transceiver to a PC by use of the KPG-36U/ KPG-36X (Portable) or KPG-46U/ KPG-46X (Mobile) programming cable and writing the data configured using KPG-D1/ D1N to the transceiver. In this manual, a corresponding reference in the help texts of KPG-D1/ D1N is described for each function of the Function Reference. Therefore, you can configure the function by referring to the function also appearing in the help texts of KPG-D1/ D1N.

About KPG-D1N

KPG-D1N is the programming software to configure functions for the transceiver to be used in the U.S.A.

KPG-D1N is compliant with the FCC Part 90 standard so that the specification does not allow to configure "Wide" (25 kHz) for **Channel Spacing** with a VHF or UHF transceiver in the frequency band regulated by the FCC Part 90. Except for the function above, specifications of KPG-D1 and KPG-D1N are the same.

About the Notation of "Configuration Using KPG-D1/ D1N"

In this manual, for the description of each function written as "Configuration using KPG-D1/ D1N", a corresponding reference in the help texts of KPG-D1/ D1N is described. Therefore, you can configure the function by referring to the function also appearing in the help texts of KPG-D1/ D1N.

About the Zone-channel Format

Using KPG-D1/ D1N, the zone information of the transceiver can be configured by selecting whether to configure for each zone the channels in the same communication system (Analog Conventional, P25 Conventional, NXDN Conventional, P25 Trunking, NXDN Trunking, or DMR Conventional), or channels in different systems.

Channel Table:

The communication system to be used can be selected for each zone. Only channels which use the same communication system can be configure in a zone.

Personality:

The communication system to be used can be selected for each channel. Channels which use different communication systems can exist in a zone.

In this manual, the Channel Table format or the Personality format may be described in explanations and references. This indicates that the function is enabled only when the format is configured. Also, the data configured by the Channel Table format can be migrated to the Personality format, but the data configured by the Personality format cannot be migrated to the Channel Table format.

Refer to the help texts of KPG-D1/ D1N for the method for configuring **Zone-channel Format** using KPG-D1/ D1N.

About System Type

For KPG-D1/ D1N, a **System Type** (Analog Conventional, P25 Conventional, NXDN Conventional, P25 Trunking, NXDN Trunking, LTR Trunking, P25 Voting with NAC, NXDN Site Roaming or NXDN Site Roaming with RAN, or DMR Conventional, DMR Site Roaming) needs to be selected in **System Information** of KPG-D1/ D1N in order to configure the system data or Zone-channel data of each communication system.

In this manual, for the description of each function written as "Configuration using KPG-D1/ D1N", a corresponding reference in the help texts of KPG-D1/ D1N is described as follows:

Configuring Unit ID (Own) (See Transceiver Settings > Personal > System Information > NXDN Conventional > Unit ID (Own))

In this case, if "NXDN Conventional" is selected in **System Type** of **System Information**, **Unit ID (Own)** can be configured in an NXDN Conventional system.

Refer to the help texts of KPG-D1/ D1N for the method of **System Type** configuration using KPG-D1/ D1N.

About Multi RF Deck/ Multi Control Head

For Mobile, by connecting 1 or 2 Control Heads to multiple mobile transceivers (RF Deck), 1 Multi RF Deck system can be structured.

Refer to "MULTI RF DECK/ MULTI CONTROL HEAD" for the instructions on how to structure and how to configure Multi RF Deck/ Multi Control Head, and for the special functions of Multi RF Deck/ Multi Control Head.

About Options to Use the Functions Described in This Document

To use the functions described in this document, the following KENWOOD optional accessories need to be prepared on your own as necessary.

Portable/ Mobile	Option
Portable	• KMC-25 (Speaker Microphone) • KMC-41 (Speaker Microphone) • KMC-41D (Speaker Microphone) • KMC-42W (Speaker Microphone) • KMC-42WD (Speaker Microphone) • KMC-47GPS/ KMC-47GPSD (GPS Speaker Microphone) • KMC-54WD (Speaker Microphone) • KWD-AE30 (Secure Cryptographic Module) • KWD-AE31 (Secure Cryptographic Module) • KPG-93 (Keyloader Interface Cable) • KPG-36U/ KPG-36X (Programming Interface Cable) • KHS-14 (Headset) • KHS-15 (Headset)
Mobile	• KMC-27A (Microphone) • KMC-27B (Microphone) • KMC-28A (Microphone with 12-Keypad) • KMC-35 (Microphone) • KMC-36 (Microphone with 12-Keypad) • KCT-73MIC (External Microphone) • KMC-9C (Desktop Microphone) • KMC-53 (Desktop Microphone) • KES-3 (External Speaker) • KES-5 (External Speaker) • KAP-2 (PA, HA Unit) • KCT-18 (Ignition Sense Cable) • KCT-46 (Ignition Sense Cable) • KRA-40 (GPS Antenna) • KWD-AE30 (Secure Cryptographic Module) • KWD-AE31 (Secure Cryptographic Module) • KPG-115 (Keyloader Interface Cable) • KPG-46U/ KPG-46X (Programming Interface Cable) • KCH-19 (Remote Control Head (Basic Panel)) • KCH-20R (Remote Control Head (Featured Panel)) • KRK-14H (Control Head Interface Kit) • KRK-15B (Control Head Remote Kit) • KCT-71 (Remote Control Cable) • KCT-72 (Connection Cable)

About the Built-in GPS Receiver Unit

The GPS receiver is built-in for NX-5200/ NX-5300/ NX-5400/ NX-5700/ NX-5800/ NX-5900. Read the following warnings before using the built-in GPS receiver unit of NX-5200/ NX-5300/ NX-5400/ NX-5700/ NX-5800/ NX-5900.

● **On the use of the GPS**

With frequency interference in the GPS receive frequency range to the transceiver or another transceiver, the GPS receiver may not position normally.

1. If the GPS receiver positions during transmission:
   • The GPS receiver may be unable to position if the transmit spurious emission of the transceiver interferes within the GPS receive frequency range.
   • The interference to the GPS receiver changes depending on the transmission power of the transceiver. Greater transmission power results in the higher possibility of being unable to position.

2. If the GPS receiver positions during reception:
   • The GPS receiver may be unable to position if the harmonics of the oscillator equipped in the transceiver interfere within the GPS receive frequency range.

3. Effects of other interfering frequencies (such as if other transceivers transmit):
   • If even transmit and receive frequencies other than the above, the GPS receiver may be unable to position if frequencies emitted from other transceivers and electronic equipment interfere within the GPS receive frequency range.

● As the built-in GPS receiver unit consumes more power when powered on compared to when powered off, the battery life of the transceiver becomes shorter compared to when the built-in GPS receiver unit is powered off.

● If the clock in the transceiver is not configured, a cold start always occurs. Therefore, the time until the start of positioning is longer. (Refer to Adjusting the Time.)

How to Search for Information

For your convenience of reading through this document using Adobe Acrobat or Adobe Reader, a link to a corresponding item is pasted in the Contents page, Index page, the lower part of each page and in the context. Clicking the portion where a link is pasted enables a jump to the corresponding page.

Placing a pointer over the portion where a link is pasted changes the shape of the pointer to a hand (🖑).

CONTENTS

Clicking a title in the Contents page allows a jump to the corresponding page.

CONTENTS

INDEX

Clicking a function name, a title or a page number in the Index pages allows a jump to the corresponding page.

Blue Characters in the Main Text

Clicking a portion with blue characters in the main context allows a jump to the corresponding page.
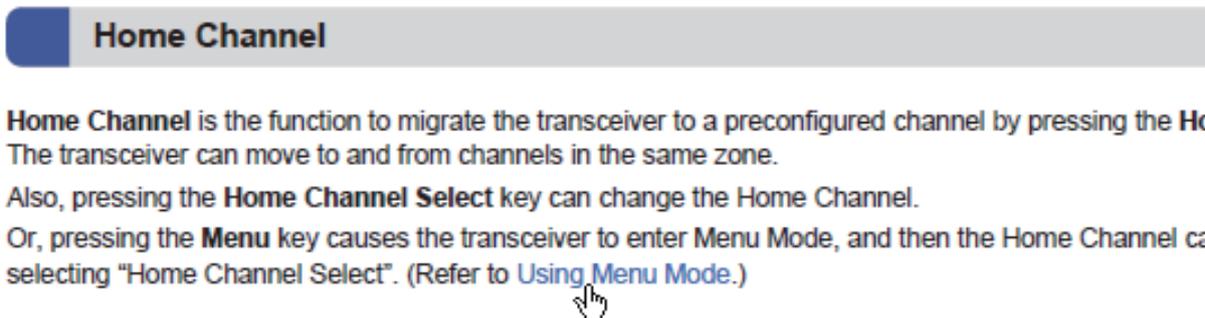
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Clicking a portion with blue characters located at the bottom of each page allows a jump to the first page of the contents or index.
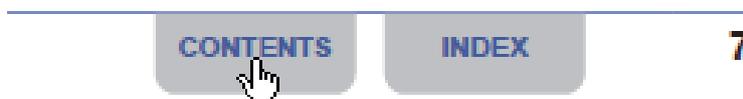
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Search the Text

The text in this document can be searched using the search function of your Adobe Acrobat or Acrobat Reader.

Open the Reference in Another FUNC

In this manual, a reference to other FUNC is written as "NXDN FUNC Scan", for example. Clicking the link opens the corresponding FUNC page. However, to open the link, the PDF file of each FUNC needs to be stored in the same folder.

Outline of This Transceiver

NX-5200/ NX-5300/ NX-5400/ NX-5700/ NX-5800/ NX-5900 is the VHF/ UHF or 700 MHz/ 800 MHz transceiver for the use of professionals. The transceiver is equipped with the digital communications system (conventional and trunking) which complies with the NXDN, P25, and DMR common air interface specifications, as well as the existing analog FM mode.

GENERAL FEATURES

Portable

- 128 Zones, 512 Channels per zone [*1]

Models
- VHF Models
  Low: 1 W, High: 6 W
- UHF Models
  Low: 1 W, High: 5 W
- 700 MHz/ 800 MHz Model
  Low: 1 W, High: 3 W

Display Functions
- Color LCD
- 7 Color LED
- Function/ Status LCD Icons
- Transmit/ Busy/ Call Alert/ Warn LED

Specifications
- Emergency/ AUX Key
- On/ Off Volume Knob
- 16-Position Mechanical Selector
- 2 Position Lever Switch
- 4 Front PF Keys & Cross Key
- 12-Key Keypad (Full key model)
- 3 Customize Keys (Standard key model)
- 3 Side PF Keys
- Audio Power more than 1 W@8 Ω
- PC Serial Interface
- Built-in GPS Receiver
- Built-in Bluetooth
- microSD card slot
- Motion Sensor

Others
- Date & 12/ 24 Hour Time Clock
- Flash Firmware Upgrading

Mobile

- 128 Zones, 512 Channels per zone [*1]

Models
- VHF Models
  Low: 5 W, High: 50 W
- UHF Models
  Low: 5 W, High: 45 W
- 700 MHz/ 800 MHz Model
  Low: 2 W, High: 30 W/ 35 W

Display Functions
- Color LCD
- 7 Color LED
- Function/ Status LCD Icons
- Transmit/ Busy/ Call Alert/ Warn LED

Specifications
- Emergency/ AUX Key
- 4 Up/ Down Selectors & 7 Front PF Keys (Basic Panel)
- 14 Front PF Keys & 4-Way D-pad Key (Featured Panel)
- 16-Position Mechanical Selector (Featured Panel)
- 4 Front PF Keys & Cross Key (Handheld Control Head)
- 12-Key Keypad (Handheld Control Head)
- 2 Customize Keys (Handheld Control Head)
- Front Panel Speaker, 4 W Speaker Audio
- Illumination Sensor
- PC Serial Interface
- DB 25 Accessory Interface
- 9 Programmable AUX I/Os
- 2 Programmable AUX Outputs
- Microphone
- Built-in GPS Receiver
- Built-in Bluetooth
- microSD card slot

Others
- Date & 12/ 24 Hour Time Clock
- Timed Power-off
- Ignition Sense
- Public Address/ Horn Alert Output
- Flash Firmware Upgrading

P25 DIGITAL MODES

GENERAL

- P25 Digital Air Interface
- AMBE+2 VOCODER
- 12.5 kHz Channel Spacing
- Individual Call
- Group Call
- Emergency Call
- All Group Call
- Radio Inhibit / Uninhibit [2]
- Remote Monitor [2]
- Ignition On/ Off GPS Reporting (Mobile only)
- Single Scan, List Scan
- AES & DES Encryption Module Option
- AES/ DES Key Loader Option
- Over-the-Air-Rekeying

CONVENTIONAL MODE

- P25 Phase 1 Conventional
- Network Access Code (NAC)
- ALL CALL
- Priority Scan
- 2-tone
- Multi-Zone Scan

TRUNKING MODE

- P25 Phase 1 Trunking, P25 Phase 2 Trunking
- Paging Call
- Telephone Call
- Priority Monitor Scan
- Limited Talkgroup Scan

NXDN DIGITAL MODES

GENERAL

- NXDN Digital Air Interface
- AMBE+2 VOCODER
- 6.25 kHz (Very Narrow)/ 12.5 kHz (Narrow) Channel Spacing
- Over-the-Air Alias
- Paging Call
- Emergency Call
- All Group Call
- Status Message [3]
- Remote Stun/ Kill [2]
- Remote Monitor [2]
- Short & Long Messages [3]
- AUX Input Status Message (Mobile Only) [4]
- AUX Output Status Message (Mobile Only) [5]
- Ignition On/ Off GPS Reporting (Mobile only)
- Data with Voice
- Single Scan, List Scan
- NXDN Scrambler Included
- AES & DES Encryption Module Option
- AES/ DES Key Loader Option

CONVENTIONAL MODE

- 63 Radio Access Numbers (RAN)
- Individual Call & Group Call
- Mixed FM/ Digital Operation
- Site Roaming
- 2-tone
- Multi-Zone Scan

TRUNKING MODE

- Individual Call
- Group Call & Broadcast Call
- Telephone Call
- Transmission Trunked Mode [6]
- Message Trunked Mode [6]
- 4 Priority Monitor IDs [6]
- Remote Group Add [2]
- Failsoft Mode

DMR CONVENTIONAL MODES

- DMR Digital Air Interface
- AMBE+2 VOCODER
- 12.5 kHz Channel Spacing
- Color Code
- Individual Call
- Paging Call
- Group Call & Broadcast Call
- Unaddressed Call
- Emergency Call
- All Group Call
- Status Message [3]
- Short Messages [3]
- AUX Input Status Message (Mobile Only) [4]
- AUX Output Status Message (Mobile Only) [5]
- Open Voice Channel Mode (OVCM)
- Call Interruption
- Remote Control
- Ignition On/ Off GPS Reporting (Mobile only)
- Bit Scramble Encryption
- Single Scan, List Scan, Multi-Zone Scan
- AES & DES Encryption Option
- ARC4 Encryption Option
- Site Roaming

ANALOG MODES

GENERAL

- 12.5 kHz (Narrow)/ 20.0 kHz (Wide 4k) (NX-5400/ NX-5900 only)/ 25.0 kHz (Wide) Channel Spacing [*7]
- Conventional & LTR Systems
- FleetSync/ FleetSync II, MDC-1200, DTMF
- QT/ DQT/ 2-tone
- Single Scan, List Scan
- Priority Scan
- Multi-Zone Scan
- Voice Inversion Scrambler (16 Codes)

FleetSync

- PTT ID/ Caller ID
- Selective/ Group Call
- Status Message [*3]
- Emergency, Short & Long Messages [*3]
- AUX Input Status Message (Mobile Only) [*4]
- AUX Output Status Message (Mobile Only) [*5]
- Ignition On/ Off GPS Reporting (Mobile only)

MDC-1200

- PTT ID/ Caller ID
- Selective/ Group Call
- Radio Check, Radio Inhibit/ Uninhibit
- AUX Output ID (Mobile Only) [*5]

5-tone

- Selective/ Group Call
- Status Message
- Emergency Call

[*1] The maximum number of channels that can be configured for a transceiver in total is 1,024. With the Radio Feature License (KWD-5000CH) enabled, the maximum number of configurable channels can be extended to 4,000. The maximum number of Talkgroup IDs that can be configured in a P25 Trunking system is 512.

[*2] The supported PC software and external devices need to be separately prepared for the transmitting transceiver.

[*3] To send messages or data with serial communications, the supported PC software and external devices need to be separately prepared for the transmitting transceiver. In addition, to send the received messages or data to external devices, the supported PC software and external devices need to be separately prepared for the receiving transceiver.

[*4] A sensor to detect the change of port status needs to be attached to the AUX Input port for the transmitting transceiver.

[*5] To remotely control external devices according to the change of port status, the external devises need to be connected to the AUX Output port for the receiving transceiver.

[*6] These trunking functions rely on the programming and operation of the system. Priority Monitor also requires NX subscriber settings.

[*7] For KPG-D1N, "Wide" cannot be configured in **Channel Spacing** if a receive frequency or a transmit frequency is configured in the following ranges:

  VHF: above 149.98750 MHz and less than 174.01250 MHz

  UHF: above 420.98750 MHz and less than 470.01250 MHz

Revision History

Date	Description
2015.11.30	1) Added NX-5900 (700/ 800 MHz model) as a supported model. 2) Added the information of KCH-20R (Featured Panel) as a supported Control Head. 3) Added KPG-36X and KPG-46X as supported programming cables. 4) Changed the description in "About this Manual" as follows: • Changed the version information • Changed the Left Up key to the [+] key • Added Radio Feature License 5) Added terms to "Abbreviations Used in this Document". 6) Added "About Multi RF Deck/ Multi Control Head". 7) Added option information to "About Options to Use the Functions Described in this Document". 8) Added supported functions to "Outline of this Transceiver". 9) Added references for the following functions in "CONTENTS BY PURPOSE": • VOX • Multi RF Deck/ Multi Control Head 10) Added "KCH-20R (Featured Panel)" and "External Microphone (KMC-25)" in "1 FUNCTIONS AND PANEL LAYOUT". 11) Added "Mobile (KCH-20R (Featured Panel))" in "1.3 About LCD". 12) Added "2.2 Connecting the Transceiver to a PC by Bluetooth". 13) Added the description of DFA Data Erase in the notes of "2.3 Writing the Configuration Data to the Transceiver". 14) Added the following items in "2.3 Writing the Configuration Data to the Transceiver": Writing configuration data to multiple transceivers using Bluetooth communication About the writing of configuration data in a Multi RF Deck/ Multi Control Head structure 15) Added "2.5 Writing Configuration Data Using Wireless Communication (OTAP)". 16) Added the Function Modes for using Mode Reset Timer to Table 3-3. 17) Added Direct Channel & OST to Table 3-4. 18) Added the description of the analog system in "Manual Dialing". 19) Added the description of the analog system and Table 3-6 in "3.7 Viewing the Receive History (Stack)". 20) Added "Scroll Display" in "3.8 Operating the Transceiver in Each Mode (Common Operation)". 21) Added the following items to Table 3-8: • Volume Control • Mobile (KCH-20R (Featured Panel)) 22) Added "3.10 Operations in a Single RF Deck/ Dual Control Head". 23) Added "3.11 Switching the Display". 24) Added the transmission power of NX-5900 to Table 4-2. 25) Added the information of an LTR Trunking system to the following items: 4.3 Channel Spacing 4.2 Transmit Power 4.4 Beat Shift Using Sound to Notify the Timing to Start Communications (PTT Proceed Tone) Using Sound to Notify the Other Party that the Communication Ends (PTT Release Tone) External PTT (Data) Data PTT DTC Available Functions for AUX Output Ports 12.2 Controlling Vehicle Operation According to the State of the Horn Alert Port (Horn Alert) Available Functions for the PF Keys Available Functions for Menu Mode 26) Added the description related to the "DFA" display in "4.5 Displaying the Signal Strength Level (RSSI Level) (Maintenance Display)". 27) Added the notes related to the behavior when in a Multi RF Deck/ Multi Control Head structure to the following items: 4.5 Displaying the Signal Strength Level (RSSI Level) (Maintenance Display) 5.5 Changing the Brightness of the Backlight (LCD Brightness) 5.7 Automatically Adjusting the Brightness Level of the LCD (Auto Dimmer)

Date	Description
2015.11.30	28) Added the items of Analog and LTR Trunking to Table 5-1.
	29) Added the description of "Full Color White" in "5.6 Changing the Color Scheme of the Transceiver Display (Color Scheme)".
	30) Added a supported icon to Table 5-2.
	31) Added the description of "FleetSync ID" in "Power-on Text".
	32) Added "Sub-LCD Display Priority" in "5.10 Display Functions of the Display".
	33) Added the description of the screen size in Mobile (Featured Panel) in "5.12 Displaying a Bitmap Image When the Transceiver is Turned ON (Custom Start-up Screen)".
	34) Added the description of the supported tones in "6.1 Tones that Sound When a User Operates the Transceiver or When the Transceiver Status Is Changed" and "6.2 Tones that Sound When the Transceiver Receives a Call".
	35) Added notes and "About the Behavior When Using KAP-2" in "6.5 Using the Transceiver as a Megaphone (Public Address)".
	36) Added "Microphone 7" to Table 6-13.
	37) Changed the configuration range of "Microphone Sense/ External Microphone Sense".
	38) Changed the configuration range of "Digital Audio Offset".
	39) Added the function description for Mobile and the following items in "7 BATTERY".
	7.6 Displaying the Remaining Battery Power When the Transceiver Is Turned ON (Power-on Battery Information)
	7.7 Checking the Detailed Information of a Battery (Battery Information Display)
	40) Added the information of MDC-1200/ FleetSync/ 2-tone/ DTMF to Table 9-2.
	41) Added notes in "9.2 Recording Received Audio Automatically (Auto Recording)".
	42) Added notes in "9.4 Storing the GPS Data (GPS Data Storage)".
	43) Added notes in "10.1 Toggling Bluetooth On/ Off".
	44) Added the description related to the device class of the transceiver in "About the Displayed Contents of a Bluetooth-compatible Device".
	45) Added the following items in "10.2 Finding a Bluetooth-compatible Device (Bluetooth Find Device)":
	Configuring the Bluetooth Device Name of the Transceiver (Bluetooth Device Name)
	Checking the Bluetooth Device Name (Bluetooth Information)
	Responding to the Search of a Bluetooth-compatible Device (Bluetooth Discoverable)
	46) Added the descriptions of Headset Profile and Serial Port Profile in "Receiving a Pairing Request from a Bluetooth-compatible Device".
	47) Corrected the descriptions on the available operations in "10.4 Displaying a Bluetooth-compatible Device (Bluetooth My Devices)".
	48) Added the description on the volume level of the received audio of a Bluetooth-compatible device in "Connecting by Headset Profile".
	49) Added the description on how to reset a Headset Profile connection in "Resetting the Connection by Headset Profile".
	50) Added "10.6 About Serial Port Profile (SPP Connection/ SPP Disconnection)".
	51) Added "Determining the Speaker to Emit by Linking with the Microphone Hook (Off-hook Speaker Revert)" in "10.8 Resetting the GPS/ Bluetooth Device (GPS/Bluetooth Reset)".
	52) Added "10.9 Configuring the Connection Destination of a Bluetooth-compatible Device (Bluetooth Interface Selection)".
	53) Added the items of Analog Conventional/ LTR Trunking to Table 11-2.
	54) Added the items of External PTT (PA) to Table 11-3.
	55) Added "External PTT (PA)" to "11.2 D-sub 25-pin Connector".
	56) Added the information of DTMF, 2-tone, and FleetSync in "Call 1 to Call 6" of "11.2 D-sub 25-pin Connector".
	57) Added the following items to Table 11-8:
	• AUX Output ID 1 to AUX Output ID 3
	• Encryption
	58) Added "11.3 Selecting the Audio Input Line If Detaching and Using Control Head (Control Head Mic Input)".
	59) Added the description of Analog Conventional in "12.2 Controlling Vehicle Operation According to the State of the Horn Alert Port (Horn Alert)".
	60) Added "16 MULTI RF DECK/ MULTI CONTROL HEAD".
	61) Added "17 STRUCTURES OF MULTI RF DECK/ MULTI CONTROL HEAD".
	62) Added "18 VOX".
	63) Added supported functions in "Available Functions for the PF Keys". Added the note on the configuration restrictions of functions with "(Continuous)" in the function names.
	64) Added Function Mode to "Table 1-2 Function Mode".
	65) Added the note in "Available Functions for the PF Keys" about functions in common with Primary and Secondary.
	66) Added supported functions in "Available Functions for Menu Mode".
	67) Added "COM port Bluetooth" in "Available Functions for COM Port".
	68) Added notes in "Available Functions for COM Port".

Date	Description
2015.11.30	69) Added the note in "Flow Control of the Communication Port (Flow Control)". 70) Added the keys of KCH-20R (Featured Panel) to the table in "Key Operations for Each Mode". 71) Changed the version number from 1.00 to 1.60.
2016.9.30	1) Added the DMR and 5-tone information in "About this Manual" and "How to Read the In-depth Manual". 2) Added "DMR CONVENTIONAL MODES" in "Outline of this Transceiver". 3) Added "5-tone" to "ANALOG MODES" in "Outline of this Transceiver". 4) Added the following items in "Mode Reset Timer": Forward Mode, Free-dial Entry Mode, Lone Worker ON/OFF Mode, My ID Mode, OVCM Mode, Remote Control Mode, Receive Entry Mode, SD Card Direct Access Mode 5) Added the description of the operation in a DMR Conventional system to Table 3-4. 6) Added "Free-dial Entry" to Table 3-4. 7) Added the DMR and 5-tone information in "3.7 Viewing the Receive History (Stack)". 8) Added "Mic Key" to Table 3-9. 9) Added the note about Mic Key in "3.9 Locking the Transceiver Keys (Key Lock)". 10) Added the description of the specifications in a DMR Conventional system in "4.3 Channel Spacing". 11) Added the description of the behavior when the Multi-System Roaming and Multi-System Hunt functions are used to "NXDN Trunking system" in "4.5 Displaying the Signal Strength Level (RSSI Level) (Maintenance Display)". 12) Added "DMR Conventional" to Table 5-1. 13) Added the description of LCD Brightness for Control Head 2 to the note in "5.5 Changing the Brightness of the Backlight (LCD Brightness)". 14) Added the description of Auto Dimmer for Control Head 2 to the note in "5.7 Automatically Adjusting the Brightness Level of the LCD (Auto Dimmer)". 15) Added the description of the following icons to Table 5-2: System Lock icon, OVCM icon 16) Added the following tones to Table 6-1: Transaction Confirmed Tone, Record Stopped Tone, Advanced GPS Report Error Tone, Low SD Memory Tone 17) Added the description of the following tones to Table 6-3: Transaction Confirmed Tone, Record Stopped Tone 18) Added the description of the following tones to Table 6-4: Advanced GPS Report Error Tone, Low SD Memory Tone 19) Added the description of various Alert Tones in a DMR Conventional system to Table 6-10. 20) Added "6.8 Using Voice Guidance (Voice Announcement)". 21) Added the description of the specifications in a DMR Conventional system in "7.5 Reducing Battery Consumption (Battery Saver)". 22) Replaced the diagram of Figure 9-1. 23) Added the description about Voice Memo in "Folder Structure of a microSD Card". 24) Added the following items in "9.1 About microSD Card": Configuring the Warning Behavior for the Remaining Memory Capacity (Low Memory Warning) Configuring the Storage Method of an Audio Data File (First-in First-out Deletion) 25) Added the description of the behavior when 5-tone signaling is used to Table 9-2. 26) Added notes in "9.2 Recording Received Audio Automatically (Auto Recording)". 27) Added "9.3 Recording Audio to a microSD Card (Voice Memo)". 28) Added and changed the description of the operation in "9.4 Playing Back the Recorded Audio (Playback)". 29) Added "Storing Audio Data in the Saved Folder" in "9.4 Playing Back the Recorded Audio (Playback)". 30) Added "9.6 Confirming microSD Card Contents via a PC (SD Card Direct Access)". 31) Added "Configuring the Headset Profile Connection Sequence (Bluetooth Headset Connection Type)" in "10.5 About Headset Profile (HSP Connection/ HSP Disconnection)". 32) Added the description of the behavior in a DMR Conventional system in "Using the Vibrator". 33) Added the description of the behavior in a DMR Conventional system and the description of the behavior when 5-tone signaling is used in "Available Functions for AUX Input Ports". 34) Added the description of the behavior in a DMR Conventional system in "Available Functions for AUX Output Ports". 35) Added the description of the behavior in a DMR Conventional system in "Conditions to Activate the Horn Alert". 36) Added "Configuring the Output Method of the Received Audio and Beep (Multi RF Deck Audio Output Type)" in "16.7 Audio Function".

Date	Description
2016.9.30	37) Added "16.18 Relaying the Received Signal (Mobile Relay Station)". 38) Added "17.1 Initial Configuration for Multi RF Deck/ Multi Control Head". 39) Added "17.13 About the Pin Arrangement for KCT-72 When an External Device is Connected". 40) Added the following items to Table 19-1: Call Interruption, Digit 10x Down, Digit 10x Up, Digit 1x Down, Digit 1x Up, Mobile Relay Station, OVCM, Receive Entry, Remote Control, RF Deck Down, RF Deck Up, System Down, System Down (Continuous), System Lock, System Select, System Up, System Up (Continuous), Transfer, Voice Memo 41) Added the following items to Table 19-2: Mobile Relay Station, Receive Entry, Remote Control, System Select, Voice Memo 42) Added the following items to Table 19-3: Bluetooth Headset Connection Type, OVCM, Receive Entry, Remote Control, System Lock, System Select, Transfer, Voice Memo 43) Corrected the description of the operation of "Playback Mode" in "20 KEY OPERATIONS FOR EACH MODE". 44) Added the following items in "21 BEEP LIST": Record Stopped Tone, Low SD Memory Tone 45) Changed the version number from 1.60 to 2.00.
2017.1.31	1) Changed the version information in "About This Manual". Added the information of KCH-21R (Handheld Control Head). 2) Added the operating portion of KCH-21R (Handheld Control Head) to "GENERAL FEATURES". 3) Added "KCH-21R (Handheld Control Head)" to "1.2 NX-5700/ NX-5800/ NX-5900". 4) Added "Mobile (KCH-21R (Handheld Control Head))" to "LCD" in "1.3 About LCD". 5) Added "Mobile (KCH-21R (Handheld Control Head))" to "Icons" in "1.3 About LCD". 6) Added the screen of KCH-21R (Handheld Control Head) to "Key Guide" in "1.3 About LCD". 7) Added "About Displayed Stack Data" to "3.7 Viewing the Receive History (Stack)". 8) Added "Mobile (KCH-21R (Handheld Control Head))" to Table 3-11. 9) Added the description of KCH-21R (Handheld Control Head) to "5.5 Changing the Brightness of the Backlight (LCD Brightness)". 10) Added the note in "5.7 Automatically Adjusting the Brightness Level of the LCD (Auto Dimmer)". 11) Added the size of the bitmap image that can be used for KCH-21R (Handheld Control Head) to "5.12 Displaying a Bitmap Image When the Transceiver is Turned ON (Custom Start-up Screen)". 12) Added the restriction of the Minimum Volume Type configuration to "Configuring the Minimum Volume Level (Minimum Volume)". 13) Changed "About the Behavior When Using KAP-2" to "About the Speaker to Emit Audio" in "6.5 Using the Transceiver as a Megaphone (Public Address)". 14) Added "Speaker 7" to Table 6-13. Changed the speakers that supports "Internal Speaker" and "Speaker 3". 15) Changed "Resetting the Recognition of microSD Card" to "Removing the microSD Card" in "9.1 About microSD Card". 16) Corrected the note in "About the Audio to Be Recorded". 17) Changed "Configuring the Headset Profile Connection Sequence (Bluetooth Headset Connection Type)" to "If Pairing of a Bluetooth-compatible Device Cannot Occur or If a Bluetooth-compatible Device Does Not Behave (Bluetooth Headset Connection Type)". Added the table description and the note. 18) Added the description of KCH-21R (Handheld Control Head) to "Connecting by Serial Port Profile". 19) Added the description of KCH-21R (Handheld Control Head) to "10.9 Configuring the Connection Destination of a Bluetooth-compatible Device (Bluetooth Interface Selection)". 20) Added the description of KCH-21R (Handheld Control Head) to "Light Sense" in "Available Functions for AUX Input Ports". 21) Added the note in "11.3 Selecting the Audio Input Line If Detaching and Using Control Head (Control Head Mic Input)". 22) Added the description of KCH-21R (Handheld Control Head) to "15.6 Checking the Firmware Version (Transceiver Information Mode)".

Date	Description
2017.1.31	23) Added the description of KCH-21R (Handheld Control Head) to the following items: 16.1 Description 16.5 Basic Operations 16.16 Bluetooth Communication 17.9 Changing the Display Positions of a Channel Name and an Icon When Multi RF Deck View Is On "Multi RF Deck View" in "19.1 Available Functions for the PF Keys" 20 KEY OPERATIONS FOR EACH MODE 24) Added the description of communication ports to "Connecting the RF Deck by Using a D-sub 25-pin Cable". 25) Changed the DIP switch image in "About the Connection of the Control Head to the RF Deck". 26) Corrected "Adding an RF Deck" as follows: Changed the reference described in the note of step 2. Moved the note of step 5 to the operation procedure. Corrected the note of step 5. 27) Changed the version number from 2.00 to 2.10.
2017.6.30	1) Changed the version information in "About This Manual". 2) Added the reference for "Optional Signaling LED" in "Indication and Display" of "CONTENTS BY PURPOSE". 3) Added "List+", "List-" and "View" to Table 1-1. 4) Added the note about Power-on Tone in "Turning the Transceiver ON". 5) Added "System Select Mode" to Table 3-3. 6) Changed the overall description in "3.7 Viewing the Receive History (Stack)". 7) Added the following items in "3.7 Viewing the Receive History (Stack)": Configuring the Display Order of Data in Stack Mode (Stack Order) Enabling the Storage of Redundant Data (Repeated Calls Stack) Displaying the Caller ID when Displaying a Message (Caller ID for Message) Displaying the Receive Channel (Channel Name (Message Display)) 8) Changed the function names as follows: Latest Received Message Stack → Old Message Overwrite ID/Message Stack with Time Stamp → Time Stamp 9) Added that the PTT switch is also locked in "3.9 Locking the Transceiver Keys (Key Lock)". 10) Added "PTT" to the configuration items in Table 3-18. 11) Added the description of a DMR Conventional system in "4.4 Beat Shift". 12) Changed "4.5 Displaying the Signal Strength Level (RSSI Level) (Maintenance Display)" to "4.5 Displaying the Signal Strength Level (RSSI Level, BER) (Maintenance Display)". Added the description related to the BER display. 13) Added "5.4 Optional Signaling LED". 14) Added the Encryption (ARC4) icon to Table 5-2. 15) Added "Configuring a tone which sounds when the transceiver is turned ON (Power-on Tone)" in "Power-on Tone". 16) Changed "Temporarily Reducing the Volume Level of the Speaker Microphone (Speaker Attenuation)" to "Temporarily Reducing the Volume Level of the Speaker (Speaker Attenuation)". Deleted the description of the supported models (Mobile is also supported). Added that the transceiver speaker and Bluetooth speaker are also supported. Corrected the note. 17) Corrected the note related to the microphone input line of the External PTT (PA) port in "6.5 Using the Transceiver as a Megaphone (Public Address)". 18) Corrected the note in "Conditions that enables audio data file and GPS data file to be stored in a microSD card". 19) Added the description related to the internal memory in "Configuring the Storage Method of an Audio Data File (First-in First-out Deletion)". Added the description related to the backing up of audio data. 20) Added the conditions of when Auto Recording does not start in "●If Auto Recording does not start because the maximum number of recordings has been reached". Deleted the description about the SELF TESTING display of the transceiver when audio data is deleted from the internal memory. 21) Added the notes in "●Deleting an audio data folder" of "9.4 Playing Back the Recorded Audio (Playback)". 22) Deleted the description about the SELF TESTING display of the transceiver when GPS data is deleted from the internal memory in the note of "9.5 Storing the GPS Data (GPS Data Storage)".

Date	Description
2017.6.30	23) Added "External Speaker" to Table 11-3. 24) Added "External Speaker" in "Available Functions for AUX Input Ports". 25) Added the description about Conventional Channel (DMR) in "TOR" to Table 11-8. 26) Added the note to "AUX Output Status Message 1 to AUX Output Status Message 3" in Table 11-8. 27) Added "Digital Mode" and "Out of Range" to Table 11-8. 28) Deleted "External PTT (PA) port" from the descriptions of "Modulation Line" in Table 11-9. 29) Added the note in "The Amount of Time Until the Transceiver Is Turned OFF (Timed Power-off)". 30) Corrected the description of when the microSD card is not inserted in "Recording Received Audio Automatically (Auto Recording)". 31) Added the description of DMR Conventional in the following items of Table 19-1. Added "Manual Site Hunt". Group Group + Short Message Group + Status Individual Individual + Short Message Individual + Status Short Message Status 32) Added "Manual Site Hunt" to Table 19-1. 33) Corrected the description of "Speaker Attenuation" in Table 19-1. "This function can be assigned only to the PF 1 and PF 2 keys on a microphone. Deleted ". Deleted "(Portable only)". 34) Corrected the description of "Stack Mode" in "20 KEY OPERATIONS FOR EACH MODE". 35) Corrected the descriptions of the operation to change the display of "Maintenance Display Mode (NXDN Trunking)" in "20 KEY OPERATIONS FOR EACH MODE". 36) Changed the version number from 2.10 to 2.20.

CONTENTS BY PURPOSE

Basic Configurations for Using the Transceiver

Configuring Various Functions for the Transceiver

Frequencies and signaling for transmission and reception, channel data, including the transmit power, and other functions required for various communications, such as an Individual Call or a Group Call, can be configured by using KPG-D1/ D1N.

GETTING STARTED

Assigning Functions to the Keys on the Transceiver

Various functions can be assigned to the **PF** keys on the transceiver.

Available Functions for the PF Keys

Writing the Configuration Data to the Transceiver

The data configured by using KPG-D1/ D1N can be written to the transceiver. Writing the data configured by using KPG-D1/ D1N to the transceiver allows the transceiver to work according to the configuration data.

Writing the Configuration Data to the Transceiver

Reading the Configuration Data from the Transceiver

The configuration data in the transceiver can be read into KPG-D1/ D1N. By reading the configuration data written in the transceiver into KPG-D1/ D1N, the configuration data can be changed or written to another transceiver.

Reading the Configuration Data from the Transceiver

Transmission / Reception

Changing Transmit Power

The transmission power of the transceiver can be changed to high power, medium power, or low power.

Transmit Power

Changing the Input Sensitivity of the Microphone

The input sensitivity of the microphone can be changed.

Microphone Sense/ External Microphone Sense

Using Function Keys

Pressing a key to which a function is assigned can activate the assigned function or place the transceiver in various Function Modes.

Using Function Keys

Viewing the Receive History

Various received messages and callers who made calls can be viewed.

Viewing the Receive History (Stack)

Executing a Function by Selecting the Function from the Menu

Selecting functions in Menu Mode activates various functions or places the transceiver in various Function Modes.

Using Menu Mode

Transmitting Just by Audio Input to a Microphone

By using the VOX function, audio can be transmitted just by audio input into a microphone without pressing the **PTT** switch.

VOX

Indication and Display

Lighting the LED While Transmitting and Receiving

The transceiver can light or flash the LED while the transceiver is transmitting or receiving.

Busy LED

Transmit LED

Selective Call Alert LED

Optional Signaling LED

Displaying the Transceiver Received Signal Strength

The received signal strength of the transceiver can be displayed on the transceiver display.

Displaying the Signal Strength (Signal Strength Indicator)

Displaying a Bitmap Image When the Transceiver is Turned ON

A desired bitmap image can be displayed on the transceiver display when the transceiver is turned ON.

Displaying a Bitmap Image When the Transceiver is Turned ON (Custom Start-up Screen)

Displaying the Remaining Battery Power Level (Portable Only)

A user can be notified on the level of the remaining battery power on the LCD and by LED.

Displaying the Remaining Battery Power Level (Battery Indicator)

Sound

Tones Used for the Transceiver

Various tones sound from the transceiver according to the operation of the transceiver.

Tones that Sound When a User Operates the Transceiver or When the Transceiver Status Is Changed

Changing the Calling Alert Tone

Tones that sound from the transceiver when the transceiver receives a call using optional signaling or a status message can be changed to the desired tone.

Tones that Sound When the Transceiver Receives a Call

Security

Using a Password to Protect the Transceiver

A user can set a password to the transceiver so that the transceiver cannot be used by others without the user's permission.

Password for Transceiver Operation (Transceiver Password)

Using a Password to Protect the Configuration Data of the Transceiver

To prevent the configuration data of the transceiver from being altered without the user's permission, or to prevent the configuration data written in the transceiver from being diverted, a password can be set for the configuration data.

Password When Reading Configuration Data in a PC (Read Authorization Password)

Password for Writing Configuration Data (Overwrite Password)

Functions of Transceivers for Vehicles

Turning the Transceiver ON or OFF by Linking with a Vehicle Ignition

For Mobile, the transceiver can automatically be turned ON or OFF by linking with the status of the port linked with the vehicle ignition by using the ignition-linked function.

Turning the Transceiver ON or OFF According to the State of the Ignition Sense Port (Ignition Sense)

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Turning the Headlights On of the Vehicle or Making the Horn Sound When the Transceiver Receives a Call

For Mobile, by using the horn alert function, the transceiver can turn the headlights On of a vehicle to which the transceiver is connected or make the horn sound when the transceiver receives a call.

Controlling Vehicle Operation According to the State of the Horn Alert Port (Horn Alert)

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Operating in a Multi RF Deck System by Connecting Multiple Control Heads and Transceivers

By connecting 1 or 2 Control Heads to multiple mobile transceivers (RF Decks), 1 Multi RF Deck system can be structured.

MULTI RF DECK/ MULTI CONTROL HEAD

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Other Convenient Functions

Locking the Transceiver Keys

By locking the transceiver keys, a user can avoid erroneous operation of the transceiver caused by physically contacting the transceiver while carrying it around the waist, etc.

Locking the Transceiver Keys (Key Lock)

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Reducing Battery Consumption (Portable Only)

The power consumption of the transceiver can be reduced by setting the transceiver receiving intermittently.

Reducing Battery Consumption (Battery Saver)

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Recording the Received or Transmitted Audio (Optional)

By using the internal memory of the transceiver or by using a microSD card or microSDHC card mounted on the transceiver, the transmitted or received audio can be recorded. The recorded audio can be played back on the transceiver.

Recording Received Audio Automatically (Auto Recording)

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Displaying the Location Information of the Transceiver

By using an internal or optional GPS receiver unit, the transceiver can display the own location information on the display.

GPS POSITION DISPLAY

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1.1 NX-5200/ NX-5300/ NX-5400

● Full Key Model   ● Standard Key Model

Figure 1-1 NX-5200/ NX-5300/ NX-5400 Front View

❶ Selector

The preassigned function will be activated or will be changed to the active state. It is normally used to change the zone or channel.

❷ Power Switch/ Volume Control

The transceiver can be turned ON by rotating the Power switch. The volume level of the speaker sound can be adjusted.

❸ Transmit LED/ Busy LED

These LEDs light when the transceiver transmits or receives a signal.

❹ AUX Key

The preassigned function will be activated or will be changed to the active state.

❺ Lever Switch

The preassigned function will be activated or will be changed to the active state.

❻ Side 1 Key

The preassigned function will be activated or will be changed to the active state.

❼ Speaker

The received audio and the Alert Tone sound from the speaker.

❽ PTT Switch

Pressing the **PTT** switch allows transmitting.

❾ Built-in Microphone

❿ LCD

The channel number and the transceiver's status appear on this display.

⓫ Side 2 Key

The preassigned function will be activated or will be changed to the active state.

⓬ Side 3 Key

The preassigned function will be activated or will be changed to the active state.

⓭ [▲]/ [▼] Key

The preassigned function will be activated or will be changed to the active state. It is normally used to change the zone or channel.

⓮ [ ] (Menu) Key

The preassigned function will be activated or will be changed to the active state. In this manual, the [ ] (Menu) key is described as the **Menu** ([ ]) key.

⑮ [⮌] (Back) Key

The preassigned function will be activated or will be changed to the active state. In this manual, the **[⮌]** (Back) key is described as the **Back ([⮌])** key.

⑯ [◀]/ [▶] Key

The preassigned function will be activated or will be changed to the active state. It is normally used to change the zone or channel.

⑰ [◯] (Function) Key

The preassigned function will be activated or will be changed to the active state. In this manual, the **[◯]** (Function) key is described as the **Function ([◯])** key.

⑱ [⌂] (Home) Key

The preassigned function will be activated or will be changed to the active state. In this manual, the **[⌂]** (Home) key is described as the **Home ([⌂])** key.

⑲ Keypad

The transceiver can be operated by pressing a key.

⑳ [A]/ [B]/ [C] Key

The preassigned function will be activated or will be changed to the active state.

1.2 NX-5700/ NX-5800/ NX-5900

KCH-19 (Basic Panel)

Figure 1-2 NX-5700/ NX-5800/ NX-5900 Front View (KCH-19 (Basic Panel))

❶ [⏻] (Power) Switch

The transceiver is turned ON when this switch is pressed and the transceiver is turned OFF when this switch is pressed again. In this manual, the **[⏻]** (Power) switch is described as the **Power** switch.

❷ [+]/ [-] Key

The preassigned function will be activated or will be changed to the active state. It is normally used for the volume adjustment of the speaker.

❸ LCD

The channel number and the transceiver's status appear on this display.

❹ [▲]/ [▼] Key

The preassigned function will be activated or will be changed to the active state. It is normally used to change the zone or channel.

❺ Speaker

The received audio and the Alert Tone sound from the speaker.

❻ Transmit LED/ Busy LED

These LEDs light when the transceiver transmits or receives a signal.

❼ Illumination Sensor

The sensor is for automatically adjusting the luminance of the LCD depending on the brightness of the environment.

❽ [⌂] (Home) Key

The preassigned function will be activated or will be changed to the active state. In this manual, the **[⌂]** (Home) key is described as the **Home ([⌂])** key.

❾ [⊡] (Menu) Key

The preassigned function will be activated or will be changed to the active state. In this manual, the **[⊡]** (Menu) key is described as the **Menu ([⊡])** key.

The default of the **[⊡]** (Menu) key is the Menu function. If the configuration is changed using KPG-D1/ D1N, a newly configured function will be activated. Unless the Menu function is reassigned to the **[⊡]** (Menu) key, Menu Mode cannot be activated even if the **[⊡]** (Menu) key is pressed.

❿ [↰] (Back) Key

The preassigned function will be activated or will be changed to the active state. In this manual, the **[↰]** (Back) key is described as the **Back ([↰])** key.

⓫ [◀]/ [▶] Key

The preassigned function will be activated or will be changed to the active state. It is normally used to change the zone or channel.

⓬ [○] (Function) Key

The preassigned function will be activated or will be changed to the active state. In this manual, the **[○]** (Function) key is described as the **Function ([○])** key.

⓭ AUX Key

The preassigned function will be activated or will be changed to the active state.

KCH-20R (Featured Panel)

Figure 1-3 NX-5700/ NX-5800 Front View (KCH-20R (Featured Panel))

① [⏻] (Power) Switch

The transceiver is turned ON when this switch is pressed and the transceiver is turned OFF when this switch is pressed again. In this manual, the **[⏻]** (Power) switch is described as the **Power** switch.

② [+]/ [-] Key

The preassigned function will be activated or will be changed to the active state.

③ LCD

The channel number and the transceiver's status appear on this display.

④ [◀]/ [▶] Key

The preassigned function will be activated or will be changed to the active state. It is normally used to change the zone or channel.

⑤ [▲]/ [▼] Key

The preassigned function will be activated or will be changed to the active state. It is normally used to change the zone or channel.

⑥ [A]/ [B]/ [C] Key

The preassigned function will be activated or will be changed to the active state.

⑦ AUX Key

The preassigned function will be activated or will be changed to the active state.

⑧ Illumination Sensor

The sensor is for automatically adjusting the luminance of the LCD depending on the brightness of the environment.

⑨ Transmit LED

This LED lights when the transceiver transmits a signal.

⑩ Busy/ Status LED

This LED lights or flashes according to the status, such as while the transceiver is receiving a signal, and when the transceiver receives a call.

⑪ [🏠] (Home) Key

The preassigned function will be activated or will be changed to the active state. In this manual, the **[🏠]** (Home) key is described as the **Home** (**[🏠]**) key.

⑫ [🗇] (Menu) Key

The preassigned function will be activated or will be changed to the active state. In this manual, the **[🗇]** (Menu) key is described as the **Menu** (**[🗇]**) key.

The default of the **[🗇]** (Menu) key is the Menu function. If the configuration is changed using KPG-D1/ D1N, a newly configured function will be activated. Unless the Menu function is reassigned to the **[🗇]** (Menu) key, Menu Mode cannot be activated even if the **[🗇]** (Menu) key is pressed.

⑬ [⤺] (Back) Key

The preassigned function will be activated or will be changed to the active state. In this manual, the **[⤺]** (Back) key is described as the **Back** (**[⤺]**) key.

⑭ [△]/ [□] Key

The preassigned function will be activated or will be changed to the active state.

⑮ **[○] (Function) Key**

The preassigned function will be activated or will be changed to the active state. In this manual, the **[○]** (Function) key is described as the **Function** (**[○]**) key.

⑯ **[■]/ [■ ■] Key**

The preassigned function will be activated or will be changed to the active state.

⑰ **Volume Control**

The volume level of the speaker sound can be adjusted.

⑱ **Selector**

The preassigned function will be activated or will be changed to the active state. It is normally used to change the zone or channel.

KCH-21R (Handheld Control Head)

KCH-21R is the Handheld Control Head that can be used by connecting to Mobile. By using KCH-21R, the transceiver can be operated in hand as Portable.

Figure 1-4 KCH-21R (Handheld Control Head) Front View

❶ [A] Key

The preassigned function will be activated or will be changed to the active state.

❷ [B] Key

The preassigned function will be activated or will be changed to the active state.

❸ Transmit LED/ Busy LED

These LEDs light when the transceiver transmits or receives a signal.

❹ Power Switch

The transceiver is turned ON when this switch is pressed and the transceiver is turned OFF when this switch is pressed again.

❺ AUX Key

The preassigned function will be activated or will be changed to the active state.

❻ Built-in Microphone

❼ Speaker

The received audio and the Alert Tone sound from the speaker.

❽ LCD

The channel number and the transceiver's status appear on this display.

❾ [▲]/ [▼] Key

The preassigned function will be activated or will be changed to the active state. It is normally used to change the zone or channel.

❿ [🔲] (Menu) Key

The preassigned function will be activated or will be changed to the active state. In this manual, the **[🔲]** (Menu) key is described as the **Menu ([🔲])** key.

⓫ [↩] (Back) Key

The preassigned function will be activated or will be changed to the active state. In this manual, the **[↩]** (Back) key is described as the **Back ([↩])** key.

⓬ [◀]/ [▶] Key

The preassigned function will be activated or will be changed to the active state. It is normally used to change the zone or channel.

⑬ **[○] (Function) Key**

The preassigned function will be activated or will be changed to the active state. In this manual, the **[○]** (Function) key is described as the **Function ([○])** key.

⑭ **[🏠] (Home) Key**

The preassigned function will be activated or will be changed to the active state. In this manual, the **[🏠]** (Home) key is described as the **Home ([🏠])** key.

⑮ **Keypad**

The transceiver can be operated by pressing a key.

Figure 1-5 KCH-21R (Handheld Control Head) Side View

⑯ **Side 1 Key**

The preassigned function will be activated or will be changed to the active state.

⑰ **PTT Switch**

Pressing the **PTT** switch allows transmitting.

⑱ **Side 2 Key**

The preassigned function will be activated or will be changed to the active state.

⑲ **Side 3 Key**

The preassigned function will be activated or will be changed to the active state.

⑳ **[∧]/ [∨] Key**

The preassigned function will be activated or will be changed to the active state. It is normally used for the volume adjustment of the speaker.

External Microphone (KMC-25)
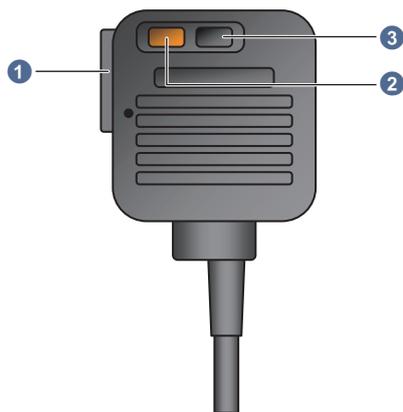
Figure 1-6 KMC-25

① PTT Switch

Pressing the **PTT** switch allows transmitting.

② PF 1 Key

The preassigned function will be activated or will be changed to the active state.

③ PF 2 Key

The preassigned function will be activated or will be changed to the active state.

1.3　About LCD

LCD

The LCD of the transceiver is as follows. The contents that appear on the LCD varies depending on the transceiver's status.

Portable

● **Basic Frame**

This frame is used to display the name, such as the channel name. Various icons indicating the transceiver's status appear in the icon display area.

● **Function Mode Frame 1**

This frame is used to display the Function Mode, such as Individual Call Mode and Status Mode. The number, such as the list number or channel number, appears at the right end of the title line.

● **Function Mode Frame 2**

This frame is used to display the Function Mode, such as Status Mode. The number, such as the list number or channel number, appears at the right end of the title line. The icon can be displayed at the right side of each line.

● **Category Icon Frame**
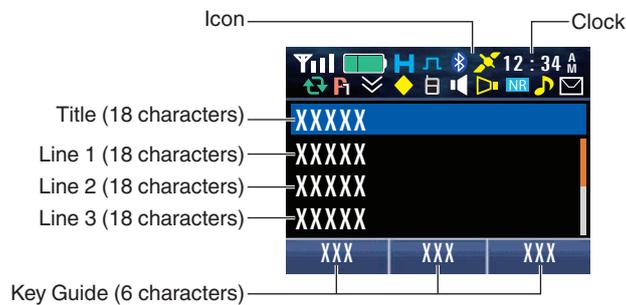
This frame is used to display the Menu Category in Icon Mode. Displays vary depending on the configuration in **Menu Icon Size**. The following screens are display examples if **Menu Icon Size** is configured "Large". (Refer to Using Menu Mode.)
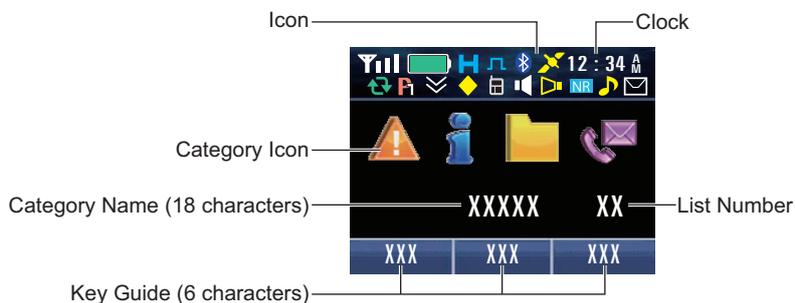
Icon   Clock

Category Icon

Category Name (18 characters)   XXXXX   XX ── List Number

Key Guide (6 characters)

● **Popup Display**

The popup appears when the adjustment of the volume level or the operation of Key Lock occurs.

Mobile (KCH-19 (Basic Panel))

● **Basic Frame**

This frame is used to display the name, such as the channel name. Various icons indicating the transceiver's status appear in the icon display area.

Icon   Clock

Sub Display (6 characters) ── XXXXXX XXXXX
Supplementary Field 1 (18 characters)
Main LCD (14 characters) ── XXXXX

Key Guide (6 characters)

Sub Display (6 characters) ── XXXXXX XXXXX
Supplementary Field 1 (18 characters) ── XXXXXXXXXXXXXX
Main LCD (14 characters) ── XXXXXXXXXXXXXX
Supplementary Field 2 (18 characters) ── XXXXXXXXXXXXXX

● **Function Mode Frame 1**

This frame is used to display the Function Mode, such as Individual Call Mode and Status Mode. The number, such as the list number or channel number, appears at the right end of the title line.

Icon ———— Clock

Title (32 characters) ———— XXXXXX

Line 1 (24 characters) ———— XXXXXXXXXXXXX

Line 2 (24 characters) ———— XXXXXXXXXXXXX

XXX XXX XXX XXX

Key Guide (6 characters) ————

● **Function Mode Frame 2**

This frame is used to display the Function Mode, such as Status Mode. The number, such as the list number or channel number, appears at the right end of the title line. The icon can be displayed at the right side of each line.

Icon ———— Clock

Title (32 characters) ———— XXXXXX

Line 1 (22 characters) ———— XXXXXXXXXXXXX

Line 2 (22 characters) ———— XXXXXXXXXXXXX

XXX XXX XXX XXX

Key Guide (6 characters) ————

● **Category Icon Frame**

This frame is used to display the Menu Category in Icon Mode.

Icon ———— Clock

Category Icon ————

Category Name (18 characters) ———— XXXXXXXXXXXXX XX ———— List Number

XXX XXX XXX XXX

Key Guide (6 characters) ————

● **Message Frame**

This frame is used to display the message, such as the Short Message.

Title (32 characters) ———— XXXXXX

Line 1 (32 characters) ———— XXXXXXXXXXXXX

Line 2 (32 characters) ———— XXXXXXXXXXXXX

Line 3 (32 characters) ———— XXXXXXXXXXXXX

XXX XXX XXX XXX

Key Guide (6 characters) ————

● **Popup Display**

The popup appears when the adjustment of the volume level or the operation of Key Lock occurs.

12 : 34 A M

XXXXXX XXXXX

XX 15

Menu SQ_Off Zone- Zone+

Mobile (KCH-20R (Featured Panel))

● **Basic Frame**

This frame is used to display the name, such as the channel name. Various icons indicating the transceiver's status appear in the icon display area.

● **Function Mode Frame 1**

This frame is used to display the Function Mode, such as Individual Call Mode and Status Mode. The number, such as the list number or channel number, appears at the right end of the title line.

● **Function Mode Frame 2**

This frame is used to display the Function Mode, such as Status Mode. The number, such as the list number or channel number, appears at the right end of the title line. The icon can be displayed at the right side of each line.

● **Category Icon Frame**
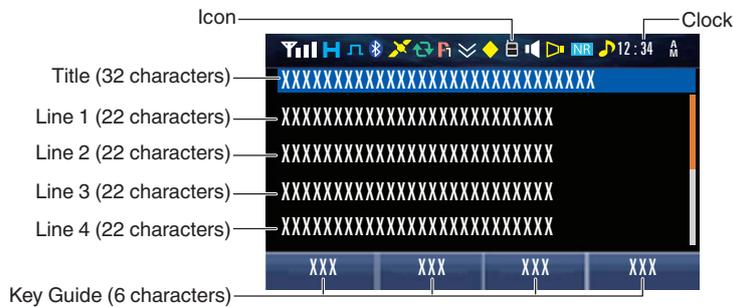
This frame is used to display the Menu Category in Icon Mode.

● **Message Frame**

This frame is used to display the message, such as the Short Message.
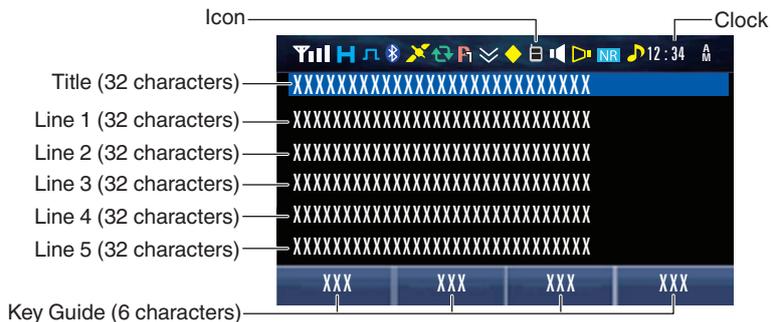
Icon — Clock

Title (32 characters)
Line 1 (32 characters)
Line 2 (32 characters)
Line 3 (32 characters)
Line 4 (32 characters)
Line 5 (32 characters)

Key Guide (6 characters)

● **Popup Display**

The popup appears when the adjustment of the volume level or the operation of Key Lock occurs.

● **Dual Frame**

This frame is used to display the channel name in the Dual RF Deck structure. This frame appears when Multi RF Deck View is On.

Icon (RF Deck 1) — Clock (Multi RF Deck)

Main LCD (RF Deck 1) (14 characters) — Sub Display (RF Deck 1) (6 characters)
Supplementary Field 1 (18 characters)

Virtual LED (RF Deck 2)

RF Deck 2 Display Field

Key Guide (6 characters)
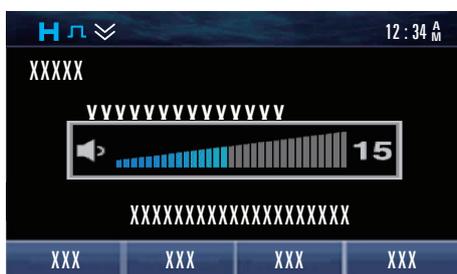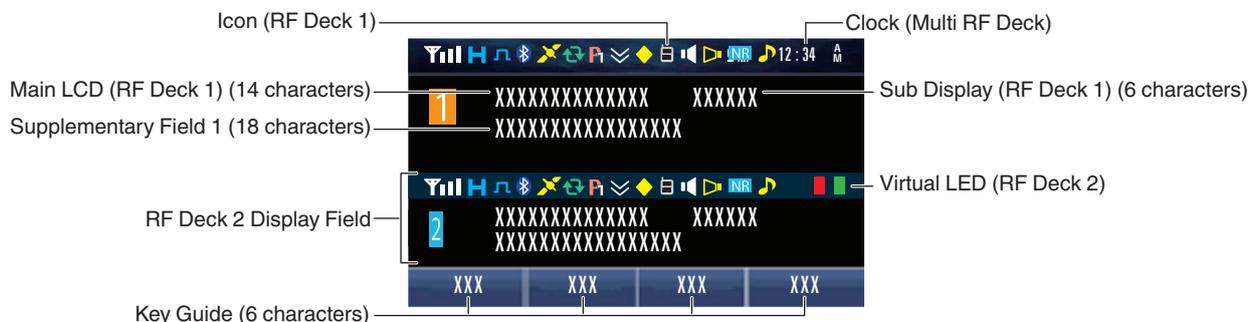
Other than the clock display and virtual LED, the display specifications of RF Deck 1 and RF Deck 2 are the same.

● **Triple Frame**

This frame is used to display the channel name in the Triple RF Deck structure. This frame appears when Multi RF Deck View is On.

Icon (RF Deck 1) — Clock (Multi RF Deck)

Main LCD (RF Deck 1) (14 characters) — Sub Display (RF Deck 1) (6 characters)
RF Deck 2 Display Field — Virtual LED (RF Deck 2)

Virtual LED (RF Deck 3)
RF Deck 3 Display Field

Key Guide (6 characters)
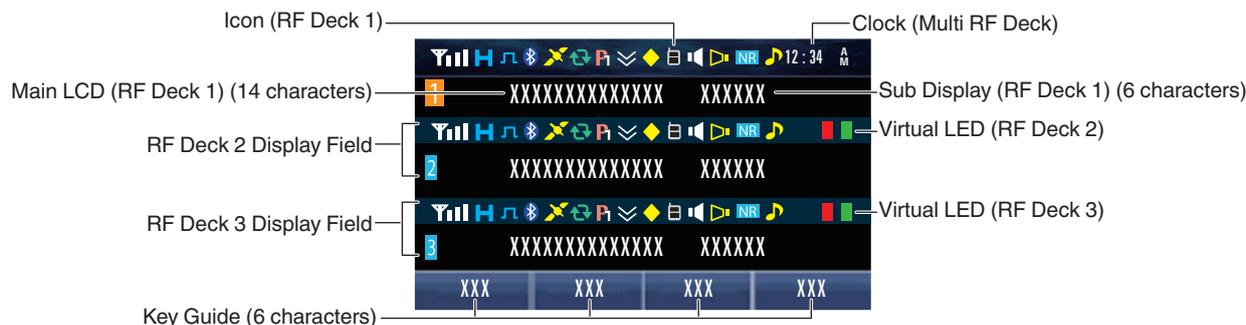
Other than the clock display and virtual LED, the display specifications of RF Deck 1, RF Deck 2 and RF Deck 3 are the same.

Mobile (KCH-21R (Handheld Control Head))

● Basic Frame

This frame is used to display the name, such as the channel name. Various icons indicating the transceiver's status appear in the icon display area.

Icon ——— Clock
Sub Display (6 characters) ——— XXXXX
Supplementary Field 1 (18 characters) ——— XXXXX
Main LCD (14 characters) ——— XXXXX
Supplementary Field 2 (18 characters) ——— XXXXX
XXX XXX XXX
Key Guide (6 characters) ———

● Function Mode Frame 1

This frame is used to display the Function Mode, such as Individual Call Mode and Status Mode. The number, such as the list number or channel number, appears at the right end of the title line.

Icon ——— Clock
Title (18 characters) ——— XXXXX
Line 1 (18 characters) ——— XXXXX
Line 2 (18 characters) ——— XXXXX
Line 3 (18 characters) ——— XXXXX
XXX XXX XXX
Key Guide (6 characters) ———

● Function Mode Frame 2

This frame is used to display the Function Mode, such as Status Mode. The number, such as the list number or channel number, appears at the right end of the title line. The icon can be displayed at the right side of each line.

Icon ——— Clock
Title (18 characters) ——— XXXXX
Line 1 (16 characters) ——— XXXXX
Line 2 (16 characters) ——— XXXXX
Line 3 (16 characters) ——— XXXXX
XXX XXX XXX
Key Guide (6 characters) ———

● **Category Icon Frame**

This frame is used to display the Menu Category in Icon Mode.

Icon — Clock

Category Icon —

Category Name (14 characters) — XXXXX XX — List Number

Key Guide (6 characters) — XXX XXX XXX

● **Popup Display**

The popup appears when the adjustment of the volume level or the operation of Key Lock occurs.

XXXXX
VVVVV
15
^^^^^
XXX XXX XXX

● **Dual Frame**

This frame is used to display the channel name in the Dual RF Deck structure. This frame appears when Multi RF Deck View is On.

Icon (RF Deck 1) — Clock

Main LCD (RF Deck 1) (14 characters) — XXXXXXXXXX
RF Deck 1 Display Field (18 characters) — XXXXX
Main LCD (RF Deck 2) (14 characters) — XXXXXXXXXX
RF Deck 2 Display Field (18 characters) — XXXXX

Key Guide (6 characters) — XXX XXX XXX

● **Triple Frame**

This frame is used to display the channel name in the Triple RF Deck structure. This frame appears when Multi RF Deck View is On.

Icon (RF Deck 1) — Clock

Main LCD (RF Deck 1) (14 characters) — XXXXXXXXXX
RF Deck 1 Display Field (18 characters) — XXXXX
Main LCD (RF Deck 2) (18 characters) — XXXXXXXXXX
RF Deck 2 Display Field (18 characters) — XXXXX

Key Guide (6 characters) — XXX XXX XXX

Other than the clock display and virtual LED, the display specifications of RF Deck 1, RF Deck 2 and RF Deck 3 are the same.

Icons

Various icons indicating the transceiver's status appear in the icon display area when a channel name is displayed. Refer to "The Icons on the LCD" for details of each icon.

● **Portable**

● **Mobile (KCH-19 (Basic Panel)/ KCH-20R (Featured Panel))**
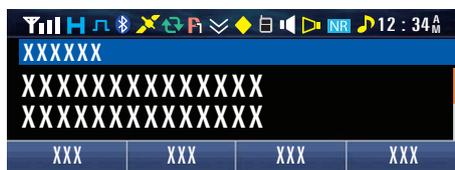
● **Mobile (KCH-21R (Handheld Control Head))**
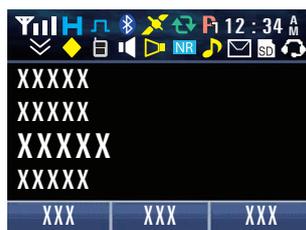
Key Guide

The key guide is displayed at the bottom of the LCD.

For Portable, the key guide displays the functions that function when the **Menu** ([🗇]), **[▲]** or **Back** ([⏎]) key is pressed.

For Mobile, the key guide displays the functions that function when the **Menu** ([🗇]), **Back** ([⏎]) or **[◀]**, **[▶]** key is pressed.

The text that appears on the display varies depending on the transceiver's status.

● **PF Key**

Functions assigned to each key will appear while the channel name appears. (Refer to Available Functions for the PF Keys.)

Portable:

Mobile (KCH-19 (Basic Panel)/ KCH-20R (Featured Panel)):

```
┌──────────────────────────┐
│ 🔋 H ⊓ ⌵      12 : 34 ᴬ   │
│                        ᴹ  │
│                           │
│ Zone 1                    │
│ Channel 1                 │
│                           │
│ ┌─────┬──────┬─────┐      │
│ │Menu │Zone+ │Indcal│     │
│ └─────┴──────┴─────┘      │
└──────────────────────────┘
```
Menu ([🗇])   **[▲]**   **Back** ([⏎])

```
┌──────────────────────────────────┐
│ H ⊓ ⌵               12 : 34 ᴬ     │
│          Zone 1              ᴹ    │
│                                   │
│        Channel 1                  │
│                                   │
│ ┌─────┬──────┬──────┬──────┐      │
│ │Menu │SQ_Off│Zone- │Zone+ │      │
│ └─────┴──────┴──────┴──────┘      │
└──────────────────────────────────┘
```
Menu ([🗇]) **Back** ([⏎]) **[◀]**   **[▶]**

Mobile (KCH-21R (Handheld Control Head)):

```
┌──────────────────────────┐
│ H ⊓ ⌵        12 : 34 ᴬ    │
│                        ᴹ  │
│                           │
│ Zone 1                    │
│ Channel 1                 │
│                           │
│ ┌─────┬──────┬─────┐      │
│ │Menu │Zone+ │Indcal│     │
│ └─────┴──────┴─────┘      │
└──────────────────────────┘
```
Menu ([🗇])   **[▲]**   **Back** ([⏎])

CONTENTS   **INDEX**

● **Function Mode**

Functions that can be used in each mode appear while the transceiver is in Function Mode, such as Selcall Mode, Status Mode and Stack Mode. However, the key guide for the **Up** key does not appear if the function which is used to select the list or code is assigned to the **[▲]** or **[▼]** key.

Portable:
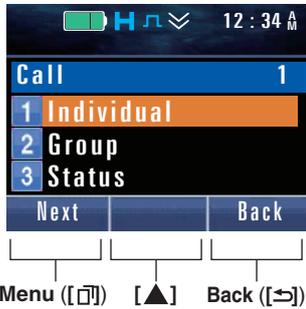
Mobile (KCH-19 (Basic Panel)/ KCH-20R (Featured Panel)):
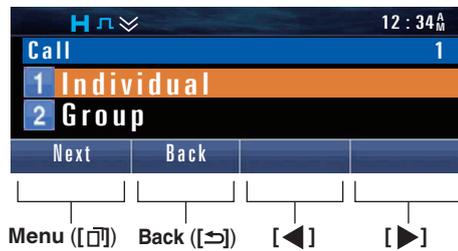
Mobile (KCH-21R (Handheld Control Head)):
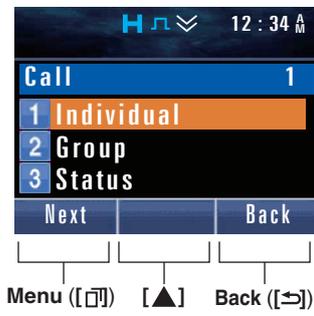
The following are key guides that appear while the transceiver is in Function Mode. (Refer to Function Mode.)

Table 1-1 Key Guide (Function Mode)

Key Guide	Operation
OK	Determines the data of the entered characters, code, or list.
Select	Determines the data of the selected characters, code, or list.
Delete	Deletes the data of the selected characters, code, or list.
Confirm	Authenticates the entered password.
Exit	Aborts the Function Mode.
Next	Proceeds to the next step.
Back	Goes back to the previous step.
Prev (Mobile only)	Restores the previous display.
Pause	Stops recording.
Conn	Enters the state to confirm connection with the device.
Discon	Enters the state to confirm disconnection with the device.
Call	Initiates the call.
Send	Sends the data.
Page	Initiates the Paging Call.
Cancel	Cancels the operation.
◀Disp (Mobile only)	Switches the display.
Disp▶ (Mobile only)	Switches the display.
◀(Mobile only)	Selects a category.
▶(Mobile only)	Selects a category.
|◀◀ (Mobile only)	Plays back the audio data from the beginning.
▶▶| (Mobile only)	Plays back the next audio data from the beginning.
List+	Selects list data.
List-	Selects list data.
View	Switches to the Short Message View display.

📋 Note

- The key guide which appears while the transceiver is in Function Mode is only for the functions that can be activated.
- Key Guide for a function assigned to and activated by pressing and holding a **PF** key appears only if no function is assigned to the same key.

  Example 1) "KeyLck" appears as Key Guide in the following case: Function = None, Hold = Key Lock

  Example 2) "Light" appears as Key Guide in the following case: Function = Backlight, Hold = Key Lock

When the transceiver is turned ON after the power source is attached to the transceiver, the transceiver starts up. To make the transceiver ready for use, the configuration data needs to be created using KPG-D1/ D1N and written to the transceiver.
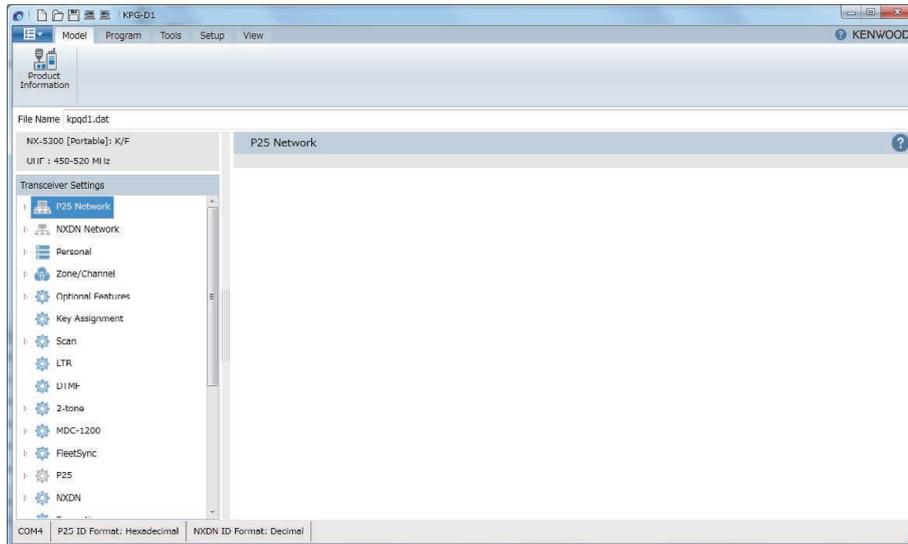
Figure 2-1 KPG-D1/ D1N Main Window

By using KPG-D1/ D1N, the zone and channel data needs to be configured and then the parameters for various functions can be configured. Refer to the help texts for configuration methods.

2.1	**Connecting the Transceiver to a PC**

To write the configuration data to or read the configuration data from the transceiver via serial communications by using a programming cable, "Programming Cable" needs to be selected from **Communication Method** of **COM port**. Also, the transceiver and a PC with KPG-D1/ D1N installed need to be connected by using the programming cable.

Portable

The transceiver and a PC need to be connected by using the KPG-36U/ KPG-36X programming cable.

Refer to the figure below.

Mobile

The transceiver and a PC need to be connected by using the KPG-46U/ KPG-46X programming cable.

Refer to the figure below.
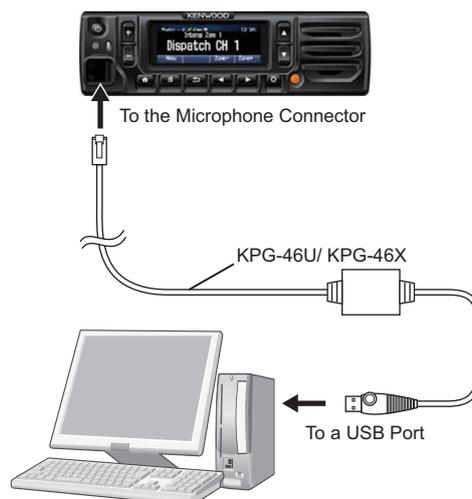
Configuration using KPG-D1/ D1N

Configuring **Communication Method** (See Setup > COM port)

| 2.2 | Connecting the Transceiver to a PC by Bluetooth |

To write the configuration data to the transceiver or to read the configuration data from the transceiver by using Bluetooth communication, "Bluetooth SPP" needs to be selected from **Communication Method** of **COM port** and a Bluetooth-compatible device (the transceiver) to be written with the configuration data needs to be selected in **Device List**.

Configuration using KPG-D1/ D1N

- Configuring **Communication Method** (🔍 See Setup > COM port)

- Selecting a Bluetooth-compatible device (the transceiver) in **Device List** (🔍 See Setup > COM port > Bluetooth SPP)

| 2.3 | Writing the Configuration Data to the Transceiver |

Clicking the "Write" button in **Program** of KPG-D1/ D1N displays **Write Data to the Transceiver**. Clicking the "Write" button of **Write Data to the Transceiver** enters FPU Programming Mode and starts writing the configuration data to the transceiver.
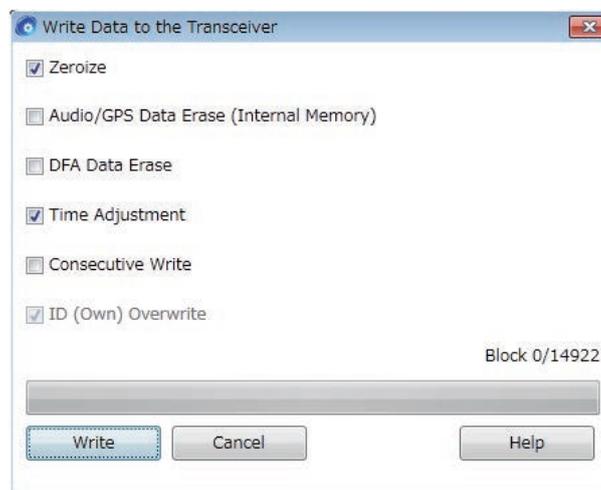
Figure 2-2 Write Data to the Transceiver

📋 Note

The transceiver behaves as follows according to the configuration in **Write Data to the Transceiver**:

- Clicking on **Zeroize** and writing deletes the Encryption Key configuration in the SCM.

- Clicking on **Time Adjustment** and writing automatically configures the transceiver to the time configured in a PC. Refer to "ADJUSTING THE TIME ON THE TRANSCEIVER" for the operations to manually adjust the time of the transceiver after writing the configuration data.

- Clicking on **Audio/GPS Data Erase (Internal Memory)** and writing deletes the audio data and GPS data stored on the transceiver.

- Clicking on **DFA Data Erase** and writing deletes the Direct Frequency Assignment information stored on the transceiver.

- Clicking on **Consecutive Write** and writing does not close **Write Data to the Transceiver** even when the writing completes, and various IDs can be changed and written in other transceiver.

- Clicking on **ID (Own) Overwrite** and writing overwrites various ID data on the transceiver by the ID data configured by KPG-D1/ D1N. Clicking off **ID (Own) Overwrite** and writing can write configuration data on the transceiver without overwriting various IDs configured in the transceiver.

Writing configuration data to multiple transceivers using Bluetooth communication

To write configuration data to multiple transceivers by using Bluetooth communication, click the "Multi Write (Bluetooth)" button. A Bluetooth-compatible device (the transceiver) is detected in **Write Data to Multiple Transceiver (Bluetooth)**, and the configuration data can be written to the transceiver by Bluetooth communication.

About the writing of configuration data in a Multi RF Deck/ Multi Control Head structure

Refer to "Configuring the FPU Data and Writing the FPU Data to Each RF Deck" in "Multi RF Deck/ Multi Control Head" for the writing of configuration data in a Multi RF Deck/ Multi Control Head structure for Mobile.

2.4 Reading the Configuration Data from the Transceiver

To change the data configured in the transceiver, read the configuration data from the transceiver to KPG-D1/ D1N, and then write the configuration data to the transceiver after the configuration data has been changed.

Clicking the "Read" button in **Program** of KPG-D1/ D1N displays **Read Data from the Transceiver**. Clicking the "Read" button of **Read Data from the Transceiver** enters FPU Programming Mode and starts reading the configuration data to the transceiver.
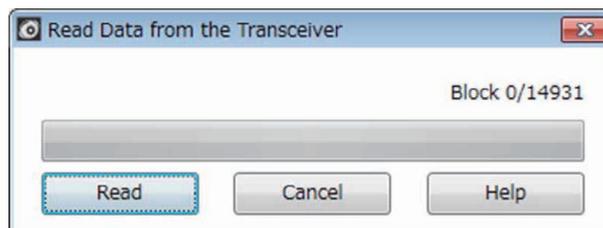
Figure 2-3 Read Data from the Transceiver

2.5	Embedding a Message in the Transceiver (Embedded Message)

The message can be written to the transceiver as part of the configuration data by using KPG-D1/ D1N.

Embedded Message

Embedded Message can be used to store a maximum of 64 characters in the transceiver. The transceiver profile information, such as the control number and the file name of the configuration data written in the transceiver, can be embedded.

The message can be written to the transceiver by using KPG-D1/ D1N. The message written in the transceiver is stored as a part of the configuration data.

The embedded messages can be read from the transceiver by using KPG-D1/ D1N.

Configuration using KPG-D1/ D1N

Configuring **Embedded Message** (🔍 See Transceiver Settings > Embedded Message)

Embedded Message with Password

Embedded Message with Password can be used to store with a password a maximum of 64 alphanumeric characters and symbols in the transceiver.

The transceiver profile information, such as the control number and the file name of configuration data written in the transceiver, can be embedded with a password.

The message and the password can be written to the transceiver by using KPG-D1/ D1N. The **Embedded Message with Password** is stored in the transceiver as independent data from the configuration data.

The password needs to be entered to write a message to the transceiver written with a password. The message cannot be written to the transceiver unless the correct password is entered.

The embedded messages can be read from the transceiver by using KPG-D1/ D1N.

Configuration using KPG-D1/ D1N

Configuring **Embedded Message with Password** (🔍 See Transceiver Settings > Embedded Message with Password)

2.6 Writing Configuration Data Using Wireless Communication (OTAP)

OTAP (Over-The-Air Programming) is the function to write configuration data to the transceiver using wireless communications. This function enables configuration data for the transceiver to be updated by remotely controlling from the base station.

OTAP can be used in a communication system which supports NEXEDGE or P25 digital communication (an NXDN Conventional system, an NXDN Trunking system, or a P25 Conventional system).

To use this function, the PC application software, OTAP Manager (KPG-180AP) is required to manage configuration data of KPG-D1/ D1N and transmit the configuration data to each subscriber unit via the base station transceiver.
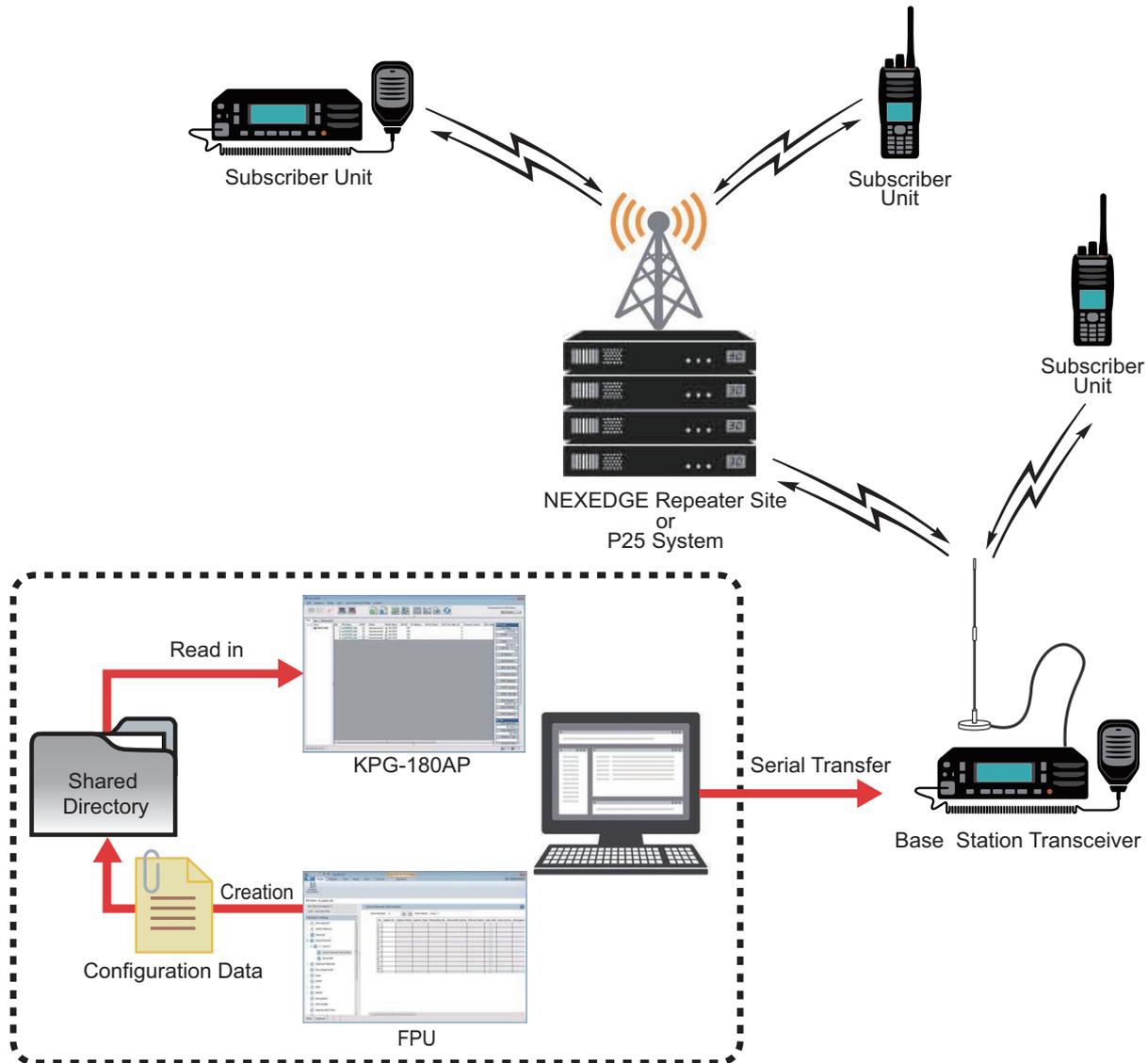
Figure 2-4 Example of the System Structure

The transceiver for which OTAP is enabled can be used in a system where OTAP is incorporated. The subscriber unit can write the received configuration data into the unit and enable the configuration data. The base station transceiver can send the configuration data to the subscriber unit according to the request from OTAP Manager.

Refer to OTAP MANAGER (KPG-180AP) Basic Operations supplied with KPG-180AP for the details of this function.

Configuration using KPG-D1/ D1N

- Configuring **P25 OTAP** to be enabled or disabled (See Model > Product Information > Feature Selection > P25)

- Configuring **NXDN OTAP** to be enabled or disabled (See Model > Product Information > Feature Selection > NXDN)

3.1 Turning the Transceiver ON/ OFF

Turning the Transceiver ON

For Portable, rotating the **Power** switch clockwise causes the transceiver to be turned ON.

For Mobile, pressing the **Power** switch causes the transceiver to be turned ON. Also, the transceiver can be turned ON by linking to the status of the Ignition Sense port of a vehicle. (Refer to Turning the Transceiver ON or OFF According to the State of the Ignition Sense Port (Ignition Sense).)

● **If the data is written to the transceiver and the password is not configured**

---

1 **Turn the Transceiver ON.**

A Power-on Tone A (1 beep) sounds from the transceiver, and then an animated logo appears for 500 ms.

If **Custom Start-up Screen** is configured, a Power-on Tone A (1 beep) sounds from the transceiver when the transceiver is turned ON and the bitmapped image configured for the transceiver appears for 2 sec. (Refer to Displaying a Bitmap Image When the Transceiver is Turned ON (Custom Start-up Screen).)

If **Power-on Text** is configured, the Power-on Text appears for 2 sec after "SELF TESTING" appears. (Refer to Power-on Text.)

The transceiver enters User Mode, and then the channel name appears.

> 📝 Note
>
> The animated logo appears only if **Custom-Start-up Screen** is not configured.

● **If the data is written to the transceiver and the transceiver's password is configured**

1 Turn the Transceiver ON.

A Power-on Tone A (1 beep) sounds from the transceiver, and then an animated logo appears for 500 ms.

If **Custom Start-up Screen** is configured, a Power-on Tone A (1 beep) sounds from the transceiver when the transceiver is turned ON and the bitmapped image configured for the transceiver appears for 2 sec. (Refer to Displaying a Bitmap Image When the Transceiver is Turned ON (Custom Start-up Screen).)

"Password" appears after "SELF TESTING" appears. (Refer to Password for Transceiver Operation (Transceiver Password).)

📝 Note

- The animated logo appears only if Custom-Start-up Screen is not configured.
- In the following cases, if the transceiver is turned ON, the transceiver enters Transceiver Password Mode:
    - If **Transceiver Password** is configured, "Transceiver Password" is not assigned to any of the **PF** keys, and "Transceiver Password" is not configured in Menu Mode
    - When "Transceiver Password" is assigned to one of the **PF** keys, or when "Transceiver Password" is configured for Menu Mode, if the transceiver is turned OFF while the transceiver is in Transceiver Password Mode

2 Enter a password.

Refer to "Entering or Deleting a Code" for entry methods.

When the correct password is entered, a Password Authorization Tone (2 beeps) sounds from the transceiver, and then the password protection of the transceiver is disabled.

If **Power-on Text** is configured, the Power-on Text appears for 2 sec. (Refer to Power-on Text.)

The transceiver enters User Mode, and then the channel name appears.
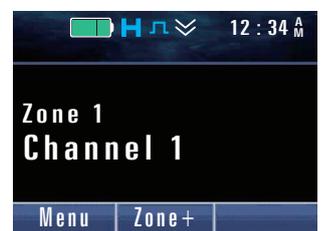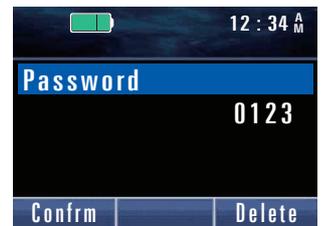
📝 Note

- If the firmware is not written to the transceiver correctly, the transceiver will enter Firmware Programming Mode. In this case, write the firmware to the transceiver again.
- "UNPROGRAM" appears on the main display if no data is written to the transceiver. In this case, data needs to be written to the transceiver by using KPG-D1/ D1N.
- In a Multi RF Deck system, pressing the **Power** switch for 1000 ms causes the transceiver to be turned ON.
- The Power-on Tone A tone when the transceiver is turned ON can be created as desired using KPG-D1/ D1N.

Turning the Transceiver OFF

For Portable, rotate the **Power** switch counterclockwise until it clicks to turn the transceiver OFF.

For Mobile, pressing the **Power** switch while the transceiver is turned ON causes the transceiver to be turned OFF. Also, the transceiver can be turned OFF according to the status of the vehicle engine, either switched On or Off. (Refer to Turning the Transceiver ON or OFF According to the State of the Ignition Sense Port (Ignition Sense).)

Also, for Mobile, pressing the **Power** switch for more than 5 sec forcibly turns the transceiver OFF. If the **Power** switch is pressed while the transceiver is turned ON, or if an error occurs from when the Ignition Sense port goes low level until the transceiver is turned OFF, or if a function in a P25 Trunking system, such as De-Registration, is functioning waiting for the transmission or response of **Suspended Power-off** and **Power-off Status**, the transceiver may actually be in the ON state even if nothing appears on the display. To turn the transceiver OFF immediately in this state, pressing the **Power** switch for more than 5 sec forcibly turns the transceiver OFF. If "Ignition Only" is configured in **Ignition Sense Type**, the Ignition Sense port needs to be at high level in order to turn the transceiver ON next time. In this case, the transceiver cannot be turned ON by pressing the **Power** switch.

Power Switch Status Memory

Supported Models: Mobile

Power Switch Status Memory is the function to configure whether to store the **Power** switch status (ON or OFF) when the power source is disconnected from the transceiver.

Whether to turn the transceiver ON when the power source is connected to the transceiver depends as below on the configuration in **Power Switch Status Memory**:

Table 3-1 Power Switch Status Memory

Configuration	Description
Enabled	Enables the capability to retain the ON- or OFF-state of the **Power** switch. By disconnecting the power source while the transceiver **Power** switch is in the ON state and then by reconnecting the power source, the transceiver is turned ON and starts up. Even if the power source is reconnected after the power source is disconnected while the transceiver **Power** switch is in the OFF state, the transceiver remains turned OFF. In this case, the transceiver does not start up unless the **Power** switch is pressed.
Disabled	Disables the capability to retain the ON- or OFF-state of the **Power** switch. Regardless of the previous ON- or OFF-state of the **Power** switch, the transceiver power is turned ON by connecting the power source to the transceiver.

Configuration using KPG-D1/ D1N

Configuring **Power Switch Status Memory** (🔍See Transceiver Settings > Optional Features > Optional Features 1 > Others)

3.2	**Adjusting the Volume Level**

Portable

Rotating the **Volume** control clockwise increases the volume level from the speaker, and rotating the **Volume** control counterclockwise decreases the volume level from the speaker.

Mobile

Pressing the **Volume Up** key increases the volume level in steps of 1. Pressing the **Volume Down** key decreases the volume level in steps of 1. KCH-20R (Featured Panel) is operated by using the Volume control just as Portable.

If "Volume Up (Continuous)" or "Volume Down (Continuous)" is assigned to the **Volume Up** or **Volume Down** key, the volume level is increased or decreased continuously every 100 ms by pressing and holding the **Volume Up** or **Volume Down** key.

3.3	**Using Function Keys**

The following functions can be assigned to each key of the transceiver using KPG-D1/ D1N. Pressing a key to which a function is assigned can activate the assigned function or place the transceiver in various Function Modes. (Refer to Available Functions for the PF Keys.)

Following are the configuration examples for each key of the transceiver.

Table 3-2 Configuration Examples for Keys

Key	Function	2nd Function	Hold	Hold Delay
Home ([🏠])	Home Channel	None	Home Channel Select	3.0
Back ([↩])	Key Lock	Autodial	None	1.0
AUX	Function	None	None	1.0

A function can be assigned to Function, 2nd Function and Hold of each key on the transceiver.

- **Function**

  The function is activated by pressing a key.

  In the configuration example above, pressing the **Home** ([🏠]), **Back** ([↩]), or **AUX** key activates the function assigned to each key.

  If a key to which Function is assigned is pressed, the transceiver waits for a function assigned to 2nd Function to be activated.

- **2nd Function**

  The function is activated by pressing a key to which the function is assigned to 2nd Function after the **Function** key is pressed.

  In the configuration example above, pressing the **Back** ([↩]) key after the **AUX** key is pressed activates the Autodial function.

- **Hold**

  The function is activated by pressing and holding a key for the length of time configured for Hold Delay.

  In the configuration example above, pressing and holding the **Home** ([🏠]) key for 3 sec activates the Home Channel Select function.

📝 Note

The two functions, Primary and Secondary, can be assigned to each key on the transceiver. Which function is used can be configured for each zone or channel.

Configuration using KPG-D1/ D1N

Assigning functions to the **PF** keys on the transceiver (🔍See Transceiver Settings > Key Assignment)

Mode Reset Timer

Mode Reset Timer is the timer for canceling the standby status of further key entry in Function Mode, and for canceling the function activation status of 2nd Function. By using this function, Function Mode does not need to be disabled manually. The function also helps by canceling the Function Mode automatically so as not to remain in Function Mode for too long a time.

The transceiver has some special Function Modes. When the transceiver enters one of these modes, a preprogrammed display appears on the main display and sub-display and the **Mode Reset Timer** starts counting down the time. If no key is pressed before the amount of time configured in **Mode Reset Timer** expires, the transceiver returns to the previous mode.

If a **Function** key is pressed, the transceiver waits for a function configured for 2nd Function to be activated, and then **Mode Reset Timer** starts counting down. If no key is pressed before the amount of time configured in **Mode Reset Timer** expires, the transceiver cancels waiting for the function to be activated. **Mode Reset Timer** can be extended by key operation.

Mode Reset Timer is used for the following Function Modes:

Table 3-3 Objective Function Modes for Mode Reset Timer

2-tone Mode
Activity Detection Mode[1]
ANR Preset Mode[1]
Audio Profile Mode[1]
Auto Dimmer Mode[1]
Autodial Mode
Autodial Programming Mode
AUX Mode[1]
AUX A/B/C Mode[1]
Battery Information Display Mode[1]
Bluetooth Mode[1]
Bluetooth Device Mode[1]
Bluetooth Find Device Mode[1]
Bluetooth Headset Connection Type Mode
Bluetooth Information Mode[1]
Bluetooth My Devices Mode[1]
Bluetooth Speaker Mode[1]
Broadcast Mode[1]
Channel Entry Mode
Clock Mode[1]
Clock Adjustment Mode
Color Scheme Mode[1]
Direct Channel & OST Mode
Display Format Mode[1]
Eject SD Card Mode
External Mic Sense Mode[1]
External Speaker Mode
Fixed Volume Mode[1]
Format SD Card Mode
Forward Mode

Free-dial Entry Mode
GPS Mode[*1]
GPS/Bluetooth Reset Mode[*1]
GPS Position Display Mode
Group Call Mode
Group ID Entry Mode
High Transmit Power Mode[*1]
Horn Alert Mode[*1]
Individual Call Mode
Intercom Mode[*1]
IP Address Mode[*1]
Key Delete Mode
Keyset Select Mode
Language Mode[*1]
LCD Brightness Mode[*1]
Lone Worker ON/OFF Mode
Low Transmit Power Mode
Maintenance Display Mode
Master Volume Control Mode[*1]
Medium Transmit Power Mode[*1]
Menu Mode
Mic Sense Mode[*1]
Microphone Type Mode[*1]
Monitor Mode[*1]
Multi RF Deck View Mode[*1]
My ID Mode
OST Mode[*1]
OST List Mode
OVCM Mode
Playback Mode
Priority-channel Select Mode
Public Address Mode[*1]
Radio Check Mode[*1]
Radio Inhibit Mode[*1]
Radio Uninhibit Mode[*1]
Remote Control Mode
RF Deck Select Mode[*1]
Receive Entry Mode
RX Audio Equalizer (High) Mode[*1]
RX Audio Equalizer (High Midrange) Mode[*1]
RX Audio Equalizer (Middle) Mode[*1]
RX Audio Equalizer (Low Midrange) Mode[*1]
RX Audio Equalizer (Low) Mode[*1]
RX Audio Gain Control Mode[*1]

Scan Mode[*1]
Scan Delete/Add Mode[*1]
Scan Normal Mode[*1]
Scan Program Mode
Scrambler/Encryption Mode[*1]
Scrambler/Encryption Code Mode
SD Card Direct Access Mode
Selcall Mode
Site Lock Mode[*1]
Site Select Mode
Speaker 1-2 Mute Mode[*1]
Speaker Type Mode[*1]
Squelch Level Mode
Squelch Off Mode[*1]
Stack Mode
Status Mode
Surveillance Mode[*1]
Short Message Mode
System Select Mode
Talk Around Mode[*1]
Talkgroup ID Select Mode
Text Messaging Mode
Transceiver Password Mode[*2]
TX Audio Equalizer (High) Mode[*1]
TX Audio Equalizer (High Midrange) Mode[*1]
TX Audio Equalizer (Middle) Mode[*1]
TX Audio Equalizer (Low Midrange) Mode[*1]
TX Audio Equalizer (Low) Mode[*1]
TX Audio Gain Control Mode[*1]
Unselected RF Deck Speaker Mode[*1]
Unselected Speaker Offset Mode[*1]
Vibrator Mode[*1]
VOX Mode[*1]
VOX Gain Level Mode[*1]
Zone Delete/Add Mode[*1]

[*1] Modes entered only from Menu Mode.

[*2] "Input Password" reappears on the display when the duration configured in **Mode Reset Timer** elapses.

Configuration using KPG-D1/ D1N

Configuring **Mode Reset Timer** (See Transceiver Settings > Optional Features > Optional Features 1 > Others)

Keypad Operation

The keypad operating method can be selected according to the user's purpose.

Functions can be assigned to the keypad by using KPG-D1/ D1N. The following is the list of the functions that can be assigned to the transceiver for Keypad Operation:

Table 3-4 Keypad Operation

Configuration	Description
None	Pressing a key on the keypad of the transceiver causes the Key-entry Error Tone (1 beep) to sound, but it has no effect on the transceiver.
Channel Entry	Pressing a key on the keypad can directly specify a channel. (Refer to Changing the Channel by Specifying the Number (Channel Entry).)
Group ID/Channel Entry	In an NXDN Trunking system, pressing the **[0]** to **[9]** keys on the transceiver's keypad can directly specify the Group ID in the NXDN Trunking system. (Refer to Changing the Group ID by Specifying the ID (Group ID Entry) (NXDN Trunking System Only).) In a system other than an NXDN Trunking system, pressing the **[0]** to **[9]** keys on the transceiver's keypad can directly specify the channel number. (Refer to Changing the Channel by Specifying the Number (Channel Entry).)
OST	Pressing a key on the keypad can directly select the OST from the OST List 1 to OST List 40. (Refer to Analog FUNC Changing the Decode/ Encode Combination of the QT/ DQT (OST).)
Autodial	In a P25 Trunking system, NXDN Trunking system, NXDN Conventional system, DMR Conventional system, or Analog Conventional system, pressing the **[0]** to **[9]** keys on the keypad allows the transceiver to enter Autodial Mode. In Autodial Mode, the transceiver can transmit by selecting a DTMF code from **Autodial List** or directly entering a DTMF code. However, the transceiver behavior on a control channel varies as below depending on the configuration in **Telephone Interconnect** (List Only, Unlimited or Answer Only). (Refer to P25 FUNC Configuring the Transmission and Reception Behaviors of a Telephone Call (Telephone Interconnect).) **Answer Only:** The transceiver cannot enter Autodial Mode on a control channel. **Unlimited:** If the transceiver enters Autodial Mode on a control channel, the transceiver can transmit by selecting a DTMF code from the Autodial List when **Autodial List** is configured. If **Autodial List** is not configured, the transceiver can transmit by directly entering a DTMF code. **List Only:** If the transceiver enters Autodial Mode on a control channel, the transceiver can transmit by selecting a DTMF code from the Autodial List when **Autodial List** is configured. If **Autodial List** is not configured, the transceiver cannot transmit a DTMF code. If **Store & Send** is disabled and **Autodial List** is configured, transmission of a DTMF code on a communication channel, regardless of the configuration in **Telephone Interconnect**, allows the transceiver to transmit by selecting a DTMF code from **Autodial List**. If **Store & Send** is enabled, the transceiver can transmit by directly entering a DTMF code.
Keypad Auto PTT	Every time a key on the keypad is pressed, the DTMF code is instantly sent.
Short Message	Pressing the **[0]** to **[9]** keys on the keypad enters Short Message Mode. In Short Message Mode, a Short Message can be sent by directly entering a Short Message.
Status	Pressing the **[0]** to **[9]** keys on the keypad enters Status Mode. In Status Mode, a status configured in the Status List in a P25 Trunking system, an NXDN system, or a DMR Conventional system can be selected. Also, in an NXDN system, a Status Message can be sent by directly entering a status number.
Individual	Pressing the **[0]** to **[9]** keys on the keypad allows the transceiver to enter Individual Call Mode in a P25 system, NXDN system, or DMR Conventional system. In Individual Call Mode, a call can be initiated by selecting an Individual ID configured in the Individual ID List or directly entering an Individual ID.

Configuration	Description
Individual + Short Message	**NXDN system:** Pressing the **[0]** to **[9]** keys on the keypad allows the transceiver to enter Individual Call Mode in an NXDN system. In Individual Call Mode, a call can be initiated by selecting an Individual ID configured in the Individual ID List or directly entering an Individual ID. Then, pressing the **[▶]** key while the transceiver is in Individual Call Mode allows the transceiver to enter Short Message Mode. In Short Message Mode, a Short Message can be sent by directly entering a Short Message. **P25 system:** Pressing the **[0]** to **[9]** keys on the keypad allows the transceiver to enter Individual Call Mode in a P25 system. In Individual Call Mode, a call can be initiated by selecting an Individual ID configured in the Individual ID List or directly entering an Individual ID. Then, in a P25 Conventional system, pressing the **[▶]** key while the transceiver is in Individual Call Mode allows the transceiver to enter Short Message Mode. In Short Message Mode, a Short Message can be sent by directly entering a Short Message. **DMR Conventional system:** Pressing the **[0]** to **[9]** keys on the keypad allows the transceiver to enter Individual Call Mode in a DMR Conventional system. In Individual Call Mode, a call can be initiated by selecting an Individual ID configured in the Individual ID List or directly entering an Individual ID. Then, pressing the **[▶]** key while the transceiver is in Individual Call Mode allows the transceiver to enter Short Message Mode. In Short Message Mode, a Short Message can be sent by directly entering a Short Message.
Individual + Status	**NXDN system:** Pressing the **[0]** to **[9]** keys on the keypad allows the transceiver to enter Individual Call Mode in an NXDN system. In Individual Call Mode, a call can be initiated by selecting an Individual ID configured in the Individual ID List or directly entering an Individual ID. Then, pressing the **[▶]** key while the transceiver is in Individual Call Mode allows the transceiver to enter Status Mode. In Status Mode, a Status Message can be sent by selecting a status configured in NXDN Status List or directly entering a status number. **P25 system:** Pressing the **[0]** to **[9]** keys on the keypad allows the transceiver to enter Individual Call Mode in a P25 system. In Individual Call Mode, a call can be initiated by selecting an Individual ID configured in the Individual ID List or directly entering an Individual ID. **DMR Conventional system:** Pressing the **[0]** to **[9]** keys on the keypad allows the transceiver to enter Individual Call Mode in a DMR Conventional system. In Individual Call Mode, a call can be initiated by selecting an Individual ID configured in the Individual ID List or directly entering an Individual ID. Then, pressing the **[▶]** key while the transceiver is in Individual Call Mode allows the transceiver to enter Status Mode. In Status Mode, a status can be sent by selecting a status configured in the DMR Status List or directly entering a status.
Group	**NXDN Conventional system:** Pressing the **[0]** to **[9]** keys on the keypad allows the transceiver to enter Group Call Mode in an NXDN Conventional system. In Group Call Mode, a Group Call can be initiated by selecting a Group ID registered in the Group ID List. **P25 Conventional system:** Pressing the **[0]** to **[9]** keys on the keypad allows the transceiver to enter Talkgroup ID Select Mode in a P25 Conventional system. In Talkgroup ID Select Mode, the Talkgroup ID configured for a channel can be changed. **DMR Conventional system:** Pressing the **[0]** to **[9]** keys on the keypad allows the transceiver to enter Group Call Mode in a DMR Conventional system. In Group Call Mode, a Group Call can be initiated by selecting a Group ID registered in the Group ID List.

Configuration	Description
Group + Short Message	**NXDN Conventional system:** Pressing the **[0]** to **[9]** keys on the keypad allows the transceiver to enter Group Call Mode in an NXDN Conventional system. In Group Call Mode, a call can be initiated by selecting a Group ID registered in the Group ID List. Then, pressing the **[▶]** key while the transceiver is in Group Call Mode allows the transceiver to enter Short Message Mode. In Short Message Mode, a Short Message can be sent by directly entering a Short Message. **NXDN Trunking system:** Pressing the **[0]** to **[9]** keys on the keypad allows the transceiver to enter Short Message Mode in an NXDN Trunking system. In Short Message Mode, a Short Message can be sent by directly entering a Short Message. **P25 Conventional system:** Pressing the **[0]** to **[9]** keys on the keypad allows the transceiver to enter Talkgroup ID Select Mode in a P25 Conventional system. In Talkgroup ID Select Mode, the Talkgroup ID configured for a channel can be changed. **DMR Conventional system:** Pressing the **[0]** to **[9]** keys on the keypad allows the transceiver to enter Group Call Mode in a DMR Conventional system. In Group Call Mode, a Group Call can be initiated by selecting a Group ID registered in the Group ID List. Then, pressing the **[▶]** key while the transceiver is in Group Call Mode allows the transceiver to enter Short Message Mode. In Short Message Mode, a Short Message can be sent by directly entering a Short Message.
Group + Status	**NXDN Conventional system:** Pressing the **[0]** to **[9]** keys on the keypad allows the transceiver to enter Group Call Mode in an NXDN Conventional system. In Group Call Mode, a call can be initiated by selecting a Group ID registered in the Group ID List. Then, pressing the **[▶]** key while the transceiver is in Group Call Mode allows the transceiver to enter Status Mode. In Status Mode, a Status Message can be sent by selecting a status configured in NXDN Status List or directly entering a status number. **NXDN Trunking system:** Pressing the **[0]** to **[9]** keys on the keypad allows the transceiver to enter Status Mode in an NXDN Trunking system. In Status Mode, a Status Message can be sent by selecting a status configured in NXDN Status List or directly entering a status number. **P25 Conventional system:** Pressing the **[0]** to **[9]** keys on the keypad allows the transceiver to enter Talkgroup ID Select Mode in a P25 Conventional system. In Talkgroup ID Select Mode, the Talkgroup ID configured for a channel can be changed. **DMR Conventional system:** Pressing the **[0]** to **[9]** keys on the keypad allows the transceiver to enter Group Call Mode in a DMR Conventional system. In Group Call Mode, a Group Call can be initiated by selecting a Group ID registered in the Group ID List. Then, pressing the **[▶]** key while the transceiver is in Group Call Mode allows the transceiver to enter Status Mode. In Status Mode, a status can be sent by selecting a status configured in the DMR Status List or directly entering a status.
Direct Channel & OST	Pressing the **[0]** to **[9]** keys on the keypad allows the transceiver to enter Direct Channel & OST Mode. If the **Menu** (**[🔲]**) or the **[*]** key is pressed in Direct Channel & OST Mode, the transceiver migrates to the channel of the entered number. Or, if the **Back** (**[⬐]**) or **[#]** key is pressed in Direct Channel & OST Mode, the transceiver migrates to the OST list of the entered number, and this OST list number is configured after the OST list number is displayed for 2 sec.
Free-dial Entry	Pressing the **[0]** to **[9]** keys on the keypad allows the transceiver to enter Free-dial Entry Mode. In Free-dial Entry Mode, a 5-tone code can be sent by directly entering a 5-tone code.

📝 Note

- Refer to each Function Reference for details about various calls.

- To directly enter an Individual ID or status in an NXDN system, P25 system, or DMR Conventional system, Manual Dialing needs to be enabled using KPG-D1/ D1N. (Refer to Manual Dialing.)

- Refer to "Available Functions for the PF Keys" for the description on FleetSync or MDC-1200.

Configuration using KPG-D1/ D1N

Configuring **Keypad Operation** (🔍See Transceiver Settings > Key Assignment > General > Keypad)

Manual Dialing

Manual Dialing is the function to directly enter an Individual ID or status number in an NXDN system or DMR Conventional system. In a P25 system, this function can directly enter an Individual ID. In an analog system, this function can directly enter a Fleet/ ID or an MDC-1200 ID.

If **Manual Dialing** is enabled, an Individual ID, Fleet/ ID, or status number can directly be entered and a call can be initiated using the keypad, **[▲]**, or **[▼]**.

Configuration using KPG-D1/ D1N

- Configuring **Manual Dialing** (P25 Conventional) to be enabled or disabled (🔍See Transceiver Settings > Personal > Personal Features > P25 Conventional > P25)

- Configuring **Manual Dialing** (NXDN Conventional) to be enabled or disabled (🔍See Transceiver Settings > Personal > Personal Features > NXDN Conventional > NXDN)

- Configuring **Manual Dialing** (P25 Trunking) to be enabled or disabled (🔍See Transceiver Settings > Personal > Personal Features > P25 Trunking > General)

- Configuring **Manual Dialing** (NXDN Trunking) to be enabled or disabled (🔍See Transceiver Settings > Personal > Personal Features > NXDN Trunking > General)

- Configuring **Manual Dialing** (DMR Conventional) to be enabled or disabled (🔍See Transceiver Settings > Personal > Personal Features > DMR Conventional > DMR)

- Configuring **Manual Dialing** (FleetSync) to be enabled or disabled (🔍See Transceiver Settings > Personal > Personal Features > Analog Conventional > Analog > FleetSync)

- Configuring **Manual Dialing** (MDC-1200) to be enabled or disabled (🔍See Transceiver Settings > Personal > Personal Features > Analog Conventional > Analog > MDC-1200)

3.4	**Using Menu Mode**

Menu Mode allows a selecting a function in the menu format and activating the function.

Since a maximum of 64 functions can be configured for a maximum of 12 categories, many functions can be used in Menu Mode.

Operating the transceiver

The following procedure is an example of the user operation in Menu Mode. Displays and operation methods vary depending on the configuration in **Menu Icon Size**.

● **If "Large" is configured in Menu Icon Size**

1 **Press the Menu key.**

The transceiver enters Menu Mode and then category icons appear.
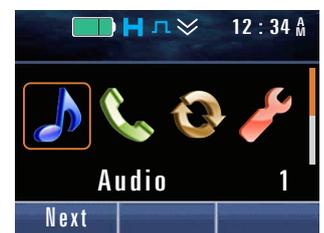
2 **Select a category by pressing the [▲], [▼], [◀], or [▶] key.**

📝 Note

- If other function icons are in the rows below and the **[▶]** key is pressed while the focus is at the right end of the current row, the function icons in the row directly below appear and the focus moves to the left end of this row directly below. If other function icons are not in the rows below and the **[▶]** key is pressed while the focus is at the right end of the current row, a Rollover Tone (1 beep) sounds from the transceiver, and then the focus moves to the left end of the current row.

- If other function icons are in the rows above and the **[◀]** key is pressed while the focus is at the left end of the current row, the function icons in the row directly above appear and the focus moves to the left end of this row directly above. If other function icons are not in the rows above and the **[◀]** key is pressed while the focus is at the left end of the current row, a Rollover Tone (1 beep) sounds from the transceiver, and then the focus moves to the right end of the current row.
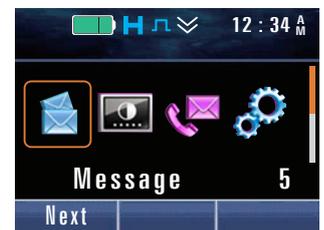
3 **Press the Menu ([⧉]) or [*] key.**
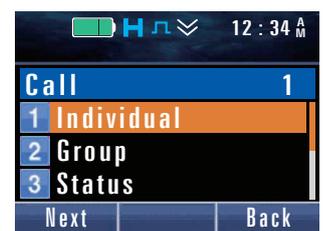
The Function List for the selected category appears.

4   **Select the function to be started from the Function List by pressing the [▲] or [▼] key.**

```
┌──────────────────────────────┐
│ ▭▯ H ⊓ ⌄        12 : 34 ᴬM     │
├──────────────────────────────┤
│ Call                       2 │
│ 1 Individual                 │
│ 2 Group                      │
│ 3 Status                     │
│   Next              Back     │
└──────────────────────────────┘
```

5   **Press the Menu ([▱]) or [*] key.**

The selected function functions.

```
┌──────────────────────────────┐
│ ▭▯ H ⊓ ⌄        12 : 34 ᴬM     │
├──────────────────────────────┤
│ Group                      1 │
│ Group 001                    │
│ Group 002                    │
│ Group 003                    │
│                     Back     │
└──────────────────────────────┘
```

Options for a function, such as "ON" and "OFF", can be selected by pressing the **[▲]** or **[▼]** key and then can be determined by pressing the **Menu** ([▱]) or **[*]** key.

```
┌──────────────────────────────┐
│ ▭▯ H ⊓ ⌄        12 : 34 ᴬM     │
├──────────────────────────────┤
│ Low TX Power               1 │
│ ◉ Off                        │
│ ◯ On                         │
│   OK                Back     │
└──────────────────────────────┘
```
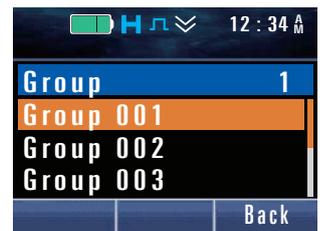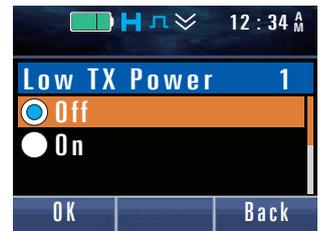
Example: Low Transmit Power

● **If "Small" is configured in Menu Icon Size**

1   **Press the Menu key.**

The transceiver enters Menu Mode and then the Category List appears.

```
┌──────────────────────────────┐
│ ▭▯ H ⊓ ⌄        12 : 34 ᴬM     │
├──────────────────────────────┤
│ Menu                       1 │
│ ♪ Audio/Tone                 │
│ ☏ Call                       │
│ ⟳ Scan                       │
│   Next                       │
└──────────────────────────────┘
```

2   **Select the Category List by pressing the [▲] or [▼] key.**

```
┌──────────────────────────────┐
│ ▭▯ H ⊓ ⌄        12 : 34 ᴬM     │
├──────────────────────────────┤
│ Menu                       2 │
│ ♪ Audio/Tone                 │
│ ☏ Call                       │
│ ⟳ Scan                       │
│   Next                       │
└──────────────────────────────┘
```

3   **Press the Menu ([▯]) or [*] key.**

The Function List for the selected category appears.

```
▭H n ⌄        12:34 A M
Call                  1
1 Individual
2 Group
3 Status
  Next            Back
```

4   **Select the function to be started from the Function List by pressing the [▲] or [▼] key.**

```
▭H n ⌄        12:34 A M
Call                  2
1 Individual
2 Group
3 Status
  Next            Back
```

5   **Press the Menu ([▯]) or [*] key.**

The selected function functions.

```
▭H n ⌄        12:34 A M
Group                 1
Group 001
Group 002
Group 003
                 Back
```

Options for a function, such as "ON" and "OFF", can be selected by pressing the **[▲]** or **[▼]** key and then can be determined by pressing the **Menu** (**[▯]**) or **[*]** key.

```
▭H n ⌄        12:34 A M
Low TX Power          1
◉ Off
● On
  OK             Back
```

Example: Low Transmit Power

📑 Note

- The category does not appear in Menu Mode when only one category is configured. When the transceiver enters Menu Mode, the functions registered in Menu Mode appear.
- Refer to "KEY OPERATIONS FOR EACH MODE" for the operation of each key in Menu Mode.

Configuration using KPG-D1/ D1N

Configuring Menu Mode (🔍See Transceiver Settings > Key Assignment > Menu)

3.5	Changing the Zone-channel

The Zone-channel can be changed using the **Selector** (Portable only) or **PF** keys.

Changing the Zone

The zone can be changed by operating the **Selector** (Portable only) or **PF** keys.

Portable

● **Changing the zone according to the number indicated by the pointer of the Selector**

Rotating the **Selector** causes the transceiver to migrate to the zone having the same number specified by the **Selector**. Zones that can be selected are limited to zone 1 to zone 16.

If an unprogrammed zone is selected, "***************" appears on the display.

This behavior can be realized by installing a stopper on the **Selector**, enabling **16 Zone/Channel Selector**, and assigning the Zone Select function to the **Selector**. (Refer to Available Functions for the Selector.)

● **Changing the zone regardless of the number indicated by the pointer of the Selector**

Rotating the **Selector** clockwise increases the zone number in steps of 1. Rotating the **Selector** counterclockwise decreases the zone number in steps of 1.

If an unprogrammed zone is selected, the zone will be skipped.

This behavior can be realized by disabling **16 Zone/Channel Selector** and assigning the Zone Up/ Down function to the **Selector**. (Refer to Available Functions for the Selector.)

● **Changing the zone by using the PF key**

Pressing the **Zone Up** key increases the zone number in steps of 1. Pressing the **Zone Down** key decreases the zone number in steps of 1.

If "Zone Up (Continuous)" or "Zone Down (Continuous)" is assigned to the **Zone Up** or **Zone Down** key, the zone number is increased or decreased continuously every 200 ms by pressing and holding the **Zone Up** or **Zone Down** key.

If an unprogrammed zone is selected, the zone will be skipped.

● **Changing the zone by using the Lever switch**

Positioning the **Lever** switch to the [A] position migrates the transceiver to the zone configured in **Zone A (Lever A Position)**.

Positioning the **Lever** switch to the [B] position migrates the transceiver to the zone configured in **Zone B (Lever B Position)**.

📋 Note

The operation for changing the zone changes depending on the configuration in **Rollover/ End Stop**. (Refer to Rollover/ End Stop.)

Mobile

Pressing the **Zone Up** key increases the zone number in steps of 1. Pressing the **Zone Down** key decreases the zone number in steps of 1. KCH-20R (Featured Panel) is operated by using the Selector just as Portable.

If "Zone Up (Continuous)" or "Zone Down (Continuous)" is assigned to the **Zone Up** or **Zone Down** key, the zone number is increased or decreased continuously every 200 ms by pressing and holding the **Zone Up** or **Zone Down** key.

If an unprogrammed zone is selected, the zone will be skipped.

📋 Note

The operation for changing the zone changes depending on the configuration in **Rollover/ End Stop**. (Refer to Rollover/ End Stop.)

Configuration using KPG-D1/ D1N

- Assigning functions to the **PF** keys on the transceiver (🔍See Transceiver Settings > Key Assignment)
- Configuring **16 Zone/Channel Selector** to be enabled or disabled (🔍See Transceiver Settings > Key Assignment > Top/Side)
- Configuring **Zone A (Lever A Position)** (🔍See Transceiver Settings > Key Assignment > Zone Select)
- Configuring **Zone B (Lever B Position)** (🔍See Transceiver Settings > Key Assignment > Zone Select)

Changing the Channel

The channel can be changed using the **Selector** (Portable only) or **PF** keys.

Portable

● **Changing the channel according to the number indicated by the pointer of the Selector**

Rotating the **Selector** causes the transceiver to migrate to the channel having the same number specified by the **Selector**. Channels that can be selected are limited to channel 1 to channel 16.

If an unprogrammed channel is selected, "**************" appears on the display.

This behavior can be realized by installing a stopper on the **Selector**, enabling **16 Zone/Channel Selector**, and assigning the Channel Select function to the **Selector**. (Refer to Available Functions for the Selector.)

● **Changing the channel regardless of the number indicated by the pointer of the Selector**

Rotating the **Selector** clockwise increases the channel number in steps of 1. Rotating the **Selector** counterclockwise decreases the channel number in steps of 1.

If an unprogrammed channel is selected, the channel will be skipped.

This behavior can be realized by disabling **16 Zone/Channel Selector** and assigning the Channel Up/ Down function to the **Selector**. (Refer to Available Functions for the Selector.)

● **Using the PF keys**

Pressing the **Channel Up** key increases the channel number in steps of 1. Pressing the **Channel Down** key decreases the channel number in steps of 1.

If "Channel Up (Continuous)" or "Channel Down (Continuous)" is assigned to the **Channel Up** or **Channel Down** key, the channel number increases or decreases continuously at 200 ms intervals by pressing and holding the **Channel Up** or **Channel Down** key.

If an unprogrammed channel is selected, the channel will be skipped.

📝 Note

The operation for changing the channel changes depending on the configuration in **Rollover/ End Stop**. (Refer to Rollover/ End Stop.)

Mobile

Pressing the **Channel Up** key increases the channel number in steps of 1. Pressing the **Channel Down** key decreases the channel number in steps of 1. KCH-20R (Featured Panel) is operated by using the Selector just as Portable.

If "Channel Up (Continuous)" or "Channel Down (Continuous)" is assigned to the **Channel Up** or **Channel Down** key, the channel number increases or decreases continuously at 200 ms intervals by pressing and holding the **Channel Up** or **Channel Down** key.

If an unprogrammed channel is selected, the channel will be skipped.

📝 Note

The operation for changing the channel changes depending on the configuration in **Rollover/ End Stop**. (Refer to Rollover/ End Stop.)

Configuration using KPG-D1/ D1N

- Assigning functions to the **PF** keys on the transceiver (🔍See Transceiver Settings > Key Assignment)
- Configuring **16 Zone/Channel Selector** to be enabled or disabled (🔍See Transceiver Settings > Key Assignment > Top/Side)

Rollover/ End Stop

Rollover/ End Stop is the method to configure how a zone or channel migrates when changing the zone or channel using the **PF** keys or **Selector** on the transceiver.

The zone or channel migrates as below depending on the configuration using KPG-D1/ D1N when changing the zone or channel using the **PF** keys or **Selector** on the transceiver.

Table 3-5 Rollover/ End Stop

Configuration	Description
Rollover	A Rollover Tone (1 beep) sounds from the transceiver and the transceiver migrates to the zone or channel having the lowest number when attempting to increase the zone or channel number while the zone or channel having the largest number is selected.
	The transceiver migrates to the zone or channel having the largest number when attempting to decrease the zone or channel number while the zone or channel having the lowest number is selected.
End Stop	The zone or channel in the range between the highest and lowest numbers can be selected. The zone or channel number is not looped. A Stop Tone (1 beep) sounds from the transceiver and the transceiver does not migrate to a different zone or channel when attempting to increase the zone or channel number while the zone or channel having the largest number is selected. Also, a Stop Tone (1 beep) sounds from the transceiver and the transceiver does not migrate to a different zone or channel when attempting to decrease the zone or channel number while the zone or channel having the lowest number is selected.

Configuration using KPG-D1/ D1N

Configuring **Rollover/ End Stop** (🔍See Transceiver Settings > Optional Features > Optional Features 1 > Others)

Changing the Channel by Specifying the Number (Channel Entry)

Channel Entry can be used to directly migrate to the channel to be used.

For use of this function, pressing the **Channel Entry** or **Group ID/Channel Entry** keys causes the transceiver to enter Channel Entry Mode.

● Using the Channel Entry key

The channel number in the current zone can be specified by directly entering numbers after pressing the **Channel Entry** key.

Also, if "Channel Entry" is configured in **Keypad Operation**, the channel number can be specified by pressing the **[0]** to **[9]** keys on the keypad even if the **Channel Entry** key is not pressed.

● Using the Group ID/Channel Entry key

While a zone other than an NXDN Trunking system zone is selected, the channel in the current zone can be specified by directly entering numbers after pressing the **Group ID/Channel Entry** key.

Also, if "Group ID/Channel Entry" is configured in **Keypad Operation**, the channel can be specified by pressing the **[0]** to **[9]** keys on the keypad while a zone other than an NXDN Trunking system zone is selected.

The transceiver automatically recognizes the digits of the highest channel number configured for the transceiver. The channel number can be entered within this range of digits.

Operating the transceiver

1 **Press the Channel Entry key, or press the Group ID/Channel Entry key after selecting a zone other than an NXDN Trunking system zone.**

The transceiver enters Channel Entry Mode.

The following operations are identical even if the transceiver enters Channel Entry Mode by using the keypad.

2 **Enter the channel number.**

The following are examples for entering a channel number by using the keypad.

- If the maximum channel number has 3 digits:

    To make a call on channel 250, press the **[2]**, **[5]** and **[0]** keys in this order.

    To make a call on channel 90, press the **[0]**, **[9]** and **[0]** keys in this order.

    To make a call on channel 7, press the **[0]**, **[0]** and **[7]** keys in this order.

- If the maximum channel number has 2 digits:

    To make a call on channel 90, press the **[9]** and **[0]** keys in this order.

    To make a call on channel 7, press the **[0]** and **[7]** keys in this order.

- If the maximum channel number has 1 digit:

    To make a call on channel 7, press the **[7]** key.

    If the maximum number of digits is entered, the transceiver exits Channel Entry Mode and then migrates to the channel of the entered channel number.

3 **Press the Menu ([▢]) key.**

The transceiver exits Channel Entry Mode and then migrates to the channel of the entered number.

If there is no channel of the entered channel number, a Key-entry Error Tone (1 beep) sounds from the transceiver, and then the transceiver exits Channel Entry Mode.

📝 Note

- Refer to "KEY OPERATIONS FOR EACH MODE" for key operations for entering the channel number in Channel Entry Mode.

- The channel number selected before the transceiver enters Channel Entry Mode appears on the display, such as "[001]".

    Pressing the **Menu** ([▢]) or **[*]** key while no channel number is entered causes the transceiver to exit Channel Entry Mode and then to return to this channel number.

- If the transceiver exits Channel Entry Mode by pressing the **Home** ([🏠]) key, the transceiver returns to the channel selected before the transceiver entered Channel Entry Mode.

- Pressing the **PTT** switch while in Channel Entry Mode causes the transceiver to transmit on the channel selected before the transceiver entered Channel Entry Mode.

- If the channel is changed while in Channel Entry Mode, pressing the **PTT** switch initiates transmission on the channel to which the transceiver has changed.

- If no key is pressed before the amount of time configured in **Mode Reset Timer** elapses, the transceiver exits Channel Entry Mode and then returns to the channel selected before the transceiver entered Channel Entry Mode.

Configuration using KPG-D1/ D1N

Assigning functions to the **PF** keys on the transceiver (🔍See Transceiver Settings > Key Assignment)

Changing the Group ID by Specifying the ID (Group ID Entry) (NXDN Trunking System Only)

Group ID Entry is the function to migrate the transceiver to the channel with the Group ID which is directly selected and to be used in an NXDN Trunking system.

The Group ID to be used can be specified by directly entering a Group ID after pressing the **Group ID/Channel Entry** key when a zone in an NXDN Trunking system is selected.

Also, if "Group ID/Channel Entry" is configured in **Keypad Operation**, the Group ID can be specified by pressing the **[0]** to **[9]** keys on the keypad while a zone in an NXDN Trunking system is selected.

By specifying a Group ID configured for a zone in an NXDN Trunking system, the transceiver can migrate to a channel with the Group ID.

The transceiver automatically recognizes the digits of the highest Group ID in all the zones in an NXDN Trunking system configured for the transceiver.

Operating the transceiver

1 **Press the Group ID/Channel Entry key after an NXDN Trunking system zone is selected.**

The transceiver enters Group ID Entry Mode.

The following operations are identical even if the transceiver enters Group ID Mode by using the keypad.

2 **Enter a Group ID.**

The following are examples for entering a Group ID by using the keypad.

- If the maximum Group ID has 5 digits:

    To enter Group ID 21250, press the **[2]**, **[1]**, **[2]**, **[5]** and **[0]** keys in this order.
    To enter Group ID 1250, press the **[0]**, **[1]**, **[2]**, **[5]** and **[0]** keys in this order.
    To enter Group ID 250, press the **[0]**, **[0]**, **[2]**, **[5]** and **[0]** keys in this order.
    To enter Group ID 90, press the **[0]**, **[0]**, **[0]**, **[9]** and **[0]** keys in this order.
    To enter Group ID 7, press the **[0]**, **[0]**, **[0]**, **[0]** and **[7]** keys in this order.

- If the maximum Group ID has 4 digits:

    To enter Group ID 1250, press the **[1]**, **[2]**, **[5]** and **[0]** keys in this order.
    To enter Group ID 250, press the **[0]**, **[2]**, **[5]** and **[0]** keys in this order.
    To enter Group ID 90, press the **[0]**, **[0]**, **[9]** and **[0]** keys in this order.
    To enter Group ID 7, press the **[0]**, **[0]**, **[0]** and **[7]** keys in this order.

- If the maximum Group ID has 3 digits:

    To enter Group ID 250, press the **[2]**, **[5]** and **[0]** keys in this order.
    To enter Group ID 90, press the **[0]**, **[9]** and **[0]** keys in this order.
    To enter Group ID 7, press the **[0]**, **[0]** and **[7]** keys in this order.

- If the maximum Group ID has 2 digits:

    To enter Group ID 90, press the **[9]** and **[0]** keys in this order.
    To enter Group ID 7, press the **[0]** and **[7]** keys in this order.

- If the maximum Group ID has 1 digit:

    To enter Group ID 7, press the **[7]** key.

If the maximum number of digits is entered, the transceiver exits Group ID Entry Mode and then migrates to the channel of the entered Group ID.

3 Press the Menu ([⬚]) key.

The transceiver exits Group ID Entry Mode and then migrates to the channel of the entered Group ID.

If there is no channel with the entered Group ID, a Key-entry Error Tone (1 beep) sounds from the transceiver, and then the transceiver exits Group ID Entry Mode.

📝 Note

- Refer to "KEY OPERATIONS FOR EACH MODE" for key operations for entering the Group ID in Group ID Entry Mode.
- Pressing the **PTT** switch while in Group ID Entry Mode causes the transceiver to transmit on the channel selected before the transceiver entered Group ID Entry Mode. If the channel is changed while in Group ID Entry Mode, pressing the **PTT** switch initiates transmission on the channel to which the transceiver has changed.

Configuration using KPG-D1/ D1N

Assigning functions to the **PF** keys on the transceiver (🔍See Transceiver Settings > Key Assignment)

Changing the Channel with a Single Touch

The channel can be changed with a single touch by using the Home Channel or Direct Channel function.

Home Channel

Home Channel is the function to migrate the transceiver to a preconfigured channel by pressing the **Home Channel** key. The transceiver can move to and from channels in the same zone.

Also, pressing the **Home Channel Select** key can change the Home Channel.

Or, pressing the **Menu** key causes the transceiver to enter Menu Mode, and then the Home Channel can be changed by selecting "Home Channel Select". (Refer to Using Menu Mode.)

📝 Note

If the **Home Channel** key is pressed during the scan, the transceiver pauses scanning while the transceiver is migrating to the Home Channel, and then a Scan Stop Tone (2 beeps) continuously sounds from the transceiver at 30-sec intervals.

Operating the transceiver

● **Migrating to the Home Channel**

1 Press the Home Channel key.

A Key Beep A (1 beep) sounds from the transceiver, and then the transceiver migrates to the Home Channel configured for the selected zone. "Home" appears on the display.

```
🔋 H ♫ ⌄        12 : 34 ᴬᴹ

Home
Zone 1
Channel 1

Menu   Zone+
```
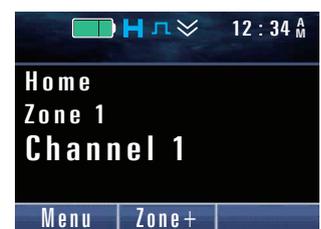
2 **Press the Home Channel key again.**

A Key Beep B (2 beeps) sounds from the transceiver, and then the transceiver returns to the previous channel.

Zone 1
Channel 15

Menu | Zone+

● **Changing the Home Channel**

1 **Select the channel to be configured as the Home Channel.**

Zone 1
Channel 15

Menu | Zone+

2 **Press the Home Channel Select key.**

A Key Beep C (3 beeps) sounds from the transceiver, and then the Home Channel is changed. "Home" appears on the display at the same time.

Home
Zone 1
Channel 15

Menu | Zone+

Configuration using KPG-D1/ D1N

● Configuring **Home Channel** (🔍See Transceiver Settings > Zone/Channel > Zone Edit > General)

● Assigning functions to the **PF** keys on the transceiver (🔍See Transceiver Settings > Key Assignment)

Direct Channel

Direct Channel is the function to migrate the transceiver to a preconfigured channel by pressing one of the **Direct Channel 1** to **Direct Channel 5** keys. The transceiver can move to and from channels in each zone.

Also, pressing one of the **Direct Channel 1 Select** to **Direct Channel 5 Select** keys can change the Direct Channel.

Or, pressing the **Menu** key causes the transceiver to enter Menu Mode, and then the Direct Channel can be changed by selecting one of "Direct Channel 1 Select" to "Direct Channel 5 Select". (Refer to Using Menu Mode.)

📝 Note

If the Return function is enabled, pressing one of the **Direct Channel 1** to **Direct Channel 5** keys during the scan pauses scanning while the transceiver is migrating to the Direct Channel, and then a Scan Stop Tone (2 beeps) continuously sounds from the transceiver at 30-sec intervals.

Operating the transceiver

● **Migrating to the Direct Channel**

1 Press one of the Direct Channel 1 to Direct Channel 5 keys.

A Key Beep A (1 beep) sounds from the transceiver, and then the transceiver migrates to the Direct Channel regardless of the selected zone. "DRn" appears on the display. The selected Direct Channel number is entered in "n".

	H ⊓ ⌄ 12 : 34 AM
	DR1
	Zone 1
	Channel 1
	Menu Zone +

If the same Direct Channel key is pressed again while the **Return** function is enabled, a Key Beep B (2 beeps) sounds from the transceiver, and then the transceiver returns to the previous channel.

	H ⊓ ⌄ 12 : 34 AM
	Zone 1
	Channel 15
	Menu Zone +
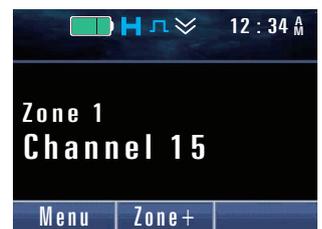
● **Changing the Direct Channel**

1 Select the channel to be configured as the Direct Channel.

	H ⊓ ⌄ 12 : 34 AM
	Zone 1
	Channel 15
	Menu Zone +

2 Press one of the Direct Channel 1 Select to Direct Channel 5 Select keys.

A Key Beep C (3 beeps) sounds from the transceiver, and then the Direct Channel is changed. "DRn" appears on the display at the same time.

	H ⊓ ⌄ 12 : 34 AM
	DR1
	Zone 1
	Channel 15
	Menu Zone +

Configuration using KPG-D1/ D1N

● Configuring **Direct Channel** (🔍See Transceiver Settings > Key Assignment > Direct Channel)

● Configuring the **Return** function to be enabled or disabled (🔍See Transceiver Settings > Key Assignment > Direct Channel)

● Assigning functions to the **PF** keys on the transceiver (🔍See Transceiver Settings > Key Assignment)

Common FUNC (K, F)/Ver 2.20

3.6	**Transmitting/ Receiving**

The **PTT** switch can be used to transmit and receive.

Receiving

Received audio sounds from the speaker when the transceiver receives a signal and conditions to unmute the speaker are satisfied. To respond, speak into the microphone while pressing the **PTT** switch.

Transmitting

Transmitting can be initiated by selecting the desired Zone-channel and then pressing the **PTT** switch. Audio is transmitted by speaking into the microphone while pressing the **PTT** switch. Releasing the **PTT** switch terminates transmitting.

Conditions to unmute the speaker while receiving, the transceiver behavior while transmitting, or communication methods, such as an individual call or group call, vary according to the system in use. Refer to each Function Reference for communication methods in each system.

In addition, for Mobile, various communications can be done using the external ports of the transceiver. Refer to "D-sub 25-pin Connector" for the function of the external ports of Mobile.

📝 Note

Audio characteristics of the microphone and speaker for transmitting and receiving can be configured in **Audio Profile**. (Refer to Configuring Audio Profile (Audio Profile).)

3.7	Viewing the Receive History (Stack)

In Stack Mode, the incoming call history (Caller ID) can be viewed. In an analog system (FleetSync/ MDC-1200/ 5-tone), an NXDN system, or a DMR Conventional system, in addition to the incoming call history, received Status Messages and Short Messages can be viewed in Stack Mode. Received IDs and messages are stored in the stack memory of the transceiver.

In order to store the received IDs and various messages in the stack memory of the transceiver, Caller ID Stack, Status Message Stack, or Short Message Stack needs to be individually enabled by using KPG-D1/ D1N.

The " ✉ " icon appears if messages are stored in the transceiver. If there is an unread message, the " ✉ " icon blinks.

Pressing the **Stack** key causes the transceiver to enter Stack Mode. Or, pressing the **Menu** key causes the transceiver to enter Menu Mode, and then selecting "Stack" will cause the transceiver to enter Stack Mode. (Refer to Using Menu Mode.)

The maximum number of stack data that can be stored

● **Caller ID/ Status Message**

A maximum of 250 Caller IDs and Status Messages in total can be stored in the stack memory.

📋 Note

Depending on the configuration of **Old Message Overwrite**, the stack data is deleted or stored like the following examples: (Refer to Stack Procedure of the Receive History (Old Message Overwrite).)

If the configuration is to automatically delete the old data:

Assume that one voice call and 249 Status Messages are stored, and that the voice call is the oldest data. In this case, if a newly received Status Message is stored, the data of the voice call is deleted and 250 Status Messages are stored.

If the configuration is not to automatically delete the old data:

Assume that 250 Status Messages are stored. In this case, even if a new voice call is received, the voice call is not stored because 250 Status Messages are stored.

● **Short Message**

The maximum number of Short Message data that can be stored in the transceiver stack memory varies as follows depending on the configuration of **Short Message Stack** in each communication protocol.

Table 3-6 No. of Short Message Data That can be Stored

Short Message Stack Configuration				No. of Data that Can be Saved
FleetSync	NXDN	P25	DMR	
Disabled	Disabled	Disabled	Disabled	0
Enabled	Disabled	Disabled	Disabled	128
Disabled	Enabled	Disabled	Disabled	128
Enabled	Enabled	Disabled	Disabled	128
Disabled	Disabled	Enabled	Disabled	64
Enabled	Disabled	Enabled	Disabled	64
Disabled	Enabled	Enabled	Disabled	64
Enabled	Enabled	Enabled	Disabled	64
Disabled	Disabled	Disabled	Enabled	32
Enabled	Disabled	Disabled	Enabled	32
Disabled	Enabled	Disabled	Enabled	32
Enabled	Enabled	Disabled	Enabled	32
Disabled	Disabled	Enabled	Enabled	32
Enabled	Disabled	Enabled	Enabled	32

📧 Note

The following are the notes only for an NXDN Conventional system and NXDN Trunking system:
- If the transceiver receives a Group Call from a telephone, the Caller ID is replaced with "Phone Call" and stored in the stack memory of the transceiver.
- The Caller ID stored by the transceiver receiving a Group Call from a telephone cannot be called.

Operating the transceiver

● **Confirming the message**

1	**Press the Stack key.**

A Key Beep A (1 beep) sounds from the transceiver and the transceiver enters Stack Mode. The subsequent operations are identical even if the transceiver enters Stack Mode by pressing the **Menu** key.

The display when the transceiver enters Stack Mode varies depending on the configurations of **Caller ID Stack**, **Status Message Stack**, and **Short Message Stack** in each communication protocol, and depending on the presence of stored data.

- **If data is stored with 2 items or more among Caller ID Stack, Status Message Stack, and Short Message Stack enabled**

  The category display appears. Proceed to step 2.
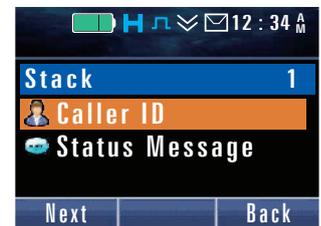
- **If data is stored with only Caller ID Stack enabled**

  The list of stored Caller IDs appears. Proceed to step 3.

- **If data is stored with only Status Message Stack enabled**

  The list of stored Status Messages appears. Proceed to step 3.
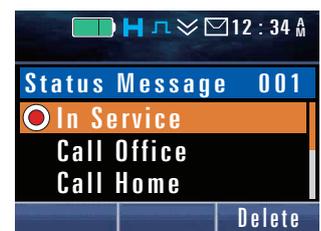
- **If data is stored with only Short Message Stack enabled**

  The list of stored Short Messages appears. Proceed to step 3.

📧 Note

- If no data is stored, "Empty" appears on the display for 1 sec and the transceiver cannot enter Stack Mode.
- If at least one system whose **Signaling Type** is 5-tone is configured, the transceiver determines that **Caller ID Stack**, **Status Message Stack**, and **Short Message Stack** are all enabled, and the transceiver migrates to the category display.

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2 Select any of the "Caller ID", "Status Message", or "Short Message" categories and press the **Menu** (**[▤]**) or **[＊]** key.

The list for the selected category appears.

> **Note**
> If no data is stored, a Key Beep A (1 beep) sounds from the transceiver and "Empty" appears on the display.

The number of the stored stack data appears at the upper right of the display. Depending on the type of stack data, the following icons appear at the left end of each stack data:

Table 3-7 Stack Mode

Message Type	Display	
	Unread	Read
Caller ID		
Status Message		
Short Message		
Unread Stack		-

3 Press the **[▲]** or **[▼]** key to select the data and confirm.

Refer to "Selecting or Clearing Data from a List" for selection methods.

For Short Message, if the **Menu** (**[▤]**) or **[*]** key is pressed, a Key Beep A (1 beep) sounds from the transceiver and the selected Short Message appears.
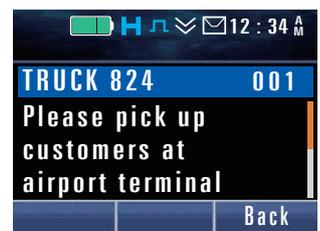
> **Note**
> If the Short Message does not fit on one screen, press the **[▲]** or **[▼]** key to scroll lines up and down, and confirm the entire message.

● **Switching the message display**

1 **Press the [◀] or [▶] key.**

The display switches as follows:

[◀] key:
- Caller ID

  Caller ID List → Receive Channel List → Receive Date and Time List → Caller ID List → ...
- Status/ Short Message

  Status/ Short Message List → Caller ID List → Receive Channel List → Receive Date and Time List → Status/ Short Message List → ...

[▶] key:
- Caller ID

  Caller ID List → Receive Date and Time List → Receive Channel List → Caller ID List → ...
- Status/ Short Message

  Status/ Short Message List → Receive Date and Time List → Receive Channel List → Caller ID List → Status/ Short Message List → ...

● **Status/ Short Message list**

The received Status Messages and Short Messages are displayed.
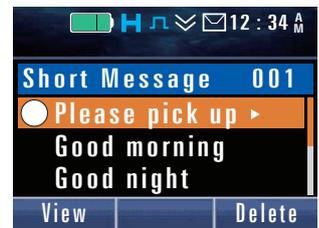
● **Caller ID Name list**

The ID Names of the transceivers which sent messages are displayed. If a Caller ID is displayed, press the **PTT** switch to respond. (Only if the type of the stored message is Caller ID.)

● **Receive channel list**

The channel names of the transceivers which received messages are displayed.
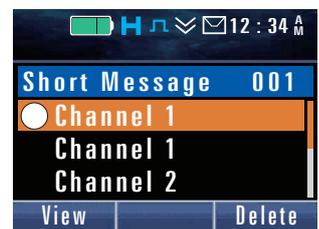
● **Receive date and time list**

The dates and times of received messages are displayed.

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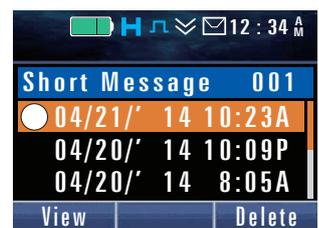
📑 Note

- The receive date and time list is displayed only if **Time Stamp** is enabled. (Refer to Time Stamp.)
- Refer to Selecting or Clearing Data from a List for instructions on how to clear a message.
- For Caller ID Stack, if **System Type** of the selected channel when the transceiver enters Stack Mode does not match **System Type** of the stack data, a Warning Tone A (continuous beep) sounds from the transceiver and transmission is unavailable even if the **PTT** switch is pressed. Also in this case, even if the **Menu** ([☐]) key is pressed, a Key-entry Error Tone (1 beep) sounds from the transceiver and transmission is unavailable.

Configuration using KPG-D1/ D1N

- Assigning functions to the **PF** keys on the transceiver (🔍See Transceiver Settings > Key Assignment)
- Configuring **Caller ID Stack** (P25) (🔍See Transceiver Settings > P25 > P25 Information > General > Stack)
- Configuring **Caller ID Stack** (NXDN) (🔍See Transceiver Settings > NXDN > NXDN Information > General > Stack)
- Configuring **Caller ID Stack** (FleetSync) (🔍See Transceiver Settings > FleetSync > FleetSync Information > General > Stack)
- Configuring **Caller ID Stack** (MDC-1200) (🔍See Transceiver Settings > MDC-1200 > MDC-1200 Information > General > Stack)
- Configuring **Status Message Stack** (NXDN) (🔍See Transceiver Settings > NXDN > NXDN Information > General > Stack)
- Configuring **Status Message Stack** (NXDN) (🔍See Transceiver Settings > NXDN > NXDN Information > General > Stack)
- Configuring **Caller ID Stack** (DMR) (🔍See Transceiver Settings > DMR > DMR Information > General > Stack)
- Configuring **Status Message Stack** (DMR) (🔍See Transceiver Settings > DMR > DMR Information > General > Stack)
- Configuring **Short Message Stack** (DMR) (🔍See Transceiver Settings > DMR > DMR Information > General > Stack)
- Configuring **Short Message Stack** (FleetSync) (🔍See Transceiver Settings > FleetSync > FleetSync Information > General > Stack)
- Configuring **Short Message Stack** (FleetSync) (🔍See Transceiver Settings > FleetSync > FleetSync Information > General > Stack)

Configuring the Display Order of Data in Stack Mode (Stack Order)

Stack Order is the display order of data in Stack Mode.

Depending on the configuration of **Stack Order**, the data is displayed in Stack Mode as follows:

Table 3-8 Stack Order

Configuration	Description
Descending	The newest data appears on the first line of the list.
Ascending	The oldest data appears on the first line of the list.

Configuration using KPG-D1/ D1N

Configuring **Stack Order** (🔍See Transceiver Settings > Optional Features > Optional Features 1 > Stack)

Enabling the Storage of Redundant Data (Repeated Calls Stack)

Repeated Calls Stack is the function to enable the storage of redundant data.

If **Repeated Calls Stack** is enabled, a Caller ID or message is stored as new data in the stack memory of the transceiver even if the same Caller ID or message has been previously received.

Configuration using KPG-D1/ D1N

Configuring **Repeated Calls Stack** to be enabled or disabled (🔍See Transceiver Settings > Optional Features > Optional Features 1 > Stack)

Displaying the Caller ID when Displaying a Message (Caller ID for Message)

Caller ID for Message is the function to display the Caller ID of the stored data when the Status Message or Short Message is displayed in Stack Mode.

Configuration using KPG-D1/ D1N

Configuring **Caller ID for Message** to be enabled or disabled (🔍See Transceiver Settings > Optional Features > Optional Features 1 > Stack > Message Display)

Displaying the Receive Channel (Channel Name (Message Display))

Channel Name (Message Display) is the function to display the receive channel of the stored data in Stack Mode.

Configuration using KPG-D1/ D1N

Configuring **Channel Name (Message Display)** to be enabled or disabled (🔍See Transceiver Settings > Optional Features > Optional Features 1 > Stack > Message Display)

Stack Procedure of the Receive History (Old Message Overwrite)

Old Message Overwrite is the method to store the received Caller IDs, Status Messages, and Short Messages in the stack memory of the transceiver.

Table 3-9 Old Message Overwrite

Configuration	Description
Enabled	The transceiver stores a received ID or message in the stack memory in the order of receipt to the maximum number of received IDs and messages. If IDs or messages are received in excess of the maximum number of received IDs and messages, the oldest stored ID or message is deleted and the new ID or message is stored in the stack memory. In Stack Mode, the newest stack data is displayed as list number 1.
Disabled	The transceiver stores a received ID or message in the stack memory in the order of receipt to the maximum number of received IDs and messages. If IDs or messages are received in excess of the maximum number of received IDs and messages, the ID or message is not stored in the stack memory. In Stack Mode, the oldest stack data is displayed as list number 1.

Configuration using KPG-D1/ D1N

Configuring **Old Message Overwrite** to be enabled or disabled (🔍See Transceiver Settings > Optional Features > Optional Features 1 > Stack)

Caller ID Stack

Caller ID Stack is the function to store IDs of callers in the stack memory.

The transceiver can store a maximum of 250 Caller IDs.

By selecting a Caller ID and pressing the **PTT** switch while in Stack Mode, the transceiver can respond to the Caller ID.

When the transceiver receives a call, the " ✉ " icon blinks to notify that the ID is being saved. If the transceiver enters Stack Mode, a user can check the stored IDs.

About the Caller ID Stack configuration

The transceiver behaves as follows according to the configuration in **Caller ID Stack**:

Table 3-10 Caller ID Stack

Configuration	Description
None	The Caller ID is not stored even if a call is received.
Individual Call	Only the Caller ID of an Individual Call or Paging Call is stored.
Any Call	The Caller IDs of all calls are stored. However, the Caller IDs of Unaddressed Calls and Broadcast Group Calls are not stored in a DMR Conventional system.

📝 Note

- The transceiver stores in combination a maximum of 250 Caller IDs and Status Messages in the stack memory. If no Status Message is stored, the transceiver stores up to 250 Caller IDs.
- The storage method varies depending on the configuration in **Old Message Overwrite**.

Configuration using KPG-D1/ D1N

- Configuring **Caller ID Stack** (P25) to be enabled of disabled (🔍 See Transceiver Settings > P25 > P25 Information > General > Stack)

- Configuring **Caller ID Stack** (NXDN) (🔍 See Transceiver Settings > NXDN > NXDN Information > General > Stack)

- Configuring **Caller ID Stack** (FleetSync) (🔍 See Transceiver Settings > FleetSync > FleetSync Information > General > Stack)

- Configuring **Caller ID Stack** (MDC-1200) (🔍 See Transceiver Settings > MDC-1200 > MDC-1200 Information > General > Stack)

- Configuring **Caller ID Stack** (DMR) (🔍 See Transceiver Settings > DMR > DMR Information > General > Stack)

Time Stamp

Time Stamp is the function to store a Caller ID, Status Message or Short Message with the stamp of the received time in the stack memory.

Configuration using KPG-D1/ D1N

Configuring **Time Stamp** (🔍See Transceiver Settings > Optional Features > Optional Features 1 > Stack > Message Display)

Message Memory

Message Memory is the function to retain the stored Caller IDs, Status Messages, or Short Messages in the stack memory of the transceiver even after the transceiver is turned OFF.

Configuration using KPG-D1/ D1N

Configuring **Message Memory** (🔍See Transceiver Settings > Optional Features > Optional Features 1 > Stack)

Clear Caller ID Stack on Reply

Clear Caller ID Stack on Reply is the function to clear a Caller ID from the stack memory of the transceiver if the Caller ID stored in the stack memory is selected and called.

This function is used if not storing used Caller IDs in the stack memory of the transceiver.

If this function is enabled, a Caller ID is cleared from the stack memory of the transceiver if the Caller ID stored in the stack memory is selected and called. The Caller ID is cleared from the stack memory even if a call cannot be initiated since the channel is busy. If the transceiver receives a response from the target party, the Caller ID is not stored in the stack memory while the **Auto Reset Timer** is counting down.

Also, the Caller ID of the calling party is store in the stock memory when the transceiver receives a call, but the Caller ID is cleared from the stack memory if a response is initiated while the **Auto Reset Timer** is counting down. Subsequently, the Caller ID is not stored in the stack memory even if a call from the same party is received while the **Auto Reset Timer** is counting down.

Configuration using KPG-D1/ D1N

- Configuring **Clear Caller ID Stack on Reply** (NXDN) to be enabled or disabled (🔍See Transceiver Settings > NXDN > NXDN Information > General)
- Configuring **Clear Caller ID Stack on Reply** (DMR) to be enabled or disabled (🔍See Transceiver Settings > DMR > DMR Information > General)

| 3.8 | Operating the Transceiver in Each Mode (Common Operation) |

This section describes operations common to transceivers, such as list selection, character entry, etc.

Selecting or Clearing Data from a List

This section explains operations using operating examples for Individual Call Mode and Playback Mode.

● **Selecting data from a list by using the [▲] or [▼] key**
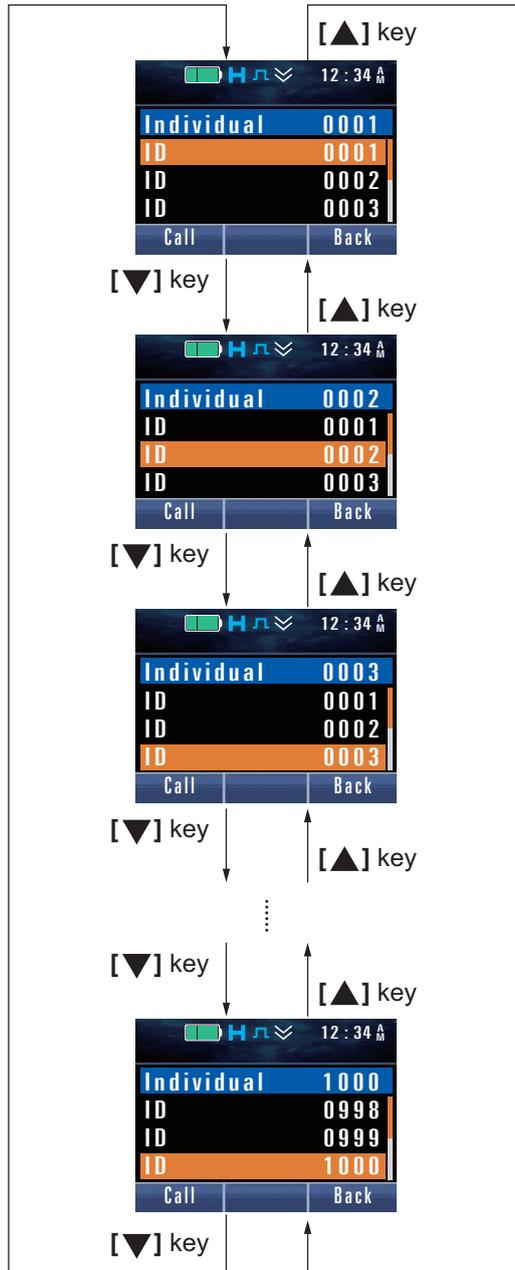
📝 Note

- The list number automatically scrolls up or down continuously while the **[▲]** or **[▼]** key is pressed and held.
- The displays above are the displays when **Individual Call Acknowledge Request** in an NXDN Conventional system is enabled.

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● **Selecting data from a list by using the keypad (Shortcut Entry)**

The following are the operation examples for selecting "ID 0002", "ID 0024" or "ID 0245" from a Unit ID List in Individual Call Mode:

Selecting "ID 0002":

Press the **[0]** and **[2]** keys on the keypad in this order, and then press the **Menu** ([⌷]) or **[*]** key (OK) to fix.

Selecting "ID 0024":

Press the **[0]**, **[2]** and **[4]** keys on the keypad in this order, and then press the **Menu** ([⌷]) or **[*]** key (OK) to fix.

Selecting "ID 0245":

Press the **[0]**, **[2]**, **[4]**, and **[5]** keys on the keypad in this order.
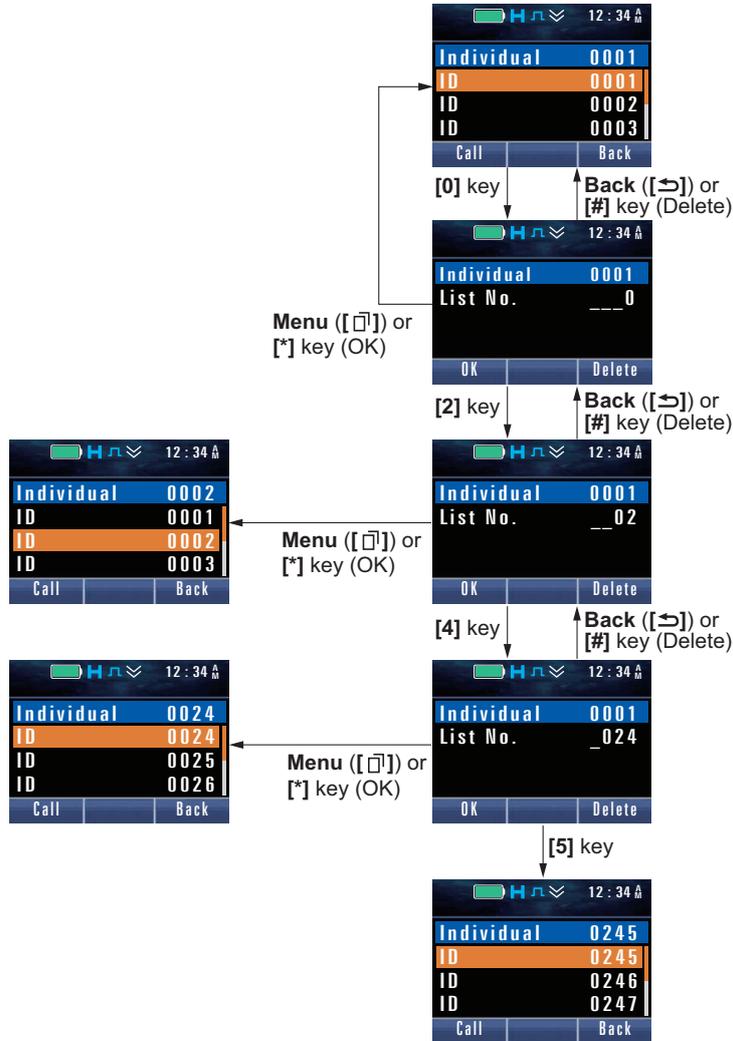
> 📋 Note

- The following are the main keys to be used for these operation examples:

    To determine: the **Menu** ([⌷]) or **[*]** key

    To delete one character: the **Back** ([⇐]) or **[#]** key

- The number of digits to be entered varies as follows depending on the highest list number configured in the transceiver:
  - If the highest list number is lower than 10: one digit
  - If the highest list number is 10 or higher and lower than 100: two digits
  - If the highest list number is 100 or higher and lower than 1000: three digits
  - If the highest list number is 1000 or higher: four digits
- If the entered number does not exist when it is determined, the transceiver restores the previous display prior to entering the number.
- The displays above are the displays when **Individual Call Acknowledge Request** in an NXDN Conventional system is enabled.

● **Clearing data from a list**

The following are the operation examples for clearing recorded data in Playback Mode:

Back ([↰]) or
[#] key (Back)

Back ([↰]) or [#] key (Back)

Back ([↰]) or
[#] key (Delete) *1

If pressing and holding
the **Back** ([↰]) or **[#]** key
as it stands in*1:

Menu ([▯]) or **[*]** key (OK)

Menu ([▯]) or **[*]** key (OK)

1 second later
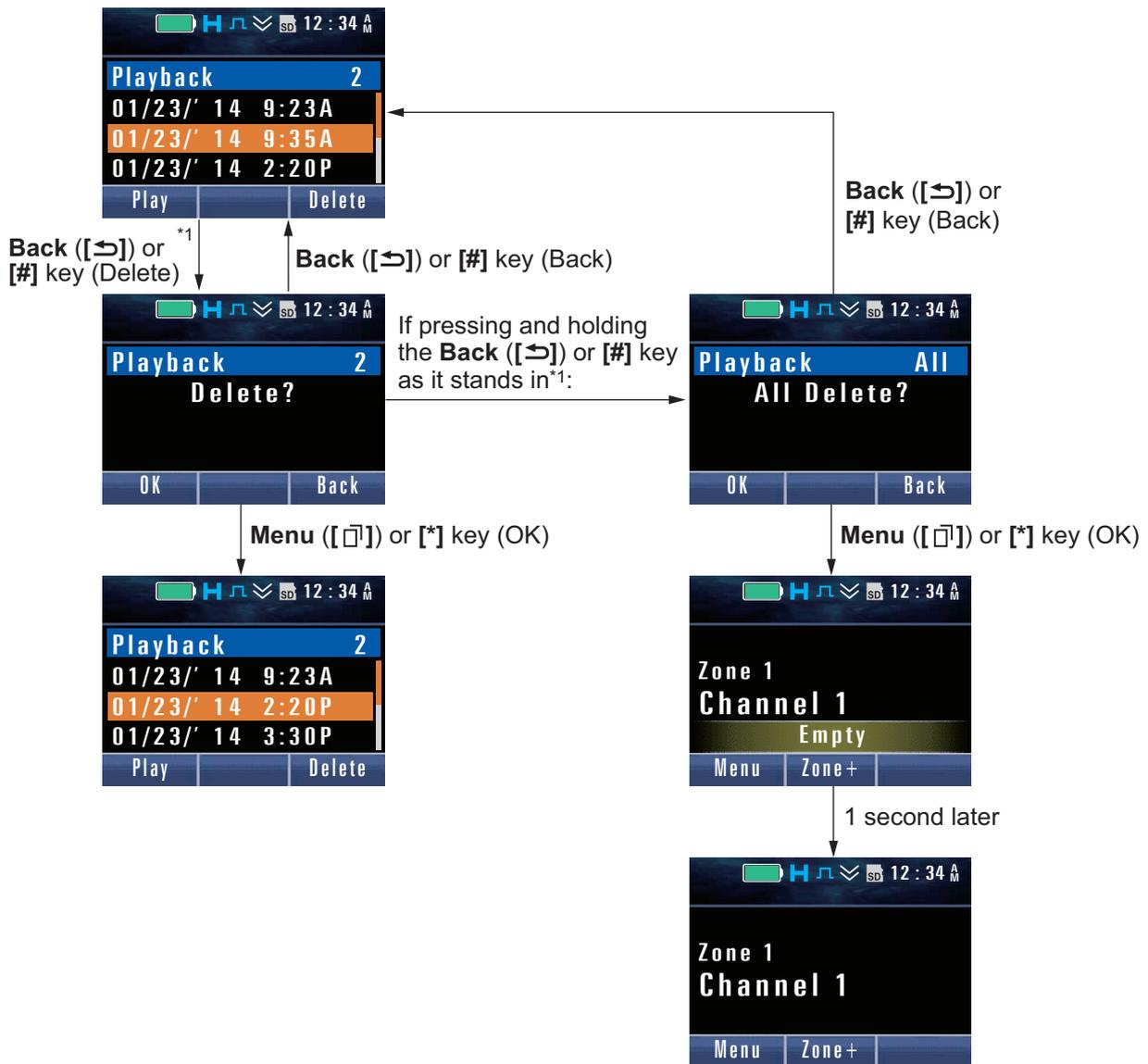
📝 Note

The following are the main keys to be used for these operation examples:

To clear one piece of data: Press the **Back** ([↰]) or **[#]** key.

To clear all data: Press and hold the **Back** ([↰]) or **[#]** key.

To determine: the **Menu** ([▯]) or **[*]** key

Entering or Deleting a Code

This section explains operations using operating examples for Individual Call Mode. The displays used in this section are the displays when **Individual Call Acknowledge Request** in an NXDN Conventional system is enabled.

● **Entering a code using the [▲] or [▼] key**

The following is the operation example to enter "ID 12" in Individual Call Mode:

| [▲] or [▼] key

Select "1". | **Menu** ([▢]) or **[*]** key (Select)

| [▲] or [▼] key

Select "2". | **Menu** ([▢]) or **[*]** key (Select)

⋮
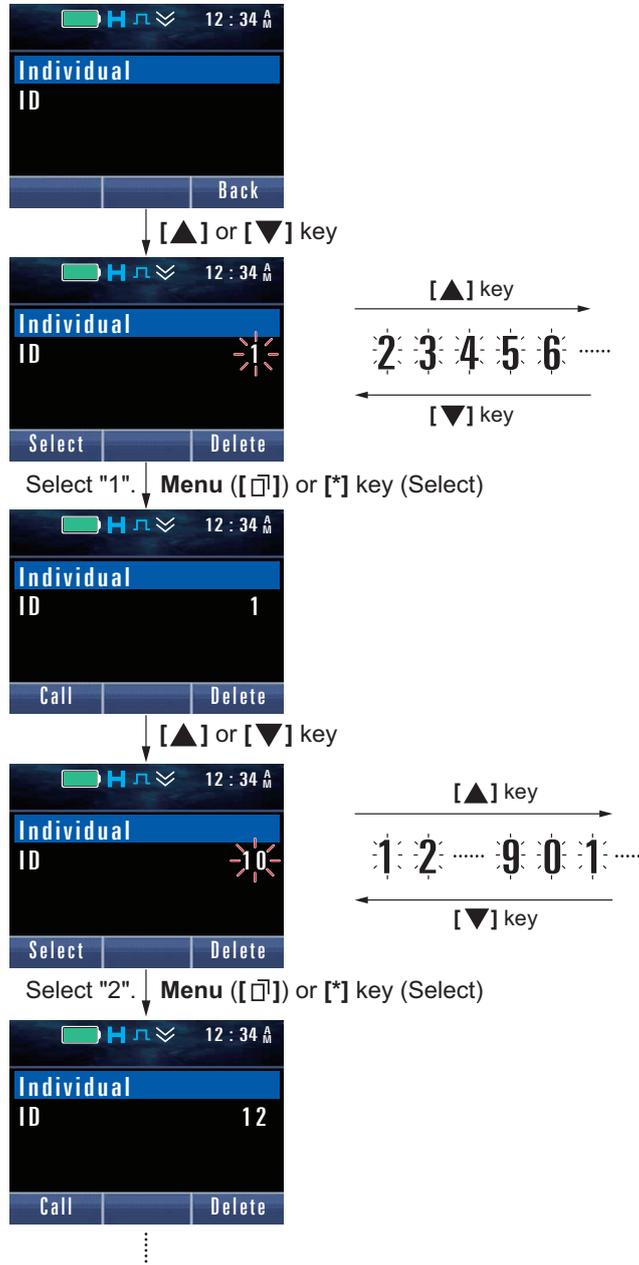
📝 Note

• The following are the main keys to be used for these operation examples:

   To select a code: the **[▲]** or **[▼]** key

   To determine: the **Menu** ([▢]) or **[*]** key

• Pressing and holding the **[▲]** or **[▼]** key continuously scrolls the code up or down.

• The code that can be entered varies depending on the mode and the number of entered digits.

● **Entering a code using the keypad**

The following is the operation example to enter "ID 12" in Individual Call Mode:

[1] key

[2] key
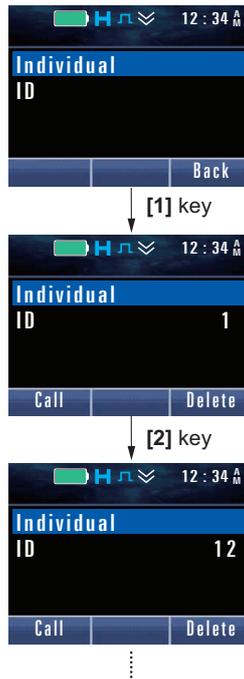
● **Deleting the entered code**

Pressing the **Back** ([⏎]) or **[#]** key clears the lowest digit of the code. If the **Back** ([⏎]) or **[#]** key remains pressed and held, all the codes are cleared.

Back ([⏎]) or **[#]** key (Delete)

Back ([⏎]) or **[#]** key (Delete)

Back ([⏎]) or **[#]** key (Delete)
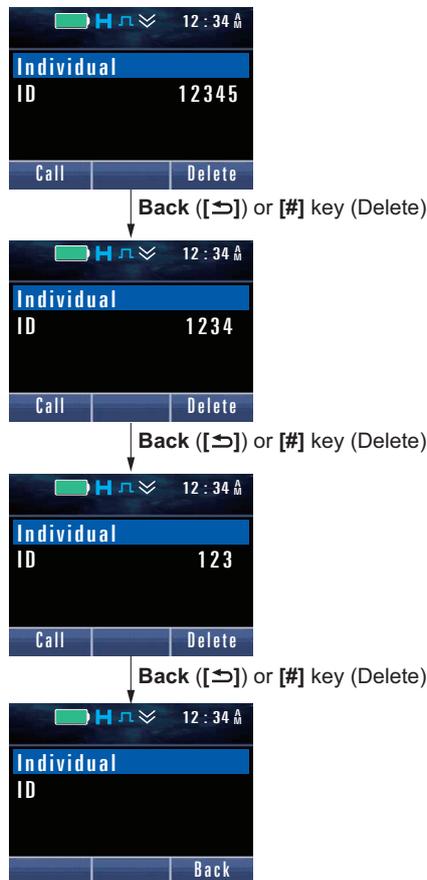
Entering or Deleting Characters

This section explains operations using operating examples for Short Message Mode.

● **Entering characters using the [▲] and [▼] keys**

The following is the operation example to enter "JVC" in Short Message Mode.
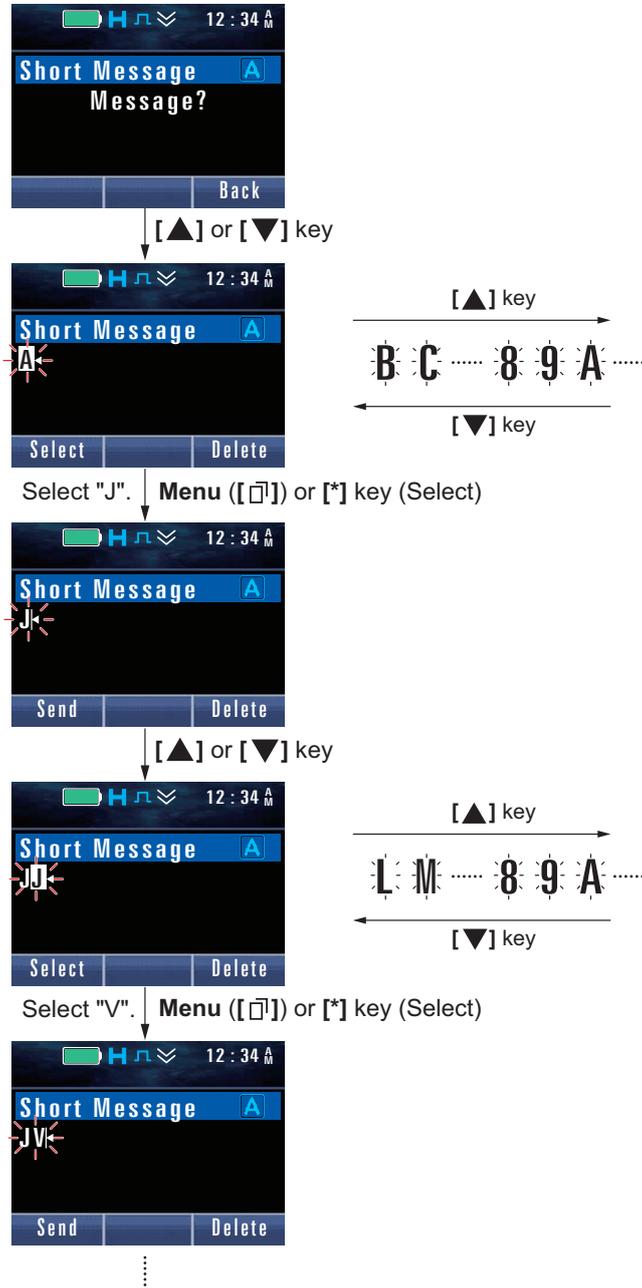
```
┌─────────────────────────┐
│ ▭ H ⊓ ⌄      12:34 AM   │
│ Short Message        A  │
│       Message?          │
│                         │
│                  Back   │
└─────────────────────────┘
```

[▲] or [▼] key

```
┌─────────────────────────┐
│ ▭ H ⊓ ⌄      12:34 AM   │
│ Short Message        A  │
│ A◄                      │
│                         │
│ Select          Delete  │
└─────────────────────────┘
```

[▲] key →
B C ······ 8 9 A ······
← [▼] key

Select "J". **Menu** ([⬚]) or **[*]** key (Select)

```
┌─────────────────────────┐
│ ▭ H ⊓ ⌄      12:34 AM   │
│ Short Message        A  │
│ J◄                      │
│                         │
│ Send            Delete  │
└─────────────────────────┘
```

[▲] or [▼] key

```
┌─────────────────────────┐
│ ▭ H ⊓ ⌄      12:34 AM   │
│ Short Message        A  │
│ J A◄                    │
│                         │
│ Select          Delete  │
└─────────────────────────┘
```

[▲] key →
L M ······ 8 9 A ······
← [▼] key

Select "V". **Menu** ([⬚]) or **[*]** key (Select)

```
┌─────────────────────────┐
│ ▭ H ⊓ ⌄      12:34 AM   │
│ Short Message        A  │
│ J V◄                    │
│                         │
│ Send            Delete  │
└─────────────────────────┘
```

⋮

📣 Note

- The following are the main keys to be used for these operation examples:

    To select a character: the **[▲]** or **[▼]** key

    To determine: the **Menu** ([⬚]) or **[*]** key

- Pressing and holding the **[▲]** or **[▼]** key scrolls the character up or down.

- Characters to be entered can be changed by the configuration in **Character Entry**. (Refer to Character Entry.)

- ◄ at the end of the entered string of text is the mark indicating the end position.

● **Entering characters using the keypad**

The following is the operation example to enter "KENWOOD" in Short Message Mode.

📝 Note

- The following are the main keys to be used for these operation examples:

    To select a character: each key on the keypad

    To determine: the **Menu** ([▯]) or **[*]** key

- Characters to be entered can be changed by the configuration in **Character Entry**. (Refer to Character Entry.)

● **Moving the cursor**

Pressing the **[◀]** key moves the cursor to left, and pressing the **[▶]** key moves the cursor to right. Pressing and holding the **[◀]** or **[▶]** key moves the cursor continuously.
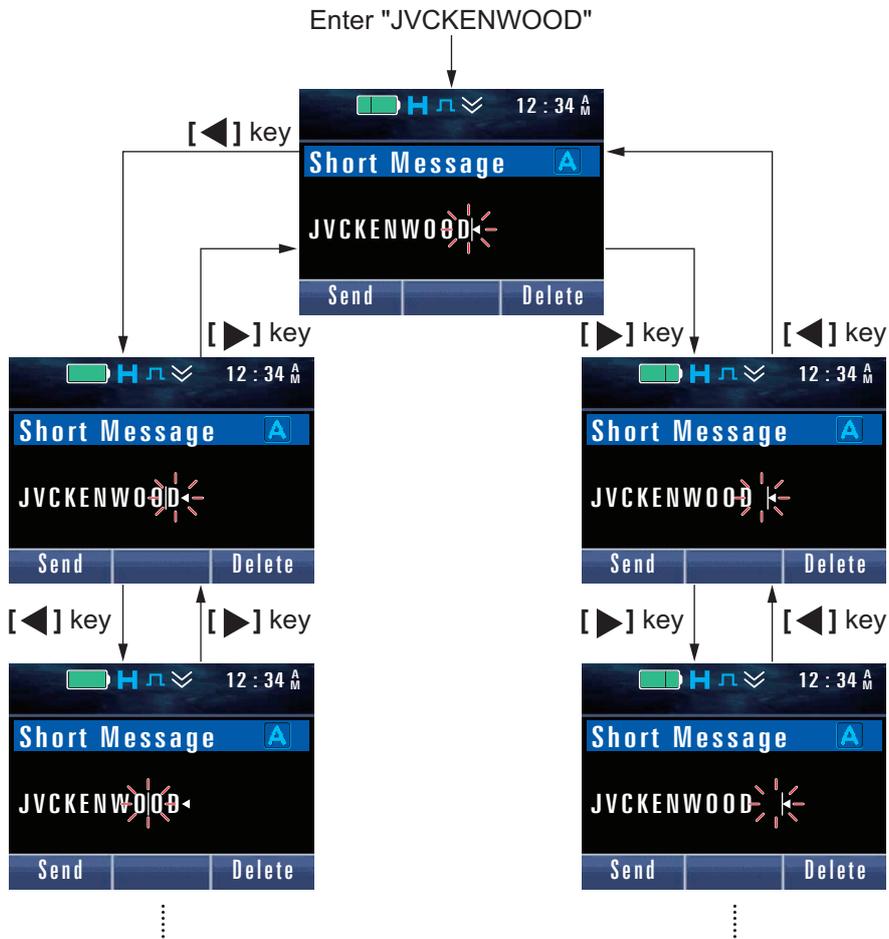
● **Deleting characters**

Pressing the **Back** (**[⏎]**) or **[#]** key deletes one character. If the **Back** (**[⏎]**) or **[#]** key remains pressed and held, all the characters are deleted.

Back (**[⏎]**) or **[#]** key (Delete)

Back (**[⏎]**) or **[#]** key (Delete)

Back (**[⏎]**) or **[#]** key (Delete)

Back (**[⏎]**) or **[#]** key (Delete)
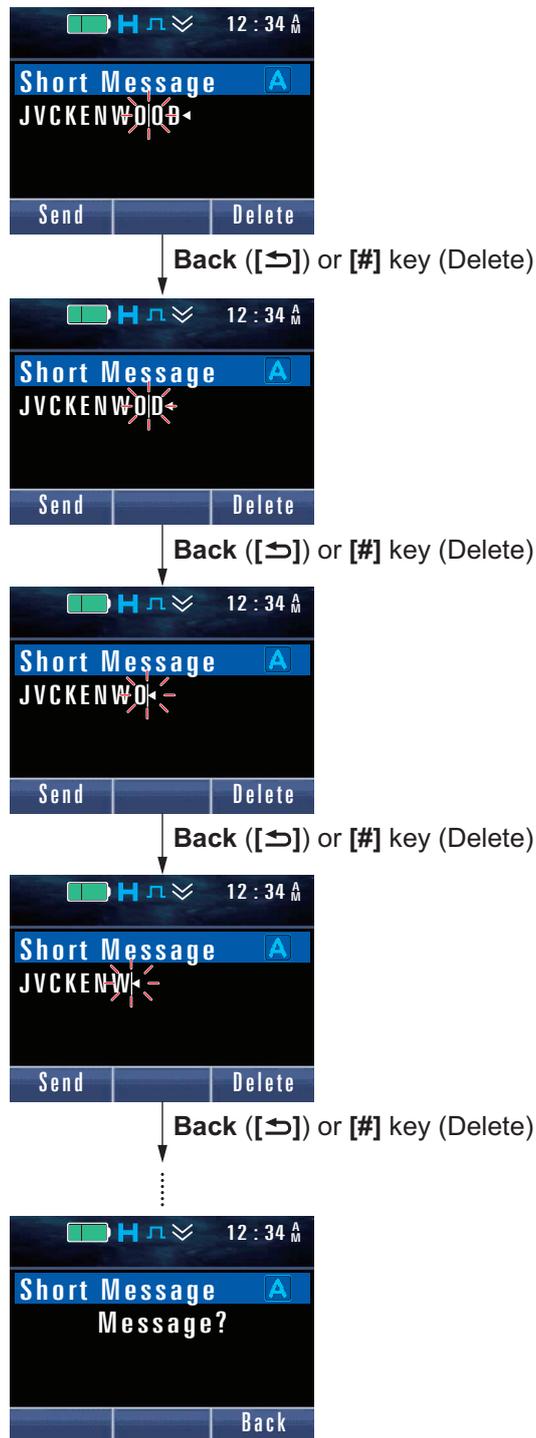
● **Inserting characters**

The following is the operation example to correct "JVCKEOOD" to "JVCKENWOOD" in Short Message Mode.
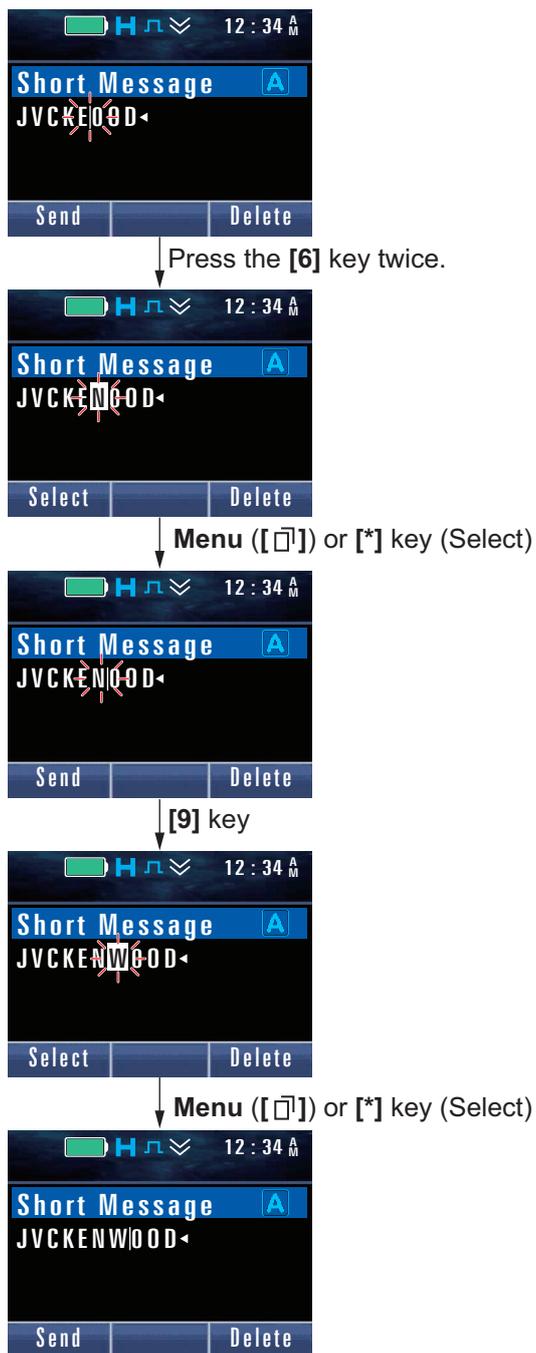
Press the **[6]** key twice.

Menu ([▢]) or **[*]** key (Select)

[9] key

Menu ([▢]) or **[*]** key (Select)

📋 Note

- The following are the main keys to be used for these operation examples:

   To select a character: each key on the keypad

   To determine: the **Menu** ([▢]) or **[*]** key

- Characters to be entered can be changed by the configuration in **Character Entry**. (Refer to Character Entry.)

Scroll Display

An example of the display of DTMF code (0123456789ABCD0123456789ABCD) is as follows:

Autodial Programming Mode

1 second later

200 ms later

200 ms later

1 second later

Character Entry

Character Entry is the function to enter alphanumeric characters and symbols by using the **[0]** to**[9]**, **[▲]**, or **[▼]** key.

Symbols and lower-case characters can be entered by using the **[0]** to **[9]**, **[▲]**, or **[▼]** key on the keypad. The number of key operations for entering characters can be minimized by configuring only necessary characters.

A maximum of 16 alphanumeric characters and symbols, namely 8 characters of **Capital Font** and 8 characters of **Small Font**, can be configured for each of the **[0]** to **[9]** keys on the keypad.

A maximum of 80 alphanumeric characters and symbols can be configured for the **[▲]** or **[▼]** key on the keypad.

Character Entry can be used to enter a message in Short Message Mode.

Operating the Transceiver (Operation Examples for Portable)

● **If "AaBbCc...Zz" is configured for the Up and Down keys**

Each time the **Up** key is pressed, a focused letter varies in the predetermined order.
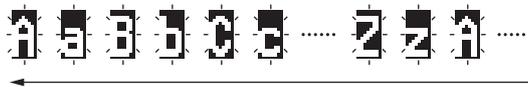
Each time the **Down** key is pressed, a focused letter varies in the opposite order to the predetermined order.

● **If "ABCabc2" is configured for the [2] key**

Each time the **[2]** key is pressed, a focused letter varies in the predetermined order.

📮 Note

* When the **Function** (**[○]**) or **[*]** key is pressed, the entry mode switches as follows:

  Uppercase characters > lowercase characters > numbers > uppercase characters ...

* If the behavior of the **[▲]**/ **[▼]** key is configured "Line Up/Down", the **[▲]**/ **[▼]** key can be used to move the cursor up and down and characters cannot be entered.

* Refer to "Operating the Transceiver in Each Mode (Common Operation)" for operation methods.

Configuration using KPG-D1/ D1N

Configuring **Character Entry** (🔍See Transceiver Settings > Key Assignment > Character Entry)

| 3.9 | Locking the Transceiver Keys (Key Lock) |

Key Lock is the function to disable the transceiver key operation.

This function prevents the incorrect operation of the transceiver by physically contact while carrying the transceiver, such as around the waist.

Pressing the **Key Lock** key toggles Key Lock between activated and deactivated.

Even if a key on the transceiver is pressed while the Key Lock is enabled, a Key-entry Error Tone (1 beep) sounds from the transceiver, but it has no effect on the transceiver. If the **PTT** switch is operated, a Warning Tone sounds from the transceiver. If the **Selector** or **Volume** control is operated, no tone sounds.

Whether each key operation is targeted for the Key Lock can be configured by using KPG-D1/ D1N. The following keys are targeted for the Key Lock when each configuration is enabled:

Table 3-11 Key Lock

Portable/ Mobile	Configuration	Keys targeted for the Key Lock
Portable	PTT	**PTT** switch of the transceiver
	Selector	**Selector**
	Front Key	**Menu** ([⬚]), **Back** ([⬑]), **Function** ([◯]), **Home** ([⌂]), [▲], [▼], [◀], [▶], [0] to [9], [*], [#], **Microphone** Key
	Top/Side Key	**AUX**, **Side 1**, **Side 2**, and **Side 3**
	Mic Key	**PF 1**, **PF 2**
	Volume Control	**Volume** control (excludes the ON/ OFF of power)
Mobile (KCH-19 (Basic Panel))	PTT	**PTT** switch of the front microphone
	Head Key	**Menu** ([⬚]), **Back** ([⬑]), **Function** ([◯]), **Home** ([⌂]), [▲], [▼], [◀], [▶], [+], [-], **AUX**, **Microphone** Key
	Mic Key	**PF 1**, **PF 2**
Mobile (KCH-20R (Featured Panel))	PTT	**PTT** switch of the front microphone
	Selector	**Selector**
	Head Key	**Menu** ([⬚]), **Back** ([⬑]), **Function** ([◯]), **Home** ([⌂]), [▲], [▼], [◀], [▶], [+], [-], **AUX**, [△], [▢], [■], [■■], **Microphone** Key
	Mic Key	**0 to 9**, *****, **#**, **A** to **D**
	Volume Control	**Volume** Control
Mobile (KCH-21R (Handheld Control Head))	PTT	**PTT** switch of KCH-21R
	Front Key	**Menu** ([⬚]), **Back** ([⬑]), **Function** ([◯]), **Home** ([⌂]), [▲], [▼], [◀], [▶], [0] to [9], [*], [#], **AUX**
	Top/Side Key	**Side 1**, **Side 2**, **Side 3**, [A], [B], [⋀], [⋁]

Note

Keys assigned with the following functions can be used even while the Key Lock is enabled:

- Emergency
- Backlight
- LCD Brightness
- Battery Status
- Call Response
- Clear
- Function
- Key Lock (does not function in a Multi RF Deck/ Multi Control Head structure for Mobile.)
- Monitor
- Monitor Momentary
- Squelch Off
- Squelch Off Momentary
- Zeroize

Also, the following function even while the Key Lock is enabled:

- **Lever** switch (Portable only)
- Mic Hook (Mobile only)
- AUX Input port (Mobile Only)
- Manual Dialing
- Power ON/ OFF

Operating the transceiver

● Activating the Key Lock

1 **Press the Key Lock key while the Key Lock is disabled.**

The Key Lock is enabled.
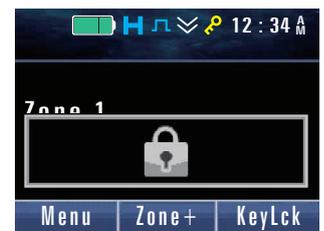
● Deactivating the Key Lock

1 **Press the Key Lock key while the Key Lock is enabled.**

The Key Lock is disabled.

Note

If **Mic Key** is enabled, activating the Key Lock locks the microphone keys.

Configuration using KPG-D1/ D1N

- Assigning functions to the **PF** keys on the transceiver (🔍 See Transceiver Settings > Key Assignment)

- Configuring **Key Lock** to be enabled or disabled (🔍 See Transceiver Settings > Key Assignment > General > Key Lock)

- Configuring **Mic Key** to be enabled or disabled (🔍 See Transceiver Settings > Key Assignment > General > Key Lock)

Auto Key Lock Timer

Auto Key Lock Timer is the function to automatically enable the Key Lock when no key is operated after the Key Lock is disabled.

If no key is operated for the amount of time configured in **Auto Key Lock Timer** after the Key Lock is disabled, the Key Lock is automatically enabled.

Either 15 sec or 30 sec can be configured in **Auto Key Lock Timer** by using KPG-D1/ D1N.

📝 Note

If the Key Lock function is assigned to the **Lever** switch, the Auto Key Lock function does not function.

Configuration using KPG-D1/ D1N

Configuring **Auto Key Lock Timer** (🔍 See Transceiver Settings > Optional Features > Optional Features 1 > Others)

3.10 Operations in a Single RF Deck/ Dual Control Head Structure

By connecting 2 Control Heads to 1 mobile transceiver (RF Deck), a Single RF Deck/ Dual Control Head system can be structured.

"RF Deck" indicates NX-5700/ NX-5800/ NX-5900, and "Control Head" indicates Basic Panel (KCH-19), Featured Panel (KCH-20R), and Handheld Control Head (KCH-21R).
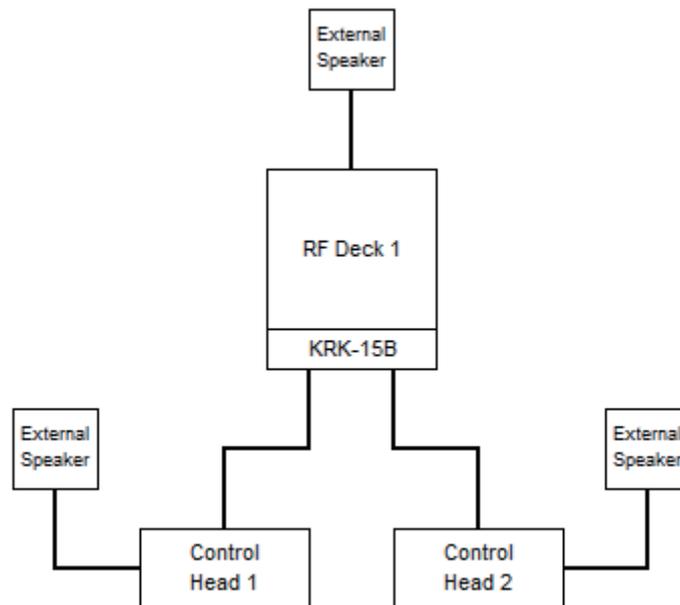
Figure 3-1 Diagram of the Single RF Deck/ Dual Control Head Structure

- If the structure for Mobile is Dual Control Head, the same content appears on each display as the basic behavior, and each Control Head behaves together according to the operations of each Control Head. However, each display does not display the same content depending on the functions such as **Transmit Audio Monitor**.
- The **PF** keys are configured to each Control Head and behave.
- Either Control Head operates the same RF Deck.
- In the following states, each Control Head displays the same contents (display mirroring) according to the basic behavior of Dual Control Head operations, and any Control Head can be operated.
  - Standby screen
  - Service mode (except Front Panel Programming Mode and Radio Mode Selection Mode)
  - Display while Zeroizing
  - When without password entry of Transceiver Password Mode (while displaying Input Password)
  - When without password entry of Front Panel Programming Mode (while displaying Input Password)
  - Mobile Relay Station Mode
- The operation and display specifications in a Dual Control Head structure does not depend on the combination of Control Heads. Even if the Control Heads to be used are the same type or different types, the specifications are the same.

About the Behavior in Function Mode While in a Dual Control Head Structure

The display and operation in Function Mode while in a Dual Control Head structure are as follows:

Display in Function Mode

- A Control Head (operating side) operated to enter the mode by the operation such as of the **PF** keys displays the Function Mode display of the appropriate function. If the operation of Control Head 1 (operating side) is enabled, "Head 1 in Use" appears on the other Control Head 2 (non-operating side). If the operation of Control Head 2 (operating side) is enabled, "Head 2 in Use" appears on the other Control Head 1 (non-operating side).

  Also, because configuration change operations are unavailable in the non-operating Control Head, nothing appears in Key Guide. Moreover, for the title display area, only the names of operating functions appear, and the list numbers do not appear.
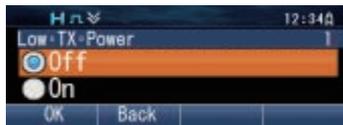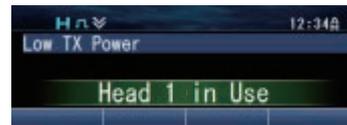
Control Head 1 (operating side)	Control Head 2 (non-operating side)

- In Menu Mode, the non-operating Control Head appears in the Function Mode Frame regardless of the configuration in **Menu Icon Size**.
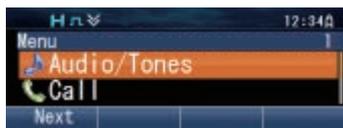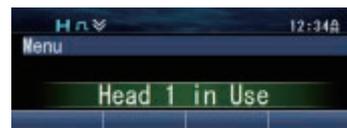
Control Head 1 (operating side)	Control Head 2 (non-operating side)

Operation in Function Mode

- The key operations are available for the operating Control Head according to the operation specifications of the mode.
- Even if a specified key is pressed (such as the operation of the OK or Back key), a Key-entry Error Tone sounds from the non-operating Control Head, and the non-operating Control Head does not respond at all because the configuration operation cannot be done. Also, the function does not behave even if the function is assigned to this key.
- The operation to exit the mode is available even for the non-operating Control Head. However, if the operating Function Mode is Transceiver Password Mode, Front Panel Programming Mode, or Radio Mode Selection Mode, the mode cannot be exited by the non-operating Control Head.
- The operation of the **PTT** switch is available for the non-operating Control Head. Pressing the **PTT** switch ends Function Mode and starts transmission. However, if the selected channel supports **Selcall on PTT**, transmission is executed according to the configuration in **Selcall on PTT**.
- The operation of the **PTT** switch is unavailable for the non-operating Control Head in the following Function Modes:
  - Transceiver Password Mode
  - Scan Program Mode
  - Front Panel Programming Mode
  - Radio Mode Selection Mode
- A differing mode cannot be entered in each Control Head.

About the Reception Display of a Short Message When in a Dual Control Head Structure

If a Short Message is received while in a Dual Control Head structure, the same content appears for each Control Head. The available key operations are also the same. The Short Message display can be exited by each Control Head, and the timing of ending the message display is the same.

Also, the automatic scrolling behavior of the message display behaves according to the specifications of each displaying Control Head. Even if in a Dual Control Head structure using Control Heads of differing types, the automatic scrolling behavior behaves according to the display specification of each Control Head.

About Featured Panel Operations

The operation of the [△]/ [□] key of the front panel changes depending on the mode status in a Featured Panel (KCH-20R).

In Function Mode or Menu Category Mode, if the [△]/ [□] key is operated, the operation is the same as when the [◀]/ [▶] key is operated. In other modes, if the [△]/ [□] key is operated, the function assigned to the [△]/ [□] key is activated.

Keys other than the [△]/ [□] key behave according to the specifications of each key regardless of the status.

| 3.11 | **Switching the Display Language** |

The language of the characters that appear on the transceiver display and of the voice guide can be configured as a language other than English, such as Spanish or French. Also, the language can be changed by the operation of the transceiver, such as from English to Spanish or from French to English.

The language to be used for the string of text of **Display Customization** and for the audio of **Voice Announcement** (**Voice Announcement Type** = Standard) can be configured in **Voice and Display Language** of KPG-D1/ D1N.

Table 3-12 Voice and Display Language

Configuration	Description
Language 1	Configures the main language to be used. After the configuration data is written to the transceiver, the language configured in **Language 1** is applied for the characters that appear on the transceiver display and for the voice guide, as long as the language is not changed by operating the transceiver. The languages that can be configured are as follows: Traditional Chinese (China)[1], English, Spanish (Spain), Spanish (Latin America), French, German, Italian, Dutch, Russian, Portuguese (Brazil)
Language 2	Configures the language that is changed by the transceiver operation. From the following languages, a language other than the language of **Language 1** can be configured: English, Spanish (Spain), Spanish (Latin America), French, German, Italian, Dutch, Russian, Portuguese (Brazil) If the language is not changed by the transceiver operation, "None" is configured.
Language 3	Configures the language that is changed by the transceiver operation. From the following languages, a language other than the languages of **Language 1** and **Language 2** can be configured: English, Spanish (Spain), Spanish (Latin America), French, German, Italian, Dutch, Russian, Portuguese (Brazil) If the language is not changed by the transceiver operation, or if switching is only with 2 languages, "None" is configured.

[1] Supported by Firmware A only. However, K-type Firmware A supports only ASCII characters. A-type supports Traditional Chinese as before.

In Menu Mode, the language of the characters that appear on the display and of the voice guide can be changed.

Pressing the **Menu** key causes the transceiver to enter Menu Mode, and then selecting "Language" can change the language to a language that is configured in **Language 1** to **Language 3**. (Refer to Using Menu Mode.)

Note

- The language configuration changed by key operation is stored in the transceiver.
- If "User Programmable" is configured in **Voice Announcement Type**, by changing the language by key operation, the changed language is applied to only the display. In this case, the language used for the voice guide is not changed.

Configuration using KPG-D1/ D1N

Configuring **Voice and Display Language** (See Transceiver Settings > Optional Features > Optional Features 1)

4.1 Transmit/ Receive Frequencies

Transmit and receive frequencies are pairs of frequencies used for transmitting and receiving.

In Analog Conventional, P25 Conventional, NXDN Conventional, and DMR Conventional systems, transmit and receive frequencies can be configured for each channel (Personality).

In a P25 Trunking system, transmit and receive frequencies to be used for communication with a repeater structuring the P25 Trunking system can be configured in the **Trunked Channel Plan** table of the P25 Trunking system.

In an NXDN Trunking system, transmit and receive frequencies to be used for communication with a repeater structuring the NXDN Trunking system can be configured in the **Frequency Table** of the NXDN Trunking system.

Table 4-1 Transmit/ Receive Frequency Range and Step Size

Model	Transmit/ Receive Frequencies	
	Range	Step
NX-5200/ NX-5700	136 MHz to 174 MHz	2.5 kHz, 3.125 kHz, 5 kHz, 6.25 kHz, 7.5 kHz
NX-5300/ NX-5800	450 MHz to 520 MHz 380 MHz to 470 MHz	3.125 kHz, 5 kHz, 6.25 kHz
NX-5400/ NX-5900	763 MHz to 870 MHz	6.25 kHz, 12.5 kHz

Configuration using KPG-D1/ D1N

- Configuring the transmit and receive frequencies for a channel (🔍See Transceiver Settings > Zone/Channel > Channel Edit)

- Configuring the transmit and receive frequencies in the **Trunked Channel Plan** table of a P25 Trunking system (🔍See Transceiver Settings > P25 Network > Trunked Channel Plan)

- Configuring the transmit and receive frequencies in the **Frequency Table** of an NXDN Trunking system (🔍See Transceiver Settings > NXDN Network > Frequency Table)

4.2 Transmit Power

Transmit Power is the transmission power of the transceiver. A user can use the transceiver by switching the transmission power to high power, medium power or low power.

If the transceiver is located near repeaters or target party, a user can change the transmission power to low power in order to avoid causing unnecessary radio interference to other transceivers. Also, for Portable, the battery operating time of the transceiver is extended by reducing power consumption.

Medium power can be adjust as desired between low power and high power. The transmission power can be switched among 3 levels and used by adjusting medium power.

Table 4-2 Transmit Power

Model	Transmit Power		
	Low	Medium	High
NX-5200	1 W	Depends on the adjustment[*1]	6 W
NX-5300	1 W	Depends on the adjustment[*1]	5 W
NX-5400	1 W	Depends on the adjustment[*1]	3 W
NX-5700	5 W	Depends on the adjustment[*1]	50 W
NX-5800	5 W	Depends on the adjustment[*1]	45 W
NX-5900	2 W	Depends on the adjustment[*1]	**If the transmit frequency is 806 MHz or lower:** 30 W **If the transmit frequency exceeds 806 MHz:** 35 W

[*1] The default value is the same value as low power.

The "H" icon appears in the icon display area of the transceiver when a channel configured "High" for the transmission power is selected, the "M" icon appears in the icon display area of the transceiver when a channel configured "Medium" for the transmission power is selected, and the "L" icon appears in the icon display area of the transceiver when a channel configured "Low" for the transmission power is selected.

The methods of configuring the transmission power and changing the transmission power by using the transceiver vary depending on the system as follows:

Analog Conventional/ P25 Conventional/ NXDN Conventional/ DMR Conventional/ LTR Trunking system

In Analog Conventional, P25 Conventional, NXDN Conventional, DMR Conventional, and LTR Trunking systems, "High", "Medium", or "Low" can be configured for the transmission power on each channel (Personality).

The transmission power can be switched among "High", "Medium", or "Low" by the following methods:

● **Low Transmit Power**

The transmission power can be switched to "Low" by selecting a channel where "High" or "Medium" is configured for the transmission power and operating one of the following:

• Press the **Low Transmit Power** key.
• Select "On" or "Off" after pressing the **Menu** key to enter Menu Mode and then selecting "Low Transmit Power".

With one of the operations, the transmission power of the selected channel is "Low" by enabling **Low Transmit Power**, and the transmission power of the selected channel returns to the previous configuration ("High" or "Medium") by disabling **Low Transmit Power**.

● **Medium Transmit Power**

The transmission power can be switched to "Medium" by selecting a channel where "High" or "Low" is configured for the transmission power and operating one of the following:

• Select "On" or "Off" after pressing the **Menu** key to enter Menu Mode and then selecting "Medium Transmit Power".

The transmission power of the selected channel is "Medium" by enabling **Medium Transmit Power**, and the transmission power of the selected channel returns to the previous configuration ("High" or "Low") by disabling **Medium Transmit Power**.

● **High Transmit Power**

The transmission power can be switched to "High" by selecting a channel where "Medium" or "Low" is configured for the transmission power and operating one of the following:

• Press the **High Transmit Power** key.
• Select "On" or "Off" after pressing the **Menu** key to enter Menu Mode and then selecting "High Transmit Power".

With one of the operations, the transmission power of the selected channel is "High" by enabling **High Transmit Power**, and the transmission power of the selected channel returns to the previous configuration ("Medium" or "Low") by disabling **High Transmit Power**.

P25 Trunking/ NXDN Trunking system

In a P25 Trunking and NXDN Trunking systems, "High", "Medium", "Low", or "Auto" can be configured for the transmission power in each system.

If "Auto" is configured for the transmission power, the transceiver automatically switches the transmission power to "High" or "Low" by comparing the threshold value of signal strength level configured in **Power Threshold** with the current received signal strength level.

Also, the transmission power can be switched manually among "High", "Medium", or "Low" by the following methods:

● **Low Transmit Power**

The transmission power can be switched to "Low" by selecting a channel in a system where "High", "Medium", or "Auto" is configured for the transmission power and operating one of the following:

- Press the **Low Transmit Power** key.
- Select "On" or "Off" after pressing the **Menu** key to enter Menu Mode and then selecting "Low Transmit Power".

With one of the operations, the transmission power of the system to which the selected channel belongs is "Low" by enabling **Low Transmit Power**, and the transmission power of the system to which the selected channel belongs returns to the previous configuration ("High", "Medium", or "Auto") by disabling **Low Transmit Power**.

● **Medium Transmit Power**

The transmission power can be switched to "Medium" by selecting a channel in a system where "High", "Low", or "Auto" is configured for the transmission power and operating one of the following:

- Select "On" or "Off" after pressing the **Menu** key to enter Menu Mode and then selecting "Medium Transmit Power".

The transmission power of the system to which the selected channel belongs is "Medium" by enabling Medium Transmit Power, and the transmission power of the system to which the selected channel belongs returns to the previous configuration ("High", "Low", or "Auto") by disabling Medium Transmit Power.

● **High Transmit Power**

The transmission power can be switched to "High" by selecting a channel in a system where "Medium", "Low", or "Auto" is configured for the transmission power and operating one of the following:

- Press the **High Transmit Power** key.
- Select "On" or "Off" after pressing the **Menu** key to enter Menu Mode and then selecting "High Transmit Power".

With one of the operations, the transmission power of the system to which the selected channel belongs is "High" by enabling **High Transmit Power**, and the transmission power of the system to which the selected channel belongs returns to the previous configuration ("Medium", "Low", or "Auto") by disabling **High Transmit Power**.

📝 Note

Enabling one of High Transmit Power, **Medium Transmit Power**, and **Low Transmit Power** automatically disables the configurations of the other transmission powers.

Configuration using KPG-D1/ D1N

- Configuring **Transmit Power** (Personality) in an Analog Conventional system (🔍See Transceiver Settings > Personal > Personality > Analog Conventional)
- Configuring **Transmit Power** (Channel Edit) in an Analog Conventional system (🔍See Transceiver Settings > Zone/Channel > Channel Edit > Analog Conventional)
- Configuring **Transmit Power** (Personality) in a P25 Conventional system (🔍See Transceiver Settings > Personal > Personality > P25 Conventional > General)
- Configuring **Transmit Power** (Channel Edit) in a P25 Conventional system (🔍See Transceiver Settings > Zone/Channel > Channel Edit > P25 Conventional > General)
- Configuring **Transmit Power** (Personality) in an NXDN Conventional system (🔍See Transceiver Settings > Personal > Personality > NXDN Conventional > General)
- Configuring **Transmit Power** (Channel Edit) in an NXDN Conventional system (🔍See Transceiver Settings > Zone/Channel > Channel Edit > NXDN Conventional > General)
- Configuring **Transmit Power** (Personality) in a DMR Conventional system (🔍See Transceiver Settings > Personal > Personality > DMR Conventional > General)
- Configuring **Transmit Power** (Channel Edit) in a DMR Conventional system (🔍See Transceiver Settings > Zone/Channel > Channel Edit > DMR Conventional > General)

- Configuring **Transmit Power** in a P25 Trunking system (🔍See Transceiver Settings > Personal > Personal Features > P25 Trunking > General)

- Configuring **Transmit Power** in an NXDN Trunking system (🔍See Transceiver Settings > Personal > Personal Features > NXDN Trunking > General)

- Configuring the Power Threshold in a P25 Trunking system (🔍See Transceiver Settings > Personal > Personal Features > P25 Trunking > General > RSSI Setting)

- Configuring the Power Threshold in an NXDN Trunking system (🔍See Transceiver Settings > Personal > Personal Features > NXDN Trunking > General > RSSI Settings)

- Configuring **Transmit Power** (Personality) in an LTR Trunking system (🔍See Transceiver Settings > Personal > Personality > LTR Trunking)

- Configuring **Transmit Power** (Channel Edit) in an LTR Trunking system (🔍See Transceiver Settings > Zone/Channel > Channel Edit > LTR Trunking)

4.3   Channel Spacing

Channel Spacing is the channel spacing used by the transceiver to transmit and receive.

Channel spacing is the spacing of frequencies between adjacent channels.

Bandwidths of the channel spacing are as follows:

Table 4-3 Channel Spacing

Channel Spacing	Bandwidth
25.0 (Wide)[*1] 25.0 (Wide 5k)[*2]	25.0 kHz
20.0 (Wide 4k)[*2]	20.0 kHz
12.5 (Narrow)	12.5 kHz
6.25 (Very Narrow)	6.25 kHz

[*1] Available for the K-type NX-5200/NX-5300/NX-5700/NX-5800 only.

[*2] Available for the K-type NX-5400/NX-5900 and all E-type models only.

The available channel spacing varies as follows depending on the communication system:

Analog Conventional system

In an Analog Conventional system, "25.0 (Wide 5k)", "20.0 (Wide 4k)" or "12.5 (Narrow)" can be configured for the channel spacing on each channel (Personality).

LTR Trunking system

In an LTR Trunking system, "25.0 (Wide 5k)", "20.0 (Wide 4k)" or "12.5 (Narrow)" can be configured for the channel spacing in each system.

P25 Conventional system

In a P25 Conventional system, the channel spacing is fixed at "12.5 (Narrow)".

NXDN Conventional system

In an NXDN Conventional system, "12.5 (Narrow)" or "6.25 (Very Narrow)" can be configured for the channel spacing on each channel (Personality).

DMR Conventional system

In a DMR Conventional system, the channel spacing is fixed at "12.5 (Narrow)".

P25 Trunking system

The channel spacing can be configured in the Trunked Channel Plan table of a P25 Trunking system within the following range:

Table 4-4 Channel Spacing (P25 Trunking)

Model	Channel Spacing
NX-5200/ NX-5700	2.50 kHz to 127.50 kHz
NX-5300/ NX-5800	5.00 kHz to 125.00 kHz
NX-5400/ NX-5900	6.25 kHz to 125.00 kHz

NXDN Trunking system

In the Frequency Table of an NXDN Trunking system, "12.5 (Narrow)" or "6.25 (Very Narrow)" can be configured for the channel spacing.

📝 Note

For KPG-D1N, "25.0 (Wide 5k)" cannot be configured for the channel spacing if a receive frequency or transmit frequency is configured in the following ranges:

VHF: above 149.98750 MHz and less than 174.01250 MHz

UHF: above 420.98750 MHz and less than 470.01250 MHz

Configuration using KPG-D1/ D1N

- Configuring **Channel Spacing** (Personality) in an Analog Conventional system (🔍See Transceiver Settings > Personal > Personality > Analog Conventional)

- Configuring **Channel Spacing** (Channel Edit) in an Analog Conventional system (🔍See Transceiver Settings > Zone/ Channel > Channel Edit > Analog Conventional)

- Configuring **Channel Spacing** (Personality) in a P25 Conventional system (🔍See Transceiver Settings > Personal > Personality > P25 Conventional > General)

- Configuring **Channel Spacing** (Channel Edit) in a P25 Conventional system (🔍See Transceiver Settings > Zone/ Channel > Channel Edit > P25 Conventional > General)

- Configuring **Channel Spacing** (Personality) in an NXDN Conventional system (🔍See Transceiver Settings > Personal > Personality > NXDN Conventional > General)

- Configuring **Channel Spacing** (Channel Edit) in an NXDN Conventional system (🔍See Transceiver Settings > Zone/ Channel > Channel Edit > NXDN Conventional > General)

- Configuring **Channel Spacing** (Personality) in a DMR Conventional system (🔍See Transceiver Settings > Personal > Personality > DMR Conventional > General)

- Configuring **Channel Spacing** (Channel Edit) in a DMR Conventional system (🔍See Transceiver Settings > Zone/ Channel > Channel Edit > DMR Conventional > General)

- Configuring **Channel Spacing** in a P25 Trunking system (🔍See Transceiver Settings > P25 Network > Trunked Channel Plan)

- Configuring **Channel Spacing** in an NXDN Trunking system (🔍See Transceiver Settings > NXDN Network > Frequency Table > Frequency Edit)

- Configuring **Channel Spacing** in an LTR Trunking system (🔍See Transceiver Settings > Personal > Personal Features > LTR Trunking > General)

4.4　Beat Shift

Beat Shift is the function to eliminate the influences of heterodyning in the SCM caused by internal oscillators.

Due to the transceiver's circuit configuration, the harmonics of the oscillators may interfere with reception depending on the receive frequency. The interference to reception can be avoided by slightly shifting the frequency of the oscillator in the SCM.

The clock frequency of the SCM is shifted on the channel where **Beat Shift** for the SCM is enabled.

In P25 Conventional, NXDN Conventional, and DMR Conventional systems, **Beat Shift** can be configured for each channel (Personality).

In an NXDN Trunking system, **Beat Shift** can be configured in the Frequency Table of the NXDN Trunking system.

In an LTR Trunking system, **Beat Shift** can be configured for each repeater CH (frequency) structuring the LTR Trunking system.

In Analog Conventional and P25 Trunking systems, **Beat Shift** cannot be configured.

Configuration using KPG-D1/ D1N

- Configuring **Beat Shift** in a P25 Conventional system to be enabled or disabled (🔍See Transceiver Settings > Personal > Personality > P25 Conventional > General > Beat Shift)

- Configuring **Beat Shift** in a P25 Conventional system to be enabled or disabled (🔍See Transceiver Settings > Zone/ Channel > Channel Edit > P25 Conventional > General > Beat Shift)

- Configuring **Beat Shift** in an NXDN Conventional system to be enabled or disabled (🔍See Transceiver Settings > Personal > Personality > NXDN Conventional > General > Beat Shift)

- Configuring **Beat Shift** in an NXDN Conventional system to be enabled or disabled (🔍See Transceiver Settings > Zone/ Channel > Channel Edit > NXDN Conventional > General > Beat Shift)

- Configuring **Beat Shift** in a DMR Conventional system to be enabled or disabled (🔍See Transceiver Settings > Personal > Personality > DMR Conventional > General)

- Configuring **Beat Shift** in a DMR Conventional system to be enabled or disabled (🔍See Transceiver Settings > Zone/ Channel > Channel Edit > DMR Conventional > General)

- Configuring **Beat Shift** in an NXDN Trunking system to be enabled or disabled (🔍See Transceiver Settings > NXDN Network > Frequency Table)

- Configuring **Beat Shift** (SCM) in an LTR Trunking system to be enabled or disabled (🔍See Transceiver Settings > Personal > Personal Features > LTR Trunking > Repeater Information)

4.5 Displaying the Signal Strength Level (RSSI Level, BER) (Maintenance Display)

Maintenance Display is the function to check the signal strength level (RSSI level), site information, and simplified BER by displaying them on the transceiver's LCD as rough indications when structuring a system or executing maintenance of the system.

Pressing the **Maintenance** key places the transceiver in Maintenance Display Mode.

Or, the transceiver can also be placed in Maintenance Display Mode by selecting "Maintenance" after placing the transceiver in Menu Mode by pressing the **Menu** key.

About BER

The BER in this function is used for an area check, and for an status check when an abnormal noise sounds.

The area check can also be checked by signal strength, but the signal strength may appear higher if an interfering signal, etc. are close-by.

Because communication is actually unavailable at the location where the BER deteriorates even if the signal strength is sufficient, the BER can be used to check an area for actual use, and as a guide to measure the sensitivity capability.

In this way, the purpose of use of the BER in this function differs from the purpose of use of the BER measurement in Test Mode.

Analog Conventional, P25 Conventional, NXDN Conventional, and DMR Conventional systems

1 **Press the Maintenance key.**

The transceiver enters Maintenance Display Mode and then the RSSI level appears. Display of the RSSI level is renewed every 500 ms.

The following operations are the same even if the transceiver enters Maintenance Display Mode by pressing the **Menu** key:

If the RSSI level is -96 dBm

If the RSSI level is less than -120 dBm
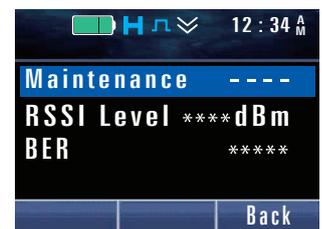
If the RSSI level is more than -70 dBm
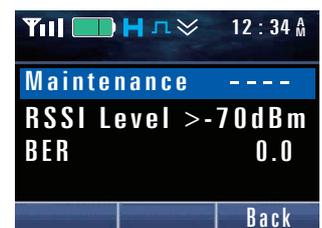
For Mobile, ">-80dBm" appears if the RSSI level is more than -80 dBm.

NXDN Trunking system

1 Press the Maintenance key.

The transceiver enters Maintenance Display Mode, and then the channel number of the control channel currently acquired or the channel number of the selected channel appears in the title line. The RSSI level appears in the first line and the site number or site name appears in the second line.

● If a channel of DFA is selected, "DFA" appears instead of a channel number.

● If the transceiver is in a Roaming System by using the SKF for roaming in the Multi-System Roaming function, "Roam" appears instead of a channel number.

The following operations are the same even if the transceiver enters Maintenance Display Mode by pressing the **Menu** key:

```
         12:34 AM
Maintenance        1
RSSI Level  -96dBm
Site No.           1
                Back
```

2 Switch the frequency display or channel.

Switching to the frequency display:

Pressing the [▶] key switches the display to the frequency display.

Pressing the [◀] key while the RSSI/ BER display is displayed switches the display to the frequency display. The receive frequency of the control channel currently acquired or the receive frequency of the selected channel appears in the first line, and the transmit frequency appears in the second line.

```
         12:34 AM
Maintenance        1
RX  462.250000MHz
TX  469.250000MHz
                Back
```

Switching to the RSSI/ BER display:

Pressing the [◀] key switches the display to the RSSI/ BER display.

Pressing the [▶] key while the frequency display is displayed switches the display to the RSSI/ BER display. The BER appears on the second line.

```
         12:34 AM
Maintenance        1
RSSI Level  -96dBm
BER           0.0
                Back
```

Switching the display when Multi-System Hunt is enabled:

If **Multi-System Hunt** is enabled, pressing the [◀] key toggles the display in the following order:

RSSI/ Site Number Display → RSSI/ BER Display → System Name/ Site Number Display → Frequency Display → ...

Pressing the [▶] key toggles the display in the following order:

RSSI/ Site Number Display → Frequency Display → System Name/ Site Number Display → RSSI/ BER Display → ...

Switching channels:

Pressing the **[▲]** or **[▼]** key switches the channel number of the channel configured in **Frequency Table**. If the selected channel number satisfies the conditions to acquire a control channel, the channel number or site name appears in the second line of the display.
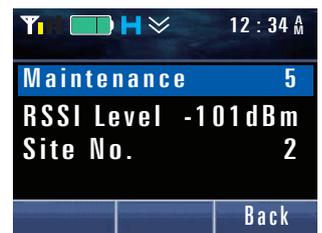
If the selected channel number does not satisfy the conditions for acquiring a control channel, the transceiver enters the Out of Service state, and then the RSSI icon blinks. In this case, the site number or site name does not appear.
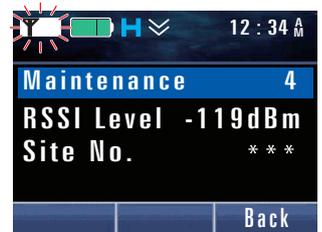
P25 Trunking system

1 **Press the Maintenance key.**

The transceiver enters Maintenance Display Mode, and then the channel number of the control channel currently acquired or the channel number of the selected channel appears in the title line. The RSSI level appears in the first line and the RFSS ID or Site ID appears in the second line.

The following operations are the same even if the transceiver enters Maintenance Display Mode by pressing the **Menu** key:

2 Switch the frequency display, ID/ channel number display or channel.

Switching to the frequency display:

Pressing the **[▶]** key switches the display to the frequency display.

Pressing the **[◀]** key while the ID/ channel number display is displayed switches the display to the frequency display. The receive frequency of the control channel currently acquired or the receive frequency of the selected channel appears in the first line, and the transmit frequency appears in the second line.

Switching to the RSSI/ BER display:

Pressing the **[◀]** key switches the display to the RSSI/ BER display.

Pressing the **[▶]** key while the ID/ channel number display is displayed switches the display to the RSSI/ BER display. The BER appears on the second line.

**Switching to the ID/ channel number display:**

Pressing the **[▶]** key while the frequency display is displayed switches the display to the ID/ channel number display. Pressing the **[◀]** key while the RSSI/ BER display is displayed switches the display to the ID/ channel number display.

In the first line, the channel ID and channel number of the receive channel specified by the system when the control channel is acquired appear. If no control channel is acquired, "**-****" appears.

In the second line, the channel ID and channel number of the transmit channel specified by the system when the control channel is acquired appear. If no control channel is acquired, "**-****" appears.

Switching channels:

Pressing the **[▲]** or **[▼]** key switches the channel number.

If Adjacent Channel information is retained in the transceiver, Adjacent Channels and Normal Hunt Channels can be selected starting from the first Adjacent Channel.

If Adjacent Channel information is not retained in the transceiver, Normal Hunt Channels can be selected starting from the channel number of the currently selected Normal Hunt Channel.

Registration is started by selecting a Normal Hunt Channel or Adjacent Channel which can acquire a control channel, and then pressing the **Menu** (**[⌂]**) or **[*]**.

When an Adjacent Channel is selected

When a Normal Hunt Channel is selected

If the selected channel number does not satisfy the conditions for acquiring a control channel, the transceiver enters the Out of Service state, and then the RSSI icon blinks. In this case, the site number or site name does not appear.
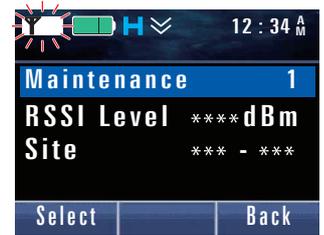
> 📰 Note

- In an NXDN Trunking system, if the transceiver is in Failsoft mode, the channel number of the Failsoft channel appears. In this case, the site number or site name does not appear. In a P25 Trunking system, if the transceiver is in Failsoft mode, the channel number and site number or the site name does not appear.
- If the transceiver is in a Roaming System by using the SKF for roaming in the Multi-System Roaming function, Failsoft does not function.
- In a P25 Trunking or NXDN system, pressing the **PTT** switch while the transceiver is in Maintenance Display Mode starts a Group Call with the Maintenance Display Mode displayed. If the transceiver migrates to a traffic channel, the display of the channel number is changed to the channel number of the traffic channel. If the transceiver receives a Group Call while in Maintenance Display Mode, the transceiver receives the Group Call with the Maintenance Display Mode displayed in the same way.
- The **PTT** switch can be used even if the transceiver is in Maintenance Display Mode. However, in a P25 Trunking or NXDN Trunking system, the **PTT** switch cannot be used if the transceiver is in the Out of Service state.
- While this function is in use, Battery Saver is disabled. (Portable only)
- In an NXDN Trunking system, the display is renewed at intervals of 1 frame.
- If the transceiver enters Maintenance Display Mode while the Site Lock is enabled, the Site Lock is temporarily disabled. In this case, the Site Lock is enabled when the transceiver exits Maintenance Display Mode.
- If the transceiver enters Maintenance Display Mode while the transceiver is outside of the communication area, the channel number retained in the transceiver appears.
- When the transceiver is in Maintenance Display Mode, the ID display in **Caller ID Display** of NXDN or P25 and the message display when a Status/ Short Message is received are not displayed.
- Maintenance Display does not function in a Multi RF Deck/ Multi Control Head structure for Mobile.

Configuration using KPG-D1/ D1N

Assigning functions to the **PF** keys on the transceiver (🔍See Transceiver Settings > Key Assignment)

The transceiver has the following indicator and display.

- LED (TX/ Busy)
- LCD
- Selective Call Alert LED

5.1   Busy LED

Busy LED is the function to notify a user visually that the transceiver has received a signal.

The LED lights green while the transceiver is receiving a signal in an Analog Conventional system, P25 Conventional system, NXDN Conventional system, and DMR Conventional system.

The LED lights only when the transceiver is on a traffic channel in a P25 Trunking system and NXDN Trunking system. The Busy LED does not light when the transceiver is on a control channel.

Also, whether the Busy LED will light while the transceiver receives in Emergency Mode can be configured.

Configuration using KPG-D1/ D1N

- Configuring **Busy LED** to be enabled or disabled (🔍See Transceiver Settings > Optional Features > Optional Features 1 > Display > LEDs)
- Configuring **Emergency LED** to be enable or disabled (🔍See Transceiver Settings > Emergency > Emergency Profile)

5.2   Transmit LED

Transmit LED is used to notify a user visually that the transceiver is transmitting.

The Transmit LED lights red while the transceiver is transmitting.

Also, whether the Transmit LED will light while the transceiver transmits in Emergency Mode can be configured.

Configuration using KPG-D1/ D1N

- Configuring **Transmit LED** to be enabled or disabled (🔍See Transceiver Settings > Optional Features > Optional Features 1 > Display > LEDs)
- Configuring **Emergency LED** to be enable or disabled (🔍See Transceiver Settings > Emergency > Emergency Profile)

5.3	Selective Call Alert LED

Selective Call Alert LED is used to notify a user visually that the transceiver has received various calls.

When receiving various calls, such as P25, NXDN, or DMR Individual Calls and Group Calls, the LED can flash any of the following 7 colors, and the flashing color can be configured for each type of call:

- Yellow
- Purple
- Blue
- Light Blue
- Red
- Green
- White

Configuration using KPG-D1/ D1N

- Configuring **Selective Call Alert LED** in a P25 Conventional system (🔍 See Transceiver Settings > P25 > P25 Information > Conventional)

- Configuring **Selective Call Alert LED** in an NXDN Conventional system (🔍 See Transceiver Settings > NXDN > NXDN Information > Conventional)

- Configuring **Selective Call Alert LED** in a DMR Conventional system (🔍 See Transceiver Settings > DMR > DMR Information > Conventional)

- Configuring **Selective Call Alert LED** in a P25 Trunking system (🔍 See Transceiver Settings > P25 > P25 Information > Trunking)

- Configuring **Selective Call Alert LED** in an NXDN Trunking system (🔍 See Transceiver Settings > NXDN > NXDN Information > Trunking)

5.4 Optional Signaling LED

Optional Signaling LED is the function to notify visually by flashing the LED yellow when the received Optional Signaling matches the Optional Signaling configured in the transceiver, or that the transceiver is in the state of voice communication to a telephone.

A user can notice by the LED that the transceiver is receiving a call.

When Optional Signaling is no longer matching due to operation of the transceiver key or upon elapse of the time configured in **Auto Reset Timer**, the light of the LED goes off.

However, if **Selective Call Alert LED** or **Telephone Call Alert LED** is enabled, the LED flashes according to the configuration of **Selective Call Alert LED** or **Telephone Call Alert LED** even when **Optional Signaling LED** is enabled.

Configuration using KPG-D1/ D1N

- Configuring **Optional Signaling LED** in an NXDN Conventional system (🔍See Transceiver Settings > NXDN > NXDN Information > Conventional)

- Configuring **Optional Signaling LED** in a DMR Conventional system (🔍See Transceiver Settings > DMR > DMR Information > Conventional)

- Configuring **Optional Signaling LED** in a P25 Conventional system (🔍See Transceiver Settings > P25 > P25 Information > Conventional)

- Configuring **Optional Signaling LED** in an NXDN Trunking system (🔍See Transceiver Settings > NXDN > NXDN Information > Trunking)

- Configuring **Optional Signaling LED** in a P25 Trunking system (🔍See Transceiver Settings > P25 > P25 Information > Trunking)

- Configuring **Optional Signaling LED** of MDC-1200 (🔍See Transceiver Settings > MDC-1200 > MDC-1200 Information > General)

- Configuring **Optional Signaling LED** of FleetSync (🔍See Transceiver Settings > FleetSync > FleetSync Information > General)

- Configuring **Optional Signaling LED** of DTMF (🔍See Transceiver Settings > DTMF > Decode)

- Configuring **Optional Signaling LED** of 2-tone

  (🔍See Transceiver Settings > 2-tone > 2-tone (Analog) > Decode (2-tone 1 to 4))

  (🔍See Transceiver Settings > 2-tone > 2-tone (Digital) > Decode (2-tone 1 to 4))

5.5 Lighting the Backlight (Backlight)

The backlight is equipped on the back side of the LCD on the transceiver. By lighting the backlight, the LCD can be viewed in dark places or at night.

Pressing the **Backlight** key toggles the backlight between On and Off.

If **Auto Backlight** is enabled, the backlight lights when operating any key of the transceiver, or when receiving a call. The conditions for lighting the backlight by the Auto Backlight function can be configured by using KPG-D1/ D1N.

● **PTT Press**

If **PTT Press** is enabled, the backlight lights when the **PTT** switch is pressed.

● **Any Key Operation**

If **Any Key Operation** is enabled, the backlight lights when any key other than the **PTT** switch is operated.

● **ID/Message Reception**

If **ID/Message Reception** is enabled, the backlight lights when the transceiver receives the following various calls and messages:

Table 5-1 List of Calls Lighting the Backlight when ID/Message Reception Is Enabled

NXDN	Conventional	Individual Call
		Individual Call Acknowledge Request
		Group Call
		Paging Call
		Status Message
		Short Message
	Trunking	Individual Call
		Individual Call (Message Trunked (Enhanced))
		Group Call/ Broadcast Group Call
		Group Call/ Broadcast Group Call (Message Trunked (Enhanced))
		Paging Call
		Status Message
		Short Message
P25	Conventional	Individual Call
		Group Call
		Emergency Call
	Trunking	Individual Call (No Availability Check)
		Individual Call (Availability Check)
		Paging Call
		Group Call/ Announcement Group/ Super Group Call
		System Call
		Telephone Call
		Emergency Call

DMR Conventional	Individual Call
	Individual Call Acknowledge Request
	Group Call
	Paging Call
	Emergency Alarm
Analog	Emergency Call (MDC-1200)
	Selcall (FleetSync/ MDC-1200)
	Call Alert (MDC-1200)
	Paging Call (FleetSync)
LTR Trunking	Selcall (FleetSync/ MDC-1200)
	Call Alert (MDC-1200)
	Paging Call (FleetSync)
	Emergency Call (MDC-1200)

After the backlight is turned On, the backlight will automatically be turned Off upon the elapse of the time configured in **Backlight Timer**. If a key is operated or the call of a condition to light is received before the time configured in **Backlight Timer** elapses, the lighting time of the backlight is extended by the time configured in **Backlight Timer**.

When "Off" is configured in **Backlight Timer**, the backlight is turned On until the **Backlight** key is pressed to turn the backlight Off.

Configuration using KPG-D1/ D1N

- Assigning functions to the **PF** keys on the transceiver (🔍See Transceiver Settings > Key Assignment)

- Configuring **Auto Backlight** to be enabled or disabled (🔍See Transceiver Settings > Optional Features > Optional Features 1 > Display > Auto Backlight)

5.6	Changing the Brightness of the Backlight (LCD Brightness)

The transceiver can be used in dark places or at night by obscuring the brightness of the backlight.

The brightness of the backlight can be configured in **LCD Brightness** by using KPG-D1/ D1N. This configuration can be changed by operating the transceiver.

● LCD Brightness key

Pressing the **LCD Brightness** key gradates the brightness of the backlight as follows:

Portable:

High → Medium → Low → High ...

Mobile (KCH-19 (Basic Panel)/ KCH-20R (Featured Panel)):

Level 7 → Level 6 → Level 5 → Level 4 → Level 3 → Level 2 → Level 1 → Level 7 ...

Mobile (KCH-21R (Handheld Control Head)):

Level 7 → Level 6 → Level 5 → Level 4 → Level 3 → Level 2 → Level 1 → Off → Level 7 ...

● Menu key

Pressing the **Menu** key to enter Menu Mode, the brightness can be changed by executing "LCD Brightness" and then selecting the backlight brightness from the selections.

Portable:

High, Medium, Low

Mobile (KCH-19 (Basic Panel)/ KCH-20R (Featured Panel)):

Level 1, Level 2, Level 3, Level 4, Level 5, Level 6, Level 7

Mobile (KCH-21R (Handheld Control Head)):

Off, Level 1, Level 2, Level 3, Level 4, Level 5, Level 6, Level 7

Status of the backlight's brightness that was changed is retained even after the transceiver is turned OFF.

📑 Note

In a Dual Control Head structure, the changed configuration is applied to the Control Head for which the configuration of **LCD Brightness** is changed. Also, **LCD Brightness** can be configured for each Control Head by using KPG-D1/ D1N. The configuration in **LCD Brightness** applies to Control Head 1, and the configuration in **LCD Brightness for Control Head 2** applies to Control Head 2.

Configuration using KPG-D1/ D1N

- Configuring **LCD Brightness** (🔍See Transceiver Settings > Optional Features > Optional Features 1 > Display)

- Configuring **LCD Brightness for Control Head 2** (🔍See Transceiver Settings > Optional Features > Optional Features 1 > Display)

- Assigning functions to the **PF** keys on the transceiver (🔍See Transceiver Settings > Key Assignment)

5.7 Changing the Color Scheme of the Transceiver Display (Color Scheme)

Color Scheme is the function to switch the color scheme of the LCD.

The color scheme of the LCD can be configured in **Color Scheme** by using KPG-D1/ D1N.

Pressing the **Menu** key to enter Menu Mode, and then executing "Color Scheme" and selecting the LCD color scheme from the selection can change the color scheme.

● **Full Color (default)**

Appears in a color scheme consisting of a maximum of 65,536 colors with a black background.

● **Full Color White**

Appears in a color scheme consisting of a maximum of 65,536 colors with a white background.

● **Monochrome Black**

Appears darkened as a black background in a monochrome color scheme consisting of 256 colors.

● **Monochrome White**

Appears brightened as a white background in a monochrome color scheme consisting of 256 colors.

The LCD color scheme that is changed is retained even after the transceiver is turned OFF.

Configuration using KPG-D1/ D1N

Configuring **Color Scheme** (See Transceiver Settings > Optional Features > Optional Features 1 > Display)

5.8 Automatically Adjusting the Brightness Level of the LCD (Auto Dimmer)

Supported Models: Mobile

Auto Dimmer is the function to automatically adjust the brightness level of the LCD depending on the brightness of the environment according to the brightness level sensor.

The sensor level of **Auto Dimmer** can be configured in **Auto Dimmer** by using KPG-D1/ D1N.

Pressing the **Menu** key causes the transceiver to enter Menu Mode, and then selecting "Auto Dimmer" can change the sensor level of **Auto Dimmer**.

● **Off**

The brightness level of the LCD is the brightness configured in **LCD Brightness** without **Auto Dimmer** functioning, and the brightness is not automatically adjusted.

● **Level 1 to Level 5**

The brightness level of the LCD is automatically adjusted by the brightness level sensor with **Auto Dimmer** functioning.

The sensitivity level of the brightness level sensor can be selected from 5 steps: Level 1 to Level 5. Level 5 is the maximum sensitivity, and the sensor is very sensitive to the brightness of the environment.

The configuration of **Auto Dimmer** that is changed is retained even after the transceiver is turned OFF.

📝 Note

- This function can be used only if KCH-19 (Basic Panel) or KCH-20R (Featured Panel) is used.
- In a Dual Control Head structure, the changed configuration is applied to the Control Head for which the configuration of **Auto Dimmer** is changed. Also, **Auto Dimmer** can be configured for each Control Head by using KPG-D1/ D1N. The configuration in **Auto Dimmer** applies to Control Head 1, and the configuration in **Auto Dimmer for Control Head 2** applies to Control Head 2.
- **Auto Dimmer** is automatically disabled while the transceiver is in the following modes. After exiting the modes, **Auto Dimmer** behaves according to the configuration. When in Firmware Programming Mode, the transceiver behaves at the brightness level of High in **LCD Brightness** for Portable, and the transceiver behaves at the brightness level of Level 7 in **LCD Brightness** for Mobile. When in other modes, the transceiver behaves at the brightness level configured in **LCD Brightness**.
  - Test Mode
  - Clone Mode
  - Firmware Programming Mode
  - Transceiver Information Mode
  - FPU Programming Mode
  - Stun/Kill
  - Radio Inhibit
  - Emergency Mode (Emergency Mode Type = Silent)
  - Key Loader Mode
  - Radio Authentication Key Loader Mode

Configuration using KPG-D1/ D1N

- Configuring **Auto Dimmer** (🔍See Transceiver Settings > Optional Features > Optional Features 1 > Display)
- Configuring **Auto Dimmer for Control Head 2** (🔍See Transceiver Settings > Optional Features > Optional Features 1 > Display)

5.9	The Icons on the LCD

The following icons are displayed in the icon display area of the LCD:

Table 5-2 Icon List

Icons	Description
	• RSSI Icon Indicates the signal strength level.
	• Battery Status Icon (Portable only) Indicates the battery power level.
	• High Transmit Power Icon Appears when the channel configured to high power transmission is selected.
	• Medium Transmit Power Icon Appears when the channel configured to medium power transmission is selected.
	• Low Transmit Power Icon Appears when the channel configured to low power transmission is selected.
	• Analog Icon Appears when an analog channel is selected.
	• Digital Icon Appears when a digital Conventional channel is selected.
	• Analog (Mixed Mode) Icon Appears when a Mixed channel with "Analog" configured in **Transmit Mode** is selected.
	• Digital (Mixed Mode) Icon Appears when a Mixed channel with "Digital" configured in **Transmit Mode** is selected.
	• Bluetooth Icon Appears when the Bluetooth is enabled. There are 2 states as follows: Lighted: Bluetooth is enabled Blinking: Bluetooth is enabled (processing)
	• Bluetooth Connection Icon Appears when connected to a Bluetooth device.
	• GPS Icon Appears when the GPS is enabled. There are 2 states as follows: Lighted: GPS is enabled (positioning state) Blinking: GPS is enabled (non-positioning state)
	• Scan Icon The scan status appears. There are 2 states as follows: Lighted: Scanning Blinking: Scan is paused
	• Priority Scan Icon The priority scan status appears. There are 2 states as follows: Lighted: Priority scan is scanning Blinking: Priority scan is paused

Icons	Description
P1	• Priority-channel/ Priority Monitor ID Icon Appears when the Priority Channel or Priority Monitor ID is selected. P1: Priority 1 Channel/ Priority Monitor ID 1 P2: Priority 2 Channel/ Priority Monitor ID 2 P3: Priority Monitor ID 3 P4: Priority Monitor ID 4
≫	• Channel Add Icon Appears when the channel to be scanned is selected.
▽	• Zone Add Icon Appears when the zone to be scanned is selected.
◇	• Scrambler Icon Appears when the Scrambler is enabled.
◆	• Encryption Icon Appears when the Encryption of the bit scrambling format is enabled. There are 2 states as follows: Lighted: No carrier message is received Blinking: When an encrypted carrier message is received Also, this icon lights when the transceiver is in the Key Fail state, even for Encryption in the AES/ DES format.
AES	• Encryption (AES) Icon Appears when the Encryption (AES) is enabled. There are 2 states as follows: Lighted: When no carrier message is received or sent Blinking: When an encrypted carrier message is received
DES	• Encryption (DES) Icon Appears when the Encryption (DES) is enabled. There are 2 states as follows: Lighted: When no carrier message is received or sent Blinking: When an encrypted carrier message is received
EE	• Encryption (ARC4) Icon Appears when the Encryption (ARC4) is enabled. There are 2 states as follows: Lighted: When no carrier message is received or sent Blinking: When an encrypted carrier message is received
▤	• Talk Around Icon Appears when the Talk Around is enabled.
◁)	• Monitor Open/ Squelch Off Icon Appears when the transceiver is unmuted, or when signaling is disabled.
▷◁	• External Speaker Icon Appears when the external speaker is enabled.
▷◁	• External Speaker (Internal + External) Icon (Mobile only) Appears when the internal speaker and external speaker are enabled.
NR	• Noise Reduction Icon Appears when the Noise Reduction is enabled. There are 2 states as follows: Lighted: Noise Reduction is enabled Blinking: Noise Reduction is being executed
♪	• Call Icon Indicates the status of the signaling. There are 2 states as follows: Lighted: The state where the **PTT** switch is pressed and the Optional Signaling is disabled. Blinking: The state where Optional Signaling matches (including when communications by NXDN or P25 Voice Call is determined)

Icons	Description
✉	• Message Stack Icon Appears when the received message is stored in the transceiver stack memory. There are 2 states as follows: Lighted: The state where no messages are unread Blinking: The state where one or more messages are unread
SD	• microSD Icon (when recognized) Appears when the microSD is recognized.
✕	• microSD Icon (when unrecognized) Appears when the microSD is not recognized.
VOX	• VOX Icon Appears while VOX is activated.
333	• Vibrator Icon (Portable only) Indicates the status of the Vibrator. There are 2 states as follows: Lighted: Vibrator is enabled Blinking: Vibrator is not operating
⋈	• Horn Alert Icon (Mobile only) Appears when the Horn Alert is enabled.
⚑	• Site Lock Icon Appears when the Site Lock is enabled.
⚑⚑	• System Lock Icon Appears when the System Lock is enabled.
👥	• Broadcast Icon Appears when the Broadcast is enabled.
🚫	• Surveillance Icon Appears when the Surveillance is enabled.
☎	• Telephone ID Icon There are 2 states as follows: Lighted: Indicates the status of the Telephone ID and RIC (Repeater Interconnect). Blinking: Indicates the status of Auto Telephone Search.
T	• Tactical Zone Icon Appears when Tactical Zone is selected.
Ⓐ	• AUX A Icon Appears when the AUX A port is active.
Ⓑ	• AUX B Icon (Mobile only) Appears when the AUX B port is active.
Ⓒ	• AUX C Icon (Mobile only) Appears when the AUX C port is active.
◎	• Public Address Icon (Mobile only) Appears when the Public Address is enabled.

Icons	Description
	• Intercom Icon Appears when Intercom is enabled in a Dual Control Head structure for Mobile.
	• Lone Worker Icon Appears when the Lone Worker is enabled.
	• Activity Detection Icon (Portable only) Appears when the Activity Detection is enabled.
	• OVCM Icon Appears when OVCM is enabled.
	• Compander Icon Appears when the Compander is enabled.
	• OST Icon Appears when the OST is enabled.
	• Auto Recording Icon Appears while the Auto Recording is executing.
	• Key Lock Icon Appears when the Key Lock is enabled.

5.10 Displaying the Signal Strength (Signal Strength Indicator)

Signal Strength Indicator can be used to display the signal strength of the received signal.

The RSSI icon indicating the signal strength appears in the following manner depending on the signal level of the received signal.

Table 5-3 Signal Strength Indicator

Icons	Status	Signal Strength
	High	Above -80 dBm
	Medium	-95 dBm to -80 dBm
	Low	-110 dBm to -95 dBm
	Very weak	With a carrier less than -110 dBm
Disabled	No signal	No carrier
	Blinking: Outside of the communication area (P25 Trunking/ NXDN Trunking system only)	-

Note

The signal strength references are rough indicators of room temperature.

Configuration using KPG-D1/ D1N

Configuring **Signal Strength Indicator** to be enabled or disabled (See Transceiver Settings > Optional Features > Optional Features 1 > Display)

5.11	Display Functions of the Display

The following functions are relevant to the display.

- Zone Name display
- Display Format
- Power-on Text
- Sub-LCD Display
- Clock Display

Zone Name Display

Zone Name Display is the function to display the Zone Name on the display.
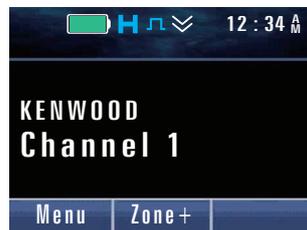
📝 Note

If the Zone Name is not configured, the zone number is displayed.

Configuration using KPG-D1/ D1N

Configuring **Zone Name Display** to be enabled or disabled (🔍See Transceiver Settings > Optional Features > Optional Features 1 > Display)

Display Format

Display Format is the function to display the Channel Name or both the zone number and channel number on the display.

Table 5-4 Display Format

Configuration	Description
Channel Name	Displays the Channel Name.
Zone-Channel Number	Displays both the zone number and channel number.

Pressing the **Display Format** key changes the display. Or, pressing the **Menu** key causes the transceiver to enter Menu Mode, and then the display can be changed by selecting the "Display Format". (Refer to Using Menu Mode.)

Configuration using KPG-D1/ D1N

- Configuring **Date Format** (🔍See Transceiver Settings > Optional Features > Optional Features 1 > Display)

- Assigning functions to the **PF** keys on the transceiver (🔍See Transceiver Settings > Key Assignment)

Common FUNC (K, F)/Ver 2.20

Power-on Text

Power-on Text is the function to display characters when the transceiver is turned ON.

If **Power-on Text** is configured, the configured characters appear for 2 sec when the transceiver is turned ON.

If "Text" is configured in **Message Type**, the configured text appears.

Example:

Power-on Text = "Truck 8649"

If "%" is used in a string of text when "Unit ID" is configured in **Message Type**, "%" appears replaced with the Unit ID (Own) of the system configured in **Preset System Number**.

Example:

Unit ID (Own)/ NXDN = 60000

Power-on Text ="Taxi %%%%%"

When "Unit ID Name" is configured in **Message Type**, the string of the Unit ID Name (Own) of the system configured in **Preset System Number** appears. If no Unit ID Name (Own) of the system is configured in **Preset System Number**, nothing appears.

Example:

Unit ID Name (Own) = "Truck 3012"

If "%" is used in a string of text when "FleetSync ID" is configured in **Message Type**, "%" appears replaced with the Fleet (Own) and ID (Own) of the system configured in **Preset System Number**.

Example:

Fleet (Own) = 110

ID (Own) = 1911

Power-on Text = "NYPD %%%-%%%%"

📝 Note

Pressing a key while the Power-on Text appears causes the Power-on Text to disappear.

Configuration using KPG-D1/ D1N

- Configuring **Power-on Text** and **Message Type** (🔍See Transceiver Settings > Optional Features > Optional Features 1 > Power-on)

- Configuring **Preset System Number** (🔍See Transceiver Settings > Optional Features > Optional Features 1 > Power-on)

Sub-LCD Display

Sub-LCD Display is the function to display the transceiver information on the display while the transceiver is in the normal state.

Table 5-5 Sub-LCD Display

Configuration	Description
None	Nothing appears.
Zone Number	The zone number appears.
Channel Number	The channel number appears.
OST List Number	The OST List number appears.
Site Number	The site number of the fixed site appears while Site Lock is enabled. The site number of the current site appears if the transceiver has acquired a control channel while Site Lock is disabled. The site number does not appear if the transceiver does not acquire a control channel while Site Lock is disabled.

📝 Note

Site Number can be used only in an NXDN Trunking system.

Configuration using KPG-D1/ D1N

Configuring **Sub-LCD Display** (🔍See Transceiver Settings > Optional Features > Optional Features 1 > Display)

Sub-LCD Display Priority

Sub-LCD Display Priority is the function to display the sub-display prioritizing the display contents configured in **Sub-LCD Display**.

Table 5-6 Sub-LCD Display Priority

Configuration	Description
High	The number display configured in **Sub-LCD Display** has the highest priority. If a function to display on the sub-display is activated while a function number configured in **Sub-LCD Display** appears on the sub-display, after the string of text corresponding to the function is displayed for 1 sec, the number display configured in **Sub-LCD Display** is restored. However, if a function to display on the sub-display is activated while **Sub-LCD Display** is configured as follows, the string of text corresponding to the function is displayed until the function is reset: • When "None" is configured in **Sub-LCD Display** • When "OST List Number" is configured in **Sub-LCD Display** and nothing appears on the sub-display, such as when the OST function is disabled or when the transceiver is on a digital channel
Low	The number display configured in **Sub-LCD Display** has the lowest priority. If a function to display on the sub-display is activated, the string of text corresponding to the function is displayed until the function is reset.

Configuration using KPG-D1/ D1N

Configuring **Sub-LCD Display Priority** (🔍See Transceiver Settings > Optional Features > Optional Features 1 > Display)

Clock Display

Clock Display is the function to display the clock on the display.

Configuration using KPG-D1/ D1N

Configuring **Clock Display** to be enabled or disabled (🔍See Transceiver Settings > Optional Features > Optional Features 1 > Display)

5.12 Customizing a Displayed Text String (Display Customization)

Using KPG-D1/ D1N, this function can be used to change a string of text which appears on the LCD of the transceiver, such as Function Mode and Key Guide.

The string of text that appears on the LCD of the transceiver can be changed to the function names used in other models.

Configuration using KPG-D1/ D1N

Changing the string of text that appears on the LCD of the transceiver (🔍See Transceiver Settings > Display Customization)

5.13	Displaying a Bitmap Image When the Transceiver is Turned ON (Custom Start-up Screen)

Custom Start-up Screen is the function to display a bitmap image when the transceiver is turned ON. The image of a company name, logo, or simple message can be converted into bitmap image data and it can be displayed for 2 sec when the transceiver is turned ON. (Refer to Turning the Transceiver ON.)

Bitmap images of the following sizes can be used:

Portable: 240 horizontal dots, 180 vertical dots

Mobile (KCH-19 (Basic Panel)): 422 horizontal dots, 154 vertical dots

Mobile (KCH-20R (Featured Panel)): 400 horizontal dots, 240 vertical dots

Mobile (KCH-21R (Handheld Control Head)): 240 horizontal dots, 180 vertical dots

An image with 65,536 colors can be displayed.

📝 Note

Only image files (extension: .bmp) edited in Windows Paint can be used.

Configuration using KPG-D1/ D1N

Configuring **Custom Start-up Screen** (🔍See Transceiver Settings > Optional Features > Optional Features 1 > Power-on)

6 SOUND

6.1 Tones that Sound When a User Operates the Transceiver or When the Transceiver Status Is Changed

The following are the tones that sound from the transceiver:

Table 6-1 Tone List

Tone	Description and Type	Remarks
Power-on Tone	Power-on Tone A Power-on Tone B	
Control Tone	Key Beep A Key Beep B Key Beep C Key-entry Error Tone Rollover Tone Stop Tone Password Authorization Tone Queue Tone Free System Ringback Mode Tone Ringer Tone Priority-channel Tone Scan Stop Tone Individual Call Tone Fleet Call Tone Group Call Tone Search Mode Tone Out of Range Tone Call Request Tone OTAP Reactivation Tone Call In Progress Tone Disconnect Indication Tone Key Load Alert Tone Transaction Confirmed Tone Bluetooth Find Device Mode Tone Bluetooth Connect Tone Bluetooth Disconnect Tone Complete Tone Record Stopped Tone	The volume levels of each tone can be configured using KPG-D1/ D1N.
Warning Tone	Warning Tone A Warning Tone B Warning Tone C Battery Warning Tone TOT Pre-alert Tone PLL Unlock Tone Busy Tone Busy Tone 2 Timed Power-off Pre-alert Tone A Timed Power-off Pre-alert Tone B Timed Power-off Pre-alert Tone C Call Queue Tone System Busy Tone System Search Tone System Search End Tone System Select Tone Call Invalid Tone Invalid Dial Tone Not Authorized Tone No Reply Tone Delay Tone	

Tone	Description and Type	Remarks
Warning Tone	Intercept Tone Intercept Tone 2 Deny Tone Call Fail Tone Call Deny Tone Lone Worker Tone Group-registration Invalid Tone Call Processing Tone Network Failure Tone A Network Failure Tone B Man-down Pre-alert Stationary Pre-alert Tone Motion Pre-alert Tone Key Fail Alert Tone Ignore Encryption Switch Alert Tone Site Trunking Tone Bluetooth No Response Tone Bluetooth Connect Denied Tone Bluetooth Connect Invalid Tone Bluetooth No Service Tone Battery Level Tone Advanced GPS Report Error Tone Low SD Memory Tone	The volume levels of each tone can be configured using KPG-D1/ D1N.
Locator Tone	Emergency Locator Tone	
Sidetone	Proceed Tone VOX Proceed Tone PTT ID Sidetone	
Alert Tone	Special Alert Tone Transmit Clear Alert Tone Site Trunking Alert Ack Wait Enter Tone Emergency Indicator Alert Tone	
Volume Level Tone	Fixed Volume Key Tone Volume Key Tone	
Transmit Tone	Transpond Tone Stun-on Tone Stun-off Tone PTT Release Tone Background Tone	

Power-on Tone

A Power-on Tone sounds from the transceiver when the transceiver is turned ON.

The volume level of Power-on Tone can be configured using KPG-D1/ D1N. (Refer to Configuring the Volume Level of Various Tones (Tone Volume).)

Table 6-2 Power-on Tone

Function	Description
Power-on Tone A	This tone sounds from the transceiver when the transceiver is turned ON.
Power-on Tone B (Mobile only)	This tone sounds when the transceiver is turned ON by pressing and holding the **Power** switch while " Ignition & Switch" is configured in **Ignition Sense Type**. In this case, **Timed Power-off** is not activated.

Configuring a tone which sounds when the transceiver is turned ON (Power-on Tone)

The tone pattern (frequency and length) for a Power-on Tone A which sounds from the transceiver when the transceiver is turned ON can be configured using KPG-D1/ D1N.

The default for a Power-on Tone A is a frequency of 1480 Hz and a tone length of 500 ms. The tone length can be extended up to 1000 ms.

Configuration using KPG-D1/ D1N

Configuring **Power-on Tone** (🔍See Transceiver Settings > Special Tone)

Control Tone

A Control Tone sounds when a function is activated by a user operating the transceiver.

The volume level of Control Tone can be configured using KPG-D1/ D1N. (Refer to Configuring the Volume Level of Various Tones (Tone Volume).)

Table 6-3 Control Tone

Function	Description
Key Beep A	This tone sounds from the transceiver when a function is enabled by pressing a key.
Key Beep B	This tone sounds from the transceiver when a function is disabled by pressing a key.
Key Beep C	This tone sounds from the transceiver when Home Channel or Direct Channel is changed using the **Home Channel Select** or **Direct Channel Select** key, or when the time in the transceiver is changed in Clock Adjustment Mode.
Key-entry Error Tone	This tone sounds from the transceiver when the operation activated by pressing a key is denied.
Rollover Tone	This tone sounds from the transceiver when the lowest zone or channel number is selected. Also, this tone sounds if the lowest list number is selected in various list modes, or if the smallest font or lowest value is selected while entering characters or code. (Refer to Rollover/ End Stop.)
Stop Tone	This tone sounds from the transceiver if "End Stop" is configured in **Rollover/ End Stop**. This tone sounds from the transceiver if the zone or channel number is decreased while the zone or channel having the lowest number is selected. Or, this tone sounds from the transceiver if the zone or channel number is increased while the zone or channel having the lowest number is selected. (Refer to Rollover/ End Stop.)
Password Authorization Tone	This tone sounds from the transceiver if the entered password matches the password preconfigured for the transceiver.

Function	Description
Queue Tone	This tone sounds from the transceiver while the transceiver is searching with the Auto Telephone in an LTR Trunking system for an available RIC repeater to be connected. This tone sounds from the transceiver every 1 sec until an available RIC repeater to be connected is found or Auto Telephone is terminated if the transceiver cannot find an available RIC repeater within 60 sec.
Free System Ringback Mode Tone	This tone sounds from the transceiver when the transceiver enters Free System Ringback Mode in an LTR Trunking system.
Ringer Tone	This tone sounds from the transceiver when a repeater is temporarily available in Free System Ringback Mode in an LTR Trunking system.
Priority-channel Tone	This tone sounds from the transceiver when the scan is paused on a Priority-channel.
Scan Stop Tone	Pressing the **Home Channel** or **Direct Channel** key during the scan pauses the scan, and the transceiver migrates to the Home Channel or Direct Channel. Also, pressing the **Channel Recall** key during the scan pauses the scan, and the transceiver migrates to the last called Zone-channel. This tone sounds from the transceiver at 30-sec intervals while the scan pauses.
Individual Call Mode	This tone sounds from the transceiver when the transceiver initiates a FleetSync Individual Call.
Fleet Call Tone	This tone sounds from the transceiver when the transceiver initiates a FleetSync Fleet Call.
Group Call Tone	This tone sounds from the transceiver when the transceiver initiates a FleetSync Group Call.
Search Mode Tone	This tone sounds from the transceiver when the transceiver initiates Forced Search in an NXDN Trunking system. This tone sounds from the transceiver when the transceiver initiates System Search in a P25 Trunking system. This tone sounds from the transceiver when the transceiver starts searching for the repeaters that can be synchronized in a DMR Conventional system.
Out of Range Tone	This tone sounds at 30-sec intervals from the transceiver when the transceiver is in the search state, even if 10 sec elapse after the transceiver starts searching for a control channel in an NXDN Trunking system or P25 Trunking system.
Call Request Tone	**NXDN Trunking/ P25 Trunking system:** This tone sounds from the transceiver when the transceiver initiates an Individual Call or Group Call by pressing the **PTT** switch. **NXDN Conventional system:** This tone sounds from the transceiver when the transceiver initiates an Individual Call (Individual Call Acknowledge Request) by pressing the **PTT** switch.
OTAP Reactivation Tone	This tone sounds from the transceiver when OTAP Reactivation completes.
Call In Progress Tone	This tone sounds from the transceiver if the transceiver initiates a Telephone Call, Individual Call (Message Trunked (Enhanced)), or Group Call (Message Trunked (Enhanced)) and the transceiver is available for communications.
Disconnect Indication Tone	This tone sounds from the transceiver if the transceiver terminates communications with a Telephone Call, Individual Call (Message Trunked (Enhanced)), or Group Call (Message Trunked (Enhanced)).
Key Load Alert Tone	This tone sounds from the transceiver when Key Data is written to the Secure Cryptographic Module (SCM) or when Key Data is deleted is from the SCM.
Transaction Confirmed Tone	In a DMR Conventional system, this tone sounds from the transceiver when the transceiver detects that no carrier is present after sending a Call Interrupt request message.
Bluetooth Find Device Mode Tone	This tone sounds from the transceiver when Bluetooth Find Device is executed in Bluetooth Device Mode and a Bluetooth-compatible device is searched.
Bluetooth Connect Tone	This tone sounds from the transceiver when the transceiver successfully connects to a Bluetooth-compatible device.
Bluetooth Disconnect Tone	This tone sounds from the transceiver when the connection to a Bluetooth-compatible device is disconnected.
Complete Tone	This tone sounds from the transceiver when the transmission successfully sends a Status Message, Short Message, GPS data or Paging Call by operating the keys on the transceiver.
Record Stopped Tone	This tone sounds from the transceiver when the transceiver exits Voice Memo Mode.

Warning Tone

Warning Tone is a tone that sounds from the transceiver before or when the transceiver is disabled to transmit, when the transceiver becomes unable to transmit, or when the transceiver attempts to transmit while the transceiver is unable to transmit.

The volume level of Warning Tone can be configured using KPG-D1/ D1N. (Refer to Configuring the Volume Level of Various Tones (Tone Volume).)

Table 6-4 Warning Tone

Function	Description
Warning Tone A	This tone sounds from the transceiver while an unprogrammed channel is selected. This tone sounds from the transceiver until the **PTT** switch is released if the transmission is terminated by the **Time-out Timer**, or if the transceiver cannot transmit. This tone sounds from the transceiver until the **PTT** switch is released if Busy Channel Lockout is activated in an Analog Conventional, P25 Conventional and NXDN Conventional system.
Warning Tone B	This tone sounds from the transceiver when the VOX transmission is terminated by **Time-out Timer**.
Warning Tone C	This tone sounds from the transceiver when the automatic transmission is terminated by **Time-out Timer**.
Battery Warning Tone (Portable only)	This tone sounds from the transceiver when the Battery voltage level drops to the adjusted reduced-voltage level. (Refer to Warning that the Battery Voltage Is Low (Battery Warning).)
TOT Pre-alert Tone	This tone sounds from the transceiver when the transmit inhibit period configured in **Time-out Timer** is about to expire.
PLL Unlock Tone	This tone sounds from the transceiver when PLL is unlocked.
Busy Tone	This tone sounds from the transceiver if data cannot be sent by pressing the **PTT** switch since the channel is busy.
Busy Tone 2	This tone sounds from the transceiver if data communication is disabled since the channel is busy. This tone sounds from the transceiver when the transceiver receives a response message from the system that notifies of the busy state of the receiving transceiver in an NXDN Trunking system.
Timed Power-off Pre-alert Tone A (Mobile only)	This tone sounds from the transceiver 1 min before the time preconfigured in **Timed Power-off**.
Timed Power-off Pre-alert Tone B (Mobile only)	This tone sounds from the transceiver 10 sec before the time preconfigured in **Timed Power-off**.
Timed Power-off Pre-alert Tone C (Mobile only)	This tone sounds from the transceiver 2 sec before the time preconfigured in **Timed Power-off**.
Call Queue Tone	This tone sounds from the transceiver when the transceiver receives a response message from the system that indicates a queued state in an NXDN Trunking system or P25 Trunking system.
System Busy Tone	This tone sounds from the transceiver when the transceiver receives a response message from the system indicating that no traffic channel is available in an NXDN Trunking system.
System Search Tone	This tone sounds from the transceiver when the transceiver initiates System Search and changes the system in an LTR Trunking system.
System Search End Tone	This tone sounds from the transceiver when there is no repeater that can connect by using System Search in an LTR Trunking system.
System Select Tone	This tone sounds from the transceiver when the transceiver finds an available system by using System Auto Select and registration is successful in an NXDN Trunking system. This tone sounds from the transceiver when the transceiver searches for the repeaters that can be synchronized and a synchronized Personality is found in a DMR Conventional system.
Call Invalid Tone	This tone sounds from the transceiver when the transceiver receives from the system a response message, such as a response message that service is disabled, in an NXDN Trunking system or P25 Trunking system.
Invalid Dial Tone	While sending a Telephone Call in a P25 Trunking system, this tone sounds from the transceiver when the transceiver receives from the system a response message that service is disabled (Reason Code: $40 or $42).

Function	Description
Not Authorized Tone	While sending a Telephone Call in a P25 Trunking system, this tone sounds from the transceiver when the transceiver receives from the system a response message that service is disabled (Reason Code: $41).
No Reply Tone	This tone sounds from the transceiver when the transceiver receives a message from the system notifying that no response has been received from the receiving transceiver in an NXDN Trunking system or P25 Trunking system.
Call Fail Tone	This tone sounds from the transceiver when the transceiver receives no message from the system in an NXDN Trunking system or P25 Trunking system.
Call Deny Tone	**P25 Conventional system:** This tone sounds from the transceiver when a Registration Response - Denied is received while the Rekey Request key is pressed and held with the registration (CAI Data Registration) unsuccessful. This tone sounds from the transceiver while the Rekey Request key is pressed and held with CAI Data Registration denied. **P25 Trunking system:** This tone sounds from the transceiver if the transceiver receives a rejection response message from the target transceiver when sending an Individual Call. **NXDN Conventional system:** In an Individual Call (Individual Call Acknowledge Request), this tone sounds from the transceiver if a cancellation notification message is received from the receiving transceiver while waiting to receive a response from the receiving transceiver. **NXDN Trunking system:** In an Individual Call (Message Trunked (Enhanced)), this tone sounds from the transceiver if a cancellation notification message is received from the receiving transceiver while waiting to receive a response from the receiving transceiver.
Lone Worker Tone	This tone sounds from the transceiver when the amount of time configured in **Lone Worker Interval** elapses after the transceiver enters Lone Worker Mode.
Group-registration Invalid Tone	In an NXDN Trunking system, this tone sounds at 30-sec intervals from the transceiver upon receipt of a response message from the system indicating a failure in Group ID registration.
Call Processing Tone	**NXDN Trunking/ P25 Trunking system:** When the transceiver initiates an Individual Call or Group Call by pressing the **PTT** switch, this tone sounds from the transceiver while the **PTT** switch is pressed and held. However, when sending an Individual Call (Message Trunked (Enhanced)) in an NXDN Trunking system, the tone from the transceiver continues to sound even if the **PTT** switch is released. **NXDN Conventional system:** This tone sounds from the transceiver when the transceiver initiates an Individual Call (Individual Call Acknowledge Request) by pressing the **PTT** switch. The tone from the transceiver continues to sound even if the **PTT** switch is released.
Network Failure Tone A	In an NXDN Trunking system, this tone sounds at 5-sec intervals from the transceiver while the transceiver is in Network Failure Mode.
Network Failure Tone B	In an NXDN Trunking system, this tone sounds from the transceiver when the transceiver exits Network Failure Mode.
Man-down Pre-alert (Portable only)	After the transceiver is detected to be in a tilted state by using the Man-down Detection function, this tone sounds from the transceiver when the time configured in **Man-down Pre-alert** elapses.
Stationary Pre-alert Tone (Portable only)	After the transceiver is detected to be in a stationary state by using the Stationary Detection function, this tone sounds from the transceiver when the time configured in **Stationary Pre-alert** elapses.
Motion Pre-alert Tone (Portable only)	After the transceiver is detected to be in a vigorously moving state by using the Motion Detection function, this tone sounds from the transceiver when the time configured in **Motion Pre-alert** elapses.
Key Fail Alert Tone	Upon transmission using the Encryption function by means of AES/DES, this tone sounds from the transceiver if no SCM is installed in the transceiver, or if the SCM is disabled, or if no encryption key data corresponding to the Multi-key List Number is configured on the SCM.

Function	Description
Ignore Encryption Switch Alert Tone	This tone sounds from the transceiver when the **PTT** switch is pressed while the enabled (Secure) or disabled (Clear) state of Encryption in a P25 system differs from the configuration in Encryption (Clear, Secure or Select) for the channel or the Talkgroup ID List.
Site Trunking Tone	This tone sounds from the transceiver when the system enters Site Trunking Mode in a P25 Trunking system.
Bluetooth No Response Tone	This tone sounds from the transceiver if no response is received from a Bluetooth-compatible device when approximately 10 sec elapses after pairing with the Bluetooth-compatible device is started.
Bluetooth Connect Denied Tone	This tone sounds from the transceiver if paring is denied by a Bluetooth-compatible device after pairing is started.
Bluetooth Connect Invalid Tone	This tone sounds from the transceiver if the PIN Code or Fixed PIN entered in the transceiver is detected to be different from the PIN Code entered in a Bluetooth-compatible device after pairing with the Bluetooth-compatible device is started.
Bluetooth No Service Tone	This tone sounds from the transceiver if pairing occurs with a Bluetooth-compatible device which is not compatible with the transceiver.
Battery Level Tone	This tone sounds from the transceiver according to the battery status.
Delay Tone	This tone sounds from the transceiver between the 3rd and 6th attempts to access a repeater by pressing the **PTT** switch in an LTR Trunking system, in order to notify a user that the connection to the repeater has been delayed.
Intercept Tone	This tone sounds from the transceiver when the transceiver accesses a repeater by pressing the **PTT** switch in an LTR Trunking system, and a user fails to connect to the repeater.
Intercept Tone 2	This tone sounds from the transceiver when the PF key to which **Call 1** to **Call 6** is assigned is pressed or when the repeater is accessed for automatic transmission, such as of a Status Message, and the connection to the repeater fails in an LTR Trunking system.
Deny Tone	This tone sounds from the transceiver if the transceiver cannot connect to an available RIC repeater within 60 sec by using Auto Telephone in an LTR Trunking system.
Advanced GPS Report Error Tone	In an NXDN Trunking system, this tone sounds from the transceiver at 30-sec intervals when the channel for GPS data transmission becomes unavailable.
Low SD Memory Tone	This tone sounds from the transceiver when the available capacity on a microSD card becomes 10 % or less.

Locator Tone

Locator Tone is the tone sounding from the transceiver before the transceiver starts automatic transmission in Emergency Mode, and after the transceiver ends automatic transmission in Emergency Mode.

The volume level of Locator Tone can be configured using KPG-D1/ D1N. (Refer to Configuring the Volume Level of Various Tones (Tone Volume).)

Table 6-5 Locator Tone

Function	Description
Emergency Locator Tone	A Locator Tone 1 sounds from the transceiver before the transceiver starts automatic transmission in Emergency Mode.
	A Locator Tone 2 sounds from the transceiver after the transceiver ends automatic transmission in Emergency Mode.
	In Emergency Mode, the transceiver repeats an automatic communication only the number of times configured in **Emergency Cycle**.

Sidetone

Sidetone sounds from the transceiver when the transceiver can communicate or the transceiver completes a transmission.

The volume level of Sidetone can be configured using KPG-D1/ D1N. (Refer to Configuring the Volume Level of Various Tones (Tone Volume).)

Table 6-6 Sidetone

Function	Description
Proceed Tone	This tone sounds from the transceiver when a connection to a repeater completes by pressing the **PTT** switch in a P25 Trunking system or NXDN Trunking system.
	In a P25 Conventional system, NXDN Conventional system, and DMR Conventional system, this tone is used to prevent missing the beginning of the audio to be transmitted. This tone can be used with **Proceed Tone Delay Time** at the same time.
VOX Proceed Tone	This tone sounds from the transceiver when the transceiver starts transmitting by using the VOX function.
PTT ID Sidetone	This tone sounds from the transceiver when the transceiver starts transmitting a FleetSync PTT ID and MDC-1200 PTT ID.

Alert Tone

Alert Tone sounds from the transceiver when the transceiver receives various types of calls, Status Message, or Short Message. (Refer to Tones that Sound When the Transceiver Receives a Call.)

The volume level of Alert Tone can be configured using KPG-D1/ D1N. (Refer to Configuring the Volume Level of Various Tones (Tone Volume).)

Table 6-7 Alert Tone

Function	Description
Special Alert Tone	This tone sounds from the transceiver when the transceiver receives various types of calls, Status Message, or Short Message.
	A maximum of 8 types of tones can be arbitrarily configured or changed. (Refer to Configuring the Alert Tone (Alert Tone Pattern).)
Transmit Clear Alert Tone	This tone sounds from the transceiver when the transceiver starts transmitting without encrypting audio data.
Site Trunking Alert	This tone sounds from the transceiver when the transceiver initiates a site trunking in a P25 Trunking system.
Ack Wait Enter Tone	This tone sounds from the transceiver when a Response Packet is received from the system when sending a P25 Rekey Request in a P25 system.
Emergency Indicator Alert Tone	This tone sounds from the transceiver when the transceiver receives an Emergency message in a P25 system.

Volume Level Tone

Volume Level Tone sounds from the transceiver when the volume level is changed.

Table 6-8 Volume Level Tone

Function	Description
Fixed Volume Key Tone	This tone sounds from the transceiver when the volume level is changed by using the **Fixed Volume** key.
Volume Key Tone (Mobile only)	This tone sounds from the transceiver when the volume level is changed by pressing the **Volume Up** or **Volume Down** key.

Transmit Tone

Transmit Tone is a tone sent to the communicating party.

Table 6-9 Transmit Tone

Function	Description
Transpond Tone	This tone is sent to the other transceiver after receiving a call by 2-tone or DTMF code.
	This tone is sent to the other transceiver after receiving a call in an LTR Trunking system.
Stun-on Tone	This tone is sent to the other transceiver after receiving a Stun code.
Stun-off Tone	This tone is sent to the other transceiver after receiving a Revive code while the transceiver is in the Stun state.
PTT Release Tone	This tone is sent to the other transceiver when the **PTT** switch is pressed to send and then released after the call ends.
Background Tone	This tone is sent to the other transceiver every 1 sec during voice transmission in Emergency Mode.

6.2 Tones that Sound When the Transceiver Receives a Call

An Alert Tone sounds from the transceiver such as when the transceiver receives a call using an Individual Call or a Group Call, a Status Message, or a Short Message and notifies the user of the reception.

The Alert Tone pattern can be configured by selecting from 8 types of tones configured in **Special Alert Tone**. (Refer to Configuring the Alert Tone (Alert Tone Pattern).)

Following are the types of Alert Tone.

Table 6-10 Alert Tone

P25 Conventional	
Alert Tone (Individual Call)	This tone sounds from the transceiver when the transceiver receives an Individual Call.
Alert Tone (Group Call)	This tone sounds from the transceiver when the transceiver receives a Group Call.
Alert Tone (All Group Call)	This tone sounds from the transceiver when the transceiver receives an All Group Call.
Alert Tone (Text Message Call)	This tone sounds from the transceiver when the transceiver receives a Text Message Call.
Alert Tone (Emergency Response)	If **Alert Tone** is enabled for **Emergency Status Response**, this tone sounds from the transceiver when the transceiver receives an Emergency Call.
P25 Trunking	
Alert Tone (Individual Call)	This tone sounds from the transceiver when the transceiver receives an Individual Call.
Alert Tone (Individual Call Incoming)	If Automatic Response is disabled, this tone sounds from the transceiver when the transceiver receives an Individual Call.
Alert Tone (Group Call)	This tone sounds from the transceiver when the transceiver receives a Group Call.
Alert Tone (System Call)	This tone sounds from the transceiver when the transceiver receives a System Call.
Alert Tone (Paging Call)	This tone sounds from the transceiver when the transceiver receives a Paging Call.
Alert Tone (Telephone Call)	This tone sounds from the transceiver when the transceiver receives a Telephone Call.
Alert Tone (Emergency Response)	If **Alert Tone** is enabled for **Emergency Status Response**, this tone sounds from the transceiver when the transceiver receives an Emergency Call.
NXDN Conventional	
Alert Tone (Individual Call)	This tone sounds from the transceiver when the transceiver receives an Individual Call.
Alert Tone (Individual Call Incoming)	If **Automatic Response** is disabled, this tone sounds from the transceiver when the transceiver receives an Individual Call (Individual Call Acknowledge Request).
Alert Tone (Group Call)	This tone sounds from the transceiver when the transceiver receives a Group Call.
Alert Tone (Paging Call)	This tone sounds from the transceiver when the transceiver receives a Paging Call.
Alert Tone (Status/Short Message Call)	This tone sounds from the transceiver when the transceiver receives a Status Message or a Short Message.
Alert Tone (Emergency Response)	If **Alert Tone** is enabled for **Emergency Status Response**, this tone sounds from the transceiver when the transceiver receives an Emergency Call.

DMR Conventional	
Alert Tone (Individual Call)	This tone sounds from the transceiver when the transceiver receives an Individual Call.
Alert Tone (Group Call)	This tone sounds from the transceiver when the transceiver receives a Group Call.
Alert Tone (Broadcast Group Call)	This tone sounds from the transceiver when the transceiver receives a Broadcast Group Call.
Alert Tone (Paging Call)	This tone sounds from the transceiver when the transceiver receives a Paging Call.
Alert Tone (Status/ Short Message Call)	This tone sounds from the transceiver when the transceiver receives a Status Call/ Short Message Call.
Alert Tone (Emergency Response)	This tone sounds from the transceiver when the transceiver receives an Emergency Status.
NXDN Trunking	
Alert Tone (Individual Call)	This tone sounds from the transceiver when the transceiver receives an Individual Call in an NXDN Trunking system.
Alert Tone (Individual Call Incoming)	If **Automatic Response** is disabled, this tone sounds from the transceiver when the transceiver receives an Individual Call (Message Trunked (Enhanced)).
Alert Tone (Telephone Individual Call)	This tone sounds from the transceiver when the transceiver receives a Telephone Individual Call in an NXDN Trunking system.
Alert Tone (Conference Group Call)	This tone sounds from the transceiver when the transceiver receives a Conference Group Call in an NXDN Trunking system.
Alert Tone (Broadcast Group Call)	This tone sounds from the transceiver when the transceiver receives a Broadcast Group Call in an NXDN Trunking system.
Alert Tone (Paging Call)	This tone sounds from the transceiver when the transceiver receives a Paging Call in an NXDN Trunking system.
Alert Tone (Telephone Group Call)	This tone sounds from the transceiver when the transceiver receives a Group Call from a telephone in an NXDN Trunking system.
Alert Tone (Status/Short Message Call)	This tone sounds from the transceiver when the transceiver receives a Status Message or a Short Message.
Alert Tone (Emergency Response)	If **Alert Tone** is enabled for **Emergency Status Response**, this tone sounds from the transceiver when the transceiver receives an Emergency Call.
DTMF	
Alert Tone	This tone sounds from the transceiver when the transceiver receives a call using a DTMF code.
2-tone	
Alert Tone (Analog/ Digital)	This tone sounds from the transceiver when the transceiver receives a call using a 2-tone code.
MDC-1200	
Alert Tone (Individual Call)	This tone sounds from the transceiver when the transceiver receives an MDC-1200 Individual Call.
Alert Tone (Group Call)	This tone sounds from the transceiver when the transceiver receives an MDC-1200 Group Call.
Alert Tone (Fleet Call)	This tone sounds from the transceiver when the transceiver receives an MDC-1200 Fleet Call.
Alert Tone (All Call)	This tone sounds from the transceiver when the transceiver receives an MDC-1200 All Call.

FleetSync	
Alert Tone (Individual Call)	This tone sounds from the transceiver when the transceiver receives a FleetSync Individual Call.
Alert Tone (Other Selective Calls)	This tone sounds from the transceiver when the transceiver receives a FleetSync Group Call, FleetSync Fleet Call, FleetSync Supervisor Call or FleetSync Broadcast Call.
Alert Tone (Paging Call)	This tone sounds from the transceiver when the transceiver receives a FleetSync Paging Call.
Alert Tone (Status/Short Message Call)	This tone sounds from the transceiver when the transceiver receives a FleetSync Status/Short Message Call.
Alert Tone (Emergency Response)	If **Alert Tone** is enabled for **Emergency Status Response**, this tone sounds from the transceiver when the transceiver receives a FleetSync Emergency Call.

Configuration using KPG-D1/ D1N

- Configuring various **Alert Tones** (P25 Conventional) (🔍 See Transceiver Settings > P25 > P25 Information > Conventional > Alert Tone)

- Configuring various **Alert Tones** (P25 Trunking) (🔍 See Transceiver Settings > P25 > P25 Information > Trunking > Alert Tone)

- Configuring various **Alert Tones** (NXDN Conventional) (🔍 See Transceiver Settings > NXDN > NXDN Information > Conventional > Alert Tone)

- Configuring various **Alert Tones** (DMR Conventional) (🔍 See Transceiver Settings > DMR > DMR Information > Conventional > Alert Tone)

- Configuring various **Alert Tones** (NXDN Trunking) (🔍 See Transceiver Settings > NXDN > NXDN Information > Trunking > Alert Tone)

- Configuring various **Alert Tones** (DTMF) (🔍 See Transceiver Settings > DTMF > Decode)

- Configuring various **Alert Tones** (2-tone (Analog)) (🔍 See Transceiver Settings > 2-tone > 2-tone (Analog) > Decode (2-tone 1 to 4))

- Configuring various **Alert Tones** (2-tone (Digital)) (🔍 See Transceiver Settings > 2-tone > 2-tone (Digital) > Decode (2-tone 1 to 4))

- Configuring various **Alert Tones** (2-tone (MDC-1200)) (🔍 See Transceiver Settings > MDC-1200 > MDC-1200 Information > General > Call Alert > Alert Tone)

- Configuring various **Alert Tones** (2-tone (FleetSync)) (🔍 See Transceiver Settings > FleetSync > FleetSync Information > General > Alert Tone)

Configuring the Alert Tone (Alert Tone Pattern)

Alert Tone Pattern is the alert tone pattern when receiving a call with the optional signaling. An Alert Tone that is suitable for a user's environment can be selected.

Alert Tone Pattern can be used to select an Alert Tone from 8 patterns of Alert Tones. An Alert Tone pattern consists of 16 tones.

Alert Tone Pattern can be configured by using KPG-D1/ D1N. The following table shows the configuration items for the Autodial List.

Table 6-11 Alert Tone Pattern

Alert Tone Pattern	Description
Frequency	The tone frequency can be configured. A frequency between 400 Hz and 2500 Hz can be configured in steps of 10 Hz. Gap can be configured if "No Tone" is selected.
Length	The tone length can be configured. A tone length between 10 ms and 2500 ms can be configured in steps of 10 ms. No tone sounds if 0 ms is configured.
Cycle	This function can be used to configure the number of times for the Alert Tone that sounds from the transceiver. A number from 1 to 255 can be configured for the number of times. The Alert Tone sounds from the transceiver until it is manually stopped if "Infinite" is configured. If it is intended for the Alert Tone to sound multiple times, the Alert Tone does not sound from the transceiver while the transceiver unmutes the speaker. Or, if the matching state of Optional Signaling is reset, Alert Tone will also be disabled.
Interval	This function can be used to configure the timing to repeat the Alert Tone that sounds from the transceiver. A time between 0 and 255 s can be configured in steps of 1 s.

Configuration using KPG-D1/ D1N

Configuring **Alert Tone Pattern** (🔍See Transceiver Settings > Special Alert Tone)

6.3 | Tones that Sound When the Communication Starts/ Ends

These tones sound when the communication starts or ends and notifies the user of it.

Using Sound to Notify the Timing to Start Communications (PTT Proceed Tone)

PTT Proceed Tone is the tone that sounds from the transceiver when the transceiver becomes available by a user pressing the **PTT** switch.

In an LTR Trunking system, P25 Trunking system and NXDN Trunking system, a user needs to start speaking when the repeater becomes available after pressing the **PTT** switch. Since this duration is not always the same, it is difficult for a user to know when to start speaking after pressing the **PTT** switch. In this case, if a user starts speaking when a PTT Proceed Tone (3 beeps) sounds from the transceiver, communication can be initiated without losing the beginning of a call.

In an Analog Conventional system, P25 Conventional system, NXDN Conventional system, and DMR Conventional system, the PTT Proceed Tone is used to delay the start of a voice call by the transmitting transceiver when reception takes time, such as when the receiving transceiver is scanning or when Battery Saver is used.

A PTT Proceed Tone (3 beeps) sounds from the transceiver when the length of time configured in **Proceed Tone Delay Time** elapses after the transceiver starts transmission and enters the enabled state to modulate the audio signals.

📝 Note

The transceiver does not transmit audio signals until the PTT Proceed Tone (3 beeps) stops sounding even if the transceiver transmits upon pressing the **PTT** switch.

Configuration using KPG-D1/ D1N

- Configuring **PTT Proceed Tone** (NXDN Trunking) to be enabled or disabled (🔍See Transceiver Settings > Personal > Personal Features > NXDN Trunking > General)

- Configuring **PTT Proceed Tone** (P25 Trunking) (Personality) to be enabled or disabled (🔍See Transceiver Settings > Personal > Personality > P25 Trunking)

- Configuring **PTT Proceed Tone** (P25 Trunking) (Channel Table) to be enabled or disabled (🔍See Transceiver Settings > Zone/Channel > Channel Edit > P25 Trunking)

- Configuring **PTT Proceed Tone** (Conventional) to be enabled or disabled (🔍See Transceiver Settings > Optional Features > Optional Features 2 > Conventional > PTT Proceed Tone)

- Configuring **PTT Proceed Tone** (LTR Trunking) to be enabled or disabled (🔍See Transceiver Settings > LTR > PTT Proceed Tone)

- Configuring **Proceed Tone Delay Time** (🔍See Transceiver Settings> Optional Features> Optional Features 2 > Conventional> PTT Proceed Tone)

Using Sound to Notify the Other Party that the Communication Ends (PTT Release Tone)

PTT Release Tone is the function to notify the receiving party by audible tone that a communication ended by releasing the **PTT** switch when the communication ends. With this function, knowing an audible tone marks the end of a call will allow the receiving party to easily recognize the timing to transmit next.

The transceiver transmits the PTT Release Tone (1 beep) and then ends the actual transmission when the call finishes by releasing the **PTT** switch.
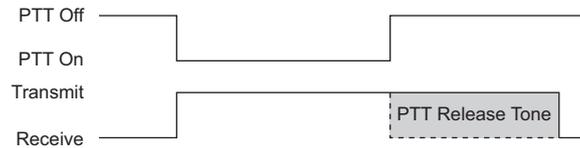

Figure 6-1 PTT Release Tone

The volume level of PTT Release Tone can be configured in **Transmit Tone Level**.

Configuration of PTT Release Tone in an LTR Trunking system

In an LTR Trunking system, the enabling and disabling of **PTT Release Tone** when transmitting a Dispatch ID and the enabling and disabling of **PTT Release Tone** when transmitting a Telephone ID can each be configured. This can be configured individually in order to avoid double beeping when using a Telephone ID, since some repeaters have a function similar to Telephone ID.

> 🗩 Note
>
> If EOT for DTMF or MDC-1200 is configured, the PTT Release Tone is sent after the EOT is sent. If EOT for FleetSync is configured, a PTT Release Tone is sent after the EOT is sent.

Configuration using KPG-D1/ D1N

- Configuring **PTT Release Tone** (NXDN Trunking) to be enabled or disabled (🔍See Transceiver Settings > Personal > Personal Features > NXDN Trunking > General)

- Configuring **PTT Release Tone** (P25 Trunking) (Personality) to be enabled or disabled (🔍See Transceiver Settings > Personal > Personality > P25 Trunking)

- Configuring **PTT Release Tone** (P25 Trunking) (Channel Table) to be enabled or disabled (🔍See Transceiver Settings > Zone/Channel > Channel Edit > P25 Trunking)

- Configuring **PTT Release Tone** (Conventional) to be enabled or disabled (🔍See Transceiver Settings > Optional Features > Optional Features 2 > Conventional)

- Configuring **PTT Release Tone** (LTR Trunking) to be enabled or disabled (🔍See Transceiver Settings > LTR)

- Configuring **Transmit Tone Level** (🔍See Transceiver Settings > Optional Features > Optional Features 1 > Sound)

6.4   Functions Related to the Volume Configuration

The following functions are relevant to the volume configuration.

- Minimum Volume
- Maximum Volume
- Tone Volume Offset
- Tone Volume
- Selectable Tone Level
- Speaker Attenuation

Configuring the Minimum Volume Level (Minimum Volume)

Minimum Volume varies depending on the configuration in **Minimum Volume Type**.

- **If "Preset" is configured in Minimum Volume Type (KCH-19 (Basic Panel)/ KCH-21R (Handheld Control Head) only):**

  Minimum Volume is the function to enable the volume level configured in **Minimum Volume** to be applied when the transceiver is turned ON again after the volume level is turned fully down and the transceiver is turned OFF.

- **If "Lowest Limit" is configured in Minimum Volume Type:**

  Minimum Volume is the function to maintain an audible volume level even if the volume level is turned down.

  The resulting audio volume prevents the user from failing to hear received audio even if the volume level is erroneously turned down fully. Turning up the volume causes the volume level to be increased from the audio level configured in **Minimum Volume**. If **Minimum Volume** is not configured, turning the volume level fully down will result in the audio being inaudible.

Configuration using KPG-D1/ D1N

- Configuring **Minimum Volume** (🔍See Transceiver Settings > Optional Features > Optional Features 1 > Sound > Audio Volume)
- Configuring **Minimum Volume Type** (🔍See Transceiver Settings > Optional Features > Optional Features 1 > Sound > Audio Volume)

Configuring the Maximum Volume Level (Maximum Volume)

Maximum Volume is the function to limit the volume level from exceeding the configured volume level even if the volume control is turned up.

This prevents a user from discomfort caused by an excessive volume level when wearing a headset.

Configuration using KPG-D1/ D1N

Configuring **Maximum Volume** (🔍See Transceiver Settings > Optional Features > Optional Features 1 > Sound > Audio Volume)

Configuring the Offset Value for Volume Level (Tone Volume Offset)

Tone Volume Offset is the function to adjust how much the standard tone volume level can be increased or decreased from the fixed volume position. This function can be used to adjust the volume level of a tone depending on the situation.

Configuration using KPG-D1/ D1N

Configuring **Tone Volume Offset** (🔍See Transceiver Settings > Optional Features > Optional Features 1 > Sound > Tone Volume)

Configuring the Volume Level of Various Tones (Tone Volume)

Tone Volume is the function to adjust the volume level of various tones.

This function can be used to maintain the volume level of the tones at a constant level depending on the situation or mute tones.

Tone Volume for the following tones can be configured using KPG-D1/ D1N:

- Power-on Tone
- Control Tone
- Warning Tone
- Alert Tone
- Sidetone
- Locator Tone

The following are the types of **Tone Volume** that can be configured:

Table 6-12 Available Tone Volume

Tone Volume	Description
Current	The Tone Volume varies in conjunction with the current volume level.
1 to 31	The tone sounds from the transceiver with a fixed tone volume. Higher values result in greater volume.
Off	The tone does not sound from the transceiver.
Selectable	The tone volume varies in conjunction with the **Fixed Volume** key. (Refer to Changing the Tone Volume Level with a Single Touch (Selectable Tone Level).)

Configuration using KPG-D1/ D1N

Configuring **Tone Volume** of each tone (🔍See Transceiver Settings > Optional Features > Optional Features 1 > Sound > Tone Volume)

Changing the Tone Volume Level with a Single Touch (Selectable Tone Level)

Selectable Tone Level is the function to enable the Tone Volume to be changed by using a **PF** key.

Pressing the **Fixed Volume** key causes the volume level to be changed to **Low Volume Level (Fixed Volume)** or **High Volume Level (Fixed Volume)**configured using KPG-D1/ D1N.

Or, pressing the **Menu** key to enter Menu Mode and then selecting "Fixed Volume" enables Tone Volume to be changed. (Refer to Using Menu Mode.)

Operating the transceiver

1 **Press the Fixed Volume key.**

The tone volume switches in the following order: Low Volume Level (Fixed Volume) → High Volume Level (Fixed Volume) → Off → Low Volume Level (Fixed Volume) ...

Configuration using KPG-D1/ D1N

- Configuring **Low Volume Level (Fixed Volume)** and High Volume Level (Fixed Volume) (🔍See Transceiver Settings > Optional Features > Optional Features 1 > Sound > Tone Volume)
- Assigning functions to the **PF** keys on the transceiver (🔍See Transceiver Settings > Key Assignment)

Temporarily Reducing the Volume Level of the Speaker (Speaker Attenuation)

Speaker Attenuation is the function to temporarily reduce the volume levels of the speaker microphone, the speaker of the transceiver, and the Bluetooth speaker.

This function can be used while the transceiver is in use in a quiet place. This function is normally activated and the transceiver can pause Speaker Attenuation only if making an important call, such as an emergency call.

Pressing the **Speaker Attenuation** key toggles Speaker Attenuation between activated and deactivated.

Operating the transceiver

● **Activating Speaker Attenuation**

1 **Press the Speaker Attenuation key while the Speaker Attenuation is deactivated.**

Speaker Attenuation is activated and then the volume level will be decreased by approximately 10 dB.

● **Deactivating Speaker Attenuation**

1 **Press the Speaker Attenuation key while the Speaker Attenuation is activated.**

Speaker Attenuation is deactivated and then the volume level will restore to the previous level.

📄 Note

The status of Speaker Attenuation is retained even if the speaker microphone is removed while Speaker Attenuation is activated.

Configuration using KPG-D1/ D1N

Assigning functions to the **PF** keys on the speaker microphone (🔍See Transceiver Settings > Key Assignment)

6.5   Using the Transceiver as a Megaphone (Public Address)

Supported Models: Mobile

Public Address enables the transceiver to be used in place of a megaphone.

Pressing and holding the **PTT** switch while Public Address is enabled causes the audio spoken into the microphone to be emitted from the external speaker for Public Address that is connected to the rear panel of the transceiver.

Operating the transceiver

● **Enabling the Public Address**

1 **Press the Public Address key while Public Address is disabled.**

Public Address is enabled, and then the " " icon appears.

```
H ♫ ≫ ◎                    12 : 34 ᴬ
                                   M
         Zone 1
      Channel 1
    Public Address
Menu    SQ Off   Zone-   Zone+
```

● **Disabling the Public Address**

1 **Press the Public Address key while Public Address is enabled.**

Public Address is disabled, and then the " " icon disappears.

📋 Note

• Pressing the **Menu** key causes the transceiver to enter Menu Mode, and then the status of Public Address can be toggled between enabled and disabled by selecting "Public Address". (Refer to Using Menu Mode.)

• Public Address is automatically disabled if the channel is changed.

• To use Public Address, an optional KAP-2 and external speaker for Public Address are required.

• In an NXDN Trunking system (Message Trunked (Enhanced)), Public Address is disabled when the reception of a call is initiated by using a traffic channel, such as an Individual Call, Group Call, and Broadcast Group Call. On the other hand, even if the transceiver receives a call initiated by using only a control channel such as a Status Call and Short Data Call, Public Address will not be disabled.

• In a P25 Trunking system, Public Address is disabled if an Individual Call, Paging Call or Telephone Call is received.

• Public Address is disabled if a zone or channel is changed.

• In an NXDN Conventional system, if an Individual Call ACK request message is received when **Automatic Response** is disabled, **Public Address** is disabled.

• If **Public Address** is used by operating the **PTT** switch or External PTT (Voice) port, the configuration of **Modulation Line** (MI, MI2, DI) applies to the configuration of Mic Line. However, the Mic Lines of MI2 and DI cannot be used at the same time. Also, if **Public Address** is used by operating the External PTT (PA) port, MI2 Line is used as the microphone input line.

• If a Bluetooth-compatible device connecting by Headset Profile exists, the Mic Line of the Bluetooth-compatible device is enabled. Therefore, if audio is inputted into the Mic Line of the Bluetooth-compatible device by operating one of the **PTT** switch, External PTT (Voice) port, External PTT (PA) port, or the **PTT** switch of the Bluetooth-compatible device while **Public Address** is enabled, audio is emitted from the transceiver regardless of the configuration of **Bluetooth Speaker**.

• Even while audio is emitted from an external speaker by pressing the **PTT** switch when **Public Address** is enabled, a signal can be received. However, the received audio is not emitted even if the received signal satisfies the conditions to unmute the speaker. Also, even if various messages other than P25 Radio Inhibit/ Uninhibit and P25 Radio Check are received, reception behaviors such as the response behavior and the matching behavior are not executed.

- Even if **Public Address** is enabled and the **PTT** switch is pressed while Dropout Delay Time or Dwell Time of Scan is counting down, the timer is not extended.
- If **Public Address** is enabled and the **PTT** switch is pressed while the **Auto Reset Timer** of each call is counting down, the **Auto Reset Timer** extends while the **PTT** switch is pressed and held.

Configuration using KPG-D1/ D1N

Assigning functions to the **PF** keys on the transceiver (🔍See Transceiver Settings > Key Assignment)

About the Speaker to Emit Audio

While **Public Address** is enabled, the speaker to emit audio when the **PTT** switch is pressed and the speaker to emit audio when an audio signal is received with the **PTT** switch released are as follows:

Table 6-13 Speaker to Emit Audio When Public Address Is Used

Connection Status of KES-5	Connection Status of KES-3	Speaker to Emit Audio	
		When the PTT Switch Is Pressed	When an Audio Signal Is Received with the PTT Switch Released
Connected via KAP-2 (4-5 Pin Short)	Connected	KES-5	KES-3 or the internal speaker[*1]
	Disconnected	KES-5	Internal Speaker
Connected via KAP-2 (5-6 Pin Short)	Connected	KES-5	KES-5
	Disconnected	KES-5	KES-5
Disconnected	Connected	KES-3	KES-3 or the internal speaker[*1]
	Disconnected	**KCH-19 (Basic Panel)/ KCH-20R (Featured Panel):** Internal Speaker **KCH-21R (Handheld Control Head):** No speaker to emit audio	Internal Speaker

[*1] Depends on the configuration in **External Speaker**.

6.6 Restricting Alert Tone When Consecutively Receiving a Call (Alert Tone Restriction from 2nd Call)

Alert Tone Restriction from 2nd Call is the function that disables the functions such as the storing of a Caller ID in the transceiver stack memory and the activation of various alerts, if the transceiver consecutively receives an Individual Call from the transceiver having the same Individual ID, or receives a Group Call with the same Group ID after the transceiver receives an Individual Call or a Group Call.

For instance, emitting an Alert Tone from the transceiver every time the transceiver repeatedly and frequently receives a call from the same party may be annoying. In that case, this function can be used to disable the Alert Tone for sounding from the transceiver even if the transceiver receives a call from the same party in succession.

This function prevents these functions from activating as follows even if these functions are enabled or configured to be enabled when the transceiver receives a call from the same party in succession.

- **Alert Tone**

  An Alert Tone does not sound from the transceiver even if the transceiver receives a call from the same party in succession.

- **Selective Call Alert LED**

  A Selective Call Alert LED does not blink even if the transceiver receives a call from the same party in succession.

- **Horn Alert (Mobile only)**

  The headlights or the horn of a vehicle being connected to the Horn Alert port does not light or sound even if the transceiver receives a call from the same party in succession.

- **Caller ID Stack**

  The Caller ID cannot be stored in the transceiver stack memory even if the transceiver receives a call from the same party in succession.

When the transceiver receives an Individual Call or Group Call using this function, the transceiver behaves as follows.

● **Behavior examples of when the transceiver receives an Individual Call**

If the transceiver receives an Individual Call, an Alert Tone does not sound from the transceiver even when the transceiver receives an Individual Call again from the transceiver having the same Individual ID before the time configured in **Auto Reset Timer** elapses.
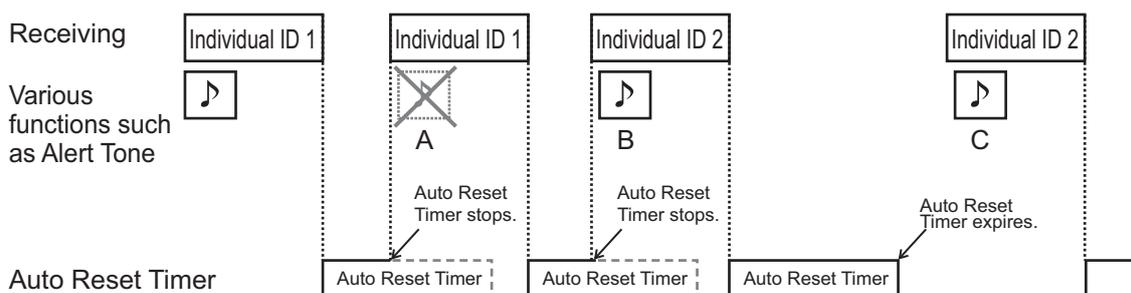
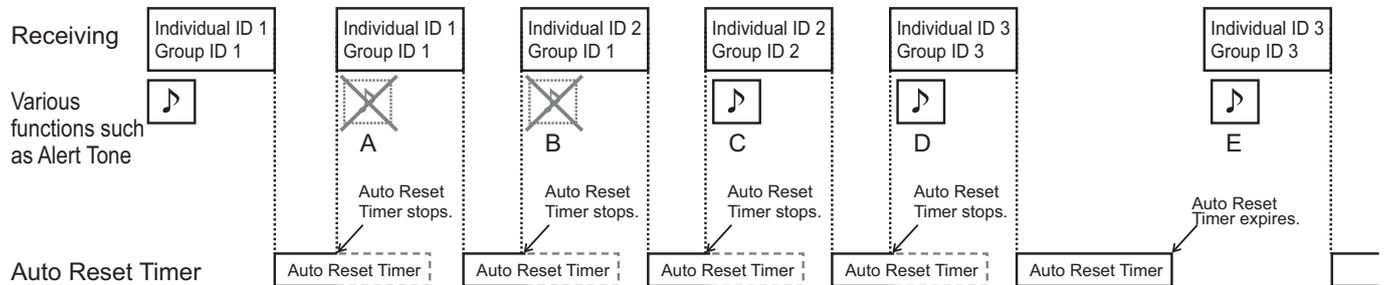**Figure 6-2 Alert Tone Restriction from 2nd Call (Individual Call)**

A: The transceiver receives an Individual Call from the transceiver (Individual ID 1) having the same Individual ID before the time configured in **Auto Reset Timer** elapses, so that various functions such as Alert Tone will not be activated.

B: Even before the time configured in **Auto Reset Timer** elapses, the transceiver receives an Individual Call from the transceiver (Individual ID 2) having a different Individual ID, so that various functions such as Alert Tone will be activated.

C: Even if the transceiver receives an Individual Call from the transceiver (Individual ID 2) again, the time configured in **Auto Reset Timer** elapsed, so that various functions such as Alert Tone will be activated.

● **Behavior examples of when the transceiver receives a Group Call**

If the transceiver receives a Group Call, various functions such as Alert Tone are not activated when the transceiver receives a Group Call again using the same Group ID while the amount of time configured in **Auto Reset Timer** elapses. In this case, even if the Individual ID of the transmitting transceiver is either the same or different, various functions such as Alert Tone will not be activated when the Group ID for the Group Call received second time or later is the same as the Group ID for the Group Call received first time.

Figure 6-3 Alert Tone Restriction from 2nd Call (Group Call)

A: The transceiver receives a Group Call using the same Group ID from the transceiver (Individual ID 1) having the same Individual ID before the time configured in **Auto Reset Timer** elapses, so that various functions such as Alert Tone will not be activated.

B: Even if the transmitting transceiver has the different Individual ID, the transceiver receives a Group Call using the same Group ID before the time configured in **Auto Reset Timer** elapses, so that various functions such as Alert Tone will not be activated.

C: Even if the transmitting transceiver has the same Individual ID, the transceiver receives a Group Call using the different Group ID before the time configured in **Auto Reset Timer** elapses, so that various functions such as Alert Tone will be activated.

D: The transceiver receives a Group Call using the different Group ID from the transceiver having the different Individual ID before the time configured in **Auto Reset Timer** elapses, so that various functions such as Alert Tone will be activated.

E: Even if the transceiver receives a Group Call using the same Group ID, the time configured in **Auto Reset Timer** has already elapsed, so that various functions such as Alert Tone will be activated.

📋 Note

If **Alert Tone Restriction from 2nd Call** is enabled, various functions such as Alert Tone will not be activated upon the reception of the second and subsequent calls from the same transceiver even if "Off" is configured in **Auto Reset Timer**.

Configuration using KPG-D1/ D1N

● Configuring **Alert Tone Restriction from 2nd Call** to be enabled or disabled (🔍See Transceiver Settings > NXDN > NXDN Information > General)

● Configuring **Alert Tone Restriction from 2nd Call** to be enabled or disabled (🔍See Transceiver Settings > DMR > DMR Information > General)

6.7 Configuring Audio Profile (Audio Profile)

The received audio sounds different depending on the usage environment of the transceiver, characteristics of devices, such as the microphone to be combined with the transceiver and external devices, or the tone of voice and manner of speaking of the speaker. Also, the received audio sounds different depending on the output method, such as using a speaker of the transceiver or a earphone, to hear the received audio.

By having multiple configuration states of audio characteristics and noise cancellation for transmission and reception, **Audio Profile** is the function to enable the transceiver to switch among preset audio profiles according to the usage environments, situations, and preferences of the transceiver.

By designating each configuration of each of the following category as one audio profile, a total of 6 types of audio profiles can be used by switching:

- General
- RX Audio Response
- TX Audio Response
- Active Noise Reduction

The configuration items included in each category are as follows:
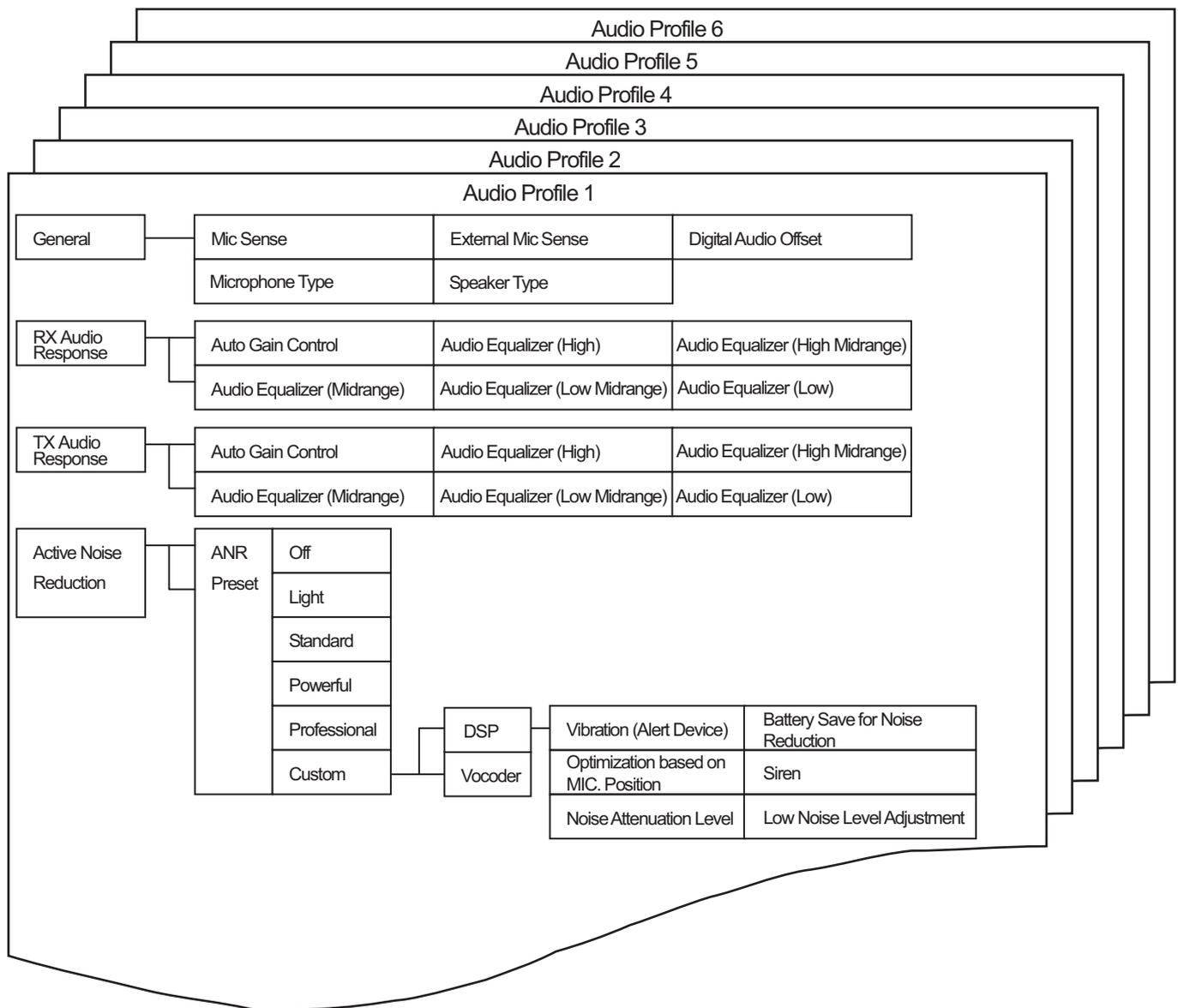
Figure 6-4 Audio Profile

An audio profile used for the transceiver can be configured using KPG-D1/ D1N. Also, the audio profile to be used can be changed in Audio Profile Mode by operating the transceiver.

Pressing the **Menu** key to enter Menu Mode, and then selecting "Audio Profile" places the transceiver in Audio Profile Mode. (Refer to Using Menu Mode.)

Configuration using KPG-D1/ D1N

- Configuring **Audio Profile** (🔍See Transceiver Settings > Audio Profile)

- Configuring **Audio Profile Number** used for the transceiver (🔍See Transceiver Settings > Optional Features > Optional Features 1 > Sound)

General

The following are the common functions of the audio profile:
- Speaker Type
- Microphone Type
- Microphone Sense
- External Microphone Sense
- Digital Audio Offset

Speaker Type (digital channels only)

Speaker Type is the function to configure the type of external speaker to be connected to the transceiver and keep the audio in optimum condition.

The external speakers to be connected to the transceiver have different audio characteristics. Using this function equalizes audio characteristics that differ for each speaker, and can correct the demodulated sound when a digital signal is received.

Table 6-14 Speaker Type

Speaker Type	Description
None	Disables the capability to adjust audio characteristics. This configuration is used when not wanting to change the audio characteristics.

Internal Speaker	**Portable:**
	  Configuration is not available.
	Mobile:
	  KCH-19 (Basic Panel)

Speaker 1	Enables the optimum audio characteristics of the following speakers:
	Portable:
	  KMC-54WD
	Mobile:
	  KES-3

Speaker 2	Enables the optimum audio characteristics of the following speakers:
	Portable:
	  KMC-41, KMC-41D, KMC-42W, KMC-42WD
	Mobile:
	  KES-5

Speaker Type	Description

Speaker 3	Enables the optimum audio characteristics of the following speakers:
	Portable:
	   KMC-25, KMC-47GPS, KMC-47GPSD
	Mobile:
	   KCH-21R (Handheld Control Head)

Speaker 4	Enables the optimum audio characteristics of the following speakers:
	Portable:
	   KHS-11, KHS-12, KHS-14
	Mobile:
	   Configuration is not available.

Speaker 5	Enables the optimum audio characteristics of the following speakers:
	Portable:
	   KHS-15
	Mobile:
	   Configuration is not available.

Speaker 6	Enables the optimum audio characteristics of the following speakers:
	Portable:
	   KMC-49
	Mobile:
	   Configuration is not available.

Speaker 7	Enables the optimum audio characteristics of the following speakers:
	Portable:
	   Configuration is not available.
	Mobile:
	   KCH-21R (Handheld Control Head)

🗊 Note

• If using an external speaker unlisted in the table above, configuring "None" in **Speaker Type** is recommended.
• Pressing the **Menu** key places the transceiver in Menu Mode, and then the transceiver enters External Speaker Type Mode by selecting "Speaker Type". In External Speaker Type Mode, the configuration in **Speaker Type** can be changed.

Microphone Type (digital channels only)

Microphone Type is the function to configure the type of external microphone to be connected to the transceiver and keep the audio quality in optimum condition.

The external microphones to be connected to the transceiver have different audio characteristics. Use of this function equalizes audio characteristics and corrects the condition to be optimum for digitalization.

If Mobile is Dual Control Head, Control Head 1 reflects the configuration of **Microphone Type**, and Control Head 2 reflects the configuration of **Microphone Type for Control Head 2**.

Table 6-15 Microphone Type

Microphone Type	Description
None	Disables the capability to adjust audio characteristics. This configuration is used when not wanting to change the audio characteristics.
Microphone 1	Enables the optimum audio characteristics of the following microphones: **Portable:** 　KMC-54WD **Mobile:** 　KMC-35, KMC-36
Microphone 2	Enables the optimum audio characteristics of the following microphones: **Portable:** 　KMC-41, KMC-41D, KMC-42W, KMC-42WD **Mobile:** 　KMC-30, KMC-32
Microphone 3	Enables the optimum audio characteristics of the following microphones: **Portable:** 　KMC-25, KMC-47GPS, KMC-47GPSD **Mobile:** 　KMC-53
Microphone 4	Enables the optimum audio characteristics of the following microphones: **Portable:** 　KHS-11, KHS-12, KHS-14 **Mobile:** 　KMC-9C
Microphone 5	Enables the optimum audio characteristics of the following microphones: **Portable:** 　KHS-15 **Mobile:** 　KMC-27
Microphone 6	Enables the optimum audio characteristics of the following microphones: **Portable:** 　KMC-49 **Mobile:** 　KMC-28
Microphone 7	Enables the optimum audio characteristics of the following microphones: **Portable:** 　Configuration is not available. **Mobile:** 　KCT-73MIC

📝 Note

- If using an external microphone unlisted in the table above, configuring "None" in **Microphone Type** or **Microphone Type for Control Head 2** is recommended.
- Pressing the **Menu** key places the transceiver in Menu Mode, and then the transceiver enters Microphone Type Mode by selecting "Microphone Type". In Microphone Type Mode, the configuration in **Microphone Type** can be changed.
- If the structure for Mobile is Dual Control Head, the configuration of **Microphone Type** can be changed when Microphone Type Mode is entered by operating Control Head 1, and the configuration of **Microphone Type for Control Head 2** can be changed when Microphone Type Mode is entered by operating Control Head 2.

Microphone Sense/ External Microphone Sense

Microphone Sense and **External Microphone Sense** are the input sensitivity of the microphone.

Within the range between -20 dB and +20 dB, the microphone sensitivity of the internal microphone can be configured in **Microphone Sense**, and the microphone sensitivity of the external microphone can be configured in **External Microphone Sense**.

The appropriate level of microphone sensitivity for normal operation is 0 dB. Based on this level, the parameter of the microphone sensitivity can be configured.

On a digital channel, configuring **Digital Audio Offset** enables the transceiver to function after the offset value configured in Digital Audio Offset is added to or deleted from the configuration values in **Microphone Sense** and **External Microphone Sense**.

📝 Note

- If a level lower than "0 dB" is configured in **Microphone Sense** or **External Microphone Sense**, Modulation Limiting (minimum) in Analog FM is lowered because the amplitude limit level is also simultaneously lowered.
- Pressing the **Menu** key places the transceiver in Menu Mode, and then the transceiver enters Mic Sense Mode by selecting "Mic Sense". In Mic Sense Mode, the configuration in **Microphone Type** can be changed.
- Pressing the **Menu** key places the transceiver in Menu Mode, and then the transceiver enters External Mic Sense Mode by selecting "External Mic Sense". In External Mic Sense Mode, the configuration in **External Microphone Sense** can be changed.
- For Mobile, the Mic sensitivity of when "Mic Line" is configured for the Modulation Line can be configured in **Microphone Sense**, and the Mic sensitivity of when "MI2 Line" or the Mic Line of a Bluetooth-compatible device is configured for the Modulation Line can be configured in **External Microphone Sense**.

Configuration using KPG-D1/ D1N

- Configuring **Microphone Sense** (🔍See Transceiver Settings > Audio Profile > General > Microphone Sense)
- Configuring **External Microphone Sense** (🔍See Transceiver Settings > Audio Profile > General > Microphone Sense)

Digital Audio Offset

Digital Audio Offset is the function to enable the transceiver to function after the offset value configured in **Digital Audio Offset** is added to or deleted from the configuration values in **Microphone Sense** and **External Microphone Sense**. This function is used when the microphone level used on digital channels and the microphone level used on analog channels are to be configured separately.

The configuration range of **Digital Audio Offset** is between 6 dB and -10 dB. On a digital channel, the transceiver functions with the combined value of the configuration value in **Microphone Sense** or **External Microphone Sense** and the configuration value in **Digital Audio Offset**.

Configuration using KPG-D1/ D1N

Configuring **Digital Audio Offset** (🔍See Transceiver Settings > Audio Profile > General > Microphone Sense)

RX Audio Response

The following are the common functions of the audio profile related to reception:
- Auto Gain Control (RX Audio Response)
- Audio Equalizer (RX Audio Response)

These functions can be used only in a P25 system, NXDN system, and DMR system.

Auto Gain Control (RX Audio Response)

Auto Gain Control (RX Audio Response) is the function to adjust the volume level of the received audio. The received audio sounds better by amplifying or attenuating the received audio.

The volume level of the received audio may vary depending on the voice level of a user talking to the transmitting transceiver and the distance between the microphone and the mouth. In this case, this function allows a user to hear the received audio clearly since the received audio is automatically adjusted to a certain volume level according to the configuration for the volume level.

Table 6-16 Auto Gain Control (RX Audio Response)

Auto Gain Control	Description
Off	**Auto Gain Control (RX Audio Response)** is disabled and the volume level of the received audio is not automatically adjusted.
High	**Auto Gain Control (RX Audio Response)** is enabled and the volume level of the received audio is automatically adjusted to a certain level according to the configuration for the volume level. However, a background noise of the received audio may be played back loudly, or a howl may occur.
Low	**Auto Gain Control (RX Audio Response)** is enabled and the volume level of the received audio is automatically adjusted to a certain level according to the configuration for the volume level. However, the controlled volume level will be lower than the case if "High" is configured. Therefore, the range of the volume level to be automatically adjusted will be narrow, but the less effect on the background noise and howl will occur.

📝 Note

- If **Auto Gain Control (RX Audio Response)** is disabled in the receiving transceiver but **Auto Gain Control (TX Audio Response)** is enabled in the transmitting transceiver, the volume level of the received audio is automatically adjusted to a certain level.
- Pressing the **Menu** key to enter Menu Mode, and then selecting "RX Auto Gain Control" places the transceiver in RX Auto Gain Control Mode. In RX Auto Gain Control Mode, the configuration in **Auto Gain Control (RX Audio Response)** can be changed.

Configuration using KPG-D1/ D1N

Configuring **Auto Gain Control (RX Audio Response)** (🔍See Transceiver Settings > Audio Profile > Advanced Settings > RX Audio Response (Digital))

Audio Equalizer (RX Audio Response)

Audio Equalizer (RX Audio Response) is the function to adjust audio characteristics to be applied to playing back the received audio.

The received audio may sound differently depending on the usage environment of the transceiver and whether to use a speaker or headphones to play back the received audio. Also, the received audio may sound differently depending on the effect of a microphone equipped with the transmitting transceiver and external connector devices. Use of this function allows a user to adjust according to user convenience or preference an audio characteristic of the received audio sounding from the speaker.

By using KPG-D1/ D1N, the received audible characteristics can be configured in the range between -10 dB and +10 dB for each of the High, High Midrange, Midrange, Low Midrange and Low audio frequency.

Table 6-17 Audio Equalizer (RX Audio Response)

Audio Equalizer	Description
High	The audible frequency characteristics for the high range can be configured.
High Midrange	The audible frequency characteristics for the middle to high range can be configured.
Midrange	The audible frequency characteristics for the middle range can be configured.
Low Midrange	The audible frequency characteristics for the middle to low range can be configured.
Low	The audible frequency characteristics for the low range can be configured.

Also, preset items with various types of received audio characteristics can be selected to be used as approximate indicators for configuration.

Table 6-18 Audio Equalizer (RX Audio Response) (Preset)

Preset	Description
Flat	This is a standard audio characteristic.
High Boost	This audio characteristic emphasizes the received audio range which is higher than Flat. The quality of the received audio will be clear with the focus on hearing conversations for certain.
Mid Boost	This audio characteristic emphasizes the audible frequency of received audio higher than Flat. The audio will have a more stable, less distorted, and well-rounded tone.
Low Boost	This audio characteristic minimizes the received audio range which is higher than Flat and emphasizes the low range. The quality of the received audio will be natural.
Low Cut	Suppresses the audio of 300 Hz or lower. The distortion of audio when played back can be suppressed, and the muffling can be prevented.

📝 Note

Pressing the **Menu** key to enter Menu Mode, and then selecting one of the following configurations places the transceiver in RX Audio Equalizer Mode. In RX Audio Equalizer Mode, the configuration of High, High Midrange, Midrange, Low Midrange or Low can be changed.

- RX Audio Equalizer (High)
- RX Audio Equalizer (High Midrange)
- RX Audio Equalizer (Midrange)
- RX Audio Equalizer (Low Midrange)
- RX Audio Equalizer (Low)

Configuration using KPG-D1/ D1N

Configuring **Audio Equalizer (RX Audio Response)** (🔍See Transceiver Settings > Audio Profile > Advanced Settings > RX Audio Response (Digital))

TX Digital Audio Response

The following are the common functions of the audio profile related to transmission:

- Auto Gain Control (TX Audio Response)
- Audio Equalizer (TX Audio Response)

These functions can be used only in a P25 system, NXDN system, and DMR system.

Auto Gain Control (TX Audio Response)

Auto Gain Control (TX Audio Response) is the function to adjust the volume level of the transmitted audio. When the volume level of the transmitted audio is adjusted by automatically increasing or decreasing the microphone sensitivity, the transmitted audio can be heard clearly in the receiving transceiver.

The volume level of the transmitted audio may vary depending on the voice level of a user talking to the transmitting transceiver and the distance between the microphone and the mouth. In this case, the use of this function automatically adjusts the microphone sensitivity, so that the transmitted audio can be heard clearly in the receiving transceiver.

If the background noise is loud, the microphone sensitivity may not be properly adjusted. In this case, a user needs to hold the microphone closer and speaks loudly.

Table 6-19 Auto Gain Control (TX Audio Response)

Auto Gain Control	Description
On	**Auto Gain Control (TX Audio Response)** is enabled and the volume level of the transmitted audio is automatically adjusted to the proper volume level.
Off	**Auto Gain Control (TX Audio Response)** is disabled and the volume level of the transmitted audio is not automatically adjusted.

📝 Note

The transceiver enters Menu Mode by a user pressing the **Menu** key, and then the transceiver enters TX Auto Gain Control Mode by a user selecting "TX Auto Gain Control". In TX Auto Gain Control Mode, the configuration in **Auto Gain Control (TX Audio Response)** can be changed.

Configuration using KPG-D1/ D1N

Configuring **Auto Gain Control (TX Audio Response)** (🔍See Transceiver Settings > Audio Profile > Advanced Settings > TX Audio Response (Digital))

Audio Equalizer (TX Audio Response)

Audio Equalizer (TX Audio Response) is the function to adjust audio characteristics to be applied when the received audio is played back. **Audio Equalizer (TX Audio Response)** is applied to a transmitted audio played back by the receiving transceiver.

Also, the received audio may sound differently depending on an usage environment of the transceiver, and effects of a microphone equipped with the transceiver and external connector devices. Use of this function allows a user to select according to user convenience or preference an audio characteristic of the transmitted audio inputted to a microphone.

By using KPG-D1/ D1N, the transmitted audible characteristics can be configured in the range between -10 dB and +10 dB for each of the High, High Midrange, Midrange, Low Midrange and Low audio frequency.

Table 6-20 Audio Equalizer (TX Audio Response)

Audio Equalizer	Description
High	The audible frequency characteristics for the high range can be configured.
High Midrange	The audible frequency characteristics for the middle to high range can be configured.
Midrange	The audible frequency characteristics for the middle range can be configured.
Low Midrange	The audible frequency characteristics for the middle to low range can be configured.
Low	The audible frequency characteristics for the low range can be configured.

Also, preset items with various types of transmitted audio characteristics can be selected to be used as approximate indicators for configuration.

Table 6-21 Audio Equalizer (RX Audio Response) (Preset)

Preset	Description
Flat	This is a standard audio characteristic.
High Boost	This audio characteristic emphasizes the transmitted audio range which is higher than Flat. The quality of the transmitted audio will be clear with the focus on hearing conversations for certain.
Mid Boost	This audio characteristic emphasizes the audible frequency of transmitted audio higher than Flat. The audio will have a more stable, less distorted, and well-rounded tone.
Low Boost	This audio characteristic minimizes the transmitted audio range which is higher than Flat and emphasizes the low range. The quality of the transmitted audio will be natural.
Low Cut	Suppresses the audio of 300 Hz or lower. The distortion of audio when played back can be suppressed, and the muffling can be prevented.

📝 Note

Pressing the **Menu** key to enter Menu Mode, and then selecting one of the following configurations places the transceiver in TX Audio Equalizer Mode. In TX Audio Equalizer Mode, the configuration of High, High Midrange, Midrange, Low Midrange or Low can be changed.

- TX Audio Equalizer (High)
- TX Audio Equalizer (High Midrange)
- TX Audio Equalizer (Midrange)
- TX Audio Equalizer (Low Midrange)
- TX Audio Equalizer (Low)

Configuration using KPG-D1/ D1N

Configuring **Audio Equalizer (TX Audio Response)** (🔍See Transceiver Settings > Audio Profile > Advanced Settings > TX Audio Response (Digital))

Active Noise Reduction

Active Noise Reduction (ANR) is the function to cancel the noise component of the collected audio in order to improve the transmitted audio quality.

The noise cancellation function can be collectively configured according to the usage environment. Also, selecting "Custom" enables the detailed configuration of the noise cancellation function.

Table 6-22 ANR Preset

ANR Preset	Description
Off	The noise cancellation characteristics cannot be configured.
Light	Reduces the background noise. Reduces the background noise less effectively than "Standard". On an analog channel, the effect of the background noise reduction is the same as when "Off" is configured.
Standard	Reduces the background noise. Assuming a variety of environments, this configuration is for not deteriorating audio.
Powerful	Reduces the background noise more effectively than "Standard". Audio may be slightly suppressed. Also, since the position of the microphone is being detected even while not transmitting, this configuration is suitable for a user using the transceiver in a noisy environment or with the microphone on the shoulder.
Professional	Reduces the background noise. This configuration reduces noise of a specific environment, such as a siren, and is also harmless to audio. The optimal noise cancellation effect is available by having the mouth of a transmitting user and the microphone positioned at an appropriate distance when the transceiver is used. This configuration is suitable for use in a fire department and a police station.
Custom	The following various functions of noise cancellation can be configured: **Vocoder:** In **Vocoder**, whether the transceiver transmits on a digital channel with or without reducing and eliminating the noise component of the background noise can be configured. If the transceiver is used in a noisy environment, enabling this function allows the transceiver to transmit by reducing and eliminating the noise components in the background noise, so that the noise at the receiving transceiver is eliminated or reduced. However, a part of the voice component is also reduced, and this reduction may cause the received audio to be fuzzy. In such case, disabling this function results in the transmitted audio resembling an analog voice signal, so the audio on the receiving transceiver may sound natural. **DSP:** In **DSP**, whether to reduce and eliminate the background noise or not while transmitting can be configured. This configuration can be configured according to the situation of the background noise or usage environment. Using a microphone consisting of 2 microphones can be more effective. **Noise Attenuation Level:** In **Noise Attenuation Level**, the amount of noise reduction can be configured. The standard configuration is 0 dB, and the sound quality is balanced with the amount of noise reduction. If -20 dB is configured, the noise can be most effectively reduced while the sound quality degrades more easily. If +10 dB is configured, the noise is least effectively reduced while the sound quality degrades less. **Low Noise Level Adjustment:** In **Low Noise Level Adjustment**, whether to stop the noise cancellation process automatically in an environment where background noise is low can be configured. If this function is enabled, the degradation of sound quality can be prevented in an environment where background noise is low. **Optimization based on Microphone Position (Portable only):** Whether to optimize the noise cancellation process according to the positional relationship of the microphone and the mouth of a user can be configured. If this function is enabled, the positional relationship of the microphone and the mouth is detected and the noise cancellation process is optimized. This function is effective when the microphone is not held stable by a user or unable to be used in front of the mouth. If this function is disabled, the noise cancellation process is not optimized according to the microphone position. However, if the microphone is used in front of the mouth, optimized noise cancellation is available. This function is valid when an internal microphone or KMC-54 is used. **Siren:** In **Siren**, whether to remove the siren audio component when a siren audio is detected can be configured.

ANR Preset	Description
Custom	**Vibrator (Alert Device) (Portable only):** In **Vibration (Alert Device)**, whether to delete the audio component of Vibration Noise when a Vibration Noise is detected can be configured. Vibration Noise is a periodic, abrupt sound emitting from a vibrating function being used, such as on a firefighting mask. **Battery Save for Noise Reduction (Portable only):** In **Battery Save for Noise Reduction**, whether to stop the noise cancellation process when the transceiver is not transmitting can be configured. If this function is enabled, the noise cancellation process functions while the transceiver is transmitting. This function takes longer to reduce the noise, but the function reduces battery power consumption. If this function is disabled, the noise cancellation process always functions, and the noise is reduced from the start of transmission. For Mobile, no configuration is required since the noise cancellation process always functions. However, microphones other than the microphone connected to the head may take time to reduce the noise in the same manner as when this function is enabled.

Each function of the noise cancellation characteristic is automatically configured according to the configuration of the ANR Preset.

Table 6-23 Automatic Configuration Using the ANR Preset

Function	ANR Preset				
	OFF	Light	Standard	Powerful	Professional
Vocoder	Uncheck	Check	Check	Check	Check
Digital Signal Processor	Uncheck	Uncheck	Check	Check	Check
Noise Attenuation Level	0 dB	0 dB	0 dB	-6 dB	-6 dB
Low Noise Level Adjustment	Uncheck	Uncheck	Check	Uncheck	Check
Optimization based on Microphone Position	Uncheck	Uncheck	Check	Check	Uncheck
Siren	Uncheck	Uncheck	Uncheck	Uncheck	Check
Vibration (Alert Device)	Uncheck	Uncheck	Uncheck	Uncheck	Check
Battery Save for Noise Reduction	Uncheck	Check	Check	Uncheck	Uncheck

📋 Note

Pressing the **Menu** key places the transceiver in Menu Mode, and then selecting "ANR Preset" places the transceiver in ANR Preset Mode. In ANR Preset Mode, the configuration in **ANR Preset** can be changed.

Configuration using KPG-D1/ D1N

Configuring **ANR Preset** (🔍See Transceiver Settings > Audio Profile > Active Noise Reduction (ANR))

6.8   Using Voice Guidance (Voice Announcement)

Voice Announcement is the function to notify the following contents by voice:

- The selected Zone-channel number when the transceiver is turned ON and the new Zone-channel number when the Zone-channel is changed (Refer to Zone-Channel Guide.)
- The function status and transceiver status when the **PF** key is operated (Refer to Function Guide.)
- The reception status (Refer to Status Guide.)
- To use these voice guidance functions, the voice guidance method needs to be configured in **Voice Announcement Type**.

📝 Note

- The audio for **Voice Announcement** sounds from the speaker of the transceiver. However, if the external speaker is connected to the transceiver, the audio sounds from the external speaker.
- The volume for Voice Announcement is set according to the configuration in **Control Tone**. **Voice Announcement** does not function if "Off" is configured in **Control Tone**. (Refer to Configuring the Volume Level of Various Tones (Tone Volume).)
- **Voice Announcement** does not function while the transceiver is in Emergency Mode.
- **Voice Announcement** does not function if a zone or channel is changed by using the scan function.
- The received audio does not sound from the speaker while the audio for **Voice Announcement** sounds.

Configuring Voice Guidance Method (Voice Announcement Type)

Voice Announcement Type is the function to specify whether to execute various voice guidance by using fixed phrases or by using audio files arbitrarily configured by a user.

The transceiver behaves as follows according to the configuration in **Voice Announcement Type**:

Table 6-24 Voice Announcement Type

Configuration	Description
None	Voice guidance is not executed.
Standard	The Zone-channel number, key function status, and transceiver status are notified by using the fixed phrase audio. Voice guidance can be executed in 3 languages configured in **Language 1** to **Language 3** of **Voice and Display Language**. The languages that can be configured in **Language 1** to **Language 3** are as follows: English, Spanish (Spain), Spanish (Latin America), French, German, Italian, Dutch, Russian, Portuguese (Brazil)
User Programmable	The Zone-channel name, key function status, transceiver status, and received status are notified by using the audio configured by a user. Configure the audio to be used by selecting from the audio files registered in **Audio Library**. Therefore, the audio files to be used for voice guidance need to be registered in **Audio Library** beforehand. 📝 Note The audio file that can be registered in **Audio Library** is 8 k 16 bit monaural PCM data within 5 sec. When the total capacity of **Audio Library** reaches 3 MB, or when the total number of files reaches 240, no more audio files can be registered. To register a new audio file, a file registered in **Audio Library** needs to be deleted.

Configuration using KPG-D1/ D1N

- Configuring **Voice and Display Language** (🔍See Transceiver Settings > Optional Features > Optional Features 1)

- Configuring **Voice Announcement Type** (🔍See Transceiver Settings > Optional Features > Optional Features 1 > Voice Announcement)

- Registering an audio file in **Audio Library** (🔍See Tools > Audio Library)

Zone-Channel Guide

Zone-Channel Guide is the function to notify by voice Zone-channel numbers such as the selected Zone-channel number when the transceiver is turned ON and the new Zone-channel number when the Zone-channel is changed.

If this function is enabled, the transceiver executes voice guidance according to the configuration in **Voice Announcement Type**. (Refer to Configuring Voice Guidance Method (Voice Announcement Type).)

● **If "Standard" is configured in Voice Announcement Type:**

When the transceiver is turned ON, when the zone is changed, or when the **Direct Channel** key (1 to 5) is operated, the new zone number and channel number are notified by voice as follows:

"Zone xxx, Channel yyy" (xxx: zone number, yyy: channel number)

If only one zone is configured in the transceiver, only a channel number is notified by voice as "yyy" (yyy: channel number).

When the channel is changed, or the **Home Channel** key is operated, the new channel number is notified by voice as "yyy" (yyy: channel number).

● **If "User Programmable" is configured in Voice Announcement Type:**

Whether to execute voice guidance can be configured for each zone and each channel.

Voice Announcement (Zone):

Table 6-25 Voice Announcement (Zone)

Configuration	Description
None	Voice guidance is not executed.
Audio file	Contents such as a zone name are notified by using the audio configured by a user. Configure the audio to be used by selecting from the audio files registered in **Audio Library**.

Voice Announcement (Channel):

Table 6-26 Voice Announcement (Channel)

Configuration	Description
None	Voice guidance is not executed.
Audio file	Contents such as a channel name are notified by using the audio configured by a user. Configure the audio to be used by selecting from the audio files registered in **Audio Library**.

When the transceiver is turned ON, when the zone is changed, or when the **Direct Channel** key (1 to 5) is operated, voice guidance is executed according to the configuration in **Voice Announcement** of the new zone and channel.

If only one zone is configured in the transceiver, voice guidance is executed according to the configuration in **Voice Announcement** of the new channel.

Also, when the channel is changed or when the **Home Channel** key is operated, voice guidance is executed according to the configuration in **Voice Announcement** of the new channel.

Configuration using KPG-D1/ D1N

- Configuring Zone-Channel Guide to be enabled or disabled (🔍See Transceiver Settings > Optional Features > Optional Features 1 > Voice Announcement)
- Configuring Voice Announcement for each zone (🔍See Transceiver Settings > Zone/Channel > Zone Edit > General)
- Configuring Voice Announcement for each channel (🔍See Transceiver Settings > Zone/Channel > Channel Edit)

Function Guide

Function Guide is the function to notify by voice the function status and transceiver status when the **PF** key is operated.

If this function is enabled, the transceiver executes voice guidance according to the configuration in **Voice Announcement Type**. (Refer to Configuring Voice Guidance Method (Voice Announcement Type).)

● **If "Standard" is configured in Voice Announcement Type:**

The status of the following functions assigned to the **PF** keys is notified by voice:

Table 6-27 Voice Announcement (Zone)

Key Function	Voice Guidance Contents (in English)	
	Key Function On	Key Function Off
Encryption	Encryption On	Encryption Off
Home Channel	Home Channel	Channel No.
Horn Alert	Horn Alert On	Horn Alert Off
Key Lock	Key Locked	Key Unlocked
Low Transmit Power	RF Low Power On	RF Low Power Off
Public Address	Public Address On	Public Address Off
Scrambler	Scrambler On	Scrambler Off
Scan	Scan On	Scan Off
Scan Normal	Scan On	Scan Off
Send the GPS Data	Send GPS	-
Site Lock	Site Locked	Site Unlocked
Speaker Attenuation	Speaker Attenuation On	Speaker Attenuation Off
System Search	System Search	-
Talk Around	Talk Around On	Talk Around Off
Key Function	Transfer	-
Key Function On	Transfer On	-
Key Function Off	Transfer Off	-
VOX	VOX On	VOX Off

The following transceiver statuses are notified by voice:

Table 6-28 Function Guide (Transceiver Status)

Item	Transceiver Status	Voice Guidance Contents (in English)
Transceiver Password	The transceiver was operated when in Transceiver Password Mode.	"Radio Locked"
Key Lock	The transceiver was operated when the Key Lock was enabled.	"Key Locked"
FleetSync	The target party did not receive the data or message.	"Message Denied"
NXDN	The target party did not receive the data or message.	"Message Denied"
P25	The target party did not receive the status or text message.	"Message Denied"
DMR	The target party did not receive the data or message.	Message Denied

● **If "User Programmable" is configured in Voice Announcement Type:**

Function Guide (PF key):

Whether to execute voice guidance can be configured for each of the following key functions (On/ Off):

Table 6-29 Function Guide On/ Off

Key Function On	Key Function Off
Key Function Off	Encryption Off
Home Channel	-
Horn Alert On	Horn Alert Off
Key Locked	Key Unlocked
Low Transmit Power On	Low Transmit Power Off
Public Address On	Public Address Off
Scrambler On	Scrambler Off
Scan On	Scan Off
Scan Normal On	Scan Normal Off
Send the GPS Data	-
Site Lock On	Site Lock Off
Speaker Attenuation On	Speaker Attenuation Off
System Search	-
Talk Around On	Talk Around Off
VOX On	VOX Off

Table 6-30 On/ Off Configuration for Function Guide

Configuration	Description
None	Voice guidance is not executed.
Audio file	The function status when the **PF** key is operated is notified by audio configured by a user. Configure the audio to be used by selecting from the audio files registered in **Audio Library**.

Function Guide (Transceiver Status):

Whether to execute voice guidance can be configured for each of the following transceiver statuses:

Table 6-31 Function Guide (Transceiver Status)

Configuration	Description
Radio Locked	The transceiver was operated when in Transceiver Password Mode.
Status Message Denied	The target party did not receive the data or message.

Table 6-32 Configuration for Function Guide (Transceiver Status)

Configuration	Description
None	Voice guidance is not executed.
Audio file	The transceiver status is notified by using the audio configured by a user. Configure the audio to be used by selecting from the audio files registered in **Audio Library**.

Configuration using KPG-D1/ D1N

- Configuring **Function Guide** to be enabled or disabled (🔍See Transceiver Settings > Optional Features > Optional Features 1 > Voice Announcement > Function Guide)

- Configuring voice guidance when the **PF** key is operated (**On/ Off**) (🔍See Transceiver Settings > Optional Features > Optional Features 1 > Voice Announcement > Function Guide)

- Configuring voice guidance to notify the transceiver status (**Radio Locked/ Status Message Denied**) (🔍See Transceiver Settings > Optional Features > Optional Features 1 > Voice Announcement > Function Guide)

Status Guide

Status Guide is the function to notify the received status by using the audio configured by a user.

To use this function, "User Programmable" needs to be configured in **Voice Announcement Type**.

(Refer to Configuring Voice Guidance Method (Voice Announcement Type).)

Whether to execute voice guidance can be configured for each of the statuses registered in the Status List.

Also, whether to execute voice guidance can be configured when various Emergency Statuses (Emergency Status/ Man-Down Status/ Lone Worker Status/ Stationary Status/ Motion Status) are received.

Table 6-33 Voice Announcement (Status/ Emergency Status Response)

Configuration	Description
None	Voice guidance is not executed.
Audio file	Contents such as a status name are notified by using the audio configured by a user. Configure the audio to be used by selecting from the audio files registered in **Audio Library**.

If the transceiver receives a status, voice guidance is executed after an Alert Tone sounds from the transceiver. The number of times executing voice guidance corresponds to the configuration in **Cycle** of **Special Alert Tone**. However, if the Alert Tone is configured not to sound, the Alert Tone does not sound from the transceiver, and voice guidance is executed only once. (Refer to Configuring the Alert Tone (Alert Tone Pattern).)

Configuration using KPG-D1/ D1N

- Configuring **Voice Announcement** for each Status List

  FleetSync (🔍See Transceiver Settings > FleetSync > Status List)

  NXDN (🔍See Transceiver Settings > NXDN > Status List)

  P25 (🔍See Transceiver Settings > P25 > Status List)

  DMR (🔍See Transceiver Settings > DMR > Status List)

- Configuring **Voice Announcement** of **Emergency Status Response**

  FleetSync (🔍See Transceiver Settings > FleetSync > FleetSync Information > General > Emergency Status Response)

  NXDN (🔍See Transceiver Settings > NXDN > NXDN Information > General > Emergency Status Response)

  DMR (🔍See Transceiver Settings > DMR > DMR Information > General > Emergency Status Response)

For Portable, a user can be notified on the level of the remaining battery power on the LCD and by LED. And, a user can also use the function to save the battery consumption.

For Mobile, a user can be notified by the LED that the battery voltage of the vehicle battery is low.

7.1 Displaying the Remaining Battery Power Level (Battery Indicator)

Portable

Battery Indicator can be used to display a warning icon on the LCD and warn using LED when the remaining battery level is low.

Conditions to activate the **Battery Indicator** vary depending on the configuration in **Battery Warning**. (Refer to Warning that the Battery Voltage Is Low (Battery Warning).)

Mobile

Battery Indicator is the function to notify a user by the LED that transmission is restricted because the battery voltage of the vehicle battery is low.

Table 7-1 Battery Indicator

Configuration	Description
Off	**Portable:** The transceiver does not notify a user on the LCD and by LED when the remaining battery power is low. **Mobile:** The transceiver does not notify a user by the LED that transmission is restricted because the battery voltage of the vehicle battery is low.
LCD (Portable only)	The transceiver notifies a user by displaying the "Battery Status" icon on the LCD that the remaining battery power is low. Depending on the remaining battery capacity, the "Battery Status" icon displays the remaining battery level in 4 stages: Full, Sufficient, Low, and Very Low. However, the "Battery Status" icon does not appear if "While Transmitting" is configured in **Battery Warning**.
LED	**Portable:** The transceiver notifies a user by a flashing red LED that the remaining battery power is low. **Mobile:** The transceiver notifies a user by flashing the LED red that transmission is restricted because the battery voltage of the vehicle battery is low.
LCD & LED (Portable only)	The transceiver notifies a user by displaying the "Battery Status" icon on the LCD and by a flashing red LED at the same time that the remaining battery power is low. However, the "Battery Status" icon does not appear if "While Transmitting" is configured in **Battery Warning**.

For Portable, if "LCD" or "LCD & LED" is configured in **Battery Indicator**, the remaining battery power appears in 4 stages depending on the remaining battery capacity.

Table 7-2 Battery Status Icon (Portable only)

Icons	Status
	Full
	Sufficient
	Low
(Flashing)	Very Low

Configuration using KPG-D1/ D1N

Configuring **Battery Indicator** (See Transceiver Settings > Optional Features > Optional Features 1 > Battery)

7.2 Warning that the Battery Voltage Is Low (Battery Warning)

Supported Models: Portable

Battery Warning can be used to notify a user by emitting a beep or flashing the LED when the remaining battery power is low.

The transceiver always monitors whether the battery voltage goes low and notifies a user that the remaining battery power is low according to the configuration in **Battery Indicator** when the battery voltage level goes lower than the warning voltage level. (Refer to Displaying the Remaining Battery Power Level (Battery Indicator).)

Table 7-3 Battery Warning

Configuration	Description
While Transmitting	The transceiver detects that the battery voltage is low while transmitting. When the battery voltage level goes lower than the warning voltage level (6.2 V), the transceiver notifies a user that the remaining battery power is low by a flashing red Transmit LED.
Always	The transceiver always detects whether the battery voltage goes low while the transceiver is in use. When the battery voltage goes below the warning voltage level (during transmission: 6.2 V, non-transmission: 7.0 V), the transceiver notifies a user that the remaining battery power is low according to the **Battery Indicator** configuration by changing the "Battery Status" icon, and by flashing a red Transmit LED.
Always - Late Warning	The transceiver always detects whether the battery voltage goes low while the transceiver is in use. When the battery voltage goes below the warning voltage level (during transmission: 6.2 V, non-transmission: 6.5 V), the transceiver notifies a user that the remaining battery power is low according to the **Battery Indicator** configuration by changing the "Battery Status" icon, and by flashing a red Transmit LED.

Also, if **Battery Warning Tone** is enabled, the transceiver notifies a user that the remaining battery power is low by making the Battery Warning Tone (3 beeps) sound from the transceiver if the **PTT** switch is not pressed when the battery voltage level goes lower than the warning voltage level.

📝 Note

This function cannot be activated if "Off" has been configured in **Battery Indicator**.

Configuration using KPG-D1/ D1N

- Configuring **Battery Warning** (See Transceiver Settings > Optional Features > Optional Features 1 > Battery)

- Configuring **Battery Warning Tone** to be enabled or disabled (See Transceiver Settings > Optional Features > Optional Features 1 > Battery)

7.3	Warning the Battery Power of the Vehicle Battery Is Low (Battery Warning)

Supported Models: Mobile

Battery Warning for Mobile notifies a user by the LED or warning tone that a transmission is restricted because the battery power of the vehicle battery is low.

If the battery power of the vehicle battery goes lower than the threshold (8.5 V), the LED flashes red and a Battery Warning Tone sounds from the transceiver. If the battery power of the vehicle battery recovers to the threshold (8.5 V), the flashing of the LED and the Battery Warning Tone stop.

If the power of the vehicle battery is lower than the threshold (8.5 V) when transmitting, transmission cannot occur. In this case, while the **PTT** switch is being pressed. a Warning Tone A (continuous beep) sounds from the transceiver. The threshold (8.5 V) is not determined while transmitting.

📝 Note

For Mobile, **Battery Warning** cannot be configured by using KPG-D1/ D1N and always functions as above.

7.4	Displaying the Remaining Battery Power by Operating the Transceiver (Battery Status)

Supported Models: Portable

By flashing the LED red or emitting a Beep, **Battery Status** notifies a user of the remaining battery power by operating the key of the transceiver.

Battery Status is executed by pressing the **Battery Status** key.

Or, Battery Status is executed by selecting "Battery Status" after placing the transceiver in Menu Mode by pressing the **Menu** key.

(Refer to Using Menu Mode.)

If Battery Status is executed, the LED flashes red depending on the remaining battery power. Also, if **Battery Level Tone** is enabled, a Battery Level Tone (1 beep) sounds from the transceiver depending on the remaining battery power.

Table 7-4 Battery Status

Status	Number of LED Flashes	Number of Battery Level Tones
Full	4 times	4 times
Sufficient	3 times	3 times
Low	2 times	2 times
Very Low	1 time	1 time

📝 Note

If the following, Battery Status does not operate:

- While the transceiver is in Emergency Mode
- While the transceiver is transmitting
- While the transceiver is executing Battery Warning
- While the transceiver is in Transceiver Password Mode

Configuration using KPG-D1/ D1N

- Assigning functions to the **PF** keys on the transceiver (🔍See Transceiver Settings > Key Assignment)

- Configuring **Battery Level Tone** (🔍See Transceiver Settings > Optional Features > Optional Features 1 > Battery)

7.5	Reducing Battery Consumption (Battery Saver)

Supported Models: Portable

Battery Saver allows the transceiver to reduce power consumption by receiving intermittently.

The transceiver receives intermittently when there is no carrier and no key is pressed for 5 sec or more, or when the transceiver is in the following states:

● **Analog Conventional channel**

When there is a carrier, but the QT tone or DQT code does not match the tone or code preconfigured for the transceiver and no key is pressed for 5 sec or more

● **P25 Conventional channel**

When there is a carrier, but the NAC (Network Access Code) does not match the code preconfigured for the transceiver and no key is pressed for 5 sec or more

● **NXDN Conventional channel**

When there is a carrier, but the RAN (Radio Access Number) does not match the number preconfigured for the transceiver and no key is pressed for 5 sec or more

● **DMR Conventional channel**

When there is a carrier, but the Color Code does not match the code preconfigured for the transceiver and no key is pressed for 5 sec or more

Extension of the intervals for intermittent reception may reduce the battery consumption; however, interruptions to introductory parts of received audio may occur. To use **Battery Saver** effectively, there are systemic issues to consider, for instance, the duration from when the transceiver starts transmitting until the transceiver starts sending audio.

Intervals for intermittent reception are as follows.

Table 7-5 Duration of the Battery Saver

Save	No Carrier	Inconsistent Status of QT tone, DQT code, NAC code, RAN code, or Color Code
Off	Off	Off
Short	200 ms	400 ms
Medium	400 ms	800 ms
Long	800 ms	1600 ms

← 200/400/800ms or 400/800/1600ms →

Off   Saver On   Off
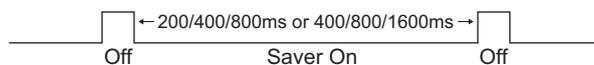
Figure 7-1 Battery Saver

📋 Note

• Battery Saver is activated only in an Analog Conventional system, P25 Conventional system and NXDN Conventional system.

• Battery Saver is not activated while the transceiver is scanning.

Configuration using KPG-D1/ D1N

• Configuring **Battery Saver** (Analog Conventional) (🔍See Transceiver Settings > Personal > Personal Features > Analog Conventional > General)

• Configuring **Battery Saver** (P25 Conventional) (🔍See Transceiver Settings > Personal > Personal Features > P25 Conventional > General)

• Configuring **Battery Saver** (NXDN Conventional) (🔍See Transceiver Settings > Personal > Personal Features > NXDN Conventional > General)

7.6	Displaying the Remaining Battery Power When the Transceiver Is Turned ON (Power-on Battery Information)

Supported Models: Portable

Power-on Battery Information is the function to display the remaining capacity of an Intelligent Battery when the transceiver is turned ON. When using the transceiver, the remaining capacity of the battery can be checked with greater accuracy than the Battery Status icon.

If **Battery Information** is enabled, the remaining capacity of an Intelligent Battery appears for 2 sec when the transceiver is turned ON.
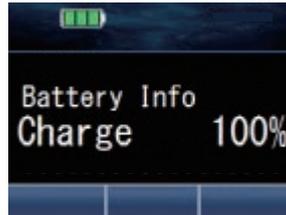
📝 Note

When the transceiver is turned ON, the remaining capacity of the battery does not appear when the information of an Intelligent Battery cannot be acquired, such as when the transceiver is turned ON while the transceiver is connected to the battery charger or when a battery other than an Intelligent Battery is used.

Configuration using KPG-D1/ D1N

Configuring **Battery Information** to be enabled or disabled (🔍 See Transceiver Settings > Optional Features > Optional Features 1 > Power-on)

7.7 Checking the Detailed Information of a Battery (Battery Information Display)

Supported Models: Portable

Battery Information Display is the function for checking the detailed information of an Intelligent Battery. The information of an Intelligent Battery, such as the battery consumption level and the performance temperature, can be checked.

By pressing the **Menu** key to enter Menu Mode, and then executing "Battery Information Display", Battery Information Display Mode is entered. (Refer to Using Menu Mode.)

In Battery Information Display Mode, the following battery information is displayed:

Table 7-6 Battery Information Display Mode

Item	Appearance of the Display	Display Range	Description
Current Charge	Charge	0 % to 100 %	Indicates the charge status of an Intelligent Battery.
Cycle Count	Count	0 to 65535	Indicates the number of charges and discharges of an Intelligent Battery.
Battery Health	Health	0 % to 100 %	Indicates the degradation status of an Intelligent Battery.
Current Voltage	Voltage	0 V to 12.00 V	Indicates the voltage value of an Intelligent Battery.
Temperature	Temp.	Celsius: -60.0 ºC to 100.0 ºC Fahrenheit: -76.0 ºF to 212.0 ºF	Indicates the temperature of an Intelligent Battery.
Chemistry	Chem.	Li-ion, Ni-MH	Indicates the type of an Intelligent Battery.
Serial Number	Serial	10-digit alphanumeric character	Indicates the serial number of an Intelligent Battery.
Model Name	Model	KNB-L1, KNB-L2, KNB-L3, KNB-N4	Indicates the model name of an Intelligent Battery.
Date of First Use	1st Used	Year/ Month/ Day	Indicates the date of first use of an Intelligent Battery. The order of the year, month and day depends on the configuration of Date Format. * If the values are not entered on the Battery Reader such as KAS-12, "--/--/--" is displayed.
Battery Alias	Alias	20 alphanumeric characters and symbols	Indicates the arbitrary string of text entered on the Battery Reader such as KAS-12. * Only ASCII codes 0x20 - 0x7E are enabled. A character code other than these ASCII codes will be replaced with one or more spaces.

Pressing the **[▼]** key can change the display in the following order:

Charge, Count, Health Display → Voltage, Temp., Chem. Display → Serial, Model, 1st Used Display → Alias Display → Charge, Count, Health Display → ...

Pressing the **[▲]** key can change the display in the following order:

Charge, Count, Health Display → Alias Display → Serial, Model, 1st Used Display → Voltage, Temp., Chem. Display → Charge, Count, Health Display → ...

📝 Note

- "---" remains on the display if the information of an Intelligent Battery cannot be acquired such as when the transceiver is turned ON while the transceiver is connected to the battery charger or when the battery other than an Intelligent Battery is used.
- Battery Information is not updated while the transceiver is in Battery Information Display Mode.
- Since KNB-N4 does not support **Battery Alias** and **Date of First Use**, "---" remains for these items even if reading is completed properly.

Global Positioning System (GPS) is the system that allows a user to check the current location of latitude and longitude by receiving signals from the Global Positioning System satellites orbiting the earth. GPS Position Display is the function to show the location information on the transceiver display.

For example, a forest ranger or forest firefighter can use this function to monitor the current location and report the location to the base station in order to smoothly perform their tasks smoothly.

GPS Position Display has the following functions:

- Displays the current location (latitude and longitude) on the display of the transceiver
- Displays the altitude of the current location on the display of the transceiver
- Automatically toggles the display of the transceiver between displaying the current location (latitude and longitude) and the altitude display (Mobile only)

8.1   Configuring the GPS Position Display

The functions below related to GPS Position Display can be configured using KPG-D1/ D1N. The functions must be configured in the following order.

1) Communication port

To use the built-in GPS receiver unit, configure **Built-in GPS Receiver/Bluetooth** to be enabled.

To use an external GPS receiver unit, assign "GPS" to the communication port to which the GPS receiver unit is connected. (Refer to Available Functions for COM Port.)

2) PF key

GPS Position Display needs to be assigned to a key on the transceiver.

Pressing the **GPS Position Display** key causes the transceiver to enter GPS Position Display Mode.

The transceiver also enters GPS Position Display Mode if "GPS Position Display" is selected after entering Menu Mode by pressing the **Menu** key. (Refer to Using Menu Mode.)

3) Configuring displays in GPS Position Display Mode

- **Latitude and Longitude**

This function can be used to configure whether the latitudinal and longitudinal values appear on the transceiver display. If this function is enabled, the latitudinal and longitudinal values appear on the transceiver display in GPS Position Display Mode. For the convenience of the user, the latitude and longitude display format can be selected from "Degrees, Minutes" and "Degrees, Minutes, Seconds".

If this function is disabled, the latitudinal and longitudinal values do not appear in GPS Position Display Mode.

- **Altitude**

  This function can be used to configure whether the altitudinal value appears on the transceiver display. If this function is enabled, the altitudinal value appears on the transceiver display in GPS Position Display Mode. For convenience of the user, either meters or feet can be configured for the format to display the altitudinal value.

  If this function is disabled, the altitudinal value does not appear in GPS Position Display Mode.

Configuration using KPG-D1/ D1N

- Configuring **COM port** (🔍See Transceiver Settings > Optional Features > Optional Features 1 > Serial Interface > COM port)

- Configuring **Built-in GPS Receiver/Bluetooth** to be enabled or disabled (🔍See Transceiver Settings > Optional Features > Optional Features 2 > GPS/Bluetooth)

- Assigning functions to the **PF** keys on the transceiver (🔍See Transceiver Settings > Key Assignment)

- Configuring **Latitude and Longitude** (🔍See Transceiver Settings > Optional Features > Optional Features 2 > GPS/ Bluetooth > GPS > GPS Position Display)

- Configuring **Altitude** (🔍See Transceiver Settings > Optional Features > Optional Features 2 > GPS/Bluetooth > GPS > GPS Position Display)

8.2	Displaying the Location Information

The transceiver enters GPS Position Display Mode if the **GPS Position Display** key is pressed or "GPS Position Display" is selected by pressing the **Menu** key while the transceiver is in standby mode.

For Mobile, the transceiver automatically toggles between displaying the location (latitude and longitude) and the altitude approximately every 5 sec while in GPS Position Display Mode. Pressing the **Menu** ([🔲]) or **[*]** key aborts GPS Position Display Mode.

```
        ┌──────────────────────────────┐
        │                              ↓
        │     ┌────────────────────────────┐
        │     │   Latitude and longitude   │
        │     └────────────────────────────┘
        │                │
        │          5 seconds later
        │                ↓
        │     ┌────────────────────────────┐
        │     │          Altitude          │
        │     └────────────────────────────┘
        │                │
        └────────── 5 seconds later
```
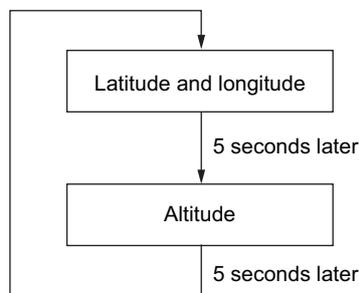
📝 Note

- The transceiver cannot enter GPS Position Display Mode if the display that appears in GPS Position Display Mode is not configured.

- For Mobile, pressing and holding the **Menu** ([🔲]) or **[*]** key pauses the toggling of the automatic display. Pressing and holding the **Menu** ([🔲]) or **[*]** key again resumes the toggling of the automatic display.

Operating the transceiver

1 **Press the GPS Position Display key.**

The transceiver enters GPS Position Display Mode.

The following operations are identical even if the transceiver enters GPS Position Display Mode by pressing the **Menu** key.

The following displays appear:

● **Latitude and Longitude Display**

"Degrees, Minutes" display

```
[battery] H ⊓ X ∨ 12:34 A M
GPS Pos Disp
North    35°33.206′
East    139°33.546′
Altitude    1000m
Exit            Back
```

"Degrees, Minutes, Seconds" display

```
[battery] H ⊓ X ∨ 12:34 A M
GPS Pos Disp
North    35°33.12″
East    135°33.32″
Altitude    1000m
Exit            Back
```

● **Altitude Display**

Meters display
"Altitude" is displayed in meters.

```
[battery] H ⊓ X ∨ 12:34 A M
GPS Pos Disp
North    35°33.206′
East    139°33.546′
Altitude    1000m
Exit            Back
```

Feet display
"Altitude" is displayed in feet.

```
[battery] H ⊓ X ∨ 12:34 A M
GPS Pos Disp
North    35°33.206′
East    139°33.546′
Altitude    3048ft
Exit            Back
```

● **GPS Non-positioning Status Display**

The "X" icon blinks if 5 sec elapse after the transceiver receives non-positioning data from the GPS receiver unit and is not able to receive serial data.

```
[battery] H ⊓ X ∨ 12:34
GPS Pos Disp
North    35°33.206′
East    139°33.546′
Altitude    1000m
Exit            Back
```

"-" appears for all digits on the display if the transceiver receives no location data from the GPS receiver unit, such as immediately after the transceiver is turned ON.

```
[battery] H ⊓ X ∨ 12:34 A M
GPS Pos Disp
North    --°--.---′
East    ---°--.---′
Altitude    ------m
Exit            Back
```

📝 Note

For Mobile, the transceiver automatically toggles between displaying the location (latitude and longitude) and the altitude approximately every 5 sec.

2 **Press the Menu ([⊡]) or [*] key.**

The transceiver exits GPS Position Display Mode and then restores the previous display.

📝 Note

"-" appears for all digits on the display if the transceiver is not receiving any location data from the GPS receiver unit, such as when the transceiver is turned ON.

By using the internal memory of the transceiver or using a microSD card or microSDHC card mounted on the transceiver, audio can be recorded (**Auto Recording**) or played back (**Playback**), or functions such as **GPS Data Storage** can be used.

The recorded audio and acquired GPS data is stored in the internal memory of the transceiver or a microSD card or microSDHC card mounted on the transceiver.

📝 Note

> Hereinafter, microSD card and microSDHC card are referred to collectively as "microSD card".

9.1   About microSD Card

If a microSD card is properly recognized after mounted on the transceiver, the " 🔲 " icon appears. If the microSD card is properly recognized, audio data recorded by using Auto Recording and GPS data acquired by using GPS Data Storage can be stored in the microSD card.

If the microSD card is not properly recognized due to the following causes, the " ❌ " icon appears:

Table 9-1 Causes of microSD Card Not Being Recognized Properly

Cause	Description
A card other than a microSD card is inserted	"Unsupported SD" appears on the display. Insert a microSD card.
• The microSD card is not correctly inserted • The microSD card is corrupted • Management information in the microSD card is corrupted	"SD Card Error" appears on the display. In order to recognize the microSD card properly, execute one of the following methods: • Turn the transceiver OFF and then turn it ON again • Remove the microSD card and then insert it again • Change the microSD card
The file system of the microSD card is different from the file system of the transceiver	"File Sys Error" appears on the display. Format the microSD card.

📝 Note

- If a microSD card is used for the first time on the transceiver, format the microSD card beforehand. (Refer to Formatting a microSD Card.)
- When the microSD card is removed from the transceiver, reset the recognition of the microSD card before removing. (Refer to Removing the microSD Card.)
- A microSD card manufactured by Toshiba, SanDisk or Panasonic is recommended.

Formatting a microSD Card

In order to use a microSD card on the transceiver, the microSD card needs to be formatted in advance in Format SD Card Mode.

Pressing the **Format SD Card** key places the transceiver in Format SD Card Mode. Or, pressing the **Menu** key to enter Menu Mode and then selecting "Format SD Card" places the transceiver in Format SD Card Mode. (Refer to Using Menu Mode.)

Operating the transceiver

1 **Press the Format SD Card key.**

A Key Beep A (1 beep) sounds from the transceiver, and then the transceiver enters Format SD Card Mode.

The following operations are identical even if the transceiver enters Format SD Card Mode by pressing the **Menu** key.

> 📝 Note
>
> In the following cases, pressing the Format SD Card key sounds a Key-entry Error Tone (1 beep) from the transceiver, and the transceiver does not enter Format SD Card Mode.
>
> - If no microSD card is inserted
> - If the microSD card is being accessed
> - If "Unsupported SD" is displayed
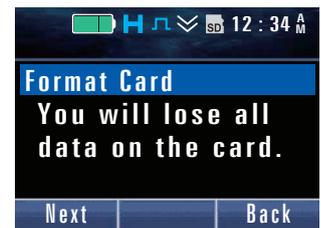
2 **Press the Menu ([▢]) or [*] key.**

A Key Beep A (1 beep) sounds from the transceiver, and then the screen to select whether to execute formatting appears.

3 **Press the [▲] key or [▼] key and select "Start".**
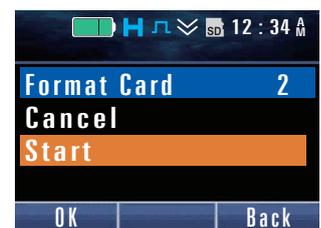
4 **Press the Menu ([▯]) or [*] key.**

The formatting starts after a Key Beep A (1 beep) sounds from the transceiver.

📋 Note

If the formatting fails, "Format Error" is displayed for 1 sec. Also, if the " 🆂🅳 " icon appears before the formatting is executed, the " ❎ " icon appears.

When the formatting completes, "Complete" is displayed.

```
████ H ⊓ ⌄ SD 12 : 34 AM


Zone 1
Channel 1
         Formatting
Menu    Zone+
```

```
████ H ⊓ ⌄ SD 12 : 34 AM


Zone 1
Channel 1
          Complete
Menu    Zone+
```

Configuration using KPG-D1/ D1N

Assigning functions to the **PF** keys on the transceiver (🔍See Transceiver Settings > Key Assignment)

Removing the microSD Card

In order to avoid damage to a file stored in a microSD card or to avoid failure of the transceiver, the recognition of the microSD card needs to be reset in Eject SD Card Mode before removing the microSD card from the transceiver. If the recognition of a microSD card is reset, the transceiver enters the state where the microSD card can be safely removed.

Pressing the **Eject SD Card** key places the transceiver in Eject SD Card Mode. Or, pressing the **Menu** key to enter Menu Mode and then selecting "Eject SD Card" places the transceiver in Eject SD Card Mode. (Refer to Using Menu Mode.)

Operating the transceiver

1 **Press the Eject SD Card key.**

A Key Beep A (1 beep) sounds from the transceiver, and then the transceiver enters Eject SD Card Mode.

The following operations are identical even if the transceiver enters Eject SD Card Mode by pressing the **Menu** key.

```
████ H ⊓ ⌄ SD 12 : 34 AM

Eject Card
The card will be
  unavailable.


Next            Back
```

2 **Press the Menu ([▯]) or [*] key.**

A Key Beep A (1 beep) sounds from the transceiver, and the screen to select whether to reset the recognition of the microSD card appears.

3 Press the [▲] key or [▼] key and select "Start".

```
┌──────────────────────────────┐
│ 🔋 H ⊓ ⌄ SD  12:34 ᴬM       │
│ Eject Card              2    │
│ Cancel                       │
│ Start                        │
│                              │
│   O K   │        │  Back     │
└──────────────────────────────┘
```
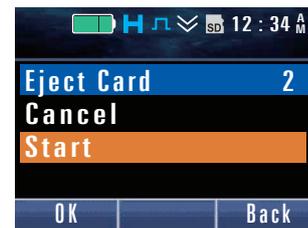
4 Press the Menu ([▢]) or [*] key.

The recognition of the microSD card is reset after a Key Beep A (1 beep) sounds from the transceiver.

```
┌──────────────────────────────┐
│ 🔋 H ⊓ ⌄       12:34 ᴬM      │
│                              │
│ Zone 1                       │
│ Channel 1                    │
│      Card Ejected            │
│  Menu  │ Zone+ │             │
└──────────────────────────────┘
```

Configuration using KPG-D1/ D1N

Assigning functions to the **PF** keys on the transceiver (🔍See Transceiver Settings > Key Assignment)

Folder Structure of a microSD Card

If a microSD card is formatted, all the data in the microSD card is deleted, and then folders are created in the following structure:
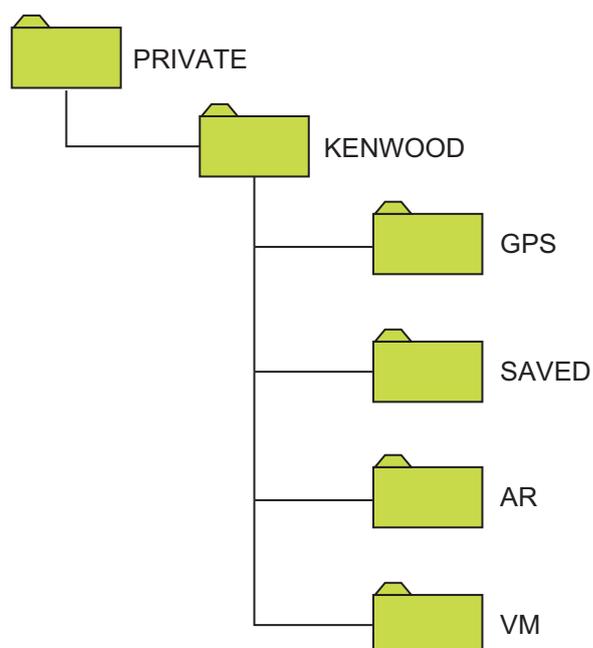
Figure 9-1 Folder Structure of a microSD Card

About file name

● **GPS folder**

GPS data files acquired by using **GPS Data Storage** are stored.

● **Saved folder**

Audio data files recorded by using **Auto Recording** or **Voice Memo** can be stored. (Refer to Storing Audio Data in the Saved Folder.)

● **AR folder**

Audio data files recorded by using **Auto Recording** are stored.

● **VM folder**

Audio data files recorded by using **Voice Memo** are stored.

In each folder, a maximum of 250 files can be stored.

The following file name is automatically given to the file stored in each folder.

20140930_174530_AR_N65519.WAV

①   ②   ③   ④   ⑤

① **Start date of storing**

The year, month, and day of the date when storing started.

② **Start time of storing**

The time (hour, minute, and second) when storing started.

③ **Function type**

"AR" appears for an audio data file recorded by **Auto Recording**, "GPS" appears for a GPS data file stored by **GPS Data Storage**, and "VM" appears for an audio data file recorded by **Voice Memo**.

④ **ID information**

The ID information of the transmitting transceiver. This information is added only for an audio data file recorded by **Auto Recording** when receiving an Individual Call, and for an audio data file recorded by **Voice Memo**. The file name is assigned in the "N + ID" format if an Individual Call is received in an NXDN system, and in the "A + ID" format if an Individual Call is received in a P25 system. "---" appears if no ID information exists.

⑤ **Extension**

".WAV" appears for an audio data file recorded by **Auto Recording**, and ".TXT" appears for a GPS data file stored by **GPS Data Storage**.

Conditions that enables audio data file and GPS data file to be stored in a microSD card

● **Audio data file**

In **Auto Recording** and **Voice Memo**, an audio data file is created for each recording. (Refer to Recording Received Audio Automatically (Auto Recording), Recording Audio to a microSD Card (Voice Memo).)

In order to create an audio data file, the following conditions needs to be satisfied:

• The number of audio data files that exist in the AR folder or VM folder is less than 250.
• The capacity for the length of time of 2 recording sessions in **Auto Recording** (Maximum Recording Length x 2) is available.
• The capacity for the length of time of 2 recording sessions in **Voice Memo** (10 minutes x 2) is available.
• If the clock count by RTC is paused, or if the clock of the transceiver is not configured, no file having "009999" at the beginning of the file name exists.

📝 Note

The method of storing an audio data file when the full capacity of a microSD card or the full capacity of the internal memory has been used varies depending on the configuration in **First-in First-out Deletion**. (Refer to Configuring the Storage Method of an Audio Data File (First-in First-out Deletion).)

● **GPS data file**

The GPS data acquired by using **GPS Data Storage** is stored in the GPS data file having the same date in the GPS folder. (Refer to Storing the GPS Data (GPS Data Storage).)

If no GPS data file exists or if the date of the file changes, a new GPS data file is created automatically.

If the clock count by RTC is paused, or if the clock of the transceiver is not configured, the GPS data is stored in the GPS data file of the file size less than 43 MB. If no GPS data file exists or if the file size reaches 43 MB, a new GPS data file is created automatically.

In order to create a GPS data file, the following conditions needs to be satisfied:

- The number of GPS data files that exist in the GPS folder is less than 250.
- A capacity for storing 86,400 GPS data is available. (If the capacity is not available, the oldest GPS data file is deleted to secure the required capacity.)
- If the clock count by RTC is paused, or if the clock of the transceiver is not configured, no file having "009999" at the beginning of the file name exists.

Configuring the Warning Behavior for the Remaining Memory Capacity (Low Memory Warning)

Low Memory Warning is the function to warn that the available capacity is insufficient by the display or Alert Tone when the available capacity on a microSD card becomes 10 % or less.

The transceiver behaves as follows according to the configuration in **Low Memory Warning**:

Table 9-2 Low Memory Warning

Configuration	Description
Off	The transceiver does not warn even if the available capacity on a microSD card becomes 10 % or less.
Display	If the available capacity on a microSD card becomes 10 % or less, "Low SD Memory" appears on the display for 1 sec. After that, "Low SD Memory" appears for 1 sec at 10-sec intervals.
Display & Alert Tone	If the available capacity on a microSD card becomes 10 % or less, "Low SD Memory" appears on the display for 1 sec, and a Low SD Memory Tone (4 beeps) sounds from the transceiver simultaneously. After that, "Low SD Memory" appears for 1 sec at 10-sec intervals, and a Low SD Memory Tone (4 beeps) sounds from the transceiver simultaneously. However, a Low SD Memory Tone (4 beeps) does not sound from the transceiver if the transceiver is transmitting.

Configuration using KPG-D1/ D1N

Configuring **Low Memory Warning** (🔍See Transceiver Settings > Optional Features > Optional Features 2 > microSD/ Memory)

Configuring the Storage Method of an Audio Data File (First-in First-out Deletion)

First-in First-out Deletion is the function to delete the oldest audio data file in order to store a new audio data file if the full capacity of the microSD card or the full capacity of the internal memory has been used.

The transceiver behaves as follows according to the configuration in **First-in First-out Deletion**:

Table 9-3 First-in First-out Deletion

Configuration	Description
Enabled	The transceiver deletes the oldest audio data file in the oldest folder and stores a new audio data file in the microSD card.
	The transceiver deletes the oldest audio data file stored in the internal memory and stores a new audio data file in the internal memory.
	When the transceiver is turned OFF by the **Power** switch, the transceiver backs up the audio data recorded by **Auto Recording**.
Disabled	The audio data files stored in the microSD card or the internal memory are not deleted. The transceiver cannot record.
	The transceiver backs up the audio data each time the transceiver records by **Auto Recording**.

Configuration using KPG-D1/ D1N

Configuring **First-in First-out Deletion** (🔍See Transceiver Settings > Optional Features > Optional Features 2 > microSD/ Memory)

9.2	Recording Received Audio Automatically (Auto Recording)

Auto Recording is the function to record transmitted or received audio automatically to the internal memory or to a microSD card. This function is used if the audio needs to be listened again after a part of the conversation is missed, or if the previous conversation needs to be kept as a record.

If a microSD card is mounted on the transceiver and the " 🗂 " icon appears, the audio is recorded to the microSD card. If no microSD card is mounted on the transceiver, the audio is recorded to the internal memory.

To use this function, **Auto Recording** needs to be enabled by using KPG-D1/ D1N, and the method to start recording needs to be configured in **Recording Type**.

The transceiver starts recording as follows according to the configuration in **Recording Type**:

Table 9-4 Recording Type

Configuration	Description
All TX/RX Audio	If transmission or reception starts, the audio is recorded to the internal memory or a microSD card. If the recording starts, the timer for **Maximum Recording Length** is activated. When the amount of time configured in **Maximum Recording Length** elapses while recording, the recording ends.
Individual Call	If an Individual Call to the own transceiver is received and enters the matching state, the audio is recorded to the internal memory or a microSD card. If the recording starts, the timer for **Maximum Recording Length** is activated. When the amount of time configured in **Maximum Recording Length** elapses while recording, the recording ends.
	After the recording ends, while in the matching state, if an Individual Call from the same transceiver is received or if Talkback is activated, the recording does not start. However, if an Individual Call from a different transceiver to the own transceiver is received, the recording starts.
	The matching state indicates the following states:
	MDC-1200/ FleetSync/ NXDN Conventional/ DMR Conventional:
	The state that Optional Signaling matches
	NXDN Trunking/ P25 Conventional/ P25 Trunking:
	The state that the ID Name or Unit ID of the transmitting transceiver is displayed
	2-tone/ DTMF:
	The state that the 2-tone or DTMF code is received, and the Optional Signaling matches
	For 5-tone, the transceiver starts recording to the internal memory or microSD card if audio sounds from the speaker after the 5-tone sequence matches and Decode Format (MONF, MONO) is executed.

📝 Note

- Maximum Recording Length is the maximum length of time for Auto Recording to record a single session. (Refer to Configuring Recording Time (Maximum Recording Length).)

Transceiver behavior

Caution

Do not disconnect the power source of the transceiver or remove the microSD card from the transceiver while the audio is recorded to the microSD card. Also, for Portable, be careful that the remaining battery power does not run out. The data may not be stored, or the data may be damaged.

Each screen is an example of the display when an Individual Call in an NXDN Conventional system is received and the received audio is recorded to a microSD card.

● **Starting Auto Recording**

If **Auto Recording** starts recording the received or transmitted audio at the timing configured in **Recording Type**, the "⊡" icon blinks.

The recording start date and time is stored. Also, if "Individual Call" is configured in **Recording Type**, the ID information of the transmitting transceiver is stored.

When the amount of time configured in **Maximum Recording Length** elapses, the "⊡" icon disappears and the recording ends.

● **If Auto Recording does not start because the maximum number of recordings has been reached**

"Memory Full" appears on the display for 1 sec. After that, "Memory Full" appears on the display for 1 sec at 10-sec intervals.

If the audio is recorded to the internal memory, **Auto Recording** does not start if **First-in First-out Deletion** is disabled, and if the maximum number of recordings has already been reached. Also, if the audio is recorded to a microSD card, **Auto Recording** does not start if the conditions for storing data in the microSD card are not satisfied. (Refer to Conditions that enables audio data file and GPS data file to be stored in a microSD card.)

● **If Auto Recording does not start because a file having the same file name exists**

"SD Card Error" appears on the display for 1 sec.

If the audio is recorded to a microSD card, **Auto Recording** does not start if a file having the same file name exists in the AR folder.

📝 Note

- If one of the following occurs during the recording, the timer for **Maximum Recording Length** stops and the recording ends:
  - The Gap timer elapses (the recording continues for 3 sec from when the transmission or reception completes. This duration of time is called the Gap timer.)
  - The channel or site is changed
  - Scanning starts or stops
  - The transceiver enters Emergency Mode
  - The data transmission starts
  - The **PTT** switch is pressed while **Public Address** is enabled (Mobile only)
  - The **PTT** switch is pressed while **Intercom** is enabled (only for a Dual Control Head structure of Mobile)
  - The **Clear** key is pressed and the communication ends
  - The DTMF code and "#" code are received, and the matching state of Optional Signaling is reset
- While **Priority Scan** or **Priority Monitor Scan** is activated, the transceiver behaves as follows:
  - Regardless of the configuration in **Recording Type**, the muted sound is recorded while **Lookback** is activated.
  - If "All TX/RX Audio" is configured in **Recording Type**, and if a signal of a Priority Channel is received while the received audio of a Normal Channel (which is not the Priority Channel) is recorded, the recording continues and the received audio of the Priority Channel is recorded.
  - If "Individual Call" is configured in **Recording Type**, and if a signal of a Priority Channel is received while the received audio of a Normal Channel is recorded, the recording of the Normal Channel ends, and then recording of the Priority Channel starts.
- During transmission, the audio is recorded via the Mic Line or MI2 Line.
- The recorded audio can be played back or deleted in Playback Mode. (Refer to Playing Back the Recorded Audio (Playback).)
- When transmitting data, **Auto Recording** does not start.
- Although a Transmit Tone is recorded, a Control Tone and Side Tone are not recorded.
- If "All TX/RX Audio" is configured in **Recording Type**, the ID information is not stored when **Auto Recording** is started.
- After the configuration data is written, the configuration values in Internal Memory of **Maximum Recording Length** before and after writing are compared for each RF Deck. If the configurations differ, the audio data recorded in the internal memory is deleted.
- If the configuration data with **Audio/GPS Data Erase (Internal Memory)** enabled is written, the audio data recorded in the internal memory is deleted.
- If **Auto Recording** is used with other functions such as GPS Data Storage, the beginning may be missing from the audio recorded by **Auto Recording**.

Configuration using KPG-D1/ D1N

- Configuring **Auto Recording** to be enabled or disabled (🔍 See Transceiver Settings > Optional Features > Optional Features 2 > microSD/Memory > Auto Recording)
- Configuring **Recording Type** (🔍 See Transceiver Settings > Optional Features > Optional Features 2 > microSD/ Memory > Auto Recording)

Configuring Recording Time (Maximum Recording Length)

Maximum Recording Length is the maximum length of time for **Auto Recording** to record a single session.

By using KPG-D1/ D1N, the maximum length of time for **Auto Recording** to record a single session can be configured for each the internal memory and a microSD card.

Table 9-5 Maximum Recording Length

Configuration	Description
Internal Memory	Either 30 sec or 60 sec can be configured for the maximum length of recording time for a single session when recording the transmitted or received audio to the internal memory. If 30 sec is configured, 4 recordings can be recorded. If 60 sec is configured, 2 recordings can be recorded. If the maximum number of recordings is reached, a further new recording is disabled.
microSD Card	The maximum length of recording time for a single session can be configured from 15 sec to 300 sec in 15-second increments when recording the transmitted or received audio to a microSD card mounted on the transceiver.

Configuration using KPG-D1/ D1N

Configuring **Maximum Recording Length** (🔍 See Transceiver Settings > Optional Features > Optional Features 2 > microSD/Memory > Auto Recording > Maximum Recording Length)

9.3 Recording Audio to a microSD Card (Voice Memo)

Voice Memo is the function to record audio to a microSD card manually. The content of a conversation around the transceiver can be recorded.

If the transceiver is placed in Voice Memo Mode, the transceiver starts recording to the microSD card.

Pressing the **Voice Memo** key places the transceiver in Voice Memo Mode.

Or, the transceiver enters Voice Memo Mode when "Voice Memo" is executed after entering Menu Mode by pressing the **Menu** key.

Operating the transceiver

● Starting the recording

If "Voice Memo" is executed after the transceiver enters Menu Mode by pressing the **Voice Memo** key or the **Menu** key, a Key Beep A (1 beep) sounds from the transceiver, and the transceiver enters Voice Memo Mode. The transceiver starts recording to a microSD card.

The recording start date (year, month, and day), the recording start time (hour and minute), and the length of recording time appear on the display while the transceiver is in Voice Memo Mode.

● If recording does not start because the maximum number of recordings has been reached:

"Memory Full" appears on the display for 1 sec.

● Ending the recording

If 10 minutes elapse after recording starts, if any transceiver key is operated, or if the transceiver enters the following states, the transceiver exits Voice Memo Mode and recording ends:

- When the channel or site is changed
- When scanning is started or stopped
- When the transceiver enters Emergency Mode
- When the transceiver sends data (Recording is stopped if data is sent by user operation. Recording is not stopped if GPS data is automatically sent.)
- When the transceiver sends audio
- When the transceiver receives audio
- When the microSD card is removed

If 10 minutes elapse after recording starts and the transceiver exits Voice Memo Mode, a Record Stopped Tone (4 beeps) sounds from the transceiver, and "Record Stopped" appears on the display for 2 sec.

> **Note**
> - Recording does not start if the conditions for storing data in the microSD card are not satisfied. (Refer to Conditions that enables audio data file and GPS data file to be stored in a microSD card.)
> - **Voice Memo** records audio to the microSD card. Therefore, while recognition of the microSD card is not completed, while the microSD card is formatted, or while an audio file is deleted, a Key-entry Error Tone (1 beep) sounds from the transceiver and recording does not start even if the **Voice Memo** key is pressed.
> - The maximum length of recording time is 10 minutes.
> - **Mode Reset Timer** is extended while the transceiver is in Voice Memo Mode. Also, the VOX function is temporarily disabled.
> - If the transceiver receives a request message for GPS data by using wireless communication while in Voice Memo Mode, the transceiver sends the GPS data to the base station after the transceiver exits Voice Memo Mode. (Refer to Storing the GPS Data (GPS Data Storage).)
> - If **Voice Memo** is used with other functions such as GPS Data Storage, the beginning may be missing from the audio recorded by **Voice Memo**.

About the Audio to Be Recorded

The following audio is recorded while the transceiver is in Voice Memo Mode.

Portable:

If a speaker microphone (such as KMC-54WD) is connected to the transceiver, the audio inputted to the microphone of the speaker microphone is recorded. If a speaker microphone is not connected, the audio inputted to the microphone of the transceiver is recorded.

Mobile:

The audio inputted to the Mic Line is recorded.

> **Note**
> - The inputted audio is recorded even if a Bluetooth-compatible headset is connected to the transceiver.
> - For Mobile, the audio path of the Mic Line changes according to the configuration in **Control Head Mic Input**. (Refer to Selecting the Audio Input Line If Detaching and Using Control Head (Control Head Mic Input).)

9.4　Playing Back the Recorded Audio (Playback)

If the transceiver enters in Playback Mode, the audio data recorded by using **Auto Recording** can be played back. Unnecessary recorded data can be deleted.

Pressing the **Playback** key places the transceiver in Playback Mode. Or, the transceiver can also be placed in Playback Mode by selecting "Playback" after placing the transceiver in Menu Mode by pressing the **Menu** key. (Refer to Using Menu Mode.)

In Playback Mode, if a microSD card is mounted on the transceiver and the " " icon appears, only the audio data stored in the microSD card is displayed. If no microSD card is mounted on the transceiver, only the audio data stored in the internal memory is displayed.

Note

The audio data cannot be removed from the internal memory and stored.

Operating the transceiver

● **Playing back the audio data**

1　Press the **Playback** key.

A Key Beep A (1 beep) sounds from the transceiver, and then the transceiver enters Playback Mode.
The subsequent operations are identical even if the transceiver enters Playback Mode by pressing the **Menu** key.

● **If a microSD card is not inserted in the transceiver:**

The audio data stored in the internal memory is displayed in a list.

● **If a microSD card is inserted in the transceiver:**

The category folders of audio data stored in the microSD card are displayed in a list.

Saved:

The audio data recorded by using Auto Recording or Voice Memo stored in the Saved folder is stored.

Auto Recording:

The audio data recorded by using Auto Recording is stored.

Voice Memo:

The audio data recorded by using Voice Memo is stored.
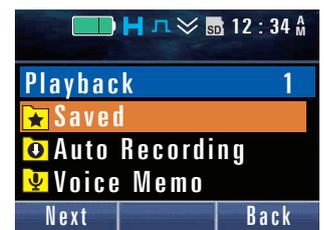
Selecting a category folder and pressing the **Menu** ([🗇]) key displays the audio data folders stored in the category folder.

```
🔋 H ⊓ ≫ SD 12:34 ᴬᴹ

Playback              1
🟠 07/28/'15 11:35A
🔵 07/27/'15 10:54A
🔵 07/26/'15  9:23A
   Next          Back
```

Selecting an audio data folder and pressing the **Menu** ([🗇]) key displays the audio data stored in the audio data folder in a list.

📝 Note

• A folder in which no audio data is stored is not displayed.
• The oldest audio data is displayed as list number 1.
• Each list of audio data is displayed in the format of either the recording start date and time or the ID of the transmitting transceiver. Pressing the [◀] key or [▶] key can switch the display. The recording start date and time is displayed according to the configurations in **Date Format** and **Time Format**.
• If no audio data is stored, "Empty" is displayed for 1 sec.

```
🔋 H ⊓ ≫ SD 12:34 ᴬᴹ

Playback              1
07/28/'15 11:35
07/28/'15 14:20
07/28/'15 15:23
   Play          Back
```

2 Press the [▲] key or [▼] key to select the audio data, and then press the Menu ([🗇]) or [*] key.

A Key Beep A (1 beep) sounds from the transceiver, the playback screen appears, and playback of the audio data starts.

```
🔋 H ⊓ ≫ SD 12:34 ᴬᴹ

Playback              1
           00:00/00:45
UID              65519

   Pause         Back
```

If playback of the audio data having the last list number ends, the list display is restored.

```
🔋 H ⊓ ≫ SD 12:34 ᴬᴹ

Playback              1
01/23/'14  9:23A
01/23/'14  9:35A
01/23/'14  2:20P
   Play        Delete
```

The following operations are enabled during playback:

Table 9-6 Operations during Playback

Transmission Operation	Description
Pause	Pressing the **Menu** ([⌂]) or **[*]** key pauses the playback of audio data. Pressing the **Menu** ([⌂]) or **[*]** key again resumes the playback of audio data.
Cue	Pressing the **[◀]** key cues to the beginning of the audio file being played back, and then starts the playback. If the **[◀]** key is pressed again before the playback of audio data starts, the playback starts after cuing to the beginning of the audio data which has the previous list number. Pressing the **[▶]** key cues to the beginning of the audio data which has the next list number, and then starts the playback. Pressing the **[▶]** during playback of the audio data which has the last list number ends the playback and the list display is restored. If the playback is being paused, the audio data is cued while remaining in the paused state.
Rewind	While the **[◀]** key is pressed and held, the audio data being played back continues to rewind. Releasing the **[◀]** key starts the playback from the point. If the **[◀]** key continues to be pressed and held until the rewinding reaches the beginning of the audio data being played back, the rewinding pauses. Furthermore, if the **[◀]** key continues to be pressed and held, the rewinding is resumed from the end of the audio data which has the previous list number. If the rewinding reaches the beginning of the audio data with the list number 1, the rewinding ends and the audio data having the list number 1 is played back. If the playback is being paused, the audio data is rewound while remaining in the paused state.
Fast forward	While the **[▶]** key is pressed and held, the audio data being played back continues to fast-forward. Releasing the **[▶]** key starts the playback from the point. If the **[▶]** key continues to be pressed and held until the fast-forwarding reaches the end of the audio data being played back, the fast-forwarding pauses. Furthermore, if the **[▶]** key continues to be pressed and held, the fast-forwarding is resumed from the beginning of the audio data which has the next list number. If the fast-forwarding reaches the end of the audio data having the last list number, the fast-forwarding and playback end and the list display is restored. If the playback is being paused, the audio data is fast-forwarded while remaining in the paused state.
End of playback	Pressing the **Back** ([⇆]) or **[#]** key restores the list display and the playback of the recorded data ends.

● **Deleting an audio datum**

1 **Press the Playback key to display the audio data.**

Refer to step 1 of "Playing back the audio data".

```
🔋 H ♫ ⌄ SD 12:34 ᴬᴹ

Playback              1
01/23/' 14  9:23A
01/23/' 14  9:35A
01/23/' 14  2:20P
 Play           Delete
```

2 **Press the [▲] or [▼] key to select the audio data to be deleted.**

3 **Press the Back ([⇆]) or [#] key after pressing the Function ([○]) key.**

The screen to confirm whether to delete the audio data appears.

```
🔋 H ♫ ⌄ SD 12:34 ᴬᴹ

Playback              1
       Delete?



 OK             Back
```

4   **Press the Menu ([▢]) or [*] key.**

The delete process of the audio data starts. When the delete process completes, the list display is restored.

```
[====]H ⊓ ⌄ SD 12:34 A/M

Playback              1
01/23/'14  9:35A
01/23/'14  2:20P

  Play              Delete
```
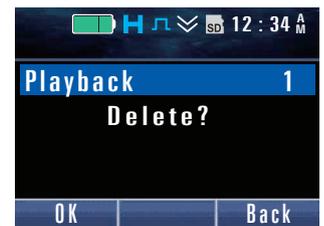
● **Deleting all audio data**

1   **Press the Playback key to display the audio data.**

Refer to step 1 of "Playing back the audio data".

```
[====]H ⊓ ⌄ SD 12:34 A/M

Playback              1
01/23/'14  9:23A
01/23/'14  9:35A
01/23/'14  2:20P
  Play              Delete
```

2   **Press and hold the Back ([⬑]) or [#] key after pressing the Function ([○]) key.**

The screen to confirm whether to delete the audio data appears.

```
[====]H ⊓ ⌄ SD 12:34 A/M

Playback            All
     All Delete?



   OK                Back
```

3   **Press the Menu ([▢]) or [*] key.**

The delete process of the audio data starts. When the delete process completes, the standby display is restored, and then "Empty" appears for 1 sec.

```
[====]H ⊓ ⌄ SD 12:34 A/M


Zone 1
Channel 1
              Empty
  Menu   Zone+
```
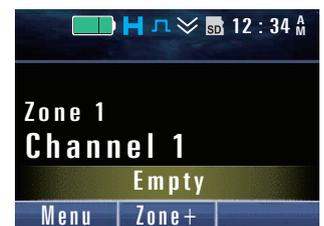
● **Deleting an audio data folder**

1 **Press the Playback key to display the audio data folders in the microSD card.**

Refer to step 1 of "Playing back the audio data".

```
         ▭▶ H ⊓ ⌄ SD  12:34 A
                                 M
Playback                      1
🔻 07/28/' 15 11:35A
🔺 07/27/' 15 10:54A
🔺 07/26/' 15  9:23A
 Next                      Back
```

2 **Press the [▲] or [▼] key to select the audio data folder to be deleted.**

3 **Press the Menu ([▢]) or [*] key after pressing the Function ([○]) key.**

The screen to confirm whether to delete the folder appears.

```
         ▭▶ H ⊓ ⌄ SD  12:34 A
                                 M
Playback                      1
          Delete?

 OK                        Back
```
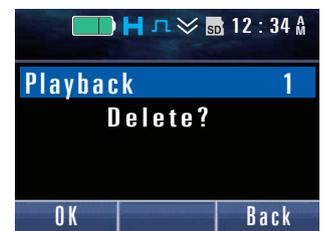
4 **Press the Menu ([▢]) or [*] key.**

The delete process of the folder starts. When the delete process
completes, the list display is restored.

```
         ▭▶ H ⊓ ⌄ SD  12:34 A
                                 M
Playback                      1
🔻 07/27/' 15 10:54A
🔺 07/26/' 15  9:23A

 Next                      Back
```

📝 Note
- Category folders cannot be deleted.
- If the **Menu** ([▢]), **Back** ([↩]), **[*]** or **[#]** key is pressed while the audio data is being deleted, a Key-entry Error Tone (1 beep) sounds from the transceiver and the transceiver does not respond at all.

Configuration using KPG-D1/ D1N

- Assigning functions to the **PF** keys on the transceiver (🔍See Transceiver Settings > Key Assignment)
- Configuring **Date Format** (🔍See Transceiver Settings > Optional Features > Optional Features 1 > Display)
- Configuring **Time Format** (🔍See Transceiver Settings > Optional Features > Optional Features 1 > Display)

Storing Audio Data in the Saved Folder

Audio data in the Auto Recording or Voice Memo folder can be copied and stored in the Saved folder.

1 **Press the Playback key to display the audio data folders in the microSD card.**

Refer to step 1 of "Playing back the audio data".

```
H ⊓ ⌄ SD 12:34 A/M
Playback              1
07/28/'15 11:35
07/28/'15 14:20
07/28/'15 15:23
Play              Back
```

2 **Press the [▲] or [▼] key to select the audio data folder to be stored.**

3 **Press the Menu ([▢]) or [*] key after pressing the Function ([○]) key.**

The screen to confirm whether to store the audio data appears.

```
H ⊓ ⌄ SD 12:34 A/M
Playback              1
  Copy to Saved?


OK                Back
```
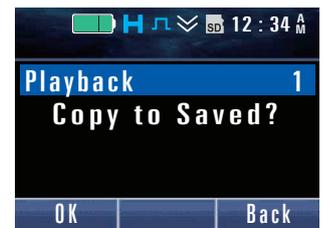
4 **Press the Menu ([▢]) or [*] key.**

The storage process of the audio data starts. When the storage process completes, "Complete" appears on the display for 1 sec, and the list display is restored.

```
H ⊓ ⌄ SD 12:34 A/M
Playback              1

   Complete

Play              Back
```
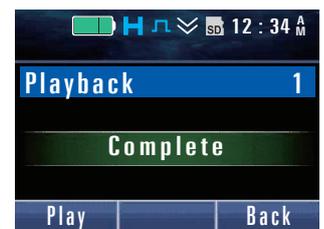
9.5	Storing the GPS Data (GPS Data Storage)

GPS Data Storage is the function to enable the GPS data to be stored in the internal memory and microSD card.

At the time intervals configured in **GPS Storage Interval**, the GPS data acquired from the GPS receiver unit is stored to both in the internal memory and microSD card.

The acquired data is temporarily stored in the RAM in the transceiver, and if 3 data are stored, the data are collectively stored in both the internal memory and microSD card. If 1 or 2 GPS data are temporarily stored in the RAM in the transceiver, the GPS data are deleted without being stored in the internal memory and microSD card when the transceiver is turned OFF.

A maximum of 7,000 GPS data can be stored in the internal memory. If the number of the GPS data reaches 7,000, the older 3,500 GPS data are deleted, so the actual number of the GPS data which can be stored in the internal memory is 3,500.

In a microSD card, the GPS data of a maximum of 250 days or the GPS data with a size of the microSD card capacity can be stored. The GPS data is stored according to the output format configured in GPS Data Record Format. If no output format is configured, the GPS data is not stored.

The GPS data stored in the internal memory can be sent from the transceiver using wireless communication and be transferred to a PC.

Caution

Do not disconnect the power source of the transceiver or remove the microSD card from the transceiver while the GPS data is stored in the microSD card. Also, for Portable, be careful that the remaining battery power does not run out. The data may not be stored, or the data may be damaged.

Sending and transferring the GPS data

● Sending the GPS data using wireless communication

The transceiver sends the GPS stored in the internal memory to the base station according to the specified period and specified number of data upon the receipt of a request message for the GPS data which is sent from the base station using the NXDN air protocol.

📝 Note

- While the transceiver is sending the GPS data using wireless communication, new GPS data is not stored even if the transceiver acquires the new GPS data from the GPS receiver unit.
- If the number of the stored GPS data does not reach the number of data specified by the request message for the GPS data which is sent from the base station, the transceiver sends all the stored GPS data to the base station.

● Transferring the GPS data to a PC

To transfer the GPS data to a PC, the transceiver and the PC must be connected by a serial cable.

The transceiver transfers the GPS data stored in the internal memory to the PC according to the specified period and specified number of data upon the receipt of a request message for the GPS data which is sent from the PC.

📝 Note

- To transfer the GPS data to the PC, the GPS data request message must be controlled using a PC application. Also, Base Station Settings must be configured using KPG-D1/ D1N.
- While the transceiver is transferring the GPS data using a PC command, new GPS data is not stored even if the transceiver acquires the new GPS data from the GPS receiver unit.
- If the number of the stored GPS data does not reach the number of data specified by the request message for the GPS data which is sent from the PC, the transceiver sends all the stored GPS data to the PC.
- If the configuration data with **Audio/GPS Data Erase (Internal Memory)** enabled is written, the GPS data stored in the internal memory is deleted.

Configuration using KPG-D1/ D1N

- Configuring **GPS Data Storage** to be enabled or disabled (🔍 See Transceiver Settings > Optional Features > Optional Features 2 > microSD/Memory > GPS Data)

- Configuring **GPS Storage Interval** (🔍 See Transceiver Settings > Optional Features > Optional Features 2 > microSD/ Memory > GPS Data)

- Configuring **GPS Data Record Format** (🔍 See Transceiver Settings > Optional Features > Optional Features 2 > microSD/Memory > GPS Data > GPS Data Record Format)

9.6	**Confirming microSD Card Contents via a PC (SD Card Direct Access)**

SD Card Direct Access is the function to make the PC recognize the microSD card that is inserted in the transceiver as a removal disk drive.

Connecting the transceiver to the PC by using the KPG-36X/ KPG-46X programming cable and placing the transceiver in SD Card Direct Access Mode can make the PC recognize the microSD card that is inserted in the transceiver as a removal disk drive.

By using this function, data stored in the microSD card can be read by the PC.

Operating the transceiver

- **If KCH-19 is attached to Portable or an RF Deck:**

1	Connect the transceiver to the PC by using the KPG-36X/ KPG-46X programming cable.

The screen to confirm whether to enter SD Card Direct Access Mode appears.
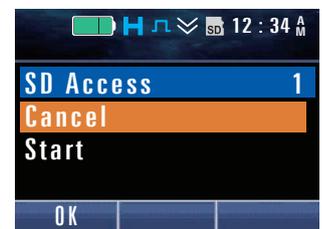
2	Press the [▲] or [▼] key to select "Start", and then press the Menu ([▣]) or [∗] key.

A Key Beep A (1 beep) sounds from the transceiver, and then the transceiver enters SD Card Direct Access Mode.

If a microSD card is inserted in the SD card slot, the " 🆂🅳 " icon appears.
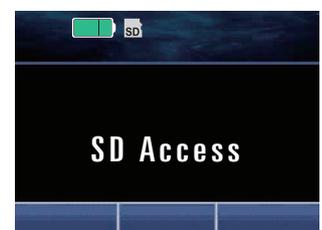
● **If KCH-19 is not attached to the RF Deck:**

1 **Connect the transceiver to the PC by using the KPG-46X programming cable.**

The screen to confirm whether to enter SD Card Direct Access Mode appears.

H			SD		12 : 34 A M
SD Access					1
Cannel					
Start					
OK					

2 **Press the [▲] or [▼] key to select "Start", and then press the Menu ([▯]) or [*] key.**

A Key Beep A (1 beep) sounds from the transceiver, and a caution message appears.

H		SD		12 : 34 A M
SD Access				
	Extended Access			
	Time Required.			
OK				
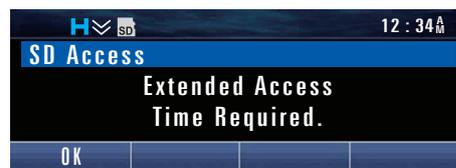
3 **Press the Menu ([▯]) or [*] key.**

A Key Beep A (1 beep) sounds from the transceiver, and then the transceiver enters SD Card Direct Access Mode.

If a microSD card is inserted in the SD card slot, the " SD " icon appears.

SD		12 : 34 A M
	SD Access	

● **If multiple SD card slots exist (Mobile only):**

1 **Connect the transceiver to the PC by using the KPG-46X programming cable.**

The screen to confirm whether to enter SD Card Direct Access Mode appears.

H			SD		12 : 34 A M
SD Access					1
Cannel					
Start					
OK					
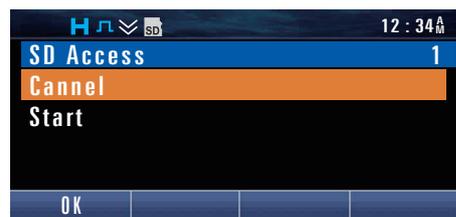
2 **Press the [▲] or [▼] key to select "Start", and then press the Menu ([⬚]) or [*] key.**

A Key Beep A (1 beep) sounds from the transceiver, and the SD card slots that can be selected appear.

📝 Note

In a Multi RF Deck/ Multi Control Head structure or in a Single RF Deck/ Single Control Head structure using KCH-20R, multiple SD card slots exist.

```
H ♫ ⌄ SD                    12:34 A M
SD Access                        1
Deck 1
Deck 2
Deck 3
Head 1
   OK
```
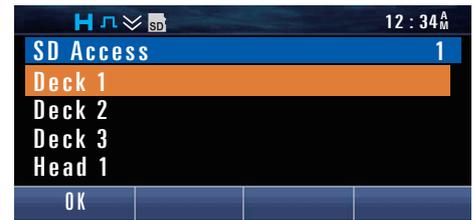
3 **Press the [▲] key or [▼] key to select an SD card slot, and then press the Menu ([⬚]) or [*] key.**

A Key Beep A (1 beep) sounds from the transceiver, and a caution message appears.

```
H ♫ ⌄ SD                    12:34 A M
SD Access
        Extended Access
        Time Required.

   OK
```
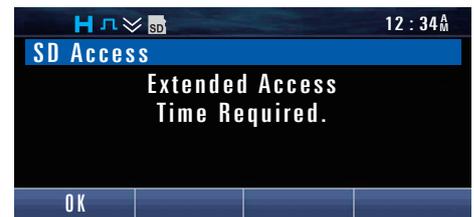
4 **Press the Menu ([⬚]) or [*] key.**

A Key Beep A (1 beep) sounds from the transceiver, and then the transceiver enters SD Card Direct Access Mode.

If a microSD card is inserted in the selected SD card slot, the " SD " icon appears.

```
 SD


        SD Access

```

📝 Note

- If the transceiver is turned OFF or the KPG-36X/ KPG-46X programming cable is removed, the transceiver exits SD Card Direct Access Mode. However, if the transceiver is turned OFF or the KPG-36X/ KPG-46X programming cable is removed while an audio file in the microSD card is being read by the PC, the data in the microSD card may be damaged. When exiting SD Card Direct Access Mode, execute the operation to remove the mass storage device on the Tray of Windows on the PC in advance.
- Do not format the microSD card on the PC. If the microSD card is formatted on the PC, each function of **Auto Recording**, **Voice Memo**, and **GPS Data Storage** may not function properly.

Configuration using KPG-D1/ D1N

Configuring **SD Card Direct Access** to be enabled or disabled (🔍See Transceiver Settings > Optional Features > Optional Features 1 > Mode)

Bluetooth can be used to wirelessly connect a Bluetooth-compatible device and the transceiver.

As the main method of use, wirelessly connecting by Bluetooth a Bluetooth-compatible headset and the transceiver can execute a voice call using the mic and speaker of the headset.

> 📝 Note
> • The transceiver complies with Bluetooth standard Version 3.0.
> • To wirelessly connect by Bluetooth a Bluetooth-compatible headset and the transceiver, the Bluetooth-compatible headset needs to support HSP (Headset Profile).

Configuration using KPG-D1/ D1N

Configuring **Built-in GPS Receiver/Bluetooth** to be enabled or disabled (🔍See Transceiver Settings > Optional Features > Optional Features 2 > GPS/Bluetooth)

10.1 Toggling Bluetooth On/ Off

To use various Bluetooth functions, **Built-in GPS Receiver/Bluetooth** needs to be enabled (On) by using KPG-D1/ D1N.

Also, Bluetooth can be toggled On and Off by operating the transceiver.

Pressing the **Bluetooth** key can toggle Bluetooth On and Off.

Or, pressing the **Menu** key causes the transceiver to enter Menu Mode, and then Bluetooth can be toggled On and Off by selecting "On" or "Off". (Refer to Using Menu Mode.)

Operating the transceiver

● **Enabling Bluetooth**

1 Press the Bluetooth key when Bluetooth is disabled.

A Key Beep A (1 beep) sounds from the transceiver and the "⁑" icon blinks.
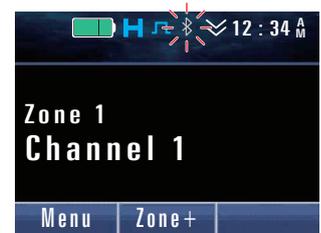
The "⁑" icon lights when Bluetooth is enabled.

● **Disabling Bluetooth**

1 **Press the Bluetooth key when Bluetooth is enabled.**

A Key Beep B (2 beeps) sounds from the transceiver and Bluetooth is disabled. The "🛇" icon disappears.

> Zone 1
> **Channel 1**
>
> Menu   Zone+

📋 Note

If **Bluetooth** in **GPS/Bluetooth Preset (Default)** is enabled, Bluetooth is enabled when the transceiver is turned ON. However, the Bluetooth enabled or disabled state is retained; therefore, the transceiver starts up in the same Bluetooth status as retained when the transceiver is turned ON next time.

Configuration using KPG-D1/ D1N

- Assigning functions to the **PF** keys on the transceiver (🔍 See Transceiver Settings > Key Assignment)

- Configuring **Bluetooth** to be enabled or disabled (🔍 See Transceiver Settings > Optional Features > Optional Features 2 > GPS/Bluetooth > GPS/Bluetooth Preset (Default))

10.2   Finding a Bluetooth-compatible Device (Bluetooth Find Device)

Bluetooth Find Device is the function to find a Bluetooth-compatible device.

For wirelessly connecting by Bluetooth a Bluetooth-compatible device and the transceiver, the Bluetooth-compatible device is found by using this function.

The transceiver can find a Bluetooth-compatible device by entering Bluetooth Find Device Mode.

Pressing the **Menu** key causes the transceiver to enter Menu Mode, and then the transceiver enters Bluetooth Find Device Mode by executing "Find Device" after executing "Bluetooth Device". (Refer to Using Menu Mode.)

Operating the transceiver

1 **Press the Menu key to enter Menu Mode and then execute "Bluetooth Device".**

Pressing the **[▲]** or **[▼]** key to select "Bluetooth Device" and then pressing the **Menu** ([▭]) or **[*]** key causes the transceiver to enter Bluetooth Device Mode. (Refer to Using Menu Mode.)

> BT Device   1
> My Devices
> Find Device
>
> Next   Back

2 Press the [▲] or [▼] key to select "Find Device", and then press the Menu ([🗐]) or [*] key.

A Key Beep A (1 beep) sounds from the transceiver, and then the transceiver enters Bluetooth Find Device Mode. The transceiver automatically initiates the search for a Bluetooth-compatible device. A Bluetooth Find Device Mode Tone (2 beeps) continuously sounds from the transceiver during the search.
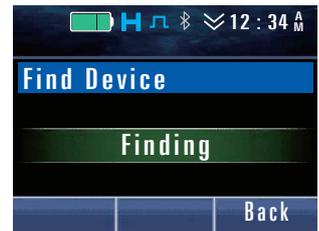
📨 Note

- If Bluetooth is disabled when "Bluetooth Device" is executed, Bluetooth is automatically enabled.
- The Bluetooth-compatible device first needs to be in pairing mode.

3 Find a Bluetooth-compatible Device.

A found Bluetooth-compatible device appears on the display.

With the Bluetooth-compatible device found earliest listed as list number 1, a maximum of 16 devices are displayed. When about 30 sec elapse after the search is started, or when 16 devices are found, the search ends. Even if the search ends, the transceiver continues in Bluetooth Find Device Mode.

📨 Note

- The Bluetooth Find Device Mode Tone stops and the search ends if about 30 sec elapse without the transceiver finding a Bluetooth-compatible device. In this case, "BT Not Found" appears on the display.
- When "BT Not Found" or a found Bluetooth-compatible device appears on the display, pressing the **Back** ([↩]) or **[#]** key stops the Bluetooth Find Device Mode Tone and ends the search. A Key Beep A (1 beep) sounds from the transceiver and the transceiver returns to Bluetooth Device Mode.
- A found Bluetooth-compatible device is registered in the transceiver and the transceiver can connect wirelessly. (Refer to Finding, Registering and Connecting a Bluetooth-compatible Device (Bluetooth Find Device).)
- A found Bluetooth-compatible device is displayed in the format of either the Bluetooth device name, Bluetooth device address, or device class. Pressing the [▲] or [▼] key can switch the display. (Refer to About the Displayed Contents of a Bluetooth-compatible Device.)
- If the Bluetooth device name of a found Bluetooth-compatible device cannot be acquired, the Bluetooth device name is displayed as "- - -".
- **Mode Reset Timer** is extended during a search. **Mode Reset Timer** is initiated when the search ends.
- If the transceiver receives an individual call while in Bluetooth Find Device Mode, Bluetooth Find Device Mode ends.
- If the Bluetooth-compatible device to be connected wirelessly is not found, move the Bluetooth-compatible device closer to the transceiver and search again.

About the Displayed Contents of a Bluetooth-compatible Device

A found Bluetooth-compatible device is displayed in the format of either the Bluetooth device name, Bluetooth device address, or device class. Pressing the [▲] key or [▼] key can switch the display.

Bluetooth device name:

The name of the Bluetooth-compatible device. The name of the Bluetooth-compatible device appears as a maximum 14-character ASCII code on the display of the transceiver. Therefore, if the name of a found Bluetooth-compatible device is 15 characters or more, the first 14 characters are displayed. If non-ASCII code characters are used, these characters are blank.

Bluetooth device address:

The unique address of the Bluetooth-compatible device. The Bluetooth device address appears as 12 hexadecimal digits on the display of the transceiver.

Device class:

The type of the Bluetooth-compatible device. The device class is displayed by the following icons: If the device cannot be classified even in the following table, the device class is "Other Device". The device class of the transceiver is "Phone".

Table 10-1 Device Class

Device Class	Icons	
	Disconnected	Connected
Computer		
Phone		
Audio/Video		
LAN/Network		
Peripheral		
Imaging		
Wearable		
Toy		
Health		

📋 Note

- The device class of the transceiver is "Phone".

- If the device class is "Other Device", the icon is " " or " ".

- The device class icon of a Bluetooth-compatible device registered using the **Bluetooth Connect / Disconnect** key is " " or " ".

Configuring the Bluetooth Device Name of the Transceiver (Bluetooth Device Name)

Bluetooth Device Name is the Bluetooth device name of the transceiver to be notified to a Bluetooth-compatible device.

A maximum of 14 characters of Bluetooth device name can be configured. By configuring the Bluetooth device name of the transceiver, the configured Bluetooth device name can be notified to the Bluetooth-compatible device. The Bluetooth-compatible device can display the notified Bluetooth device name.

The type of Bluetooth device name can be configured in **Name Type**.

Table 10-2 Name Type

Configuration	Description
Text	An arbitrary text string can be configured as a Bluetooth device name. If the text is left blank, the combination of Model Name and Market Code of the Kenwood ESN is configured as the Bluetooth device name.
Unit ID	Using "%" in the text string can configure the Unit ID of the system configured in **Preset System Number** as a Bluetooth device name. If the text is left blank, the combination of Model Name and Market Code of the Kenwood ESN is configured as the Bluetooth device name. 📋 Note • If the number of configured "%" is less than the number of digits for the Unit ID (Own), the Unit ID is displayed from the lowest digits. • If the number of configured "%" is more than the number of digits configured for the Unit ID (Own), the extra "%" is replaced with a space. This method is also applied if Unit ID is not configured.
Unit ID Name	The Unit ID Name (Own) string of the system configured in **Preset System Number** can be configured as a Bluetooth device name. If the Unit ID Name (Own) of the system configured in **Preset System Number** is not configured, a combination of Model Name and Market Code of the Kenwood ESN is configured as the Bluetooth device name.
ESN	Serial Number of Kenwood ESN can be configured as a Bluetooth device name.
FleetSync ID	Using "%" in a text string can configure the Fleet (Own) and ID (Own) of the system configured in **Preset System Number** as the Bluetooth device name. 📋 Note • If the number of configured "%" is less than 7, the IDs are displayed from the lowest digits. • If both Fleet (Own) and ID (Own) are not configured, "%" is replaced with a space.

📋 Note

While the transceiver is in Unprogramming Mode, the Bluetooth device name becomes the combination of Model Name and Market Code of the Kenwood ESN. If the combination of characters for Model Name and Market Code is 15 or more, the number of characters of Model Name are removed from the end to display the name within 14 characters. For example, if the configuration is such as the following, the Bluetooth device name becomes "1234567890ABCD".

Model Name: "123456789012"

Market Code: "ABCD"

Configuration using KPG-D1/ D1N

● Configuring **Bluetooth Device Name** (Control Head 2) (🔍See Transceiver Settings > Optional Features > Optional Features 2 > GPS/Bluetooth > Bluetooth > Control Head 2 > Bluetooth Device Name)

● Configuring **Bluetooth Device Name** (Portable) (🔍See Transceiver Settings > Optional Features > Optional Features 2 > GPS/Bluetooth > Bluetooth > Portable > Bluetooth Device Name)

● Configuring **Bluetooth Device Name** (RF Deck/Control Head 1) (🔍See Transceiver Settings > Optional Features > Optional Features 2 > GPS/Bluetooth > Bluetooth > RF Deck/Control Head 1 > Bluetooth Device Name)

Checking the Bluetooth Device Name (Bluetooth Information)

In **Bluetooth Information**, the own Bluetooth device name configured for the transceiver can be confirmed on the display.

Pressing the **Menu** key to enter Menu Mode and executing "Bluetooth Information" sounds a Key Beep A (1 beep) from the transceiver and places the transceiver in Bluetooth Information Mode. If **Bluetooth** is disabled, **Bluetooth** becomes enabled automatically.

In Bluetooth Information Mode, the Bluetooth device name, the Bluetooth device address, and the device class configured in the transceiver are displayed.

Pressing the [◀] key can change the display in the following order:

    Bluetooth device name → Bluetooth device address → device class → Bluetooth device name → ...

Pressing the [▶] key can change the display in the following order:

    Bluetooth device name → device class → Bluetooth device address → Bluetooth device name → ...

Responding to the Search of a Bluetooth-compatible Device (Bluetooth Discoverable)

Bluetooth Discoverable is the function to respond to the search of a Bluetooth-compatible device.

A Bluetooth-compatible device searches to understand a Bluetooth device name and a Bluetooth device address of the transceiver before requesting a pairing to the transceiver. Whether or not the transceiver responds to the search of a Bluetooth-compatible device can be configured using KPG-D1/ D1N beforehand.

If **Bluetooth Discoverable** is enabled, the transceiver responds to the search of a Bluetooth-compatible device.

If **Bluetooth Discoverable** is disabled, the transceiver responds to the search of a Bluetooth-compatible device temporarily in Menu Mode.

Pressing the **Menu** key to enter Menu Mode and executing "Bluetooth Discoverable" sounds a Key Beep A (1 beep) from the transceiver and places the transceiver in Bluetooth Discoverable Mode.

The available time to respond is displayed and counting down of the time is started while the transceiver is in Bluetooth Discoverable Mode.

After responding to the search of a Bluetooth-compatible device, the transceiver notifies the Bluetooth-compatible device of the Bluetooth device name and the Bluetooth device address.

When a Bluetooth-compatible device requests a pairing to the transceiver, the transceiver will be in the state of confirming whether or not to pair with the Bluetooth-compatible device. Refer to "Registering and Connecting a Bluetooth-compatible Device to the Transceiver (Pairing/ HSP Connection)" for the pairing operation.

📝 Note

- Bluetooth Discoverable Mode ends upon lapse of 60 sec after the transceiver enters the mode. Or, pressing the **Menu** (⌘), **Home**, or **[*]** key sounds a Key Beep A (1 beep) from the transceiver and ends the mode.
- If the transceiver enters Bluetooth Discoverable Mode when Bluetooth is disabled, Bluetooth becomes enabled automatically.
- **Mode Reset Timer** is extended while the transceiver is in Bluetooth Discoverable Mode.

Configuration using KPG-D1/ D1N

Configuring **Bluetooth Discoverable** to be enabled or disabled (🔍See Transceiver Settings > Optional Features > Optional Features 2 > GPS/Bluetooth > Bluetooth)

10.3	**Registering and Connecting a Bluetooth-compatible Device to the Transceiver (Pairing/ HSP Connection)**

Pairing is the function to register the device configuration of a Bluetooth-compatible device to the transceiver. For registering a device configuration, authentication is required, such as entering a PIN Code. If a Bluetooth-compatible device is registered in the transceiver, HSP Connection starts, and the transceiver and Bluetooth-compatible device are connected wirelessly. (Refer to About Headset Profile (HSP Connection/ HSP Disconnection).)

Once pairing succeeded, additional pairing is not required.

Pairing can be started for a Bluetooth-compatible device from the transceiver by one of the following methods:

● **Bluetooth Find Device Mode**

In Bluetooth Find Device Mode, the transceiver can select a Bluetooth-compatible device and start pairing. (Refer to Finding, Registering and Connecting a Bluetooth-compatible Device (Bluetooth Find Device).)

● **Bluetooth Connect / Disconnect key**

Pressing the Bluetooth Connect / Disconnect key causes the transceiver to behave as follows. (Refer to Registering and Connecting Using PF Keys (Define Bluetooth Device).)

Table 10-3 Bluetooth Connect / Disconnect

Connection Status	Define Bluetooth Device Registration Status	Operation
Disconnected	**Unregistered**	Pairing is started for a Bluetooth-compatible device having an address configured in **Define Bluetooth Device**.
Disconnected	**Already Registered**	By HSP Connection, connection starts for a Bluetooth-compatible device having an address configured in **Define Bluetooth Device**.
Connected	**Not Depend on the Registration Status**	The connection to the connected Bluetooth-compatible device is reset.

Also, the transceiver can start pairing by receiving a pairing request from a Bluetooth-compatible device. (Refer to Receive a pairing request from a Bluetooth-compatible device..)

📝 Note

- If pairing for a Bluetooth-compatible device is started from the transceiver, the transceiver checks whether the Bluetooth-compatible device supports the Headset Profile. If the Bluetooth-compatible device does not support the Headset Profile, pairing ends.
- A maximum of 10 Bluetooth-compatible devices can be registered in the transceiver. If pairing is executed while 10 devices are already registered, the registration of the Bluetooth-compatible device registered earliest is reset, and the new Bluetooth-compatible device is registered.
- Pairing continues even if a Voice Call or Data Call is received during pairing.
- **Mode Reset Timer** is extended during pairing.

About Authentication

The authentication of pairing differs as follows depending on whether the Bluetooth-compatible device supports Secure Simple Pairing:

● **If Secure Simple Pairing is not supported**

If authenticating a Bluetooth-compatible device found in Bluetooth Find Device Mode, the same PIN Code needs to be entered on both the transceiver and the Bluetooth-compatible device. A PIN Code is a number of 1 digit to 6 digits (from 0 to 999999).

If authenticating a Bluetooth-compatible device having an address configured in **Define Bluetooth Device** by pressing the **Bluetooth Connect / Disconnect** key, the Fixed PIN preconfigured by using KPG-D1/ D1N is used.

● **If Secure Simple Pairing is supported**

The behavior when authenticating differs as follows depending on whether an input function and display function are available for the Bluetooth-compatible device:

Table 10-4 Behavior when Secure Simple Pairing is Supported

Input Functions	Display Functions	Operation
Disabled	Disabled	Authenticating a Bluetooth-compatible device is not required.
Enabled	Disabled	Pairing cannot occur because the transceiver cannot authenticate this Bluetooth-compatible device. In this case, pairing ends.
Enabled	Enabled	Whether the Passkey displayed on the transceiver and the Passkey displayed on the Bluetooth-compatible device are the same needs to be confirmed. A Passkey is a 6-digit number.

Finding, Registering and Connecting a Bluetooth-compatible Device (Bluetooth Find Device)

In Bluetooth Find Device Mode, the transceiver searches for a Bluetooth-compatible device, and the transceiver can start pairing for the found Bluetooth-compatible device.

Operating the transceiver

1 **Search for a Bluetooth-compatible device in Bluetooth Find Device Mode.**

Refer to "Finding a Bluetooth-compatible Device (Bluetooth Find Device)" for operation methods.

2 **Press the [▲] or [▼] key to select the Bluetooth-compatible device, and then press the Menu ([▤]) or [*] key.**
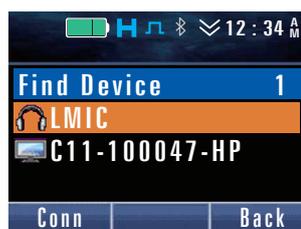
A Key Beep A (1 beep) sounds from the transceiver and pairing starts. An LED flashes blue during pairing.

```
■□ H ⊓ ∦ ⌄12:34 A
                   M
Find Device      1

      Connecting

```
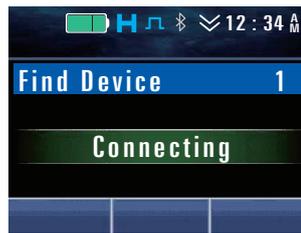
If the selected Bluetooth-compatible device is already registered in the transceiver, the connection process starts by HSP Connection without pairing occurring. Proceed to step 5.

If the selected Bluetooth-compatible device is not registered in the transceiver, the transceiver checks whether the Bluetooth-compatible device supports Secure Simple Pairing. The operation procedure differs as follows according to the check results. (Refer to About Authentication.)

● **If Secure Simple Pairing is not supported**

The following screen appears. Proceed to step 3.
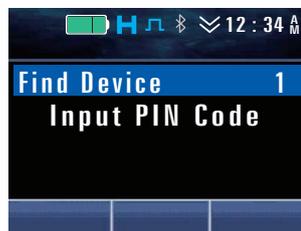
```
■□ H ⊓ ∦ ⌄12:34 A
                   M
Find Device      1
  Input PIN Code

```

● **If Secure Simple Pairing is supported**

The behavior differs as follows depending on whether an input function and display function are available for the Bluetooth-compatible device:

● **No input function/ no display function**

Pairing continues. The display does not change. Proceed to step 5.

● **Input function available/ no display function**

Pairing cannot occur because the transceiver cannot authenticate this Bluetooth-compatible device. In this case, pairing ends.

● **Input function available/ display function available**

The following screen appears. Proceed to step 4.

```
■□ H ⊓ ∦ ⌄12:34 A
                   M
Find Device      1
      Passkey
      123456

 OK
```

3   **Enter the PIN Code.**

Refer to "Entering or Deleting a Code" for entry methods.

Press the **Menu** ([⬚]) or **[*]** key.

A Key Beep A (1 beep) sounds from the transceiver and the transceiver checks whether the PIN Codes match.

Proceed to step 5.
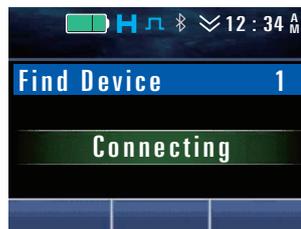
4   **Check whether the Passkey displayed on the transceiver and the Passkey displayed on the Bluetooth-compatible device are the same.**

If the Passkeys match:

Press the **Menu** ([⬚]) or **[*]** key.

A Key Beep A (1 beep) sounds from the transceiver and pairing continues. Proceed to step 5.
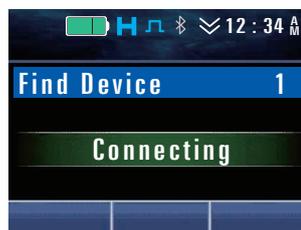
If the Passkeys do not match:

Pairing cannot occur with this Bluetooth-compatible device. Pressing the **Home** ([🏠]) key ends pairing.

📝 Note

If the Passkeys do not match, pairing ends even if the **Menu** ([⬚]) or **[*]** key is pressed.

5 **Complete pairing.**

When pairing completes, the Bluetooth-compatible device is registered in the transceiver, and the connection process starts by HSP Connection.

If a connected Bluetooth-compatible device exists, the connection process starts after the connection is reset.

A Ring Tone sounds from the Bluetooth-compatible device during the connection process. In this case, start-up operations need to be done on the Bluetooth-compatible device. Refer to the instruction manual supplied with the Bluetooth-compatible device for details on the start-up operations.

The mic and speaker of the Bluetooth-compatible device can be used when the connection process completes. In this case, a Bluetooth Connect Tone (2 beeps) sounds from the transceiver, the " " icon blinks, and "Connected" appears for 1 sec. Also, the LED turns Off.

> **Note**

- The connection process continues even if a Voice Call or Data Call is received during the connection process.
- **Mode Reset Timer** is extended during the connection process.

Registering and Connecting Using PF Keys (Define Bluetooth Device)

Pairing can be started for a Bluetooth-compatible device having an address configured in **Define Bluetooth Device**.

Operating the transceiver

1 **Press the Bluetooth Connect / Disconnect key when a connected Bluetooth-compatible device does not exist.**

A Key Beep A (1 beep) sounds from the transceiver and pairing starts. An LED flashes blue during pairing.

If the Bluetooth-compatible device having an address configured in **Define Bluetooth Device** is already registered in the transceiver, the connection process starts by HSP Connection without pairing occurring. Proceed to step 3.

If the Bluetooth-compatible device having an address configured in **Define Bluetooth Device** is not registered in the transceiver, the transceiver checks whether the Bluetooth-compatible device supports Secure Simple Pairing. The operation procedure differs as follows according to the check results. (Refer to About Authentication.)

● **If Secure Simple Pairing is not supported**

The transceiver checks whether the Fixed PIN matches. If the **Fixed PIN** matches, pairing continues. Proceed to step 3.

If the **Fixed PIN** does not match, pairing cannot occur because the transceiver cannot authenticate this Bluetooth-compatible device. In this case, pairing ends.

● **If Secure Simple Pairing is supported**

The behavior differs as follows depending on whether an input function and display function are available for the Bluetooth-compatible device having an address configured in **Define Bluetooth Device**:

● **No input function/ no display function**

Pairing continues. The display does not change. Proceed to step 3.

● **Input function available/ no display function**

Pairing cannot occur because the transceiver cannot authenticate this Bluetooth-compatible device. In this case, pairing ends.

● **Input function available/ display function available**

The following screen appears. Proceed to step 2.

📰 Note

- Pressing the **Bluetooth Connect / Disconnect** key while Bluetooth is turned Off causes Bluetooth to automatically turn On, and then pairing starts.
- If the Bluetooth device address of the transceiver is configured in **Define Bluetooth Device**, pressing the **Bluetooth Connect / Disconnect** key sounds a Key-entry Error Tone (1 beep) and the transceiver does not respond at all.

2 **Check whether the Passkey displayed on the transceiver and the Passkey displayed on the Bluetooth-compatible device are the same.**

If the Passkeys match:

Press the **Menu** ([⌷]) or **[*]** key.

A Key Beep A (1 beep) sounds from the transceiver and pairing continues. Proceed to step 3.

If the Passkeys do not match:

Pairing cannot occur with this Bluetooth-compatible device. Pressing the **Home** (**[⌂]**) key ends pairing.

📋 Note

If the Passkeys do not match, pairing ends even if the **Menu** (**[▤]**) or **[*]** key is pressed.

3 Complete pairing.

When pairing completes, the Bluetooth-compatible device is registered in the transceiver, and the connection process starts by HSP Connection.

A Ring Tone sounds from the Bluetooth-compatible device during the connection process. In this case, start-up operations need to be done on the Bluetooth-compatible device. Refer to the instruction manual supplied with the Bluetooth-compatible device for details on the start-up operations.

```
 ▭ H ⌐ ⁑ ⌄ 12 : 34 ᴬᴹ

Zone 1
Channel 1
      Connecting
 Menu  Zone+
```

The mic and speaker of the Bluetooth-compatible device can be used when the connection process completes. In this case, a Bluetooth Connect Tone (2 beeps) sounds from the transceiver, the "❋" icon blinks, and "Connected" appears for 1 sec. Also, the LED turns Off.

```
 ▭ H ⌐ ⁑ ⌄ 12 : 34 ᴬᴹ

Zone 1
Channel 1
      Connected
 Menu  Zone+
```

📋 Note

- The connection process continues even if a Voice Call or Data Call is received during the connection process.
- **Mode Reset Timer** is extended during the connection process.

Configuration using KPG-D1/ D1N

- Configuring **Define Bluetooth Device** (🔍See Transceiver Settings > Optional Features > Optional Features 2 > GPS/ Bluetooth > Bluetooth > Define Bluetooth Device)
- Configuring **Fixed PIN** (🔍See Transceiver Settings > Optional Features > Optional Features 2 > GPS/Bluetooth > Bluetooth > Define Bluetooth Device)

Receive a pairing request from a Bluetooth-compatible device.

When the transceiver receives a pairing request from a Bluetooth-compatible device, the Bluetooth device name or Bluetooth device address appears on the transceiver and whether to connect can be selected.

If a pairing request from a Bluetooth-compatible device is received, the connection can be made by using either Headset Profile or Serial Port Profile.

Operating the transceiver

● **If a pairing request from a Bluetooth-compatible device not supporting Secure Simple Pairing is received**

1 **Receive a pairing request from a Bluetooth-compatible device.**

If the Bluetooth-compatible device is already registered in the transceiver, the connection process starts by HSP Connection or SPP Connection without pairing occurring. Proceed to step 3.

If the Bluetooth-compatible device is not registered in the transceiver, the PIN Code entry screen appears and the LED flashes blue.

If permitting pairing, enter the PIN Code. Proceed to step 2.
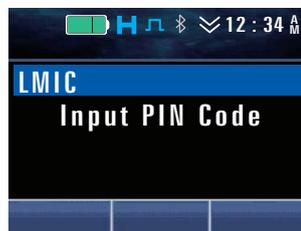
If rejecting pairing, press the **Home** (**[🏠]**) key to end pairing. Also, pairing ends if 30 sec elapse without confirming the entered PIN Code.

2 **Enter the PIN Code.**

Refer to "Entering or Deleting a Code" for entry methods.

Press the **Menu** (**[▣]**) or **[*]** key.

A Key Beep A (1 beep) sounds from the transceiver and the transceiver checks whether the PIN Codes match.

Proceed to step 5.

3 Complete pairing.

When pairing completes, the Bluetooth-compatible device is registered in the transceiver, and the connection process starts by HSP Connection or SPP Connection. However, if a connected Bluetooth-compatible device exists, the connection process by HSP Connection or SPP Connection does not start.

A Ring Tone sounds from the Bluetooth-compatible device during the connection process. In this case, start-up operations need to be done on the Bluetooth-compatible device. Refer to the instruction manual supplied with the Bluetooth-compatible device for details on the start-up operations.

```
■□ H ⏄ * ⌄ 12 : 34 A
                           M


Zone 1
Channel 1
           Connecting
Menu    Zone+
```

*If a Bluetooth-compatible device is registered in the transceiver, "Connecting" does not appear.

For the Headset Profile connection, the microphone and speaker of the Bluetooth-compatible device can be used when the connection process completes. For the Serial Port Profile connection, the communication to KPG-D1/ D1N and using the PC Interface Protocol become available. In this case, a Bluetooth Connect Tone (2 beeps) sounds from the transceiver, the " ⓑ " icon blinks, and "Connected" appears for 1 sec. Also, the LED turns Off.

```
■□ H ⏄ * ⌄ 12 : 34 A
                           M


Zone 1
Channel 1
           Connected
Menu    Zone+
```

● **If a pairing request from a Bluetooth-compatible device supporting Secure Simple Pairing and having an input function and display function is received**

1 Receive a pairing request from a Bluetooth-compatible device.

If the Bluetooth-compatible device is already registered in the transceiver, the connection process starts by HSP Connection or SPP Connection without pairing occurring. Proceed to step 3.

If the Bluetooth-compatible device is not registered in the transceiver, the Passkey confirmation screen appears and the LED flashes blue.

If permitting pairing, whether the Passkey displayed on the transceiver and the Passkey displayed on the Bluetooth-compatible device are the same needs to be confirmed. Proceed to step 2.
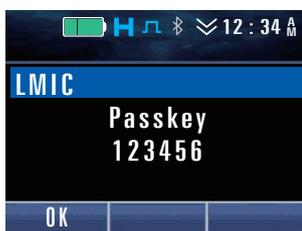
```
■□ H ⏄ * ⌄ 12 : 34 A
                           M
LMIC
        Passkey
        123456

OK
```

If rejecting pairing, press the **Home** (**[🏠]**) key to end pairing. Also, pairing ends if 30 sec elapse with the Passkey displayed.

2 **Check whether the Passkey displayed on the transceiver and the Passkey displayed on the Bluetooth-compatible device are the same.**

If the Passkeys match:

> Press the **Menu** ([⟐]) or **[*]** key.
>
> A Key Beep A (1 beep) sounds from the transceiver and pairing continues. Proceed to step 3.

If the Passkeys do not match:

> Pairing cannot occur with this Bluetooth-compatible device. Pressing the **Home** ([🏠]) key ends pairing.

📝 Note

> If the Passkeys do not match, pairing ends even if the **Menu** ([⟐]) or **[*]** key is pressed.

3 **Complete pairing.**

When pairing completes, the Bluetooth-compatible device is registered in the transceiver, and the connection process starts by HSP Connection or SPP Connection. However, if a connected Bluetooth-compatible device exists, the connection process by HSP Connection or SPP Connection does not start.

A Ring Tone sounds from the Bluetooth-compatible device during the connection process. In this case, start-up operations need to be done on the Bluetooth-compatible device. Refer to the instruction manual supplied with the Bluetooth-compatible device for details on the start-up operations.

*If a Bluetooth-compatible device is registered in the transceiver, "Connecting" does not appear.

For the Headset Profile connection, the microphone and speaker of the Bluetooth-compatible device can be used when the connection process completes. For the Serial Port Profile connection, the communication to KPG-D1/ D1N and using the PC Interface Protocol become available. In this case, a Bluetooth Connect Tone (2 beeps) sounds from the transceiver, the " 🔵 " icon blinks, and "Connected" appears for 1 sec. Also, the LED turns Off.

📝 Note

- The connection process continues even if a Voice Call or Data Call is received during the connection process.
- **Mode Reset Timer** is extended during the connection process.
- If a pairing request is received from a Bluetooth-compatible device when **Key Lock** is enabled, **Key Lock** is temporarily disabled with the "🔑" icon displayed. **Key Lock** is restored to the enabled state by one of the following operations:
  - Confirming the PIN Code
  - Completing Passkey confirmation
  - Aborting the current mode

Behavior of the Transceiver When Pairing Cannot Occur

If pairing cannot occur, the transceiver behaves as follows:

Table 10-5 Behavior of the Transceiver When Pairing Cannot Occur

Status	Transceiver Behavior
When nothing can be received from the Bluetooth-compatible device	Pairing ends in one of the following conditions. In this case, a Bluetooth No Response Tone (1 beep) sounds from the transceiver, the LED turns Off, and "No Response" appears on the display for 1 sec. • The transceiver starts pairing for the Bluetooth-compatible device, and the Bluetooth-compatible device does not respond even if about 10 sec elapse. • The transceiver moves outside the Bluetooth operation range while pairing.
When the Bluetooth-compatible device rejects pairing	If the transceiver starts pairing for the Bluetooth-compatible device and pairing is rejected, pairing ends. In this case, a Bluetooth Connect Denied Tone (2 beeps) sounds from the transceiver, the blue LED turns Off, and "Connect Denied" appears on the display for 1 sec.
When the Bluetooth-compatible device does not support Headset Profile	If pairing for a Bluetooth-compatible device is started from the transceiver, the transceiver checks whether the Bluetooth-compatible device supports the Headset Profile. If the Bluetooth-compatible device does not support the Headset Profile, pairing ends. In this case, a Bluetooth No Service Tone (3 beeps) sounds from the transceiver, the LED turns Off, and "BT No Service" appears on the display for 1 sec.
When the PIN Code is incorrect	If the PIN Code entered on the transceiver differs, or if the Fixed PIN and the PIN Code entered on the Bluetooth-compatible device differ, pairing ends. In this case, a Bluetooth Connect Invalid Tone (3 beeps) sounds from the transceiver, the LED turns Off, and "BT PIN Invalid" appears on the display for 1 sec.
When nothing operates	Pairing ends in one of the following conditions when the transceiver starts pairing for the Bluetooth-compatible device. In this case, a Bluetooth Connect Denied Tone (2 beeps) sounds from the transceiver, the LED turns Off, and "Connect Denied" appears on the display for 1 sec. • 30 sec elapse without pressing the **Menu** ([🔲]) or **[*]** key after "Passkey" appears on the display. • 30 sec elapse without confirming the PIN Code after the PIN Code entry screen appears. • 30 sec elapse without the Bluetooth-compatible device completing confirmation of the Passkey. • 30 sec elapse without the Bluetooth-compatible device confirming of the PIN Code.
If Passkey Entry	If pairing occurs with a Bluetooth-compatible device which supports Secure Simple Pairing, which does not have a display function, and which has an input function, pairing ends. In this case, a Bluetooth No Service Tone (3 beeps) sounds from the transceiver, the LED turns Off, and "BT No Service" appears on the display for 1 sec.

10.4 Displaying a Bluetooth-compatible Device (Bluetooth My Devices)

Bluetooth My Devices is the function to display a Bluetooth-compatible device registered in the transceiver.

If the transceiver enters Bluetooth My Devices Mode, a Bluetooth-compatible device registered in the transceiver appears on the display.

The following operations are enabled in Bluetooth My Devices Mode:

- The connection to the selected Bluetooth-compatible device can be made by using Headset Profile.
- The connection to the connected Bluetooth-compatible device by Headset Profile is reset.
- The registration of a Bluetooth-compatible device can be reset if the connection has not been made by using Headset Profile or Serial Port Profile.

Pressing the **Menu** key causes the transceiver to enter Menu Mode, and then the transceiver enters Bluetooth My Devices Mode by executing "Bluetooth My Devices" after executing "Bluetooth Device". (Refer to Using Menu Mode.)

Operating the transceiver

● **Placing the transceiver in Bluetooth My Devices Mode**

1 **Press the Menu key to enter Menu Mode and then execute "Bluetooth Device".**

Pressing the **[▲]** or **[▼]** key to select "Bluetooth Device" and then pressing the **Menu** ([⟳]) or **[*]** key causes the transceiver to enter Bluetooth Device Mode. (Refer to Using Menu Mode.)

2 **Press the [▲] or [▼] key to select "My Devices", and then press the Menu ([⟳]) or [*] key.**

A Key Beep A (1 beep) sounds from the transceiver, and then the transceiver enters Bluetooth My Devices Mode.
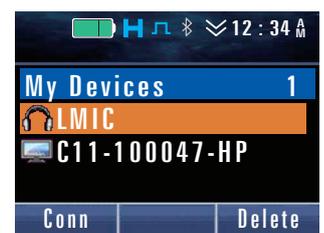
If a Bluetooth-compatible device registered in the transceiver does not exist, a Key-entry Error Tone (1 beep) sounds from the transceiver and "BT No Device" appears on the display.
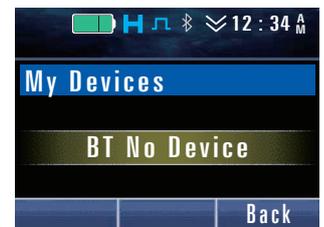
📝 Note

- A Bluetooth-compatible device registered in the transceiver is displayed in the format of either the Bluetooth device name, Bluetooth device address, or device class. Pressing the [◀] or [▶] key can switch the display. (Refer to About the Displayed Contents of a Bluetooth-compatible Device.)

- If the Bluetooth device name of a Bluetooth-compatible device registered in the transceiver cannot be acquired, the Bluetooth device name is displayed as "- - -".

- If the transceiver receives an individual call while in Bluetooth My Devices Mode, Bluetooth My Devices Mode ends.

● **Connecting to a Bluetooth-compatible device, or resetting the connection**

1 **In Bluetooth My Devices Mode, press [▲] or [▼] key to select a Bluetooth-compatible device.**
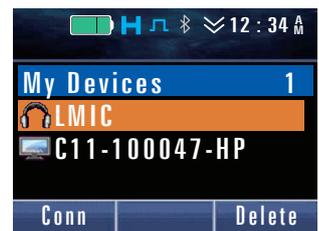
2 **Press the Menu ([🗔]) or [*] key.**

If a disconnected Bluetooth-compatible device is selected:
A Key Beep A (1 beep) sounds from the transceiver, and then the screen to confirm whether to connect appears.

If a connected Bluetooth-compatible device is selected:
A Key Beep A (1 beep) sounds from the transceiver, and then the screen to confirm whether to reset the connection appears.

3 **Press the Menu ([🗔]) or [*] key.**

If a disconnected Bluetooth-compatible device is selected:
The connection process by HSP Connection starts. The LED flashes blue and "Connecting" appears on the display.
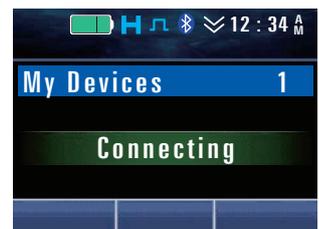
If a connected Bluetooth-compatible device is selected:

The connection to the Bluetooth-compatible device is reset. In this case, a Bluetooth Disconnect Tone (2 beeps) sounds from the transceiver, the "🅑" icon blinks, and "Disconnected" appears on the display for 1 sec.

● **Deregistration of 1 Bluetooth-compatible device**

1 **In Bluetooth My Devices Mode, press [▲] or [▼] key to select a disconnected Bluetooth-compatible device.**

2 **Press the Back ([⤺]) or [#] key.**

A Key Beep A (1 beep) sounds from the transceiver, and then the screen to confirm whether to deregister a Bluetooth-compatible device appears.
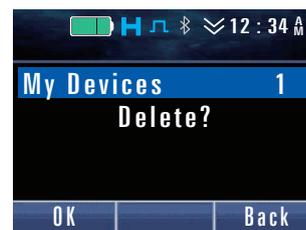
3 **Press the Menu ([⬚]) or [*] key.**

A Key Beep B (2 beeps) sounds from the transceiver and the selected Bluetooth-compatible device is deregistered, and then the list display is restored.

● **Deregistering all Bluetooth-compatible devices**

1 **In Bluetooth My Devices Mode, press and hold the Back ([↩]) or [#] key.**

A Key Beep A (1 beep) sounds from the transceiver, and then the screen to confirm whether to deregister a Bluetooth-compatible device appears.

My Devices   2
          Delete?

O K   Back

Pressing and holding the key causes the screen to confirm whether to deregister all Bluetooth-compatible devices to appear.

📑 Note

If all Bluetooth-compatible devices cannot be deregistered, the list display is restored.

My Devices   All
        All Delete?

O K   Back

2 **Press the Menu ([▯]) or [*] key.**

A Key Beep B (2 beeps) sounds from the transceiver and all Bluetooth-compatible devices are deregistered, and then "BT No Device" appears on the display.

My Devices

    BT No Device

                    Back
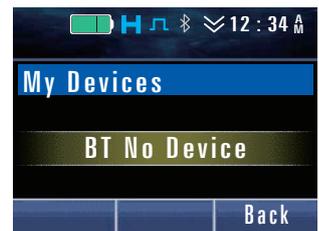
10.5 About Headset Profile (HSP Connection/ HSP Disconnection)

HSP Connection is the function to connect a registered Bluetooth-compatible device to the transceiver by Headset Profile. If connected by Headset Profile, a voice call can be made using the mic and speaker of the Bluetooth-compatible device. For connecting by Headset Profile, a Bluetooth-compatible device needs to support Headset Profile.

Also, **HSP Disconnection** is the function to reset a connection by Headset Profile.

Connecting by Headset Profile

A Bluetooth-compatible device that supports Headset Profile can be selected and the connection process can be initiated by one of the following methods:

● **Bluetooth Find Device Mode**

Entering Bluetooth Find Device Mode, the transceiver selects a Bluetooth-compatible device and starts pairing. If pairing is successful, the connection process is automatically initiated.

In this case, if a connected Bluetooth-compatible device exists, connection to the found Bluetooth-compatible device is initiated after connection to the connected Bluetooth-compatible device is automatically reset. (Refer to Finding, Registering and Connecting a Bluetooth-compatible Device (Bluetooth Find Device).)

● **Bluetooth My Devices Mode**

Entering Bluetooth My Devices Mode, the transceiver selects a Bluetooth-compatible device registered in the transceiver and initiates the connection process. In this case, if a connected Bluetooth-compatible device exists, connection to the selected Bluetooth-compatible device is initiated after connection to the connected Bluetooth-compatible device is automatically reset. (Refer to Displaying a Bluetooth-compatible Device (Bluetooth My Devices).)

● **Bluetooth Connect / Disconnect key**

When **Define Bluetooth Device** is registered in the transceiver with no connected Bluetooth-compatible devices, pressing the **Bluetooth Connect / Disconnect** key starts connection to **Define Bluetooth Device**.

(Refer to Registering and Connecting Using PF Keys (Define Bluetooth Device).)

The following is the behavior of the transceiver when the connection process of the transceiver and Bluetooth-compatible device completes:

● If the **PTT** switch of the transceiver (including the microphone of Mobile) is pressed, or if the External PTT (Voice) port (Mobile only) is configured low level, the Mic Line of the Bluetooth-compatible device is enabled.

● The configuration in **External Microphone Sense** applies to the microphone sensitivity of the Bluetooth-compatible device.

● The speaker to emit audio is switched according to the configuration in **Bluetooth Speaker**. (Refer to Switching the Speaker to Emit Audio (Bluetooth Speaker).)

● The volume level of the received audio of a Bluetooth-compatible device is operated as follows:

For Portable, or Mobile for which "RF Deck" is configured in Bluetooth Interface Selection:

Based on the volume level 31 of the transceiver, the volume level of the received audio of a Bluetooth-compatible device is adjusted by the volume operation of the Bluetooth-compatible device. Even if the volume level is operated by the transceiver, the volume level of the received audio of the Bluetooth-compatible device does not change.

For Mobile for which "Control Head" is configured in Bluetooth Interface Selection (Featured Panel only):

The volume level of the received audio of a Bluetooth-compatible device can be adjusted by the volume operation of the Bluetooth-compatible device based on the volume level from 0 to 31 of the transceiver. If the volume level is operated by the transceiver, the volume level of the received audio of the Bluetooth-compatible device also changes.

● The configuration in **Tone Volume** applies to the volume level of a tone emitted from a Bluetooth-compatible device as follows. (Refer to Configuring the Volume Level of Various Tones (Tone Volume).)

Table 10-6 Tone Volume

Tone Volume	Description
Current	The tone volume is linked to the reception volume level adjusted in a Bluetooth-compatible device.
1 to 31	The tone sounds from a Bluetooth-compatible device with a fixed tone volume. Higher values result in greater volume.
Off	The tone does not sound from a Bluetooth-compatible device.
Selectable	The tone volume varies in conjunction with the **Fixed Volume** key. (Refer to Changing the Tone Volume Level with a Single Touch (Selectable Tone Level).)

● The sound quality function behaves as follows. (Refer to Configuring Audio Profile (Audio Profile).)

Table 10-7 Sound Quality Function

Type	Function		Configuration
RX Audio Response	Auto Gain Control		Yes
	Audio Equalizer (High)		Yes
	Audio Equalizer (High Midrange)		Yes
	Audio Equalizer (Midrange)		Yes
	Audio Equalizer (Low Midrange)		Yes
	Audio Equalizer (Low)		Yes
	Speaker Type		Yes[*1]
TX Audio Response	Auto Gain Control		Yes
	Audio Equalizer (High)		Yes
	Audio Equalizer (High Midrange)		Yes
	Audio Equalizer (Midrange)		Yes
	Audio Equalizer (Low Midrange)		Yes
	Audio Equalizer (Low)		Yes
	Microphone Type		Yes[*1]
Active Noise Reduction	ANR Preset Mode		Yes
		Vocoder	Yes
		DSP	Yes
		Noise Attenuation Level	Yes
		Low Noise Level Adjustment	Yes
		Optimization based on Microphone Position	No[*2]
		Siren	Yes
		Vibration (Alert Device)	Yes
		Battery Save for Noise Reduction	Yes[*3]

[*1] Behaves as the configuration of "None".

[*2] Behaves as the configuration of "Off".

[*3] For Portable, behaves as the configuration of "On", and for Mobile, behaves as the configuration of "Off".

Yes: Indicates that the configuration is enabled when connected to a Bluetooth-compatible device and that the sound quality function behaves as configured.

No: Indicates that the configuration is disabled when connected to a Bluetooth-compatible device.

When a Pairing Cannot Occur with the Bluetooth-compatible Device or the Bluetooth-compatible Device Does Not Behave (Bluetooth Headset Connection Type)

An appropriate Headset Profile connection sequence exists for each of the Bluetooth-compatible devices (headsets) to be connected with the transceiver by using Headset Profile. For the transceiver, an appropriate Headset Profile connection sequence needs to be configured in **Bluetooth Headset Connection Type** according to the Bluetooth-compatible device to be used.

By using KPG-D1/ D1N, **Bluetooth Headset Connection Type** can be configured.

The following Bluetooth-compatible devices are guaranteed to behave properly.

Table 10-8 Bluetooth Headset Connection Type

Configuration	Description

Headset 1	The following Bluetooth-compatible devices can be used normally:
	Manufactured by Plantronics:
	    Voyager Legend
	Manufactured by Pryme:
	    BTH-LMIC
	    BTH-300
	    BTH-600
	Manufactured by 3M:
	    Peltor WS Headset XP
	    Peltor WS ProTac XP
	Manufactured by Sensear:
	    SM1x Smart Muff-HB
	    SPx Smart Plug
	Manufactured by Savox:
	    BTR-155 Radio (K551061)

Headset 2	The following Bluetooth-compatible devices can be used normally:
	Manufactured by Plantronics:
	    Voyager Legend
	Manufactured by Pryme:
	    BT-LMIC
	    BTH-LMIC
	Manufactured by 3M:
	    Peltor WS Headset XP
	    Peltor WS ProTac XP
	Manufactured by Sensear:
	    SM1x Smart Muff-HB
	    SPx Smart Plug

Also, the Headset Profile connection sequence can be changed by selecting "Headset 1" or "Headset 2" after placing the transceiver in Menu Mode by pressing the **Menu** key and executing "Bluetooth Headset Connection Type".

(Refer to Using Menu Mode.)

📝 Note

Bluetooth-compatible devices with different connection sequences may not be connected even if either "Headset 1" or "Headset 2" is configured in **Bluetooth Headset Connection Type**.

Configuration using KPG-D1/ D1N

- Configuring **Bluetooth Headset Connection Type** (Control Head 2) (🔍 See Transceiver Settings > Optional Features > Optional Features 2 > GPS/Bluetooth > Bluetooth > Control Head 2)
- Configuring **Bluetooth Headset Connection Type** (Portable) (🔍 See Transceiver Settings > Optional Features > Optional Features 2 > GPS/Bluetooth > Bluetooth > Portable)
- Configuring **Bluetooth Headset Connection Type** (RF Deck/Control Head 1) (🔍 See Transceiver Settings > Optional Features > Optional Features 2 > GPS/Bluetooth > Bluetooth > RF Deck/Control Head 1)

Resetting the Connection by Headset Profile

Connection by Headset Profile can be reset by one of the following methods:

- Pressing the **Bluetooth Connect / Disconnect** key when a connected Bluetooth-compatible device exists
- Placing the transceiver in Bluetooth My Devices Mode, selecting a connected Bluetooth-compatible device, and pressing the **Menu** ([🔲]) or **[*]** key (Refer to Displaying a Bluetooth-compatible Device (Bluetooth My Devices).)
- Disabling Bluetooth
- Moving outside the Bluetooth operation range
- Receiving a disconnection request from a connected Bluetooth-compatible device

If connection by Headset Profile is reset by any of these methods, a Bluetooth Disconnect Tone (2 beeps) sounds from the transceiver, the "⁂" icon blinks, and "Disconnected" appears on the display for 1 sec.

Also, connection by Headset Profile can be reset even by the following methods:

- Turning the transceiver OFF
- Disabling Bluetooth (Refer to Toggling Bluetooth On/ Off.)

Behavior of the Transceiver When Connecting to a Bluetooth-compatible Device Fails (Headset Profile)

If connection to a Bluetooth-compatible device fails by Headset Profile, the transceiver behaves as follows:

Table 10-9 Behavior of the Transceiver When Connecting to a Bluetooth-compatible Device Fails

Status	Transceiver Behavior
When the Bluetooth-compatible device does not support Headset Profile	If connection to a Bluetooth-compatible device is started using Bluetooth My Devices Mode or the **Bluetooth Connect / Disconnect** key, the transceiver checks whether the Bluetooth-compatible device supports Headset Profile. If the Bluetooth-compatible device does not support Headset Profile, the connection process ends. In this case, a Bluetooth No Service Tone (3 beeps) sounds from the transceiver, the LED turns Off, and "BT No Service" appears on the display for 1 sec.
When nothing can be received from the Bluetooth-compatible device	The connection process ends in one of the following conditions. In this case, a Bluetooth No Response Tone (1 beep) sounds from the transceiver, the LED turns Off, and "No Response" appears on the display for 1 sec. • The transceiver starts connection to the Bluetooth-compatible device, and the Bluetooth-compatible device does not respond even if about 10 sec elapse. • The transceiver moves outside the Bluetooth operation range during the connection process.
When the Bluetooth-compatible device rejects the connection request.	The connection process ends in one of the following conditions. In this case, a Bluetooth Connect Denied Tone (2 beeps) sounds from the transceiver, the LED turns Off, and "Connect Denied" appears on the display for 1 sec. • The connection request is rejected by the Bluetooth-compatible device. • 120 sec elapse without the Bluetooth-compatible device operating to start connection after a Ring Tone sounds from the Bluetooth-compatible device.

<table>
<tr><td>10.6</td><td>About Serial Port Profile (SPP Connection/ SPP Disconnection)</td></tr>
</table>

SPP Connection is the function to connect a registered Bluetooth-compatible device with the transceiver by Serial Port Profile.

Connecting by Serial Port Profile enables the communication to KPG-D1/ D1N without using a programming cable and the use of the PC Interface Protocol. Serial Port Profile is the effective function to be used in a small-scale system. Also, **SPP Disconnection** is the function to reset a connection by Serial Port Profile.

📋 Note

- When the transceiver is configured as a Bluetooth-compatible device on the PC in which KPG-D1/ D1N is used, the Serial Port Profile function (Bluetooth SPP) of KPG-D1/ D1N cannot be used. Use the Serial Port Profile function after removing the corresponding transceiver from the configuration of Bluetooth-compatible device on the PC.
- To use Serial Port Profile in KPG-D1/ D1N, a Bluetooth-compatible device using Windows standard drivers is required. Other than the above, Windows standard drivers are not required.

Connecting by Serial Port Profile

After the pairing completes, the connection process by Serial Port Profile starts when the transceiver receives a connection request from a Bluetooth-compatible device. (Refer to Receive a pairing request from a Bluetooth-compatible device..)

After the connection process between the transceiver and the Bluetooth-compatible Device completes, the communication to KPG-D1/ D1N and the use of the PC Interface Protocol are available.

The transceiver migrates to each mode when the communication to KPG-D1/ D1N starts. If the PC Interface Protocol is used, the behavior of each PC command is executed.

📋 Note

- Whether or not to use Serial Port Profile can be configured using KPG-D1/ D1N.
- The connection by Serial Port Profile cannot be requested from the transceiver to the Bluetooth-compatible device.
- If the Bluetooth-compatible device connected by Serial Port Profile exists, the transceiver does not respond even if the transceiver receives a connection request by Serial Port Profile.
- Serial Port Profile functions also in Unprogramming Mode. The following are behaviors of Bluetooth in Unprogramming Mode:

- For Mobile, the configuration of **Bluetooth Interface Selection** is retained when the transceiver migrates to FPU Programming Mode by using SPP Connection. Therefore, when the writing of configuration data fails and the transceiver starts up in Unprogramming Mode, Bluetooth of an RF Deck (mobile transceiver), KCH-20R (Featured Panel), or KCH-21R (Handheld Control Head) is enabled according to the stored configuration of Bluetooth Interface Selection. When Bluetooth is enabled, **COM port 2** cannot be used. The stored configuration of **Bluetooth Interface Selection** is initialized when the transceiver starts in user mode.
- For Portable, if the writing of FPU data by using SPP Connection fails, the transceiver enters Unprogramming Mode when the transceiver is turned ON next time. At this time, Bluetooth of an RF Deck or Featured Panel is enabled. If Bluetooth is enabled, **COM port 2** cannot be used.
- If a connection request by Headset Profile is received, the connection is established once; however, the connection is immediately disconnected. The transceiver also rejects a pairing request automatically even if the request is received.
- **Bluetooth Device Name** becomes the combination of Model Name and Market Code of the Kenwood ESN.

Configuration using KPG-D1/ D1N

- Configuring **Bluetooth Serial Port Profile** to be enabled or disabled (🔍See Model > Product Information > Feature Selection)
- Configuring **Bluetooth SPP** (🔍See Setup > COM port)

Resetting the Connection by Serial Port Profile

Connection by Serial Port Profile can be reset by one of the following methods:
- Finishing the communication with KPG-D1/ D1N (A disconnection request is sent to the connected Bluetooth-compatible device.)
- Disabling **Bluetooth** (Refer to Toggling Bluetooth On/ Off.)
- Moving outside the Bluetooth operation range
- Receiving a disconnection request from a connected Bluetooth-compatible device

📝 Note

When the transceiver is turned OFF during the connection, a disconnection request is not sent from the transceiver to the Bluetooth-compatible device. Therefore, the Bluetooth-compatible device behaves the same as when the transceiver moves out of range of Bluetooth.

Behavior of the Transceiver When Connecting to a Bluetooth-compatible Device Fails (Serial Port Profile)

The connection process ends in one of the following conditions.
- The transceiver starts connection to the Bluetooth-compatible device, and the Bluetooth-compatible device does not respond even if about 10 sec elapse.
- The transceiver moves outside the Bluetooth operation range during the connection process.

In this case, if "Connecting" appears on the display, a Bluetooth No Response Tone (1 beep) sounds from the transceiver, the LED turns Off, and "No Response" appears on the display for 1 sec. If "Connecting" does not appear on the display, the display does not change, and no tone sounds.

10.7 Switching the Speaker to Emit Audio (Bluetooth Speaker)

Bluetooth Speaker is the function to switch the speaker to emit audio between the speaker of the Bluetooth-compatible device connected to the transceiver by Headset Profile and the internal speaker of the transceiver.

Pressing the **Bluetooth Speaker** key can switch among Off, Only, Both (Bluetooth+Radio) (Mobile only) of **Bluetooth Speaker**.

Or, pressing the **Menu** key to enter Menu Mode, and selecting "Off", "Only" or "Both (Bluetooth+Radio)" (Mobile only) after executing "Bluetooth Speaker" can switch the speaker to emit audio.

(Refer to Using Menu Mode.)

Table 10-10 Bluetooth Speaker

Configuration	Description
Off	Audio is emitted from the internal speaker of the transceiver.
Only	Audio is emitted from the speaker of a Bluetooth-compatible device.
Both (Bluetooth+Radio) (Mobile only)	Audio is emitted from both the speaker of a Bluetooth-compatible device and the internal speaker of the transceiver.

📋 Note

- **Bluetooth Speaker** behaves as the configuration "Only" by default. If "Bluetooth Speaker" is not assigned to a **PF** key, and if "Bluetooth Speaker" is not configured in Menu Mode, the configuration of **Bluetooth Speaker** cannot be changed.
- The configuration status of **Bluetooth Speaker** is retained even if the transceiver is turned OFF.
- When a Bluetooth-compatible device connected by Headset Profile does not exist, pressing the **Bluetooth Speaker** key sounds a Key-entry Error Tone (1 beep) from the transceiver and the transceiver does not respond at all.
- The relationship between the **External Speaker** function and **Bluetooth Speaker** is as follows:

Table 10-11 Relationship Between the External Speaker Function and Bluetooth Speaker

Connection Status		Configuration Status		Audio Output Pattern		
External Speaker	Bluetooth-compatible Device	External Speaker	Bluetooth Speaker	Internal Speaker	External Speaker	Bluetooth-compatible Device
Disconnected	Disconnected	-	-	Output	-	-
Connected	Disconnected	Off	-	Output	No output	-
		On	-	No output	Output	-
		Internal + External (Mobile only)	-	Output	Output	-
Disconnected	Connected	-	Off	Output	-	No output
		-	Only	No output	-	Output
		-	Both (Bluetooth+Radio) (Mobile only)	Output	-	Output
Connected	Connected	Off	Off	Output	No output	No output
		On	Off	No output	Output	No output
		Internal + External (Mobile only)	Off	Output	Output	No output
		On	Only	No output	No output	Output
		Off	Only	No output	No output	Output

Connection Status		Configuration Status		Audio Output Pattern		
External Speaker	Bluetooth-compatible Device	External Speaker	Bluetooth Speaker	Internal Speaker	External Speaker	Bluetooth-compatible Device
Connected	Connected	Internal + External (Mobile only)	Only	No output	No output	Output
		Off	Both (Bluetooth+Radio) (Mobile only)	Output	No output	Output
		On	Both (Bluetooth+Radio) (Mobile only)	No output	Output	Output
		Internal + External (Mobile only)	Both (Bluetooth+Radio) (Mobile only)	Output	Output	Output

Configuration using KPG-D1/ D1N

Assigning functions to the **PF** keys on the transceiver (🔍See Transceiver Settings > Key Assignment)

Determining the Speaker to Emit by Linking with the Microphone Hook (Off-hook Speaker Revert)

Supported Models: Mobile

Off-hook Speaker Revert is the function to determine whether to use the speaker of the transceiver or the speaker of the Bluetooth-compatible device connected by Headset Profile, by linking with a microphone on- or off-hook state.

If **Off-hook Speaker Revert** is enabled, the speaker to emit is determined by the configuration of **Bluetooth Speaker** regardless of the microphone on-hook or off-hook state.

If **Off-hook Speaker Revert** is disabled, the speaker to emit is determined as follows by the microphone hook state and the configuration of Bluetooth Speaker.

Table 10-12 Off-hook Speaker Revert

Bluetooth Speaker	The Microphone Hook Status	Speaker to Emit Audio	When the Microphone Hook Status is changed	
			The Microphone Hook Status	Speaker to Emit Audio
Off [*1]	Off	Transceiver	Off → On	Transceiver
Only [*1]		Transceiver		Bluetooth-compatible Device
Both (Bluetooth + Radio) [*1]		Transceiver + Bluetooth-compatible device		Transceiver + Bluetooth-compatible device
Off	On	Transceiver	On → Off	Transceiver
Only		Bluetooth-compatible device		Transceiver
Both (Bluetooth + Radio)		Transceiver + Bluetooth-compatible device		Transceiver + Bluetooth-compatible device

[*1] The microphone goes to the off-hook state after changing the configuration of **Bluetooth Speaker** by pressing the **Bluetooth Speaker** key when the microphone is in the on-hook state.

📝 Note

- This function can be used only when a Bluetooth-compatible device connected by Headset Profile exists.
- If **Off-hook Speaker Revert** is disabled, changing the microphone on- or off-hook state while the audio data is being played back in Playback Mode pauses the playing.

Configuration using KPG-D1/ D1N

Configuring **Off-hook Speaker Revert** to be enabled or disabled (🔍See Transceiver Settings > Optional Features > Optional Features 2 > GPS/Bluetooth > Bluetooth)

10.8　Resetting the GPS/ Bluetooth Device (GPS/Bluetooth Reset)

GPS/Bluetooth Reset is the function to execute the hardware reset of the GPS/Bluetooth device.

By using this function, the GPS/Bluetooth device can be restored to the normal state without turning OFF the transceiver.

If the device does not function normally when the Bluetooth function is used, "BT Failure" appears on the display for 1 sec and the transceiver enters the state where the Bluetooth function cannot be used.
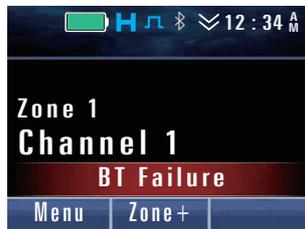
If GPS/Bluetooth Reset is executed in such case, the normal status of the GPS/Bluetooth device is restored and the Bluetooth function can be used.

Pressing the **Menu** key to enter Menu Mode, and then executing "GPS/Bluetooth Reset" places the transceiver in GPS/Bluetooth Reset Mode. (Refer to Using Menu Mode.)

Operating the transceiver

● **Placing the transceiver in Bluetooth My Devices Mode**

1　**Press the Menu key to enter Menu Mode and then execute "GPS/Bluetooth Reset".**

A Key Beep A (1 beep) sounds from the transceiver, and then the transceiver enters GPS/Bluetooth Reset Mode. (Refer to Using Menu Mode.)
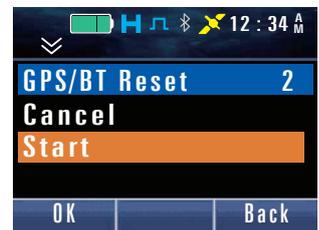
2　**Press the [▲] or [▼] key to select "Start", and then press the Menu ([ ]) or [*] key.**

A Key Beep A (1 beep) sounds from the transceiver and the hardware reset of the GPS/Bluetooth device is executed. When the hardware reset completes, the standby display is restored.

The screen above is an example of the display when executing the hardware reset of the GPS/Bluetooth device during connection of a Bluetooth-compatible device by Headset Profile or while GPS positioning.

📝 Note

• If the hardware reset of the GPS/Bluetooth device is executed while GPS positioning, the GPS positioning is disabled.

• If the hardware reset of the GPS/Bluetooth device is executed while connecting to a Bluetooth-compatible device by Headset Profile, the connection is reset.

10.9 Configuring the Connection Destination of a Bluetooth-compatible Device (Bluetooth Interface Selection)

Bluetooth Interface Selection is the function to select whether to use the Bluetooth device equipped in the transceiver or the Bluetooth device equipped in KCH-20R (Featured Panel) or KCH-21R (Handheld Control Head) when using KCH-20R (Featured Panel) or KCH-21R (Handheld Control Head).

The transceiver, KCH-20R (Featured Panel), and KCH-21R (Handheld Control Head) have the Bluetooth device which enables the Bluetooth function. When using KCH-20R (Featured Panel) or KCH-21R (Handheld Control Head), whether to use the Bluetooth device equipped in the transceiver or the Bluetooth device equipped in KCH-20R (Featured Panel) or KCH-21R (Handheld Control Head) needs to be configured.

If "RF Deck" is configured in **Bluetooth Interface Selection**, a Bluetooth-compatible device is connected to the transceiver.

If "Control Head" is configured in **Bluetooth Interface Selection**, a Bluetooth-compatible device is connected to KCH-20R (Featured Panel) or KCH-21R (Handheld Control Head).

Configuration using KPG-D1/ D1N

Configuring **Bluetooth Interface Selection** to be enabled or disabled (🔍See Transceiver Settings > Optional Features > Optional Features 2 > GPS/Bluetooth > Bluetooth)

11 EXTERNAL PORTS

The transceiver is equipped with function ports that can be programmed using KPG-D1/ D1N.

11.1 Universal Connector

Supported Models: Portable

For Portable, the transceiver is equipped with a function port that can be programmed for use with the 14-pin universal connector located on the side of the transceiver. The Vibrator unit and GPS receiver unit can be connected to the transceiver via the universal connector.

Assigning Functions to the Universal Connector

Pin 11 of the universal connector can be used with the following functions according to the user's purpose of use.

Table 11-1 Available Functions to be Assigned to Pin 11

Function	Description
AUX	When the AUX function is enabled by pressing the **AUX** key, or by pressing the Menu key to enter Menu Mode and then selecting "AUX", the 5 V power source is supplied to pin 11 of the universal connector. The transceiver stops supplying 5 V when the AUX function is disabled. A maximum of 200 mA current can be supplied to pin 11.
Vibrator	If activation conditions of the vibrator are satisfied while the Vibrator function is enabled, the 5 V power source is supplied to pin 11 at 500-ms intervals for 10 sec. The vibrator unit (KCT-48VU) connected to the universal connector notifies a user by vibrating.
Always 5 V (high)	This configuration is applied when using external devices that always require a power source, such as a speaker microphone and a headset. The transceiver behavior varies as below depending on the configuration in **Output Control by SSW**. **If the Output Control by SSW is configured to be enabled:** 　The 5 V power source is supplied to pin 11 if pin 1 (SSW) of the universal connector is low level. **If the Output Control by SSW is configured to be disabled:** 　The 5 V power source is always supplied to pin 11 regardless of the status of pin 1 (SSW) of the universal connector.
HRS Adapter	The 5 V power source is always supplied to pin 11 of the universal connector. This configuration is applied when the KCT-51 is used. HRS Adapter can be used to easily connect audio accessories or similar to the KCT-51. This configuration is also applied when an external device that always requires a power source is used.

📝 Note

• Refer to "Using Menu Mode" for operations in Menu Mode.
• If the Vibrator key is not configured while "Vibrator" is configured in **Universal Connector Pin Number 11**, the Vibrator function is automatically enabled when the transceiver is turned ON.

Configuration using KPG-D1/ D1N

● Configuring **Universal Connector Pin Number 11** (🔍See Transceiver Settings > Extended Function > Universal Connector)

● Configuring **Output Control by SSW** to be enabled or disabled (🔍See Transceiver Settings > Extended Function > Always 5V (high))

Using the Vibrator

Vibrator is the function to vibrate the transceiver when the transceiver receives an individual call with Optional Signaling, an NXDN Status Message or a Short Message. With this function, a user can recognize that the transceiver is receiving a call even in noisy environments or an environment requiring silence.

The vibrator functions under the following conditions:

Table 11-2 Conditions for the Vibrator to Function

System	Conditions
P25 Conventional	If a Selective Call matches
P25 Trunking	• If the transceiver receives an Individual Call or Group Call • If the transceiver receives a Paging Call • If the transceiver receives a Telephone Call
NXDN Conventional	• If the Optional Signaling matches • If the transceiver receives a Status Message (other than status 226) • If the transceiver receives a Short Message • If the transceiver receives a Paging Call
DMR Conventional	• If the transceiver receives an Individual Call or Group Call (except an Unaddressed Call) • If the transceiver receives a Status Message (except an Emergency Termination Status) • If the transceiver receives a Short Message • If the transceiver receives a Paging Call
NXDN Trunking	• If the transceiver receives an Individual Call or Group Call • If the transceiver receives a Status Message (other than status 226) • If the transceiver receives a Short Message • If the transceiver receives a Paging Call
Analog Conventional/ LTR Trunking	• If the Optional Signaling matches • If the transceiver receives a Status Message (except the status number 88, 90, 91, and 92) • If the transceiver receives a Short Message • If the transceiver receives a Paging Call

The vibrator vibrates for 500 ms and stops for 500 ms, and repeats this cycle 10 times.

However, in the following cases, even if the conditions for the vibrator to function are satisfied, the vibrator does not function. During this state, the " " icon blinks.

- When the transceiver receives another signal to match the Optional Signaling while the vibrator is activated after the Optional Signaling matches
- During the amount of time configured in **Auto Reset Timer** after pressing the **PTT** switch, if the transceiver is on a channel where anything other than "None" is configured for Optional Signaling
- When the transceiver receives the same call while the amount of time configured in **Auto Reset Timer** is counting down

Pressing the **Vibrator** key toggles the Vibrator between enabled and disabled.

Vibrator can also be enabled or disabled by selecting "Vibrator" after entering Menu Mode by pressing the **Menu** key. (Refer to Using Menu Mode.)

Operating the transceiver

1 Press the Vibrator key.

The " ⁂ " icon appears and then the Vibrator function is enabled. The vibrator vibrates for a second.

2 Press the Vibrator key again.

The " ⁂ " icon disappears and then the Vibrator function is disabled.

📝 Note

- If the Vibrator key is not configured while "Vibrator" is configured in **Universal Connector Pin Number 11**, the Vibrator function is automatically enabled when the transceiver is turned ON. (Refer to Assigning Functions to the Universal Connector.)
- The status of the Vibrator function is retained even if the transceiver is turned OFF.
- The function assigned to a key that is pressed while the vibrator is vibrating does not function. However, the following functions function:
  - Emergency key
  - Backlight key
  - Key Lock key
  - Function key
  - Zeroize key
- While the " ⁂ " icon blinks, the vibrator does not function even if the functioning conditions for the vibrator are satisfied.

Configuration using KPG-D1/ D1N

Assigning functions to the **PF** keys on the transceiver (🔍See | Transceiver Settings > Key Assignment)

without Alert Tone

without Alert Tone is the function to configure the transceiver not to emit an Alert Tone when the conditions for the vibrator to function are satisfied and the vibrator functions. (Refer to Conditions for the Vibrator to Function.)

If an Alert Tone sounds from the transceiver in quiet environments, it may bother other people. In this case, the transceiver can be configured to mute Alert Tones and a user can recognize the reception of a call or message only from the vibration of the vibrator.

After disabling this function, the vibrator vibrates and Alert Tones sound from the transceiver if the conditions for the vibrator to function are satisfied. However, a user may not recognize a call or message is being received only from the vibration of the vibrator. In this case, an Alert Tone notifies a user that a call or message is being received.

Configuration using KPG-D1/ D1N

Configuring **without Alert Tone** to be enabled or disabled (🔍See | Transceiver Settings > Extended Function > Vibrator)

11.2　D-sub 25-pin Connector

Supported Models: Mobile

For Mobile, the transceiver is equipped with function ports (AUX Input/ AUX Output) that can be programmed for use with the D-sub 25-pin connector located on the rear panel of the transceiver.

Available Functions for AUX Input Ports

This section describes each function that can be assigned to AUX Input ports.

Depending on a function assigned to an AUX Input port, the function immediately functions if the AUX Input port is active when the transceiver is turned ON. In addition, depending on the function assigned to an AUX Input port, the function does not function when the transceiver is in the Radio Inhibit state. Refer to the following table for how the function functions depending on the transceiver status.

Table 11-3 Behavior of Each Function Depending on the Transceiver Status

Function	Transceiver Status		
	When the transceiver is turned ON	While the transceiver is in the Stun state	While the transceiver is in the Radio Inhibit state
External PTT (Voice)	No	No	No
External PTT (Data)	No	No	No
Data PTT	No	No	No
External PTT (PA)	No	No	No
Channel Select A to Channel Select D	Yes	*1	*1
DTC	Yes	*1	*1
Speaker Mute	Yes	Yes	*1
Mic Mute	Yes	Yes	*1
External Monitor	Yes	Yes	*1
External Hook	Yes	Yes	*1
External Speaker	Yes	Yes	*1
Emergency	Yes	No	No
AUX Input Status Message 1 to AUX Input Status Message 3	No	No	No
Scan	Yes	*1	*1
Call 1 to Call 6	No	No	No
Light Sense	Yes	Yes	*1
Zeroize	Yes	No	No
Scrambler/ Encryption	Yes	*1	*1

*1 The function functions when the Stun or Radio Inhibit state is reset.

Yes: functions, No: does not function

Configuration using KPG-D1/ D1N

Assigning functions to the AUX Input port (🔍See Transceiver Settings > Extended Function > AUX)

External PTT (Voice)

External PTT (Voice) is the transmission request port for voice channels. This port can be used for a transmission request from a headset or external microphone.

The transceiver starts transmitting if the External PTT (Voice) port goes low level. The transceiver ends transmitting if the External PTT (Voice) port goes high level. If the transceiver is on a data channel, the transceiver migrates to the lowest numbered voice channel in the current zone and transmits.

Also, functions that are used for transmitting by using the External PTT (Voice) port can be configured using KPG-D1/ D1N. (Refer to Functions When Sending by Using the External PTT (Voice), External PTT (Data), and Data PTT.)

📝 Note

The Data PTT, External PTT (Voice) and External PTT (Data) ports cannot be used at the same time.

External PTT (Data)

External PTT (Data) is the transmission request port for data communications.

The following are the 2 methods of use of **External PTT (Data)**:

● **Using with the DTC port**

In an LTR Trunking system, the port becomes the transmission request port in ARQ Mode.

The transceiver transmits by activating the External PTT (Data) port after activating the DTC port.

● **Using with Channel Select A to Channel Select D**

This port functions as the transmit request port for external devices used for data communications. However, the transceiver transmits on the currently selected channel without migrating to the Data Zone-channel in the same manner as the Data PTT port.

The transceiver behaves as follows depending on the channel which has the External PTT (Data) port active:

Table 11-4 External PTT (Data)

Current Channel	Transceiver Behavior
Conventional Zone-channel (Analog)	The transceiver transmits.
Conventional Zone-Channel (NXDN/ P25/ DMR)	A Key-entry Error Tone (1 beep) sounds from the transceiver and the transceiver does not transmit.
LTR Trunking Zone-Channel	The transceiver transmits.
P25 Trunking Zone-Channel	A Key-entry Error Tone (1 beep) sounds from the transceiver and the transceiver does not transmit.
NXDN Trunking Zone-Channel	A Key-entry Error Tone (1 beep) sounds from the transceiver and the transceiver does not transmit.

Also, functions that are used for transmitting by using the External PTT (Data) port can be configured using KPG-D1/ D1N.

(Refer to Functions When Sending by Using the External PTT (Voice), External PTT (Data), and Data PTT.)

📝 Note

The Data PTT, External PTT (Voice) and External PTT (Data) ports cannot be used at the same time.

Data PTT

Data PTT is the transmission request port for data communications.

The transceiver migrates to a Data Zone-Channel/ System-Personality to start the transmission when the Data PTT port goes low level. The transceiver ends transmitting if the Data PTT port goes high level. The transceiver remains on the data channel for the amount of time configured in **Data Dwell Time** after the Data PTT port goes high level. The transceiver returns to the voice channel after the amount of time configured in **Data Dwell Time** elapses.

The relationship between the channel when the Data PTT port is activated and the Data Zone-Channel/ System-Personality is as follows:

Table 11-5 Data PTT

Current Channel	Transceiver Behavior
Conventional Zone-channel (Analog)	The transceiver migrates to an analog channel configured for the Data Zone-Channel/ System-Personality (Analog) in the Conventional Zone to start transmitting.
	If no Data Zone-Channel/ System-Personality (Analog) is configured, the transceiver migrates to the data channel (Channel Type = Analog only) configured for the highest channel number in the zone to start transmitting.
Conventional Zone-Channel (NXDN/ P25/ DMR)	The transceiver migrates to an analog channel configured for the Data Zone-Channel/ System-Personality (Analog) in the Conventional Zone to start transmitting.
	If no Data Zone-Channel/ System-Personality (Analog) is configured, a Key-entry Error Tone (1 beep) sounds from the transceiver and the transceiver does not start transmitting.
LTR Trunking Zone-Channel	The transceiver migrates to an analog channel configured for Data Zone-Channel/ System-Personality in the LTR Trunking Zone to start transmitting.
	If no Data Zone-Channel/ System-Personality is configured, the transceiver migrates to the data channel with the highest channel number in the zone to start transmitting.
P25 Trunking Zone-Channel	A Key-entry Error Tone (1 beep) sounds from the transceiver and the transceiver does not transmit.
NXDN Trunking Zone-Channel	The transceiver migrates to an analog channel configured for Data Zone-Channel/ System-Personality (Analog) in the NXDN Trunking Zone to start transmitting.
	If no Data Zone-Channel/ System-Personality (Analog) is configured, a Key-entry Error Tone (1 beep) sounds from the transceiver and the transceiver does not start transmitting.

Also, functions that are used for transmitting by using the Data PTT port can be configured using KPG-D1/ D1N.

(Refer to Functions When Sending by Using the External PTT (Voice), External PTT (Data), and Data PTT.)

📝 Note

The Data PTT, External PTT (Voice) and External PTT (Data) ports cannot be used at the same time.

External PTT (PA)

External PTT (PA) is the port for the audio output of Public Address. If the External PTT (PA) port goes low level, the transceiver enters Public Address Mode and the audio inputted from the microphone line (MI/ MI2) configured for Modulation Line is outputted from the external speaker. If the External PTT (PA) port goes high level, the transceiver terminates the audio output and exits Public Address Mode.

Channel Select A to Channel Select D

Channel Select A to **Channel Select D** are the Channel Select ports for using a Remote Channel List.

The Zone-channel of the transceiver can be changed using the external device that is connected to the transceiver. (Refer to Migrating to a Zone-channel by Using a Connected External Device (Remote Zone-Channel).)

DTC

DTC is the port that migrates the transceiver to the Data Zone-Channel/ System-Personality used for data communications.

Normally, establishing a link is required for each data communication when making data communications in an LTR Trunking system. However, if the system is busy, and a repeater has no available channels, the possibility of failing to send data becomes higher. ARQ Mode can be used to avoid these problems and unfailingly complete data communications with a single link.

If ARQ Mode is used, the transceiver does not send the EOT until the transceiver finishes data communications after the transceiver establishes a link to the repeater. The transceiver retains the linked state using the Hung Up Time configured for the repeater and then sends or receives the acknowledgment during the Hung Up Time. With this function, the transceiver is not required to link to a repeater every time to send data, and Air Time can effectively be utilized.

The relationship between the channel where the DTC port is active and the Data Zone-channel is as follows:

Table 11-6 DTC

Current Channel	Data Zone-Channel
Conventional Zone-channel (Analog)	The transceiver migrates to an analog channel configured for the Data Zone-Channel/ System-Personality (Analog) in the Conventional Zone. If no Data Zone-Channel/ System-Personality (Analog) is configured, the transceiver migrates to the data channel (Channel Type = Analog only) with the highest channel number in the zone.
Conventional Zone-Channel (NXDN/ P25/ DMR)	The transceiver migrates to an analog channel configured for the Data Zone-Channel/ System-Personality (Analog) in the Conventional Zone. If no Data Zone-Channel/ System-Personality (Analog) is configured, a Key-entry Error Tone (1 beep) sounds from the transceiver and the transceiver does not respond at all.
LTR Trunking Zone- Channel	The transceiver migrates to an analog channel configured for Data Zone-Channel/ System-Personality in the LTR Trunking Zone to start transmitting. If no Data Zone-Channel/ System-Personality is configured, the transceiver migrates to the data channel with the highest channel number in the zone.
P25 Trunking Zone-Channel	A Key-entry Error Tone (1 beep) sounds from the transceiver and the transceiver does not respond at all.
NXDN Trunking Zone-Channel	The transceiver migrates to an analog channel configured for the Data Zone-Channel/ System-Personality (Analog) in the NXDN Trunking Zone. If no Data Zone-Channel/ System-Personality (Analog) is configured, a Key-entry Error Tone (1 beep) sounds from the transceiver and the transceiver does not respond at all.

📝 Note

- The data channel is not targeted for Revert Channel.
- When the DTC port goes low level while scanning, the transceiver migrates to a Data Zone-channel in a Revert Zone.
- If "Data PTT" is assigned to another port, "DTC" cannot be assigned.
- If "External PTT (Data)" is not assigned to another port, "DTC" cannot be assigned.

Speaker Mute

Speaker Mute is the port that is used to mute the speaker audio output line.

The transceiver mutes the speaker when the Speaker Mute port goes low level. Only the received audio is muted, and the control audio, such as a beep tone, is not muted. The transceiver unmutes the speaker when the Speaker Mute port goes high level.

Mic Mute

Mic Mute is the port that is used to mute the microphone modulation line.

The Mic Line (Front Mic and MI2) is muted when the Mic Mute port goes low level. The Mic Line (Front Mic and MI2) is unmuted when the Mic Mute port goes high level.

External Monitor

External Monitor is the port that is used to activate the Monitor function.

The Monitor function is enabled when the External Monitor port goes low level. The Monitor function is disabled when the External Monitor port goes high level.

📋 Note

- If the External Monitor port is active while the Monitor function is enabled by pressing the **Monitor** key, the Monitor function for the External Monitor port is enabled.
- The enabled state of the Monitor function is not retained in the transceiver.

External Hook

External Hook is the port that is used to switch the state of the microphone hook in the same way as Local Mic Hook.

The microphone goes to the On-hook state when the External Hook port goes low level. The microphone goes to the Off-hook state when the External Hook port goes high level.

Off-hook Decode, **Off-hook Horn Alert**, **Off-hook Scan**, **Off-hook Connect**, **On-hook Disconnect**, and **Optional Signaling** are reset in the same manner as Local Mic Hook.

If both Local Mic Hook and External Hook ports are in the Off-hook state, the microphone goes to the Off-hook state. If either port is in the On-hook state, the microphone goes to the On-hook state.

External Speaker

External Speaker is the port that is used to activate the **External Speaker** function.

If the External Speaker port goes low level, **External Speaker** is enabled regardless of the configuration of **External Speaker**, or the configuration status of **External Speaker** by the **External Speaker** key.

If the External Speaker port goes high level, the configuration of **External Speaker**, or the configuration status of **External Speaker** by the **External Speaker** key is restored.

📋 Note

While the External Speaker port goes high level, the configuration of **External Speaker** cannot be switched by the **External Speaker** and in Menu Mode.

Emergency

Emergency is the port that is used to activate the Emergency function.

The transceiver enters Emergency Mode when the Emergency port goes low level.

The transceiver behaves according to the configuration using KPG-D1/ D1N in Emergency Mode. **Emergency Delay Time** needs to be configured for this port and used to avoid erroneously placing the transceiver in Emergency Mode.

AUX Input Status Message 1 to AUX Input Status Message 3

AUX Input Status Message 1 to **AUX Input Status Message 3** are the trigger ports that are used to send a FleetSync, NXDN, or DMR Status Message.

The transceiver sends a Status Message configured for each port to an ID configured for Target ID (FleetSync), Base ID (NXDN), or Base ID (DMR) when the port goes high level to low level or goes low level to high level.

Two statuses (High → Low, and Low → High) can be configured for each port of AUX Input Status Message 1 to AUX Input Status Message 3 by using KPG-D1/ D1N. These ports are normally used as the sensor ports for telemetry purposes.

📭 Note

- The transceiver does not send a Status Message immediately after the transceiver is turned ON since the transceiver does not recognize that the AUX Input port to which "AUX Input Status Message" is assigned has changed.
- If the logic of the port is not changed, the transceiver does not send a Status Message when the analog channel is changed to an NXDN or DMR channel. However, the transceiver sends a Status Message if conditions to send the Status Message are satisfied.

Zeroize

Zeroize is the port that is used to delete an Encryption Key configured for the Secure Cryptographic Module (SCM).

If the port remains active for the amount of time configured in **Zeroize Delay Time**, the transceiver determines that the port is active. When the port is activated, the Encryption Key configured for the SCM is deleted.

If "Zeroize" is assigned to the AUX Input port, the logic of the port can be configured Active High or Active Low. The transceiver behaves as follows according to the logic of the port:

Table 11-7 Zeroize

The Logic of the Port	Transceiver Behavior
Active Low	This logic is used to delete an Encryption Key by user operation, such as using the Foot Switch.
	All Encryption Keys stored in the SCM are deleted if the port is continuously detected as active for the amount of time configured in **Zeroize Delay Time**.
Active High	This logic is used to automatically delete an Encryption Key when the transceiver is turned ON to avoid any leakage of encrypted information, such as when the transceiver is stolen.
	If the port is active when the transceiver is turned ON, all Encryption Keys stored in the SCM are automatically deleted regardless of the configuration in **Zeroize Delay Time**.

Scan

Scan is the port that is used to activate the scan function.

When the Scan port goes low level, the scan is started. When the Scan port goes high level, the scan is stopped.

Light Sense

Light Sense is the port that is used to control the backlight of the LCD and the operation of the **LCD Brightness** key.

When the Light Sense port goes low level, **LCD Brightness** is configured as follows:

KCH-19 (Basic Panel)/ KCH-20R (Featured Panel):

"Level 1" is configured in LCD Brightness.

KCH-21R (Handheld Control Head):

"Off" is configured in LCD Brightness.

The brightness of the backlight cannot be switched by operating the **LCD Brightness** key, and by Menu Mode. Also, the configuration in **Auto Dimmer** cannot be changed.

If the Light Sense port goes high level, the backlight lights at the level configured in **LCD Brightness**. The brightness of the backlight can be switched by operating the **LCD Brightness** key, and by Menu Mode. Also, the configuration in **Auto Dimmer** can be changed.

Scrambler/Encryption

Scrambler/Encryption is the port that is used to operate the Scrambler/Encryption function.

When the Scrambler/Encryption port goes low level, Scrambler/Encryption is enabled. When the Scrambler/Encryption port goes high level, Scrambler/Encryption is disabled.

Call 1 to Call 6

Call 1 to **Call 6** are the ports that start the various following communications:

- Execution of the Encode Format configured in the 5-tone System Parameter
- Transmission of a DTMF code configured in the DTMF Autodial List
- Transmission of a 2-tone code configured in the 2-tone List
- Transmission of a Status Message configured in the FleetSync Status List
- Transmission of a Status Message configured in the NXDN Status List
- Transmission of an Individual Call to the Unit ID configured in the NXDN Individual ID List
- Transmission of a Status Message configured in the DMR Status List
- Transmission of an Individual Call to the Unit ID configured in the DMR Individual ID List

The various transmissions start when the port becomes active.

"Call 1" to "Call 6" are assigned to the AUX Input ports by using KPG-D1/ D1N, and then the DTMF code, 2-tone code, Status Message, and NXDN Unit ID corresponding to each port can be configured.

Configuration using KPG-D1/ D1N

- Allocating functions to the **AUX Input** port (🔍See Transceiver Settings > Extended Function > AUX)

- Configuring **Emergency Delay Time** (🔍See Transceiver Settings > Extended Function > AUX > AUX Input)

- Configuring **Zeroize Delay Time** (🔍See Transceiver Settings > Extended Function > AUX > AUX Input)

- Configuring various data corresponding to **Call 1** to **Call 6** (🔍See Transceiver Settings > Key Assignment > Call)

Available Functions for AUX Output Ports

The following functions can be assigned to AUX Output ports:

Table 11-8 Available Functions for AUX Output Ports

Function Name	Description
None	No function is assigned.
LOK	**For a Conventional Channel (Analog/ NXDN/ DMR/ P25):** The output port is active while the transceiver is transmitting. Otherwise, the output port is inactive. **For an LTR Trunking system:** The output port is activated when the transceiver is linked with a repeater while transmitting. Otherwise, the output port is inactive. **For a P25 Trunking system:** The output port is active while the transceiver is transmitting on a traffic channel. Otherwise, the output port is inactive. This function applies to all audio and data communications on the traffic channel. **For an NXDN Trunking system:** The output port is active while the transceiver is transmitting on a traffic channel. Otherwise, the output port is inactive. The output signal of LOK can be configured using KPG-D1/ D1N. There are 2 types of LOK Logic Signals: "Continuous" and "Pulse". The port is always at low level while the LOK port is active if "Continuous" is selected. The LOK port is active for the first 30 ms, and then the LOK port returns to open level if "Pulse" is selected.
COR	**For a Conventional Channel (Analog/ NXDN/ DMR/ P25) or an LTR Trunking system:** The output port is active while the transceiver is receiving a carrier. Otherwise, the output port is inactive. **For a P25 Trunking system:** The output port is active while the transceiver is receiving a carrier. Otherwise, the output port is inactive. All carriers as well as P25 signals are targeted. **For an NXDN Trunking system:** The output port is active while the transceiver is receiving a carrier. Otherwise, the output port is inactive.
COR or Channel Busy	The COR or Channel Busy output port is active while the conditions to activate COR or the conditions to activate Channel Busy are satisfied. While conditions to activate COR and Channel Busy are not satisfied, the COR or Channel Busy output port is inactive.
TOR	**For a Conventional Channel (Analog/ NXDN/ P25):** The output port is active while the received QT tone or DQT code (Analog), RAN code (NXDN), or NAC (P25) matches the QT tone or DQT code (Analog), RAN code (NXDN), or NAC (P25) preconfigured for the transceiver. If QT/DQT Decode is not configured, the output port is active while the transceiver is receiving a carrier. If RAN Decode is not configured, the output port is active while the transceiver is receiving a RAN code. Otherwise, the output port is inactive. **For a Conventional Channel (DMR):** The output port is active while the transceiver is unmuting the speaker. Otherwise, the output port is inactive. **For an LTR Trunking system:** The output port is active while a Group ID is received. Otherwise, the output port is inactive. **For a P25 Trunking system and NXDN Trunking system:** The output port is active while the transceiver is unmuting the speaker on a traffic channel. Otherwise, the output port is inactive.

Function Name	Description
TOR or Channel Busy	The TOR or Channel Busy output port is active while the conditions to activate TOR or the conditions to activate Channel Busy are satisfied. If conditions to activate the TOR and Channel Busy are not satisfied, the TOR or Channel Busy output port is inactive.

Channel Busy	The output port is active while the transceiver does not accept a remote control request from an external device. The output port is active while the transceiver is in the following states.
	
	• The output port is active regardless of the configuration in Data Override (AUX Input) while the transceiver is in the following states:
	   • While the transceiver is transmitting (including while a link is established in an LTR Trunking system)
	   • While the Public Address function is used
	   • While System Search is being executed (LTR Trunking)
	   • While the transceiver is in Emergency Mode
	   • While the transceiver is in Transceiver Password Mode
	   • While the transceiver is in the Stun state
	   • While the transceiver is in the Radio Inhibit state
	   • While the transceiver is on a P25 or NXDN channel
	   • While the transceiver is on a DMR channel
	
	• If Data Override (AUX Input) is disabled, the output port is active while the transceiver is in the following states:
	   • While Auto Telephone Search is being executed (LTR Trunking)
	   • While the transceiver is in Function Mode
	   • While an ID is displayed by transmitting and receiving a FleetSync Selcall/ Paging Call, by transmitting and receiving an MDC-1200 Selcall/ Call Alert, by receiving an NXDN Individual Call/ Group Call, by receiving a DMR Individual Call/ Group Call, or by receiving a P25 Individual Call/ Group Call
	   • While an ID is displayed by transmitting via Caller ID Stack List selection in Stack Mode
	   • While the Public Address function is used
	   • While the transceiver temporarily migrates to a channel by pressing one of the **Direct Channel 1** to **Direct Channel 5** keys, **Home Channel**, or **Channel Recall** key

System Busy	The output port is active when a repeater has no available channels in an LTR Trunking system. Otherwise, this port is inactive.
AUX A	The port output is changed with the state of the **AUX A** key. An external device connected to the AUX A port can be controlled.
AUX B	The port output is changed with the state of the **AUX B** key. An external device connected to the AUX B port can be controlled.
AUX C	The port output is changed with the state of the **AUX C** key. An external device connected to the AUX C port can be controlled.
PTT Output	The output port is active while the **PTT** switch is being pressed. Otherwise, this port is inactive.
TXS	The output port is active while the transceiver is transmitting. Otherwise, this port is inactive.
AUX Output ID 1 to AUX Output ID 3	The port output changes by linking with the state of the AUX Output ID 1 port to the AUX Output ID 3 port. External devices connected to each port of AUX Output ID 1 to AUX Output ID 3 can be controlled. **AUX Output ID 1** to **AUX Output ID 3** can be changed to high level or low level by operating the AUX Output ID 1 to AUX Output ID 3 keys. **If "Off" is configured in State Hold Timer (Active Low):** Each time one of the **AUX Output ID 1** to **AUX Output ID 3** keys is pressed, the AUX Output ID 1 to AUX Output ID 3 ports are toggled from high level to low level or from low level to high level. **If anything other than "Off" is configured in State Hold Timer (Active Low):** Pressing the **AUX Output ID 1** to **AUX Output ID 3** keys toggles the AUX Output ID 1 to AUX Output ID 3 ports to low level.

Function Name	Description
AUX Output Status Message 1 to AUX Output Status Message 3	The status of these ports are changed when the transceiver receives a FleetSync, NXDN, or DMR Status Message. The transceiver alternates the status of the AUX Output port (High to Low or Low to High) when the received Status Message matches the Status number preconfigured for the port. Two statuses (High → Low, and Low → High) can be configured for each port of AUX Output Status Message 1 to AUX Output Status Message 3 by using KPG-D1/ D1N. These ports are usually used to remotely control the transceiver by connecting an external device to the AUX Output port. Also, the port status can be retained even if the transceiver is turned OFF. 📝 Note This function is disabled when the transceiver receives a response status to a PC command (AUX Status Request Transmission). However, in a DMR Conventional system, this function is enabled even if the transceiver receives a response status to a PC command (AUX Status Request Transmission).
Encryption	If the Encryption function (AES, DES, or bit scramble) is configured for a received signal, the output port is active while receiving the signal. Otherwise, this port is inactive.
Selected RF Deck	In a Multi RF Deck system, the output port is active for the Selected RF Deck. The port is inactive for the Unselected RF Deck.
Digital Mode	**For a Conventional Channel (Analog/ NXDN/ DMR/ P25):** The output port is active if a channel with "NXDN", "DMR", or "P25" configured in **Channel Type** is selected. The output port is inactive if a channel with "Analog" configured in **Channel Type** is selected. **For an NXDN Trunking/ P25 Trunking/ LTR Trunking system:** The output port is active if a channel in an NXDN Trunking system or P25 Trunking system is selected. The output port is inactive if a channel in an LTR Trunking system is selected. **If "Mixed" is configured in Channel Type:** The transceiver behaves as follows according to the configuration in **Transmit Mode** (Analog or Digital): **Analog:** • The output port is inactive when **Signaling Reset Timer** (or **Auto Reset Timer**) is not activated. • The output port is active if the transceiver receives a digital signal, **Signaling Reset Timer** or **Auto Reset Timer** is activated, and the transceiver transmits a digital signal. • The output port is inactive if the time configured in **Signaling Reset Timer** (or **Auto Reset Timer**) elapses, and the transceiver transmits an analog signal. **Digital:** • The output port is active when **Signaling Reset Timer** (or **Auto Reset Timer**) is not activated. • The output port is inactive if the transceiver receives an analog signal, **Signaling Reset Timer** or **Auto Reset Timer** is activated, and the transceiver transmits an analog signal. • The output port is active if the time configured in **Signaling Reset Timer** (or **Auto Reset Timer**) elapses, and the transceiver transmits a digital signal.
Out of Range	The output port is active if the transceiver is in the Out of Range state in an NXDN Trunking system or P25 Trunking system. If the transceiver is in the state other than Out of Range, the output port is inactive.

Configuration using KPG-D1/ D1N

- Assigning functions to the AUX Output port (🔍See Transceiver Settings > Extended Function > AUX)

- Configuring **LOK Logic Signal** (🔍See Transceiver Settings > Extended Function > AUX > AUX Output)

- Configuring **Data Override** (🔍See Extended Function > AUX > AUX Input)

Data Dwell Time

Data Dwell Time is the delay time to return to the voice channel when the state of the DTC port or Data PTT port on the AUX Input port changes from active to inactive. This function can be used when an external device waits to receive an acknowledgment from the receiving transceiver.

Configuration using KPG-D1/ D1N

Configuring **Data Dwell Time** (🔍 See Transceiver Settings > Extended Function > AUX > AUX Input)

Avoiding Noise and Chattering on the AUX Input Port (Debounce Time)

Debounce Time is the amount of time to avoid the influence of noise and chattering that occurs on the AUX Input port.

If noise or chattering does not occur while the amount of time configured in **Debounce Time** elapses, the AUX Input Port where Debounce is enabled is activated. Using this function prevents the state of the AUX Input port from being erroneously changed by noise and chattering.
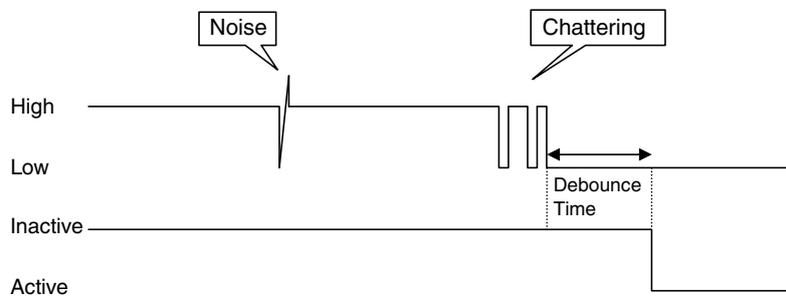
Figure 11-1 Debounce Time

Configuration using KPG-D1/ D1N

Configuring **Debounce Time** (🔍 See Extended Function > AUX > AUX Input)

State Hold Timer (Active Low)

State Hold Timer (Active Low) is the length of time that the AUX Output Status Message ports remain at the low level after these ports go low level.

The AUX Output Status Message ports go high level when the amount of time configured in **State Hold Timer (Active Low)** elapses.

If "Off" is configured in **State Hold Timer (Active Low)**, the timer is not activated. In this case, the AUX Output Status Message ports remain at low level from when the AUX Output Status Message ports go low level until the transceiver receives a Status Message which changes the AUX Output Status Message ports to high level.

Configuration using KPG-D1/ D1N

Configuring **State Hold Timer (Active Low)** (🔍See Transceiver Settings > Extended Function > AUX > AUX Output > AUX Output Status Message)

Status Memory (AUX Output Status Message)

Status Memory (AUX Output Status Message) can be used to retain the output status of AUX Output Status Message 1 to AUX Output Status Message 3.

If this function is enabled, the output status of each of AUX Output Status Message 1 to AUX Output Status Message 3 is retained. When the transceiver is turned ON, the transceiver restores the last status prior to the transceiver being turned OFF (high level or low level).

If this function is disabled, the output status of each of AUX Output Status Message 1 to AUX Output Status Message 3 is not retained and the port always goes high level when the transceiver is turned ON.

Configuration using KPG-D1/ D1N

Configuring **Status Memory (AUX Output Status Message)** (🔍See Transceiver Settings > Extended Function > AUX > AUX Output > AUX Output Status Message)

Functions When Sending by Using the External PTT (Voice), External PTT (Data), and Data PTT

The following functions that are used for sending by using the External PTT (Voice), External PTT (Data), and Data PTT can be configured using KPG-D1/ D1N.

Table 11-9 External PTT (Voice), External PTT (Data), Data PTT

Configuration	Operation
Modulation Line	Which modulation line is enabled can be configured for the External PTT (Voice) port, External PTT (Data) port, and Data PTT port. The following modulation lines are available: • **Mic Line** Whether to enable the audio line of the microphone that is connected to the microphone connector of the transceiver when transmitting by using the Mic PTT, External PTT (Voice), External PTT (Data), and Data PTT ports can be configured. • **MI2 Line** Whether to enable the audio modulation line of the D-sub 25-pin connector of the transceiver when transmitting by using the Mic PTT, External PTT (Voice), External PTT (Data), and Data PTT ports can be configured. If the transceiver transmits by using the External PTT (Voice) port, the transceiver is often configured to be modulated only by the MI2 Line. • **DI Line** Whether to enable the data modulation line of the D-sub 25-pin connector of the transceiver when transmitting by using the Mic PTT, External PTT (Voice), External PTT (Data), and Data PTT ports can be configured. If the transceiver transmits by using the External PTT (Data) or Data PTT port, the transceiver is normally configured to be modulated only by the DI Line. However, the DI Line is enabled only when transmitting on an analog channel.
With QT/ DQT	Whether to multiplex the QT tone or DQT code configured for an analog channel when transmitting by using the Mic PTT, External PTT (Voice), External PTT (Data), and Data PTT ports can be configured. Normally, QT tone or DQT code is configured to be multiplexed. This function functions only on an analog channel.
With STE	Whether to send the STE (Squelch Tail Eliminator) after sending the QT tone or DQT code configured for an analog channel when transmitting by using the Mic PTT, External PTT (Voice), External PTT (Data), and Data PTT ports can be configured. Normally, the transceiver is configured to send the STE. Sending the Squelch Tail Eliminator eliminates the noise that occurs in the receiving transceiver when transmission ends. This function functions only on an analog channel.

Configuration using KPG-D1/ D1N

Configuring functions used when sending by using **External PTT (Voice)**, **External PTT (Data)**, and **Data PTT**

(See Transceiver Settings > Extended Function > Modulation Line)

Migrating to a Zone-channel by Using a Connected External Device (Remote Zone-Channel)

Remote Zone-Channel is the function to migrate to one of a maximum of 15 zones and channels by using the Channel Select A to Channel Select D ports.

The transceiver migrates to a zone and channel configured in the Remote Zone-Channel List if one of the Channel Select A to Channel Select D ports goes low level.

Table 11-10 Remote Zone-Channel List Number Corresponding to Each Channel Select Port

Remote Zone-Channel	AUX Input port			
	Channel Select D	Channel Select C	Channel Select B	Channel Select A
No.1	High	High	High	Low
No.2	High	High	Low	High
No.3	High	High	Low	Low
No.4	High	Low	High	High
No.5	High	Low	High	Low
No.6	High	Low	Low	High
No.7	High	Low	Low	Low
No.8	Low	High	High	High
No.9	Low	High	High	Low
No.10	Low	High	Low	High
No.11	Low	High	Low	Low
No.12	Low	Low	High	High
No.13	Low	Low	High	Low
No.14	Low	Low	Low	High
No.15	Low	Low	Low	Low
Not Configured[1]	High	High	High	High

[1] If Remote Zone-Channel is not configured, the transceiver cannot migrate to a zone or channel.

📝 Note

A zone and channel for which no channel data is configured cannot be configured in the Remote Zone-Channel List.

Configuration using KPG-D1/ D1N

• Assigning functions to the AUX Input port (🔍See Transceiver Settings > Extended Function > AUX)

• Configuring **Remote Zone-Channel List** (🔍See Transceiver Settings > Extended Function > Remote Zone-Channel)

Optimizing Various Signal Levels

The DI Level, DEO Level, and AFO Level can be configured using KPG-D1/ D1N.

DI Level

DI Level is the input signal level of the DI port available on the D-sub 25-pin connector of the transceiver. The input signal level can be optimized according to the devices that are connected to the transceiver.

DEO Level

DEO Level is the output signal level of the DEO port available on the D-sub 25-pin connector of the transceiver. The output signal level can be optimized according to the devices that are connected to the transceiver.

AFO Level

AFO Level is the output signal level of the AFO port available on the D-sub 25-pin connector of the transceiver. The output signal level can be optimized according to the devices that are connected to the transceiver.

Configuration using KPG-D1/ D1N

- Configuring **DI Level** (See Transceiver Settings > Extended Function > Mobile Function)
- Configuring **DEO Level** (See Transceiver Settings > Extended Function > Mobile Function)
- Configuring **AFO Level** (See Transceiver Settings > Extended Function > Mobile Function)

11.3 Selecting the Audio Input Line If Detaching and Using Control Head (Control Head Mic Input)

Control Head Mic Input is the function to select whether to input audio from the microphone connected to 8 Pin Modular Jack of Control Head or from the MIC Input side of the connection cable (KCT-72).

By using KRK-15B and KRK-14H, the Control Head and RF Deck (transceiver) can be separated. If Control Head and RF Deck are used separately, a microphone can be connected to 8 Pin Modular Jack of Control Head, or a microphone can be connected to KRK-14H via KCT-72. At this time, configuring whether to input audio from the microphone connected to 8 Pin Modular Jack or from the Mic Input of KCT-72 is required.

As in the case of the following diagram, select whether to input audio from KMC-27 (Microphone) connected to 8 Pin Modular Jack or from KCT-73MIC (External Mic) connected via KCT-72.
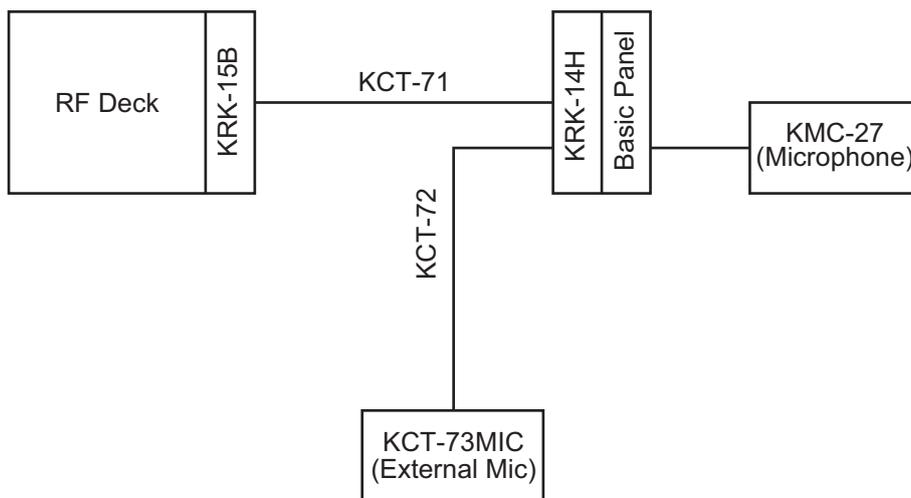
Figure 11-2 Control Head Mic Input

Table 11-11 Control Head Mic Input

Configuration	Description
Modular Jack	Inputs audio from the microphone connected to the Modular Jack.
KCT-72	Inputs audio from the Mic Input of KCT-72.

📝 Note

This function can be used only if KCH-19 (Basic Panel) or KCH-20R (Featured Panel) is used.

Configuration using KPG-D1/ D1N

Configuring **Control Head Mic Input** (🔍See Transceiver Settings > Extended Function > Mobile > Modulation Line)

Supported Models: Mobile

When the transceiver is installed in a vehicle, functions linked to the vehicle, such as Ignition Sense or Horn Alert, can be used.

12.1 Turning the Transceiver ON or OFF According to the State of the Ignition Sense Port (Ignition Sense)

Ignition Sense is the function to automatically turn the transceiver ON or OFF according to the status of the Ignition Sense port of a vehicle. While the vehicle engine is running, high level is entered for the Ignition Sense port, and when the vehicle engine is not running, low level is entered for the Ignition Sense port.

Ignition Sense can be enabled or disabled using KPG-D1/ D1N.

> 📝 Note
>
> To use the Ignition Sense function, the optional KCT-46 Ignition Sense cable and the Ignition Line of the vehicle needs to be connected.

Configuration using KPG-D1/ D1N

Configuring **Ignition Sense** to be enabled or disabled (🔍See Transceiver Settings > Optional Features > Optional Features 1 > Ignition Function)

Usage of the Ignition Sense Port

The method of turning the transceiver ON or OFF using the Ignition Sense port varies depending on the configuration in **Ignition Sense Type**.

● **Turning the transceiver ON or OFF according to the state of the Ignition Sense port**

The transceiver can be turned ON or OFF according to the state of the Ignition Sense port if "Ignition Only" is configured in **Ignition Sense Type**.

The transceiver is automatically turned ON when the Ignition Sense port goes high level and is automatically turned OFF when the port goes low level. The transceiver cannot be turned ON or OFF by pressing the **Power** switch.

● **Turning the transceiver ON or OFF using both the Ignition Sense port and Power switch**

If "Ignition and Switch" is configured in **Ignition Sense Type**, the transceiver can be turned ON or OFF using both the **Power** switch and the Ignition Sense port.

The transceiver can be turned OFF by pressing the **Power** switch even if the vehicle engine is running (the state of the Ignition Sense port is High). However, the state of the **Power** switch is not retained.

Also, the transceiver is turned ON when the state of the Ignition Sense port switches from low level to high level.

Configuration using KPG-D1/ D1N

Configuring **Ignition Sense Type** (🔍See Transceiver Settings > Optional Features > Optional Features 1 > Ignition Function)

The Amount of Time Until the Transceiver Is Turned OFF (Timed Power-off)

Timed Power-off is the amount of time from when the vehicle engine stops running (the state of the Ignition Sense port is at low level) until the transceiver is automatically turned OFF.

If the amount of time configured in **Timed Power-off** elapses after the vehicle engine stops running, the transceiver is automatically turned OFF. This function is used for continuing communications even if the vehicle engine is not running.

A Timed Power-off Pre-alert Tone sounds from the transceiver in the following manners if anything other than "Off" is configured in **Warning Tone**:

- 1 min before the transceiver is turned OFF: The transceiver beeps twice. (Timed Power-off Pre-alert Tone A)
- 10 sec before the transceiver is turned OFF: The transceiver beeps 4 times. (Timed Power-off Pre-alert Tone B)
- 2 sec before the transceiver is turned OFF: The transceiver beeps continuously. (Timed Power-off Pre-alert Tone C)

📋 Note

- **Timed Power-off** is reset if the Ignition Sense port goes high level.
- If "Ignition and Switch" is configured in **Ignition Sense Type**, **Timed Power-off** is not activated when the transceiver is turned ON by pressing and holding the **Power** switch.
- If "Ignition and Switch" is configured in **Ignition Sense Type**, the **Timed Power-off** timer is reset when the **Power** switch is pressed while **Timed Power-off** is functioning. Pressing and holding the **Power** switch turns the transceiver OFF. Also, the **Timed Power-off** timer is reset if the Ignition Sense port is switched from low level to high level while **Timed Power-off** is functioning.

Configuration using KPG-D1/ D1N

Configuring **Timed Power-off** (🔍See Transceiver Settings > Optional Features > Optional Features 1 > Ignition Function)

12.2 Controlling Vehicle Operation According to the State of the Horn Alert Port (Horn Alert)

Horn Alert is the function to activate the Horn Alert port for a certain amount of time when the transceiver receives a call.

This function turns headlights On of the vehicle connected to the Horn Alert port and makes the horn sound. Therefore, a user can recognize that the transceiver has received a call with lighting of headlights of the vehicle and the horn even if the user is away from the transceiver.

Pressing the **Horn Alert** key enables or disables Horn Alert.

Horn Alert can also be enabled or disabled by selecting "Horn Alert" after entering Menu Mode by pressing the **Menu** key. (Refer to Using Menu Mode.)

📋 Note

An optional KAP-2 is required to activate the Horn Alert.

Operating the transceiver

● **Enabling the Horn Alert**

1   **Press the Horn Alert key while Horn Alert is disabled.**

Horn Alert is enabled, and then the "⊠" icon appears.

> H ♪ ⌄ ⊠   12 : 34 ᴬᴹ
> Zone 1
> **Channel 1**
> Menu | HA | Zone- | Zone+

● **Disabling the Horn Alert**

1   **Press the Horn Alert key while Horn Alert is enabled.**

Horn Alert is disabled, and then the "⊠" icon disappears.

> H ♪ ⌄   12 : 34 ᴬᴹ
> Zone 1
> **Channel 1**
> Menu | HA | Zone- | Zone+

📝 Note

- The Horn Alert port functions according to the configuration in **Horn Alert Logic Signal**. (Refer to Horn Alert Logic Signal.)
- While the state of the Ignition Sense port is at high level, the Horn Alert port is not activate even if the transceiver receives a call.
  (Refer to Turning the Transceiver ON or OFF According to the State of the Ignition Sense Port (Ignition Sense).)

Configuration using KPG-D1/ D1N

Assigning functions to the **PF** keys on the transceiver (🔍See Transceiver Settings > Key Assignment)

Conditions to Activate the Horn Alert

The conditions to activate the Horn Alert vary on a Conventional Channel (Analog/ NXDN/ P25/ DMR), in an LTR Trunking system, in a P25 Trunking system, or in an NXDN Trunking system.

Conventional Channel (Analog/ NXDN/ P25/ DMR)

On a Conventional Channel (Analog/ NXDN/ P25/ DMR), one of the following conditions needs to be satisfied to activate the Horn Alert:

Table 12-1 Conditions to Activate the Horn Alert (Conventional Channel (Analog/ NXDN/ P25/ DMR))

Type	Conditions
Analog Conventional	• If the transceiver receives an Option Signaling while Horn Alert is enabled • If the transceiver receives a Paging Call while Horn Alert is enabled • If the transceiver receives a Call Alert while Horn Alert is enabled • If the transceiver receives Status 89 of FleetSync regardless of the Horn Alert configuration
P25 Conventional	• If the transceiver receives an Individual Call while Horn Alert is enabled • If the transceiver receives an Option Signaling while Horn Alert is enabled
NXDN Conventional	• If the transceiver receives an Option Signaling while Horn Alert is enabled • If the transceiver receives a Paging Call while Horn Alert is enabled • If the transceiver receives Horn Alert Status regardless of the Horn Alert configuration
DMR Conventional	• If the transceiver receives an Individual Call or a Group Call while Horn Alert is enabled (except an Unaddressed Call) • If the transceiver receives a Paging Call while Horn Alert is enabled • If the transceiver receives Horn Alert Status regardless of the Horn Alert configuration

LTR Trunking System

In an LTR Trunking system, Horn Alert can be enabled or disabled in each Group ID by using KPG-D1/ D1N.

● **If Horn Alert is configured for the Horn Alert key or Menu Mode**

One of the following conditions needs to be satisfied to activate Horn Alert:
• When Horn Alert is enabled by pressing the **Horn Alert** key or by selecting "Horn Alert" from Menu Mode
• When "Start Up" is configured in **Horn Alert Mode**

If one of the above conditions is satisfied, Horn Alert is activated under the following conditions:
• When the received Group ID matches if "None" is configured in **Optional Signaling** of the Group ID which the transceiver waits for and Horn Alert is enabled
• When the received Group ID and Optional Signaling match if "DTMF" or "FleetSync" is configured in **Optional Signaling** of the Group ID which the transceiver waits for and Horn Alert is enabled However, "FleetSync" needs to be configured in Optional Signaling for a Paging Call.
• When the Fix ID for which Horn Alert is enabled matches the received Group ID

Regardless of the above conditions, the configuration of Optional Signaling, and all other configurations related to Horn Alert, the Horn Alert port is activated according to the configuration in Horn Alert Logic Signal when the transceiver receives Status No.89 of Fleet Sync.

● **If Horn Alert is not configured for both the Horn Alert key and Menu Mode**

Horn Alert is activated in the following conditions:

- When the received Group ID matches if "None" is configured in Optional Signaling of the Group ID which the transceiver waits for and Horn Alert is enabled
- When the received Group ID and Optional Signaling match if "DTMF" or "FleetSync" is configured in Optional Signaling of the Group ID which the transceiver waits for and Horn Alert is enabled However, "FleetSync" needs to be configured in Optional Signaling for a Paging Call.
- When the Fix ID for which Horn Alert is enabled matches the received Group ID

Regardless of the above conditions, the configuration of Optional Signaling, and all other configurations related to Horn Alert, the Horn Alert port is activated according to the configuration in Horn Alert Logic Signal when the transceiver receives Status No.89 of Fleet Sync.

P25 Trunking System

In a P25 Trunking system, one of the following conditions needs to be satisfied to activate Horn Alert:

- If the transceiver receives an Individual Call while Horn Alert is enabled
- If the transceiver receives a Paging Call while Horn Alert is enabled

NXDN Trunking System

In an NXDN Trunking system, one of the following conditions needs to be satisfied to activate Horn Alert:

- If the transceiver receives an Individual Call or a Group Call while Horn Alert is enabled
- If the transceiver receives a Paging Call while Horn Alert is enabled
- If the transceiver receives Horn Alert Status regardless of the Horn Alert configuration

Configuration using KPG-D1/ D1N

Configuring **Horn Alert Status** (🔍See Transceiver Settings > NXDN > NXDN Information > Status > Option)

Horn Alert Logic Signal

Horn Alert Logic Signal is the function to activate the Horn Alert port depending on the configuration when Horn Alert functions.

The manner in which the Horn Alert port is activated when the Horn Alert functions can be configured using KPG-D1/ D1N.

Table 12-2 Horn Alert Logic Signal

Configuration	Description
Until Reset	The Horn Alert port remains active until the matching status of Optional Signaling is reset.
1 sec to 30 sec	The Horn Alert port remains active for configured amount of time.
Pulse	The Horn Alert port is activated 3 times at 500 ms intervals. **Figure 12-1 Pulse** Only when a Fix ID is received, the Horn Alert port becomes active for 1 sec, subsequently becomes inactive for 500 ms, and then becomes active for 1 sec again. **Figure 12-2 Pulse (Fix ID)**
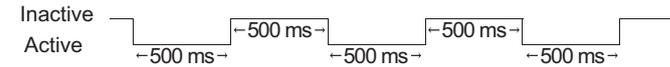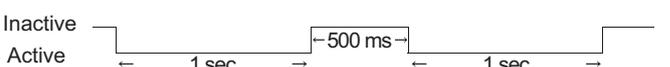
📝 Note

- The Horn Alert port is not deactivated even if the amount of time configured in **Horn Alert Logic Signal** is longer than the amount of time configured in **Auto Reset Timer**. The Horn Alert port is deactivated when the amount of time configured in Horn Alert Logic Signal elapses.
- Operating one of the following while Horn Alert is functioning deactivates Horn Alert:
  - When the **Horn Alert** key is pressed (the Horn Alert is disabled)
  - When the state of the microphone hook is changed
  - When a key is pressed

Configuration using KPG-D1/ D1N

Configuring **Horn Alert Logic Signal** (🔍See Transceiver Settings > Optional Features > Optional Features 1 > Horn Alert)

Activating Horn Alert According to the Microphone Hook (Off-hook Horn Alert)

Off-hook Horn Alert is the function to activate the Horn Alert according to the microphone hook status when Horn Alert functions.

Refer to "Conditions to Activate the Horn Alert" for conditions to activate Horn Alert.

Table 12-3 Off-hook Horn Alert

Configuration	Description
Enabled	Horn Alert is activated regardless of the microphone on- or off-hook state.
Disabled	Horn Alert is activated only if the microphone is on-hook.

Note

On-hook indicates the state that the microphone is hooked. Off-hook indicates the state that the microphone is not hooked.

Configuration using KPG-D1/ D1N

Configuring **Off-hook Horn Alert** (See Transceiver Settings > Optional Features > Optional Features 1 > Horn Alert)

Horn Alert Status When the Transceiver Is Turned ON (Horn Alert Mode)

Horn Alert Mode is the function to enable or disable Horn Alert depending on the configuration when the transceiver is turned ON.

The Horn Alert state when the transceiver is turned ON can be configured using KPG-D1/ D1N.

Table 12-4 Horn Alert Mode

Configuration	Description
Current	When the transceiver is turned ON, the transceiver always starts up with Horn Alert disabled.
Status Memory	If Horn Alert is enabled or disabled by pressing the **Horn Alert** key or selecting Horn Alert from Menu Mode, the status of Horn Alert, either enabled or disabled, can be retained in the transceiver. When the transceiver is turned ON, the transceiver starts up in the same Horn Alert state as was retained in the transceiver (enabled or disabled).
Startup	When the transceiver is turned ON, the transceiver always starts up with Horn Alert enabled.

Configuration using KPG-D1/ D1N

Configuring **Horn Alert Mode** (See Transceiver Settings > Optional Features > Optional Features 1 > Horn Alert)

The transceiver has password functions for protecting the transceiver operation and the security of the configuration data.

13.1 Password for Transceiver Operation (Transceiver Password)

Transceiver Password protects the transceiver from unauthorized usage.

Placing the transceiver in Transceiver Password Mode prevents the transceiver from being used. The transceiver exits Transceiver Password Mode and becomes available if a password is entered and the password is correct.

Pressing the **Transceiver Password** key places the transceiver in Transceiver Password Mode.

Or, pressing the **Menu** key places the transceiver in Menu Mode, and then selecting "Transceiver Password" places the transceiver in Transceiver Password Mode. (Refer to Using Menu Mode.)

A password can be configured for the transceiver using KPG-D1/ D1N. The password can be configured using any numbers between 0 and 999999 inclusive.

> 📝 Note
>
> If **Transceiver Password** is configured but no Transceiver Password is configured for the **Transceiver Password** and **Menu** keys, the transceiver enters Transceiver Password Mode when the transceiver is turned ON.

Operating the transceiver

● Placing the transceiver in Transceiver Password Mode

1 **Press the Transceiver Password key.**

The transceiver enters Transceiver Password Mode.

● Exiting the Transceiver Password Mode

1 **Enter a password in Transceiver Password Mode.**

Refer to "Entering or Deleting a Code" for entry methods.
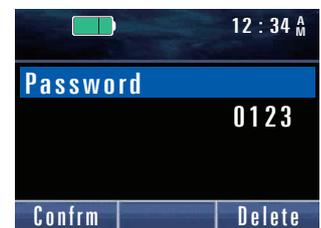
2 **Press the Menu ([▱]) or [*] key after entering the password.**

If the password matches, a Password Authorization Tone (2 beeps) sounds from the transceiver and the transceiver enters User Mode.

Configuration using KPG-D1/ D1N

- Configuring **Transceiver Password** (🔍See Transceiver Settings > Optional Features > Optional Features 1 > Password)

- Assigning functions to the **PF** keys on the transceiver (🔍See Transceiver Settings > Key Assignment)

13.2 Password When Reading Configuration Data in a PC (Read Authorization Password)

Read Authorization Password is the function to protect the configuration data, such as the operating frequencies, from being read by unauthorized persons if the transceiver should ever be stolen.

To read data using KPG-D1/ D1N from the transceiver with **Read Authorization Password** configured, **Read Authorization Password** needs to be entered on a PC. The configuration data in the transceiver cannot be read unless the correct Password is entered.

Read Authorization Password can be configured for the transceiver using KPG-D1/ D1N. **Read Authorization Password** can be configured using any numbers between 0 and 999999 inclusive.

📝 Note

If the password authentication fails consecutively for the number of times configured in **Password Entry Limit**, the transceiver enters Transceiver Lockout Mode, and then "LOCKOUT" appears on the display. In Transceiver Lockout Mode, the transceiver cannot be operated. Writing configuration data to the transceiver by using KPG-D1/ D1N, the transceiver exits Transceiver Lockout Mode.

Also, a failure in **Overwrite Password** authentication counts as a failure in the password authentication. The number of failures in the password authentication is cleared by one of the following conditions:

- When the transceiver is turned OFF and then turned ON again
- When the correct password is entered
- When configuration data is written to the transceiver by using KPG-D1/ D1N

Configuration using KPG-D1/ D1N

- Configuring **Read Authorization Password** (🔍See Transceiver Settings > Optional Features > Optional Features 1 > Data Password > Read Authorization Password)

- Configuring **Password Entry Limit** (🔍See Transceiver Settings > Optional Features > Optional Features 1 > Data Password)

13.3 Password for Writing Configuration Data (Overwrite Password)

Overwrite Password is the function to protect the configuration data from being overwritten by unauthorized persons if the transceiver should ever be stolen.

To write data using KPG-D1/ D1N to the transceiver with **Overwrite Password** configured, the password needs to be entered on a PC.

Overwrite Password can be configured for the transceiver using KPG-D1/ D1N. **Overwrite Password** can be configured using any numbers between 0 and 999999 inclusive.

📋 Note

- Copying data from another transceiver cannot occur by using the Clone function if **Overwrite Password** is configured for the transceiver.
- If the password authentication fails consecutively for the number of times configured in **Password Entry Limit**, the transceiver enters Transceiver Lockout Mode, and then "LOCKOUT" appears on the display. In Transceiver Lockout Mode, the transceiver cannot be operated. Writing configuration data to the transceiver by using KPG-D1/ D1N, the transceiver exits Transceiver Lockout Mode.
- Also, a failure in **Read Authorization Password** authentication counts as a failure in the password authentication. The number of failures in the password authentication is cleared by one of the following conditions:
  - When the transceiver is turned OFF and then turned ON again
  - When the correct password is entered
  - When configuration data is written to the transceiver by using KPG-D1/ D1N

Configuration using KPG-D1/ D1N

- Configuring **Overwrite Password** (🔍See Transceiver Settings > Optional Features > Optional Features 1 > Data Password > Overwrite Password)
- Configuring **Password Entry Limit** (🔍See Transceiver Settings > Optional Features > Optional Features 1 > Data Password)

The transceiver is equipped with an internal clock IC. Using the internal clock IC, the current time can be displayed on the display.

14.1 Displaying the Current Time

Pressing the **Clock** key displays the current time on the display.

The current time also appears when "Clock" is selected after entering Menu Mode by pressing the **Menu** key. (Refer to Using Menu Mode.)

Operating the transceiver

1 Press the Clock key.

The current time appears.

- 12H Display
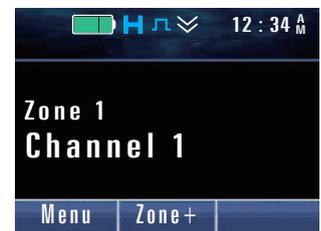
- 24H Display
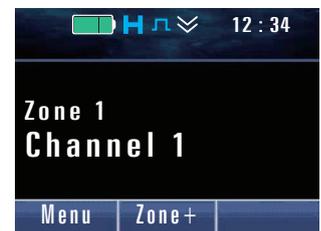
📋 Note

- If Clock Display is enabled, the current time appears on the display when the transceiver is turned ON.
- The transceiver is equipped with a separate battery for the clock IC. If the second rechargeable battery runs out, the clock will not be displayed properly. Recharge the battery and then configure the clock again. In this case, "- - : - -" appears.

Configuration using KPG-D1/ D1N

- Assigning functions to the **PF** keys on the transceiver (🔍See Transceiver Settings > Key Assignment)

- Configuring **Clock Display** (🔍See Transceiver Settings > Optional Features > Optional Features 1 > Display)

| 14.2 | **Adjusting the Time** |

Pressing the **Clock Adjustment** key causes the transceiver to enter Clock Adjustment Mode and then date and time can be adjusted.

Also, pressing the **Menu** key causes the transceiver to enter Menu Mode, and then the transceiver enters Clock Adjustment Mode by selecting "Clock Adjustment" and the date and time can be adjusted. (Refer to Using Menu Mode.)

Note

When the data configured by using KPG-D1/ D1N is written to the transceiver, the date and time of the internal clock of the transceiver can be adjusted by sending the date and time configured on the PC to the transceiver. (See Program > Write Data to the Transceiver > Time Adjustment)

Operating the transceiver

The following is the operation example when "Year/Month/Day" is configured in **Date Format** and "12H" is configured in **Time Format**:

1 Press the Clock Adjustment key.

A Key Beep A (1 beep) sounds from the transceiver, and then the transceiver enters Clock Adjustment Mode.

The following operations are the same even if the transceiver enters Clock Adjustment Mode by pressing the **Menu** key.

2 Configure the year by pressing the [▲] or [▼] key, and then press the [▶] key.

3 Configure the month by pressing the [▲] or [▼] key, and then press the [▶] key.

4   **Configure the day by pressing the [▲] or [▼] key, and then press the [▶] key.**

	Clock Adjust
	Date 14/05/20
	Time 12:34 PM
	OK Back

5   **Configure the hour by pressing the [▲] or [▼] key, and then press the [▶] key.**

	Clock Adjust
	Date 14/05/20
	Time 1:34 PM
	OK Back

6   **Configure the minute by pressing the [▲] or [▼] key, and then press the [▶] key.**

	Clock Adjust
	Date 14/05/20
	Time 1:35 PM
	OK Back

7   **Configure the display format for the time by pressing the [▲] or [▼] key, and then press the Menu ([▢])
or [*] key.**

	Clock Adjust
	Date 14/05/20
	Time 1:35 AM
	OK Back

A Key Beep C (3 beeps) sounds from the transceiver, and then the date
and time is determined.

	Zone 1
	Channel 1
	Menu Zone+

Configuration using KPG-D1/ D1N

Assigning functions to the **PF** keys on the transceiver (🔍See Transceiver Settings > Key Assignment)

The transceiver has the following modes: the mode for adjusting the transceiver, the mode for copying the configuration data to another transceiver, the mode to change the configuration of the transceiver, and the mode for updating the firmware and confirming the version number of the firmware.

- Panel Test Mode
- Panel Tuning Mode
- Clone Mode
- Front Panel Programming Mode
- Firmware Programming Mode
- Transceiver Information Mode

The transceiver can enter each mode by pressing keys on the transceiver. Whether to permit the use of these modes can be configured using KPG-D1/ D1N.

Using KPG-D1/ D1N, the transceiver also has PC Test Mode for testing transmit and receive capabilities of the transceiver and PC Tuning Mode for adjusting the transceiver.

15.1 Testing the Transmit and Receive Capabilities of the Transceiver (Panel Test Mode)

Panel Test Mode can be used to test transmit and receive capabilities of the transceiver using the operation panel of the transceiver.

Operating the transceiver

1 **Turn the transceiver ON while pressing and holding the Back ([⤺]) key.**

A Power-on Tone A (1 beep) sounds from the transceiver, and then the market code of the transceiver appears for 2 sec. For Portable, the battery type also appears.

The transceiver enters Panel Test Mode after a lapse of 2 sec.
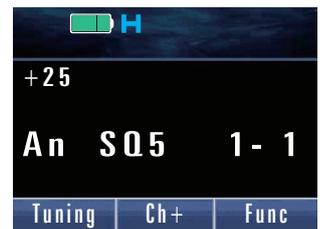
📝 Note
- Refer to the service manual for instructions on how to operate the transceiver in Panel Test Mode, and on how to test transmit and receive capabilities.
- To end Panel Test Mode, the transceiver must be turned OFF.
- Panel Test Mode does not function in a Multi RF Deck/ Multi Control Head structure for Mobile.

Configuration using KPG-D1/ D1N

Configuring whether to permit the use of Panel Test Mode (🔍See Transceiver Settings > Optional Features > Optional Features 1 > Mode)

| 15.2 | Adjusting the Transmit and Receive Capabilities of the Transceiver (Panel Tuning Mode) |

Panel Tuning Mode can be used to adjust transmit and receive capabilities of the transceiver by using the operation panel of the transceiver.

> **Note**
>
> Panel Tuning Mode does not function in a Multi RF Deck/ Multi Control Head structure for Mobile.

Operating the transceiver

1 **Turn the transceiver ON while pressing and holding the Back ([⤺]) key.**

A Power-on Tone A (1 beep) sounds from the transceiver, and then the market code of the transceiver appears for 2 sec. For Portable, the battery type also appears.

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The transceiver enters Panel Test Mode after a lapse of 2 sec.

H

+25

An SQ5   1-1

Tuning | Ch+ | Func

2 **Press the Menu ([▱]) key.**

The transceiver enters Panel Tuning Mode.
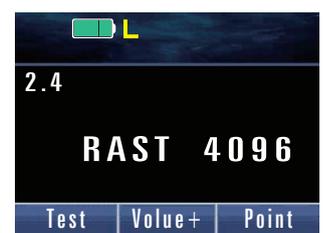
L

2.4

RAST 4096

Test | Volue+ | Point

> **Note**
>
> • Refer to the service manual for instructions on how to operate the transceiver in Panel Tuning Mode, and on how to adjust transmit and receive capabilities.
> • To end Panel Tuning Mode, the transceiver must be turned OFF.

Configuration using KPG-D1/ D1N

Configuring whether to permit the use of Panel Tuning Mode (**See** Transceiver Settings > Optional Features > Optional Features 1 > Mode)

15.3	**Copying the Configuration Data to Another Transceiver (Clone Mode)**

Clone Mode can be used to copy the data configured for the transceiver to another transceiver.

Operating the transceiver

1 **Turn the transceiver ON while pressing and holding the Function ([○]) key.**

The transceiver enters Clone Mode.
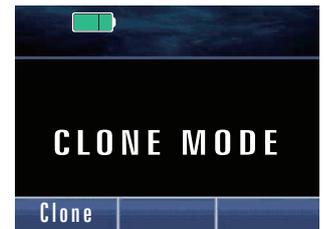
📝 Note

- Refer to the service manual for instructions on how to operate the transceiver in Clone Mode, and for details on the Clone function.
- To end Clone Mode, the transceiver must be turned OFF.
- The following data cannot be copied in Clone Mode:
  - Tuning Data
  - Embedded Message with Password
  - KENWOOD ESN Data
  - P25 ESN Data
  - NXDN ESN Data
- If the data is copied to a transceiver having a different firmware version number, this may result in an error or a failure of the transceiver to function correctly. In such a case, the cloned transceiver operation must be verified prior to using this transceiver on a regular basis.
- Clone Mode does not function in a Multi RF Deck system for Mobile.

Configuration using KPG-D1/ D1N

Configuring whether to permit the use of Clone Mode (🔍See Transceiver Settings > Optional Features > Optional Features 1 > Mode)

| 15.4 | Changing the Configuration of the Transceiver (Front Panel Programming Mode) |

This mode can be used to change data, such as the frequency on a Conventional Channel, and to add a Conventional Channel in the transceiver only.

Even if no KPG-D1/ D1N and PC is available, required data can be configured by using only the transceiver.

Pressing the **Front Panel Programming** key places the transceiver in Front Panel Programming Mode. Or, pressing the **Menu** key places the transceiver in Menu Mode, and the transceiver can be placed in Front Panel Programming Mode by selecting "Panel Program". (Refer to Using Menu Mode.)

📝 Note

To use this mode, a Radio Feature License (KWD-5001FP) is required.

Operating the transceiver

1 Press the Front Panel Programming key.

If Clone/Front Panel Programming Password is not configured:
The transceiver enters Front Panel Programming Mode.

If Clone/Front Panel Programming Password is configured:
The password entry display appears.
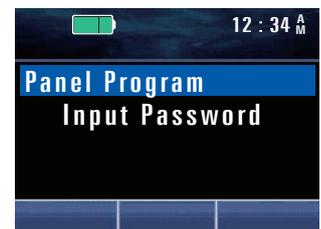
Press the **Menu** ([▢]) or **[*]** key after entering a password.
Refer to "Entering or Deleting a Code" for entry methods.
If the correct password is entered, the transceiver enters Front Panel Programming Mode.

2 Press the Menu ([▢]) or [*] key.

The zone selection display appears.
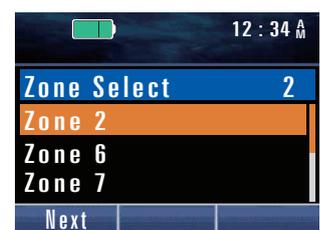
📝 Note

- Refer to the service manual for instructions on how to operate the transceiver in Front Panel Programming Mode.
- To exit Front Panel Programming Mode, press the **Home** (**[🏠]**) key, and then press the **Menu** (**[⬚]**) or **[*]** key on the confirmation screen. The transceiver exits Front Panel Programming Mode and then restarts in User Mode.

Configuration using KPG-D1/ D1N

- Configuring whether to permit the use of Front Panel Programming Mode (🔍See Model > Product Information > Feature Selection)
- Configuring Clone/Front Panel Programming Password (🔍See Transceiver Settings > Optional Features > Optional Features 1 > Password)

15.5 Overwriting the Firmware (Firmware Programming Mode)

Firmware Programming Mode can be used to write the firmware to the transceiver.

Operating the transceiver

1 **Turn the transceiver ON while pressing and holding the AUX key.**

The transceiver enters Firmware Programming Mode.

FIRMWARE PROG

📝 Note

- Refer to the service manual for instructions on how to operate the transceiver in Firmware Programming Mode, and on how to write the firmware to the transceiver.
- To end Firmware Programming Mode, the transceiver must be turned OFF.
- If no firmware is written to the transceiver, the transceiver enters Firmware Programming Mode when the transceiver is turned ON.

Configuration using KPG-D1/ D1N

Configuring whether to permit the use of Firmware Programming Mode (🔍See Transceiver Settings > Optional Features > Optional Features 1 > Mode)

15.6	Checking the Firmware Version (Transceiver Information Mode)

Transceiver Information Mode is the function to display the version of the firmware written in the transceiver and the firmware version and hardware version of the SCM.

Operating the transceiver

1 **Turn the transceiver ON while pressing and holding the Side 3 key (Portable/ KCH-21R (Handheld Control Head)) or the [+] key (Mobile).**

The transceiver enters Transceiver Information Mode. The version number of the transceiver written to the transceiver appears.

Version Info
Firmware
K xx.xx.xx
Info+

2 **Toggle the display by pressing the [▲] or [▼] key.**

The display toggles as follows:

[▼] key

Version Info
Firmware
K xx.xx.xx
Info+

[▼] key   [▲] key

Version Info (SCM)
Firmware
--.-.-
Info+

[▼] key   [▲] key

Version Info (SCM)
Hardware
-.-.-
Info+

[▲] key
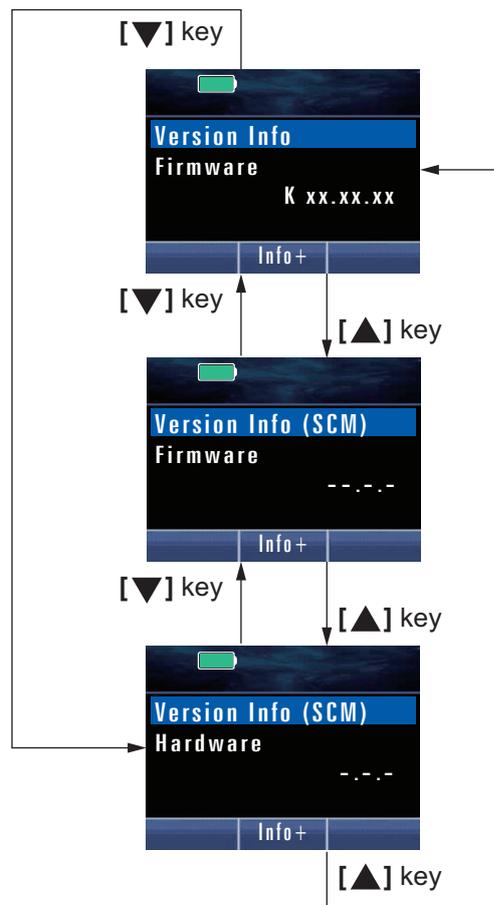
📃 Note

To end Transceiver Information Mode, the transceiver must be turned OFF.

Configuration using KPG-D1/ D1N

Configuring whether to permit the use of Transceiver Information Mode (🔍See | Transceiver Settings > Optional Features > Optional Features 1 > Mode)

15.7 Testing or Adjusting the Transmit and Receive Capabilities of the Transceiver (PC Test Mode/ PC Tuning Mode)

PC Test Mode can be used to test transmit and receive capabilities of the transceiver by using KPG-D1/ D1N.

PC Tuning Mode can be used to adjust transmit and receive capabilities of the transceiver by using KPG-D1/ D1N.

To test or adjust the transceiver in each mode, the transceiver and a PC with KPG-D1/ D1N installed need to be connected by using the programming cable. (Refer to Connecting the Transceiver to a PC.)

After connecting the transceiver and the PC, clicking the "Test Mode" button on the Program menu in the main window of KPG-D1/ D1N opens the Test Mode dialog box. By selecting an item from the tuning item list in the Test Mode dialog box and double-clicking it, the tuning dialog box of the selected item opens.
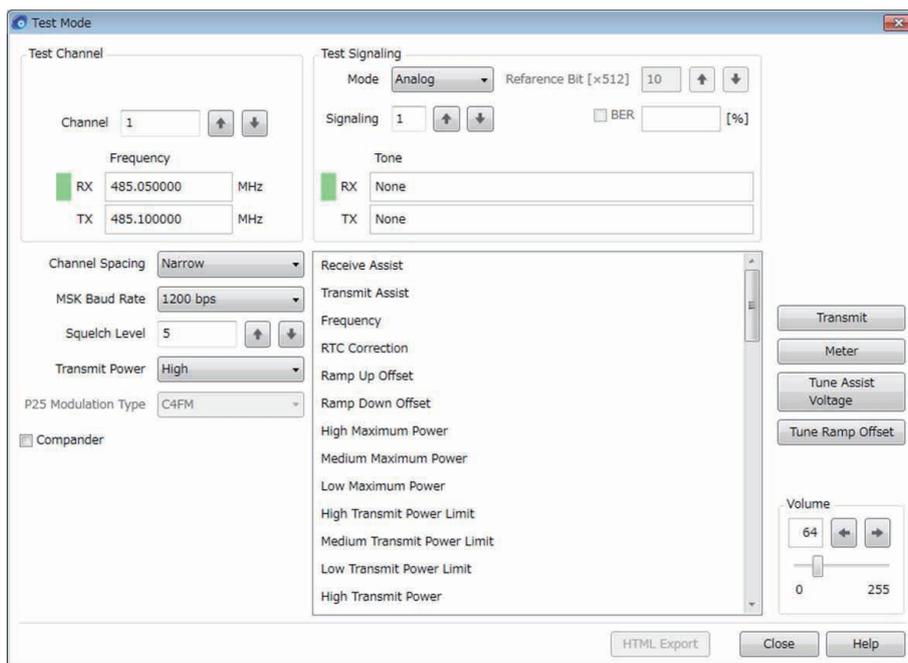
Figure 15-1 Test Mode Dialog Box

📃 Note

Refer to the service manual for operating the transceiver in PC Test Mode and PC Tuning Mode, and instructions on how to adjust transmit and receive capabilities.

Supported Models: Mobile

By connecting 1 or 2 Control Heads to multiple mobile transceivers (RF Decks), 1 Multi RF Deck system can be structured.

Figure 16-1 Multi RF Deck/Multi Control Head

"RF Deck" indicates NX-5700/ NX-5800/ NX-5900, and "Control Head" indicates Basic Panel (KCH-19), Featured Panel (KCH-20R), and Handheld Control Head (KCH-21R).

This chapter describes the basic operations when structuring Multi RF Deck/ Multi Control Head and the behavior of each function.

16.1 Description

In Multi RF Deck/ Multi Control Head, the following functions can be achieved:

- Transceivers can be operated with a combination of different frequencies such as VHF/ UHF/ 700-800 MHz.
- Transceivers can be operated with a combination of different protocols (NXDN, P25, etc.).
- The transceiver can be operated with a combination of different system types, such as Conventional and Trunking.
- Even if a failure occurs, such as the deterioration of the sensitivity of the main transceiver, or the lessening of the transmit power, the other transceivers can be operated continuously as substitute transceivers.
- Multiple transceivers can receive audio simultaneously and each transceiver can emit the audio individually by connecting an external speaker.
- If a Dual Control Head is used, an operator at a remote location can operate the transceiver individually.
- By using Remote Kit for Head (KRK-14H), Remote Kit for RF Deck (KRK-15B), and Remote Control Cable (KCT-71), a system can be structured with a maximum of 2 Control Heads and a maximum of 3 RF Decks.
- In a Multi RF Deck system, a Control Head can operate each RF Deck.
- If KCH-20R or KCH-21R is used, the channel information of multiple connected RF Decks can be displayed on the transceiver display.

16.2 Structures of Multi RF Deck/ Multi Control Head

For Multi RF Deck/Multi Control Head, the following 5 types of structures except Single RF Deck/Single Control Head are available:

	Single Control Head	Dual Control Head
Single RF Deck	RF Deck (NX-5*00) / KRK-15B — KCT-71 — Featured Panel (KCH-20R)	RF Deck (NX-5*00) / KRK-15B — KCT-71, Featured Panel (KCH-20R), Featured Panel (KCH-20R)
Dual RF Deck	RF Deck (NX-5*00) / KRK-15B, RF Deck (NX-5*00) / KRK-15B — KCT-71, Featured Panel (KCH-20R)	RF Deck (NX-5*00) / KRK-15B, RF Deck (NX-5*00) / KRK-15B — KCT-71, Featured Panel (KCH-20R), Featured Panel (KCH-20R)
Triple RF Deck	RF Deck (NX-5*00) / KRK-15B, RF Deck (NX-5*00) / KRK-15B, RF Deck (NX-5*00) / KRK-15B — KCT-71, Featured Panel (KCH-20R)	RF Deck (NX-5*00) / KRK-15B, RF Deck (NX-5*00) / KRK-15B, RF Deck (NX-5*00) / KRK-15B — KCT-71, Featured Panel (KCH-20R), Featured Panel (KCH-20R)

Figure 16-2 Structures of Multi RF Deck/ Multi Control Head

16.3   Building a Multi RF Deck System

By connecting 1 or 2 Control Heads to multiple RF Decks, a Multi RF Deck/ Multi Control Head system can be built.

Refer to "STRUCTURING A MULTI RF DECK/ MULTI CONTROL HEAD" for instructions on how to build a Multi RF Deck/ Multi Control Head system.

16.4   Configuring the Initial Configuration

This section describes the initial configuration for Multi RF Deck/ Multi Control Head. The initial configuration is configured in the following order:

1. Update the firmware.
2. Activate a Radio Feature License (KWD-5004MR).
3. Configure FPU data and write the FPU data to each RF Deck.
4. Configure the DIP switch.

Updating the Firmware

To activate Multi RF Deck/ Multi Control Head, the firmware of firmware version 1.62.00 or later needs to be written. The firmware versions of all RF Decks and Control Heads need to be the same.

In the initial configuration, the firmware is written to each RF Deck. Because KRK-14H and KCH-20R to be connected to KCH-19 are equipped with microcomputers, also write the firmware to KRK-14H and KCH-20R. Write the firmware with RF Decks and Control Heads connected. In this way, the firmware for RF Decks and the firmware for Control Heads can be written simultaneously.

Also, when writing the firmware, note that the configuration of the DIP switch needs to be considered. The DIP switch is equipped on KRK-14H, KRK-15B, and KCH-20R. When writing the firmware in Single RF Deck/Single Control Head, the SW1 to SW4 DIP switches need to be all turned on. SW1 to SW4 are all turned on prior to factory shipment. (Refer to Configuring the DIP Switch.)

16.4 Configuring the Initial Configuration

The following is the procedure to write the firmware if 3 RF Decks are used:

1 **Make the system in a Single RF Deck/ Single Control Head structure.**

Combination of Remote Kits varies depending on the type of Control Head.

Basic Panel (KCH-19)   Featured Panel (KCH-20R)
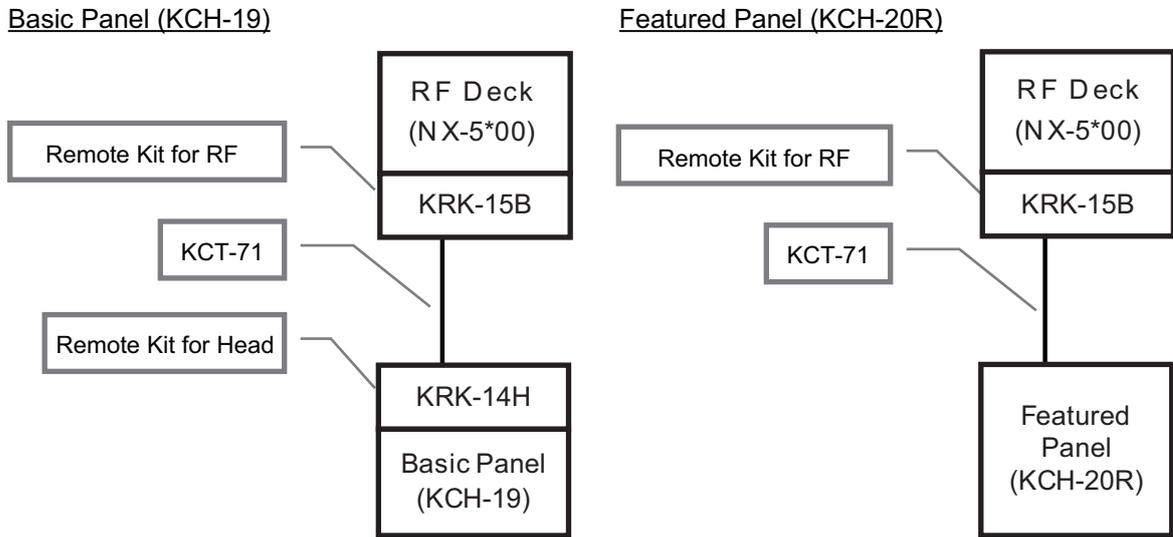
Figure 16-3 Single RF Deck/ Single Control Head

2 **Write the firmware of version 1.60.00 or later to each RF Deck with the Control Heads and RF Decks connected.**

The firmware is written to the Control Heads and RF Decks.
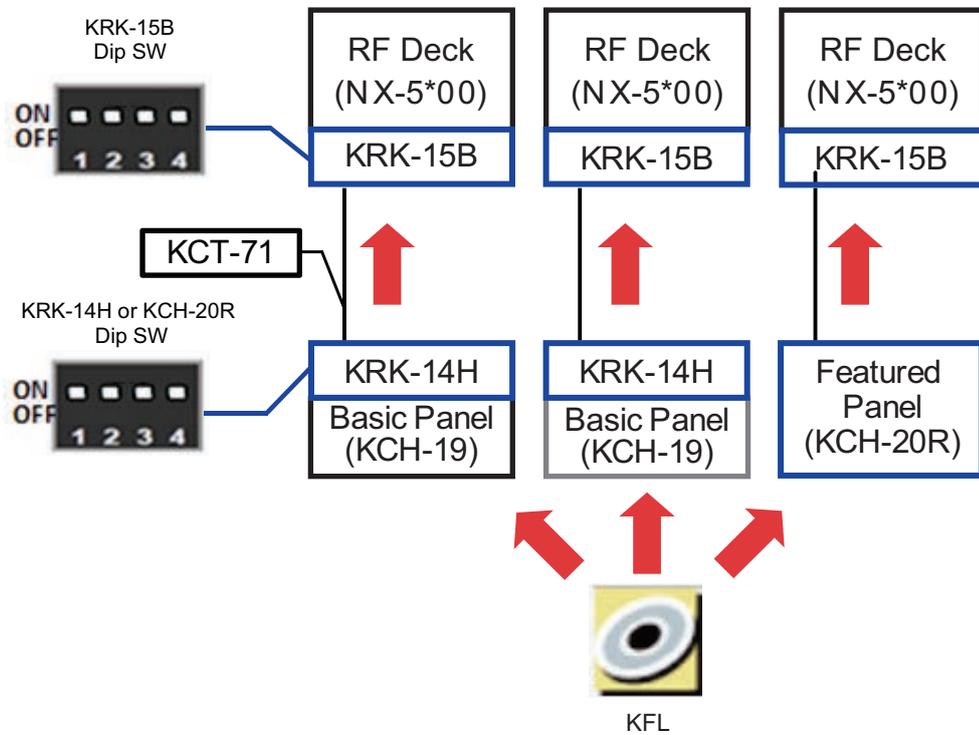
Figure 16-4 Writing the Firmware

📋 Note
- The firmware is written to KRK-14H and KCH-20R at the factory. If the firmware of the Control Head and the firmware of the RF Deck do not match, "FIRM MISMATCH" appears.
- Because the firmware needs to be written to each panel to make a system in a Dual Control Head structure, update the firmware by using both Control Heads.
- Once the initial configuration is done, if a system is made in a Multi RF Deck/ Multi Control Head structure, the firmware can be written to multiple RF Decks simultaneously.
- KCT-71 has parts of the following 3 lengths:

  KCT-71M2: 17 feet (5.2 m)

  KCT-71M3: 25 feet (7.6 m)

  KCT-71M4: 1.6 feet (0.5 m)

Activating a Radio Feature License (KWD-5004MR)

To use the Multi RF Deck/ Multi Control Head function, a Radio Feature License (KWD-5004MR) for a Multi RF Deck needs to be activated for the transceiver by using KPT-300LMC. In the same manner as the writing of the firmware, activate the Radio Feature License for each RF Deck. The following is the operation procedure to use 3 RF Decks:

1 **Make the system in a Single RF Deck/ Single Control Head structure.**

2 **Activate the Radio Feature License (KWD-5004MR) for each RF Deck with the Control Heads and RF Decks connected.**
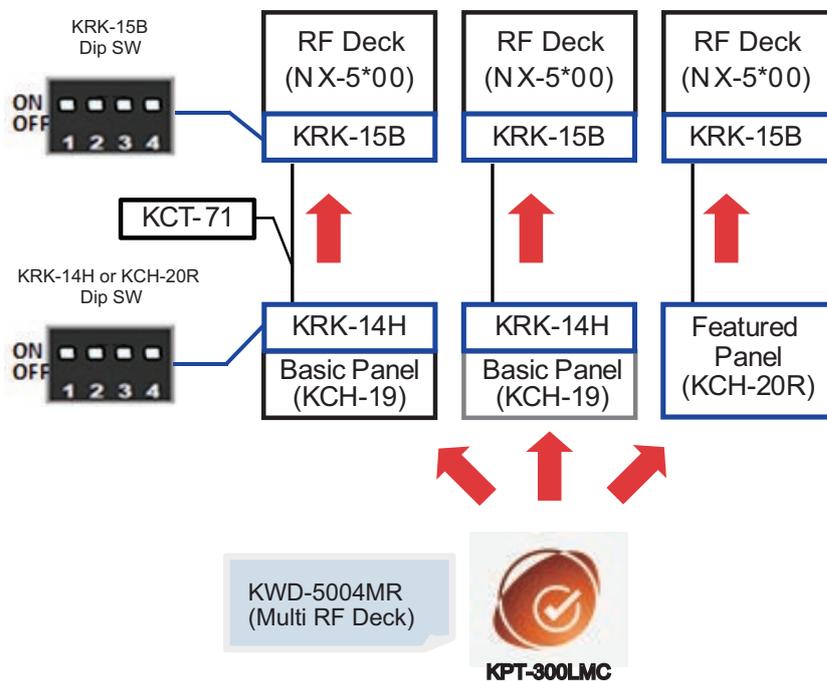
Figure 16-5 Activation of the Radio Feature License (KWD-5004MR)

📋 Note

KWD-5004MR (Multi RF Deck) is activated before the factory shipment. No charge is incurred for activation.

Configuring the FPU Data and Writing the FPU Data to Each RF Deck

FPU data that supports Multi RF Deck/ Multi Control Head can be created by using KPG-D1/ D1N having firmware version 1.60 or later.

For example, this section describes the procedure to create FPU data for Triple RF Deck/ Dual Control Head.

The frequency configuration is UHF for RF Deck 2 and 700/ 800 MHz for RF Deck 3. Create FPU data for each RF Deck (frequency).

📝 Note

The procedure to write FPU data for Single RF Deck/ Dual Control Head differs from the procedure to write FPU data for Multi RF Deck/Multi Control Head.

1 **Make the system in a Single RF Deck/ Single Control Head structure, and write FPU data to each RF Deck.**
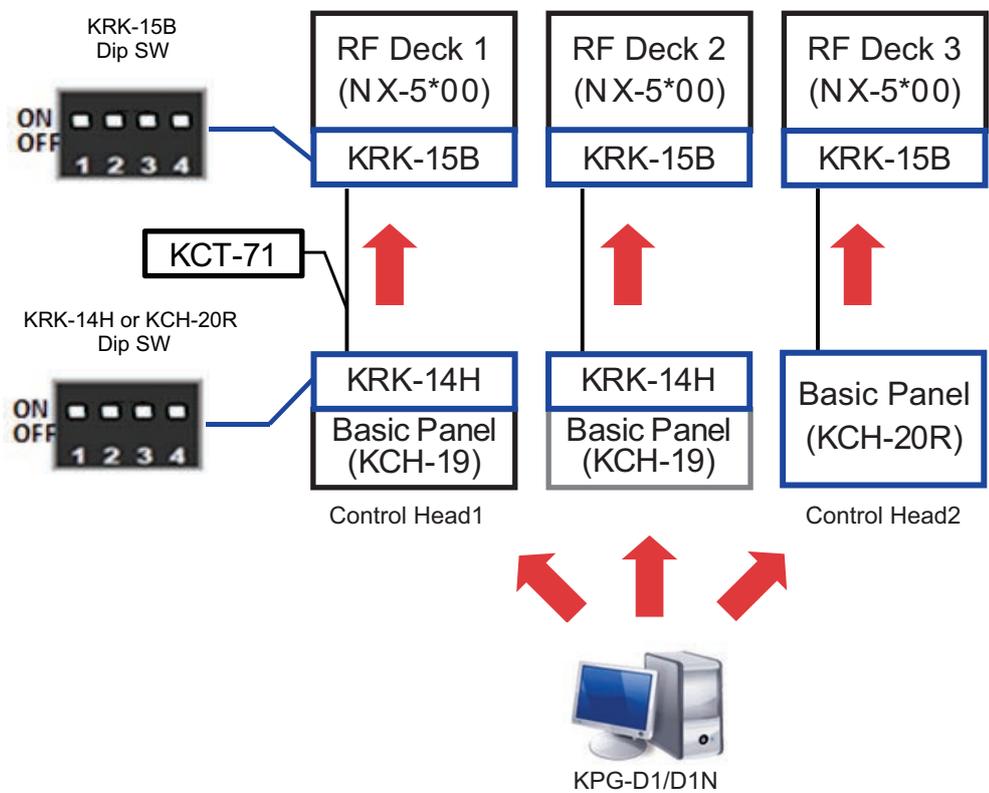
Figure 16-6 Single RF Deck/ Single Control Head

2 **Create FPU data by using KPG-D1/ D1N.**

For example, create FPU data for VHF.

- Specify Model Name and enable Multi RF Deck in Product Information.
- Select the Control Head to be connected to RF Deck 1 from Control Head 1.
- Select the Control Head to be connected to RF Deck 2 from Control Head 3.

📝 Note

To write FPU data even when connecting a Featured Panel to Control Head 2, a Basic Panel needs to be connected to write the FPU data. If Basic Panel is configured for Control Head 1 in the FPU data configuration, the FPU data cannot be written with a Featured Panel connected.
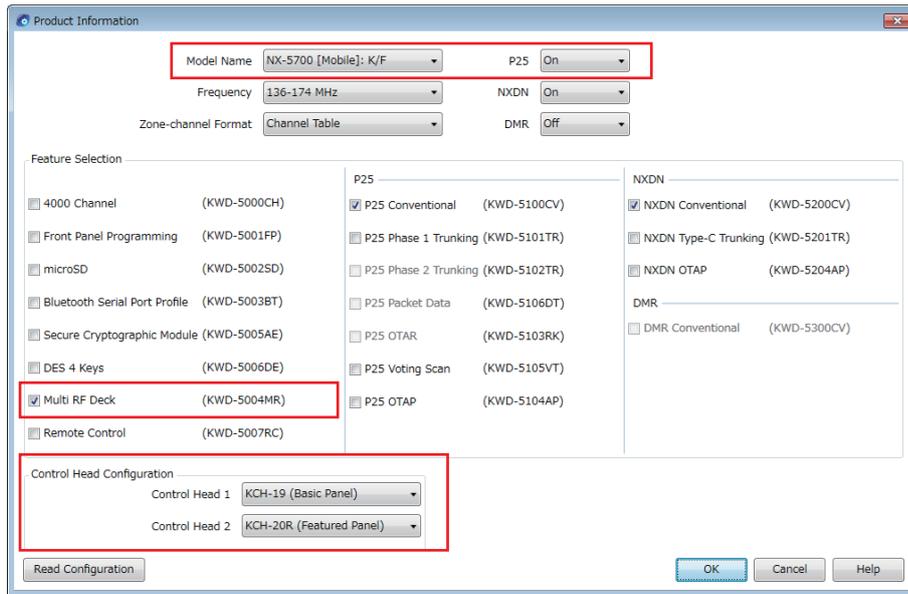
Figure 16-7 KPG-D1 > Model > Product Information

3   **Configure the channel information, Key Assignment, and other functions.**

4   **Store the created FPU data for VHF.**

5   **With the same procedure described in step 2 to step 4, create FPU data for UHF and for 700/ 800 MHz, and store each FPU data.**

6   **Click the "Multi RF Deck Setup" button.**

Figure 16-8 KPG-D1 > Program > Multi RF Deck Setup

7 **In RF Deck Data A, RF Deck Data B, and RF Deck Data C of Multi RF Deck Setup, open all FPU data for RF Decks created beforehand by clicking the "Select File" button.**

Master Operation Data is a configuration item in common in all RF Decks. The common data is reflected in the other RF Decks based on the common data of 1 RF Deck. Therefore, the inconsistency of the common data among RF Decks does not occur.

The configuration items included in the common data can be confirmed in the help texts of KPG-D1/ D1N.
Select "RF Deck Data A" in Master Operation Data.
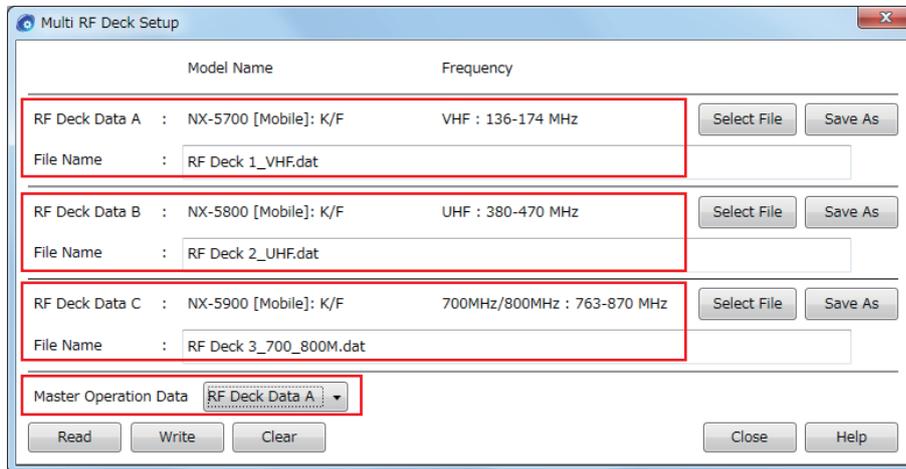
Figure 16-9 Multi RF Deck Setup

8 **Open FPU data and select the common data.**

The "Write" button is activated.

9 **Click the "Write" button.**

RF Deck Selection appears.

Select "RF Deck Data A", the data for VHF, from FPU Data Selection of RF Deck 1.
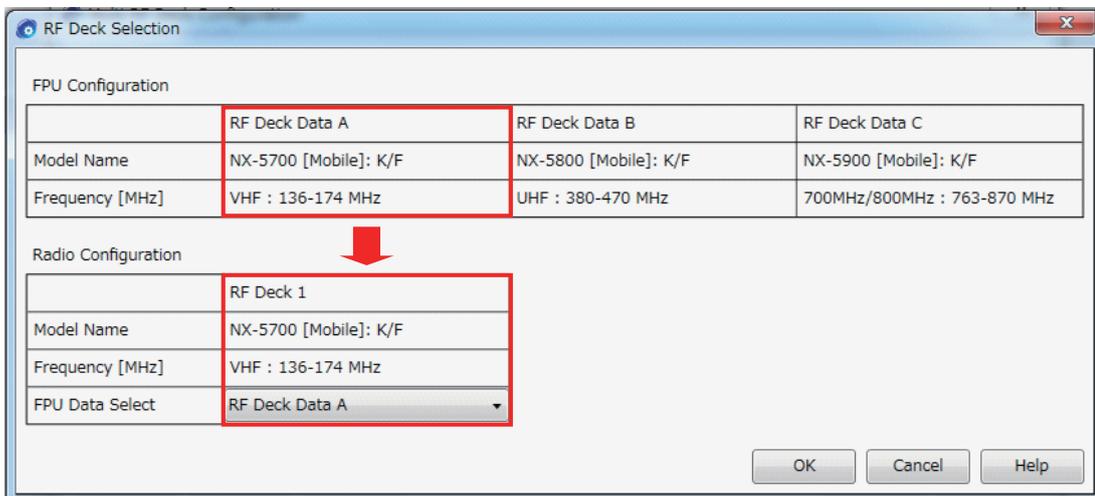
Figure 16-10 RF Deck Selection

10 **Click the "OK" button in RF Deck Selection.**

Write Data to the Transceiver appears and writing can be executed.
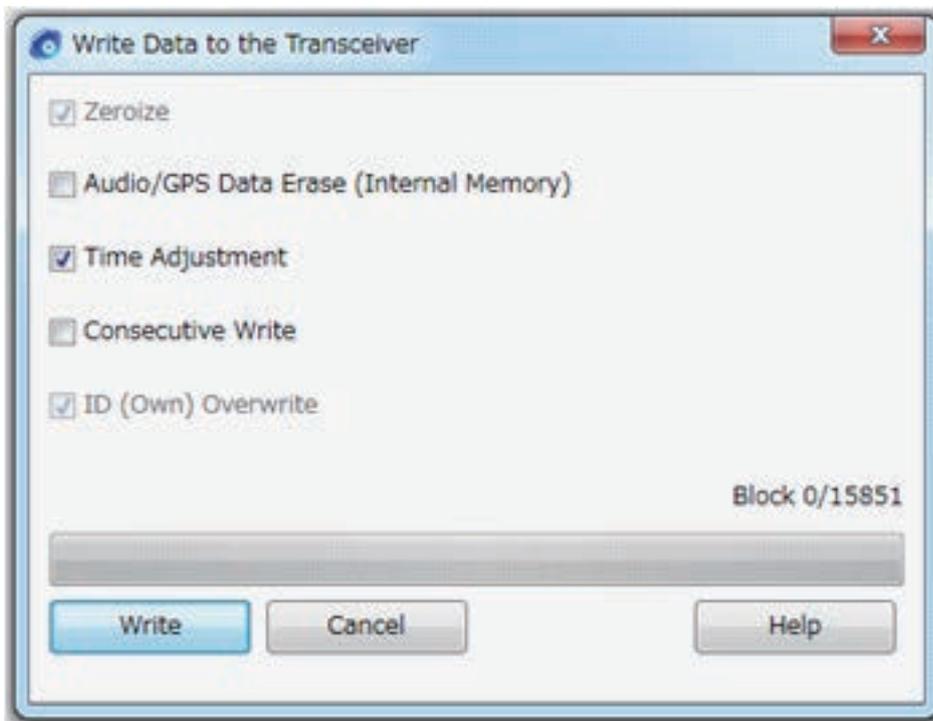
Figure 16-11 Write Data to the Transceiver

11 **With the same procedure as step 8 to step 10, write FPU data for UHF to RF Deck 2 and for 700/ 800 MHz to RF Deck 3.**

12 Connect all RF Decks and Control Heads, and configure the Dip switch.

The Dip switch needs to be configured to place the transceiver in the Triple RF Deck/ Dual Control Head state.
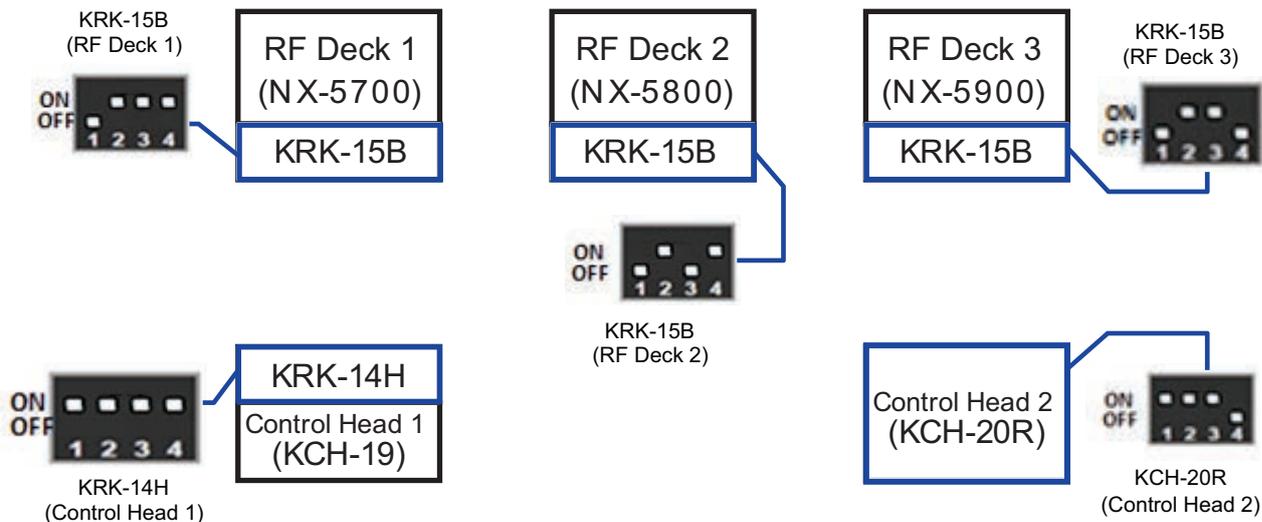
Figure 16-12 DIP Switch Configuration

13 Connect all RF Decks and Control Heads by using KCT-71.

The Control Head to be connected to RF Deck 1 is Control Head 1.

The Control Head to be connected to RF Deck 3 is Control Head 2.

No Control Head is connected to RF Deck 2.
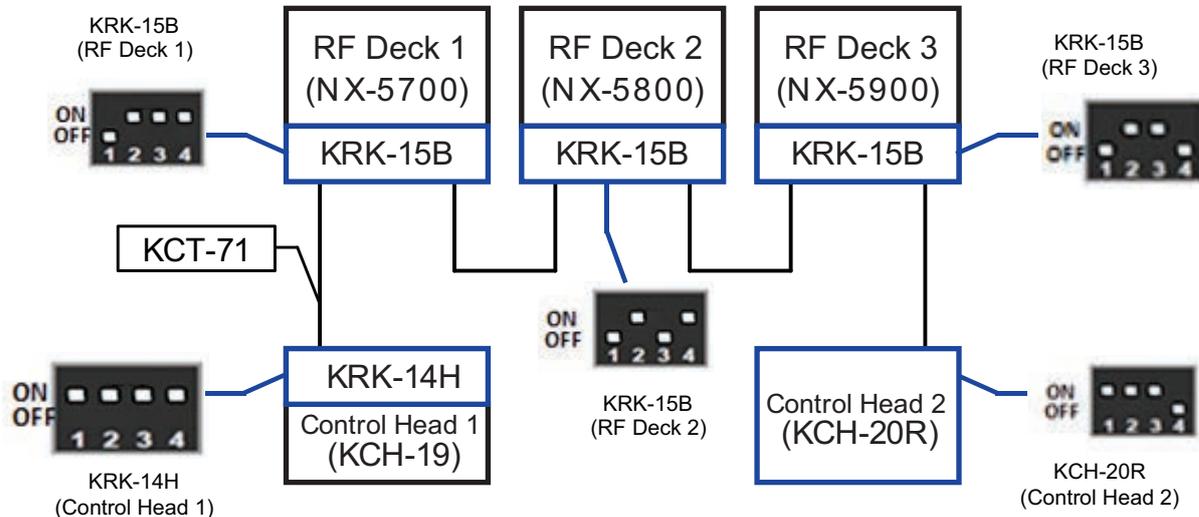
Figure 16-13 Connection of RF Decks and Control Heads

14 **If "FPU MISMATCH" appears on the transceiver after connection, write each RF Deck Data to all transceivers.**

- Select "RF Deck Data A", the data for VHF, from FPU Data Selection of RF Deck 1.
- Select "RF Deck Data B", the data for UHF, from FPU Data Selection of RF Deck 2.
- Select "RF Deck Data C", the data for 700/ 800 MHz, from FPU Data Selection of RF Deck 3.

After selection, the FPU data can be written simultaneously.
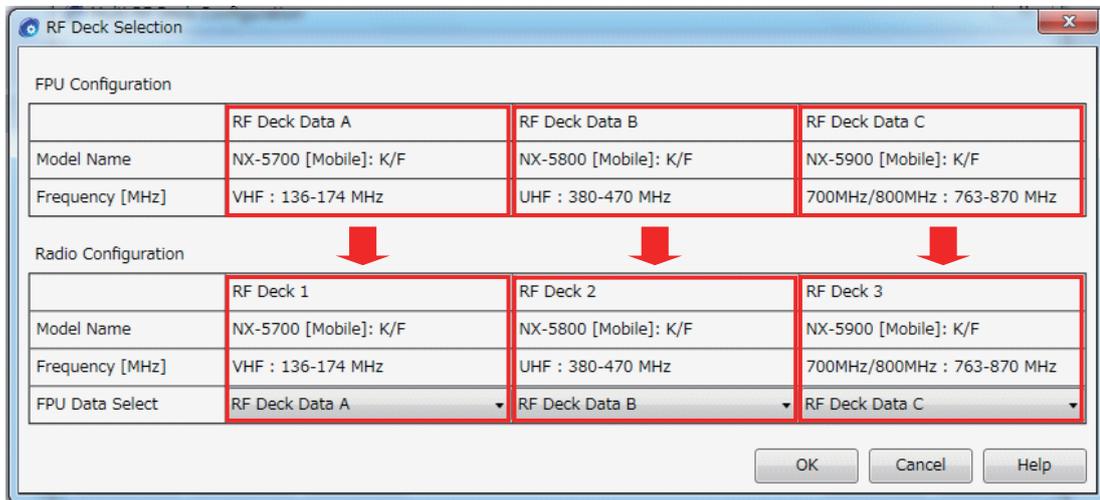
Figure 16-14 RF Deck Selection

Configuring the DIP Switch

The configuration of the DIP switch is important for making a system in a Multi RF Deck/ Multi Control Head structure behave properly. KRK-14H (Remote Kit for Head), KRK-15B (Remote Kit for RF Deck), and KCH-20R (Featured Panel) are equipped with the DIP switch. The DIP switch is the switch for managing the order of RF Decks and Control Heads connected in the system and for determining the terminal of CAN (Controller Area Network) communication. The purpose of each switch is as follows:

Table 16-1 DIP Switch

DIP Switch		KCH-20R/ KRK-14H (Control Head Side)	KRK-15B (RF Deck Side)
	SW1	Not used	For the terminal of CAN communication
	SW2	Not used	Not used
	SW3	Not used	For the numbering of RF Decks
	SW4	For the numbering of Control Heads	

The numbering of RF Decks and Control Heads by using the DIP switch is important to structuring Multi RF Deck/ Multi Control Head. If the RF Decks and Control Heads are not numbered correctly, the system may not start up properly. Number the RF Decks and Control Heads based on the following conditions, and correctly configure the DIP switch.

- The Control Head to be connected to RF Deck 1 is Control Head 1.
- The Control Head to be connected to RF Deck 3 is Control Head 2.
- No Control Head is connected to RF Deck 2.
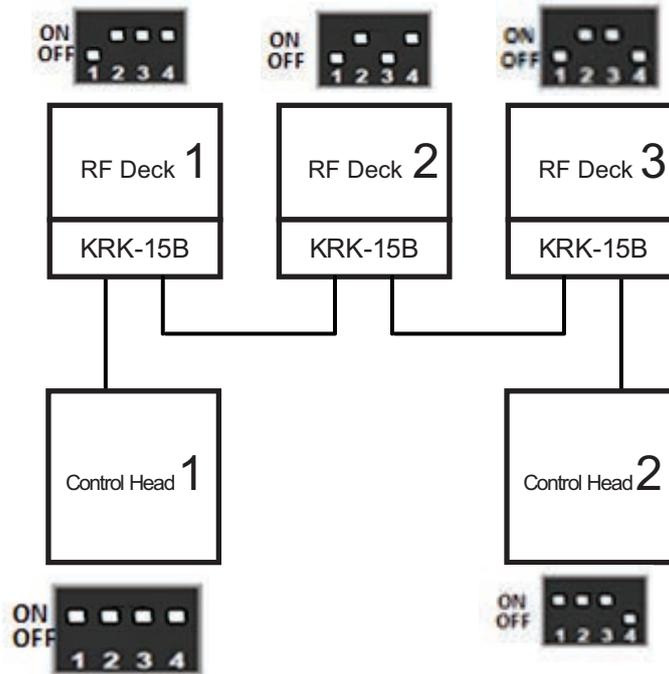
Figure 16-15 DIP Switch Configuration

Data communication of Control Heads and RF Decks occurs by using CAN. According to the High Speed CAN standards, a 120 ohm termination is required for CAN. The following figure is a block diagram of CAN communication between a Control Head and an RF Deck:
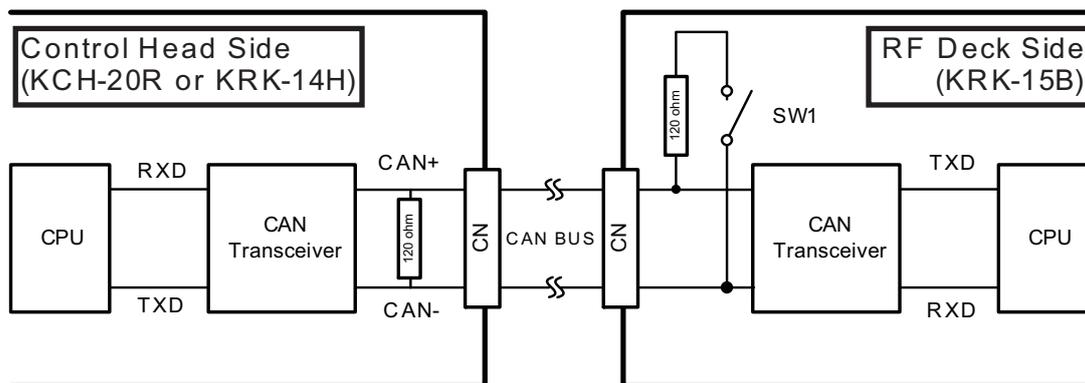
Figure 16-16 Block Diagram of CAN Communication

Because the Control Head is always the terminal, the terminal does not need to be considered if a Dual Control Head structure. If an RF Deck is the terminal, configure On the configuration of SW1 of the RF Deck. As the information to determine that an RF Deck is the terminal, if only one of the connectors to which KCT-71 implemented on KRK-15B is connected is used, the RF Deck to which the KRK-15B is connected is the terminal.

For Dual RF Deck/ Single Control Head, KRK-15B to be connected to RF Deck 2 is the terminal. For Triple RF Deck/ Single Control Head, KRK-15B to be connected to RF Deck 3 is the terminal.
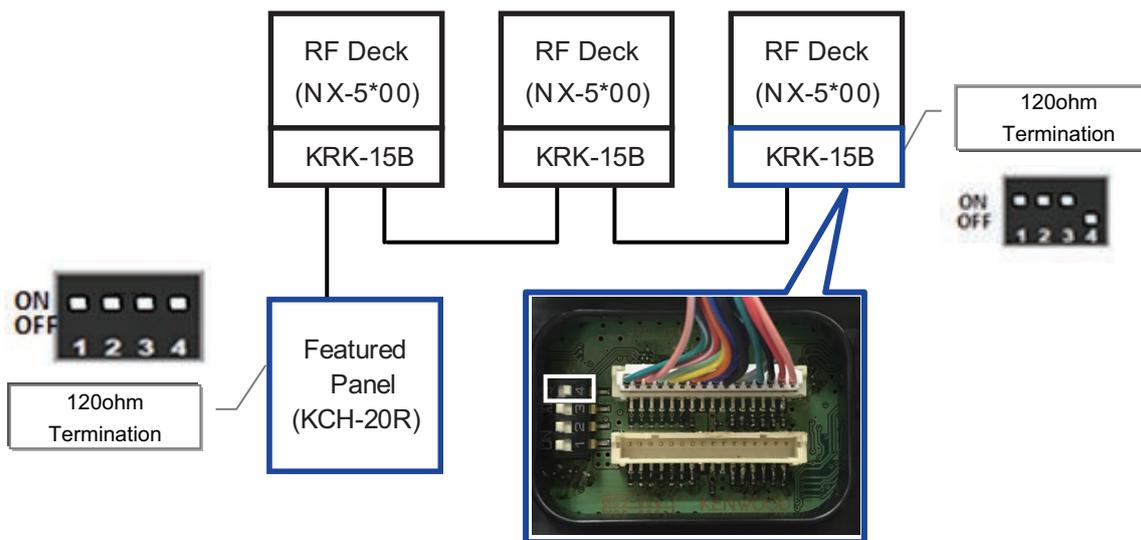
Figure 16-17 Triple RF Deck/ Single Control Head

📋 Note

- For a Single Control Head structure, the DIP switch configuration of the Control Head needs to be the Control Head 1 configuration. If the DIP switch configuration is the Control Head 2 configuration, the system may not start up properly. For a Single Control Head structure, only Control Head 1 exists as a Head.

- For a Multi RF Deck system, the DIP switch with the RF Deck 1 configuration is always required in the system. For example, for a Dual RF Deck structure, the configurations of the DIP switches consist of the RF Deck 2 configuration and the RF Deck 3 configuration, the system may not behave properly.

- If CAN is not terminated, the LCD may not display and key operations may be disabled because the waveform of the data flowing through the CAN bus line is collapsed. To make CAN communication properly, CAN must be terminated in a 120 ohm resistor in the RF Deck configured as the terminal.

The switch status configured in each hardware structure

The following is the switch status configured in each hardware structure:

Case 1: Single RF Deck/ Single Control Head
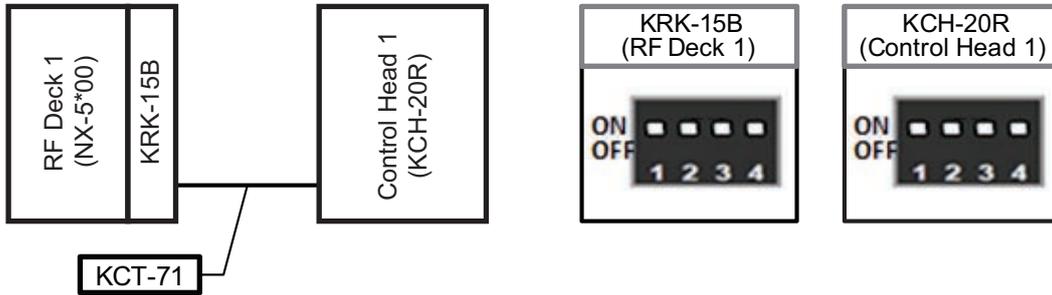
Figure 16-18 Case 1: Single RF Deck/ Single Control Head

Case 2: Single RF Deck/ Dual Control Head
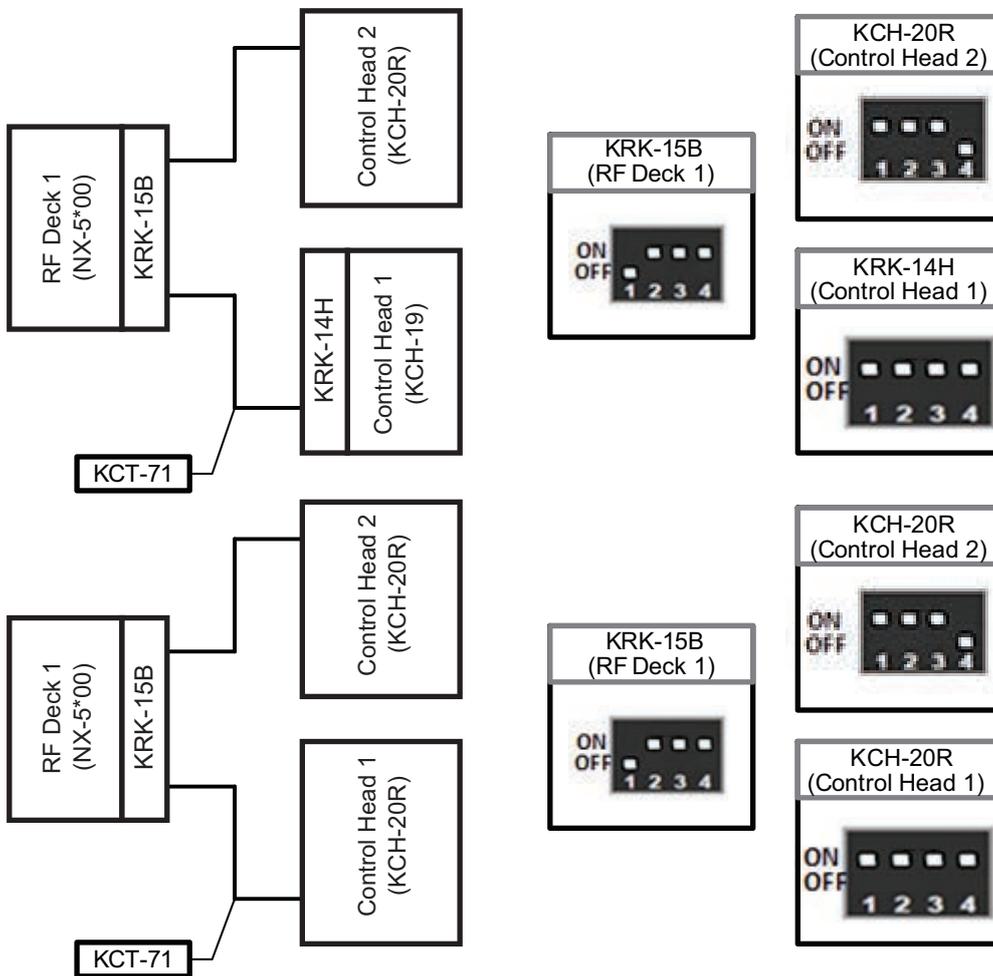
Figure 16-19 Case 2: Single RF Deck/ Dual Control Head

16.4 Configuring the Initial Configuration

Case 3: Dual RF Deck/ Single Control Head
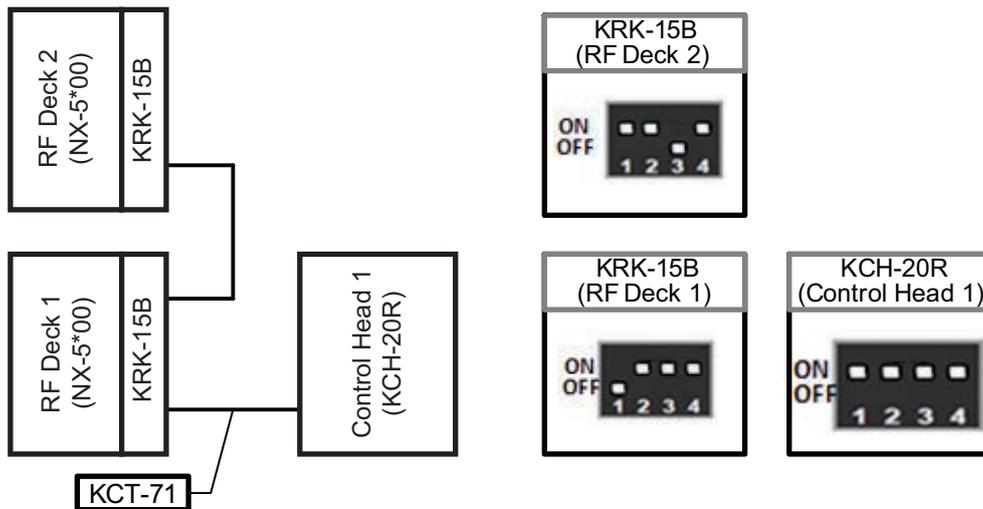
Figure 16-20 Case 3: Dual RF Deck/ Single Control Head

Case 4: Dual RF Deck/ Dual Control Head
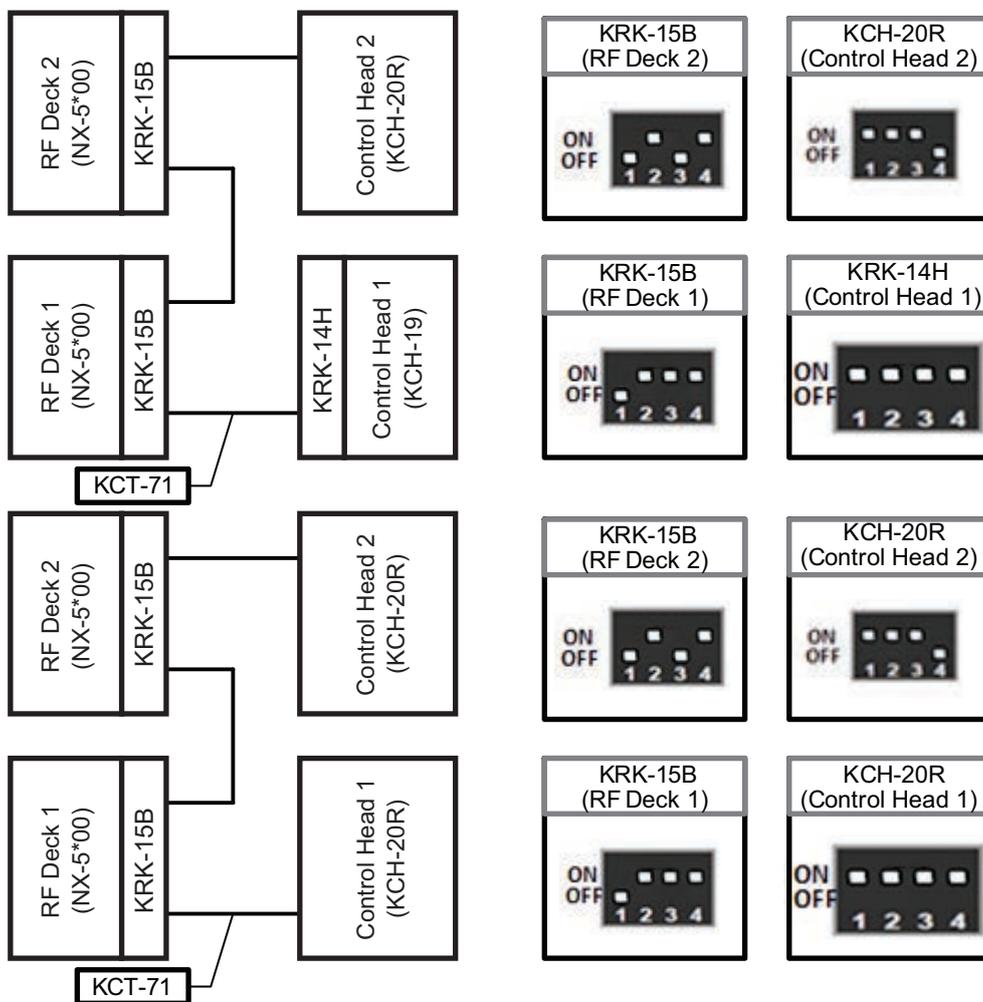
Figure 16-21 Case 4: Dual RF Deck/ Dual Control Head

Case 5: Triple RF Deck/ Single Control Head
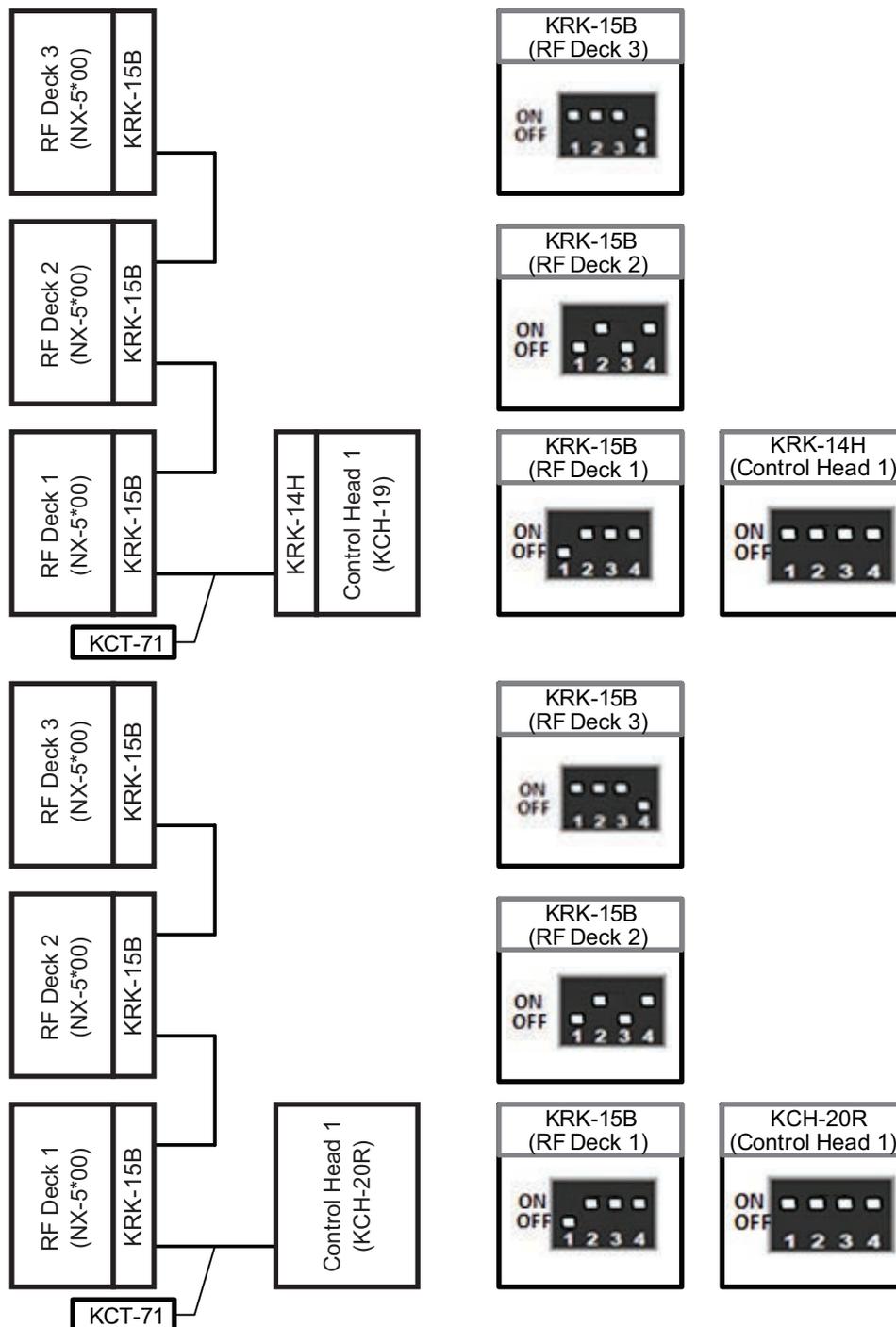
Figure 16-22 Case 5: Triple RF Deck/ Single Control Head

Case 6: Triple RF Deck/ Dual Control Head
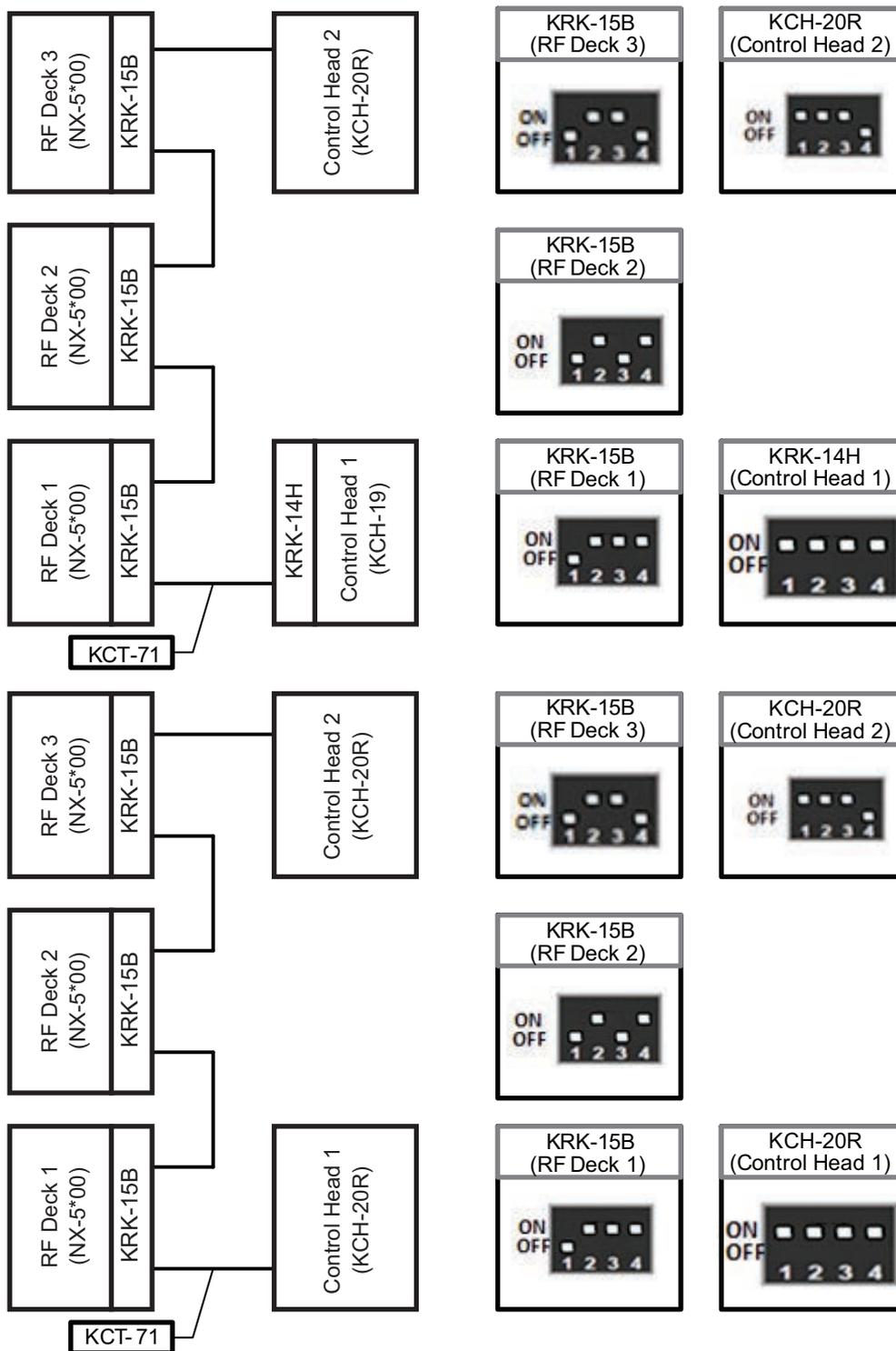
Figure 16-23 Case 6: Triple RF Deck/ Dual Control Head

16.5 Basic Operations

For the NX-5000 series, each RF Deck can behave independently. However, as an exception, some functions behave as a Multi RF Deck/Multi Control Head structure.

In the following description of basic operations, the terms "Selected RF Deck" and "Unselected RF Deck" are used.

"Selected RF Deck" indicates an RF Deck that can be operated from a Control Head in a Multi RF Deck system. Only one "Selected RF Deck" exists in a Multi RF Deck system.

Also, "Unselected RF Deck" indicates an RF Deck that cannot be operated from a Control Head.

In a Dual RF Deck structure, one "Selected RF Deck" and one "Unselected RF Deck" exist. In a Triple RF Deck structure, one "Selected RF Deck" and two "Unselected RF Deck" exist.

Operating a Control Head

In a Multi RF Deck system, a Control Head can operate the Selected RF Deck.

If the Control Head is KCH-19, the channel name of the Selected RF Deck can be displayed on the Control Head display. If the Control Head is KCH-20R or KCH-21R, all channel names of the Multi RF Deck can be displayed on the Control Head display at the same time.

In the following figure of display examples, the orange icons indicate that RF Deck 1 is the Selected RF Deck.

KCH-19   KCH-20R

KCH-21R

Figure 16-24 Display Example on the Display

Dual Control Head

If connecting 2 Control Heads (Dual Control Head) to an RF Deck, each Control Head can operate the RF Deck. In a Multi RF Deck system, the Selected RF Deck can be operated from 2 Control Heads. For Dual Control Head, KCH-19, KCH-20R, and KCH-21R can exist together.

> 📝 Note
> - For Dual Control Head, basically all Control Heads display the same contents (display mirroring). However, as an exception, display mirroring may be disabled.
> - For Dual Control Head, the LEDs of all Control Heads function together. The LED lights green when receiving and lights red when transmitting.
> - The functions can be configured for each key for each Control Head; therefore, the display of Key Guide may differ from the key assignment.

RF Deck Select

In a Multi RF Deck system, the Selected RF Deck can be manually switched from a Control Head. The configurations of RF Decks can be changed by any of the following key operations:
1. By assigning "RF Deck 1", "RF Deck 2", and "RF Deck 3" to the **PF** keys, the Selected RF Deck can be switched directly.
2. By assigning "RF Deck Select" to the **PF** key, the Selected RF Deck can be switched sequentially as follows:

In a Triple RF Deck structure:

Pressing the **RF Deck Select** key switches the Selected RF Deck as follows:
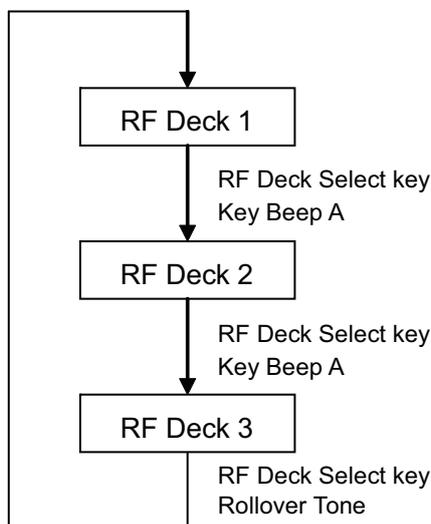
Figure 16-25 RF Deck Select (Triple RF Deck)

In a Dual RF Deck structure:

Pressing the **RF Deck Select** key switches the Selected RF Deck as follows:
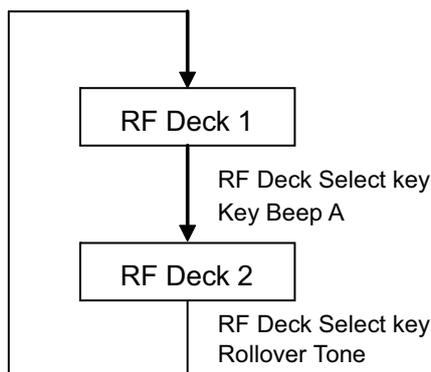
Figure 16-26 RF Deck Select (Dual RF Deck)

> 📋 Note
>
> RF Deck 1 always becomes the Selected RF Deck after the FPU data is written.

Multi RF Deck View

For KCH-20R or KCH-21R, if **Multi RF Deck View** is enabled, the channel names of all RF Decks in a Multi RF Deck system can be displayed simultaneously on the display.

Also, if **Multi RF Deck View** is disabled, only the channel of the Selected RF Deck is displayed.

The configuration in Multi RF Deck View can be changed by any of the following key operations:

1. Pressing the **Multi RF Deck View** key can toggle **Multi RF Deck View** between On and Off.
2. Entering Menu Mode by pressing the **Menu** key, and then executing "Multi RF Deck View" can toggle **Multi RF Deck View** between On and Off.

The following is the display for Triple RF Deck:
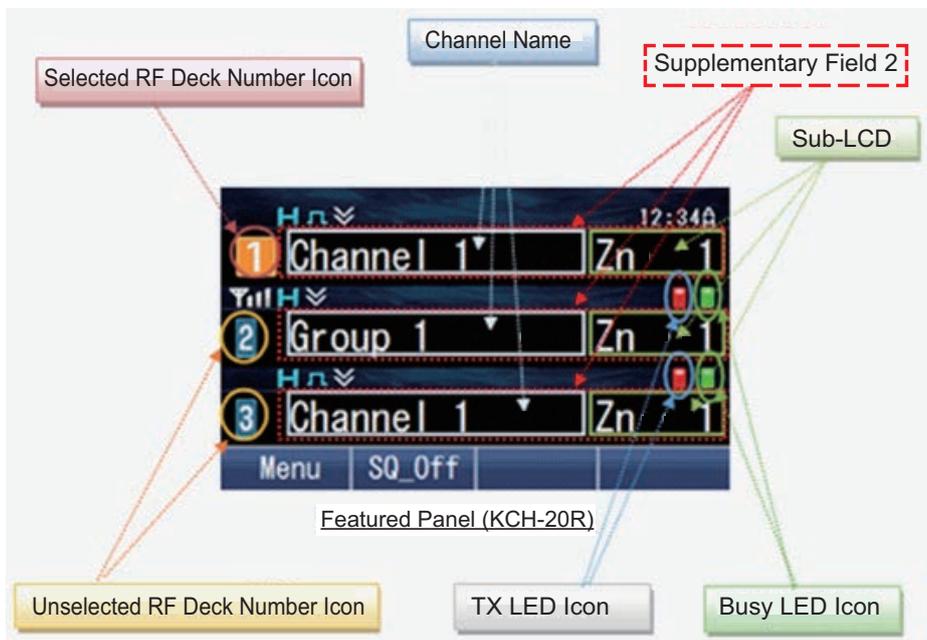
Figure 16-27 Multi Deck View (Triple RF Deck)

The following is the display for Dual RF Deck:
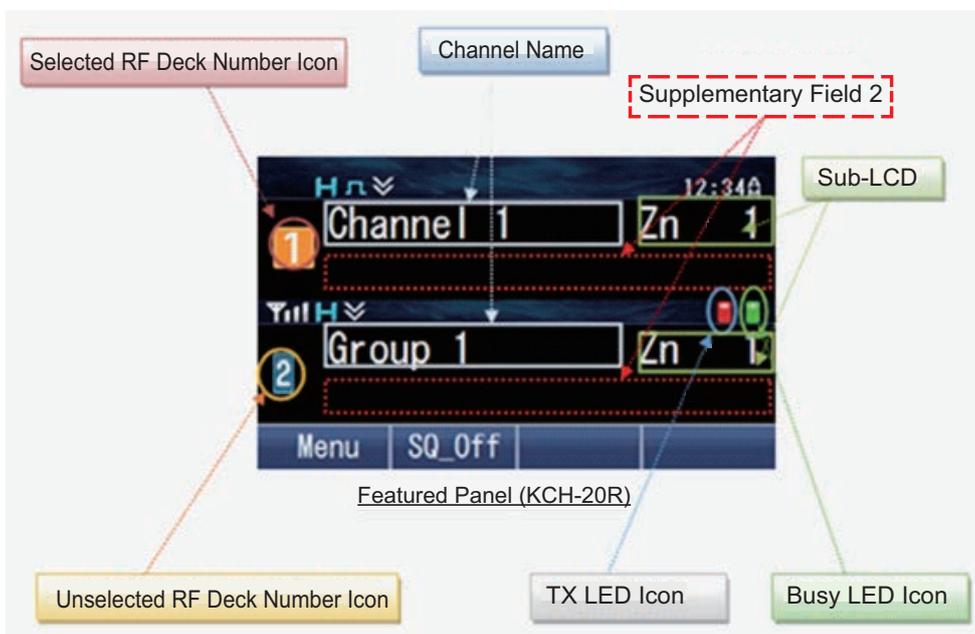
Figure 16-28 Multi Deck View (Dual RF Deck)

Receiving

If operating in a Multi RF Deck system, all RF Decks can receive simultaneously. The received audio of the Selected RF Deck is emitted from the speaker of a Control Head. Similarly, if operating in a Dual Control Head structure, the received audio of the Selected RF Deck is emitted from the speakers of both Control Heads. Additionally, if an external speaker is used, the received audio of Unselected RF Decks can be emitted. To emit the received audio from the external speaker (KES-3 or KES-5) and the speakers of the Control Heads at the same time, "Internal + External" needs to be configured in **External Speaker**.

The conditions of the received audio to be emitted when connecting the external speaker to each RF Deck in a Dual RF Deck/ Dual Control Head structure are as follows:

Case 1: Received by the Selected RF Deck

The audio received by the Selected RF Deck is emitted from Control Head 1, Control Head 2, and the external speaker connected to the Selected RF Deck. Also, the LED lights green.
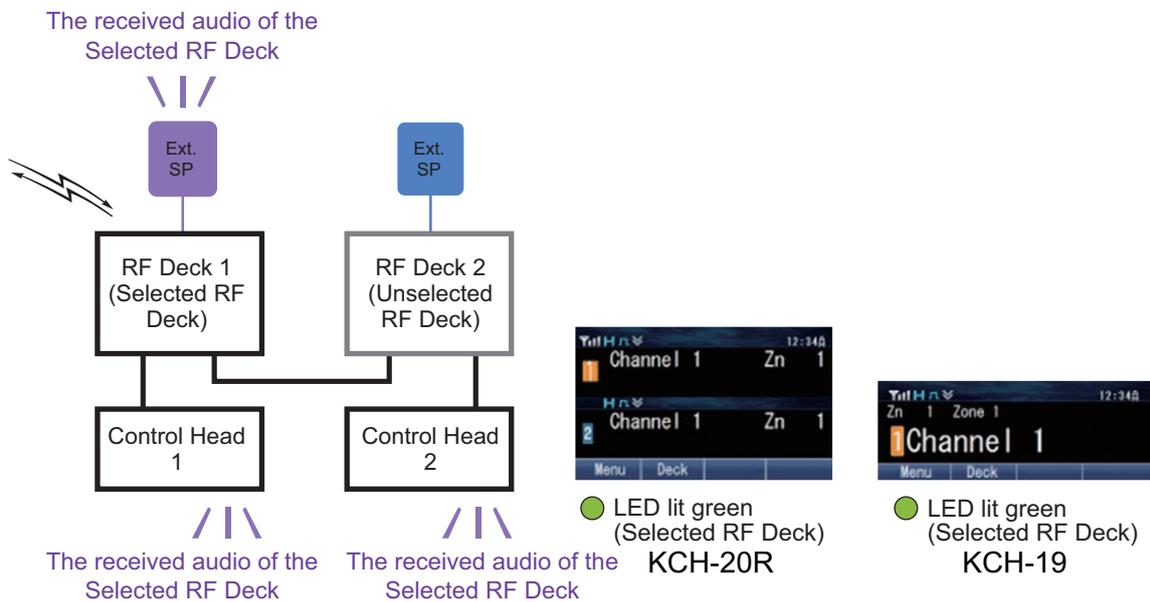
Figure 16-29 Case 1: Received by the Selected RF Deck

Case 2: Received by the Unselected RF Deck

The audio received by the Unselected RF Deck is emitted from the external speaker connected to the Unselected RF Deck. Also, if KCH-20R is used, the "BusyLED" icon appears alongside of the receiving Unselected RF Deck on the display.
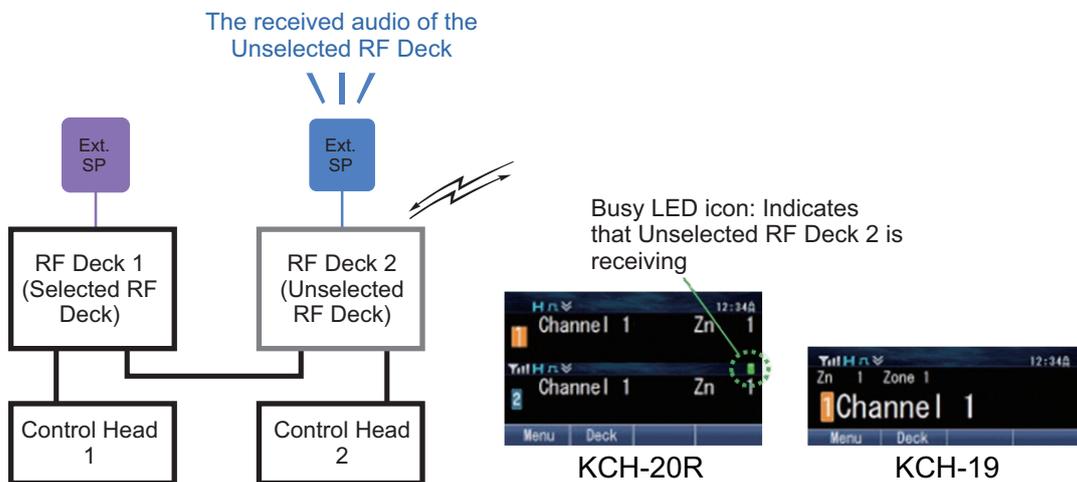
Figure 16-30 Case 2: Received by the Unselected RF Deck

Case 3: Received by the Selected RF Deck + received by the Unselected RF Deck (simultaneous reception)

The audio received by the Selected RF Deck is emitted from Control Head 1, Control Head 2, and the external speaker connected to the Selected RF Deck. Simultaneously, the audio received by the Unselected RF Deck is emitted only from the external speaker connected to the Unselected RF Deck. Also, the LED of the Selected RF Deck lights green, and the "BusyLED" icon appears alongside of the receiving Unselected RF Deck on the display of KCH-20R.
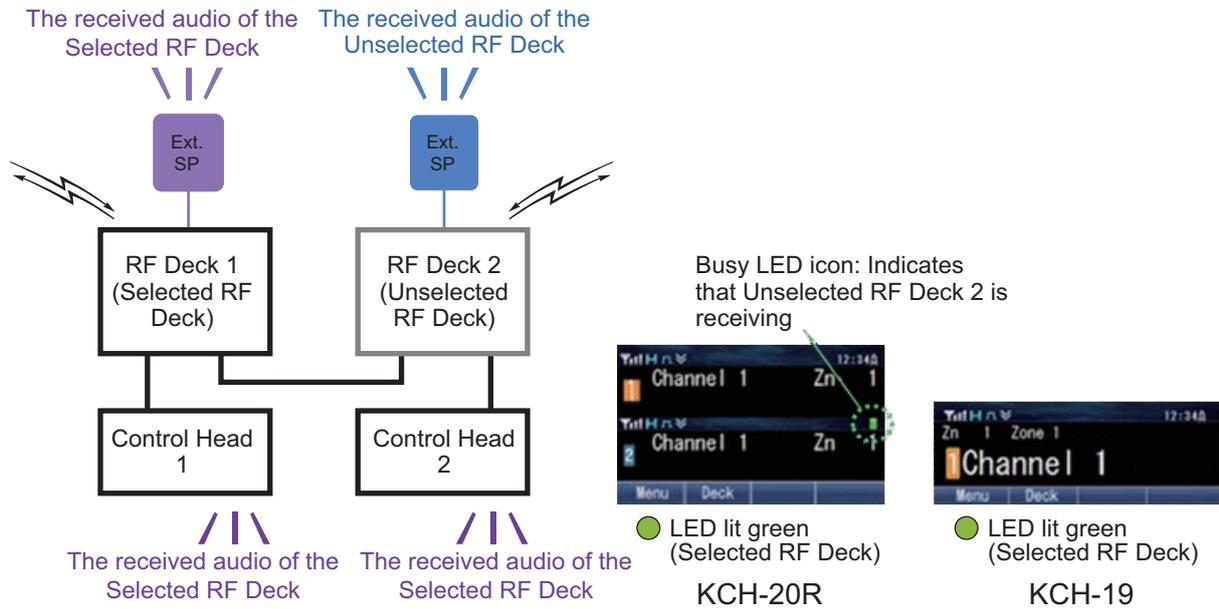
Figure 16-31 Case 3: Received by the Selected RF Deck + received by the Unselected RF Deck (simultaneous reception)

Transmitting

If operating in a Multi RF Deck system, only the Selected RF Deck transmits when the PTT is operated on a Control Head. Similarly, if operating in a Dual Control Head structure, the PTT operations of both Control Heads are enabled. Also, if the External PTT connected to a D-sub connector is operated, the connected RF Deck transmits individually.

The following are the transmission statuses assumed if the External PTT is connected to the D-sub connector of each RF Deck in a Triple RF Deck/ Dual Control Head structure:

Case 1: Transmitting by the Mic PTT of a Control Head

If transmission operation is done by the Mic PTT of Control Head 1 or Control Head 2, only the Selected RF Deck transmits. Also, the LED lights red.
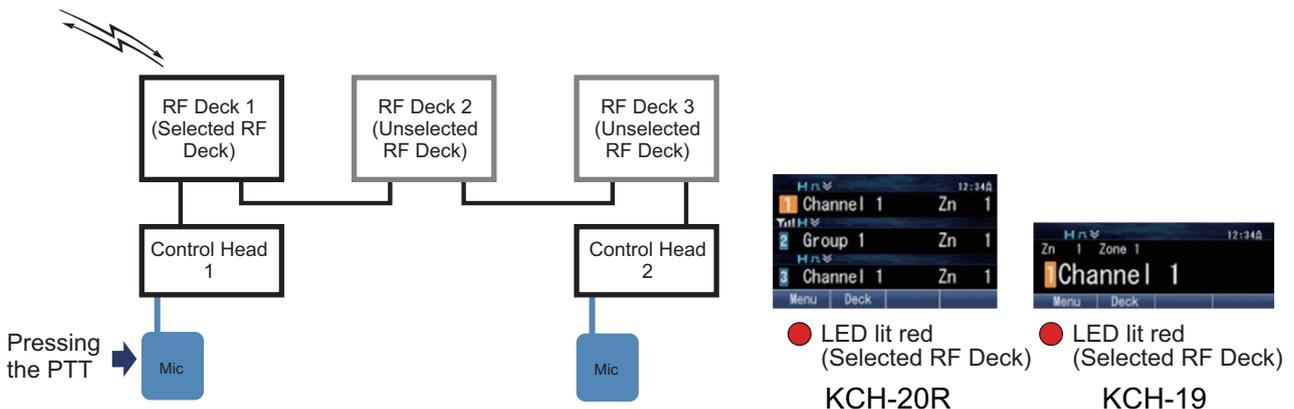
Figure 16-32 Case 1: Transmitting by the Mic PTT of a Control Head

Case 2: Transmitting by the External PTT connected to a D-sub connector

If the External PTT is connected to all RF Decks, each RF Deck transmits individually.

If the External PTT connected to the D-sub connector of the Selected RF Deck is operated, the behavior is the same as that of Case 1.

If the External PTT connected to the D-sub connector of an Unselected RF Deck is operated, the Unselected RF Deck transmits, and the "TX LED" icon appears alongside of the transmitting Unselected RF Deck on the display of KCH-20R.
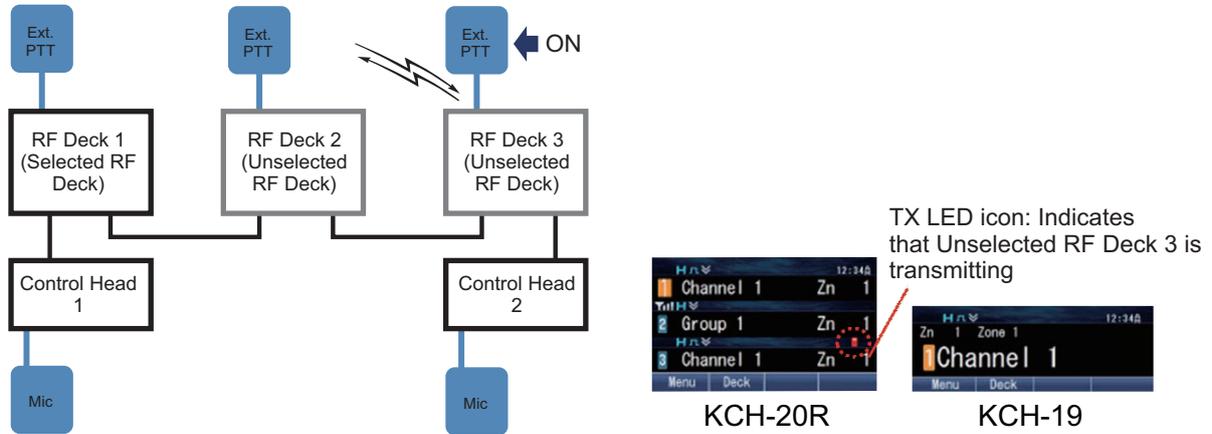
Figure 16-33 Case 2: Transmitting by the External PTT connected to a D-sub connector

16.6   Modulation Line

In a Multi RF Deck/ Multi Control Head structure, audio input by the Mic PTT, by the Ext PTT, and by Bluetooth are available for the Modulation Line. (Refer to EXTERNAL PORTS.)

The following figure is the configuration screen of Modulation Line of KPG-D1/ D1N:
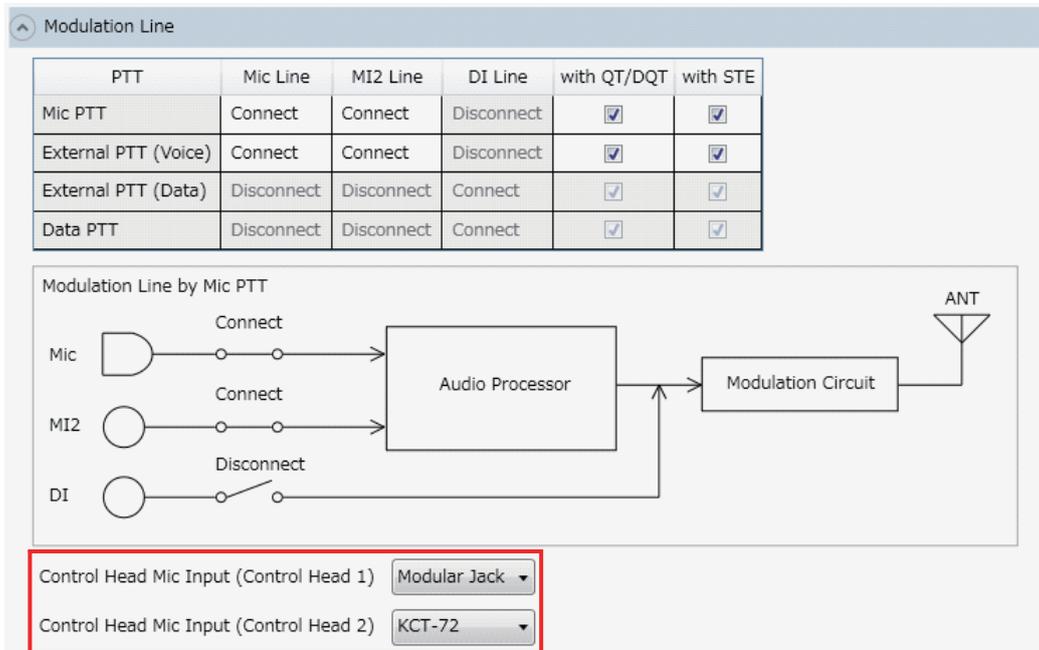
Figure 16-34 Modulation Line

Either "Modular Jack" or "KCT-72" is selected for the Mic Line of a Control Head. By using KCT-72, the connection of the External Mic (KCT-73MIC) becomes available. The Mic Input from the Modular Jack and the Mic Input from KCT-72 cannot be used at the same time.

A Control Head is equipped with a Bluetooth module. Refer to "BLUETOOTH COMMUNICATION" for the details of Bluetooth.

The following describes the Modulation Line (Mic Line) enabled when the Mic PTT, the External PTT, or the PTT of a Bluetooth headset is operated.

Configuration using KPG-D1/ D1N

Configuring **Modulation Line** (🔍 See   Transceiver Settings > Extended Function > Mobile)

Case 1: Without Bluetooth
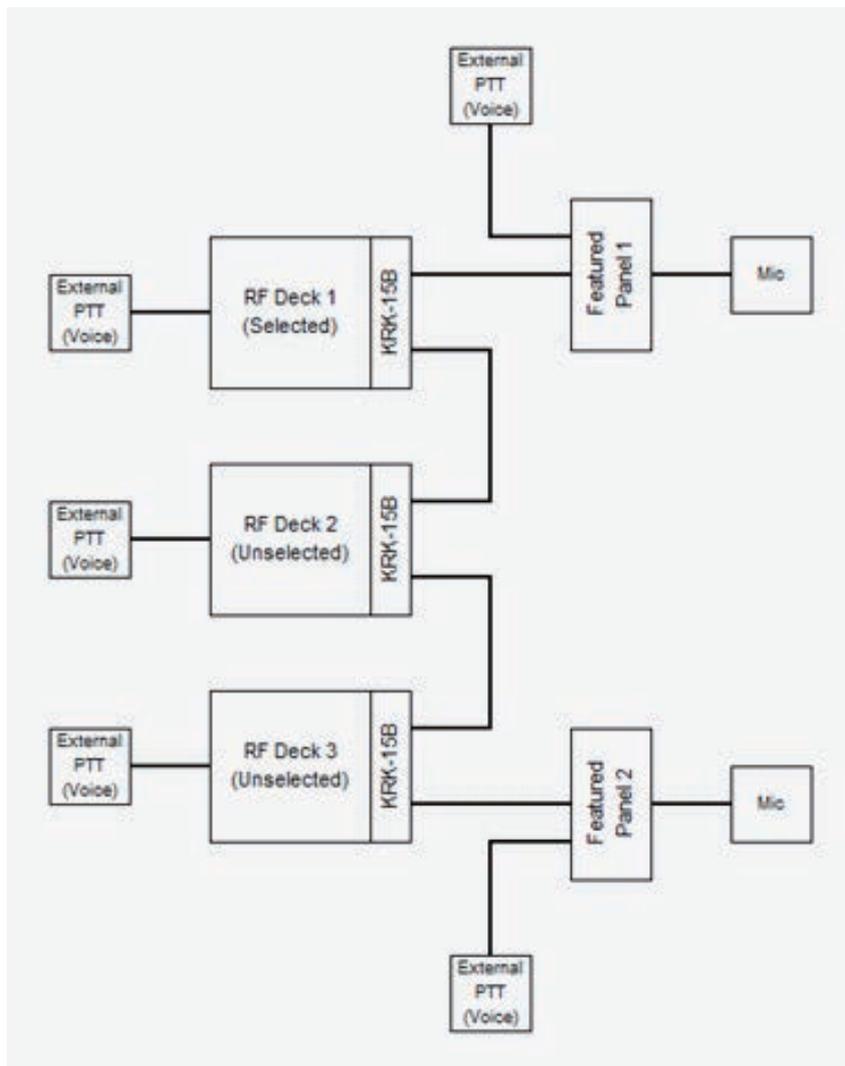
Figure 16-35 Case 1: Without Bluetooth

The Modulation Line configuration of the Mic PTT of KPG-D1/ D1N and the Mic Lines enabled when the **PTT** (microphone) switch of Control Head 1 or Control Head 2 is pressed are as follows:

Table 16-2 Mic Line (Mic PTT) (Without Bluetooth)

Modulation Line Setting		Operation	Mic Input
Mic Line	MI2 Line		
Disconnect	Disconnect	Control Head 1 - [PTT]	None
		Control Head 2 - [PTT]	None
Connect	Disconnect	Control Head 1 - [PTT]	Control Head 1 - Mic Line
		Control Head 2 - [PTT]	Control Head 2 - Mic Line
Disconnect	Connect	Control Head 1 - [PTT]	Selected RF Deck - MI2 Line
		Control Head 2 - [PTT]	Selected RF Deck - MI2 Line
Connect	Connect	Control Head 1 - [PTT]	Control Head 1 - Mic Line Selected RF Deck - MI2 Line
		Control Head 2 - [PTT]	Control Head 2 - Mic Line Selected RF Deck - MI2 Line

The Modulation Line configuration of the External PTT (Voice) of KPG-D1/ D1N and the Mic Lines enabled when each External PTT (Voice) port (AUX Input) is operated are as follows:

Table 16-3 Mic Line (External PTT (Voice)) (Without Bluetooth)

Modulation Line Setting		Operation	Mic Input
Mic Line	MI2 Line		
Disconnect	Disconnect	Control Head 1 - The External PTT (Voice) port goes low level.	None
		Control Head 2 - The External PTT (Voice) port goes low level.	None
		Selected RF Deck - The External PTT (Voice) port goes low level.	None
		Unselected RF Deck - The External PTT (Voice) port goes low level.	None
Connect	Disconnect	Control Head 1 - The External PTT (Voice) port goes low level.	Control Head 1 - Mic Line
		Control Head 2 - The External PTT (Voice) port goes low level.	Control Head 2 - Mic Line
		Selected RF Deck - The External PTT (Voice) port goes low level.	Control Head 1 - Mic Line
		Unselected RF Deck - The External PTT (Voice) port goes low level.	None
Disconnect	Connect	Control Head 1 - The External PTT (Voice) port goes low level.	Selected RF Deck - MI2 Line
		Control Head 2 - The External PTT (Voice) port goes low level.	Selected RF Deck - MI2 Line
		Selected RF Deck - The External PTT (Voice) port goes low level.	Selected RF Deck - MI2 Line
		Unselected RF Deck - The External PTT (Voice) port goes low level.	Unselected RF Deck - MI2 Line
Connect	Connect	Control Head 1 - The External PTT (Voice) port goes low level.	Control Head 1 - Mic Line Selected RF Deck - MI2 Line
		Control Head 2 - The External PTT (Voice) port goes low level.	Control Head 2 - Mic Line Selected RF Deck - MI2 Line
		Selected RF Deck - The External PTT (Voice) port goes low level.	Control Head 1 - Mic Line Selected RF Deck - MI2 Line
		Unselected RF Deck - The External PTT (Voice) port goes low level.	Unselected RF Deck - MI2 Line

Case 2: Selected RF Deck with Bluetooth

If a Bluetooth headset is connected to the Selected RF Deck, pressing the **PTT** switch of the Bluetooth headset enables the Mic Line of the Bluetooth headset regardless of the Modulation Line configuration.
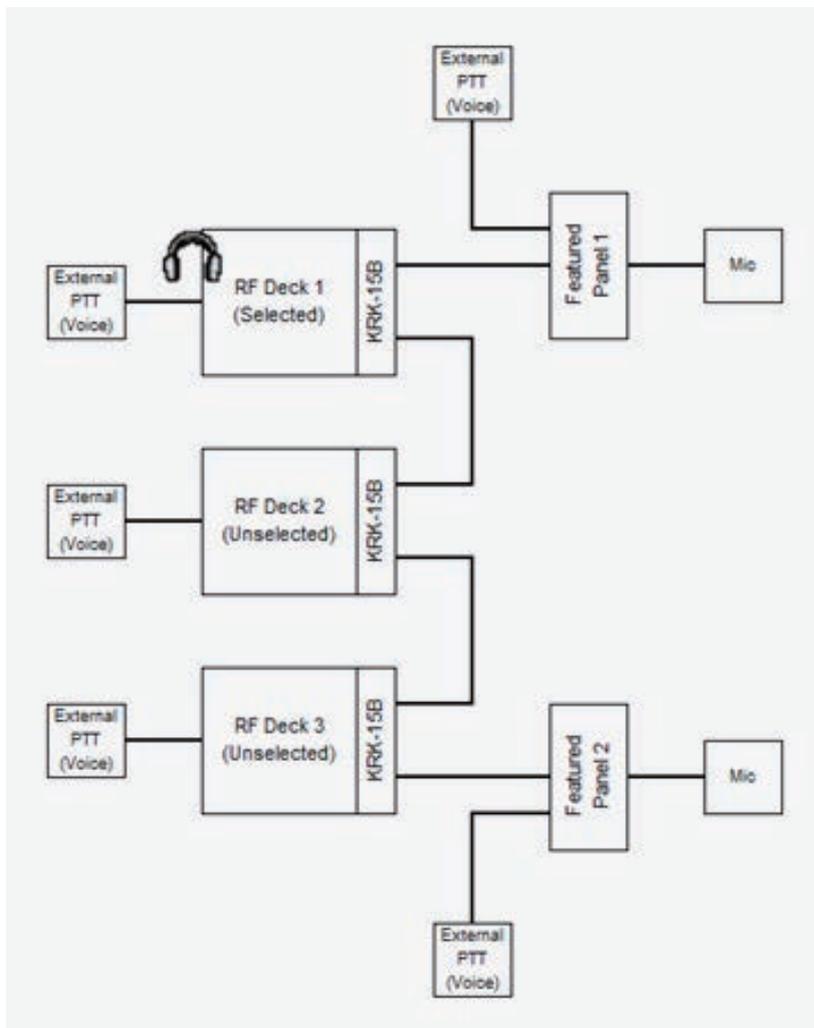
Figure 16-36 Case 2: Selected RF Deck with Bluetooth

The Modulation Line configuration of the Mic PTT of KPG-D1/ D1N and the Mic Lines enabled when the **PTT** (microphone) switch of Control Head 1 or Control Head 2 is pressed are as follows:

Table 16-4 Mic Line (Mic PTT) (Selected RF Deck with Bluetooth)

Modulation Line Setting		Operation	Mic Input
Mic Line	Ml2 Line		
Disconnect	Disconnect	Control Head 1 - [PTT]	The Mic Line of the Bluetooth-compatible device
		Control Head 2 - [PTT]	The Mic Line of the Bluetooth-compatible device
Connect	Disconnect	Control Head 1 - [PTT]	The Mic Line of the Bluetooth-compatible device
		Control Head 2 - [PTT]	The Mic Line of the Bluetooth-compatible device
Disconnect	Connect	Control Head 1 - [PTT]	The Mic Line of the Bluetooth-compatible device
		Control Head 2 - [PTT]	The Mic Line of the Bluetooth-compatible device
Connect	Connect	Control Head 1 - [PTT]	The Mic Line of the Bluetooth-compatible device
		Control Head 2 - [PTT]	The Mic Line of the Bluetooth-compatible device

The Modulation Line configuration of the External PTT (Voice) of KPG-D1/ D1N and the Mic Lines enabled when each External PTT (Voice) port (AUX Input) is operated are as follows:

Table 16-5 Mic Line (External PTT (Voice)) (Selected RF Deck with Bluetooth)

Modulation Line Setting		Operation	Mic Input
Mic Line	MI2 Line		
Disconnect	Disconnect	Control Head 1 - The External PTT (Voice) port goes low level.	The Mic Line of the Bluetooth-compatible device
		Control Head 2 - The External PTT (Voice) port goes low level.	The Mic Line of the Bluetooth-compatible device
		Selected RF Deck - The External PTT (Voice) port goes low level.	The Mic Line of the Bluetooth-compatible device
		Unselected RF Deck - The External PTT (Voice) port goes low level.	None
Connect	Disconnect	Control Head 1 - The External PTT (Voice) port goes low level.	The Mic Line of the Bluetooth-compatible device
		Control Head 2 - The External PTT (Voice) port goes low level.	The Mic Line of the Bluetooth-compatible device
		Selected RF Deck - The External PTT (Voice) port goes low level.	The Mic Line of the Bluetooth-compatible device
		Unselected RF Deck - The External PTT (Voice) port goes low level.	None
Disconnect	Connect	Control Head 1 - The External PTT (Voice) port goes low level.	The Mic Line of the Bluetooth-compatible device
		Control Head 2 - The External PTT (Voice) port goes low level.	The Mic Line of the Bluetooth-compatible device
		Selected RF Deck - The External PTT (Voice) port goes low level.	The Mic Line of the Bluetooth-compatible device
		Unselected RF Deck - The External PTT (Voice) port goes low level.	Unselected RF Deck - MI2 Line
Connect	Connect	Control Head 1 - The External PTT (Voice) port goes low level.	The Mic Line of the Bluetooth-compatible device
		Control Head 2 - The External PTT (Voice) port goes low level.	The Mic Line of the Bluetooth-compatible device
		Selected RF Deck - The External PTT (Voice) port goes low level.	The Mic Line of the Bluetooth-compatible device
		Unselected RF Deck - The External PTT (Voice) port goes low level.	Unselected RF Deck - MI2 Line

Case 3: Unselected RF Deck with Bluetooth

If a Bluetooth headset is connected to an Unselected RF Deck, pressing the **PTT** switch of the Bluetooth headset enables the Mic Line of the Bluetooth headset regardless of the Modulation Line configuration.
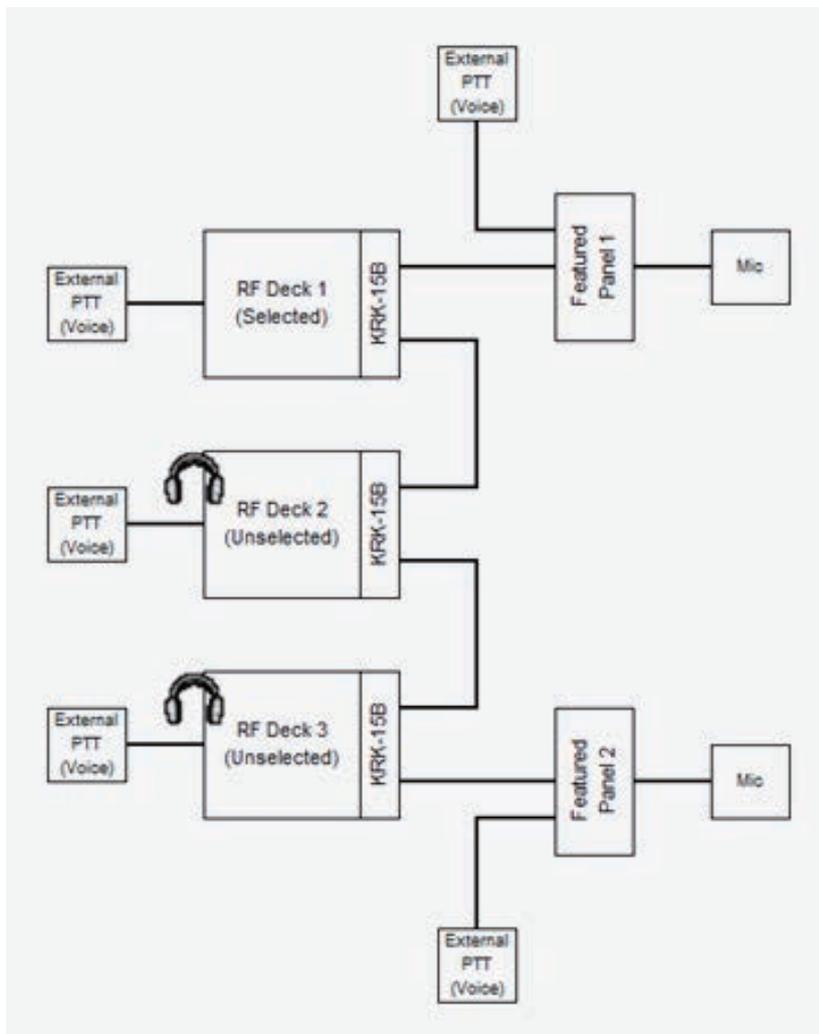
Figure 16-37 Case 3: Unselected RF Deck with Bluetooth

The Modulation Line configuration of the Mic PTT of KPG-D1/ D1N and the Mic Lines enabled when the **PTT** (microphone) switch of Control Head 1 or Control Head 2 is pressed are as follows:

Table 16-6 Mic Line (Mic PTT) (Unselected RF Deck with Bluetooth)

Modulation Line Setting		Operation	Mic Input
Mic Line	MI2 Line		
Disconnect	Disconnect	Control Head 1 - [PTT]	None
		Control Head 2 - [PTT]	None
Connect	Disconnect	Control Head 1 - [PTT]	Control Head 1 - Mic Line
		Control Head 2 - [PTT]	Control Head 2 - Mic Line
Disconnect	Connect	Control Head 1 - [PTT]	Selected RF Deck - MI2 Line
		Control Head 2 - [PTT]	Selected RF Deck - MI2 Line
Connect	Connect	Control Head 1 - [PTT]	Control Head 1 - Mic Line Selected RF Deck - MI2 Line
		Control Head 2 - [PTT]	Control Head 2 - Mic Line Selected RF Deck - MI2 Line

The Modulation Line configuration of the External PTT (Voice) of KPG-D1/ D1N and the Mic Lines enabled when each External PTT (Voice) port (AUX Input) is operated are as follows:

Table 16-7 Mic Line (External PTT (Voice)) (Selected RF Deck with Bluetooth)

Modulation Line Setting		Operation	Mic Input
Mic Line	MI2 Line		
Disconnect	Disconnect	Control Head 1 - The External PTT (Voice) port goes low level.	None
		Control Head 2 - The External PTT (Voice) port goes low level.	None
		Selected RF Deck - The External PTT (Voice) port goes low level.	None
		Unselected RF Deck - The External PTT (Voice) port goes low level.	The Mic Line of the Bluetooth-compatible device
Connect	Disconnect	Control Head 1 - The External PTT (Voice) port goes low level.	Control Head 1 - Mic Line
		Control Head 2 - The External PTT (Voice) port goes low level.	Control Head 2 - Mic Line
		Selected RF Deck - The External PTT (Voice) port goes low level.	Control Head 1 - Mic Line
		Unselected RF Deck - The External PTT (Voice) port goes low level.	The Mic Line of the Bluetooth-compatible device
Disconnect	Connect	Control Head 1 - The External PTT (Voice) port goes low level.	Selected RF Deck - MI2 Line
		Control Head 2 - The External PTT (Voice) port goes low level.	Selected RF Deck - MI2 Line
		Selected RF Deck - The External PTT (Voice) port goes low level.	Selected RF Deck - MI2 Line
		Unselected RF Deck - The External PTT (Voice) port goes low level.	The Mic Line of the Bluetooth-compatible device
Connect	Connect	Control Head 1 - The External PTT (Voice) port goes low level.	Control Head 1 - Mic Line Selected RF Deck - MI2 Line
		Control Head 2 - The External PTT (Voice) port goes low level.	Control Head 2 - Mic Line Selected RF Deck - MI2 Line
		Selected RF Deck - The External PTT (Voice) port goes low level.	Control Head 1 - Mic Line Selected RF Deck - MI2 Line
		Unselected RF Deck - The External PTT (Voice) port goes low level.	The Mic Line of the Bluetooth-compatible device

Case 4: Featured Panel with Bluetooth

If a Bluetooth headset is connected to Featured Panel 1, pressing the **PTT** switch of the Bluetooth headset enables the Mic Line of the Bluetooth headset regardless of the Modulation Line configuration.
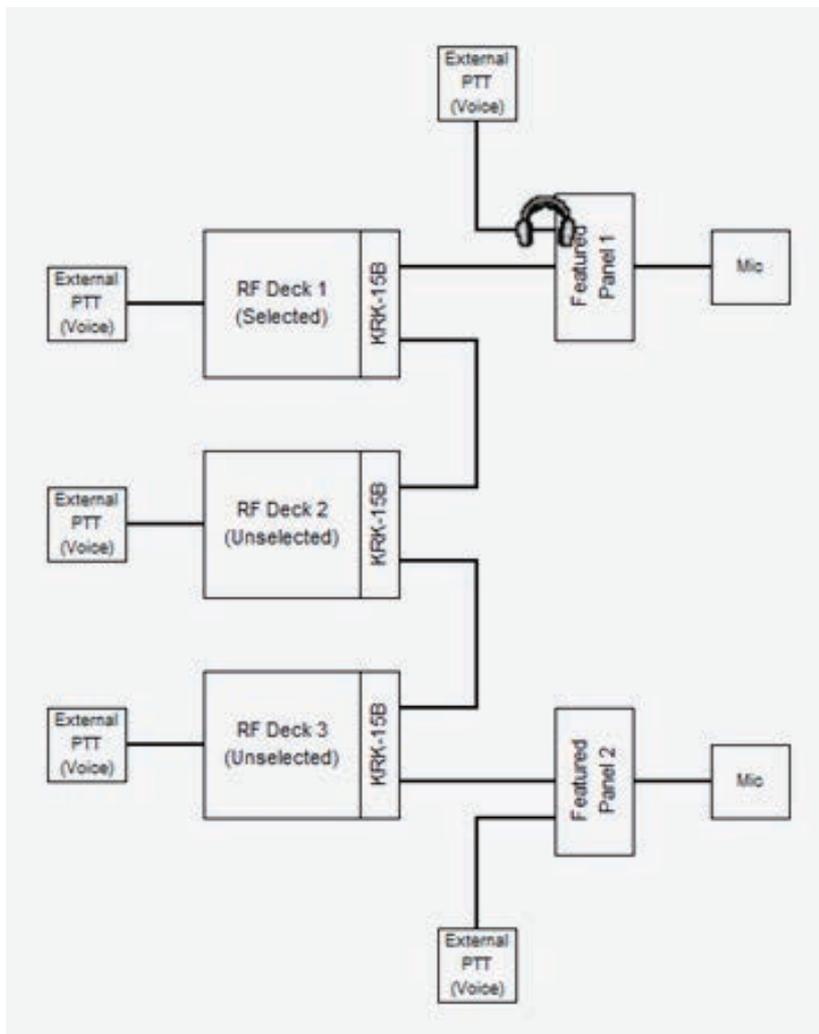
Figure 16-38 Case 4: Featured Panel with Bluetooth

The Modulation Line configuration of the Mic PTT of KPG-D1/ D1N and the Mic Lines enabled when the **PTT** (microphone) switch of Control Head 1 or Control Head 2 is pressed are as follows:

Table 16-8 Mic Line (Mic PTT) (Featured Panel with Bluetooth)

Modulation Line Setting		Operation	Mic Input
Mic Line	MI2 Line		
Disconnect	Disconnect	Control Head 1 - [PTT]	The Mic Line of the Bluetooth-compatible device
		Control Head 2 - [PTT]	None
Connect	Disconnect	Control Head 1 - [PTT]	The Mic Line of the Bluetooth-compatible device
		Control Head 2 - [PTT]	Control Head 2 - Mic Line
Disconnect	Connect	Control Head 1 - [PTT]	The Mic Line of the Bluetooth-compatible device
		Control Head 2 - [PTT]	Selected RF Deck - MI2 Line
Connect	Connect	Control Head 1 - [PTT]	The Mic Line of the Bluetooth-compatible device
		Control Head 2 - [PTT]	Control Head 2 - Mic Line Selected RF Deck - MI2 Line

The Modulation Line configuration of the External PTT (Voice) of KPG-D1/ D1N and the Mic Lines enabled when each External PTT (Voice) port (AUX Input) is operated are as follows:

Table 16-9 Mic Line (External PTT (Voice)) (Featured Panel with Bluetooth)

Modulation Line Setting		Operation	Mic Input
Mic Line	MI2 Line		
Disconnect	Disconnect	Control Head 1 - The External PTT (Voice) port goes low level.	The Mic Line of the Bluetooth-compatible device
		Control Head 2 - The External PTT (Voice) port goes low level.	None
		Selected RF Deck - The External PTT (Voice) port goes low level.	None
		Unselected RF Deck - The External PTT (Voice) port goes low level.	None
Connect	Disconnect	Control Head 1 - The External PTT (Voice) port goes low level.	The Mic Line of the Bluetooth-compatible device
		Control Head 2 - The External PTT (Voice) port goes low level.	Control Head 2 - Mic Line
		Selected RF Deck - The External PTT (Voice) port goes low level.	The Mic Line of the Bluetooth-compatible device
		Unselected RF Deck - The External PTT (Voice) port goes low level.	None
Disconnect	Connect	Control Head 1 - The External PTT (Voice) port goes low level.	The Mic Line of the Bluetooth-compatible device
		Control Head 2 - The External PTT (Voice) port goes low level.	Selected RF Deck - MI2 Line
		Selected RF Deck - The External PTT (Voice) port goes low level.	Selected RF Deck - MI2 Line
		Unselected RF Deck - The External PTT (Voice) port goes low level.	Unselected RF Deck - MI2 Line
Connect	Connect	Control Head 1 - The External PTT (Voice) port goes low level.	The Mic Line of the Bluetooth-compatible device
		Control Head 2 - The External PTT (Voice) port goes low level.	Control Head 2 - Mic Line Selected RF Deck - MI2 Line
		Selected RF Deck - The External PTT (Voice) port goes low level.	The Mic Line of the Bluetooth-compatible device
		Unselected RF Deck - The External PTT (Voice) port goes low level.	Unselected RF Deck - MI2 Line

16.7   Audio Function

This section describes the audio function available in a Multi RF Deck/ Multi Control Head structure.

Specifying a Control Head for Controlling the Volume (Master Volume Control)

Master Volume Control is the function to specify a Control Head for controlling the volume of an RF Deck. If the volume level of the Control Head specified in **Master Volume Control** is changed, the volume levels of all RF Decks are changed to the same volume level of the Control Head together.

If the volume level of a Control Head not configured in **Master Volume Control** is changed, only the volume level of the operated Control Head is changed, and the volume levels of RF Decks are not changed.

The configuration in **Master Volume Control** can be changed by any of the following key operations:

1.   The configuration in **Master Volume Control** is toggled every time the **Master Volume Control** key is pressed.
2.   Entering Menu Mode by pressing the **Menu** key, and then executing "Master Volume Control" can toggle the configuration in **Master Volume Control**.

The behavior if "Control Head 1" is configured in Master Volume Control

If the volume level of Control Head 1 is changed to 20, the volume levels of Control Head 1, RF Deck 1, and RF Deck 2 are changed to 20. If the volume level of Control Head 2 not configured in **Master Volume Control** is changed, only the volume level of Control Head 2 is changed.
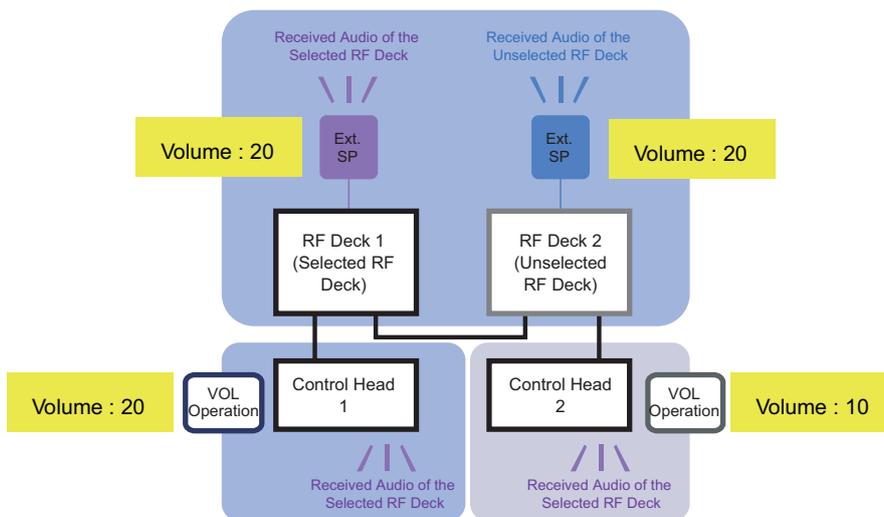
Figure 16-39 Master Volume Control = Control Head 1

📝 Note

- If a PC command for changing the volume is received from a D-sub 25-pin connector by using KAS-10, etc., only the volume of the RF Deck to which the D-sub 25-pin connector is connected is changed. Both the Selected RF Deck and the Unselected RF Deck behave the same way.
- If the volume level of each RF Deck is different, when the volume of the Control Head configured in Master Volume Control is changed, the volume of the Control Head applies to the volume levels of all RF Decks.
- The volume of an RF Deck is controlled by the D/A Converter equipped in the RF Deck. Also, the volume of a Control Head is controlled by the CODEC IC equipped in KCH-20R/ KRK-14H. In this way, the volume level of a Control Head not configured in Master Volume Control can be changed individually.

Configuration using KPG-D1/ D1N

Configuring **Master Volume Control** (🔍See Transceiver Settings > Optional Features > Optional Features 1 > Others)

Switching the Output Status of the External Speaker (Unselected RF Deck Speaker)

Unselected RF Deck Speaker is the function to switch the output status of the external speaker connected to the Unselected RF Deck between Mute and Unmute. This function is used such as to listen to only the received audio of the Selected RF Deck if the Selected RF Deck and Unselected RF Deck receive simultaneously.

One of the following key operations can switch the Unmute/ Mute status of the external speaker connected to the Unselected RF Deck:

1. Pressing the **Unselected RF Deck Speaker** key switches the Unmute/ Mute status in **Unselected RF Deck Speaker**.
2. Entering Menu Mode by pressing the **Menu** key, and then executing "Unselected RF Deck Speaker" can switch the Unmute/ Mute status of the external speaker connected to the Unselected RF Deck.
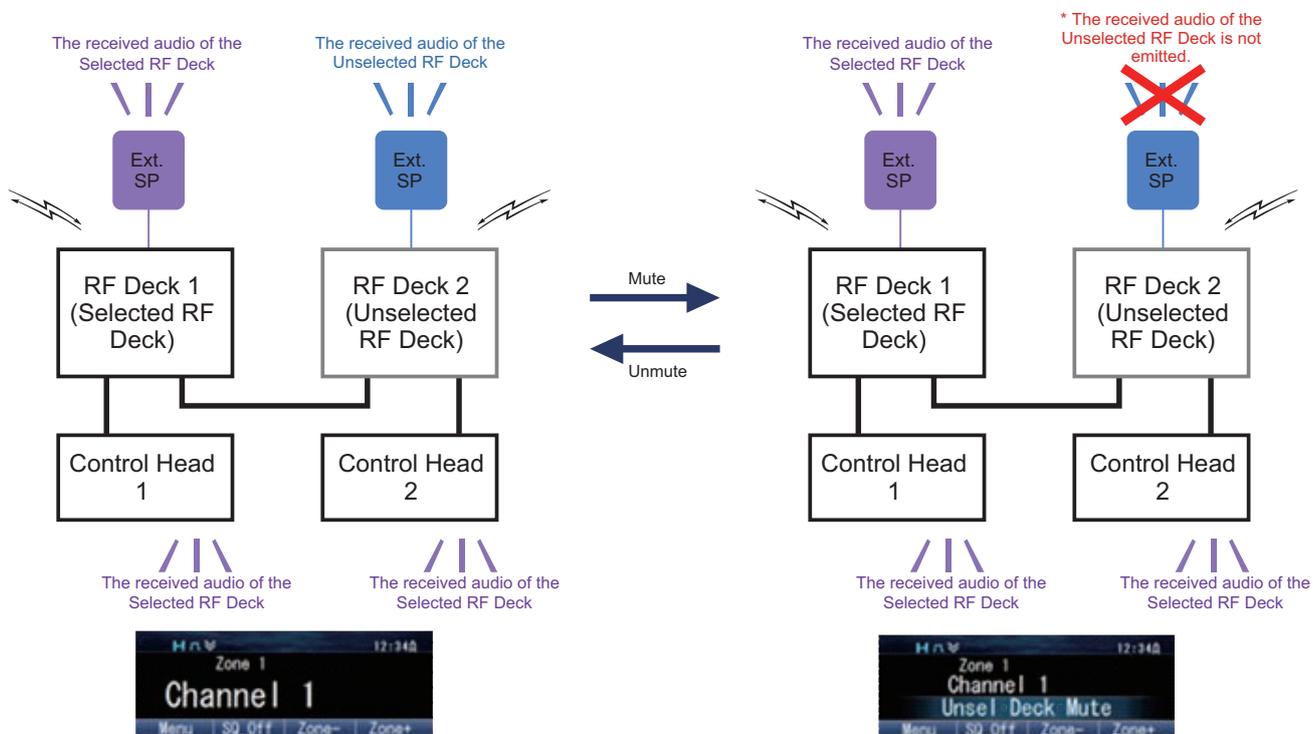
Figure 16-40 Unselected RF Deck Speaker

Configuration using KPG-D1/ D1N

Configuring **Unselected RF Deck Speaker** (🔍See Transceiver Settings > Optional Features > Optional Features 1 > Others)

Adjusting the Output Level of the External Speaker (Unselected Speaker Offset)

Unselected Speaker Offset is the function to lower the output level of the external speaker connected to the Unselected RF Deck. This function is used to improve the audio of the Selected RF Deck.

Entering Menu Mode by pressing the **Menu** key, and then executing "Unselected Speaker Offset" can switch the offset value (0 dB, -3 dB, -9 dB) of the audio output level of the external speaker connected to the Unselected RF Deck.

- 0 dB is the same output level as the output level of the Selected RF Deck.
- -3 dB is output level 3 dB lower than the output level of the Selected RF Deck.
- -9 dB is output level 9 dB lower than the output level of the Selected RF Deck.
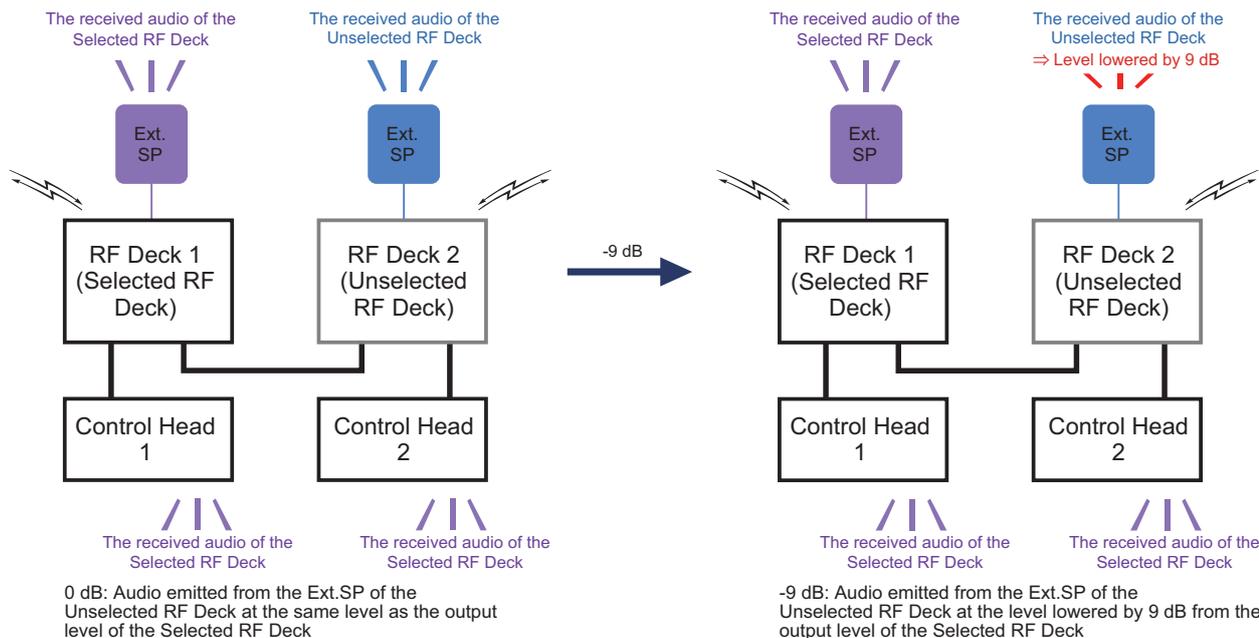
Figure 16-41 Unselected RF Deck Speaker Offset

📣 Note

- If a PC command for changing the volume is received from a D-sub 25-pin connector, the volume of the RF Deck to which the D-sub 25-pin connector is connected is changed regardless of whether the RF Deck is the Selected RF Deck or not, but the offset configuration continues to be applied.
- If a device is connected to the Unselected RF Deck by using a Bluetooth connection, the volume offset of the device with the Bluetooth connection is not applied.

Configuration using KPG-D1/ D1N

Configuring **Unselected Speaker Offset** (🔍See Transceiver Settings > Optional Features > Optional Features 1 > Others)

Communicating Directly Between Control Heads (Intercom)

Intercom is the function to directly communicate (simplex communication) between Control Head 1 and Control Head 2 with a wired connection. The function is for Dual Control Head. This function is used as means of contact between 2 Control Heads when the Control Heads are at remote locations.

Pressing the **PTT** switch of a Control Head when **Intercom** is on emits the audio from the speaker of the other Control Head.

Intercom can be toggled between on and off by any of the following key operations:

1. Pressing the **Intercom** key toggles Intercom between on and off.
2. Entering Menu Mode by pressing the **Menu** key, and then executing "Intercom" can toggle **Intercom** between on and off.

📝 Note

- The audio input to a Control Head is returned on KRK-15B via KCT-71, and is emitted from the other Control Head. Therefore, only the Mic Line is available as the Modulation Line when **Intercom** is used, and the audio is not input from MI2 of the D-sub 25-pin connector.
- If audio is received when **Intercom** is on, the received audio is emitted from Control Head 1 and Control Head 2. The received audio is also emitted from the external speaker connected to each RF Deck.
- **Intercom** turns off if a Zone-channel is changed, the Selected RF Deck is switched, or scanning is toggled between on and off when **Intercom** is on.
- If audio is received while communicating by using **Intercom**, the **Intercom** behavior is prioritized, and the received audio is not emitted from the speakers of Control Head 1 and Control Head 2. Also, the received audio is not emitted from the external speaker connected to the Selected RF Deck.
- If audio is received while communicating by using **Intercom**, the receipt of audio can be confirmed with the lighting of the LED.
- When **Intercom** is on, various commands such as Radio Inhibit/Uninhibit, Radio Check, Remote Monitor (Radio Monitor), and Stun are accepted as usual.
- KCH-20R is not equipped with any speakers. Therefore, if KCH-20R is used, KES-5 needs to be connected via KCT-72.

Procedure of the Intercom behavior

1 Pressing the Intercom key on Control Head 1 or Control Head 2.

Intercom turns on and the transceiver enters Intercom Mode. At this time, voice communication is not initiated. When in Intercom Mode, the " " icon lights on the display and "Intercom" appears.

2 Press the PTT switch when in Intercom Mode.

The transceiver enters the functioning Intercom status and initiates voice communication between Control Head 1 and Control Head 2. The audio of the Control Head of the PTT switch that is pressed first is prioritized and sounds from the other Control Head. "Intercom" blinks only on the display of the receiving party while Intercom is functioning.
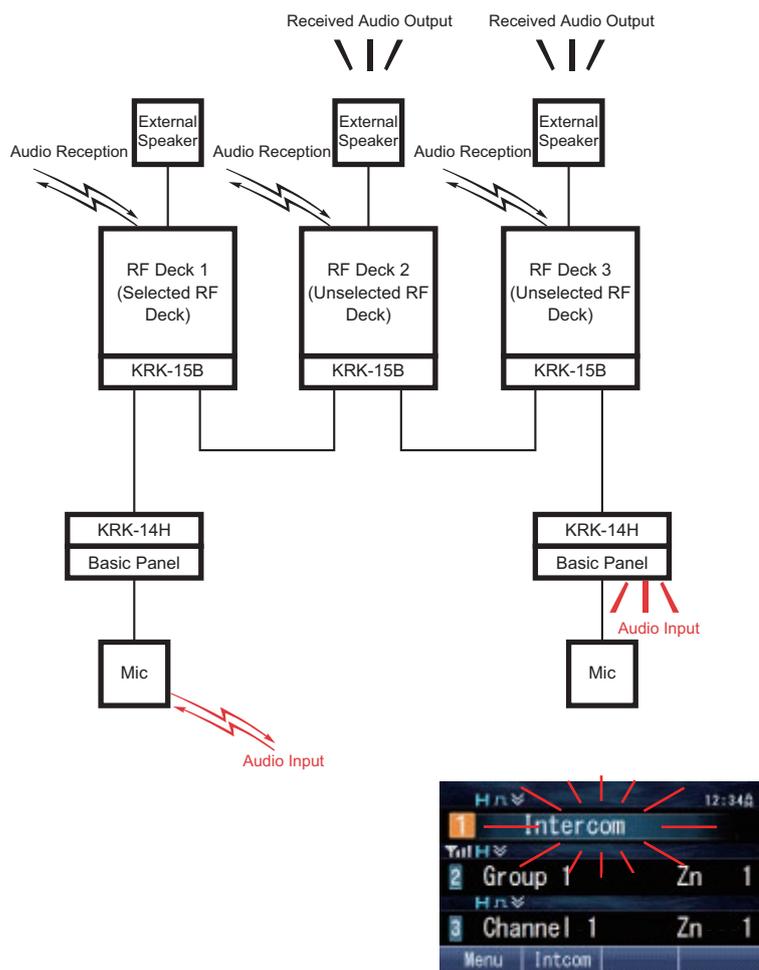
Figure 16-42 Intercom

Monitoring the Communications of Control Heads (Transmit Audio Monitor)

Transmit Audio Monitor is the function to monitor the audio of the transmitting Control Head by the speaker of the other Control Head when transmitting on the connected Control Head 1 and Control Head 2. The function is for Dual Control Head. The conversation can be heard even if the 2 Control Heads are at remote locations. Also, by using the Talk Interrupt function, one Control Head can send notifications such as a request for stopping transmission to the other transmitting Control Head by voice, and the Talk Interrupt function can be used for transmission during an emergency. Also, the voice communication can be monitored by the external speaker connected to the Selected RF Deck.

The transceiver behaves as follows according to the configuration in **Transmit Audio Monitor** (Disable, w/o Talk Interrupt, w Talk Interrupt):

● Disable

This configuration value is the default configuration value, and basically the behavior is the same as the behavior of normal transmission. The audio of the transmitting Control Head cannot be monitored by the other Control Head when transmitting.

● w/o Talk Interrupt

The audio of the transmitting Control Head can be monitored by the other Control Head when transmitting. The displays of both Control Head 1 and Control Head 2 are in the normal state while transmitting.
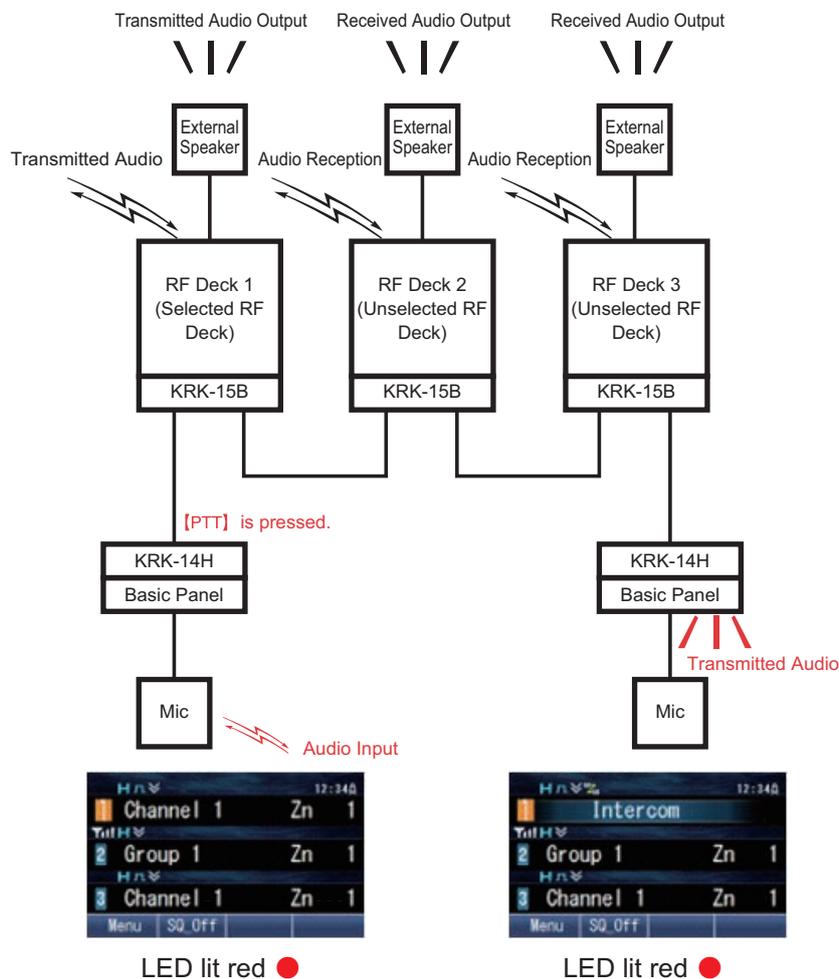
Figure 16-43 w/o Talk Interrupt

● **w talk Interrupt**

The audio of the transmitting Control Head can be monitored by the other Control Head when transmitting. Also, "Intercom" appears on the display of the other Control Head, and the " " icon lights.

While transmitting by the **PTT** switch or External PTT (Voice) port (AUX Input) of one Control Head, if the **PTT** switch of the other Control Head is pressed or if the External PTT (Voice) port goes to low level, Talk Interrupt functions. If Talk Interrupt functions, the audio input from the other Control Head is emitted from the speaker of the transmitting Control Head.
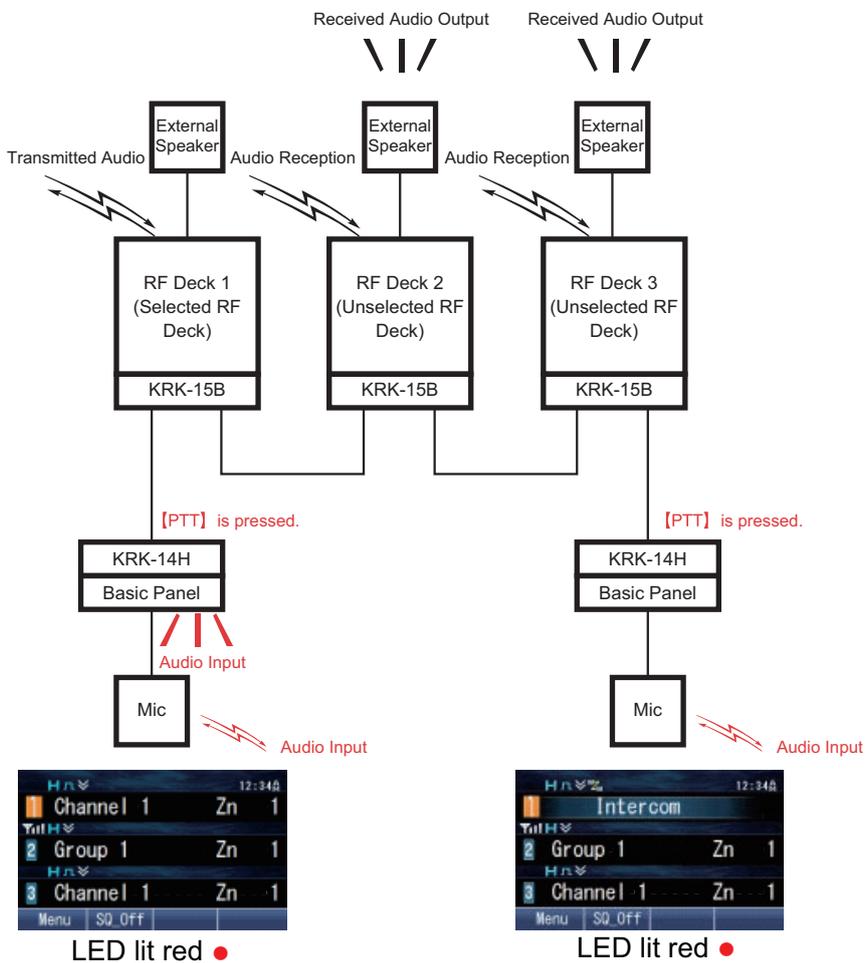
Figure 16-44 w talk Interrupt

📮 Note

• The audio input to a Control Head is returned on KRK-15B via KCT-71, and is emitted from the other Control Head. Therefore, when **Transmit Audio Monitor** is used, only the Mic Line is available as the Modulation Line, and the audio is not input from MI2 of the D-sub 25-pin connector.

• Because the Talk Interrupt behavior is the same as the **Intercom** behavior, even if Control Head 1 completes transmission, the audio of Control Head 2 continues to be emitted from Control Head 1.

• If "w Talk Interrupt" is configured in **Transmit Audio Monitor**, because the Talk Interrupt behavior is equivalent to the **Intercom** behavior, the audio is not emitted from the external speaker connected to the Selected RF Deck.

• If the External PTT (Voice) is entered from the Selected RF Deck when "w/o Talk Interrupt" or "w Talk Interrupt" is configured in **Transmit Audio Monitor**, transmission is started. In this case, the audio input behaves according to the configuration of the Modulation Line.

Configuration using KPG-D1/ D1N

Configuring **Transmit Audio Monitor** (🔍See)

Muting the Speaker of a Control Head (Speaker 1-2 Mute)

Speaker 1-2 Mute is the function to forcibly mute the output of the speaker of the other Control Head by key operations on the connected Control Head 1 and Control Head 2. The function is for Dual Control Head. This function limits Control Heads that can emit the received audio of the Selected RF Deck and enhances the private communications of the other Control Head.

Speaker 1 indicates the speaker of Control Head 1. Speaker 2 indicates the speaker of Control Head 2.

Speaker 1-2 Mute can be toggled between on and off by any of the following key operations:

1. Pressing the **Speaker 1-2 Mute** key toggles **Speaker 1-2 Mute** between on and off.
2. Entering Menu Mode by pressing the **Menu** key, and then executing "Speaker 1-2 Mute" can toggle **Speaker 1-2 Mute** between on and off.
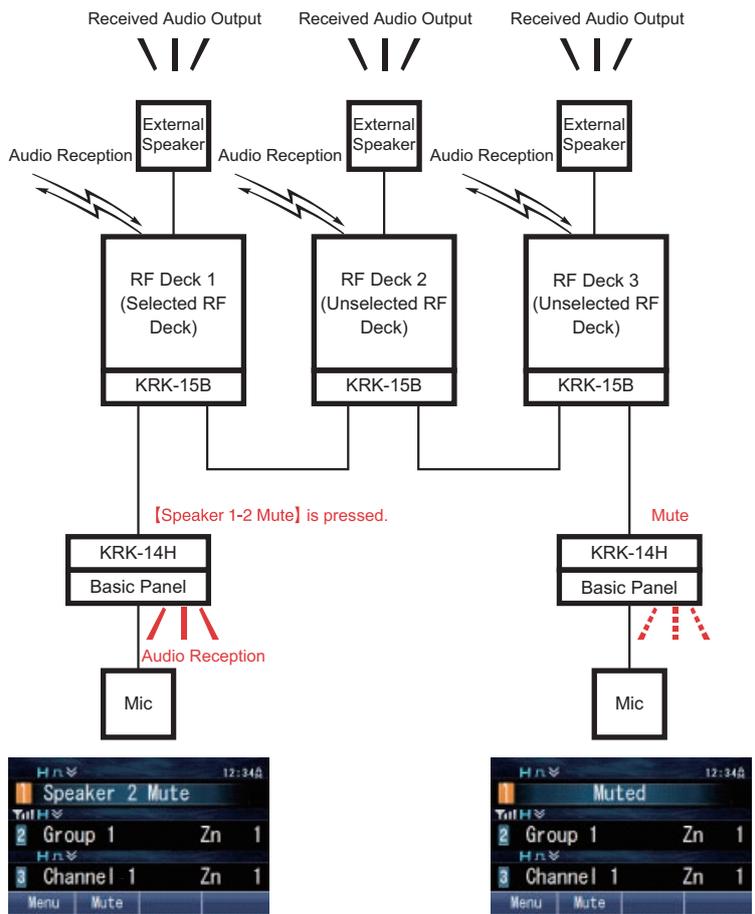
Figure 16-45 Speaker 1-2 Mute

> 📝 Note

- If **Transmit Audio Monitor** is enabled, audio is not emitted from the monitoring Control Head when **Speaker 1-2 Mute** is toggled on.
- Even if a Control Head is muted, transmitting by the other Control Head or receiving by an RF Deck can be confirmed with the lighting of the Transmit/ Busy LED.
- When **Speaker 1-2 Mute** is on, by operating a key other than the **PTT** switch or Hook on the Control Head with the function toggled on, or by operating any key (including **Volume Control**) on the other Control Head, Speaker 1-2 Mute is toggled off.

Using the Transceiver as a Megaphone (Public Address)

Public Address (PA) enables the transceiver to be used in place of a megaphone. This function is used for a bus announcement, etc.

This section describes behaviors unique to a Multi RF Deck/ Multi Control Head structure.

Public Address can be toggled between enabled and disabled by any of the following key operations:

1. Pressing the **Public Address** key toggles **Public Address** between enabled and disabled.
2. Entering Menu Mode by pressing the **Menu** key, and then executing "Public Address" can toggle **Public Address** between enabled and disabled.

Public Address functions by using the external speaker (KES-3 or KES-5) connected to RF Deck 1. Therefore, the behavior of RF Deck 1 is restricted as follows:

● While **Public Address** is enabled and the **PTT** switch is pressed, RF Deck 1 does not perform the reception behavior. The other RF Decks perform the reception behavior regardless of the status of the **PTT** switch.

● The operation to toggle **Public Address** between enabled and disabled is available only if the Selected RF Deck is RF Deck 1. When the Selected RF Deck is RF Deck 2 or RF Deck 3, the operation to toggle **Public Address** between enabled and disabled is unavailable.

If the External PTT (PA) is entered from the AUX Input port of RF Deck 2 or RF Deck 3, the audio is emitted from the external speaker of the RF Deck from which the External PTT (PA) is entered.
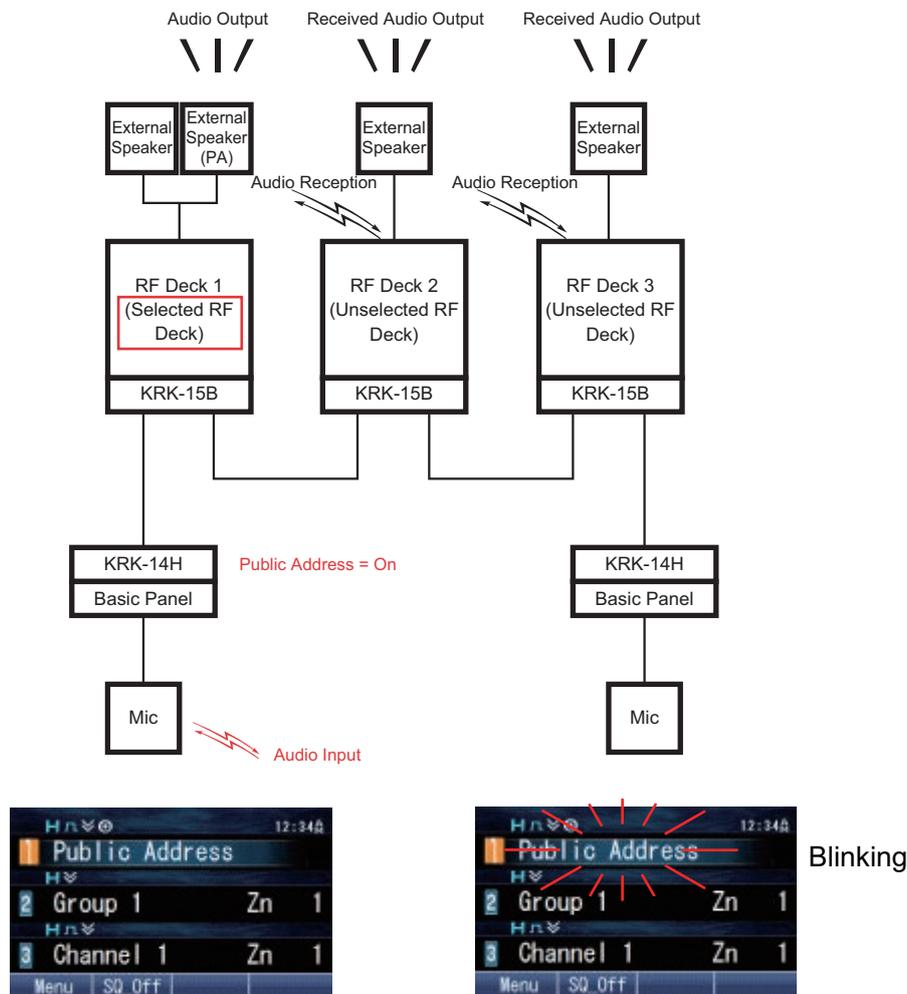
Figure 16-46 Public Address

📋 Note

- When **Public Address** is enabled, the **PTT** switch can be operated on both Control Heads, but the **PTT** switch pressed earlier becomes enabled. At this time, while the **PTT** switch of one Control Head is being pressed, nothing behaves even if the **PTT** switch of the other Control Head is pressed.
- The volume of an external speaker while **Public Address** is functioning varies in conjunction with the volume of the Control Head configured in **Master Volume Control**.
- When an external speaker (KES-3 or KES-5) is not connected to RF Deck 1, the audio of **Public Address** is emitted from Control Heads. If the external speaker is disconnected from RF Deck 1 while **Public Address** is enabled, the output is switched to the output of the Control Heads.

Configuring the Output Method of the Received Audio and Beep (Multi RF Deck Audio Output Type)

Multi RF Deck Audio Output Type is the function that switches the output method of the received audio and beep in a Multi RF Deck/ Multi Control Head structure to "Single Audio Output" or "Multi Audio Output".

The transceiver behaves as follows according to the configuration in **Multi RF Deck Audio Output Type**:

Table 16-10 Multi RF Deck Audio Output Type

Configuration	Description
Single Audio Output	The transceiver emits the received audio and beep of each RF Deck from the speaker of the Control Head, from the external speaker connected to RF Deck 1, or from both according to the configuration in **External Speaker**. The received audio and beep does not sound from each RF Deck at the same time. Only the received audio and beep of a single RF Deck sounds according to the output priority level. Because the audio of each RF Deck can be heard without preparing multiple external speakers, this configuration is used for the operation of Multi RF Deck/ Multi Control Head within a limited space. 📋 Note 　Output priority level is in the order: RF Deck 1, RF Deck 2, RF Deck 3 (highest to lowest).
Multi Audio Output	The received audio and beep of the Selected RF Deck sounds from the speaker of the Control Head according to the configuration in **External Speaker**. Also, because the received audio and beep of each RF Deck sounds from the external speaker connected to each RF Deck, the received audio and beep of multiple RF Decks can be heard at the same time. Because the received audio and beep of each RF Deck can be heard at the same time from the external speaker connected to the Control Head and each RF Deck, this configuration is used to monitor without missing the received audio and beep of all RF Decks.

Example of received audio output

The transceiver emits the received audio as follows according to the combination of configurations in **Multi RF Deck Audio Output Type** and **External Speaker**:

■ **If "Off" is configured in External Speaker:**

● **When Single Audio Output is configured**

The audio received by RF Deck 1 (Selected RF Deck) sounds from the speaker of the Control Head.
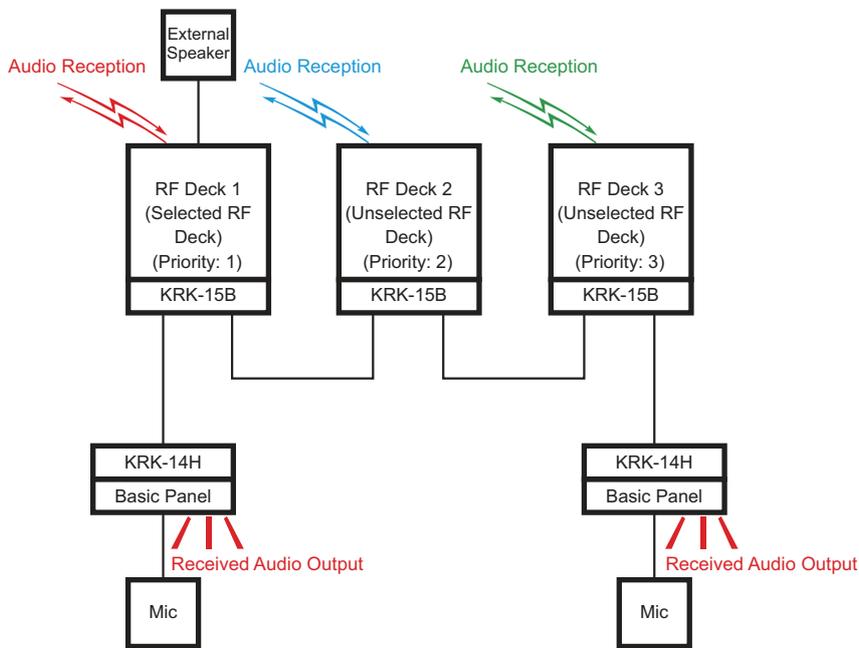
Figure 16-47 Single Audio Output (External Speaker = Off)

● **When Multi Audio Output is configured**

The audio received by RF Deck 1 (Selected RF Deck) sounds from the speaker of the Control Head.
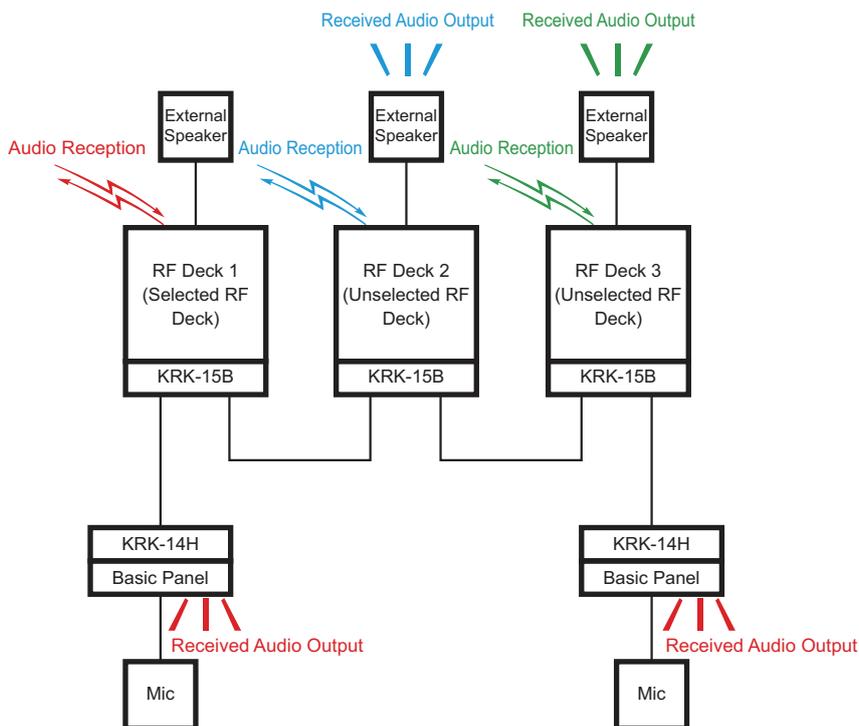
Figure 16-48 Multi Audio Output (External Speaker = Off)

■ **If "On" is configured in External Speaker:**

● **When Single Audio Output is configured**

The audio received by RF Deck 1 sounds from the external speaker connected to RF Deck 1.
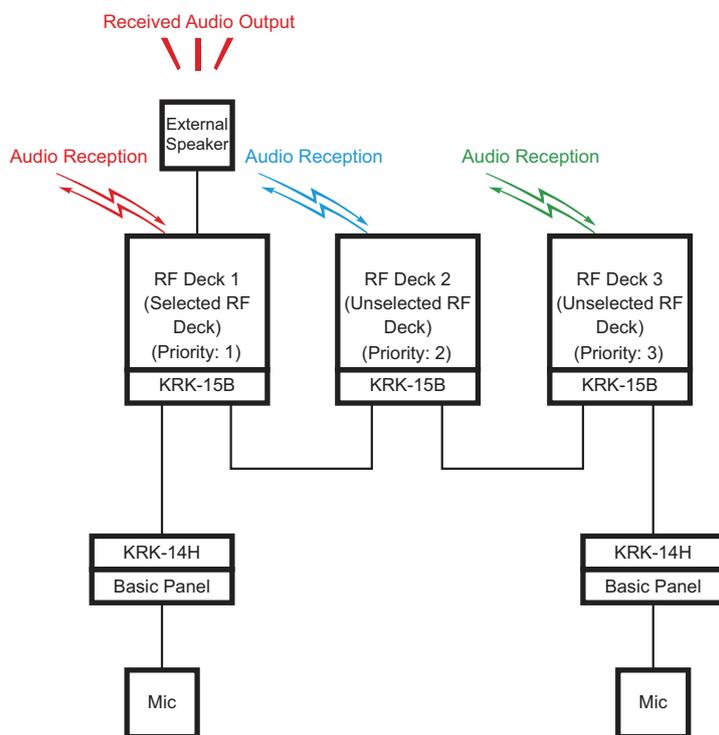
Figure 16-49 Single Audio Output (External Speaker = On)

● **When Multi Audio Output is configured**

The audio received by each RF Deck individually sounds from the external speaker connected to each RF Deck.
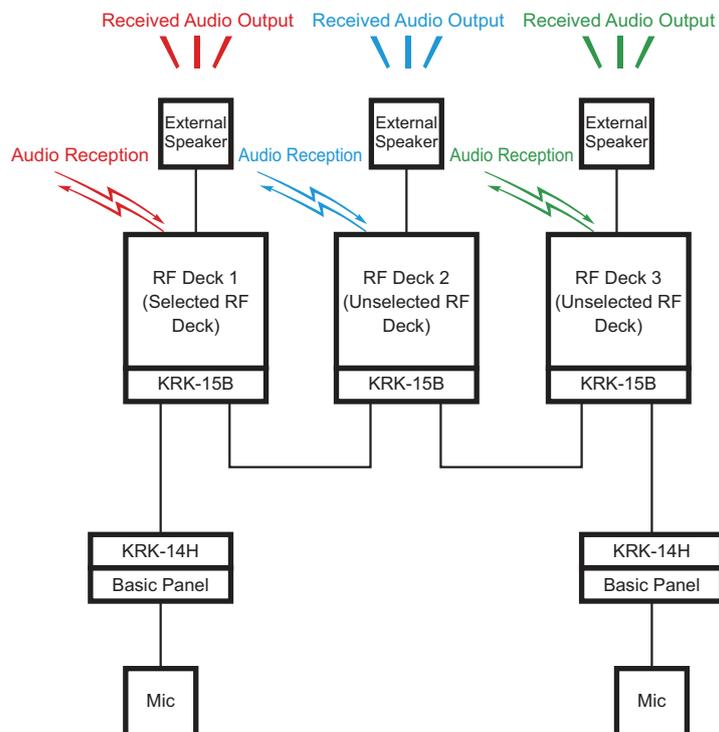
Figure 16-50 Multi Audio Output (External Speaker = On)

■ **If "Internal + External" is configured in External Speaker:**

● **When Single Audio Output is configured**

The audio received by RF Deck 1 sounds from both the speaker of the Control Head and the external speaker connected to RF Deck 1.
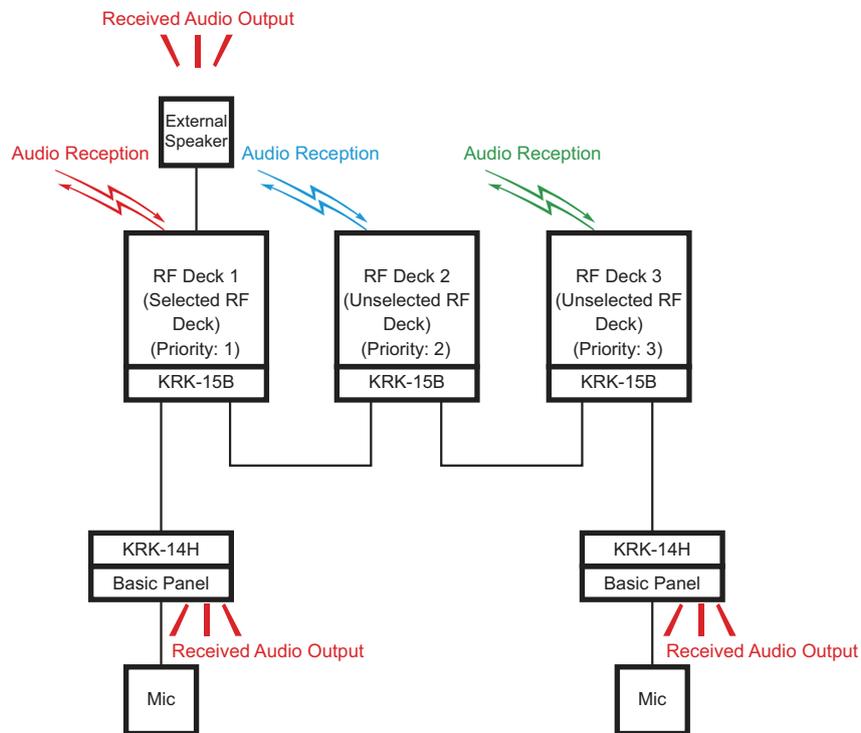
Figure 16-51 Single Audio Output (External Speaker = Internal + External)

● **When Multi Audio Output is configured**

The audio received by the Selected RF Deck sounds from the speaker of the Control Head. Simultaneously, the audio received by each RF Deck individually sounds from the external speaker connected to each RF Deck.
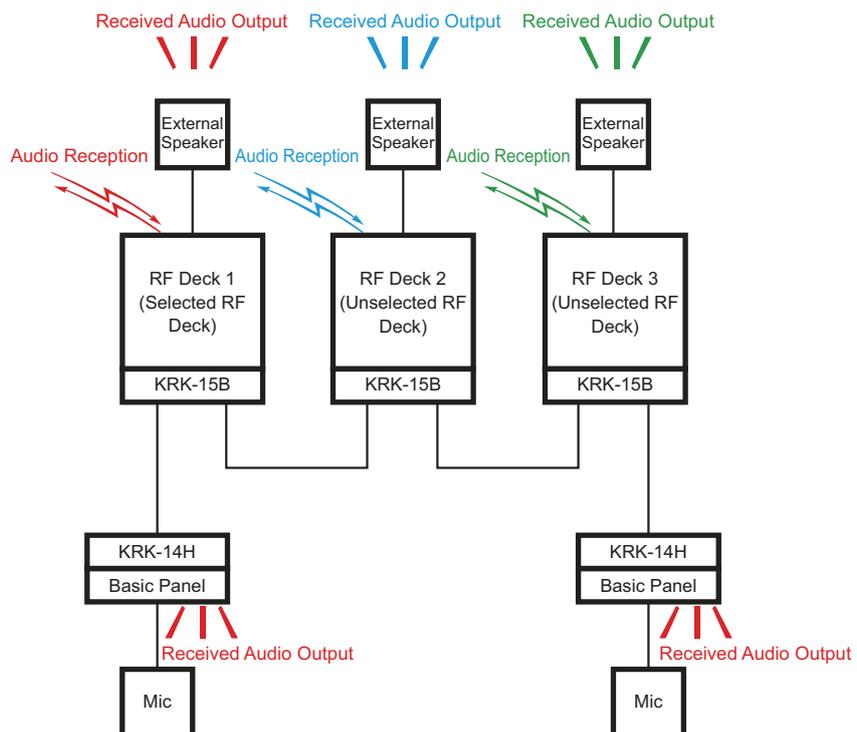
Figure 16-52 Multi Audio Output (External Speaker = Internal + External)

Example of received audio output by the priority level when Single Audio Output is configured

If "Single Audio Output" is configured in Multi RF Deck Audio Output Type, the transceiver emits the received audio as follows according to the output priority level. This is the example of the behavior if "Internal + External" is configured in External Speaker.

📠 Note

Output priority level is in the order: RF Deck 1, RF Deck 2, RF Deck 3 (highest to lowest).

1. When audio is received by RF Deck 3, the audio sounds from both the speaker of the Control Head and the external speaker connected to RF Deck 1.
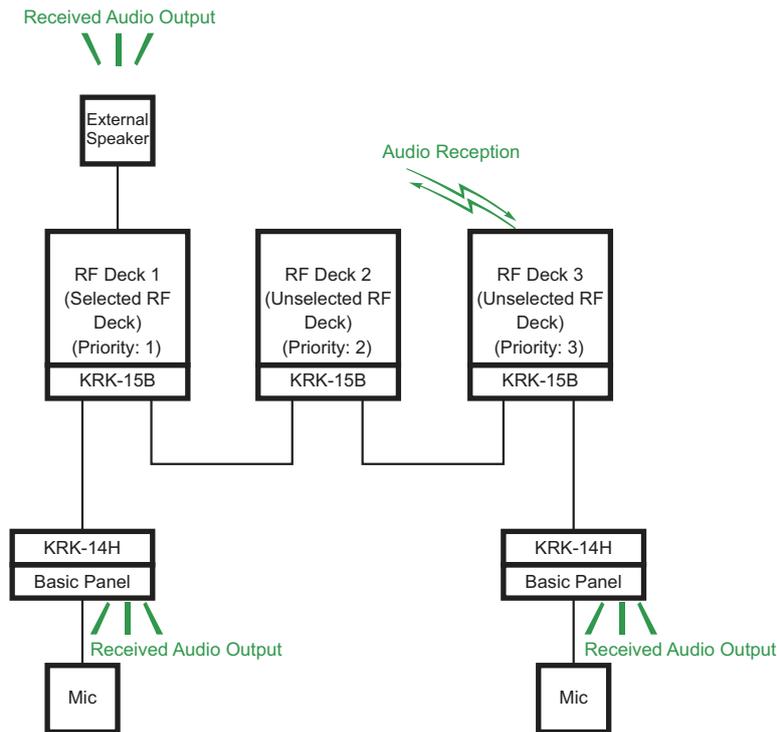
Figure 16-53 Single Audio Output 1

2. When audio is received by RF Deck 1 in the state of step 1), the audio that sounds from the speaker of the Control Head and from the external speaker connected to RF Deck 1 switches to the audio received by RF Deck 1.
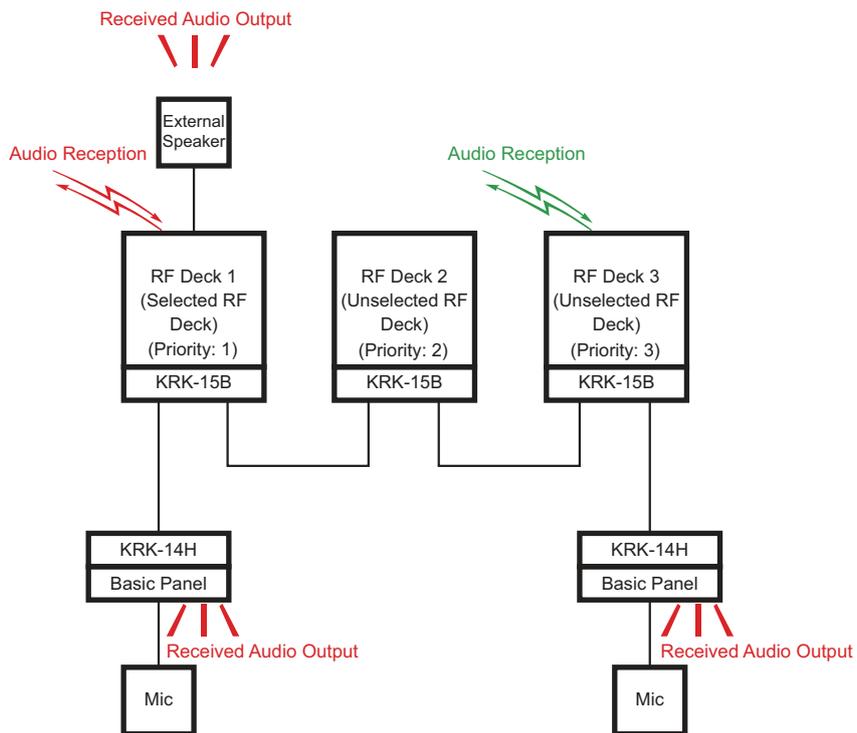
Figure 16-54 Single Audio Output 2

3. Even if audio is received again by RF Deck 2 after the state of step 2), the audio received by RF Deck 2 and RF Deck 3 do not sound while the audio received by RF Deck 1 having higher priority sounds.
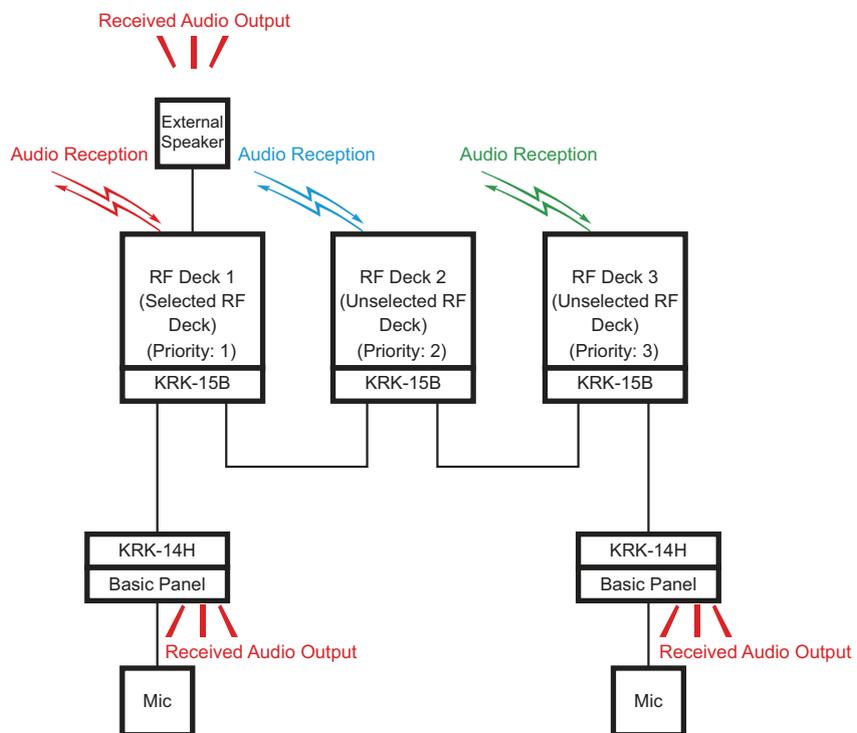
Figure 16-55 Single Audio Output 3

4. When audio reception of RF Deck 1 finishes, the audio received by RF Deck 2 sounds from the speaker of the Control Head and the external speaker connected to RF Deck 1.
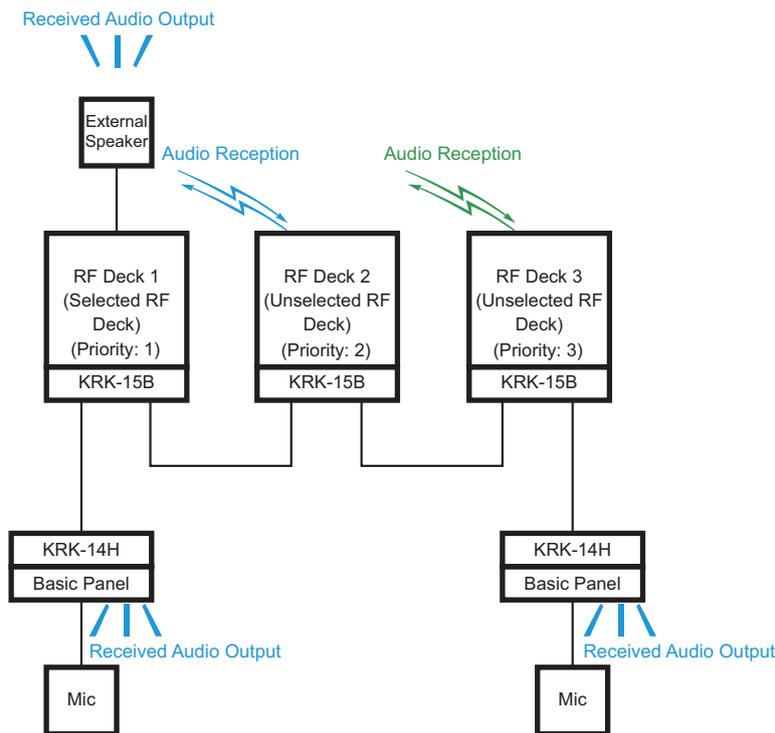
Figure 16-56 Single Audio Output 4

📋 Note

- In user mode and modes other than Mobile Relay Station Mode, **Multi RF Deck Audio Output Type** functions as the configuration of "Multi Audio Output".
- If "Single Audio Output" is configured in **Multi RF Deck Audio Output Type**, the beginning of the received audio and beep may be missing because the audio line is switched.
- If "Single Audio Output" is configured in **Multi RF Deck Audio Output Type**, the function restrictions are as follows:
  - The VOX function is unavailable.
  - "RF Deck" is fixed as the configuration of **SD Card Selection**. (Refer to microSD.)
  - "Control Head" is fixed as the configuration of **Bluetooth Interface Selection** when KCH-20R is used. The Bluetooth function is unavailable when KCH-19 is used. (Refer to Configuring the Connection Destination of a Bluetooth-compatible Device (Bluetooth Interface Selection).)
  - **Unselected Speaker Offset** is unavailable.
- When Single Audio Output is configured, External PTT (PA) can be executed by Deck 1 and cannot be executed by Deck 2 and Deck 3. (Refer to Using the Transceiver as a Megaphone (Public Address).)
- When Single Audio Output is configured, the behavior to switch the audio output by the automatic detection of the external speaker (such as KES-3) is not supported.

Configuration using KPG-D1/ D1N

Configuring **Multi RF Deck Audio Output Type** (🔍See Transceiver Settings > Optional Features > Optional Features 1 > Others)

16.8 Inhibiting Transceiver Behaviors by Remote Control (Inhibit/ Stun)

Inhibit/ Stun is the function to inhibit transceiver behaviors by remote control. This function is used to prevent the unauthorized use by a third party when the transceiver is stolen or lost.

This section describes behaviors unique to a Multi RF Deck/ Multi Control Head structure.

In a Multi RF Deck/ Multi Control Head structure, the system is operated by multiple protocols. The following are the Inhibit/ Stun behaviors under each condition:

Multi RF Deck (P25/ MDC-1200)

In Multi RF Deck operation, if any RF Deck receives an Inhibit request message, regardless of whether the RF Deck is the Selected RF Deck or not, all RF Decks enter the Inhibit state. If any RF Deck receives an Uninhibit request message, all RF Decks exit the Inhibit state.

Multi RF Deck (NXDN/ DMR/ FleetSync/ DTMF)

In Multi RF Deck operation, if any RF Deck receives a Stun/ Kill request message, regardless of whether the RF Deck is the Selected RF Deck or not, all RF Decks enter the Stun/ Kill state. If any of the RF Decks receives a Revive request message, all RF Decks exit the Stun state.

Multi RF Deck (mix of P25 and NXDN)

In Multi RF Deck operation, if any RF Deck operated in P25 receives an Inhibit request message, regardless of whether the RF Deck is the Selected RF Deck or not, all RF Decks, including RF Decks operated in NXDN, enter the Inhibit state. If any RF Deck operated in P25 receives an Uninhibit request message, all RF Decks exit the Inhibit state.

The opposite is the same, if any RF Deck operated in NXDN receives a Stun/ Kill request message, all RF Decks, including RF Decks operated in P25, enter the Stun/ Kill state. The recovery conditions are also the same. If any RF Deck operated in NXDN receives an Uninhibit request message, all RF Decks exit the Inhibit state.
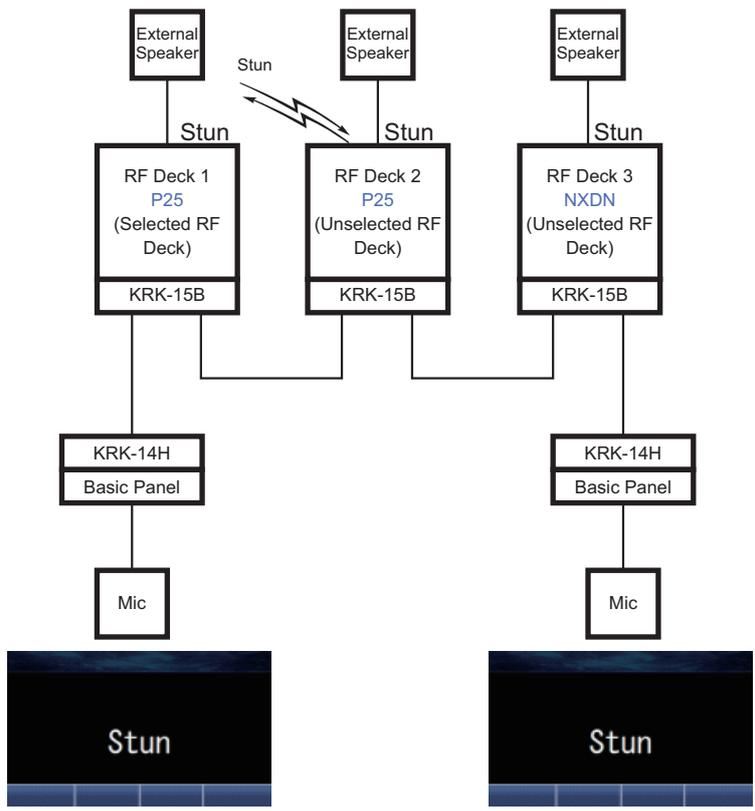
Figure 16-57 Inhibit/ Stun

📋 Note

In Multi RF Deck operation, when RF Decks are in the Inhibit/ Stun state, if one of the RF Decks is replaced with an RF Deck that is not in the Inhibit/ Stun state, the RF Deck that is not in the Inhibit/ Stun state enters the Inhibit/ Stun state. However, if an RF Deck is removed from the Multi RF Deck operation, the Inhibit/ Stun state of the RF Deck is reset.

16.9 Communication Ports

In a Multi RF Deck/ Multi Control Head structure, COM 1 and COM 2 can be configured for each RF Deck, and the communication ports of each RF Deck behave individually according to the configuration for the RF Deck with a serial cable connection, regardless of whether the RF Deck is the Selected RF Deck or not. (Refer to Available Functions for COM Port.)

The following figure shows an example of when COM ports are configured for RF Decks:
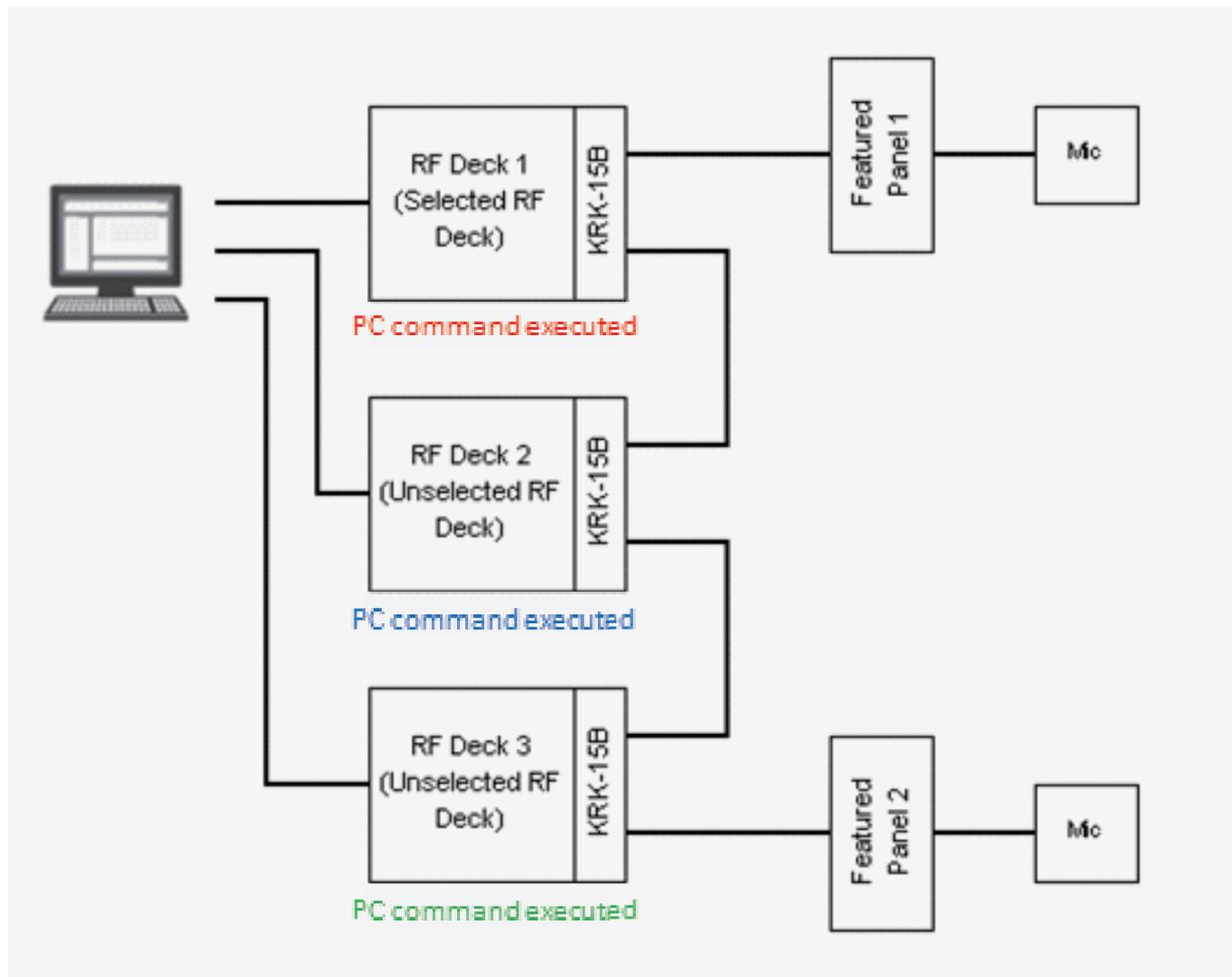
Figure 16-58 COM port

📋 Note

"GPS" can be configured in Function of **COM port 1** and **COM port 2** of RF Deck 1.

PC Interface Protocol

In a Multi RF Deck/ Multi Control Head structure, the remote control by applications such as KAS-10 is available by using a serial interface port of the transceiver.

If a PC command is executed from COM 1 or COM 2 of a D-sub 25-pin connector of an RF Deck, the communication ports of each RF Deck behave individually according to the configuration for the connected RF Deck, regardless of whether the RF Deck is the Selected RF Deck or Unselected RF Deck.

If a PC command is executed from COM 0 in a Multi RF Deck system, the communication port (COM 0) of the Selected RF Deck behaves. If a PC command is executed from COM 0, a response command is returned to the Control Head that executed the PC command.

📋 Note

In a Multi RF Deck system, if a PC command is executed from COM 1 or COM 2 of the Unselected RF Deck, some of the commands are restricted.

16.10 External Ports (AUX Input/ Output)

In a Multi RF Deck/ Multi Control Head structure, external devices such as Mobile Data Terminal (MDT) can be connected by using the AUX Input/ Output port of the transceiver. (Refer to EXTERNAL PORTS.)

The functions configured for a D-sub 25-pin connector behave only for the RF Deck connected to the D-sub 25-pin connector, regardless of whether the RF Deck is the Selected RF Deck or Unselected RF Deck. The functions configured for the 12-pin connector of a Control Head behave individually for the Selected RF Deck according to the configurations of the communication ports of each RF Deck.
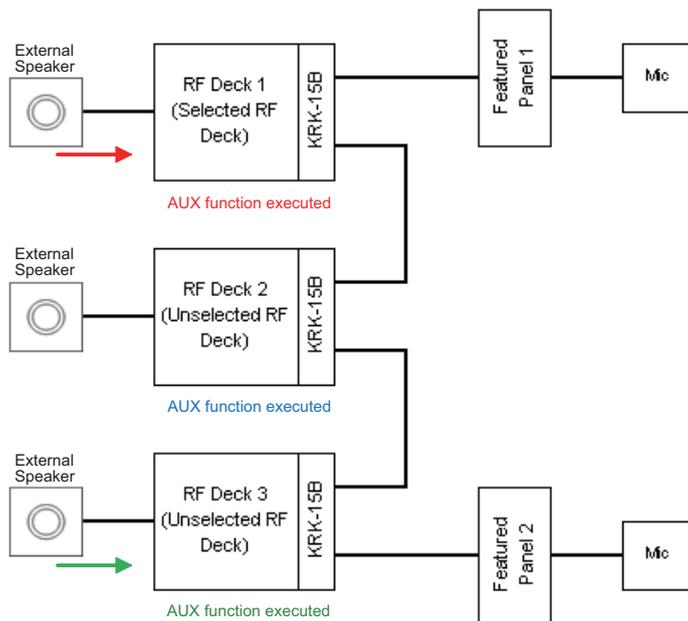
Figure 16-59 Example of When the AUX Input Is Configured for RF Decks
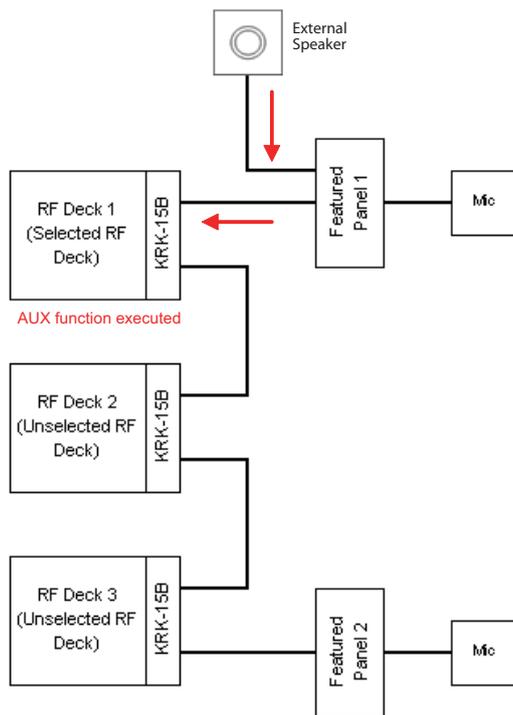
Figure 16-60 Example of When the AUX Input Is Configured for Control Heads

Restrictions When Configuring AUX Input/ Output

● **AUX Input configuration**

- In a Dual Control Head structure, if a function is configured for one of the Control Heads, the same function cannot be configured for the other Control Head.
- In a Multi RF Deck system, the same function can be configured for the D-sub connector of each RF Deck.
- The functions configured for Control Heads cannot be configured for RF Decks.
- The functions configured for RF Decks cannot be configured for Control Heads.
- The following functions can be configured only for one RF Deck or Control Head of all RF Decks and Control Heads:
  - Emergency
  - Mobile Relay Station
  - Light Sense

● **AUX Output configuration**

- In a Multi RF Deck system, no function can be configured for AUX Output of a Control Head.
- In a Dual Control Head structure, if a function is configured for one of the Control Heads, the same function cannot be configured for the other Control Head.
- In a Multi RF Deck system, the same function can be configured for the D-sub connector of each RF Deck.
- The functions configured for Control Heads cannot be configured for RF Decks.
- The functions configured for RF Decks cannot be configured for Control Heads.

📝 Note

In a Multi RF Deck system, if configuring the same AUX Input functions for the D-sub 25-pin connector of each RF Deck, connect an external device to each RF Deck individually.

16.11 | Ignition Sense

In a Multi RF Deck/ Multi Control Head structure, turning the transceiver ON or OFF can be controlled by the ignition switch of a vehicle. (Refer to FUNCTIONS LINKED TO A VEHICLE.)

RF Decks and Control Heads are equipped with an Ignition terminal.

Behaviors of Each Ignition Terminal

● **Control Head Side**

Connect a Control Head to the IGN terminal of a vehicle via KCT-72 (pin number: Pin 1) connected to the Control Head. The ignition switch is enabled only on one of the Control Heads, therefore, the ignition switch can be easily connected compared to if the ignition switch is connected to an RF Deck.
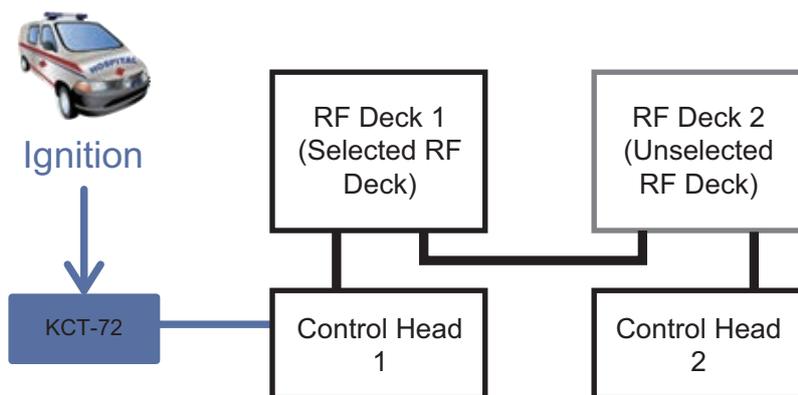
Figure 16-61 Example of When the Ignition of a Control Head Is Used

● **RF Deck Side**

Ignition can be used by inputting IGN signals from a vehicle to the Ignition terminals of all of the connected RF Decks.
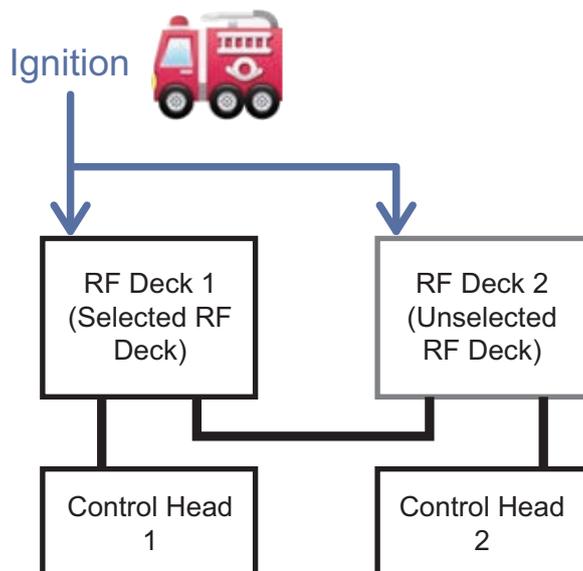
Figure 16-62 Example of When the Ignition of RF Decks Is Used

📝 Note

For RF Deck Side, even if the Ignition status of only one of the RF Decks in a Multi RF Deck system is changed, the other RF Decks cannot detect the change.

16.12 | Microphone-hook

Hook Control exists as a function to control the microphone hook status for Mobile.

Hook Control is the function to specify the conditions to place the transceiver in the on-hook state if both the Local Mic Hook and the External Hook are used. By using this function, whether the on-hook state of the transceiver when both the Local Mic Hook and the External Hook are used is determined by AND or by OR can be changed.

Also, in a Multi RF Deck/ Multi Control Head structure, whether the on-hook state of the transceiver of when the following Local Mic Hook and External Hook are used together is determined by AND or by OR can be changed:

● the Local Mic Hook of Control Head 1 or Control Head 2 for the Selected RF Deck

● the External Hook of Control Head 1 or Control Head 2, or the External Hook of an RF Deck

The transceiver behaves as follows according to the configuration in **Hook Control** (AND, OR):

● **AND**

   The transceiver behaves as the on-hook state if both the Local Mic Hook and External Hook are in the on-hook state. Also, the transceiver behaves as the off-hook state if either the Local Mic Hook or External Hook is in the off-hook state.

● **OR**

   The transceiver behaves as the on-hook state if either the Local Mic Hook or External Hook is in the on-hook state. Also, the transceiver behaves as the off-hook state if both the Local Mic Hook and External Hook are in the off-hook state.

The Unselected RF Deck judges the hook state of the connected RF Deck only by the input from the External Hook of the RF Deck, and performs the hook behavior.

Hook Control is applied to the following configurations:

● Off-hook Scan
● Off-hook Voting
● Off-hook Site Roaming
● Off-hook Decode
● Off-hook Connect
● Off-hook Speaker Revert

Configuration using KPG-D1/ D1N

Configuring **Hook Control** (🔍See Transceiver Settings > Optional Features > Optional Features 1 > Microphone-hook)

16.13 | GPS

In a Multi RF Deck/ Multi Control Head structure, the built-in GPS receiver unit or an external GPS receiver unit can be used.

In a Multi RF Deck system, a GPS antenna is connected to RF Deck 1. The acquired GPS data is transferred from RF Deck 1 to another RF Deck. Whether to enable or disable Built-in GPS Receiver can be toggled after entering GPS Mode by pressing the **GPS** key or **Menu** key, regardless of whether RF Deck 1 is the Selected RF Deck.
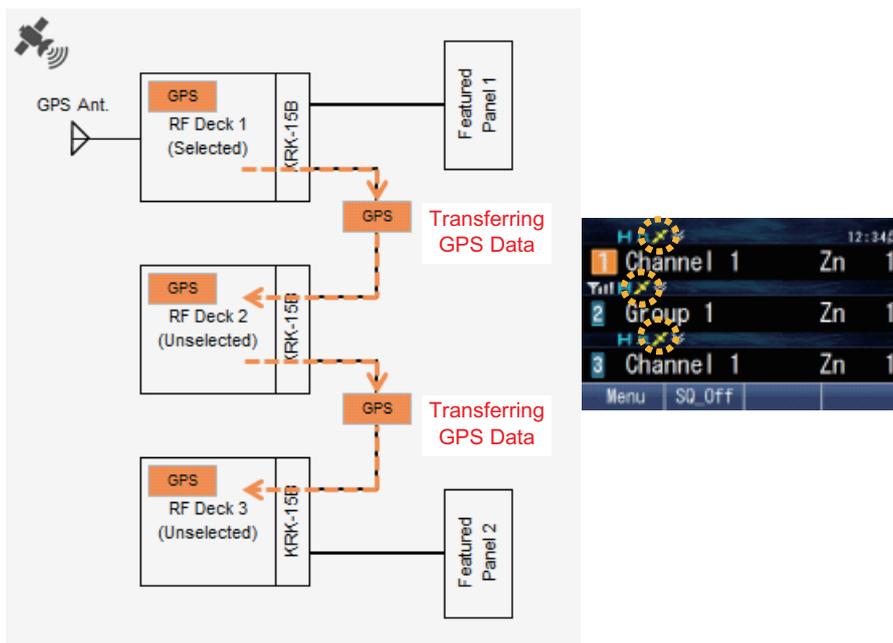
Figure 16-63 GPS

16.14 Scan

Regarding the scan behavior when Multi RF Deck is operated, each RF Deck can individually perform the scan behavior.

While scanning stops, the audio received by the Selected RF Deck sounds from the Control Head, and the audio received by the Unselected RF Deck sounds only from an external speaker connected to each Unselected RF Deck. **Revert Channel** and **Priority Channel** can be configured for each RF Deck.
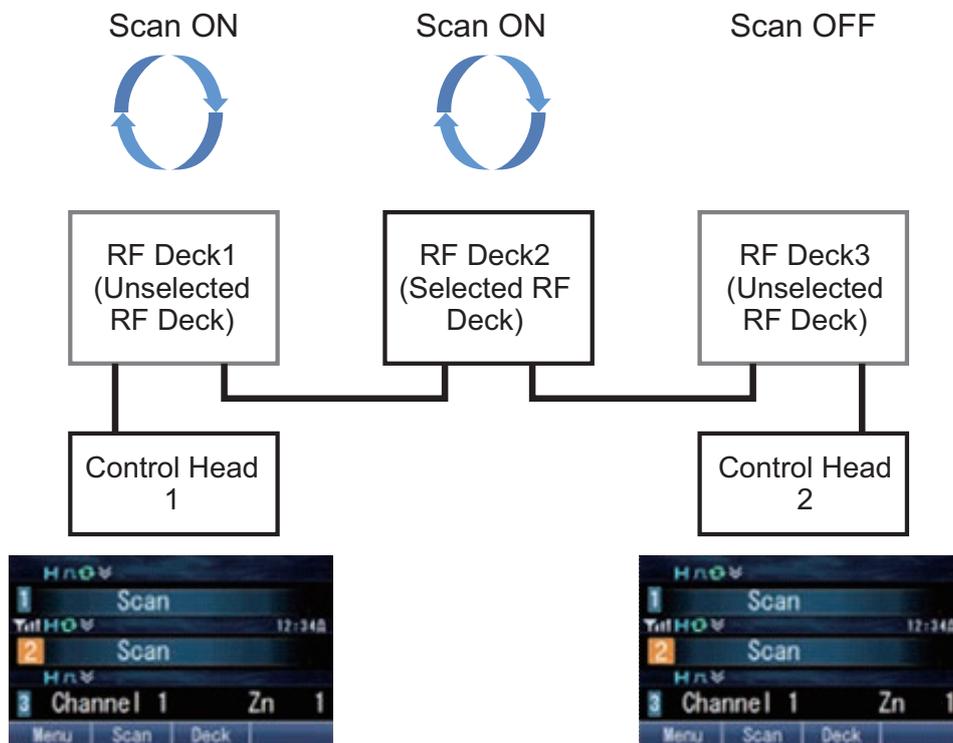
Figure 16-64 Scan

16.15 Communications in an Emergency (Emergency)

Emergency is the function to notify the base station or people around of the emergency situation by sending radio signals or emitting an alarm when a user is placed in the emergency state.

In a Multi RF Deck system, one of the multiple RF Decks executes the Emergency behavior in Emergency Mode, and the other RF Decks do not transmit and receive. The RF Decks enter Emergency Mode as a single system structured with Multi RF Deck/ Multi Control Head.

A Zone-channel on which the Emergency behavior is activated can be configured by using the configuration in **Emergency Channel Type** (Selected, Fixed).

● **Selected**

The transceiver resets the current channel moving status (such as Home Channel) and starts the Emergency behavior on the Zone-channel last selected by the Selected RF Deck.

● **Fixed**

If the transceiver enters Emergency Mode, the transceiver migrates to the Zone-channel of the RF Deck configured in Emergency Zone-Channel and starts the Emergency behavior.

The **Emergency** key can be configured for each Control Head. Also, Emergency in AUX Input can be configured only for one RF Deck or Control Head of all RF Decks and Control Heads.
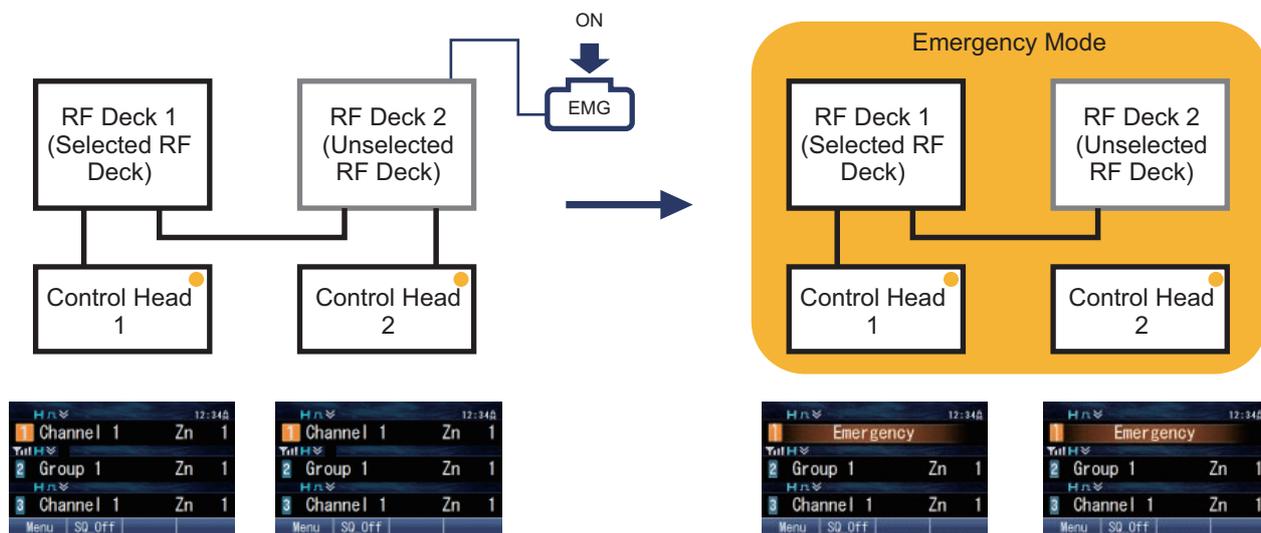
Figure 16-65 Emergency

16.16 Bluetooth Communication

This section describes the operation method for Bluetooth in a Multi RF Deck/ Multi Control Head structure.

A Bluetooth device is equipped in an RF Deck and a Control Panel (KCH-20R). If Multi RF Deck/ Multi Control Head is structured using KCH-20R, multiple available Bluetooth devices exist.

In **Bluetooth Interface Selection** of KPG-D1/ D1N, which Bluetooth device, the one equipped in an RF Deck or in a Control Head, to be used can be selected.
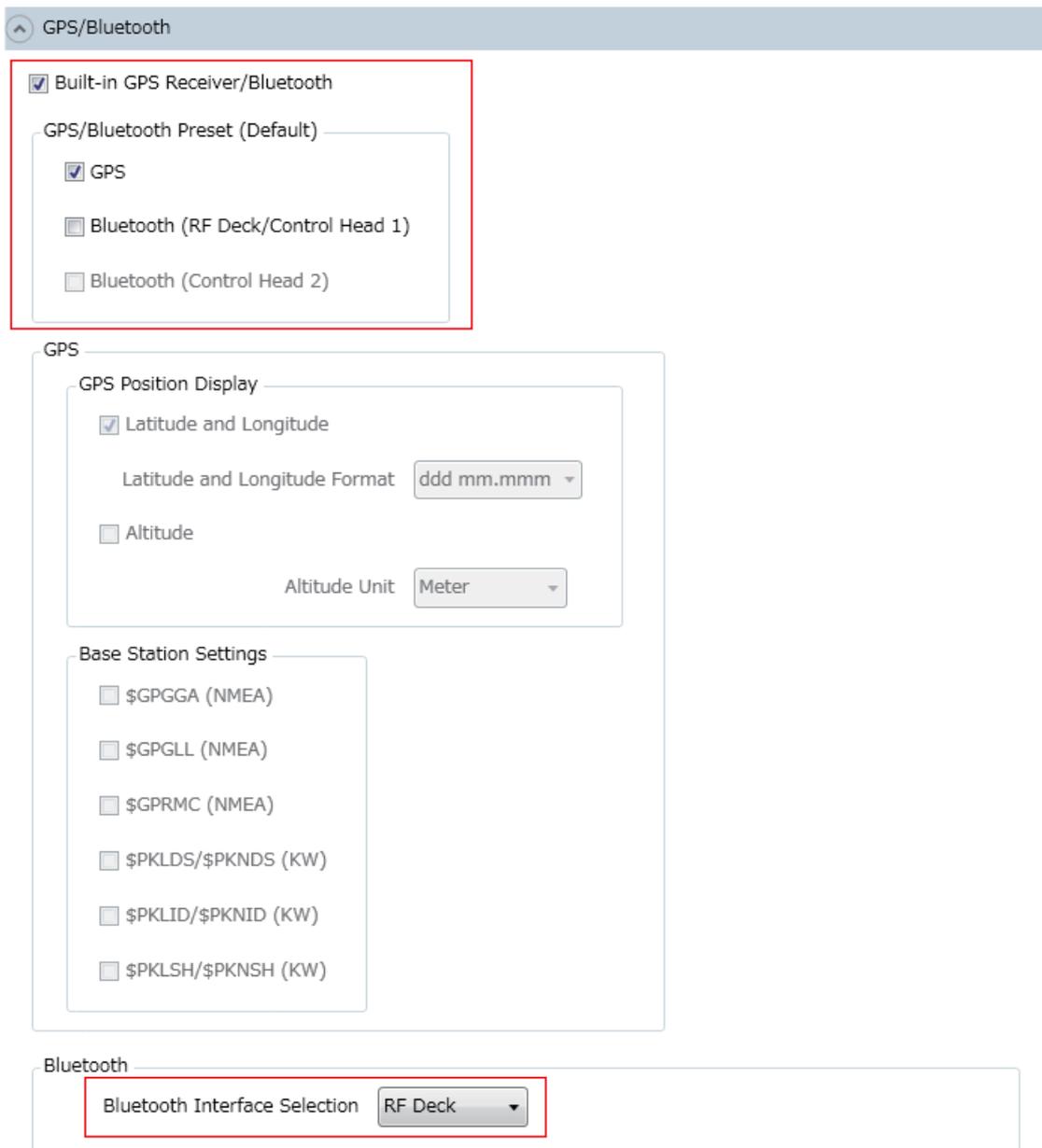
Figure 16-66 KPG-D1 > Transceiver Settings > Optional Features > Optional Features 2 > GPS/Bluetooth

If "RF Deck" is configured in Bluetooth Interface Selection:

Out of Bluetooth-compatible devices equipped in each RF Deck, which device to be used can be configured. In a Triple RF Deck structure, devices equipped in all RF Decks can be used. Using only a device equipped in a single RF Deck is also possible. In this case, activating all devices is recommended because the connection to a Bluetooth-compatible device of each RF Deck becomes possible.

If "Control Head" is configured in Bluetooth Interface Selection:

A Bluetooth-compatible device equipped in KCH-20R can be used. In a Dual Control Head structure, Bluetooth-compatible devices of all Control Heads can be used. A Bluetooth-compatible device of each Control Head cannot be individually configured. Two Control Heads always become available at a time.
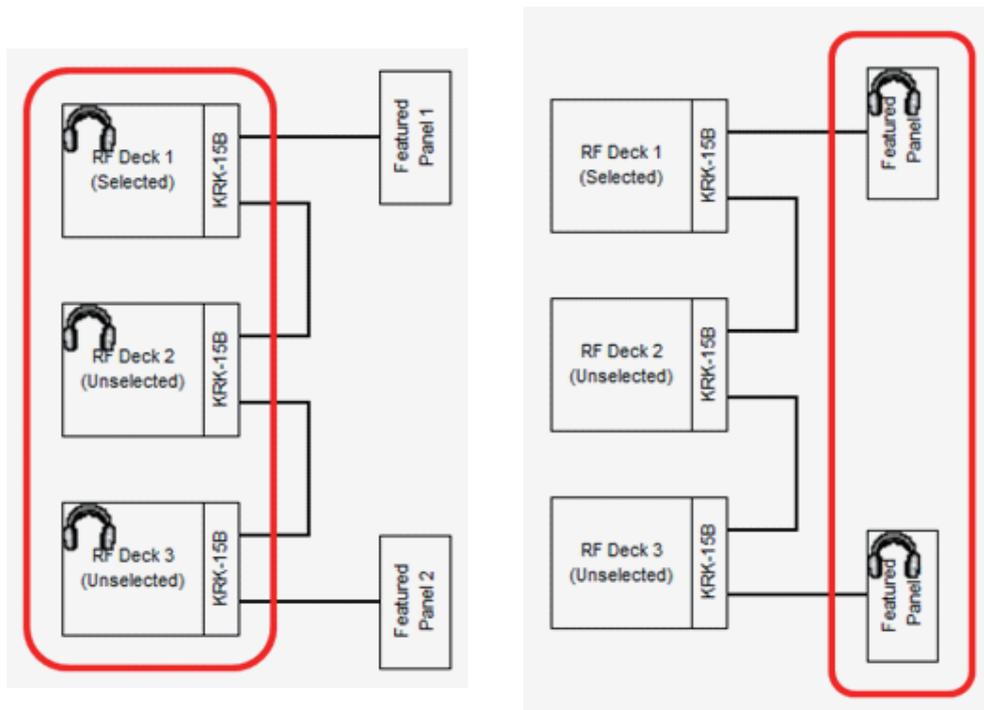
Figure 16-67 Bluetooth Interface Selection

The following Bluetooth basic functions work differently between when "RF Deck" is configured and when "Control Head" is configured in **Bluetooth Interface Selection**.

1. Bluetooth On/Off
2. Bluetooth Find Device
3. Bluetooth Device Name
4. Bluetooth Information
5. Pairing
6. Bluetooth My Devices
7. VOX
8. Bluetooth Speaker

The following describes how each function works.

Bluetooth On/Off

The Bluetooth function can be toggled between on and off. The toggling behavior varies according to the configuration in **Bluetooth Interface Selection** (RF Deck, Control Head).

● RF Deck

Bluetooth of the Selected RF Deck can be toggled between on and off by any of the following key operations:

1. Pressing the **Bluetooth** key toggles **Bluetooth** between on and off.
2. Entering Menu Mode by pressing the **Menu** key, and then executing "Bluetooth" can toggle **Bluetooth** between on and off.
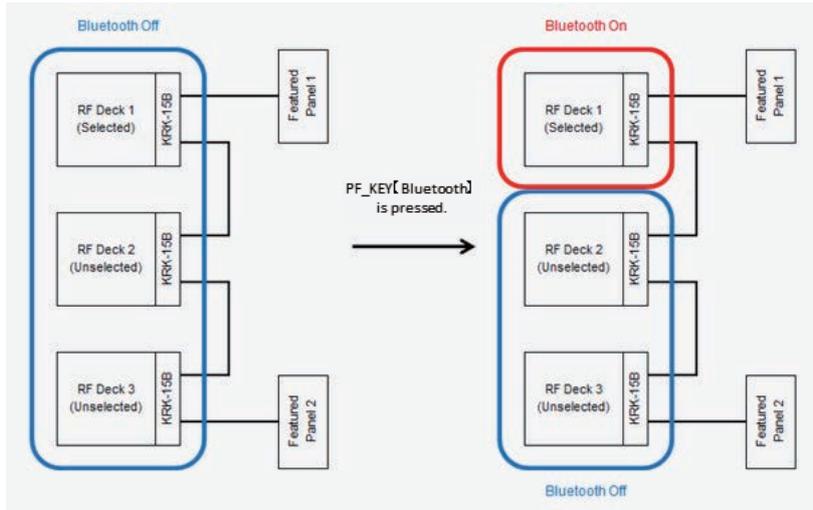
Figure 16-68 Bluetooth On/Off (RF Deck)

● Control Head

Bluetooth can be toggled between on and off by any of the following key operations:

1. Pressing the **Bluetooth** key toggles **Bluetooth** of the operated KCH-20R between on and off.
2. Entering Menu Mode by pressing the **Menu** key, and then executing "Bluetooth" can toggle **Bluetooth** of the operated Featured Panel between on and off.

If any of KCH-19, KCH-20R, and KCH-21R coexist, and if the operated Control Head is KCH-19, a Key-entry Error Tone sounds from the Control Head, and the Control Head does not respond.
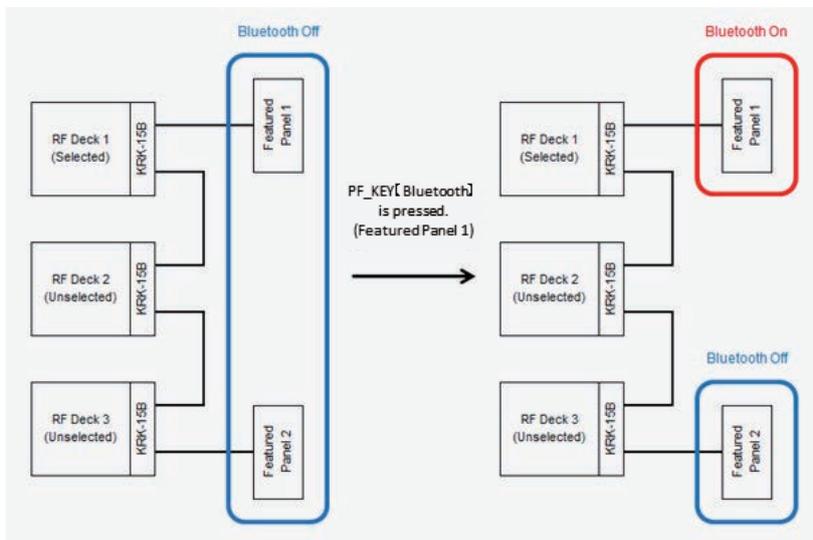
Figure 16-69 Bluetooth On/Off (Control Head)

Finding a Bluetooth-compatible Device (Bluetooth Find Device)

Bluetooth Find Device is the function to find a Bluetooth-compatible device for each RF Deck or Featured Panel. The finding behavior varies according to the configuration in **Bluetooth Interface Selection** (RF Deck, Control Head).

- **RF Deck**

    By pressing the **Menu** key to enter Menu Mode, and then executing "Bluetooth Device", Bluetooth Device Mode is entered. After that, by executing Bluetooth Find Device, Bluetooth Find Device Mode is entered. After Bluetooth Find Device Mode is entered, the Selected RF Deck automatically starts searching for a Bluetooth-compatible device.

- **Control Head**

    By pressing the **Menu** key to enter Menu Mode, and then executing "Bluetooth Device", Bluetooth Device Mode is entered. After that, by executing Bluetooth Find Device, Bluetooth Find Device Mode is entered. After Bluetooth Find Device Mode is entered, the operated KCH-20R automatically starts searching for a Bluetooth-compatible device.

    If any of KCH-19, KCH-20R, and KCH-21R coexist, and if the operated Control Head is KCH-19, a Key-entry Error Tone sounds from the Control Head, and the Control Head does not respond.

Bluetooth Device Name

An own Bluetooth device name can be configured for each RF Deck or KCH-20R. The devices for which a Bluetooth device name can be configured vary according to the configuration in **Bluetooth Interface Selection** (RF Deck, Control Head).

- **RF Deck**

    A Bluetooth device name can be configured for each RF Deck by using KPG-D1/ D1N.

    If Model Name and Market Code of Kenwood ESN are used as a Bluetooth device name, each RF Deck uses own Kenwood ESN.
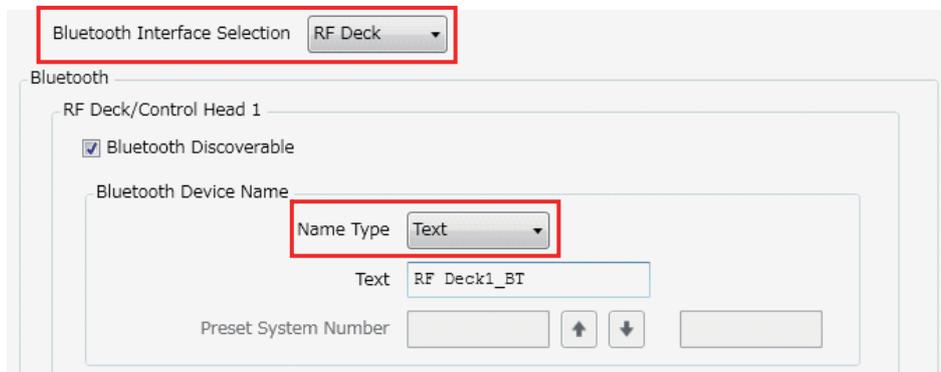
Figure 16-70 KPG-D1 > Transceiver Settings > Optional Features > Optional Features 2 > GPS/Bluetooth > Bluetooth

● **Control Head**

A Bluetooth device name can be configured for each KCH-20R by using KPG-D1/ D1N.

If "FleetSync ID", "Unit ID", "Unit ID Name" or "ESN" is configured in **Name Type**, or if Model Name and Market Code of Kenwood ESN are used as the Bluetooth device name (for example, if the configuration in Preset System Number is left blank), a Bluetooth device name needs to be configured according to the configuration for the Selected RF Deck.
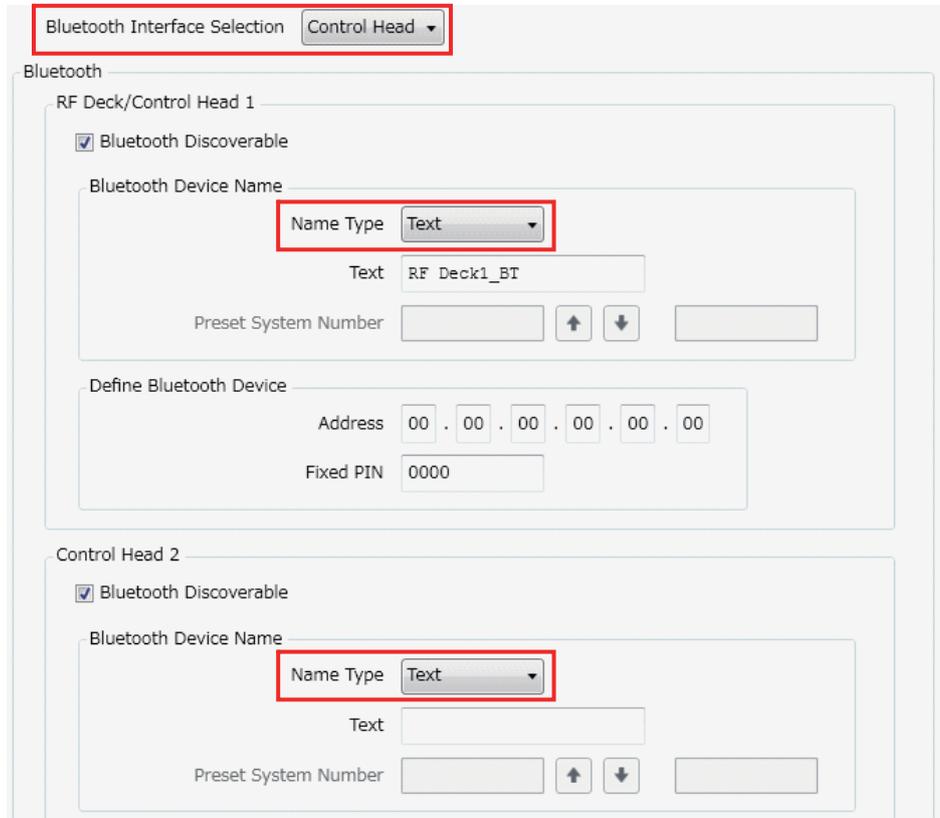
Figure 16-71 KPG-D1 > Transceiver Settings > Optional Features > Optional Features 2 > GPS/Bluetooth > Bluetooth

Checking the Bluetooth Device Name (Bluetooth Information)

In **Bluetooth Information**, the own Bluetooth device name configured for each RF Deck or KCH-20R can be confirmed on the display. The displayed Bluetooth device name varies according to the configuration in **Bluetooth Interface Selection** (RF Deck, Control Head).

● **RF Deck**

By pressing the **Menu** key to enter Menu Mode, and then executing "Bluetooth Information", Bluetooth Information Mode is entered. The Bluetooth device name configured for the Selected RF Deck can be confirmed.

● **Control Head**

By pressing the Menu key to enter Menu Mode, and then executing "Bluetooth Information", Bluetooth Information Mode is entered. The Bluetooth device name configured for the operated KCH-20R can be confirmed.

If any of KCH-19, KCH-20R, and KCH-21R coexist, and if the operated Control Head is KCH-19, a Key-entry Error Tone sounds from the Control Head, and the Control Head does not respond.

Registering a Bluetooth Connection Device (Pairing)

An Bluetooth connection device can be registered for each RF Deck or KCH-20R. The pairing behavior varies according to the configuration in **Bluetooth Interface Selection** (RF Deck, Control Head).

● **RF Deck**

Pairing can be executed by selecting a detected Bluetooth-compatible device after entering Bluetooth Find Device Mode or by pressing the **Bluetooth Connect / Disconnect** key.

When the Selected RF Deck receives a pairing request from a Bluetooth-compatible device, the Bluetooth device name or Bluetooth device address of the Bluetooth-compatible device appears on the display, and whether to execute pairing can be selected.

Once pairing completes, the device configuration is registered in the Selected RF Deck.

If the Unselected RF Deck receives a pairing request, the request is automatically rejected.

● **Control Head**

Pairing can be executed by selecting a detected Bluetooth-compatible device after entering Bluetooth Find Device Mode or by pressing the **Bluetooth Connect / Disconnect** key.

When KCH-20R receives a pairing request from a Bluetooth-compatible device, the Bluetooth device name or Bluetooth device address of the Bluetooth-compatible device appears on the display, and whether to execute pairing can be selected.

Once pairing completes, the device configuration is registered in the operated KCH-20R.

If the other KCH-20R receives a pairing request while KCH-20R of either Control Head 1 and Control Head 2 is executing pairing, the request is automatically rejected.

If any of KCH-19, KCH-20R, and KCH-21R coexist, and if the operated Control Head is KCH-19, a Key-entry Error Tone sounds from the Control Head, and the Control Head does not respond.

Displaying a Bluetooth-compatible Device (Bluetooth My Devices)

A Bluetooth-compatible device registered for each RF Deck or KCH-20R can be confirmed. The Bluetooth-compatible device which can be confirmed varies according to the configuration in **Bluetooth Interface Selection** (RF Deck, Control Head).

● **RF Deck**

By pressing the **Menu** key to enter Menu Mode, and then executing "Bluetooth Device", Bluetooth Device Mode is entered. After that, by executing Bluetooth My Devices, Bluetooth My Devices Mode is entered. In Bluetooth My Devices Mode, the Bluetooth-compatible device registered in the Selected RF Deck can be confirmed.

● **Control Head**

By pressing the **Menu** key to enter Menu Mode, and then executing "Bluetooth Device", Bluetooth Device Mode is entered. After that, by executing Bluetooth My Devices, Bluetooth My Devices Mode is entered. In Bluetooth My Devices Mode, the Bluetooth-compatible device registered in the operated KCH-20R can be confirmed.

If any of KCH-19, KCH-20R, and KCH-21R coexist, and if the operated Control Head is KCH-19, a Key-entry Error Tone sounds from the Control Head, and the Control Head does not respond.

VOX

VOX is the function to enable the transmission without pressing the **PTT** switch, just by inputting the audio to a microphone of the headset which supports Bluetooth.

In a Multi RF Deck/ Multi Control Head structure, the available operations increase compared with Single RF Deck/ Single Head Multi. The VOX behavior varies according to the configuration in **Bluetooth Interface Selection** (RF Deck, Control Head).

● **RF Deck**

By pressing the **VOX** key, or by pressing the **Menu** key to enter Menu Mode and then executing "VOX", VOX for the Selected RF Deck can be toggled between on and off.

If VOX is enabled, and if the audio is inputted to a microphone of the headset, the RF Deck connected to the headset starts transmitting.

If **Cancel Operation** is enabled, VOX will be disabled when one of the following operations is executed by the Selected RF Deck or the Unselected RF Deck:

For the Selected RF Deck:

- Pressing the **PTT** switch of Control Head 1 or Control Head 2
- The External PTT (Voice) port (AUX Input) of the Selected RF Deck goes low level
- Pressing the **PTT** switch of the headset connected to the Selected RF Deck

For the Unselected RF Deck:

- The External PTT (Voice) port (AUX Input) of the Unselected RF Deck goes low level
- Pressing the **PTT** switch of the headset connected to the Unselected RF Deck
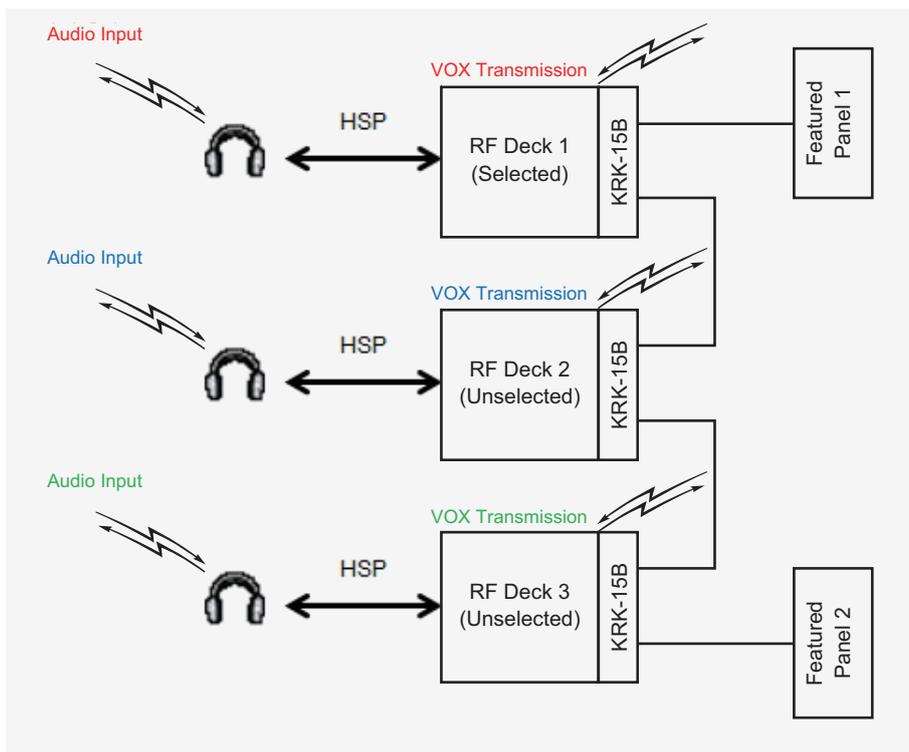
Figure 16-72 VOX Transmission (RF Deck)

● **Control Head**

By pressing the **VOX** key, or by pressing the **Menu** key to enter Menu Mode and then executing "VOX", VOX for the Control Head can be toggled between on and off.

In a Multi RF Deck/ Multi Control Head structure, which headset is used to execute the VOX function, either the headset connected to Control Head 1 or the headset connected to Control Head 2, needs to be configured in **Control Head for VOX** of KPG-D1/ D1N.
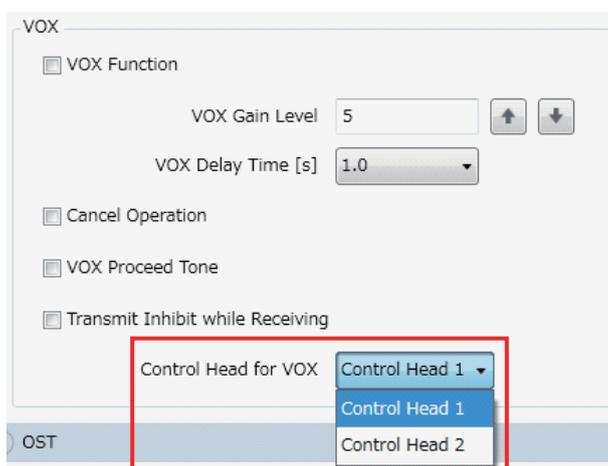
Figure 16-73 KPG-D1 > Transceiver Settings > Optional Features > Optional Features 2 > Conventional > VOX

If "Control Head 1" is configured in Control Head for VOX:

The VOX function is executed using the headset connected to Control Head 1. If the headset is not connected to Control Head 1, VOX does not function.

Or, when **Cancel Operation** is enabled, executing any of the following operations disables VOX of whole Multi RF Deck/ Multi Control Head.

- Pressing the **PTT** switch of Control Head 1
- The External PTT (Voice) port (AUX Input) of the Selected RF Deck goes low level
- Pressing the **PTT** switch of the headset connected to Control Head 1

If "Control Head 2" is configured in Control Head for VOX:

The VOX function is executed using the headset connected to Control Head 2. If the headset is not connected to Control Head 2, VOX does not function.

Or, when **Cancel Operation** is enabled, executing any of the following operations disables VOX of whole Multi RF Deck/ Multi Control Head.

- Pressing the **PTT** switch of Control Head 2
- The External PTT (Voice) port (AUX Input) of the Selected RF Deck goes low level
- Pressing the **PTT** switch of the headset connected to Control Head 2
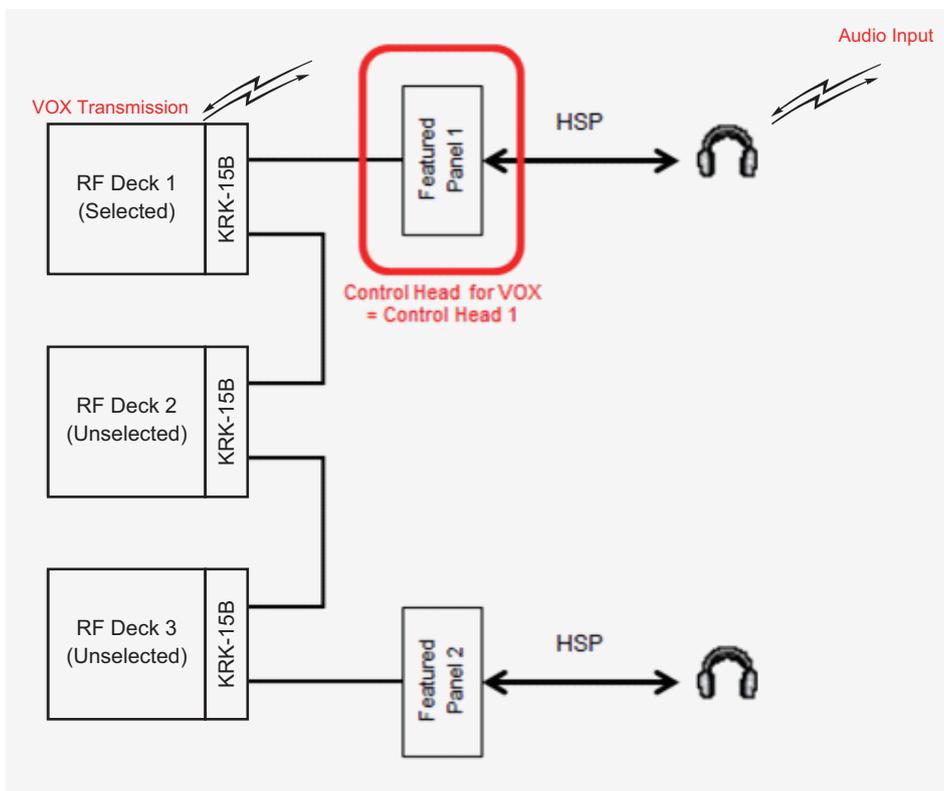
Figure 16-74 VOX Transmission (Control Head)

Switching the Speaker to Emit Audio (Bluetooth Speaker)

In a Multi RF Deck/ Multi Control Head structure, whether to emit audio from the speaker of the Bluetooth-compatible device connected by Headset Profile, or from the internal or the external speaker can be toggled by the configuration in **Bluetooth Speaker** (Off, Only, Both (Bluetooth+Radio)). The speaker to emit audio varies according to the configurations in **Bluetooth Speaker** and **Bluetooth Interface Selection** (RF Deck, Control Head).

● **RF Deck**

By pressing the **Bluetooth Speaker** key, or by pressing the **Menu** key to enter Menu Mode and then executing "Bluetooth Speaker", the configuration in **Bluetooth Speaker** can be changed.

In the following diagram, a Bluetooth speaker is connected to all RF Decks. If "Both" is configured in **Bluetooth Speaker**, the pattern of emitting audio when the audio is simultaneously received is as follows:
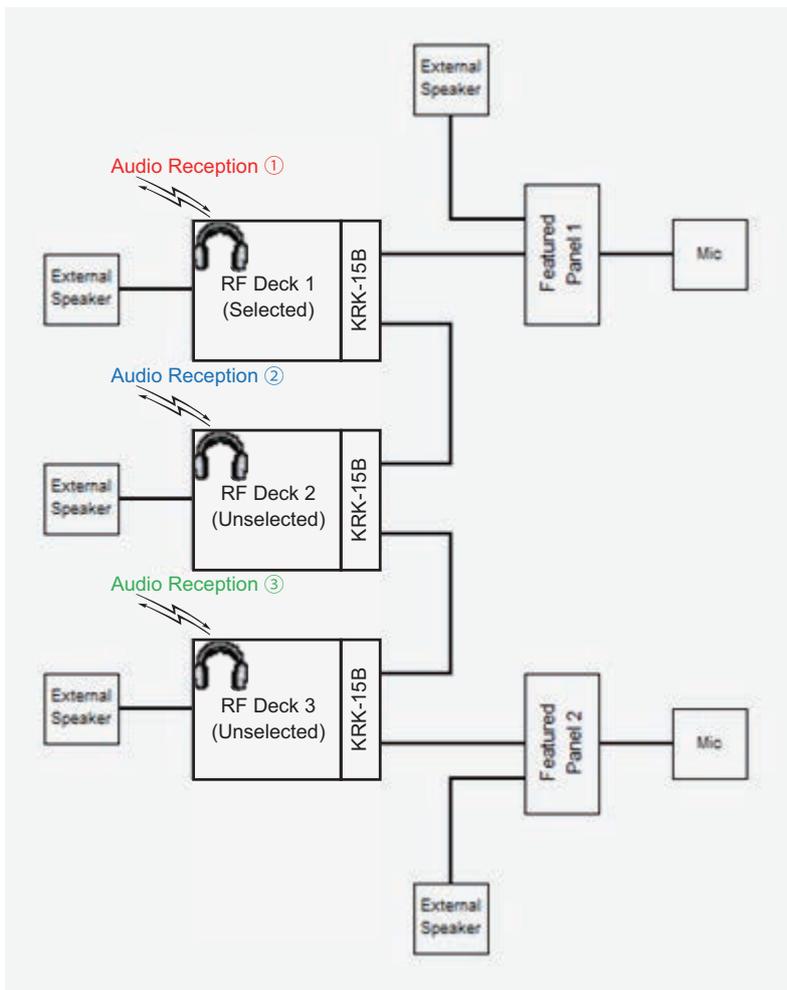
Figure 16-75 Pattern of Emitting Audio (RF Deck)

Table 16-11 Pattern of Emitting Audio (RF Deck)

Configuration Status		Audio Output Pattern							
		Control Head		RF Deck 1		RF Deck 2		RF Deck 3	
Bluetooth Speaker	External Speaker	External Speaker (Control Head 1) *1	External Speaker (Control Head 2) *1	Bluetooth-compatible Device	External Speaker	Bluetooth-compatible Device	External Speaker	Bluetooth-compatible Device	External Speaker
Off	Off	①	①	No	No	No	②	No	③
	On	No	No	No	①	No	②	No	③
	Internal + External	①	①	No	①	No	②	No	③
Only	Off	No	No	①	No	②	No	③	No
	On	No	No	①	No	②	No	③	No
	Internal + External	No	No	①	No	②	No	③	No
Both (Bluetooth + Radio)	Off	①	①	①	No	②	②	③	③
	On	No	No	①	①	②	②	③	③
	Internal + External	①	①	①	①	②	②	③	③

①: The audio reception ① of Figure 16-65 is emitted.

②: The audio reception ② of Figure 16-65 is emitted.

③: The audio reception ③ of Figure 16-65 is emitted.

No: Audio is not emitted.

*1: Treated as the internal speaker of each Control Head.

● **Control Head**

By pressing the **Bluetooth Speaker** key, or by pressing the **Menu** key to enter Menu Mode and then executing "Bluetooth Speaker", the configuration in **Bluetooth Speaker** can be changed.

In the following diagram, a Bluetooth speaker is connected to all Control Heads. If "Both" is configured in **Bluetooth Speaker**, the pattern of emitting audio when the audio is simultaneously received is as follows:
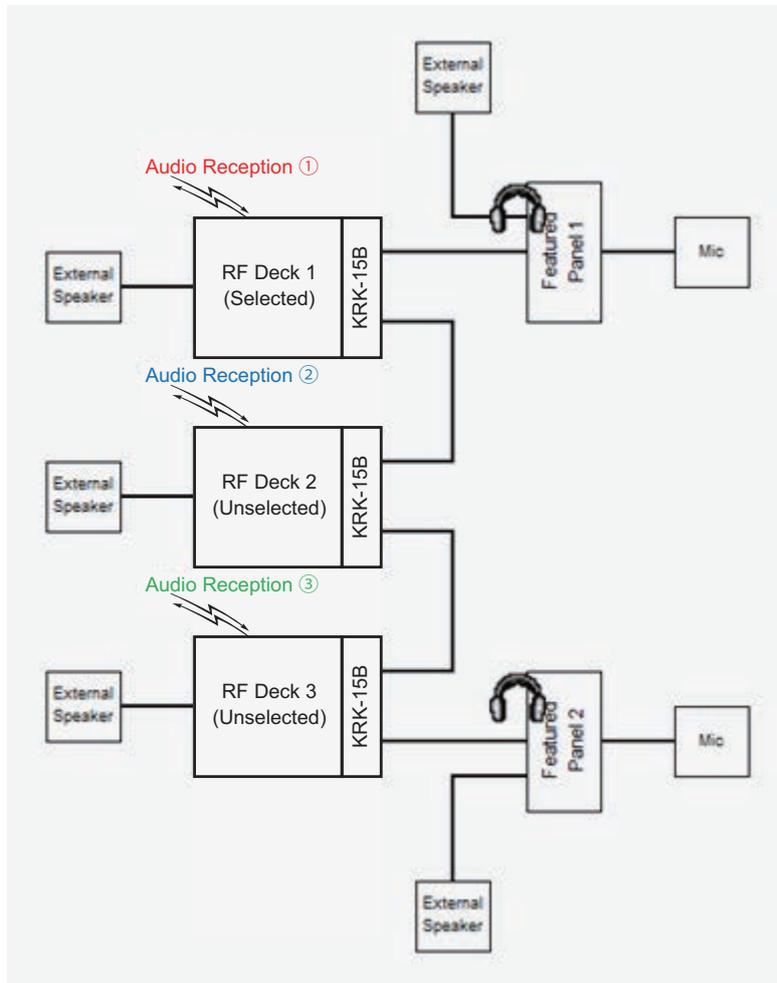
Figure 16-76 Pattern of Emitting Audio (Control Head)

Table 16-12 Pattern of Emitting Audio (Control Head)

Configuration Status		Audio Output Pattern						
		Control Head 1		Control Head 2		RF Deck 1	RF Deck 2	RF Deck 3
Bluetooth Speaker	External Speaker	External Speaker *1	Bluetooth-compatible Device	External Speaker *1	Bluetooth-compatible Device	External Speaker	External Speaker	External Speaker
Off	Off	①	No	①	No	No	②	③
	On	No	No	No	No	①	②	③
	Internal + External	①	No	①	No	①	②	③
Only	Off	No	①	No	①	No	②	③
	On	No	①	No	①	No	②	③
	Internal + External	No	①	No	①	No	②	③
Both (Bluetooth + Radio)	Off	①	①	①	①	No	②	③
	On	No	①	No	①	①	②	③
	Internal + External	①	①	①	①	①	②	③

①：The audio reception ① of Figure 16-66 is emitted.

②：The audio reception ② of Figure 16-66 is emitted.

③：The audio reception ③ of Figure 16-66 is emitted.

No：Audio is not emitted.

*1：Treated as the internal speaker of each Control Head.

16.17 microSD

This section describes the operation method for microSD/ Memory in a Multi RF Deck/ Multi Control Head structure.

The audio during transmission and reception, or the GPS location information can be stored in a microSD card. An SD card slot is equipped in the RF Deck and the Control Panel (KCH-20R). If Multi RF Deck/ Multi Control Head is structured using KCH-20R, multiple available microSD exist.

Which microSD card is used, either a microSD card inserted in the SD card slot of an RF Deck, or a microSD card inserted in the SD card slot of a Control Head, can be configured in **SD Card Selection** of KPG-D1/ D1N.
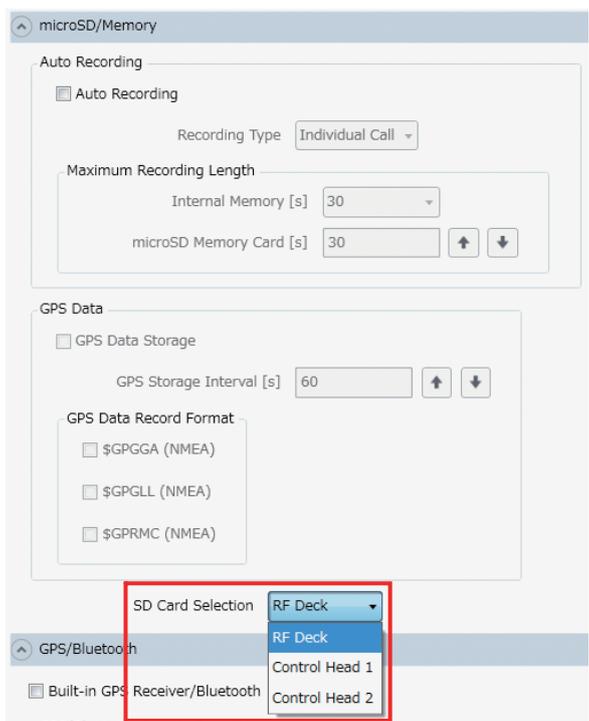
Figure 16-77 KPG-D1 > Transceiver Settings > Optional Features > Optional Features 2 > microSD/Memory

If "RF Deck" is configured in SD Card Selection:

Audio and GPS data can be stored in the microSD card inserted in the SD card slot of each RF Deck. Audio data and GPS data are stored as follows depending on the availability of a microSD card:

Table 16-13 SD Card Selection (RF Deck)

Type	microSD Card Is in the RF Deck	No microSD Card Is in the RF Deck
Audio Data	Stored in the microSD card inserted in the RF Deck.	Stored in the internal memory.
GPS Data	Stored in both the microSD card inserted in the RF Deck and the internal memory.	Stored in the internal memory.

If "Control Head 1" is configured in SD Card Selection:

Audio and GPS data can be stored in the microSD card inserted in the SD card slot of Control Head 1 (KCH-20R). Audio data and GPS data are stored as follows depending on the availability of a microSD card:

Table 16-14 SD Card Selection (Control Head 1)

Type	microSD Card Is in Control Head 1 (KCH-20R)	No microSD Card Is in Control Head 1 (KCH-20R)
Audio Data	Stored in the microSD card inserted in Control Head 1 (KCH-20R).	Stored in the internal memory.
GPS Data	Stored in both the microSD card inserted in Control Head 1 (KCH-20R) and the internal memory.	Stored in the internal memory.

If "Control Head 2" is configured in SD Card Selection:

Audio and GPS data can be stored in the microSD card inserted in the SD card slot of Control Head 2 (KCH-20R). Audio data and GPS data are stored as follows depending on the availability of a microSD card:

Table 16-15 SD Card Selection (Control Head 2)

Type	microSD Card Is in Control Head 2 (KCH-20R)	No microSD Card Is in Control Head 2 (KCH-20R)
Audio Data	Stored in the microSD card inserted in Control Head 2 (KCH-20R).	Stored in the internal memory.
GPS Data	Stored in both the microSD card inserted in Control Head 2 (KCH-20R) and the internal memory.	Stored in the internal memory.

The following microSD basic functions work differently between when "RF Deck" is configured and when "Control Head 1" or "Control Head 2" is configured in **SD Card Selection**.

1. Format SD Card
2. Eject SD Card
3. Auto Recording
4. Playback
5. GPS Data Storage

The following describes how each function works.

Formatting a microSD Card (Format SD Card)

For the first use of a microSD card inserted in the RF Deck or KCH-20R in a Multi RF Deck/ Multi Control Head structure, formatting of a microSD card is required.

A microSD card to be formatted varies according to the configuration in **SD Card Selection** (RF Deck, Control Head 1, Control Head 2).

● **RF Deck**

By pressing the **Format SD Card** key, or by pressing the **Menu** key to enter Menu Mode and then executing "Format SD Card Mode", a microSD card inserted in the Selected RF Deck can be formatted.

● **Control Head 1/ Control Head 2**

By pressing the **Format SD Card** key, or by pressing the **Menu** key to enter Menu Mode and then executing "Format SD Card Mode", a microSD card inserted in Control Head 1/ Control Head 2 (KCH-20R) can be formatted.

Resetting the Recognition of microSD Card (Eject SD Card)

Eject SD Card Mode is used to reset the recognition of microSD card from an RF Deck and KCH-20R. A microSD card for which the recognition is reset varies depending on the configuration in **SD Card Selection** (RF Deck, Control Head 1, Control Head 2).

● **RF Deck**

By pressing the **Eject SD Card** key, or by pressing the **Menu** key to enter Menu Mode and then executing "Eject SD Card Mode", the recognition of the microSD card inserted in the Selected RF Deck can be reset.

● **Control Head 1/ Control Head 2**

By pressing the **Eject SD Card** key, or by pressing the **Menu** key to enter Menu Mode and then executing "Eject SD Card Mode", the recognition of the microSD card inserted in Control Head 1/ Control Head 2 (KCH-20R) can be reset.

Recording Received Audio Automatically (Auto Recording)

If each RF Deck transmits or receives, the audio is recorded to a microSD card or internal memory. The recording behavior varies according to the configuration in **SD Card Selection** (RF Deck, Control Head 1, Control Head 2).

● **RF Deck**

The recording behavior is executed by each RF Deck. The method of starting recording can also be configured for each RF Deck.

If each RF Deck transmits or receives, the audio is recorded to a microSD card inserted in each RF Deck. If no microSD card is inserted, the audio is recorded to the internal memory of each RF Deck.

● **Control Head 1/ Control Head 2**

The recording behavior is executed by the Selected RF Deck. The method of starting recording is common to all RF Decks.

If a microSD card is inserted in Control Head 1/ Control Head 2 (KCH-20R), the audio is recorded to a microSD card when the Selected RF Deck transmits and receives. No recording is done by the Unselected RF Deck.

If no microSD card is inserted in Control Head 1/ Control Head 2 (KCH-20R), the audio is recorded to the internal memory of the Selected RF Deck when the Selected RF Deck transmits and receives. No recording is done by the Unselected RF Deck.

Recording ends if the Selected RF Deck is switched during recording. In this case, the Gap timer is not activated, and recording is not done during the silence time.

📝 Note

• Recording is not done during formatting, deleting an audio file or recognizing a microSD card. Also, even after these statuses are reset, a communication that has already started is not recorded.

• After the configuration data is written, the configuration values in **Internal Memory** of **Maximum Recording Length** before and after writing are compared for each RF Deck. If the values differ, the audio data recorded in the internal memory of the RF Deck is deleted while "SELF TESTING" appears on the display.

• If the configuration data with **Audio/GPS Data Erase (Internal Memory)** enabled is written, the audio data recorded in the internal memory of all RF Decks is deleted while "SELF TESTING" appears on the display.

• If a microSD card is ejected during recording, the audio data file during recording may not be saved correctly.

Playing Back the Recorded Audio (Playback)

The audio data recorded in the microSD card or internal memory of each RF Deck can be played back. The audio data which can be played back in Playback Mode varies according to the configuration in **SD Card Selection** (RF Deck, Control Head 1, Control Head 2).

● **RF Deck**

By pressing the **Playback** key, or by pressing the **Menu** key to enter Menu Mode and then executing "Playback", Playback Mode is entered. If a microSD card is inserted in the Selected RF Deck, the audio data in the microSD card can be played back. If no microSD card is inserted in the Selected RF Deck, the audio data in the internal memory of the Selected RF Deck can be played back.

Playback Mode ends if a microSD card is ejected from the Selected RF Deck in Playback Mode.

● **Control Head 1/ Control Head 2**

By pressing the **Playback** key, or by pressing the **Menu** key to enter Menu Mode and then executing "Playback", Playback Mode is entered. If a microSD card is inserted in Control Head 1/ Control Head 2 (KCH-20R), the audio data in the microSD card can be played back.

If no microSD card is inserted in Control Head 1/ Control Head 2 (KCH-20R), the audio data in the internal memory of the Selected RF Deck can be played back.

Playback Mode ends if a microSD card is ejected from Control Head 1/ Control Head 2 (KCH-20R) in Playback Mode.

📝 Note

• Playback Mode ends if the Selected RF Deck receives in Playback Mode. Even if the Unselected RF Deck receives, Playback Mode continues.

• If the Selected RF Deck is in the following conditions, even if the **Playback** key is pressed, a Key-entry Error Tone sounds, and Playback Mode is not entered:
  • While Speaker Unmute
  • While the Auto Recording behavior
  • While deleting audio data
  • While formatting a microSD card

Storing the GPS Data (GPS Data Storage)

GPS data can be stored in both internal memory and a microSD card.

In a Multi RF Deck/ Multi Control Head structure, the GPS data acquired by RF Deck 1 at the time interval configured in **GPS Storage Interval** is transferred to RF Deck 2 and RF Deck 3.

The storing behavior of GPS data varies according to the configuration in **SD Card Selection** (RF Deck, Control Head 1, Control Head 2).

● **RF Deck**

The GPS data is temporarily stored in the RAM of each RF Deck at the time interval configured in GPS Storage Interval. If 3 pieces of GPS data are stored, these pieces of data are stored in both the internal memory of each RF Deck and a micro SD card of each RF Deck. The GPS data (1 or 2 pieces) temporarily stored in the RAM of each RF Deck are deleted without being stored in the internal memory and microSD card when the RF Deck is turned OFF. Whether to store the GPS data can be configured for each microSD card inserted in each RF Deck.

GPS Data Transfer from RF Deck 1 to Each RF Deck   Storage of GPS Data to the Internal Memory and microSD Card
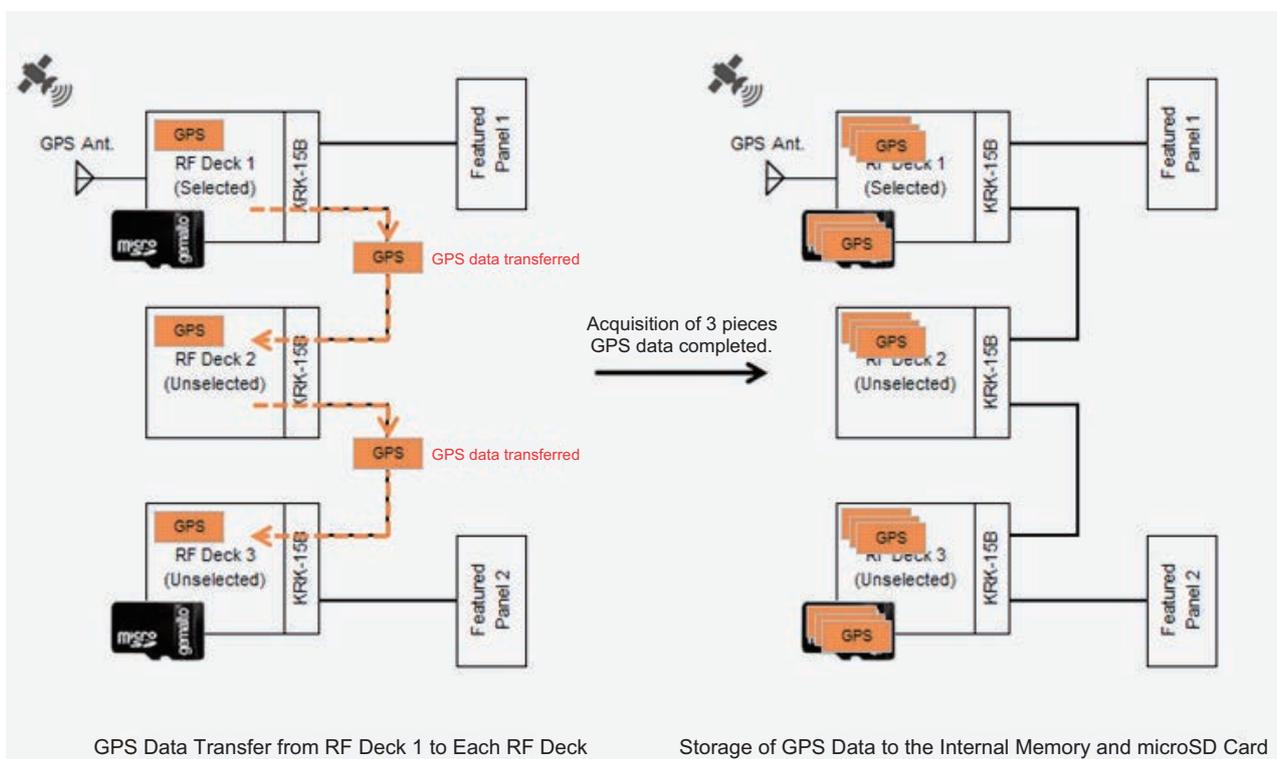
Figure 16-78 GPS Data Storage (RF Deck)

● **Control Head 1/ Control Head 2**

The GPS data is temporarily stored in the RAM of each RF Deck at the time interval configured in **GPS Storage Interval**. If 3 pieces of GPS data are stored, these pieces of data are stored in both the internal memory of each RF Deck and a micro SD card of Control Head 1/ Control Head 2 (KCH-20R). The GPS data (1 or 2 pieces) temporarily stored in the RAM of each RF Deck are deleted without being stored in the internal memory and microSD card when the RF Deck is turned OFF. Whether to store the GPS data in a microSD card inserted in Control Head 1/ Control Head 2 (KCH-20R) can be configured.

| GPS Data Transfer from RF Deck 1 to Each RF Deck | Storage of GPS Data to the Internal Memory and microSD Card |
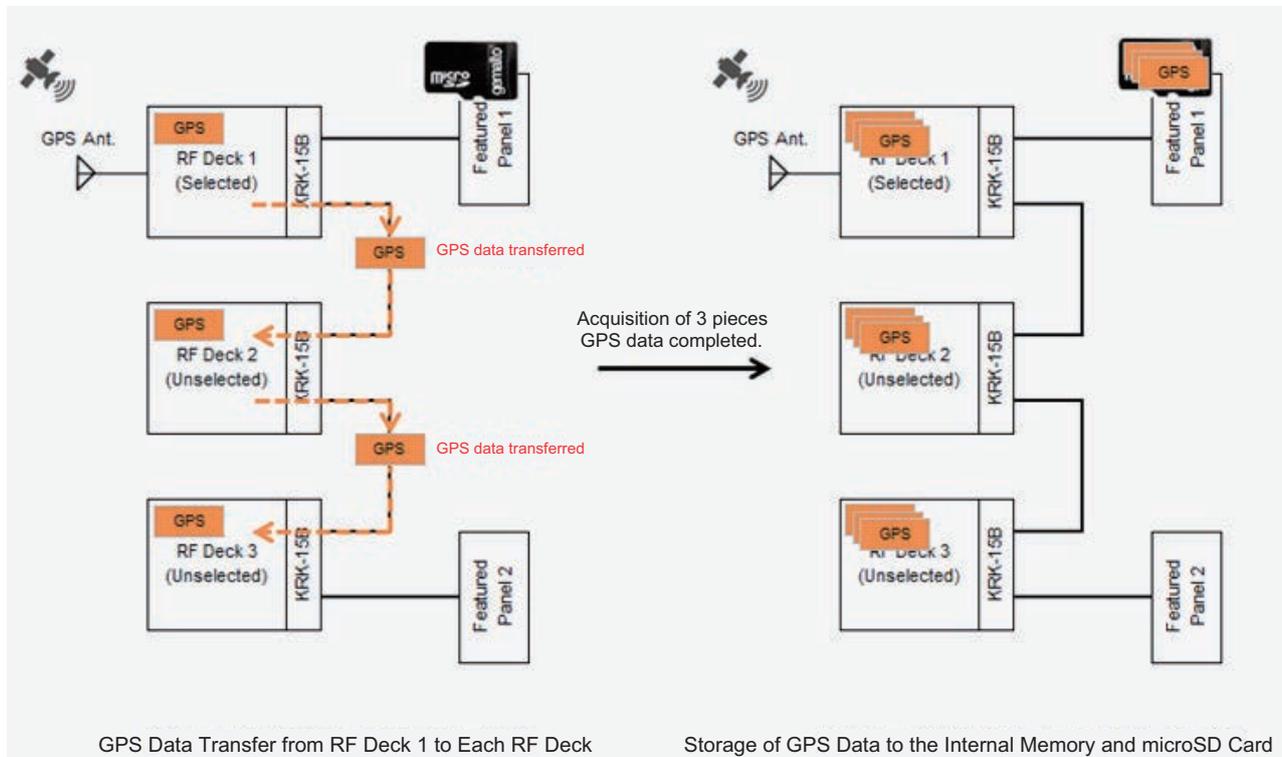
Figure 16-79 GPS Data Storage (Control Head 1/ Control Head 2)

📄 Note

• If the configuration data with Audio/GPS Data Erase (Internal Memory) enabled is written, the GPS data stored in the internal memory of all RF Decks is deleted while "SELF TESTING" appears on the display.

• If a microSD card is ejected while GPS data is being saved into the microSD card, the GPS data file which is being saved may not be saved correctly.

16.18 Relaying the Received Signal (Mobile Relay Station)

Mobile Relay Station is the function to relay the received signal by 2 RF Decks in a Multi RF Deck structure.

If this function is used, as shown in the diagram below, if RF Deck 1 transfers the signal received from Transceiver A to RF Deck 2, the signal can be transferred from RF Deck 2 to Transceiver B.
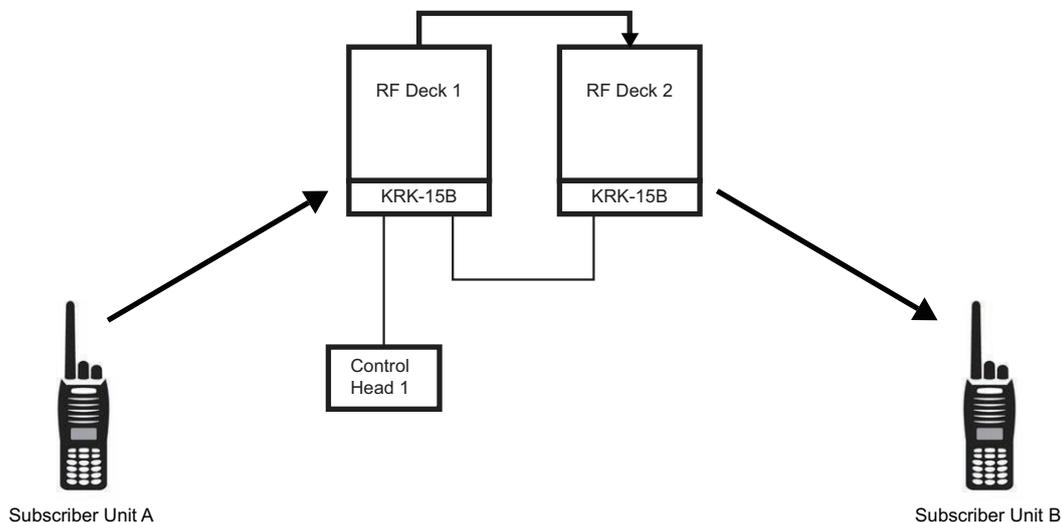
Figure 16-80 Outline of Mobile Relay Station

To use this function, the following configurations and RF Deck connections are required:

- By using KPG-D1/ D1N, configure the 2 RF Decks that activate **Mobile Relay Station**, and configure a **Mobile Relay Station** Zone-channel for each RF Deck. (Refer to Configuring Mobile Relay Station.)

- By using KPG-D1/ D1N, assign the functions to enable **Mobile Relay Station** to the **PF** key and communication port. (Refer to Configuring Mobile Relay Station.)

- Connect the 2 RF Decks that activate **Mobile Relay Station** by a D-sub 25-pin cable. (Refer to Connecting the RF Deck by Using a D-sub 25-pin Cable.)

Hereinafter, the RF Decks configured with a **Mobile Relay Station** Zone-channel are referred to as "RF Deck 1" and "RF Deck 2".

📋 Note

- Only a channel in an Analog Conventional system, NXDN Conventional system, or P25 Conventional system can be configured as a **Mobile Relay Station** channel. However, a channel with "Mixed" configured in **Channel Type** cannot be configured as a **Mobile Relay Station** channel.

- The configurations of the following need to be the same for each channel configured in the 2 RF Decks that activate **Mobile Relay Station**.
  - Channel Type
  - Channel Spacing (for a channel in an Analog Conventional system or NXDN Conventional system only)
  - P25 Modulation Type (for a channel in a P25 Conventional system only)

- If **Mobile Relay Station** is used, a delay of up to approximately 1 sec may occur in audio communications from the transceiver.

Configuration using KPG-D1/ D1N

- Configuring the RF Deck activating the **Mobile Relay Station** function (RF Deck Data) (🔍See Transceiver Settings > Extended Function > Mobile > Mobile Relay Station > Mobile Relay Channel List)

- Configuring the **Mobile Relay Station** Zone-channel (🔍See Transceiver Settings > Extended Function > Mobile > Mobile Relay Station > Mobile Relay Channel List)

Examples of Mobile Relay Station Operation

The following examples of the operation describes the behavior in a P25 Conventional system, but ID, frequency, and Signaling (QT/DQT, RAN) are transferred by the same the behavior in Analog Conventional and NXDN Conventional systems.

Also, all functions of each Conventional system, such as Optional Signaling (DTMF, 2-tone, MDC-1200, FleetSync, NXDN ID), Encryption, Emergency, and the functions of various calls, can be used.

Operation example 1

This is the example of the operation if **Mobile Relay Station** is used with the UHF transceiver as the transmitting unit and the VHF transceiver as the receiving unit in a P25 Conventional system.

The channel configurations of RF Deck 1 and RF Deck 2 are as follows:

Table 16-16 Mobile Relay Channel

RF Deck	Unit ID	Talkgroup ID	Receive Frequency	Transmit Frequency	NAC Decode	NAC Encode
RF Deck 1	1	1	460.5 MHz	465.5 MHz	293	29A
RF Deck 2	2	2	144.5 MHz	145.5 MHz	29B	29C
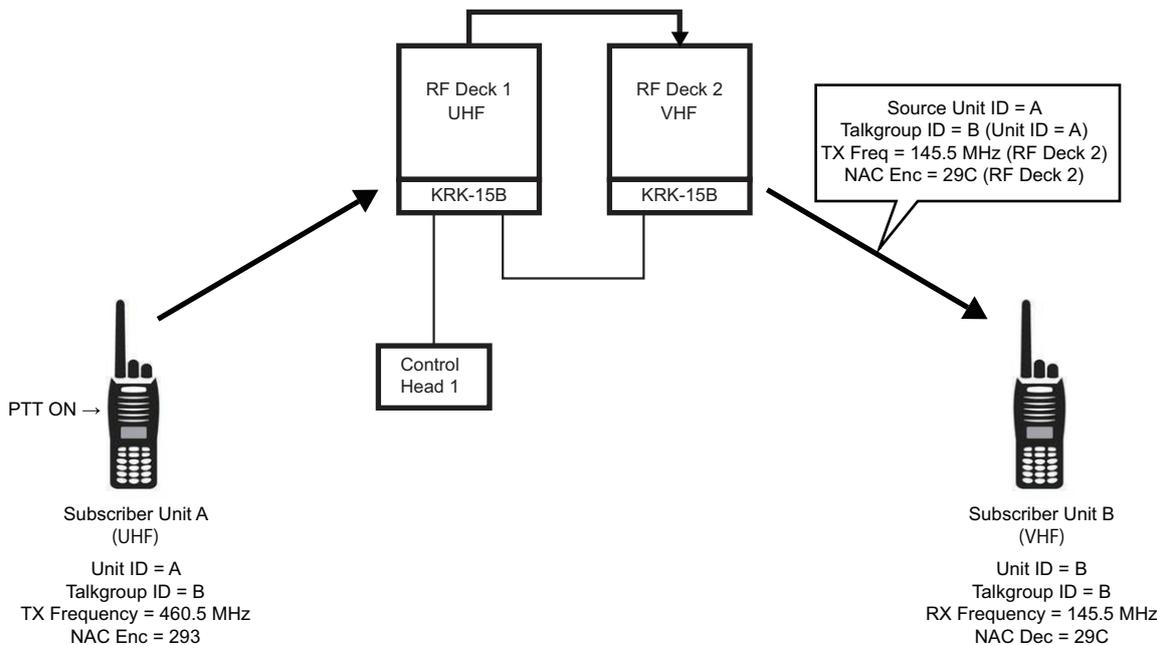
Figure 16-81 16-81 Mobile Relay Station (Operation Example 1)

In this case, RF Deck 1 behaves as the receiving repeater and RF Deck 2 behaves as the transmitting repeater.

Contrary to the example shown above, RF Deck 2 can behave as the receiving repeater and RF Deck 1 can behave as the transmitting repeater.

Operation example 2

This is the example of the operation if **Mobile Relay Station** is used via a repeater with the UHF transceiver as the transmitting unit and the VHF transceiver as the receiving unit in a P25 Conventional system.

The channel configurations of RF Deck 1 and RF Deck 2 are as follows:

Table 16-17 Mobile Relay Channel

RF Deck	Unit ID	Talkgroup ID	Receive Frequency	Transmit Frequency	NAC Decode	NAC Encode
RF Deck 1	1	1	470.5 MHz	465.5 MHz	29E	29A
RF Deck 2	2	2	144.5 MHz	145.5 MHz	29B	29C
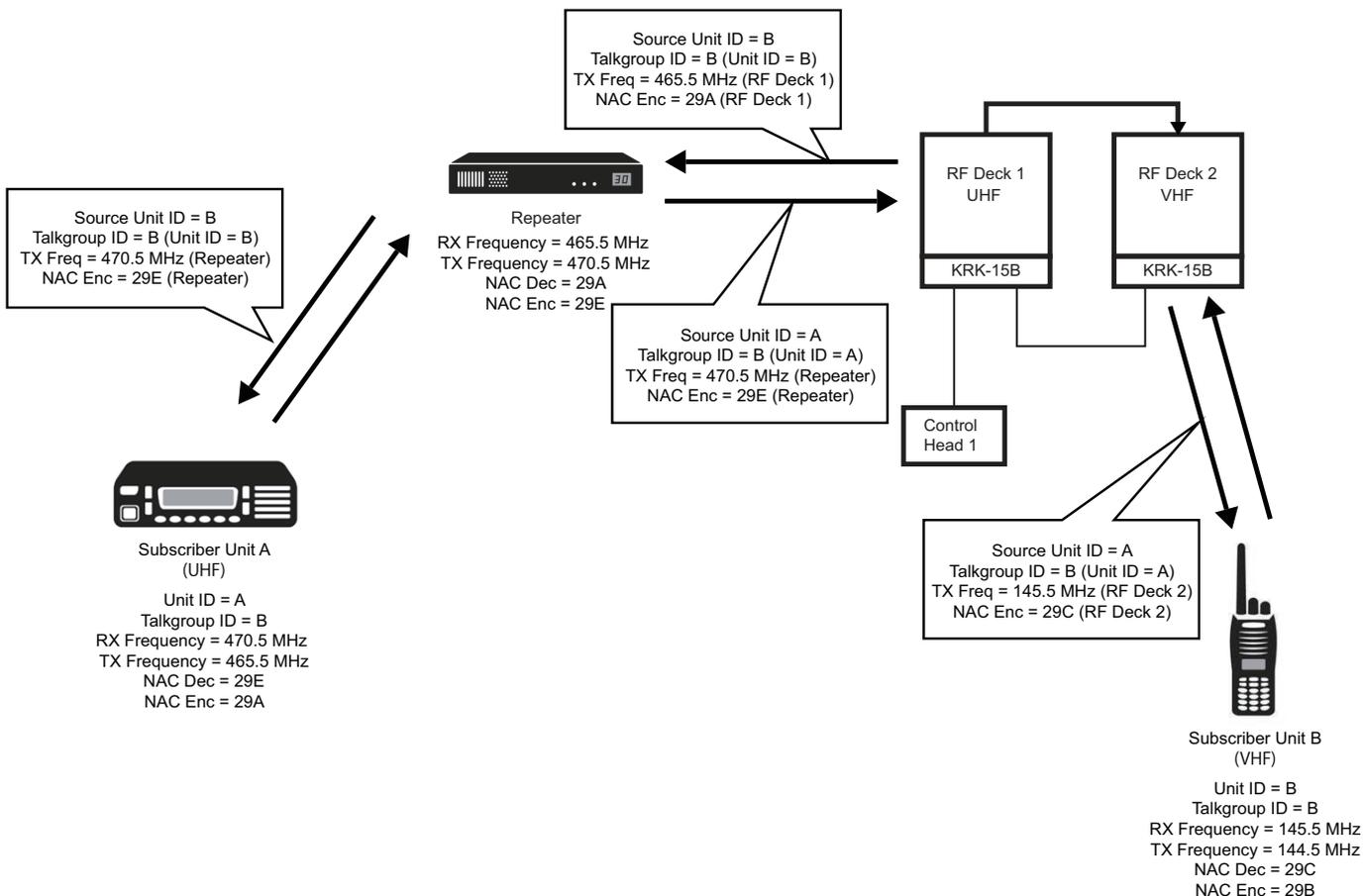
Figure 16-82 Mobile Relay Station (Operation Example 2)

📝 Note

- **Mobile Relay Station** does not function if the received signaling does not match the signaling preconfigured for the receiving RF Deck.
- QT/DQT is decoded regardless of the status of **Off-hook Decode** and microphone hook.
- **Time-out Timer** executes according to the configuration.

Configuring Mobile Relay Station

Preparation in advance

The configuration conditions of the **Mobile Relay Station** function are as follows:

Firmware version of the transceiver:

Firmware version 2.00.00 or later

FPU:

KPG-D1/ D1N V2.00 or later

Structure of transceivers:

Triple RF Deck or Dual RF Deck structure

Caution

Do not connect a D-sub 25-pin cable to the transceiver while the FPU data for Mobile Relay Station is not written in the transceiver. A D-sub 25-pin cable may malfunction if the D-sub 25-pin cable is connected to the transceiver in this state.

FPU configuration

Various functions of **Mobile Relay Station** are configured, and the configuration data is written to the transceiver by using KPG-D1/ D1N.

1 **Configure "Mobile Relay Station" to a PF key or AUX Input port.**

📝 Note

When "Mobile Relay Station" is configured for the AUX Input port, configure for only **RF Deck Data** of 1 unit. If "Mobile Relay Station" is configured for the AUX Input ports of **RF Deck Data** of 2 units, the behavior becomes incorrect.

2 **Configure the channel that behaves as a Mobile Relay Channel in Mobile Relay Channel List.**

The channel for which the values in System Type, Channel Type, and Channel Spacing are the same as the other channel needs to be configured as the Mobile Relay Channel. Also, configure both No.1 and No.2 RF Deck Data.
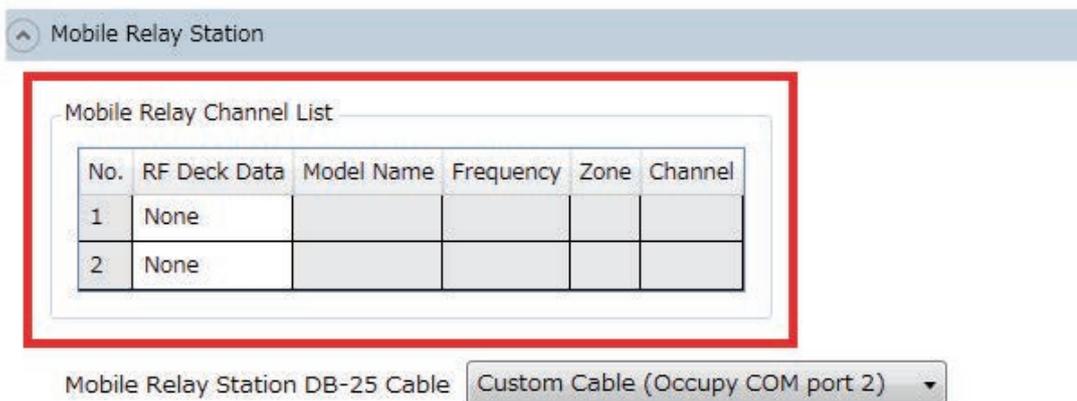
Figure 16-83 Mobile Relay Channel List

📝 Note

- **Mobile Relay Station DB-25 Cable** can be configured when No.1 and No.2 **RF Deck Data** are both configured.
- In a Triple RF Deck structure, **RF Deck Data** of 2 random units can be selected and configured as Mobile Relay Channels.
- If a Mobile Relay Channel is not configured, the transceiver cannot enter Mobile Relay Station Mode.

3 Configure the communication port to be used in Mobile Relay Station Mode in Mobile Relay Station DB-25 Cable.
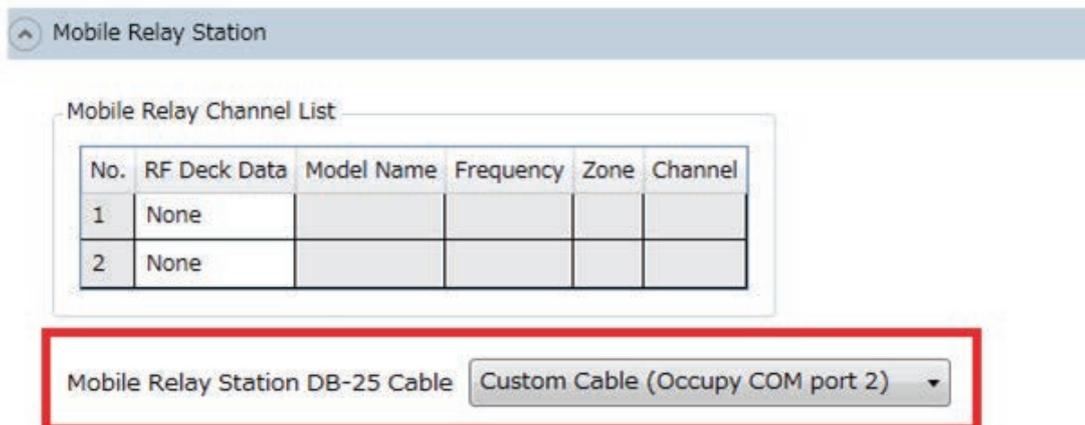
Figure 16-84 Mobile Relay Station DB-25 Cable

Table 16-18 Mobile Relay Station DB-25 Cable

Configuration	Description
Cross Cable (Occupy COM port 1)	This is the configuration for using a commercially available Null Modem cable. However, if a commercially available cable is used, an analog channel cannot be used as a Mobile Relay Channel. Also, the configuration cannot be used depending on the cable. Use a Null Modem cable of the same wiring as the wiring diagram in "● COM port 1" of "Connecting the RF Deck by Using a D-sub 25-pin Cable".
Custom Cable (Occupy COM port 2)	This is the configuration for using a self-made cable. Any of an analog channel, an NXDN channel, and a P25 channel can be used as a Mobile Relay Channel.

4 Write the FPU data.
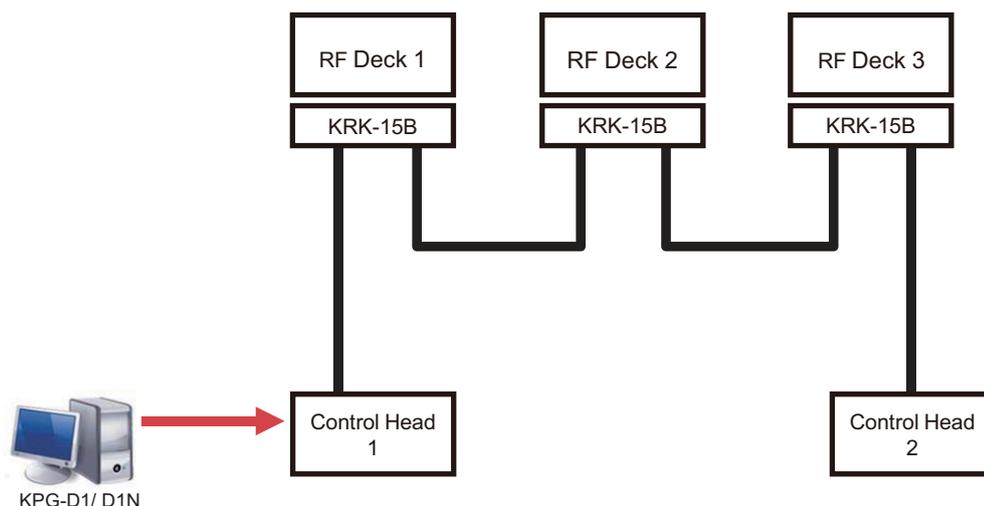
Figure 16-85 Triple RF Deck/ Dual Control Head (FPU Setting)

Connecting the RF Deck by Using a D-sub 25-pin Cable

Caution

Connect a D-sub 25-pin cable to the transceiver after confirming that the FPU data for Mobile Relay Station is written. A D-sub 25-pin cable may malfunction if the D-sub 25-pin cable is connected to the transceiver with the FPU data for Mobile Relay Station not written to the transceiver.

To use the **Mobile Relay Station** function, 2 RF Decks need to be connected by a D-sub 25-pin cable, and a Control Head needs to be connected to one of the RF Decks.

The following diagram is an example of RF Deck 1 and RF Deck 2 configured as Mobile Relay Channels in a Triple RF Deck structure:
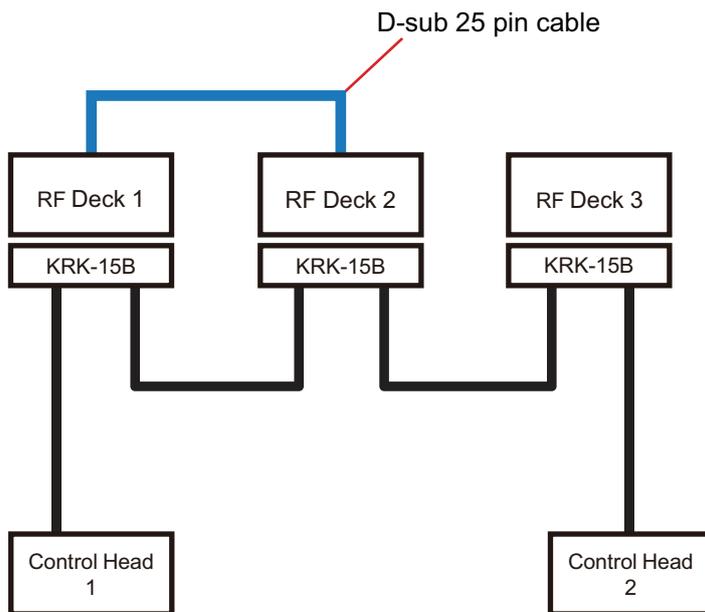
Figure 16-86 Connection Diagram

RF Deck 1 and RF Deck 2 can be connected by COM port 1 or COM port 2.

In analog communications, RF Decks are compatible with COM port 2. Also, in digital communications, RF Decks are compatible with COM port 1 and COM port 2.

● **COM port 1**

RF Deck 1 and RF Deck 2 can be connected by a commercially available Null Modem cable.

In this case, "Cross Cable (Occupy COM port 1)" needs to be configured in **Mobile Relay Station DB-25 Cable** by using KPG-D1/ D1N.

Refer to the diagram below to connect.
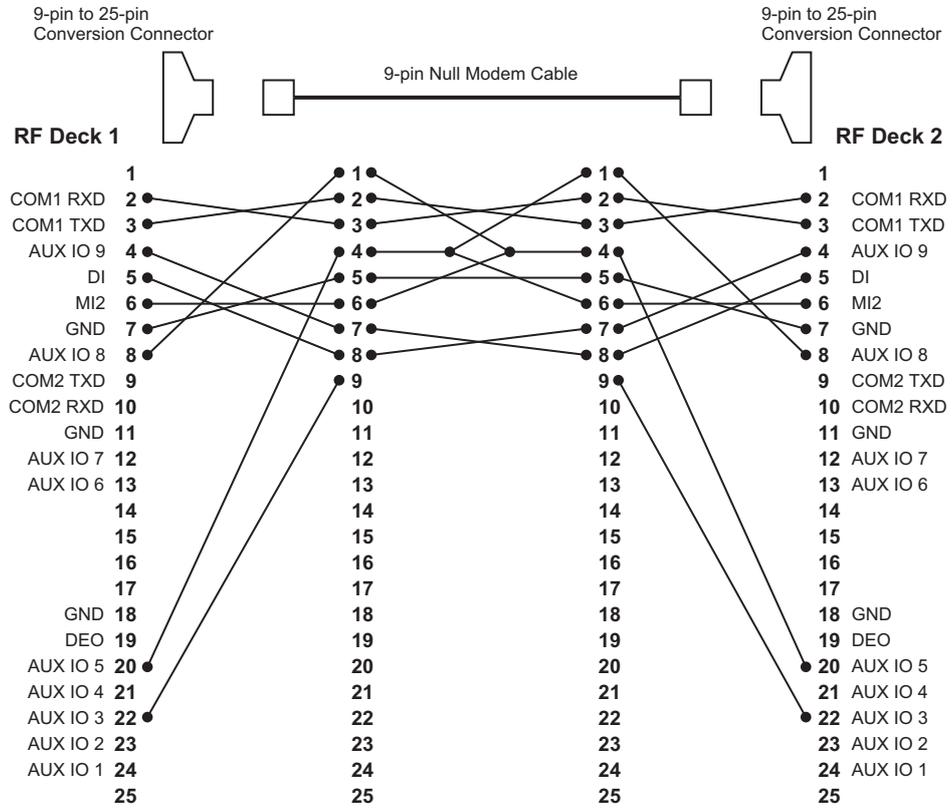
Figure 16-87 Wiring Diagram (COM port 1)

● **COM port 2**

To connect RF Deck 1 and RF Deck 2 by COM port 2 of a D-sub 25-pin connector, refer to the following wiring diagram and create a D-sub 25-pin cable. (Refer to Creating a Dedicated Mobile Relay Station Cable.)

In this case, "Custom Cable (Occupy COM port 2)" needs to be configured in **Mobile Relay Station DB-25 Cable** by using KPG-D1/ D1N.
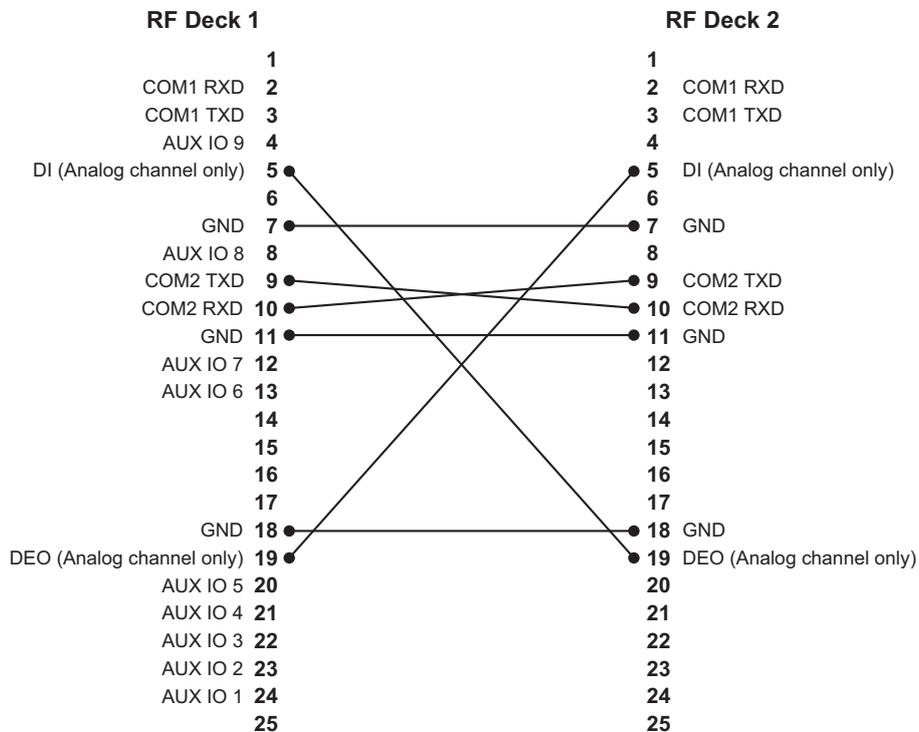
Figure 16-88 Wiring Diagram (COM port 2)

📋 Note

• For only an analog channel, DI (Pin 5) and DEO (Pin 19) are interconnected. This connection is not required for a digital channel.

• If "Cross Cable (Occupy COM port 1)" is configured in **Mobile Relay Station DB-25 Cable**, the following AUX ports do not function:

  • DB-25 4pin

  • DB-25 8pin

  • DB-25 20pin

  • DB-25 24pin

• If "Custom Cable(Occupy COM Port 2)" is configured in **Mobile Relay Station DB-25 Cable**, Built-in GPS Receiver/ Bluetooth cannot be used.

Configuration using KPG-D1/ D1N

Configuring **Mobile Relay Station DB-25 Cable** (🔍See Transceiver Settings > Extended Function > Mobile > Mobile Relay Station > Mobile Relay Channel List)

Creating a Dedicated Mobile Relay Station Cable

For connecting RF Deck 1 and RF Deck 2 by COM port 2, a D-sub 25-pin cable dedicated for Mobile Relay Station is created.

Required components

- D-sub 25-pin connector (male) (soldering type)

  Comparable product to HDBB-25P(05) (Hirose)

  A quantity of 2
- Flat cable

  Comparable product to 28AWG

  7 core wires

  Approximate length of 40 cm
- Heat shrink tubing

  SUMITUBE 1.5 φ

  Appropriate quantity

Procedure to create a D-sub 25-pin cable

1 Cut the flat cable to the required length (approximately 40 cm), strip about 2 mm from the ends the cable, and prepare the ends with solder.
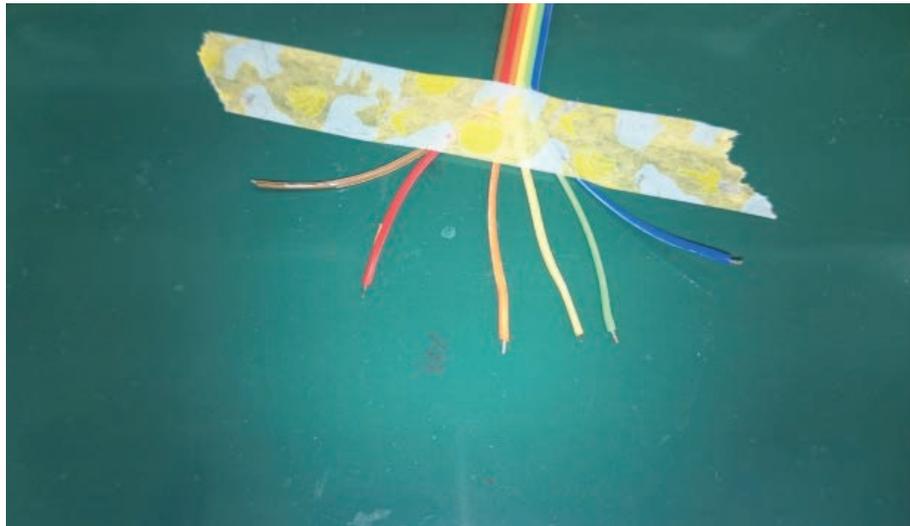
Figure 16-89 Processing of the Flat Cable

2 **After slipping the heat shrink tubing on each cable, solder each cable to the D-sub 25-pin connector.**

Solder according to the wiring diagram of "Connecting the RF Deck by Using a D-sub 25-pin Cable".
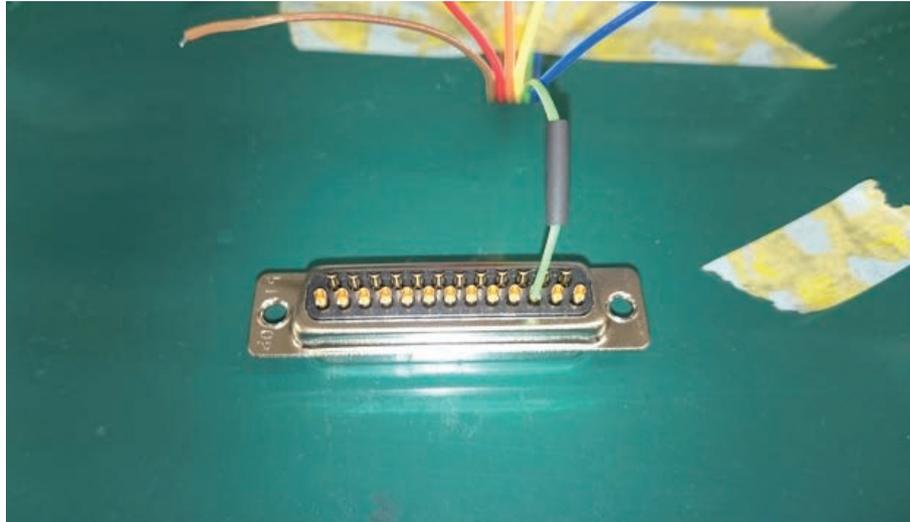
Figure 16-90 Cable Connection 1

3 **Cover the soldered parts with the heat shrink tubing, and heat shrink with the hot air.**

Figure 16-91 Cable Connection 2
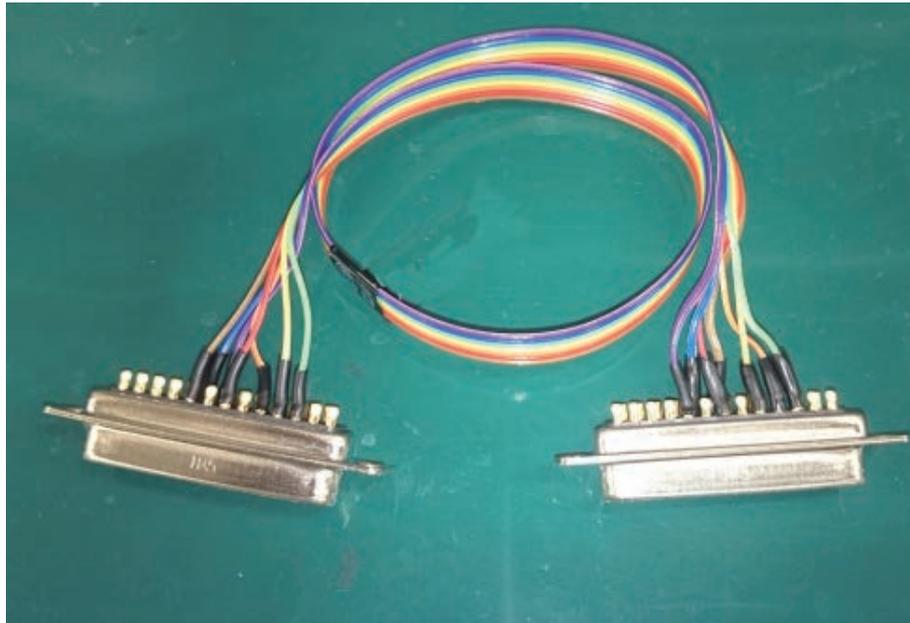
Figure 16-92 Completed Part

Connecting the External Speaker

Connect an external speaker to the RF Deck to monitor the received signal of a Mobile Relay Channel in Mobile Relay Station Mode. (Refer to About the Pin Arrangement for KCT-72 and the Connection of External Devices.)

If the received signal is encrypted, the received signal can be monitored when the SCM is connected to the transceiver. The following diagram is an example of an encrypted received signal being monitored while the SCM is connected to RF Deck 1:
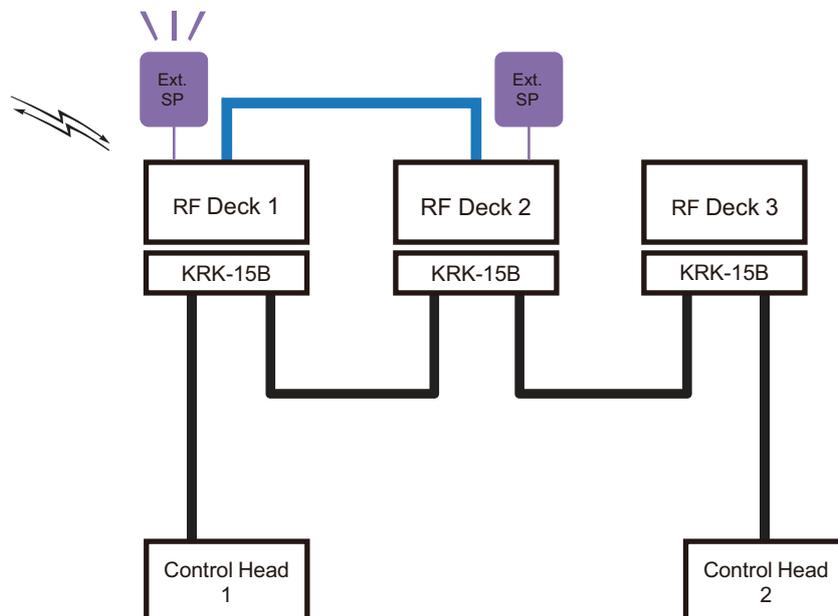
Figure 16-93 Monitor of Received Signal

Placing the Transceiver in Mobile Relay Station Mode

Mobile Relay Station functions if RF Deck 1 and RF Deck 2 are placed in Mobile Relay Station Mode.

Placing the RF Decks in Mobile Relay Station Mode

RF Deck 1 and RF Deck 2 can be placed in Mobile Relay Station Mode by one of the following methods:

- Pressing the **Mobile Relay Station** key
- Activating the Mobile Relay Station port
- Receiving a PC command from the communication port to enable Mobile Relay Station Mode

The Key Beep A (1 beep) sounds from the transceiver and "**MOBILE RELAY**" appears on the display when **Mobile Relay Station** is enabled.

> 📝 Note
>
> If the SCM is connected to the transceiver, "Initializing" appears on the display while the SCM is being initialized when the transceiver enters Mobile Relay Station Mode.

About how to manage when a failure occurs

- If a Mobile Relay Channel is not configured in **Mobile Relay Channel List**, the transceiver cannot enter Mobile Relay Station Mode. In this case, configure a Mobile Relay Channel again. (Refer to Configuring Mobile Relay Station.)
- If "Ch Mismatch" appears when the transceiver enters Mobile Relay Station Mode, a problem may exist in the configuration of a Mobile Relay Channel. In this case, check the configurations of **System Type**, **Channel Type** and **Channel Spacing** for the channel configured as a Mobile Relay Channel. (Refer to Configuring Mobile Relay Station.)
- If "Cable Error" appears when the transceiver enters Mobile Relay Station Mode, a problem exists in the connection of the cable.
  - Check the connection of the cable. (Refer to Connecting the RF Deck by Using a D-sub 25-pin Cable.)
  - Check the Mobile Relay Station DB-25 Cable configuration. (Refer to Configuring Mobile Relay Station.)

Exiting Mobile Relay Station Mode

Mobile Relay Station Mode can be exited by one of the following methods:

- Pressing the **Menu** ([⌂]) key
- Deactivating the Mobile Relay Station port
- Receiving a PC command from the communication port to disable Mobile Relay Station Mode

When **Mobile Relay Station** ends, the transceiver restarts in user mode. The Key Beep B (2 beeps) sounds from the transceiver when the **Menu** ([⌂]) key is pressed.

📝 Note

- When the Mobile Relay Station key is pressed, if the status of the Mobile Relay Station port is changed at the same time, the transceiver behaves according to the status of the Mobile Relay Station port.
- The status of Mobile Relay Station Mode is retained in the transceiver. Therefore, the transceiver starts in Mobile Relay Station Mode when the transceiver is turned OFF in Mobile Relay Station Mode and the transceiver is turned ON again.
- The receiving RF Deck can emit the received audio from the external speaker if the external speaker is connected to the RF Deck. The received audio cannot sound from the speaker of the Control Head.
- Encrypted audio can sound from the speaker. To do so, connect the SCM to RF Deck 1 and RF Deck 2.
- In Mobile Relay Station Mode, the following functions of AUX Input/Output can be activated:

  AUX Input:

  Mobile Relay Station, Light Sense, Zeroize

  AUX Output:

  COR, TOR, TXS, LOK, Encryption

- The following functions are unavailable in Mobile Relay Station Mode:
  - Built-in GPS Receiver/Bluetooth
  - Audio recording by the microSD function
  - OTAP
  - Bluetooth
  - Transmission and reception of a PC command by Bluetooth SPP
  - Reading and writing configuration data by using KPG-D1/ D1N
  - Emergency Mode
- In a Triple RF Deck structure, the RF Deck not configured as an RF Deck for Mobile Relay Station does not behave as the transceiver. However, the RF Deck can activate the AUX Input function only.

Configuration using KPG-D1/ D1N

- Assigning functions to the **PF** keys on the transceiver (🔍See Transceiver Settings > Key Assignment)
- Assigning functions to the AUX Input port (🔍See Transceiver Settings > Extended Function > AUX)

Supported Models: Mobile

This chapter describes the steps to structure a Multi RF Deck/ Multi Control Head system by connecting 1 or 2 Control Heads to multiple RF Decks.

Also refer to "Configuring the Initial Configuration" in "Multi RF Deck/ Multi Control Head" for the related configuration of when structuring a Multi RF Deck/ Multi Control Head system.

17.1 Initial Configuration for Multi RF Deck/ Multi Control Head

To activate Multi RF Deck/ Multi Control Head, the firmware needs to be updated to version 1.62.00 or later. To activate Multi RF Deck/ Multi Control Head properly, the RF Deck firmware and the Control Head firmware must be the same. Because of the structure of the transceiver, the firmware of each RF Deck needs to be updated individually in a Single RF Deck / Single Control Head structure.

Assemble each of the following devices before updating the firmware:

- Attach KRK-15BM to the RF Deck.
- Attach KRK-14HM to KCH-19M.

📋 Note

If KCH-20RM is used, KRK-14HM does not need to be attached to KCH-20RM.

Attaching KRK-15BM to the RF Deck

If KCH-19M is attached to the RF Deck, KCH-19M needs to be removed from the RF Deck by referring to step 1 to step 3 below.

If no device is attached to the RF Deck, attach KRK-15BM to the RF Deck by referring to step 4 and later.

1 Lift up 2 tabs of KCH-19M on the bottom of the RF Deck by using a flathead screwdriver, and remove KCH-19M from the chassis.

Figure 17-1 Removal of the Panel

2   Remove the flat cable from the display unit connector (CN6) of KCH-19M.

3   Remove the cable from the display unit connector (CN2) of KCH-19M.

KCH-19M

CN2

CN6
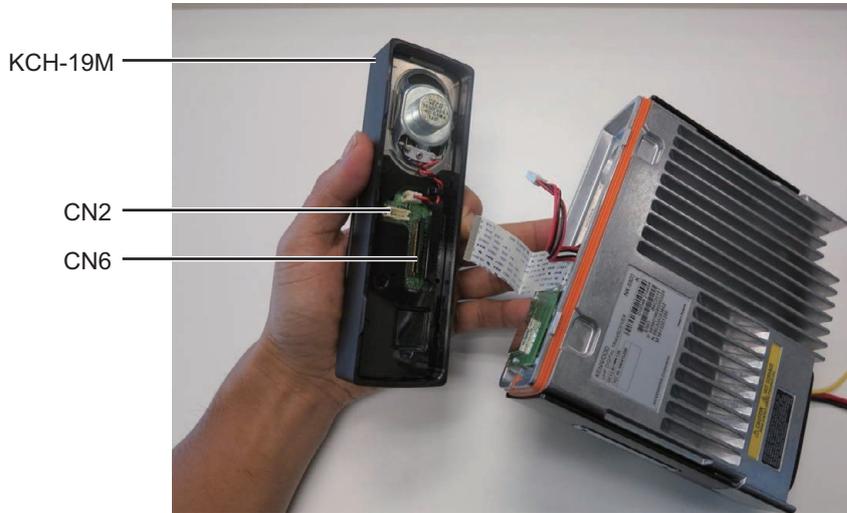
Figure 17-2 Removal of the Cables

4   Plug the cable into the connector (CN2) of KRK-15BM.

5   Plug the flat cable into the connector (CN1) of KRK-15BM.

CN1

CN2

KRK-15BM

Figure 17-3 Connection of the Cables

📝 Note

Be careful when plugging the flat cable into CN1.

6   **Embed KRK-15BM on the front of the chassis by using 4 tabs.**
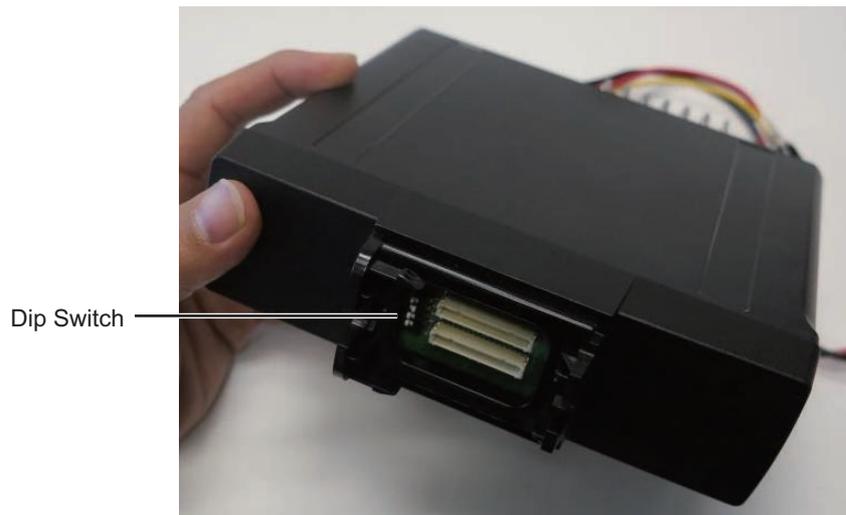
Dip Switch

Figure 17-4 Attachment of KRK-15BM

📝 Note

As in image above, attach KRK-15BM so that the Dip switch is on the left side.

Attaching KRK-14HM to KCH-19M

To use KCH-19RM, KRK-14HM needs to be attached to KCH-19RM.

Note

If KCH-20RM is used, KRK-14HM does not need to be attached to KCH-20RM.

1 Plug the cable into the connector (CN2) of KCH-19M.

2 Plug the flat cable into the connector (CN6) of KCH-19M.
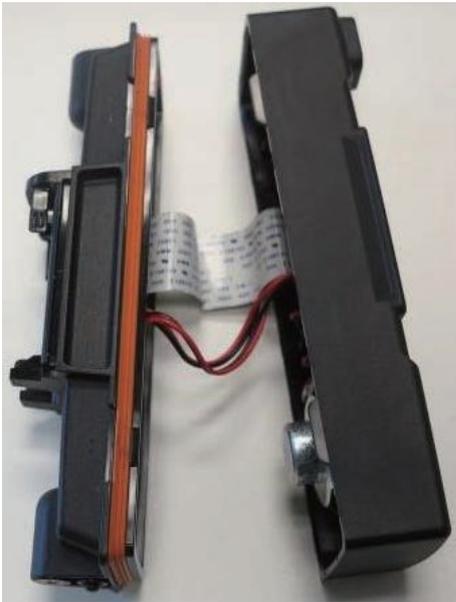
Figure 17-5 Connection of the Cables

Note
- Be careful when plugging the flat cable into CN6.
- So that the flat cable does not cross, insert the flat cable into CN6 straight.

3   **Embed the 4 tabs of KRK-14HM in KCH-19M.**

Figure 17-6 Attaching KRK-14HM

📝 Note

Lock KRK-14HM in place by applying appropriate pressure.

4   **Confirm the DIP switch configuration.**

When writing the firmware for the initial configuration, confirm that the Dip switch (1 to 4) equipped on each interface adapter (KRK-14H, KRK-15B, and KCH-20R) is in the ON position.

Updating the Firmware

Write the firmware version 1.62.00 or later into each of the following devices:

- NX-5000 RF Deck with KRK-15BM
- KCH-19M with KRK-14HM
- KCH-20RM

Figure 17-7 NX-5000 RF Deck with KRK-15BM/ KCH-19M with KRK-14HM/ KCH-20RM

Repeat the procedure below to write the firmware into each of the devices above.

1 Connect the RF Deck to the Control Head by using the KCT-71 cable, and turn the transceiver ON.

Figure 17-8 Connection of the KCT-71 Cables

📝 Note

Connect the KCT-71 cable to the upper connector of KRK-15BM.

2 Write the firmware.

The firmware is written after the programming cable is connected to Control Head 1.

1. Start up KFL to open the firmware (Ver.1.62.00 or later) of the NX-5000 series.
   Configure COM Port, and configure "Auto" in Baud Rate.
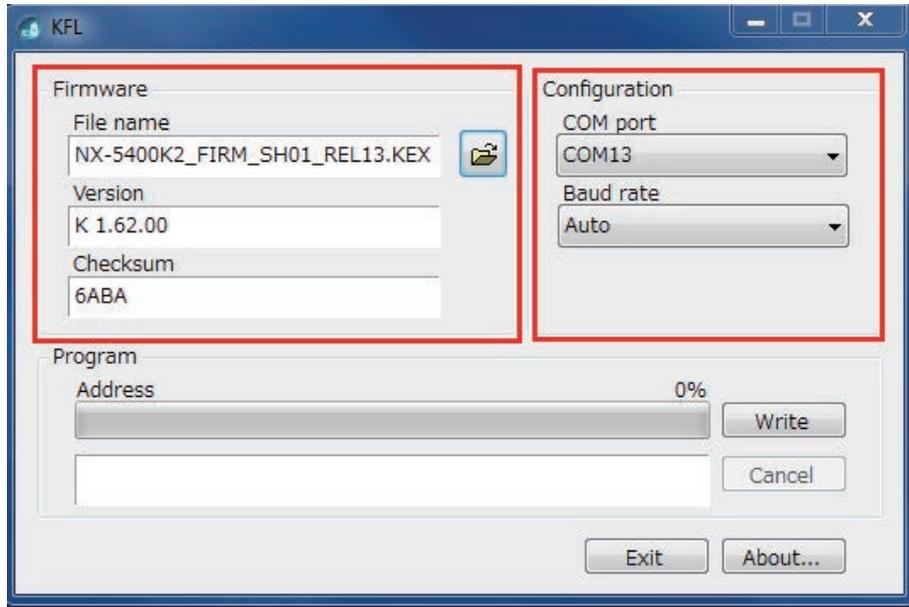
Figure 17-9 KFL

2. Connect the transceiver to the PC by using KPG-46UM or KPG-46XM.
3. Click the "Write" button of KFL.
   If the writing is successful, a message box appears.
4. Click the "OK" button.
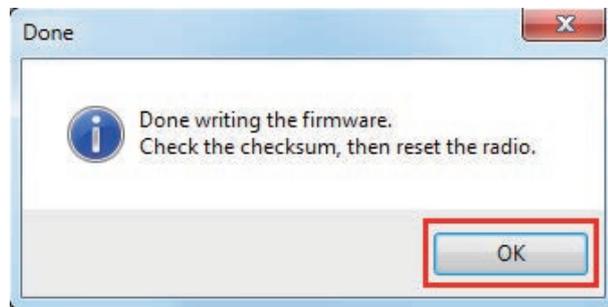
Figure 17-10 Message Box

5. Confirm the checksum of the firmware on the transceiver display.
   Confirm that the appropriate firmware is written. If the checksum is incorrect, reexecute the operations from step 1 (Connect the RF Deck to the Control Head by using the KCT-71 cable, and turn the transceiver ON.).
6. Restart the transceiver.

About the Connection of the Control Head to the RF Deck

This section describes how to connect the Control Head and RF Deck.

The following explanations use images of the Dip switch. If the Control Head and RF Deck are in the factory default configurations, do not change the configuration of the Dip switch.

How to Assemble Remote Control Mount
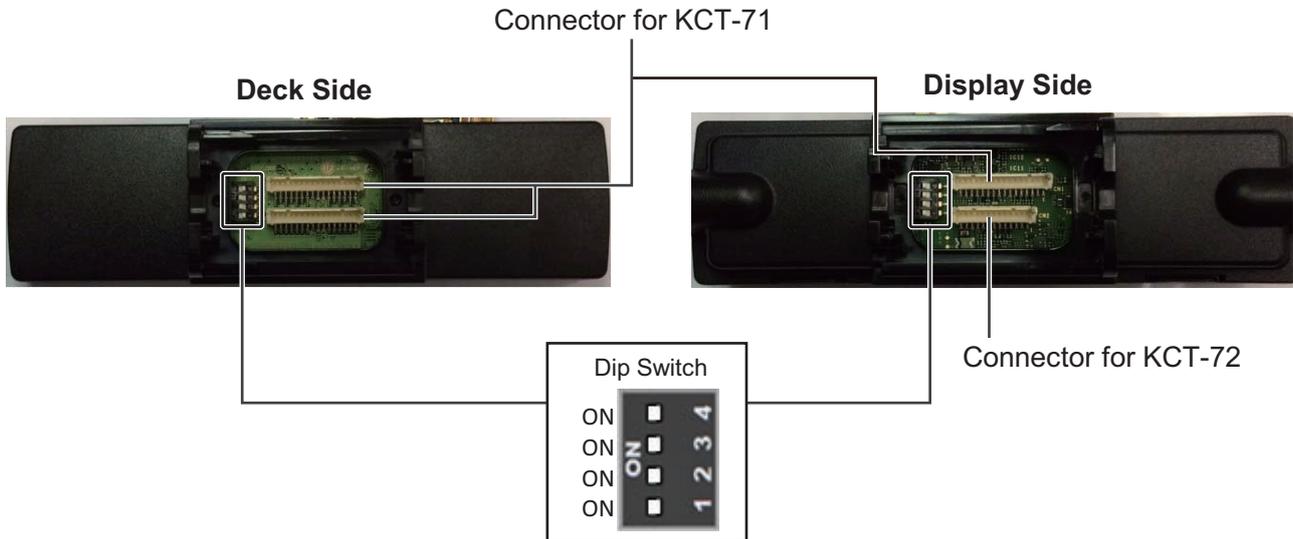
Figure 17-11 Connector Arrangement and Cable Connection

1) 5BM/ 5FM
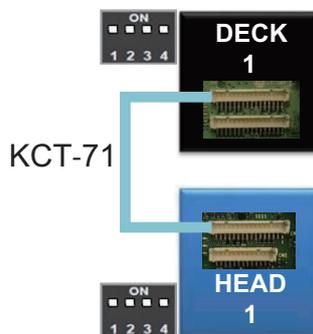
Figure 17-12 Single Deck Single Head Remote Mount

2) 5BBM/ 5FFM
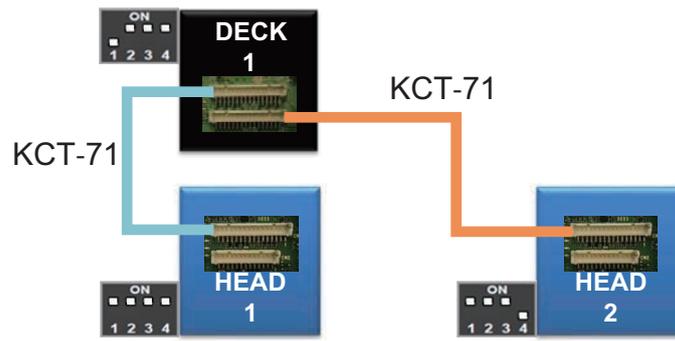
Figure 17-13 Single Deck Dual Head Remote Mount

3) 5BMM/ 5FMM (-MR)
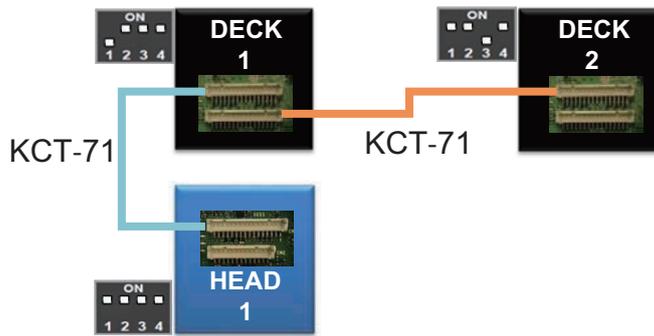
Figure 17-14 Dual Deck Single Head Remote Mount

4) 5BBMM/ 5FFMM (-MR)
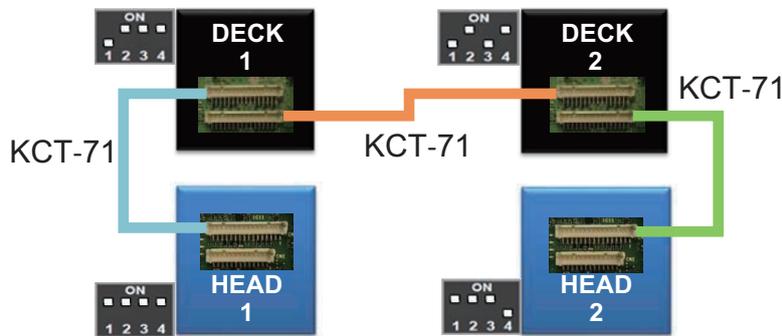
Figure 17-15 Dual Deck Dual Head Remote Mount

5) 5BMMM /5BMMM (-MR)
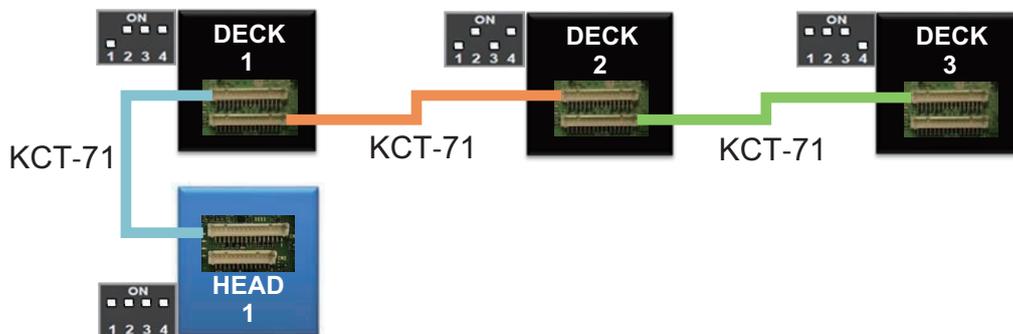
Figure 17-16 Triple Deck Single Head Remote Mount

6) 5BBMMM/ 5FFMMM (-MR)
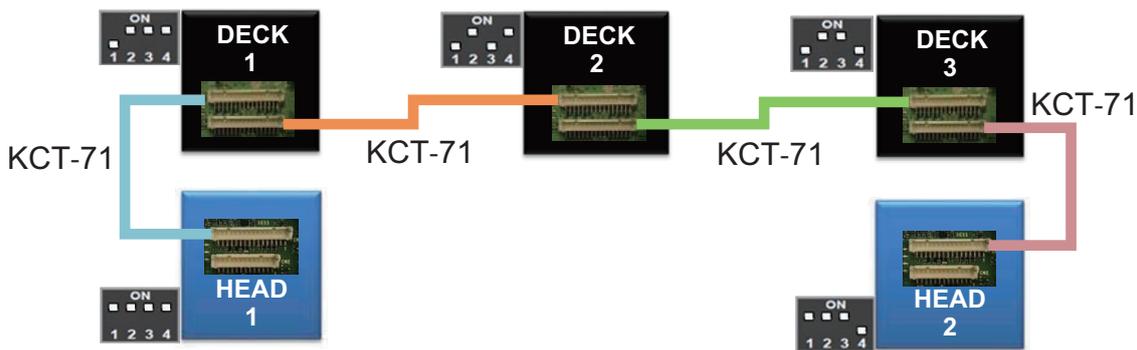
Figure 17-17 Triple Deck Dual Head Remote Mount

17.2 Adding an RF Deck/ Control Head

The system structure can be changed by adding Control Heads and RF Decks in a system that is operating.

Adding a Control Head

This section describes the procedure to add a Control Head to a system of a Triple RF Deck/ Single Control Head structure. A Control Head can be added with the same procedure when adding the Control Head to a system of the following RF Deck/ Control Head structures:

📝 Note

- Single RF Deck/ Single Control Head
- Dual RF Deck/ Single Control Head

1 **Turn OFF all RF Decks and Control Heads.**

If a Control Head is turned OFF, all RF Decks are also turned OFF.
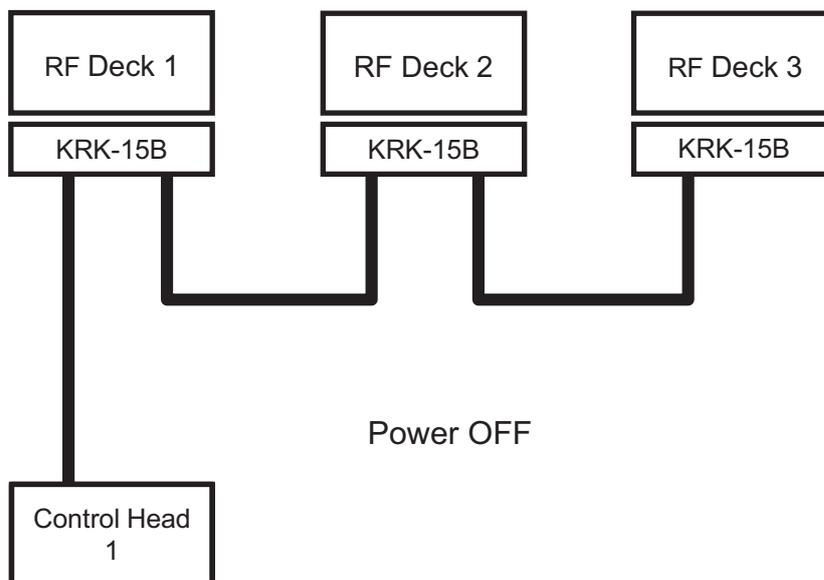
Figure 17-18 Triple RF Deck/ Single Control Head (Power OFF)

2 **Add the Control Head.**

Install the Control Head in a Multi RF Deck system.
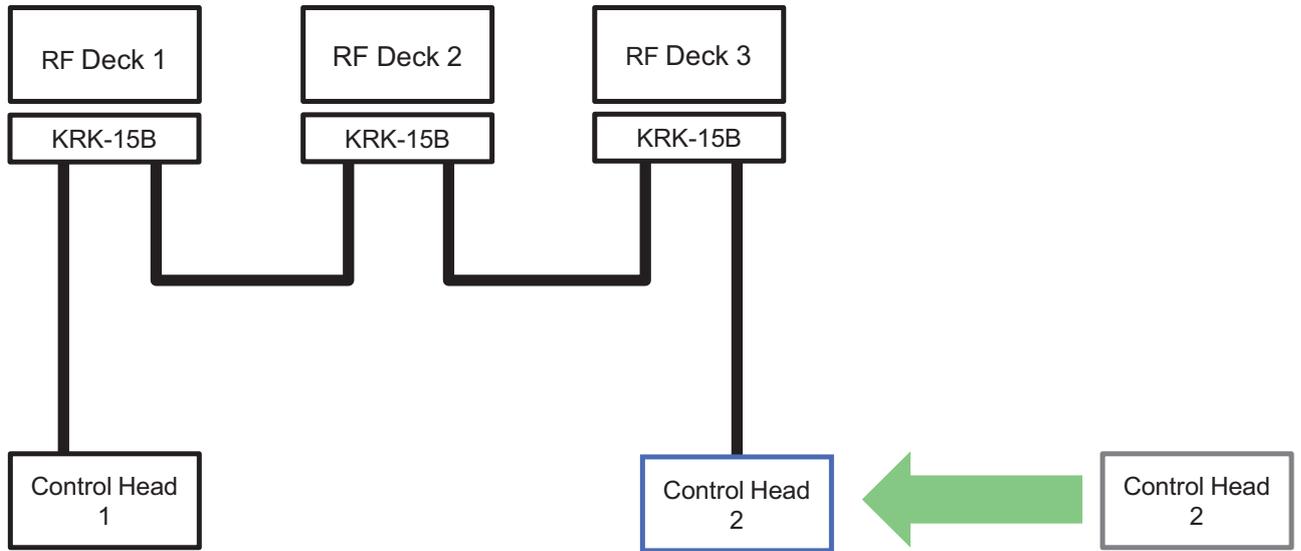
Figure 17-19 Installation of Control Head 2

3 **Change the DIP switch.**

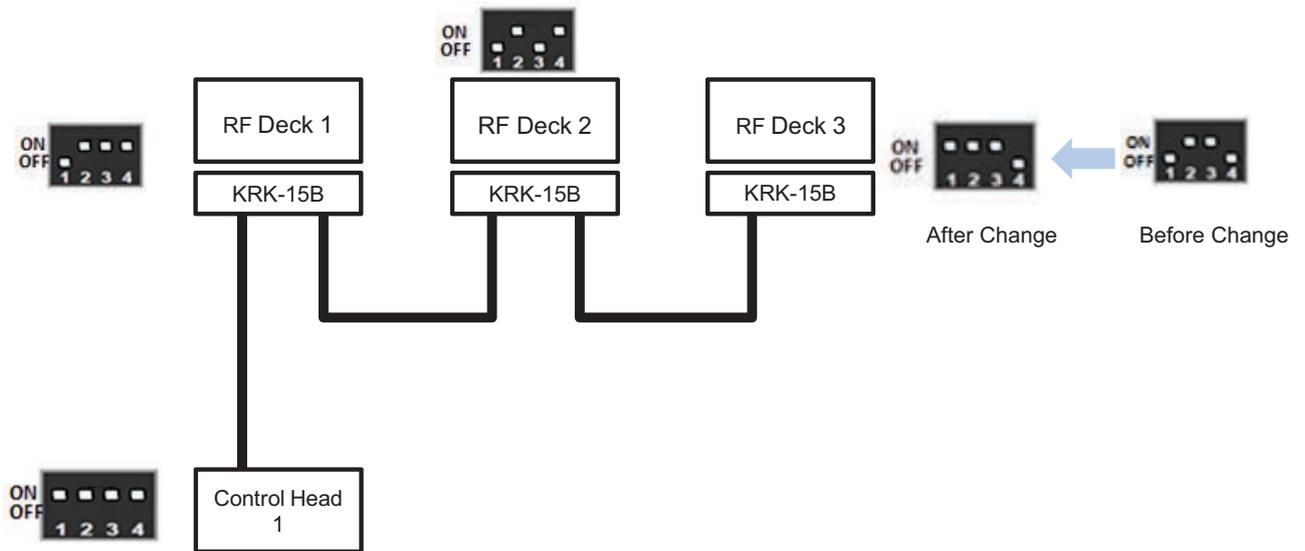Change the DIP switch to the Triple RF Deck/ Dual Control Head configuration.
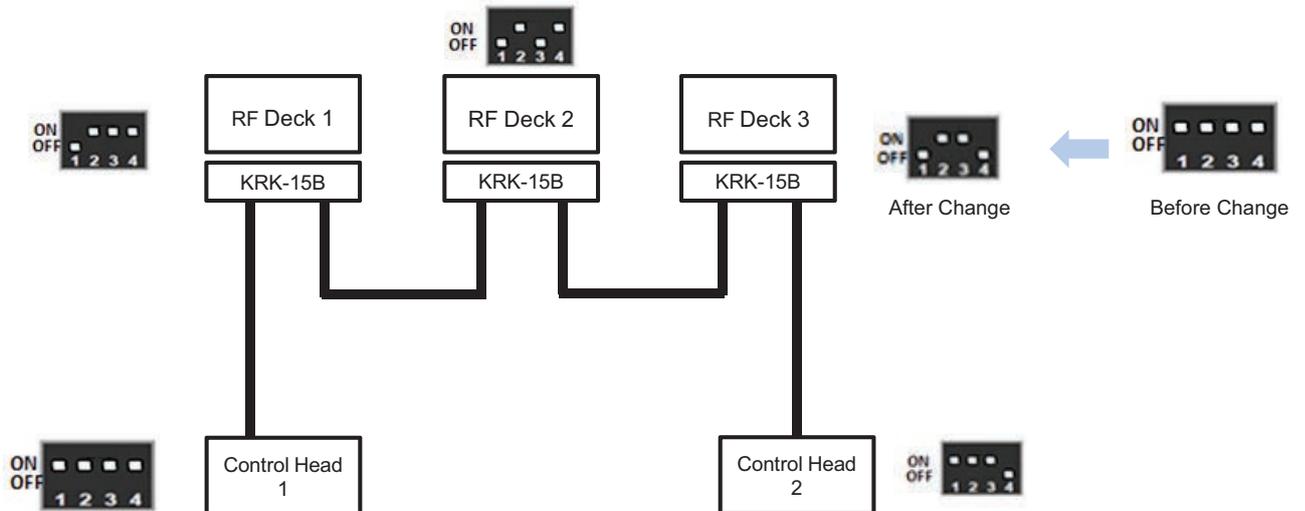
Figure 17-20 DIP Switch Configuration Triple RF Deck/ Dual Control Head

4 **Turn ON all RF Decks and Control Heads.**

If either Control Head is turned ON, all RF Decks and Control Heads are turned ON.
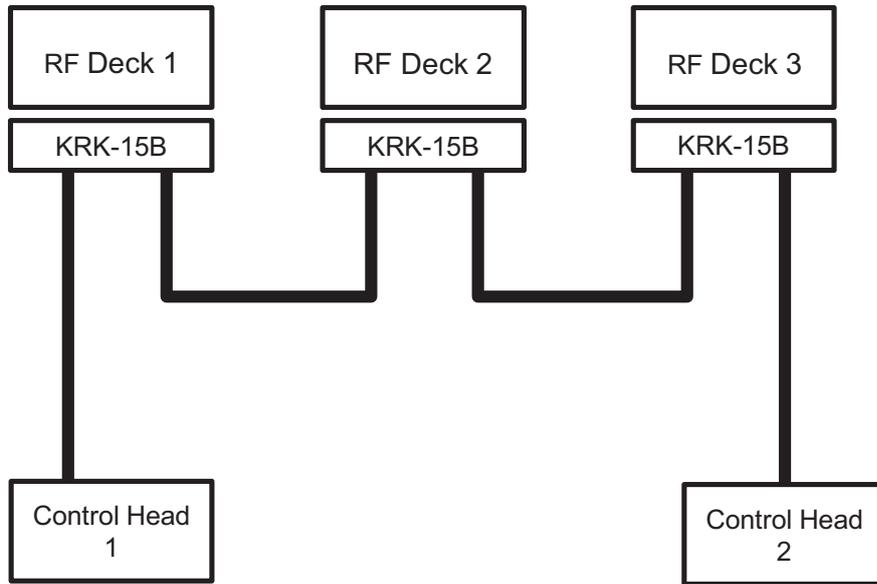
Figure 17-21 Triple RF Deck/ Dual Control Head (Power ON)

📝 Note

- If "FIRM MISMATCH" is displayed on the screen of the Control Head, proceed to step 5.
- If "FPU MISMATCH" is displayed on the screen of the Control Head, proceed to step 6.

5 **Write the firmware.**

The firmware is written after the programming cable is connected to Control Head 1.
To activate Multi RF Deck/ Multi Control Head, the firmware version 1.62.00 or later needs to be written.
The firmware version of a Control Head can be confirmed in Radio Mode Selection.
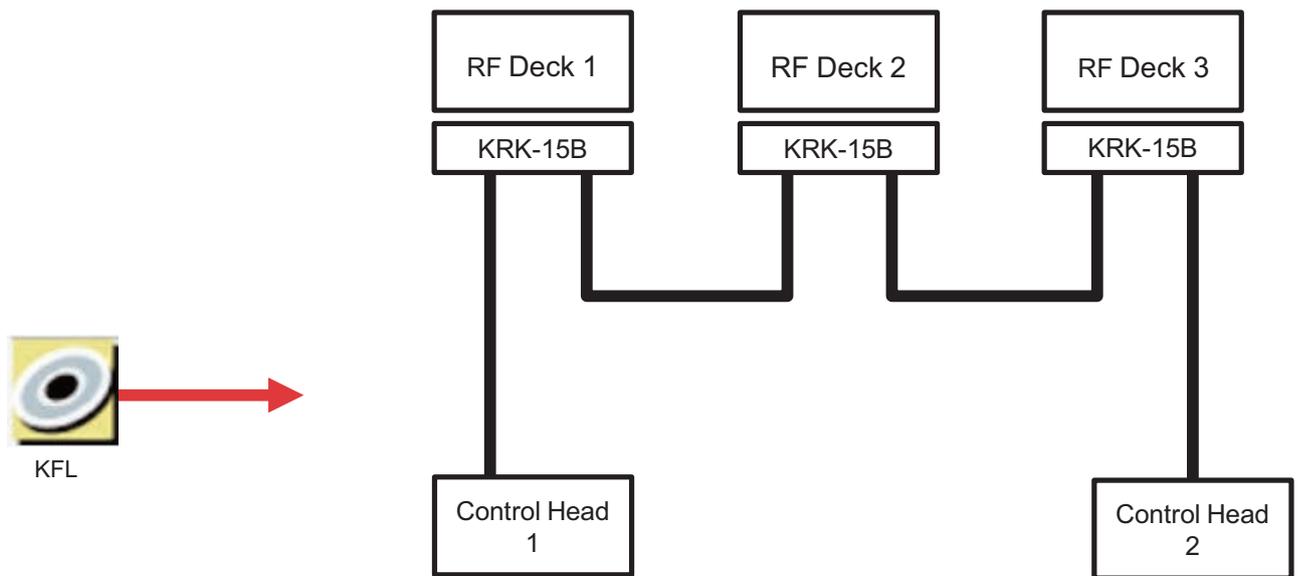
Figure 17-22 Triple RF Deck/ Dual Control Head (Firmware Setting)

📝 Note

If "FPU MISMATCH" is displayed on the screen of the Control Head, proceed to step 6.

6 **Write the FPU data.**

The FPU data for Triple RF Deck/ Dual Control Head is written to the Multi RF Deck system after the programming cable is connected to Control Head 1. Always write the FPU data in a Multi RF Deck system. Refer to "Configuration in KPG-D1/ D1N If Control Heads Are Switched" for writing configuration data.
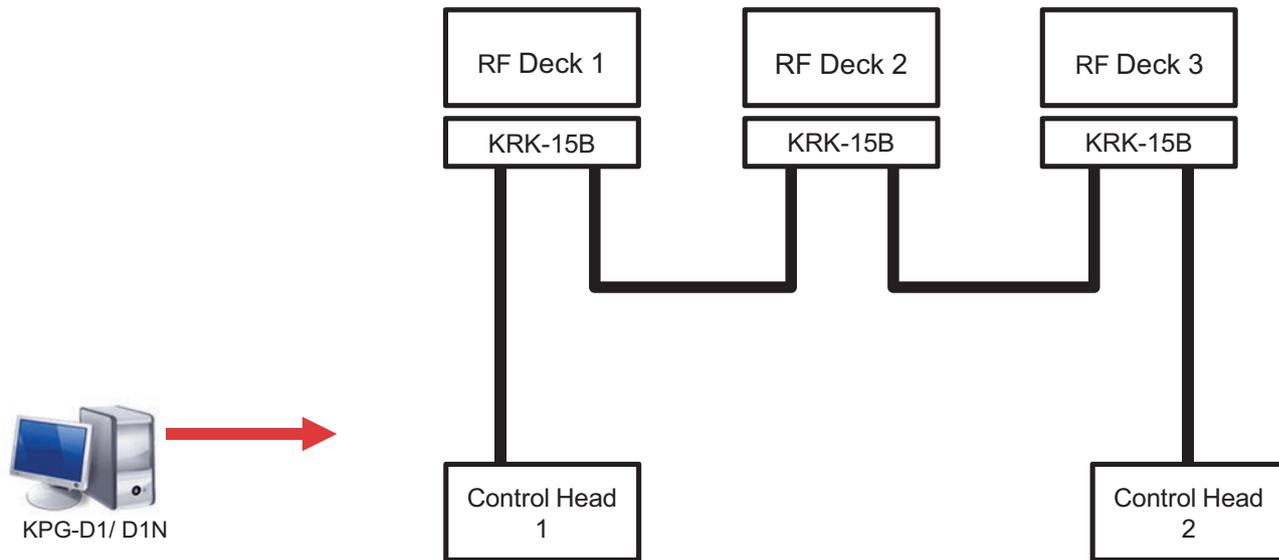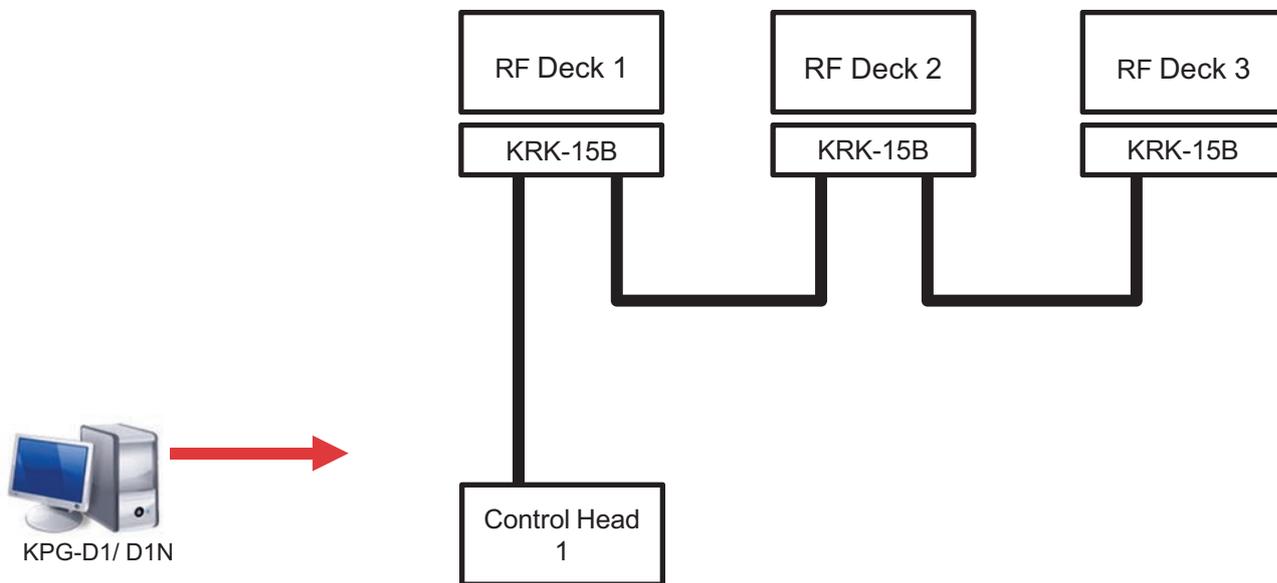

Figure 17-23 Triple RF Deck/ Dual Control Head (FPU Setting)

📝 Note

If "FIRM MISMATCH" is displayed on the screen of the Control Head, start again from step 5.

Adding an RF Deck

This section describes the steps to add an RF Deck to a system of a Dual RF Deck/ Dual Control Head structure.

📋 Note

An RF Deck can be added with the same procedure when adding the RF Deck to a system of the following RF Deck/ Control Head structures:

- Single RF Deck/ Single Control Head
- Single RF Deck/ Dual Control Head
- Dual RF Deck/ Single Control Head

1 **Turn OFF all RF Decks and Control Heads.**

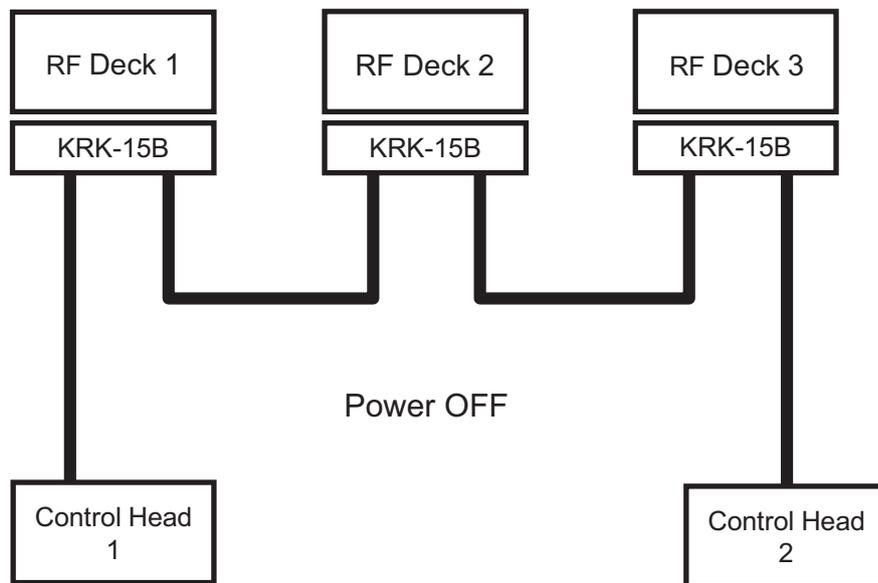If either Control Head is turned OFF, all RF Decks and Control Heads are turned OFF.
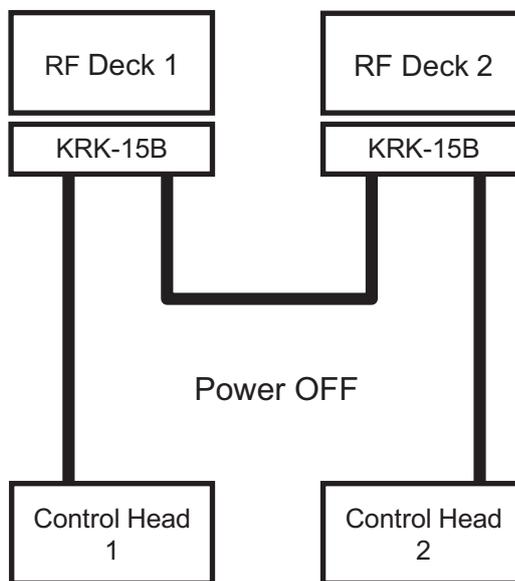
Figure 17-24 Dual RF Deck/ Dual Control Head (Power OFF)

2 **Add the RF Deck.**

Install RF Deck 3 and KCT-71 in a Multi RF Deck system.
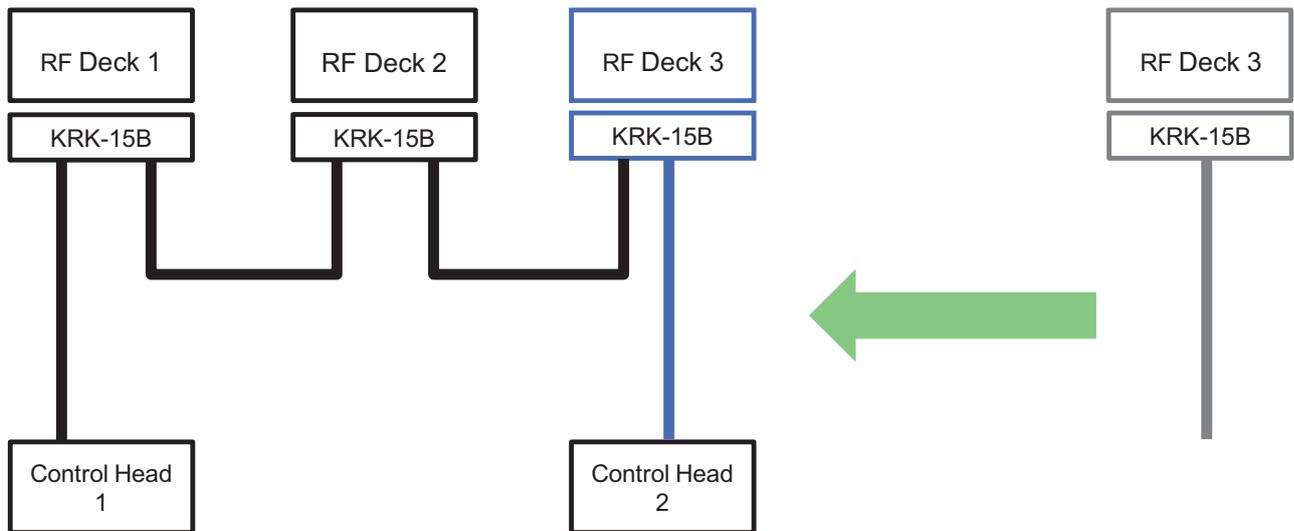
Figure 17-25 Installation of RF Deck 3/ KCT-71

📝 Note

The software option of the RF Deck to be added must be enabled. Refer to "Activating a Radio Feature License (KWD-5004MR)" of "Multi RF Deck/ Multi Control Head".

3 **Change the DIP switch.**

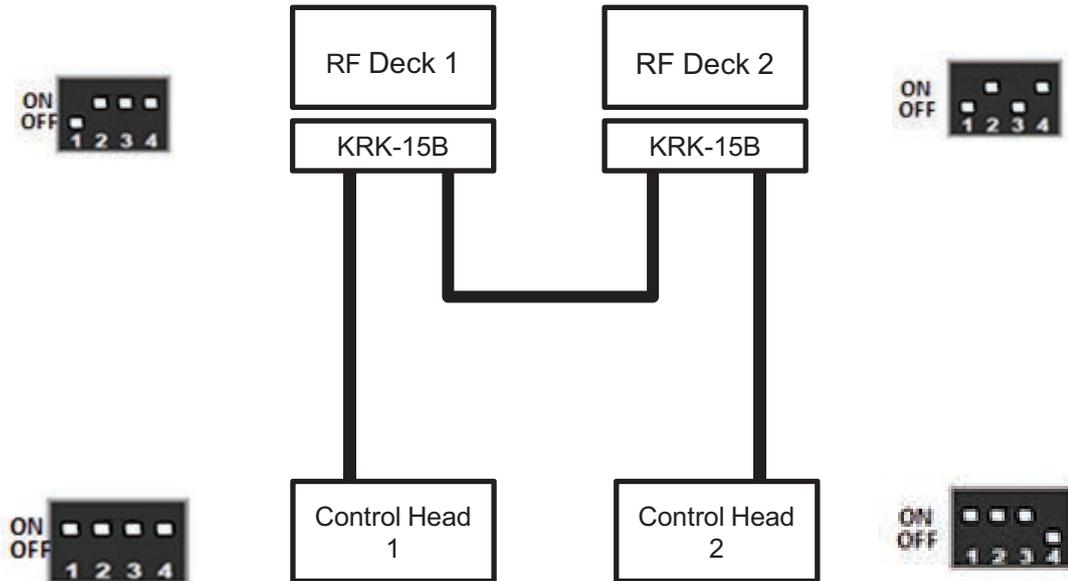Change the DIP switch to the Triple RF Deck/ Dual Control Head configuration.
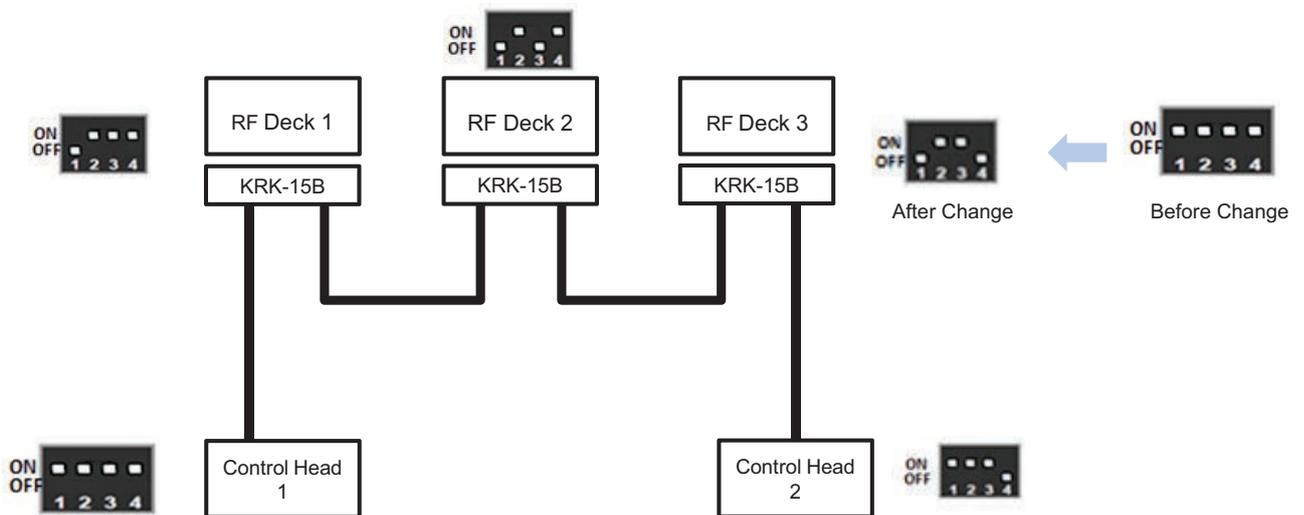
Figure 17-26 DIP Switch Configuration Triple RF Deck/ Dual Control Head

4   **Turn ON all RF Decks and Control Heads.**

If either Control Head is turned ON, all RF Decks and Control Heads are turned ON.
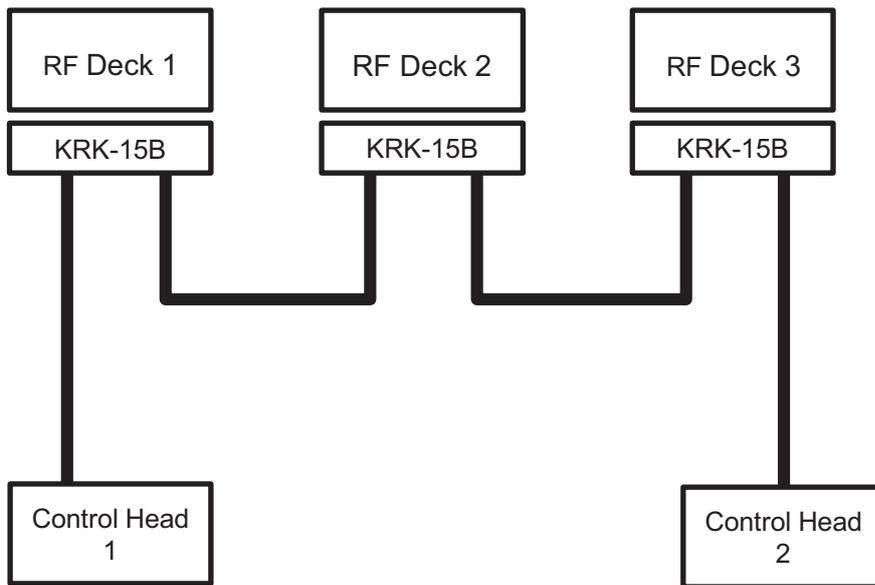
Figure 17-27 Triple RF Deck/ Dual Control Head (Power ON)

5   **Write the FPU data and restart.**

The FPU data for Triple RF Deck/ Dual Control Head is written to the Multi RF Deck system (RF Deck 1, RF Deck 2) after the programming cable is connected to Control Head 1.

Always write the FPU data in a Multi RF Deck system. Refer to "Configuration in KPG-D1/ D1N if RF Decks Are Switched" for writing configuration data.

After the FPU data is written, turn OFF all RF Decks and Control Heads, and be sure to restart the RF Decks and Control Heads.

● If "FIRM MISMATCH" is displayed on the screen of the Control Head, proceed to step 6.
● If "FPU MISMATCH" is displayed on the screen of the Control Head, proceed to step 7.
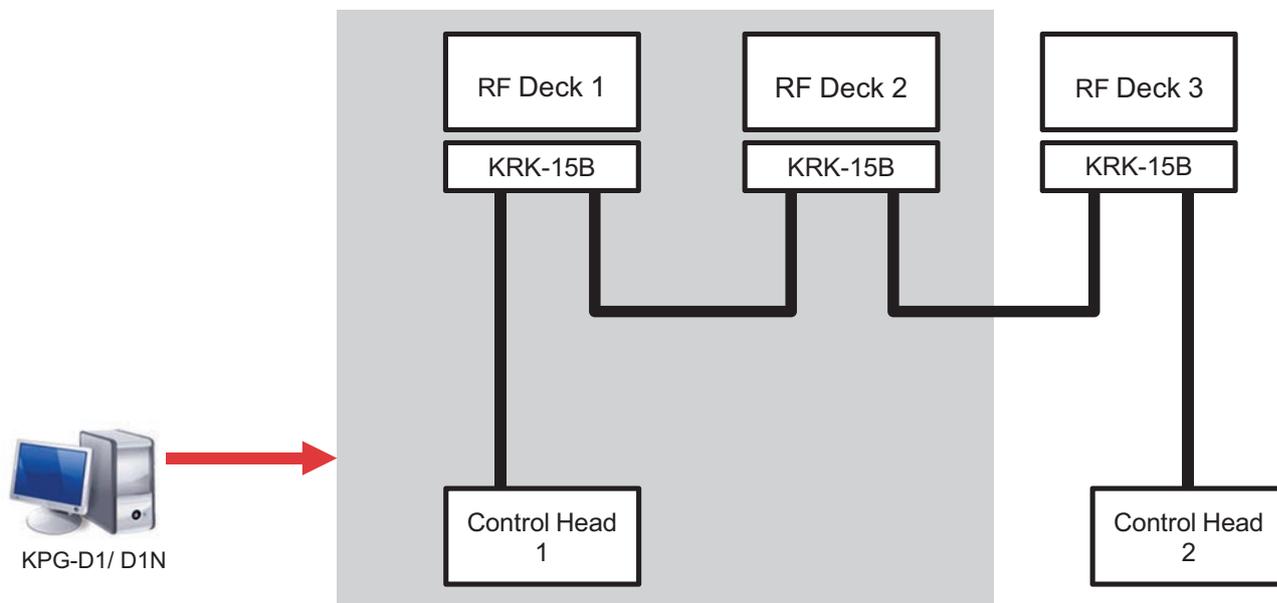
Figure 17-28 Triple RF Deck/ Dual Control Head (FPU Setting 1)

📝 Note

In this procedure, the FPU data is written to make the internal data of RF Deck 1 and RF Deck 2 for Triple RF Deck. Therefore, the FPU data is written to only RF Deck 1 and RF Deck 2, and the FPU data cannot be written to RF Deck 3.

6 **Write the firmware.**

To activate Multi RF Deck/ Multi Control Head, the firmware version 1.62.00 or later needs to be written.
The firmware version of a Control Head can be confirmed in Radio Mode Selection.
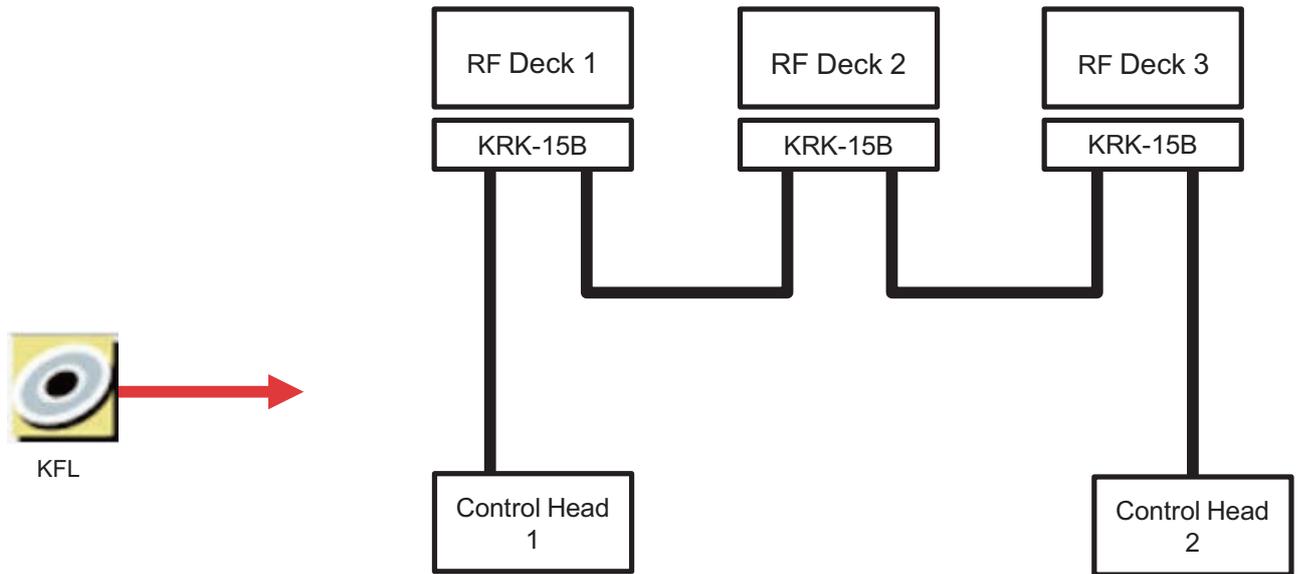
Figure 17-29 Triple RF Deck/ Dual Control Head (Firmware Setting)

📧 Note
- If "FPU MISMATCH" is displayed on the screen of the Control Head, proceed to step 7.
- If "FPU MISMATCH" is not displayed on the screen of the Control Head, the procedure is completed with step 6.

7 **Write the FPU data.**

The FPU data for Triple RF Deck/ Dual Control Head is written in a Multi RF Deck system. Always write the FPU data in a Multi RF Deck system. Refer to "Configuration in KPG-D1/ D1N if RF Decks Are Switched" for writing configuration data.
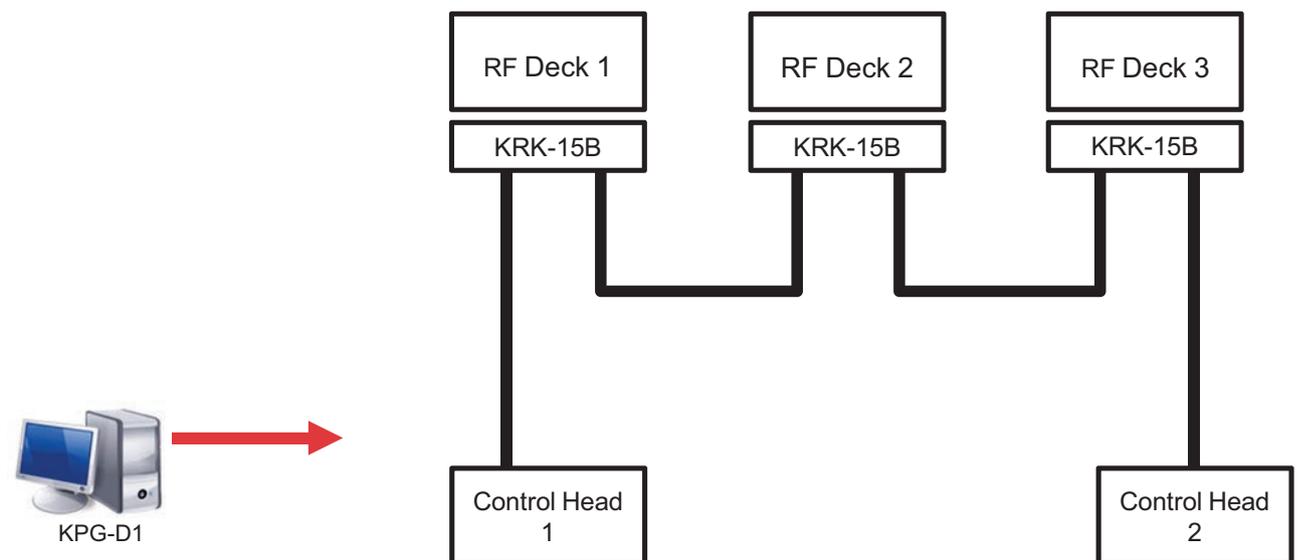
Figure 17-30 Triple RF Deck/ Dual Control Head (FPU Setting 2)

📧 Note
- If "FIRM MISMATCH" is displayed on the screen of the Control Head, start again from step 6.
- If "FIRM MISMATCH" is not displayed on the screen of the Control Head, the procedure is completed with step 7.

17.3　Replacing an RF Deck/ Control Head

The Control Heads and RF Decks in a system that is operating can be replaced.

Replacing a Control Head

This section describes the procedure to replace a Control Head in a system of a Triple RF Deck/ Dual Control Head structure.

> **Note**
>
> A Control Head can be replaced with the same procedure when replacing the Control Head in a system of the following RF Deck/ Control Head structures:
> - Dual RF Deck/ Single Control Head
> - Dual RF Deck/ Dual Control Head
> - Triple RF Deck/ Single Control Head

1　Turn OFF all RF Decks and Control Heads.

If either Control Head is turned OFF, all RF Decks and Control Heads are turned OFF.
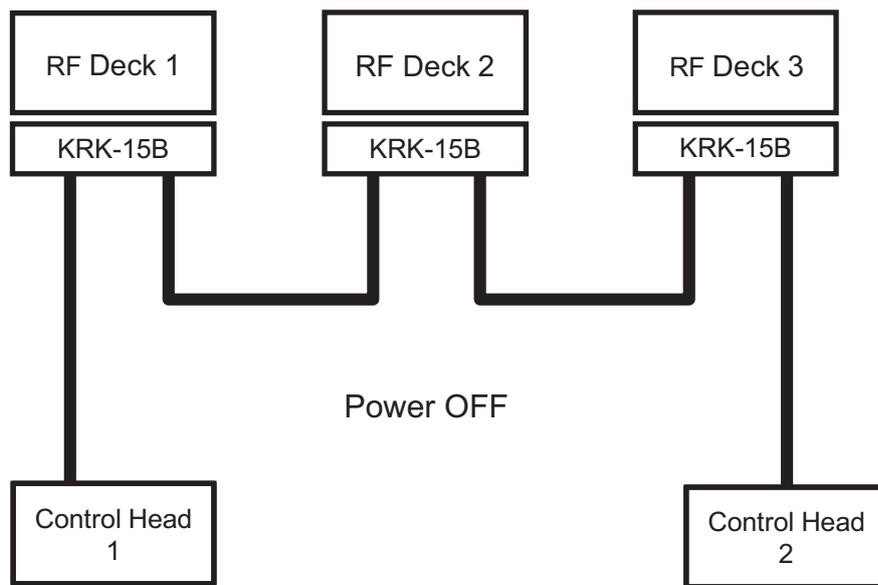
Figure 17-31 Triple RF Deck/ Dual Control Head (Power OFF)

2 **Remove the Control Head.**

Remove the Control Head from a Multi RF Deck system.
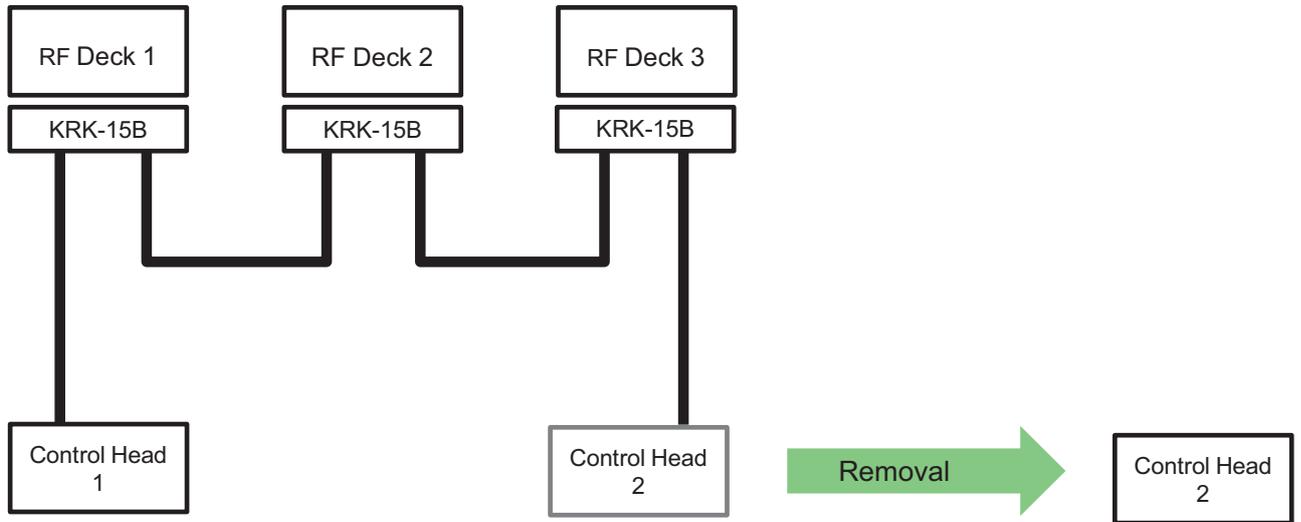
Figure 17-32 Removal of Control Head 2

3 **Install the new Control Head.**

Install the new Control Head in a Multi RF Deck system.
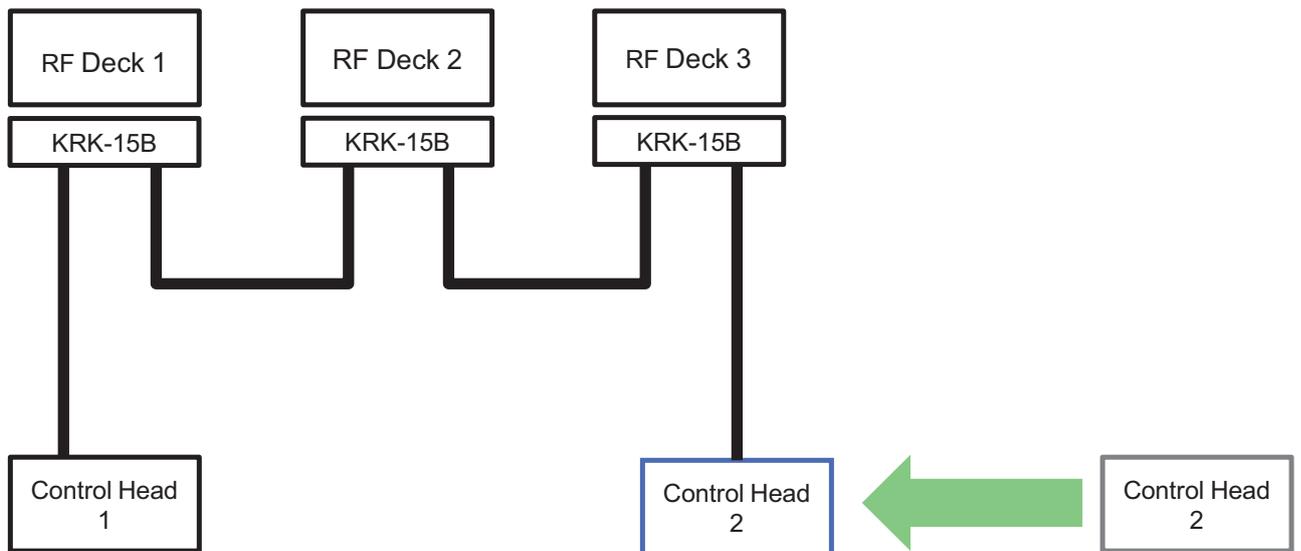
Figure 17-33 Installation of Control Head 2

4 **Change the DIP switch.**

Change the DIP switch to the Triple RF Deck/ Dual Control Head configuration.
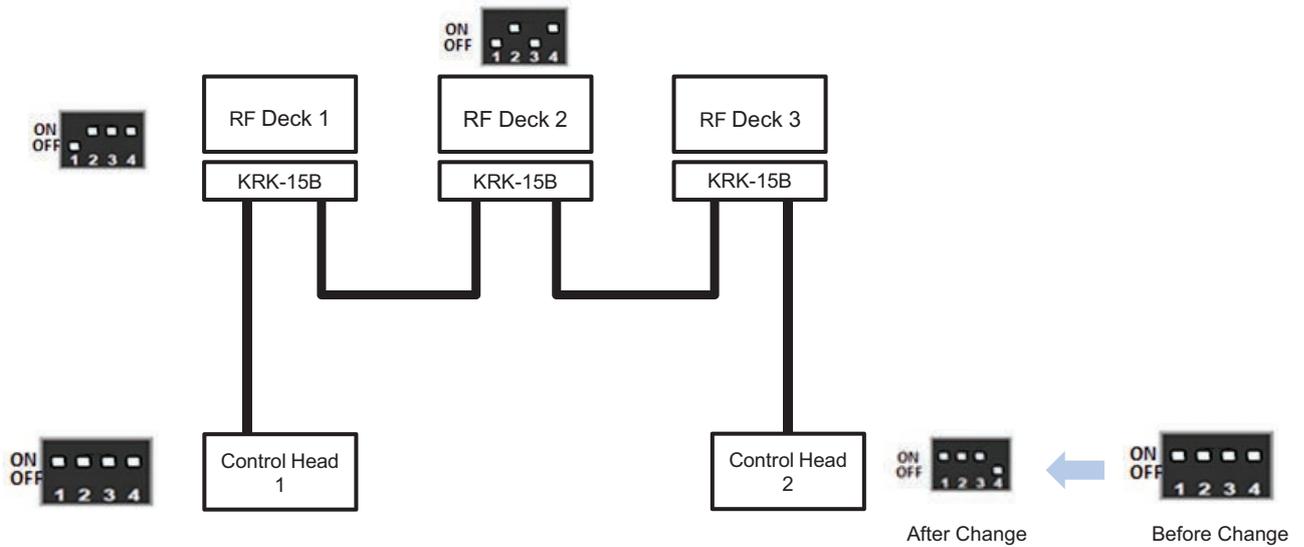
Figure 17-34 DIP Switch Configuration Triple RF Deck/ Dual Control Head

5 **Turn ON all RF Decks and Control Heads.**

If either Control Head is turned ON, all RF Decks and Control Heads are turned ON.
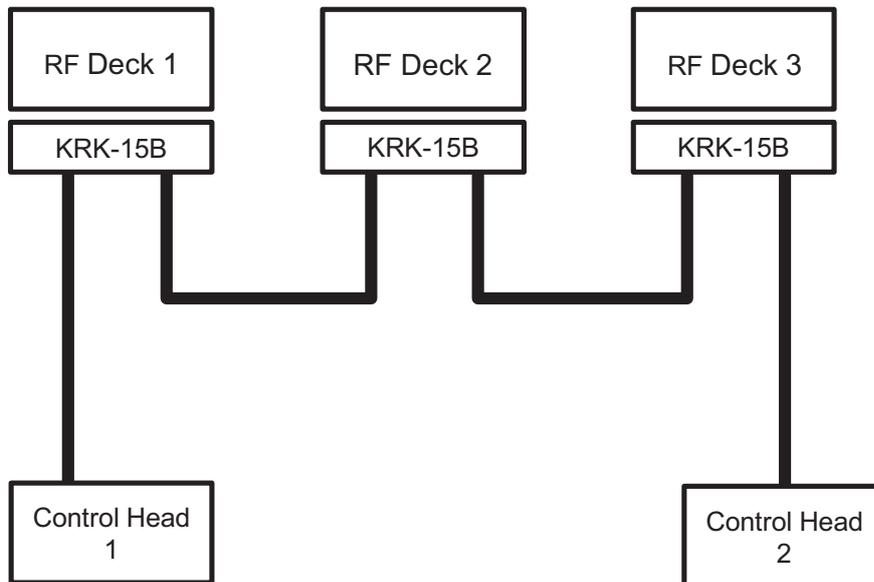
Figure 17-35 Triple RF Deck/ Dual Control Head (Power ON)

📋 Note

- If "FIRM MISMATCH" is displayed on the screen of the Control Head, proceed to step 6.
- If "FPU MISMATCH" is displayed on the screen of the Control Head, proceed to step 7.

6 **Write the firmware.**

To activate Multi RF Deck/ Multi Control Head, the firmware version 1.62.00 or later needs to be written.
The firmware version of a Control Head can be confirmed in Radio Mode Selection.
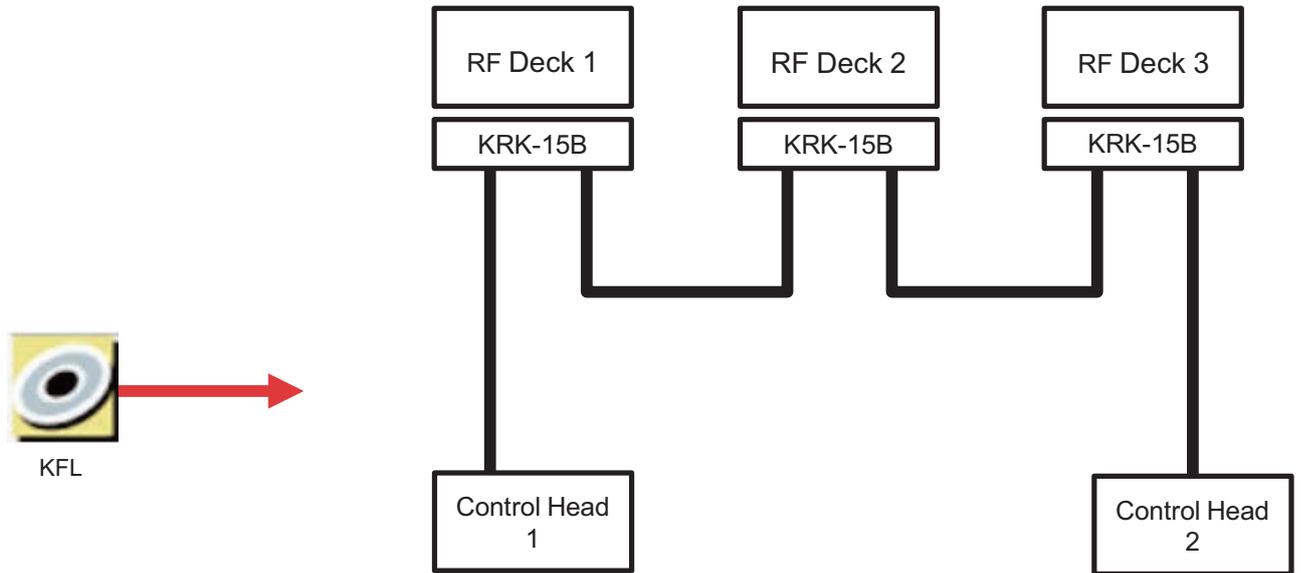
Figure 17-36 Triple RF Deck/ Dual Control Head (Firmware Setting)

📝 Note

If "FPU MISMATCH" is displayed on the screen of the Control Head, proceed to step 7.

7 **Write the FPU data.**

The FPU data for Triple RF Deck/ Dual Control Head is written in a Multi RF Deck system. Always write the FPU data in a Multi RF Deck system. Refer to "Configuration in KPG-D1/ D1N If Control Heads Are Switched" for writing configuration data.
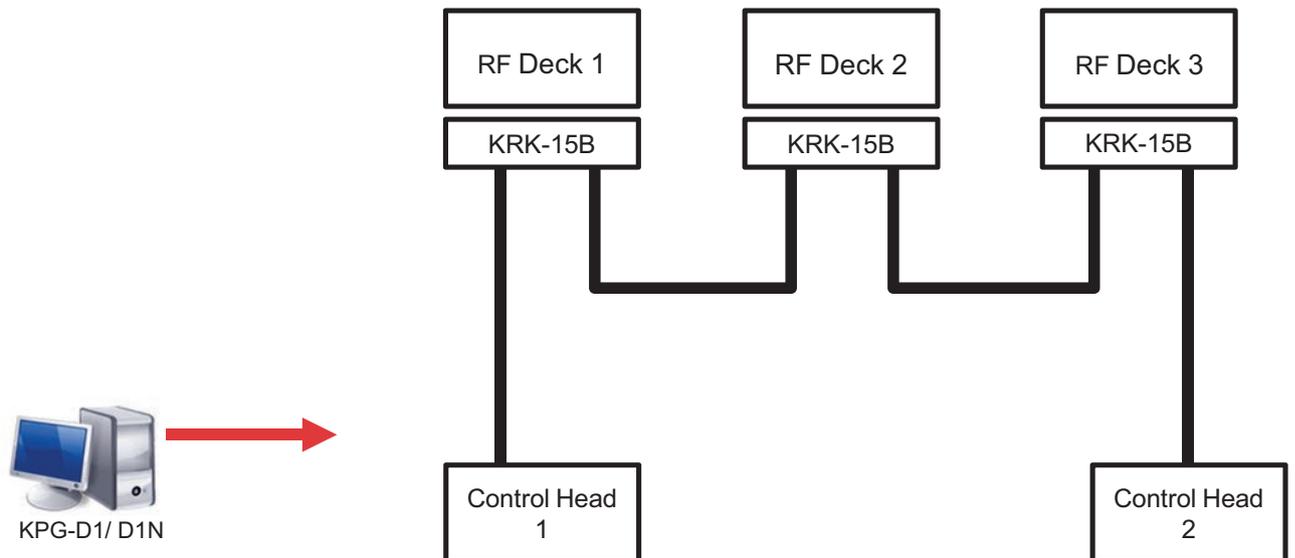
Figure 17-37 Triple RF Deck/ Dual Control Head (FPU Setting)

📝 Note

If "FIRM MISMATCH" is displayed on the screen of the Control Head, start again from step 6.

Replacing an RF Deck

This section describes the procedure to replace an RF Deck in a system of a Triple RF Deck/ Dual Control Head structure.

> 📝 Note
>
> An RF Deck can be replaced with the same procedure when replacing the RF Deck in a system of the following RF Deck/ Control Head structures:
> - Dual RF Deck/ Single Control Head
> - Dual RF Deck/ Dual Control Head
> - Triple RF Deck/ Single Control Head

1 Turn OFF all RF Decks and Control Heads.

If either Control Head is turned OFF, all RF Decks and Control Heads are turned OFF.
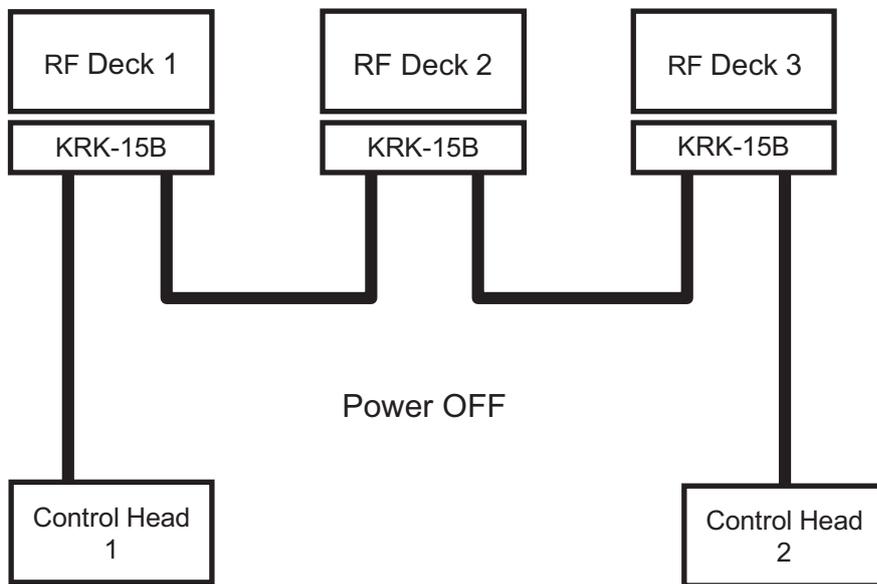
Figure 17-38 Triple RF Deck/ Dual Control Head (Power OFF)

2 Remove the RF Deck.

Remove the Control Head from a Multi RF Deck system.
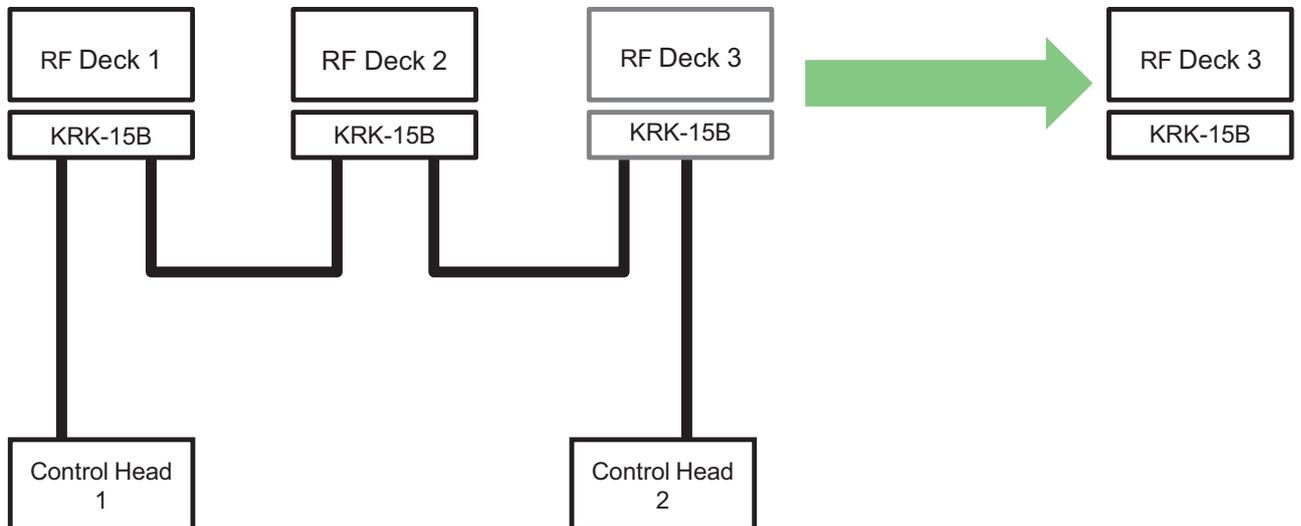
Figure 17-39 Removal of RF Deck 3

3 **Install the new RF Deck.**

Install the new RF Deck in a Multi RF Deck system.
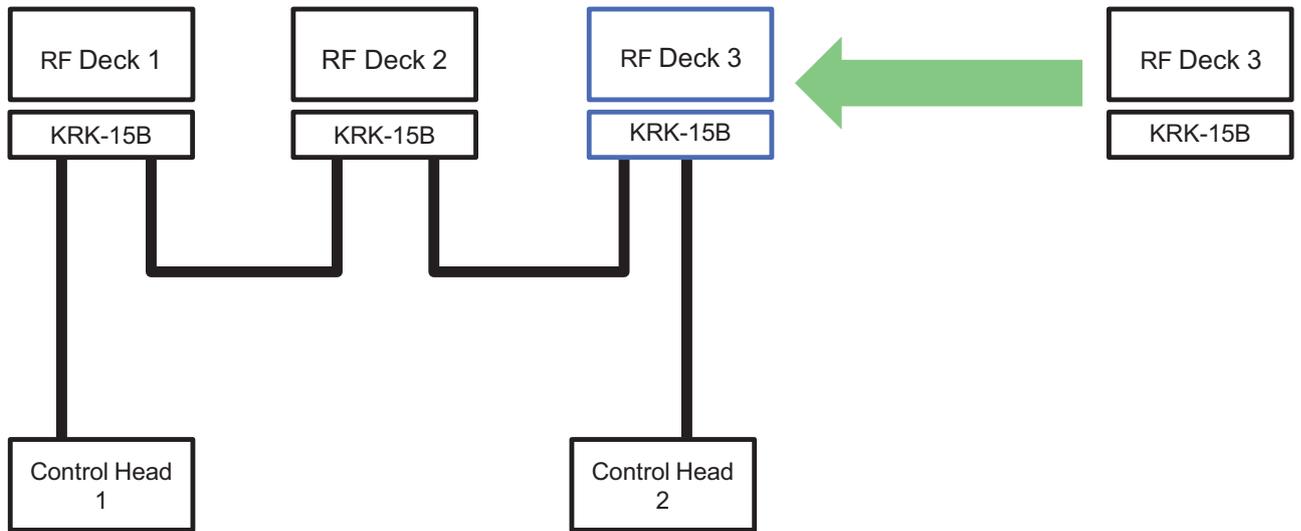
Figure 17-40 Installation of RF Deck 3

📝 Note

The software option of the new RF Deck must be enabled. Refer to "Configuring the Initial Configuration" of "Multi RF Deck/ Multi Control Head".

4 **Change the DIP switch.**

Change the DIP switch to the Triple RF Deck/ Dual Control Head configuration.
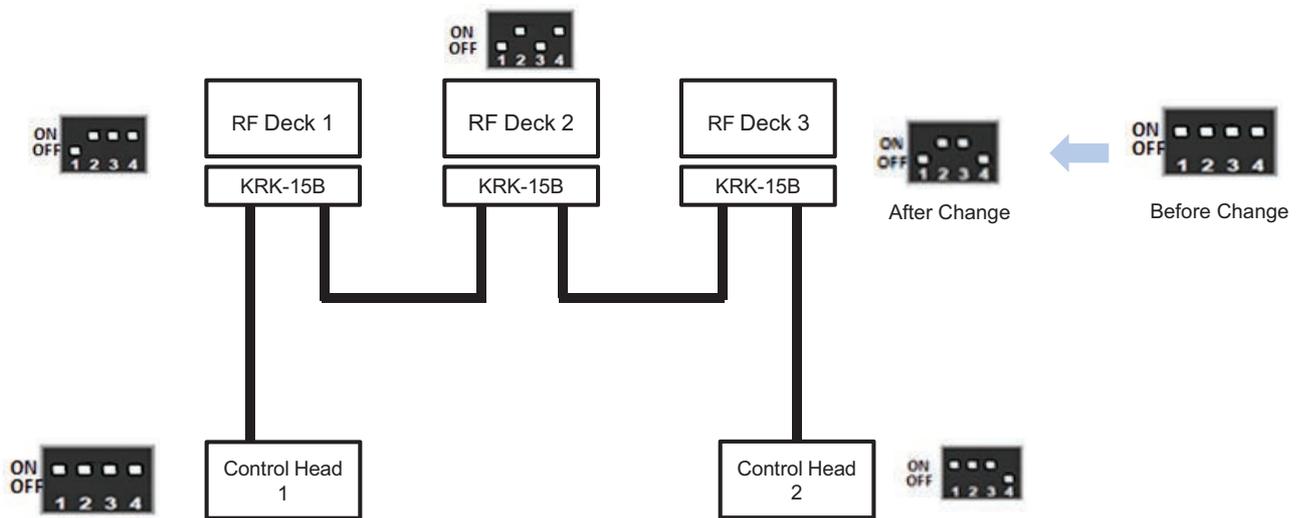
Figure 17-41 DIP Switch Configuration Triple RF Deck/ Dual Control Head

5 **Turn ON all RF Decks and Control Heads.**

If either Control Head is turned ON, all RF Decks and Control Heads are turned ON.
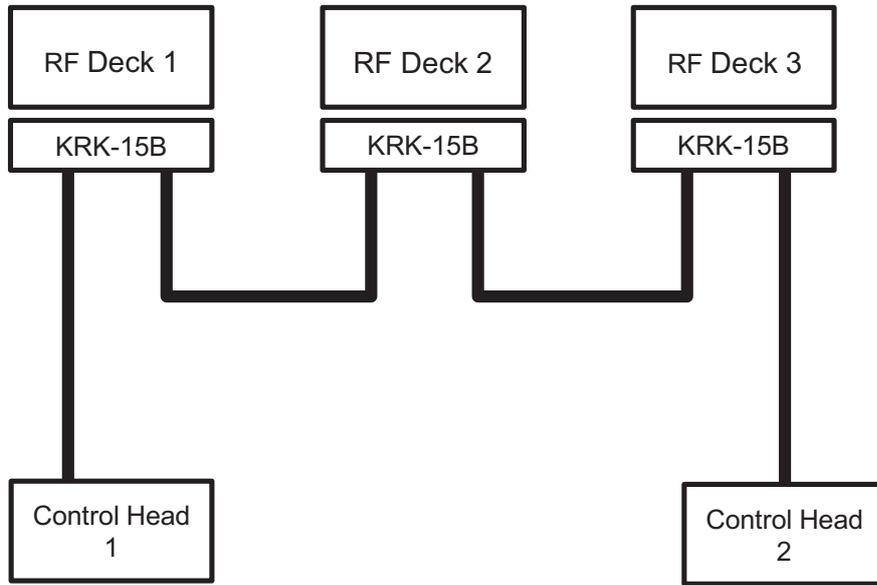
Figure 17-42 Triple RF Deck/ Dual Control Head (Power ON)

📝 Note

- If "FIRM MISMATCH" is displayed on the screen of the Control Head, proceed to step 6.
- If "FPU MISMATCH" is displayed on the screen of the Control Head, proceed to step 7.

6 **Write the firmware.**

To activate Multi RF Deck/ Multi Control Head, the firmware version 1.62.00 or later needs to be written.
The firmware version of a Control Head can be confirmed in Radio Mode Selection.
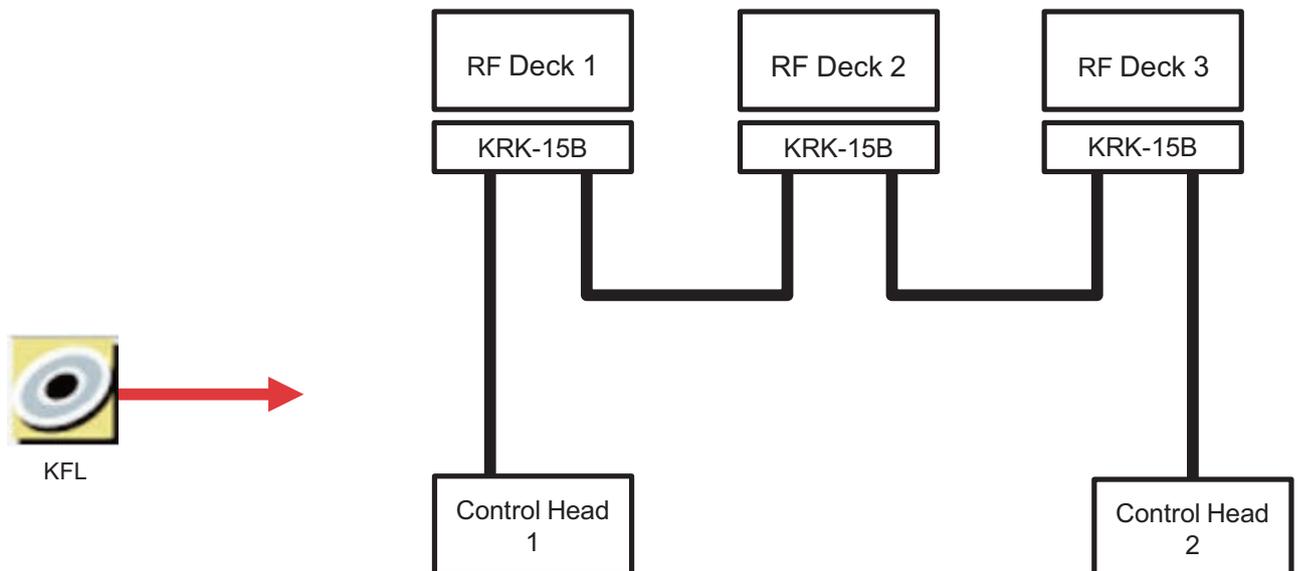
Figure 17-43 Triple RF Deck/ Dual Control Head (Firmware Setting)

📝 Note

If "FPU MISMATCH" is displayed on the screen of the Control Head, proceed to step 7.

7 **Write the FPU data.**

The FPU data for Triple RF Deck/ Dual Control Head is written in a Multi RF Deck system. Always write the FPU data in a Multi RF Deck system. Refer to "Configuration in KPG-D1/ D1N if RF Decks Are Switched" for writing configuration data.
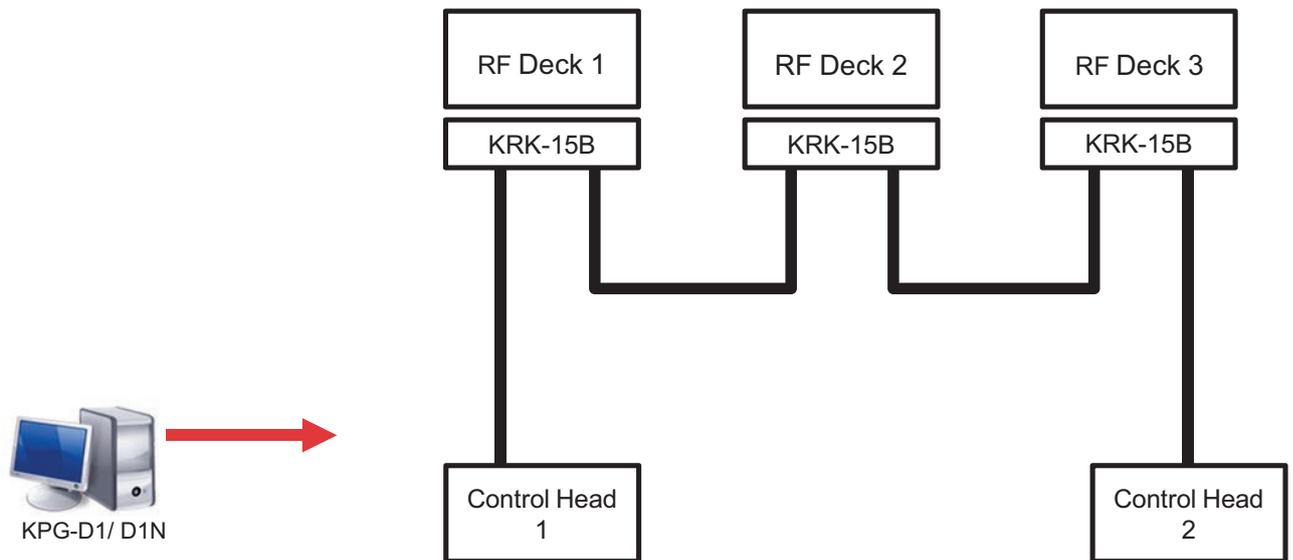
Figure 17-44 Triple RF Deck/ Dual Control Head (FPU Setting)

📝 Note

If "FIRM MISMATCH" is displayed on the screen of the Control Head, start again from step 6.

17.4　Removing an RF Deck/ Control Head

The system structure can be changed by removing the Control Heads and RF Decks in a system that is operating.

Removing a Control Head

This section describes the procedure to change a system to a Triple RF Deck/ Single Control Head structure by removing a Control Head from the system of a Triple RF Deck/ Dual Control Head structure.

📋 Note

A Control Head can be removed with the same procedure when removing the Control Head in a system of the following RF Deck/ Control Head structures:

- Dual RF Deck/ Dual Control Head
- Single RF Deck/ Dual Control Head

1 **Turn OFF all RF Decks and Control Heads.**

If either Control Head is turned OFF, all RF Decks and Control Heads are turned OFF.
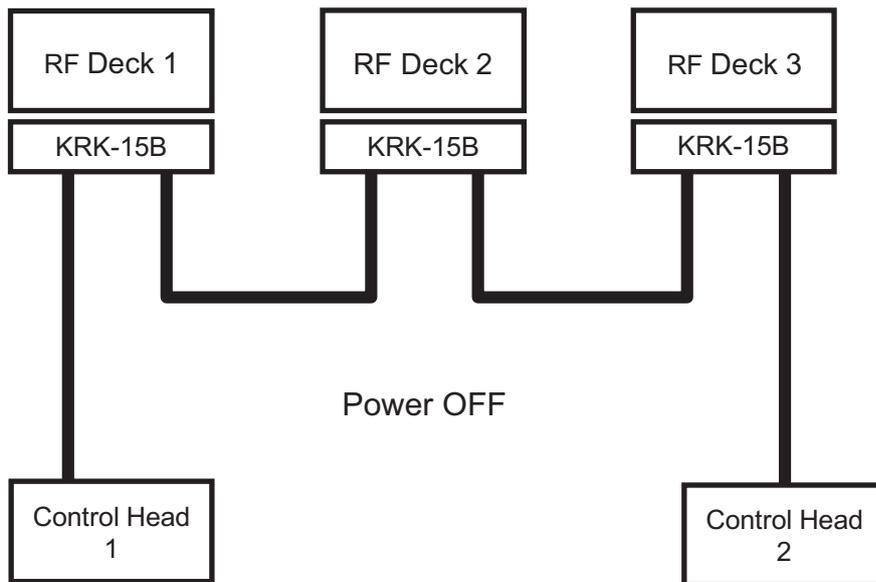
Figure 17-45 Triple RF Deck/ Dual Control Head (Power OFF)

2 **Remove the Control Head.**

Remove the Control Head and KCT-71 from a Multi RF Deck system.
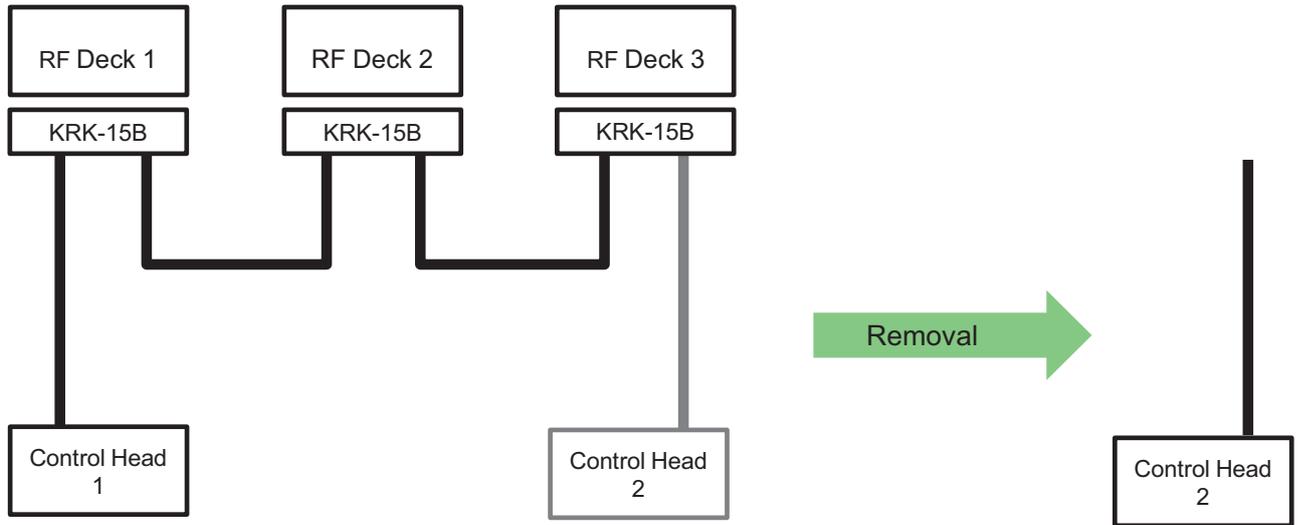
Figure 17-46 Removal of Control Head 2/ KCT-71

3 **Change the DIP switch.**

Change the DIP switch to the Triple RF Deck/ Single Control Head configuration.

Figure 17-47 DIP Switch Configuration Triple RF Deck/ Single Control Head

4 **Turn ON all RF Decks and Control Heads.**

If a Control Head is turned ON, all RF Decks are also turned ON.
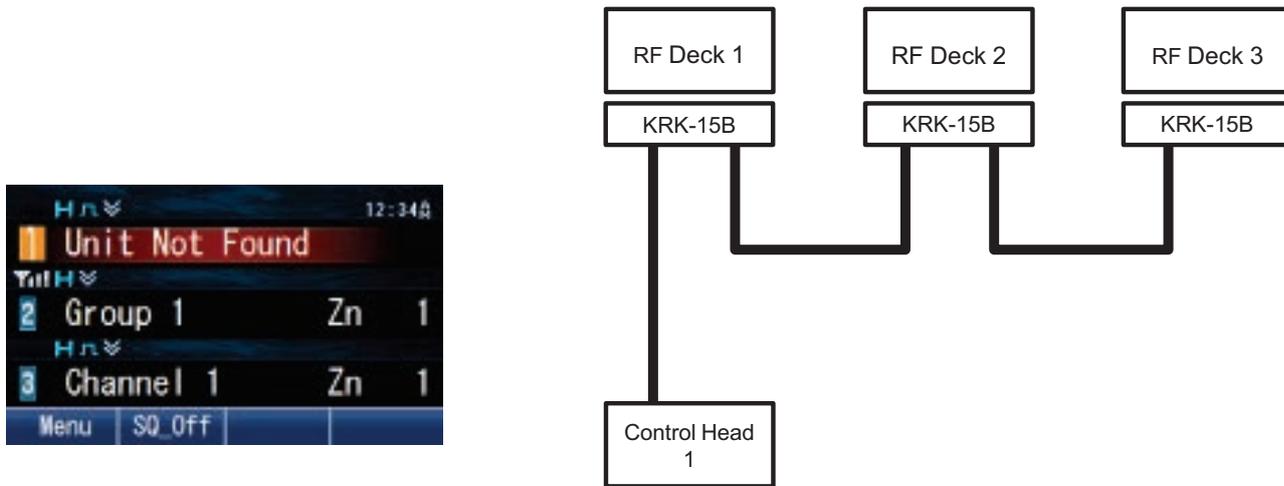
Figure 17-48 Triple RF Deck/ Single Control Head (Power ON)

📝 Note

"Unit Not Found" appears on the screen of Control Head 1 by the removal of Control Head 2.

5 **Write the FPU data.**

The FPU data for Triple RF Deck/ Single Control Head is written in a Multi RF Deck system. Always write the FPU data in a Multi RF Deck system. Refer to "Configuration in KPG-D1/ D1N If Control Heads Are Switched" for writing configuration data.

Figure 17-49 Triple RF Deck/ Single Control Head (FPU Setting)

Removing an RF Deck

This section describes the procedure to change a system to a Dual RF Deck/ Dual Control Head structure by removing an RF Deck from the system of a Triple RF Deck/ Dual Control Head structure.

📋 Note

- This section describes the procedure to remove RF Deck 3 as an example, but the same procedure can be followed when removing RF Deck 1 or RF Deck 2.
- An RF Deck can be removed with the same procedure when removing the RF Deck in a system of the following RF Deck/ Control Head structures:
  - Triple RF Deck/ Single Control Head
  - Dual RF Deck/ Dual Control Head
  - Dual RF Deck/ Single Control Head

1 Turn OFF all RF Decks and Control Heads.

If either Control Head is turned OFF, all RF Decks and Control Heads are turned OFF.

Figure 17-50 Triple RF Deck/ Dual Control Head (Power OFF)

2 **Remove the RF Deck.**

Remove RF Deck 3 and KCT-71 from a Multi RF Deck system.
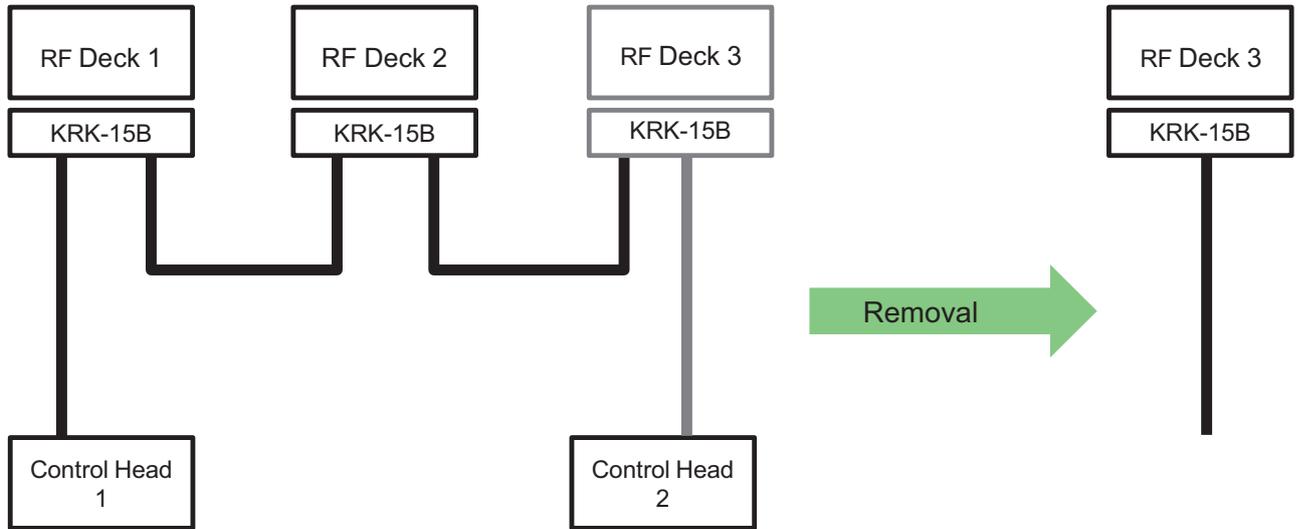
Figure 17-51 Removal of RF Deck 3/ KCT-71

3 **Connect the Control Head.**

Connect Control Head 2 to the KCT-71 connected to RF Deck 2.
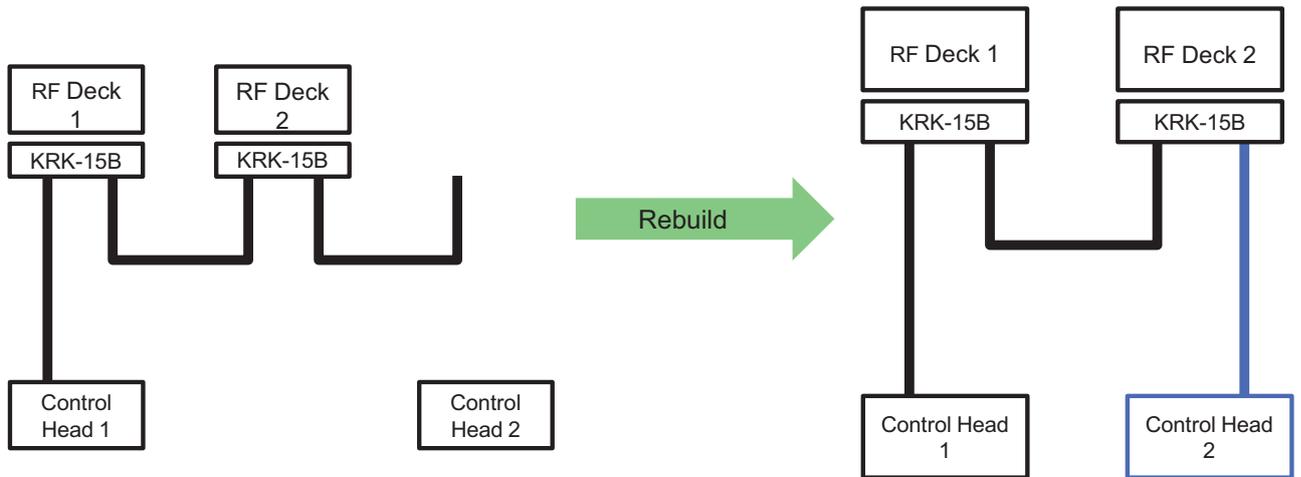
Figure 17-52 Dual RF Deck/ Dual Control Head

4 **Change the DIP switch configuration.**

Change the DIP switch to the Dual RF Deck/ Dual Control Head configuration.

Figure 17-53 DIP Switch Configuration Dual RF Deck/ Dual Control Head

5 **Turn ON all RF Decks and Control Heads.**

If either Control Head is turned ON, all RF Decks and Control Heads are turned ON.
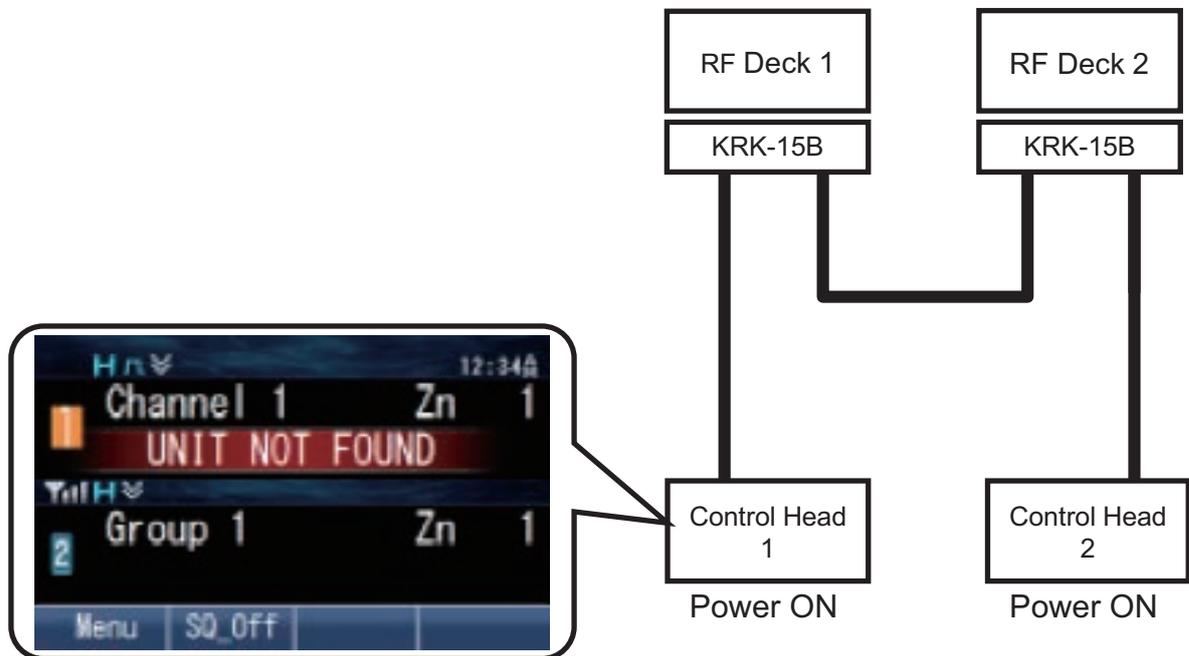
Figure 17-54 Dual RF Deck/ Dual Control Head (Power ON)

📑 Note

"Unit Not Found" appears on the screen of Control Head 1 by the removal of the RF Deck.

6 Write the FPU data.

The FPU data for Triple RF Deck/ Single Control Head is written in a Multi RF Deck system. Always write the FPU data in a Multi RF Deck system. Refer to "Configuration in KPG-D1/ D1N if RF Decks Are Switched" for writing configuration data.
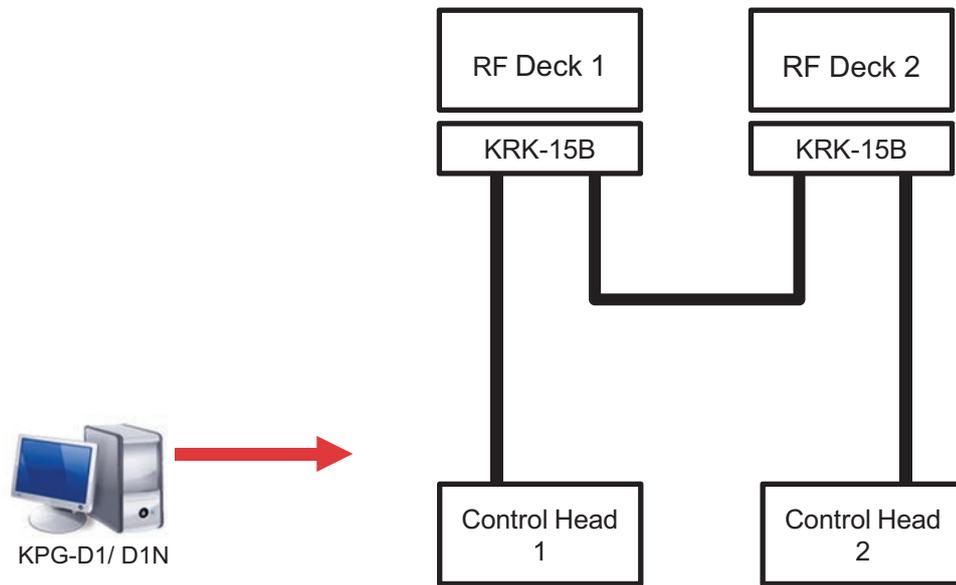
Figure 17-55 Dual RF Deck/ Dual Control Head (FPU Setting)

<table>
<tr><td>17.5</td><td>Changing Configuration Data While a System in a Multi RF Deck/ Multi Control Head Structure Is Operating</td></tr>
</table>

While a system in a Multi RF Deck/ Multi Control Head structure is operating, the configuration data can be collectively written at the same time for the Multi RF Deck/ Multi Control Head system. Rebuilding a Multi RF Deck/ Multi Control Head structure as a Single RF Deck/ Single Control Head structure is not required.

Refer to "Configuration in KPG-D1/ D1N if RF Decks Are Switched" for writing configuration data.

17.6 Updating Firmware While a System in a Multi RF Deck/ Multi Control Head Structure Is Operating

While a system in a Multi RF Deck/ Multi Control Head structure is operating, the firmware can be collectively written at the same time to all RF Decks and Control Heads. Rebuilding a Multi RF Deck/ Multi Control Head structure as a Single RF Deck/ Single Control Head structure is not required.
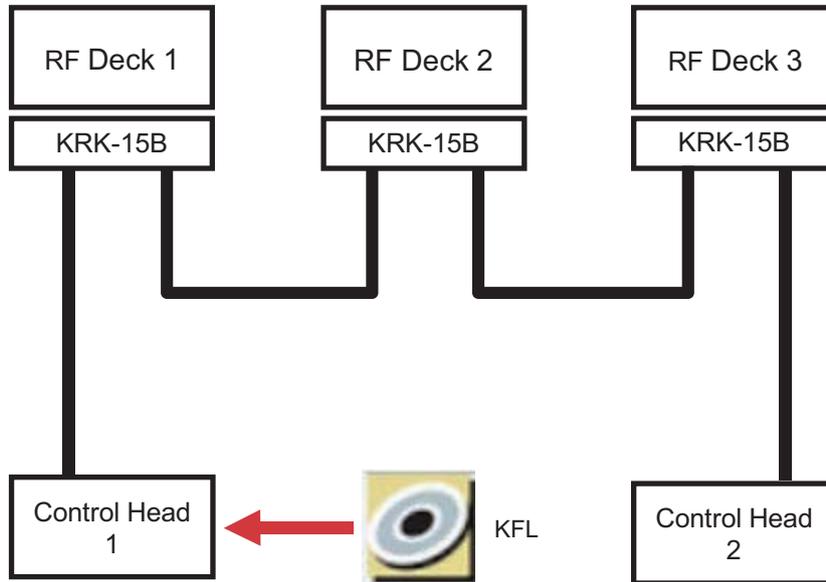
Figure 17-56 Multi RF Deck/ Multi Control Head (Firmware Update)

📝 Note

- The firmware version written in the RF Deck can be viewed in Transceiver Information of KPG-D1/ D1N.
- To activate Multi RF Deck/ Multi Control Head, the firmware version 1.62.00 or later needs to be written.

17.7 Reconnecting a Removed RF Deck

This section describes the procedure for RF Deck removal when RF Deck 3 breaks and the procedure for installation after the repair of RF Deck 3 is completed while a system in a Triple RF Deck/ Dual Control Head structure is operating.
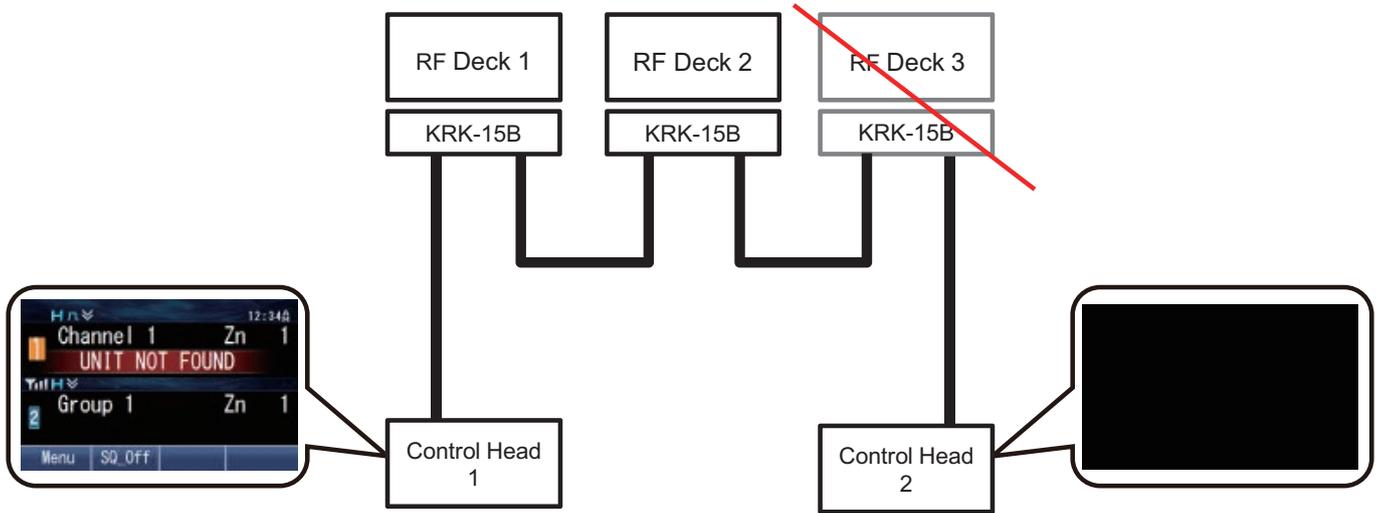
Figure 17-57 Breakdown of RF Deck 3

📝 Note

An RF Deck can be removed and installed with the same procedures even if in a system of the following RF Deck/ Control Head structures:

• Triple RF Deck/ Single Control Head

• Dual RF Deck/ Dual Control Head

• Dual RF Deck/ Dual Control Head

1 **Press the Power switch of a Control Head to turn OFF the power.**
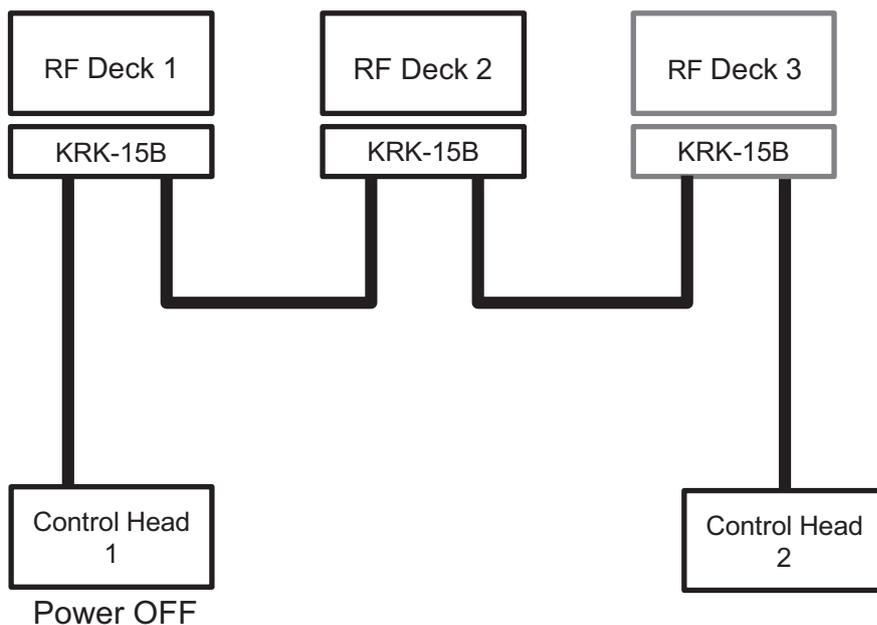
Figure 17-58 Triple RF Deck/ Dual Control Head (Power OFF)

2   **Remove RF Deck 3 and KCT-71.**
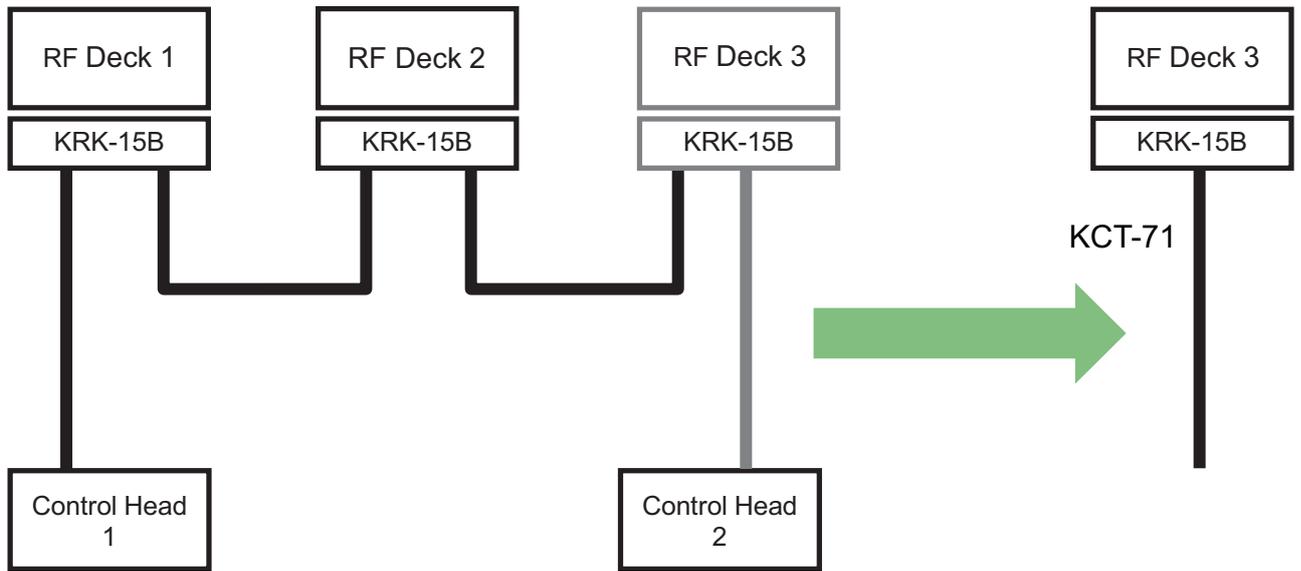
Figure 17-59 Removal of RF Deck 3/ KCT-71

📝 Note

- If the removed RF Deck 3 is not broken, by changing the configuration of the DIP switch, the system can operate in a system of a Single RF Deck/ Single Control Head structure even without overwriting the configuration data. However, "Unit Not Found" appears on the display.
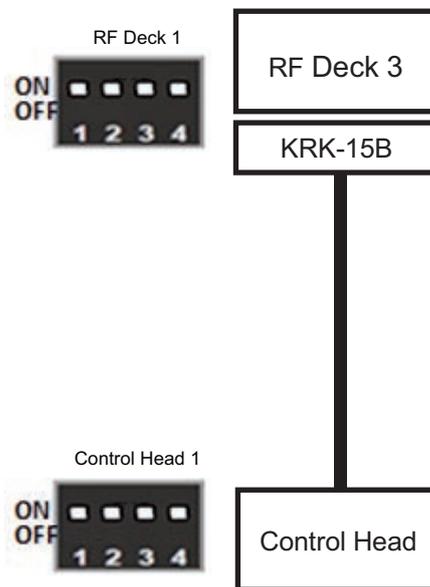
Figure 17-60 Single RF Deck/ Single Control Head

- Even if RF Deck 3 is removed, by connecting Control Head 2 to KCT-71 of RF Deck 2 and by changing the configuration of the DIP switch, the system can operate in a system of a Dual RF Deck/ Dual Control Head structure even without overwriting the configuration data. However, "Unit Not Found" appears on the display.
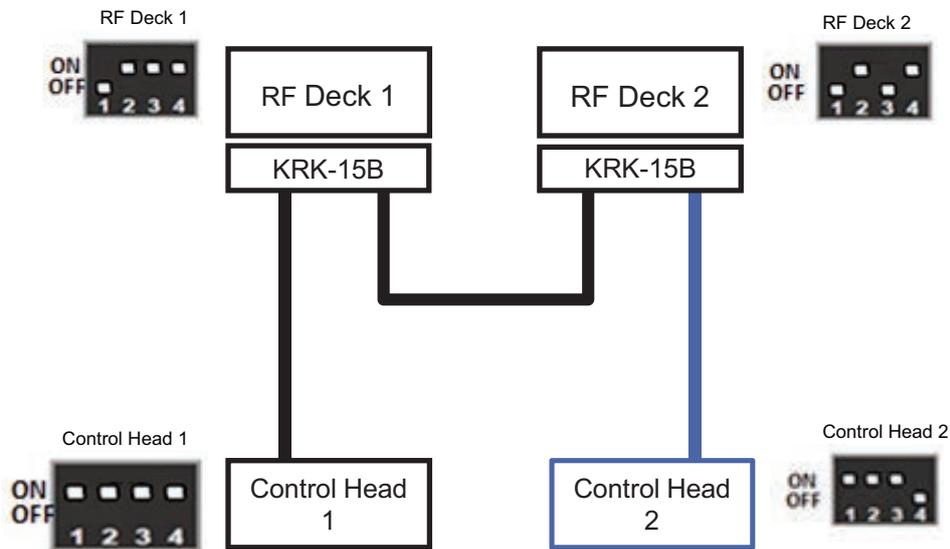
Figure 17-61 Dual RF Deck/ Dual Control Head

3 **Restore RF Deck 3 to the previous state after the repair of RF Deck 3 completes.**
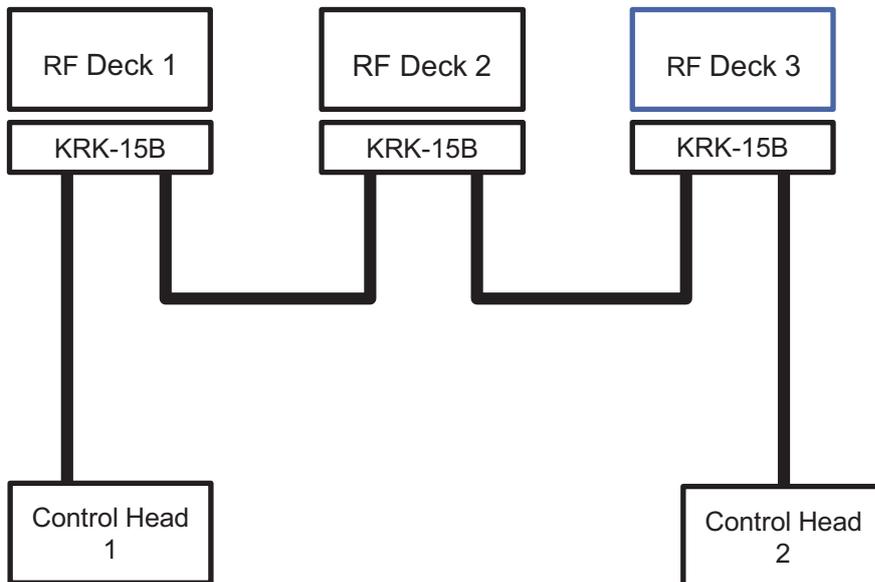
Figure 17-62 Triple RF Deck/ Dual Control Head

4 **Configure the DIP switch.**
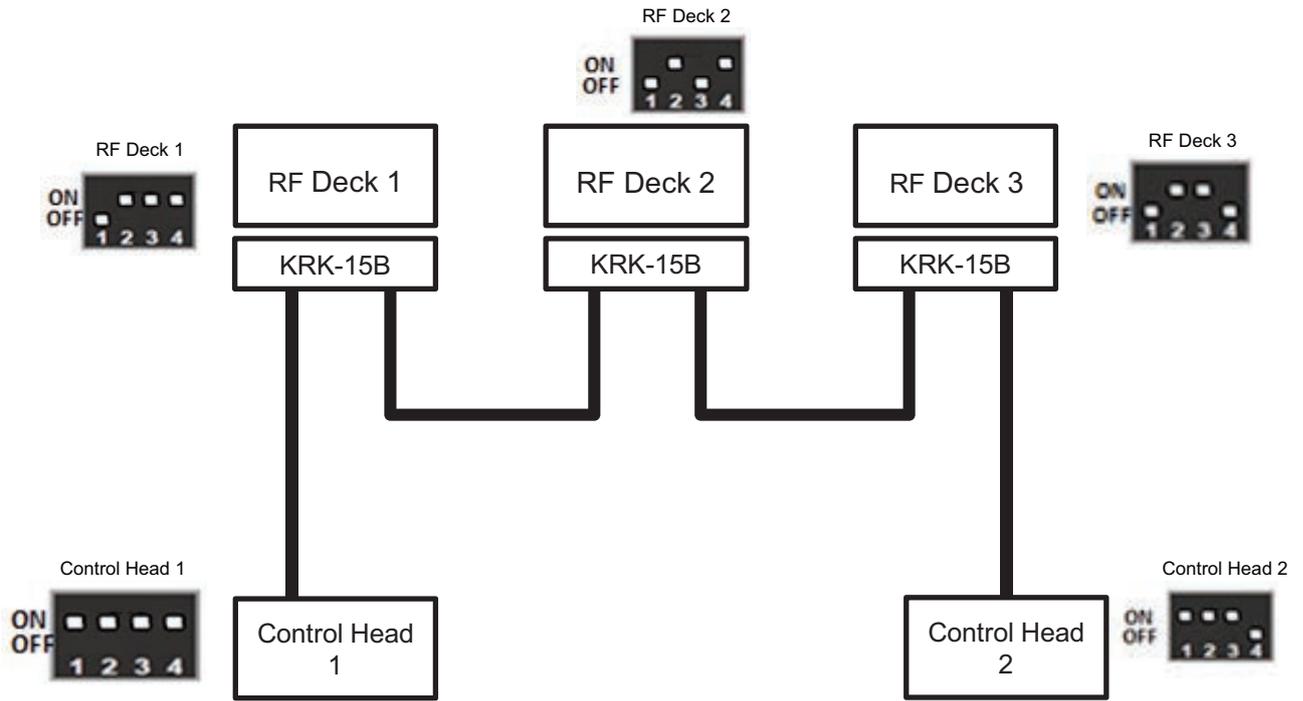
Figure 17-63 DIP Switch Configuration

17 STRUCTURING A MULTI RF DECK/ MULTI CONTROL HEAD

17.8 Changing Configuration Data of 1 RF Deck While a System in a Multi RF Deck/ Multi Control Head Structure Is Operating

17.8 Changing Configuration Data of 1 RF Deck While a System in a Multi RF Deck/ Multi Control Head Structure Is Operating

The configuration data of an RF Deck can be changed while a system in a Multi RF Deck/ Multi Control Head structure is operating. This section describes the procedure for changing the configuration data of RF Deck 2.

📝 Note

- The configuration data of RF Deck 1 and RF Deck 3 can be changed with the same procedure while a system in a Multi RF Deck/ Multi Control Head structure is operating.
- If even one piece of the configuration data is changed, the configuration data of all RF Decks and Control Heads needs to be overwritten.
- The configuration data of an RF Deck can be changed with the same procedure even if in a system of the following RF Deck/ Control Head structures:
  - Triple RF Deck/ Single Control Head
  - Dual RF Deck/ Dual Control Head
  - Dual RF Deck/ Single Control Head

1 Edit the configuration data of RF Deck 2 by using KPG-D1/ D1N.

To create new configuration data of RF Deck 2, confirm that the following are configured in **Product Information**:
- Multi RF Deck of **Feature Selection** is enabled.
- The configuration of **Control Head Configuration** matches the actual system structure.

2 Turn ON all RF Decks and Dual Control Heads in a Triple RF Deck/ Dual Control Head structure.

Configuration data can be written to all RF Decks and Control Heads.
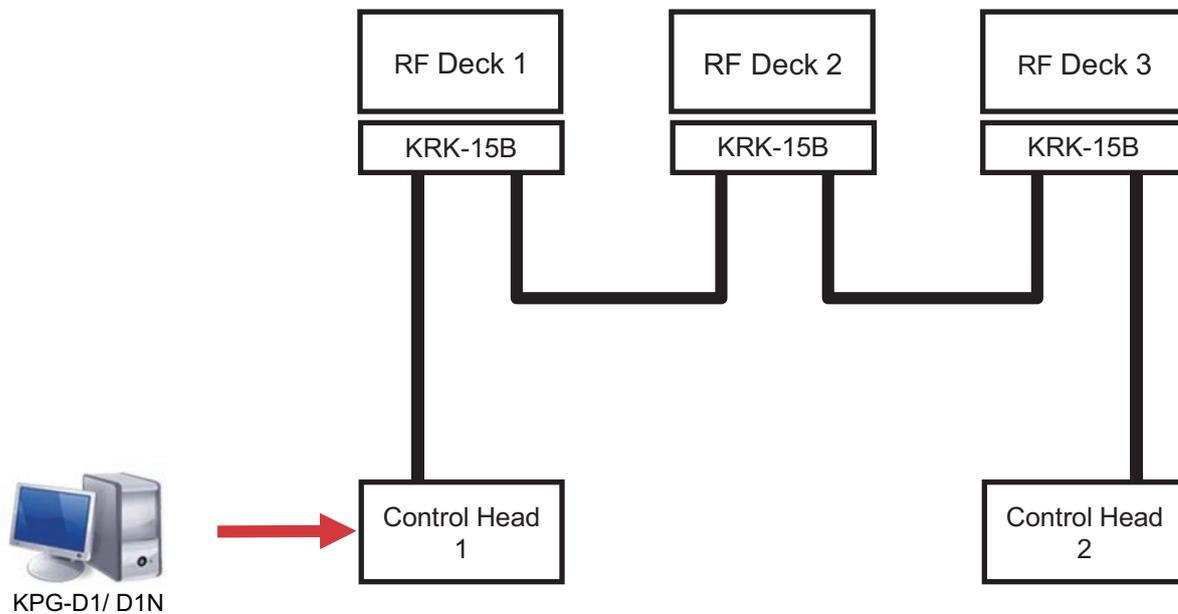
Figure 17-64 Triple RF Deck/ Dual Control Head (FPU Setting)

17 STRUCTURING A MULTI RF DECK/ MULTI CONTROL HEAD

17.8 Changing Configuration Data of 1 RF Deck While a System in a Multi RF Deck/ Multi Control Head Structure Is Operating

3   **Select the configuration data of each RF Deck in Program > Multi RF Deck Setup of KPG-D1/ D1N.**

Clicking the "Select File" button of **RF Deck Data A** to **RF Deck Data C** selects the configuration data file of each RF Deck. Also select the configuration data files of RF Decks of unchanged configurations.
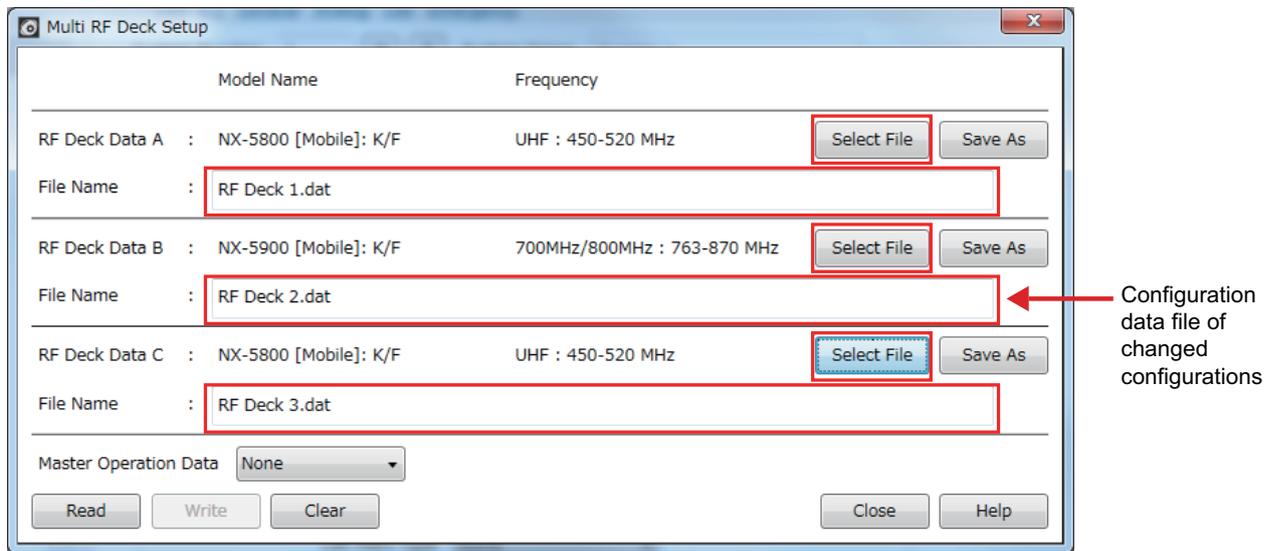
Figure 17-65 Multi RF Deck Setup (RF Deck Data)

4   **Configure Master Operation Data and click the "Write" button.**

From **RF Deck Data A** to **RF Deck Data C** configured in step 3, the configuration data of which RF Deck is to be the **Master Operation Data** is configured.
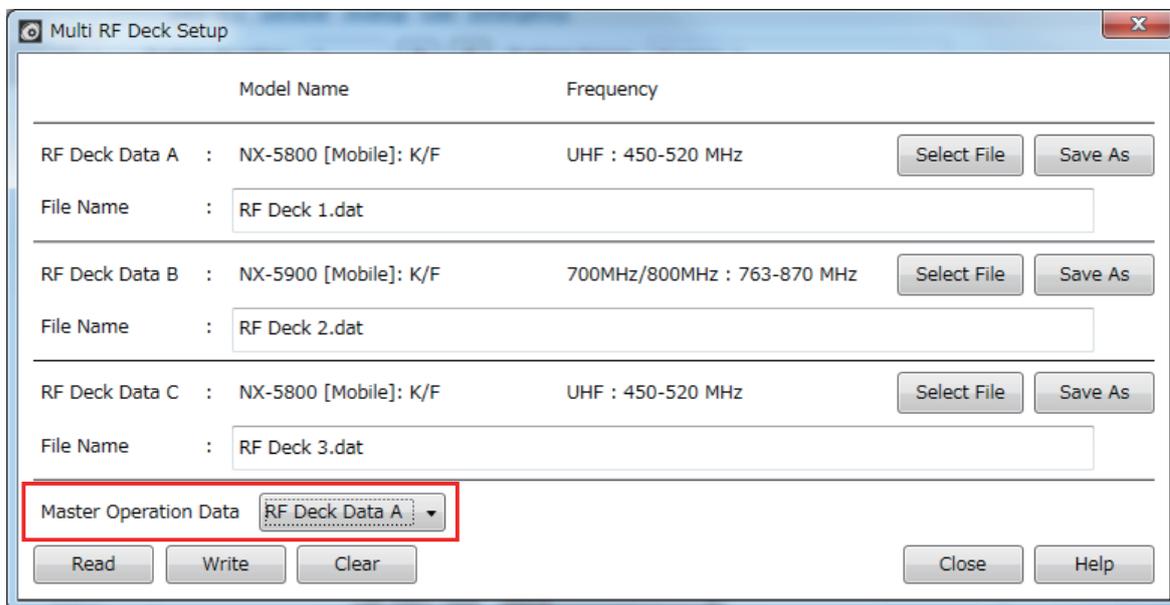
Figure 17-66 Multi RF Deck Setup (Master Operation Data)

Clicking the "Write" button displays **RF Deck Selection**.

17 STRUCTURING A MULTI RF DECK/ MULTI CONTROL HEAD

17.8 Changing Configuration Data of 1 RF Deck While a System in a Multi RF Deck/ Multi Control Head Structure Is Operating

5 **Configure FPU Data Select and click the "OK" button.**

From **RF Deck Data A** to **RF Deck Data C** configured in step 3, the configuration data of which RF Deck is to be written is configured for each RF Deck.
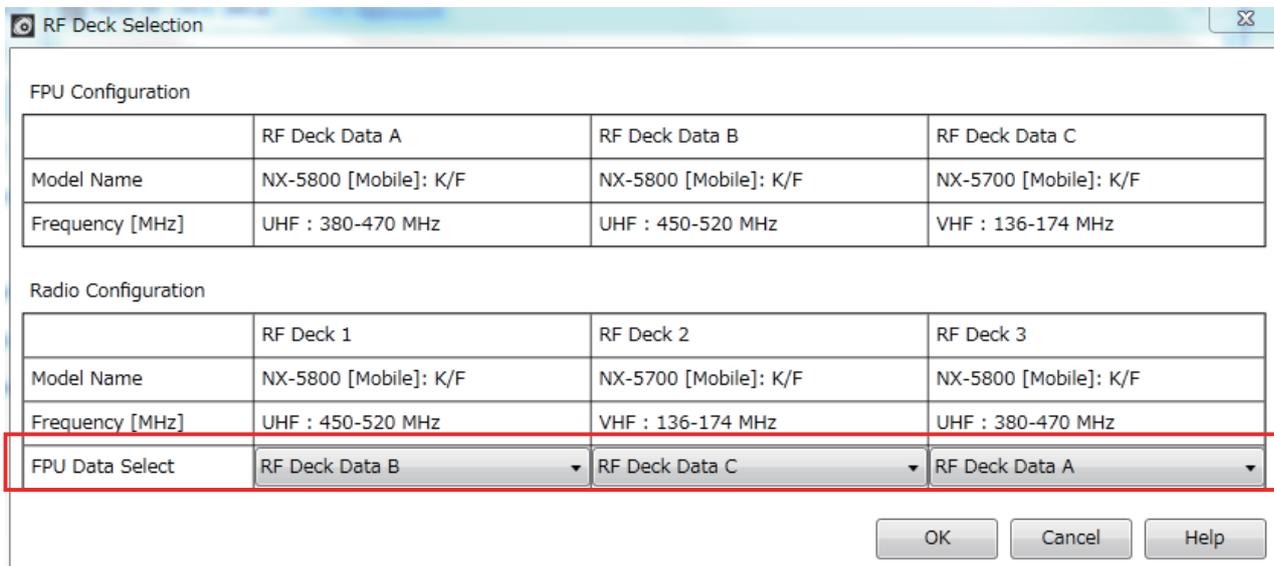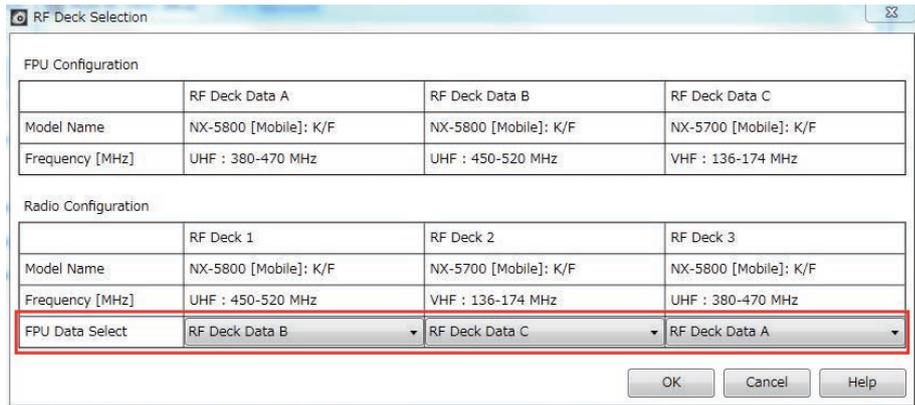

Figure 17-67 RF Deck Selection

Clicking the "OK" button displays **Write Data to the Transceiver**.

6 **Click the "Write" button.**
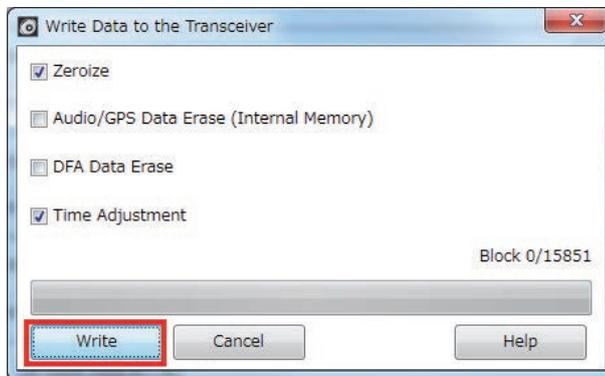
Figure 17-68 Write Data to the Transceiver

The writing of configuration data starts.

When the writing of configuration data completes, the transceiver starts up in user mode.

If continuously changing the configuration data of RF Deck 3

To continuously change the configuration data of RF Deck 3, click the "Close" button of Multi RF Deck Setup to close **Multi RF Deck Setup**.

Then, edit the configuration data of RF Deck 3, and write the configuration data by step 3 to step 6 above.

17.9 Changing the Display Positions of a Channel Name and an Icon When Multi RF Deck View Is On

If **Multi RF Deck View** is enabled when KCH-20R (Featured Panel) or KCH-21R (Handheld Control Head) is used for a Control Head, the channel names of all RF Decks in the Multi RF Deck system can be displayed simultaneously on the display.

By changing the configuration of the DIP switch of an RF Deck, the display positions of a channel name and an icon in **Multi RF Deck View** can be changed.
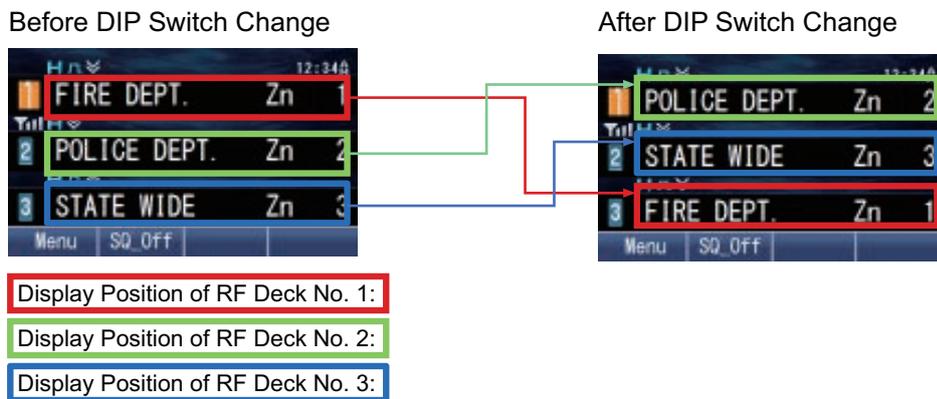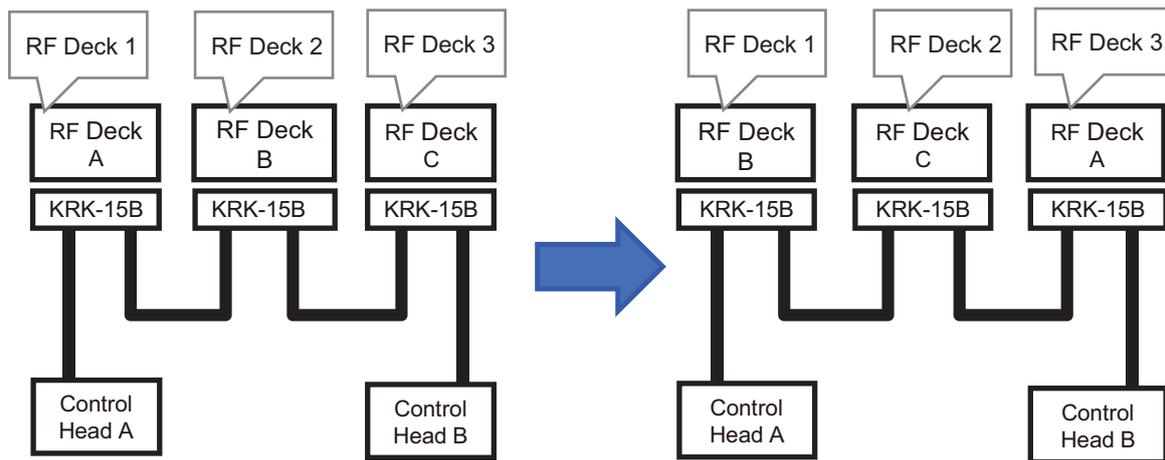
Figure 17-69 Changing the Display Position of a Channel Name in Multi RF Deck View

This section describes the procedure to switch an RF Deck number in a system of a Triple RF Deck/ Dual Control Head structure.

📝 Note

If switching an RF Deck number in a Multi RF Deck system, writing the configuration data is not required.

1 **Press the Power switch of Control Head 1 or Control Head 2 to turn OFF the power.**
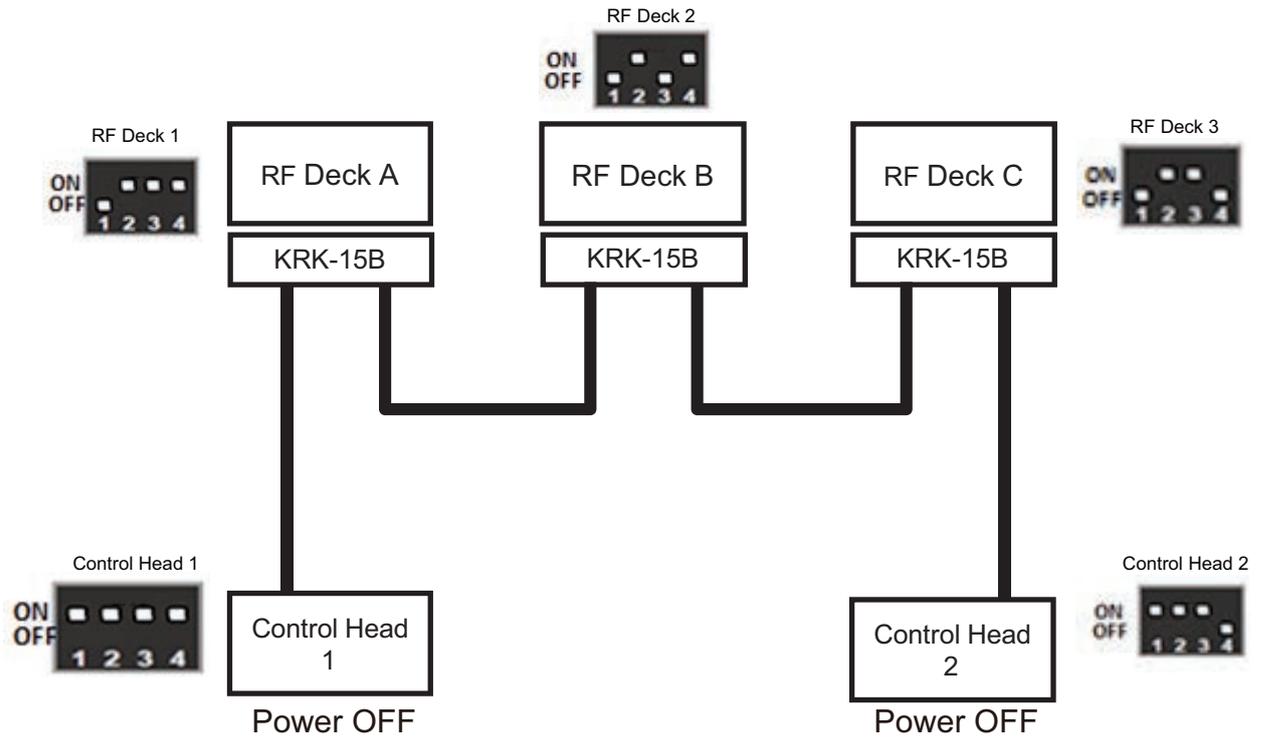
Figure 17-70 Triple RF Deck/ Dual Control Head (Power OFF)

2 **Switch the RF Decks.**
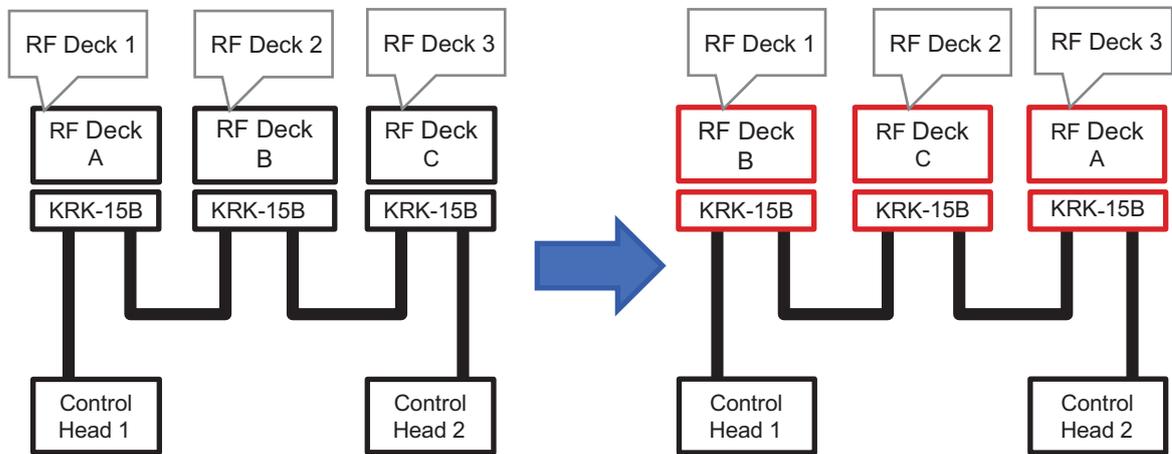
Figure 17-71 Switching of RF Decks

3 **Change the DIP switch configuration.**
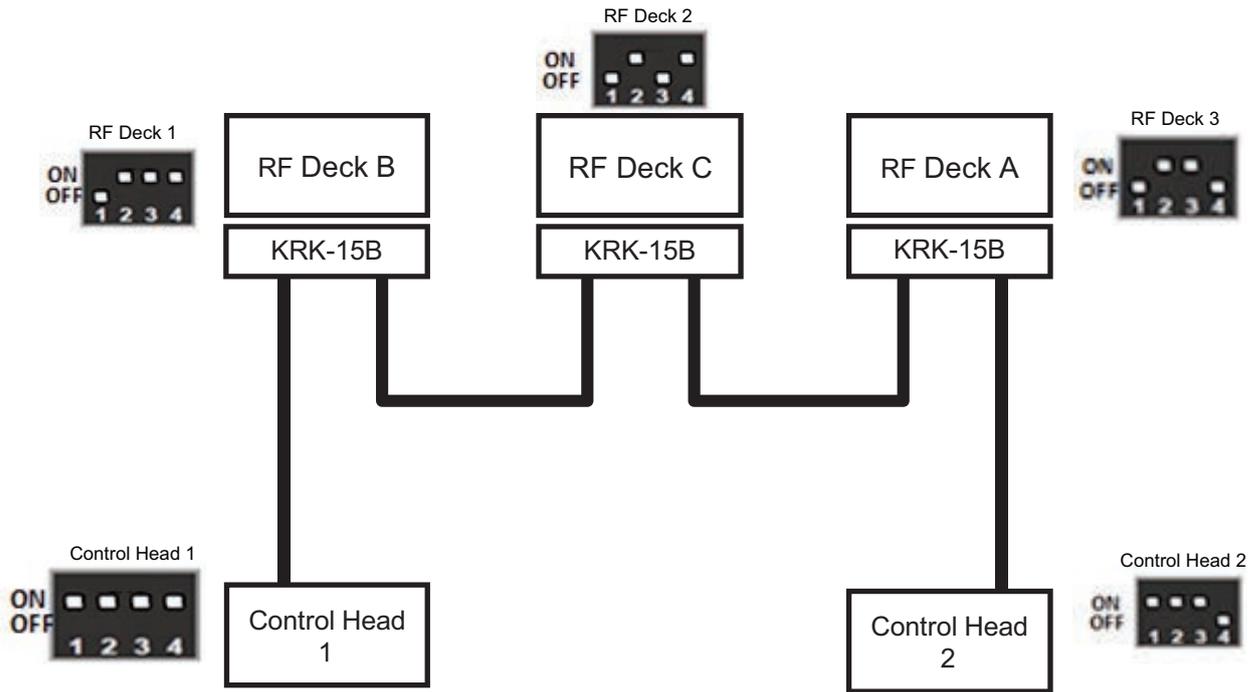
Figure 17-72 DIP Switch Configuration

4 **Press the Power switch of Control Head 1 or Control Head 2 to turn ON the power.**
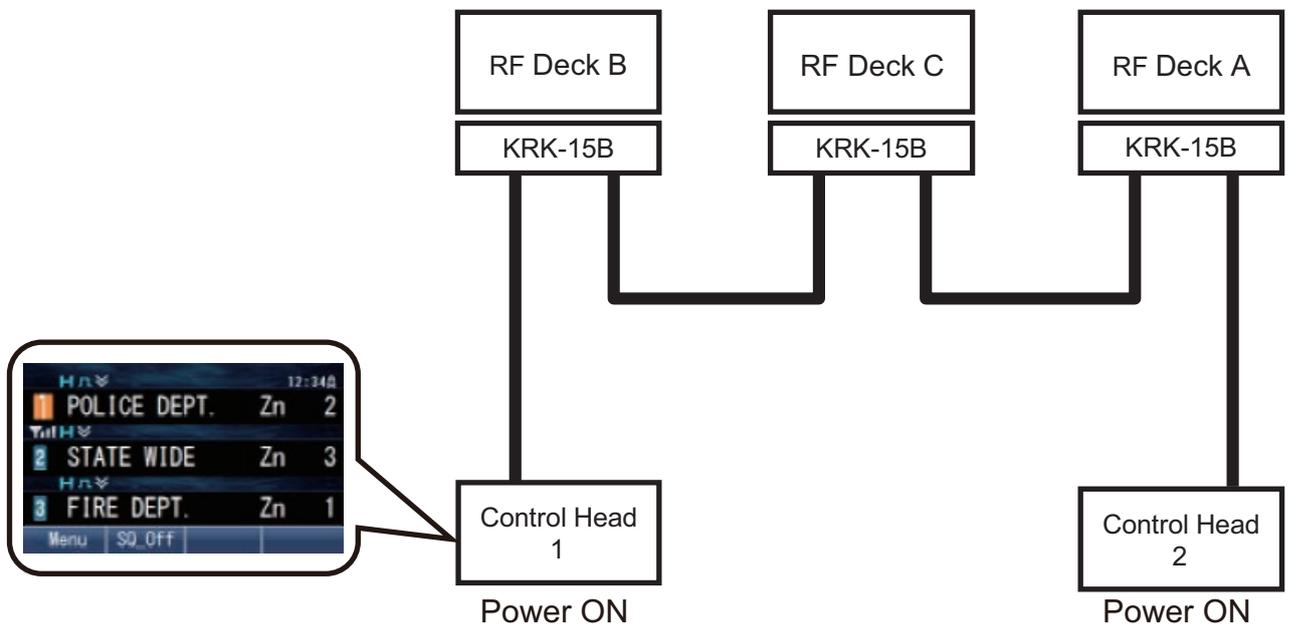
Figure 17-73 Triple RF Deck/ Dual Control Head (Power ON)

17.10 Troubleshooting in Single RF Deck/ Single Control Head

If "FIRMWARE PROG" or "FIRM MISMATCH" appears on the display in a system of a Single RF Deck/ Single Control Head structure, the firmware of the RF Deck and the firmware of the Control Head are different. In this case, write the firmware with the Control Head connected. If firmware is written from the Control Head with the Control Head connected, the same firmware is written to the RF Deck and the Control Head, and the transceiver behaves normally.

17.11 About Configuration Using KPG-D1/ D1N

This section describes the configurations in KPG-D1/ D1N for changing an RF Deck/ Control Head structure, and for switching an RF Deck and a Control Head.

Configuration in KPG-D1/ D1N If Changed from a Single RF Deck Structure to a Multi RF Deck System

1 Configure the configuration related to the RF Deck and Control Head to be switched in Product Information.

- **Multi RF Deck** is enabled in **Feature Selection**.
- Each Control Head to be used is configured in **Control Head 1** and **Control Head 2** of **Control Head Configuration**.
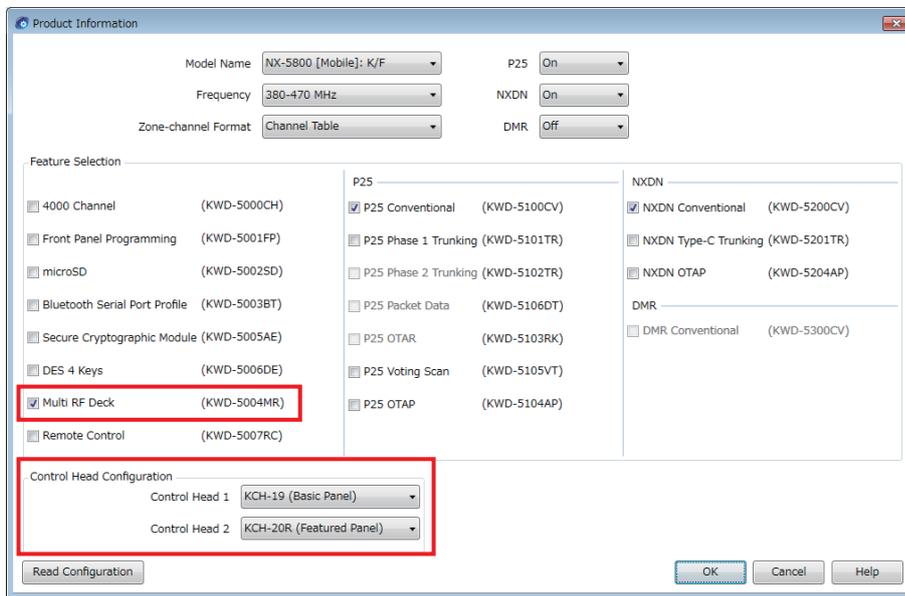
Figure 17-74 Product Information

2 Configure various functions of each RF Deck and Control Head in Transceiver Settings.

3 Select the configuration data of each RF Deck in Program > Multi RF Deck Setup.

Clicking the "Select File" button of **RF Deck Data A** to **RF Deck Data C** selects the configuration data file of each RF Deck.
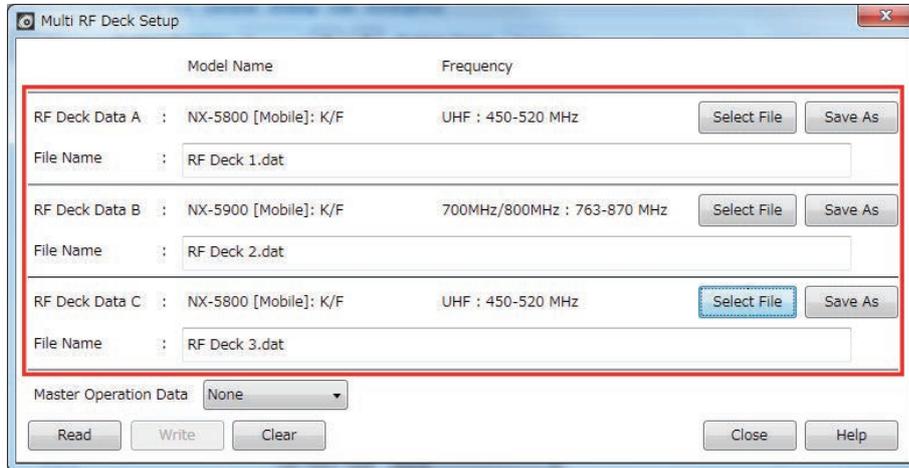
Figure 17-75 Multi RF Deck Setup (RF Deck Data)

4 Configure Master Operation Data and click the "Write" button.

From **RF Deck Data A** to **RF Deck Data C** configured in step 3, the configuration data of which RF Deck is to be the **Master Operation Data** is configured.
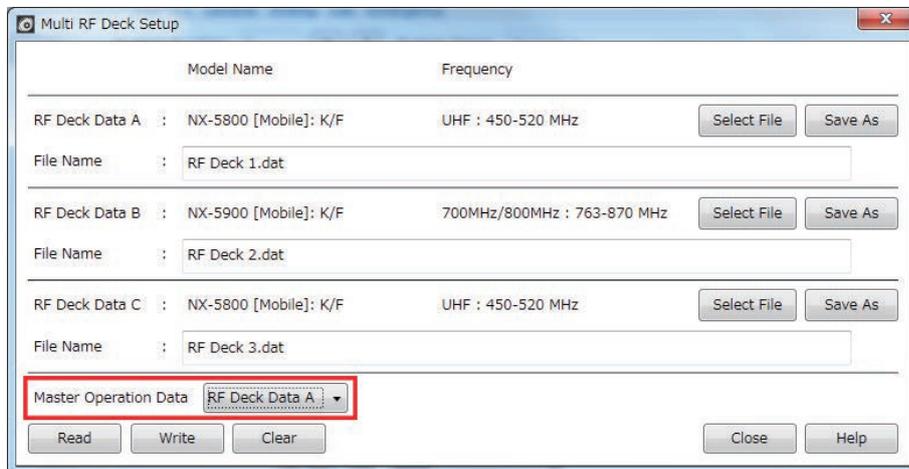
Figure 17-76 Multi RF Deck Setup (Master Operation Data)

Clicking the "Write" button displays **RF Deck Selection**.

5 **Configure FPU Data Select and click the "OK" button.**

From **RF Deck Data A** to **RF Deck Data C** configured in step 3, the configuration data of which RF Deck is to be written is configured for each RF Deck.
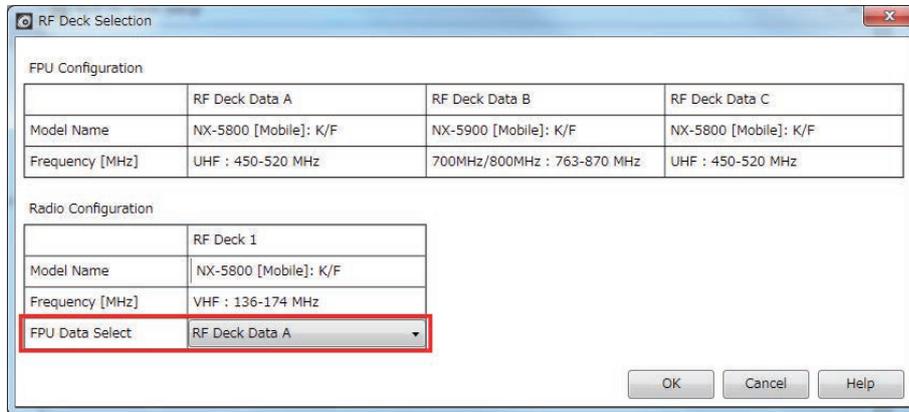
Figure 17-77 RF Deck Selection

Clicking the "OK" button displays **Write Data to the Transceiver**.

6 **Click the "Write" button.**
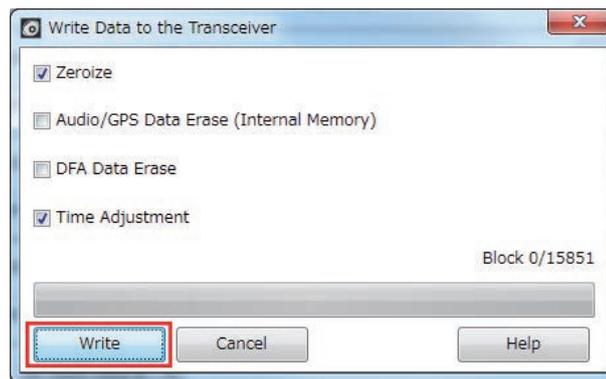
Figure 17-78 Write Data to the Transceiver

The writing of configuration data starts.

When the writing of configuration data completes, a writing complete message box appears. Click the "OK" button.

Configuration in KPG-D1/ D1N if RF Decks Are Switched

1 **Select the configuration data of each RF Deck in Program > Multi RF Deck Setup.**

Clicking the "Select File" button of **RF Deck Data A** to **RF Deck Data C** selects the configuration data file of each RF Deck.
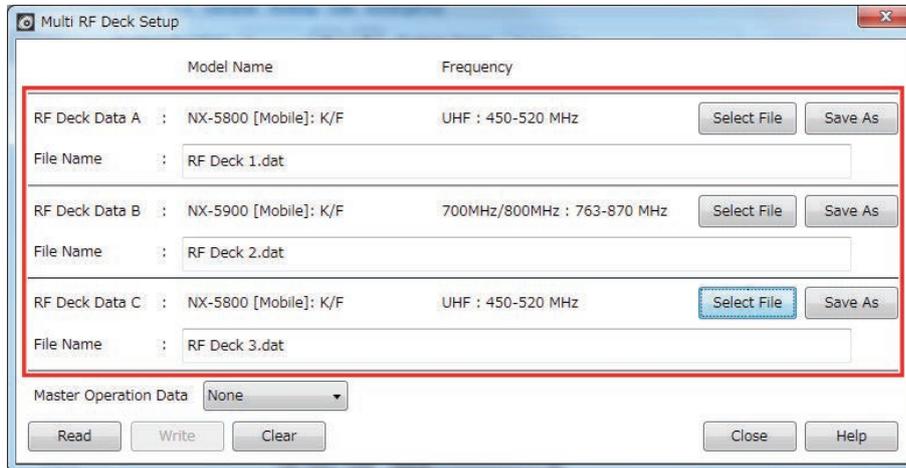
Figure 17-79 Multi RF Deck Setup (RF Deck Data)

2 **Configure Master Operation Data and click the "Write" button.**

From **RF Deck Data A** to **RF Deck Data C** configured in step 1, the configuration data of which RF Deck is to be the **Master Operation Data** is configured.
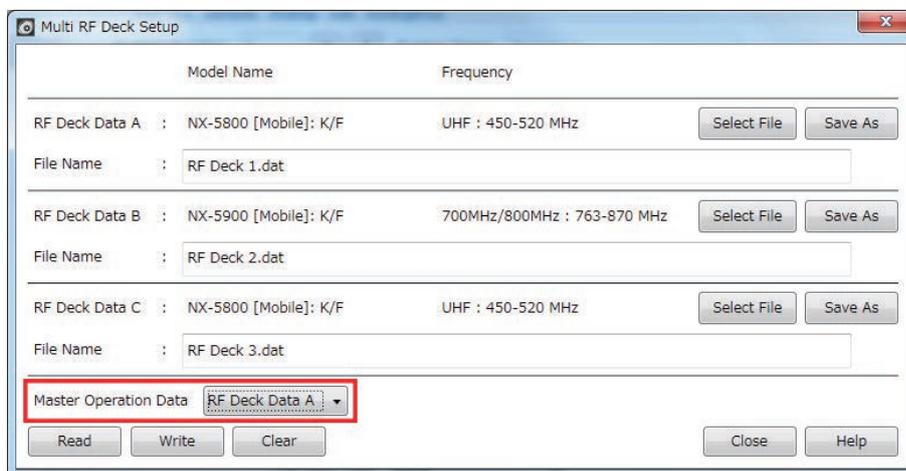
Figure 17-80 Multi RF Deck Setup (Master Operation Data)

Clicking the "Write" button displays an information message box.

3 **Click the "OK" button.**
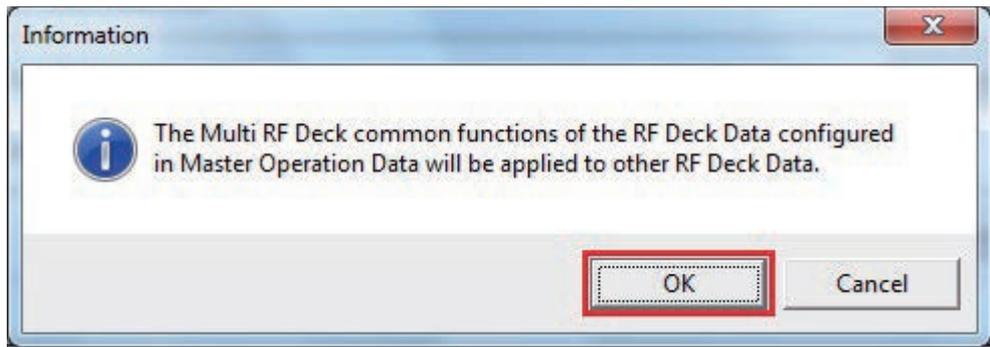
Figure 17-81 Information Message Box

RF Deck Selection appears.

4 **Configure FPU Data Select and click the "OK" button.**

From **RF Deck Data A** to **RF Deck Data C** configured in step 1, the configuration data of which RF Deck is to be written is configured for each RF Deck.

Figure 17-82 RF Deck Selection

Clicking the "OK" button displays **Write Data to the Transceiver**.

5 **Click the "Write" button.**
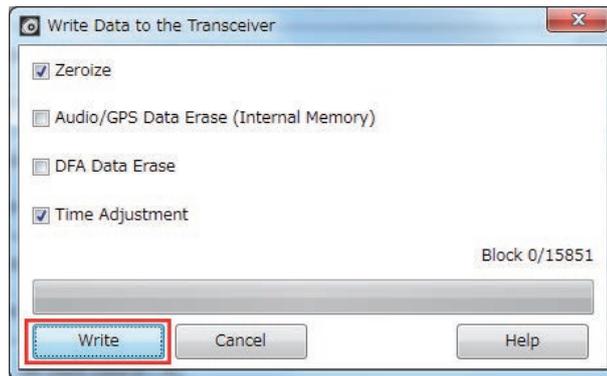
Figure 17-83 Write Data to the Transceiver

The writing of configuration data starts.

When the writing of configuration data completes, a writing complete message box appears.

6 **Click the "OK" button.**
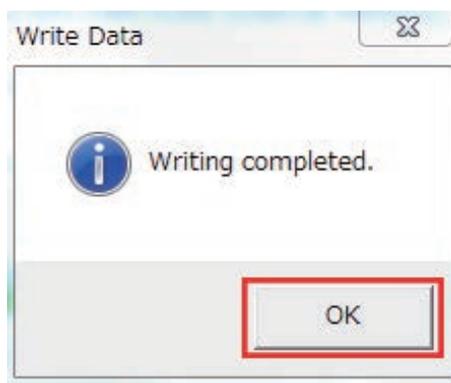
Figure 17-84 Write Data to the Transceiver

A warning message box appears.

This message appears because the common configuration in the configuration data configured in step 2 is expanded to the configuration data of each RF Deck, and the configuration contents of configuration data are changed for each RF Deck. Click the "Yes" button to store the configuration data.
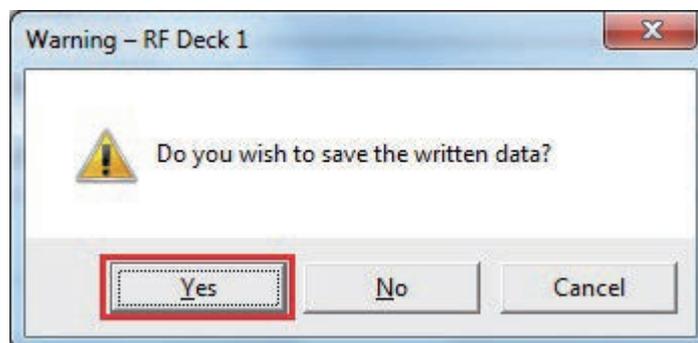
Figure 17-85 Warning Message Box

Configuration in KPG-D1/ D1N If Control Heads Are Switched

1 **Change the configuration of the Control Head in Product Information.**

Each Control Head to be used is configured in **Control Head 1** and **Control Head 2** of **Control Head Configuration**.
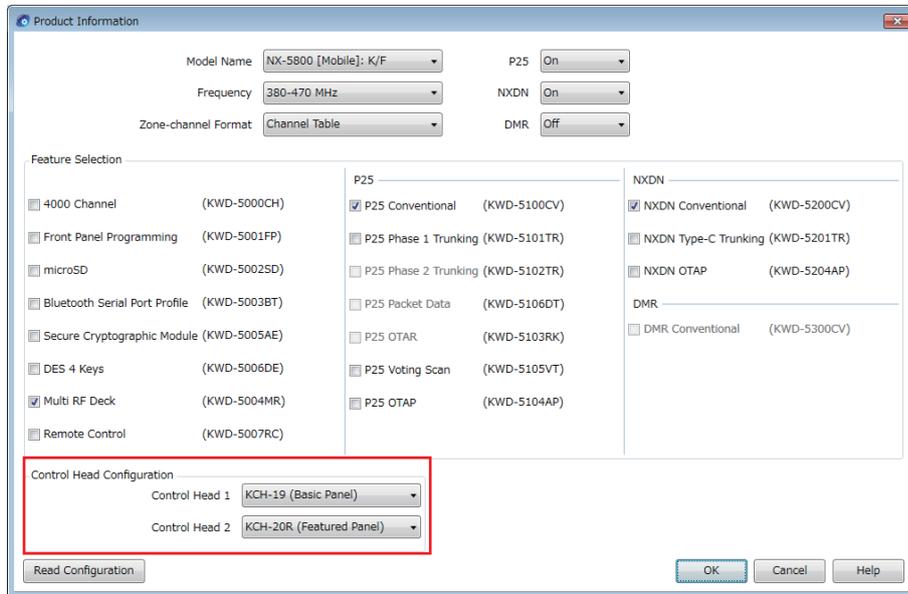
Figure 17-86 Product Information

Refer to step 2 to step 6 of "Configuration in KPG-D1/ D1N if RF Decks Are Switched" for the configuration procedures from here.

Configuration in KPG-D1/ D1N If Changed from a Multi RF Deck System to a Single RF Deck Structure

1 Disable Multi RF Deck in Product Information.

- Multi RF Deck is disabled in Feature Selection.
- Configure "None" in **Control Head 2** if a Single Control Head structure is built.
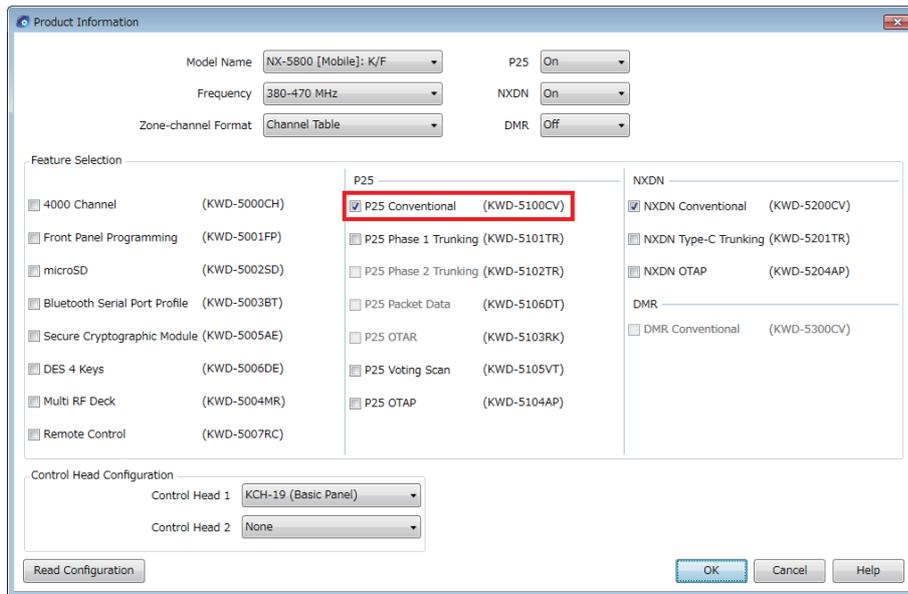
Figure 17-87 Product Information

2 Click the "Write" button in Program > Write.
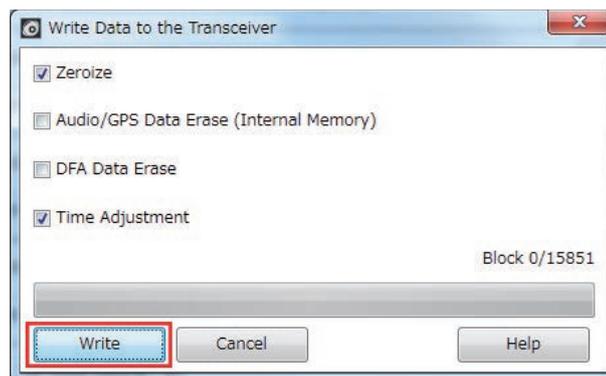
Figure 17-88 Write Data to the Transceiver

The writing of configuration data starts.

When the writing of configuration data completes, a writing complete message box appears. Click the "OK" button.

17.12 About the Message Display

While building a Multi RF Deck/ Multi Control Head system, the messages that appear in the FPU are as follows:

Table 17-1 Message Display

Message	Description
"Do you wish to save the changed data?" (Yes/ No/ Cancel)	This message is displayed if **Multi RF Deck Setup** is opened while editing the configuration data of Multi RF Deck in a screen of KPG-D1/ D1N. Click the "Yes" button to store the configuration data. If the "No" button is clicked, the configuration data is not stored.
"The Multi RF Deck common functions of the RF Deck Data configured in Master Operation Data will be applied to other RF Deck Data." (OK/ Cancel)	Clicking the "Write" button in **Multi RF Deck Setup** displays this message. Clicking the "OK" button expands the common configuration in the configuration data configured in **Master Operation Data** to the data of other RF Decks. Because the configuration data cannot be written in Multi RF Deck unless the common configuration is expanded to all RF Decks, clicking the "OK" button is required.
"If you start "Write Data to the transceiver", P25 Encryption Key data will be cleared." (OK/ Cancel)	If **Zeroize** is enabled in **Write Data to the Transceiver**, clicking the "Write" button displays this message. Clicking the "OK" button starts the writing of the configuration data.
"The system structure of the data to be written differs from the system structure of the Multi RF Deck or Control Head. For this reason, some functions do not work. Do you wish to continue?" (OK/ Cancel)	When attempting to write configuration data to the transceiver not connected to Control Head 1, or when attempting to write the data configured in **Control Head 2** (**Product Information** > **Control Head Configuration**) to the transceiver not connected to Control Head 2, this message appears.
"Do you wish to save the written data?" (Yes/ No/ Cancel)	After writing configuration data in an RF Deck, this message appears. The configuration contents of configuration data are automatically changed for each RF Deck by the common configuration in the configuration data configured in **Master Operation Data** being expanded to the configuration data of each RF Deck. Therefore, this message appears. Click the "Yes" button to store the configuration data. If the "No" button is clicked, the configuration data is not stored.

📋 Note

Refer to the service manual for the content of messages that appear on the transceiver display and how to manage when a message appears.

17.13 About the Pin Arrangement for KCT-72 and the Connection of External Devices

The following is the pin arrangement for KCT-72:

Table 17-2 Pin Arrangement for KCT-72

Pin No.	Color	Name
1	RED	IGN
2	Black	SB
3	LIGHT GREEN	GND
4	LIGHT BLUE	AUX_MIC
5	YELLOW	AUX_ME
6	GRAY	Ai1
7	WHITE	Ai2
8	PURPLE	Ao1
9	PINK	Ao2
10	ORANGE	SP-
11	BROWN	SP+
12	DARK GREEN	GND

Figure 17-89 KCH-20R with KCT-72
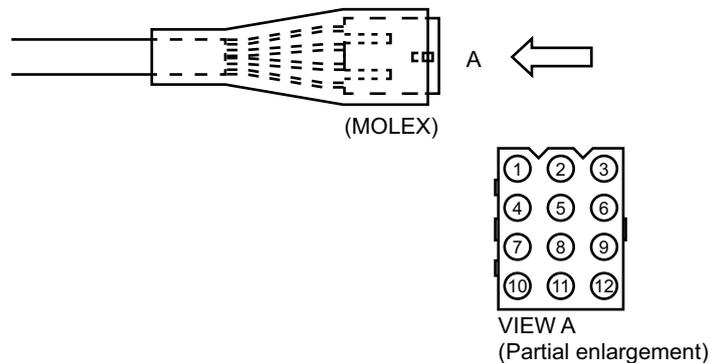
Figure 17-90 KCT-72 (Connection Cable)

Connecting the External Speaker

Connect the external speaker (KES-5) to KCT-72 as follows:
- Connect the black cable of KES-5 to pin 10 of the KCT-72 connector.
- Connect the white cable of KES-5 to pin 11 of the KCT-72 connector.

📋 Note

The external speaker cannot be connected to KCH-19 because KCH-19 does not have a speaker output port.

Connecting the External Microphone

External microphone (KCT-73MIC)

Connect the external microphone (KCT-73MIC) to KCT-72 as follows:
- Connect the white cable of KCT-73MIC to pin 4 of the KCT-72 connector.
- Connect the black cable of KCT-73MIC to pin 5 of the KCT-72 connector.

External microphone (KCT-74PTT)

Connect the external microphone (KCT-74PTT) to KCT-72 as follows:
- Connect the red cable of KCT-74PTT to pin 6 or pin 7 of the KCT-72 connector.
- Connect the black cable of KCT-74PTT to pin 12 of the KCT-72 connector.

VOX is the function to transmit audio just by speaking into a microphone without pressing the **PTT** switch.

This function can be used when a user cannot press the **PTT** switch, for instance, when a user is using both hands for other tasks.

VOX is the function that can be used only when a user wears the headset and when the transceiver is operated in a Conventional system (Analog, NXDN, P25).

To use VOX, a headset needs to be connected to the transceiver.

Portable:

For Portable, KHS-14, KHS-15 (Headset), or a headset which supports Bluetooth (Headset Profile) needs to be connected to the transceiver. The following are the behaviors of each device by the connection status.

Table 18-1 Headset Connection Status and Behavior

Connection Status		Operation
KHS-14/ KHS-15	Bluetooth-compatible Device	
Disconnected	Disconnected	Does not transmit by VOX.
Connected	Disconnected	Transmits by VOX with the audio inputted to KHS-14 or KHS-15.
Disconnected	Connected	Transmits by VOX with the audio inputted to a Bluetooth-compatible device.
Connected	Connected	Transmits by VOX with the audio inputted to a Bluetooth-compatible device.

Mobile:

For Mobile, a headset which supports Bluetooth (Headset Profile) needs to be connected to the transceiver.
If **VOX Function** is enabled using KPG-D1/ D1N, VOX is activated when the transceiver is turned ON.
Pressing and holding the **VOX** key toggles VOX between activated and deactivated.
VOX can also be activated or deactivated by executing "VOX" after entering Menu Mode by pressing the **Menu** key.

📝 Note

- Refer to "BLUETOOTH COMMUNICATION" on how to connect to a Bluetooth-compatible device.
- The VOX transmission is disabled when the transmission is prohibited, such as when the transceiver is in the Stun state.
- If the transmission ends because the Time-out Timer is activated during the continuous transmission by VOX, the transceiver cannot start the next transmission until both audio input and the **PTT** switch are disabled.
- VOX is not activated only with the transceiver itself. Although VOX is activated if the speaker microphone is connected to the transceiver, proper operation of the function cannot be guaranteed. Normally, VOX can be used by a user wearing a headset.

Operating the transceiver

● Enabling VOX

1 **Press and hold the VOX key while VOX is disabled.**

The " 🔊 " icon appears and then VOX is enabled.

● Disabling VOX

1 **Press and hold the VOX key while VOX is enabled.**

The " 🔊 " icon disappears and VOX is disabled.

Configuration using KPG-D1/ D1N

- Configuring **VOX Function** to be enabled or disabled (🔍See Transceiver Settings > Optional Features > Optional Features 2 > Conventional > VOX)

- Assigning functions to the **PF** keys on the transceiver (🔍See Transceiver Settings > Key Assignment)

18.1	**Configuring the Input Sensitivity of the Microphone (VOX Gain Level)**

VOX Gain Level is the input sensitivity of the microphone for activating VOX. This function is used to adjust the VOX to work properly based on the user's voice tone or the surrounding noise when a user transmits by speaking into a microphone.

VOX Gain Level can be configured using KPG-D1/ D1N. **VOX Gain Level** can also be changed by operating the transceiver.

Pressing the **VOX** key places the transceiver in VOX Gain Level Mode.

Or, pressing the **Menu** key to enter Menu Mode and then executing "VOX Gain Level" places the transceiver in VOX Gain Level Mode.

Operating the transceiver

1 **Press the VOX key.**

The transceiver enters VOX Gain Level Mode and the current VOX Gain Level appears. At the same time, VOX is enabled and the "🐦" icon appears.

The following operations are the same even if the transceiver enters VOX Gain Level Mode by pressing the **Menu** key.

2 **Adjust the VOX Gain Level by pressing the [▲]/ [▼] key.**

Adjustment can be done in the range between 1 and 10. Larger values result in higher sensitivity.

3 **Speak into the microphone of the headset to check whether the sensitivity is configured properly.**

The LED lights yellow when the audio input level reaches the reference value for transmission. In this case, the transceiver does not transmit.

4 **Press the Menu ([🗔]) key.**

VOX Gain Level is configured and the mode ends.

📝 Note

The higher sensitivity VOX Gain Level is, the smaller sound the transceiver reacts to, and the transceiver starts transmitting by VOX. Therefore, an appropriate **VOX Gain Level** needs to be configured according to the background noise in a usage environment.

Configuration using KPG-D1/ D1N

- Configuring **VOX Gain Level** (🔍See Transceiver Settings > Optional Features > Optional Features 2 > Conventional > VOX)
- Assigning functions to the **PF** keys on the transceiver (🔍See Transceiver Settings > Key Assignment)

18.2 Retaining Transmitting State after VOX Transmission (VOX Delay Time)

VOX Delay Time is the duration for which the transceiver retains the transmission after VOX transmission. If the transceiver reverts to receive mode too quickly after a user pauses speaking, the last part of the speech may not be transmitted. To avoid this situation, VOX Delay Time needs to be configured so that the whole speech is transmitted and that the transmission retention time is not too long.

Upon the elapse of the time configured in **VOX Delay Time** after no audio is inputted to the microphone, the transceiver terminates VOX transmission.

VOX transmission is terminated.

If audio is inputted to the microphone while **VOX Delay Time** is counting down, **VOX Delay Time** is reset and the audio transmission continues.

Configuration using KPG-D1/ D1N

Configuring **VOX Delay Time** (🔍See Transceiver Settings > Optional Features > Optional Features 2 > Conventional > VOX)

18.3 Restricting the VOX Transmission while the Audio Sounds from the Transceiver (Transmit Inhibit while Receiving)

Transmit Inhibit while Receiving is the function to restrict the VOX transmission while the speaker of the transceiver is unmuted.

This function can be used to prevent VOX from being activated by audio emitted from the speaker.

If **Transmit Inhibit while Receiving** is enabled, the VOX transmission cannot be done while the speaker is unmuted.

If **Transmit Inhibit while Receiving** is disabled, the VOX transmission can be done even while the speaker is unmuted.

Configuration using KPG-D1/ D1N

Configuring **Transmit Inhibit while Receiving** to be enabled or disabled (🔍See Transceiver Settings > Optional Features > Optional Features 2 > Conventional > VOX)

18.4 Disabling the VOX by Using the PTT Switch (Cancel Operation)

Cancel Operation is the function to disable VOX by pressing the **PTT** switch when VOX is enabled.

If **Cancel Operation** is enabled, VOX is disabled by operating the **PTT** switch, the External PTT (Voice) port, or the **PTT** switch of a Bluetooth-compatible device when VOX is enabled.

Even if VOX is disabled by **Cancel Operation**, VOX is enabled by pressing and holding the **VOX** key or by executing "VOX" after entering Menu Mode by pressing the **Menu** key.

If the **VOX** key is not configured and "VOX" is not configured in Menu Mode, VOX can be enabled by turning the transceiver OFF and ON again.

Configuration using KPG-D1/ D1N

Configuring **Cancel Operation** to be enabled or disabled (🔍 See   Transceiver Settings > Optional Features > Optional Features 2 > Conventional > VOX)

18.5 Notifying a User of the Start of the VOX Transmission with a Tone (VOX Proceed Tone)

VOX Proceed Tone is the tone that sounds from the transceiver to notify that the audio transmission becomes available after the transmission is started by using VOX.

If **VOX Proceed Tone** is enabled, a VOX Proceed Tone that notifies that the audio transmission becomes available sounds from the transceiver after the transmission is started by using VOX.

📝 Note

A VOX Proceed Tone does not sound from the transceiver if other tones, such as a Sidetone or a PTT ID Sidetone, are configured to sound.

Configuration using KPG-D1/ D1N

Configuring **VOX Proceed Tone** to be enabled or disabled (🔍 See   Transceiver Settings > Optional Features > Optional Features 2 > Conventional > VOX)

18.6 Selecting a Control Head for Using VOX (Control Head for VOX)

Supported Models: Mobile
Control Head for VOX is the function to select either Control Head 1 or Control Head 2 for enabling VOX in a Dual Control Head structure.
KCH-20R (Featured Panel) needs to be connected to a Control Head for using VOX.

Table 18-2 Control Head for VOX

Configuration	Description
Control Head 1	The VOX function behaves in Control Head 1 with KCH-20R (Featured Panel) connected.
Control Head 2	The VOX function behaves in Control Head 2 with KCH-20R (Featured Panel) connected.

Configuration using KPG-D1/ D1N

Configuring **Control Head for VOX** (🔍 See Transceiver Settings > Optional Features > Optional Features 2 > Conventional > VOX)

19.1 Available Functions for the PF Keys

The following are the functions that can be assigned to the PF keys:

Table 19-1 Available Functions for the PF Keys

Function Name	Description	Available Communication Systems[*1]
None	No function is activated.	-
2-tone	The transceiver enters 2-tone Mode. In 2-tone Mode, the transceiver can send a 2-tone code by selecting a 2-tone code configured in Encode List of 2-tone.	Analog Conventional P25 Conventional NXDN Conventional
Activity Detection (Portable only)	Toggles **Activity Detection** between enabled and disabled. **See** • P25 FUNC Placing the Transceiver in Emergency Mode Using the Activity Detection Function (Portable Only) • NXDN FUNC Using the Activity Detection Function to Place the Transceiver in Emergency Mode • DMR FUNC Placing the Transceiver in Emergency Mode by Using the Activity Detection Function	ALL
Activity Reset (Portable only)	The **Man-down Delay Time, Stationary Delay Time**, or **Motion Delay Time** timer is reset and then restarts counting down from the beginning. **See** • P25 FUNC Placing the Transceiver in Emergency Mode Using the Activity Detection Function (Portable Only) • NXDN FUNC Using the Activity Detection Function to Place the Transceiver in Emergency Mode • DMR FUNC Placing the Transceiver in Emergency Mode by Using the Activity Detection Function	ALL
Auto Telephone	The transceiver searches an LTR Trunking system that can connect to a telephone line and connects.	LTR Trunking
Autodial	The transceiver enters Autodial Mode. In Autodial Mode, the transceiver can transmit by selecting a DTMF Code from the Autodial List or by entering a DTMF Code. **See** P25 FUNC Communicating with a Telephone (Telephone Call)	P25 Trunking Analog Conventional NXDN Conventional LTR Trunking NXDN Trunking
Autodial Programming	The transceiver enters Autodial Programming Mode. In Autodial Programming Mode, the data configured in Autodial List can be added, changed, and deleted.	ALL
AUX (Portable only)	Alternates the status of the AUX Output port. The AUX Output port status is changed to inactive if the status is active; or, the AUX Output port status is changed to active if the status is inactive. Status of the AUX port can be changed by pressing the **AUX** key, hence an external device connected to the AUX port can be controlled.	ALL
AUX A (Mobile only)	Alternates the status of the AUX A Output port. The AUX A Output port status is changed to inactive if the status is active; or, the AUX A Output port status is changed to active if the status is inactive. Status of the AUX A port can be changed by pressing the **AUX A** key, hence an external device connected to the AUX A port can be controlled.	ALL
AUX B (Mobile only)	Alternates the status of the AUX B Output port. The AUX B Output port status is changed to inactive if the status is active; or, the AUX B Output port status is changed to active if the status is inactive. Status of the AUX B port can be changed by pressing the **AUX B** key, hence an external device connected to the AUX B port can be controlled.	ALL

Function Name	Description	Available Communication Systems[*1]
AUX C (Mobile only)	Alternates the status of the AUX C Output port. The AUX C Output port status is changed to inactive if the status is active; or, the AUX C Output port status is changed to active if the status is inactive. Status of the AUX C port can be changed by pressing the **AUX C** key, hence an external device connected to the AUX C port can be controlled.	ALL
AUX Output ID 1 (Mobile only)	**If "Off" is configured in State Hold Timer (Active Low):** Each time the **AUX Output ID 1** key is pressed, the AUX Output ID 1 port is toggled from high level to low level or from low level to high level. **If anything other than "Off" is configured in State Hold Timer (Active Low):** Pressing the **AUX Output ID 1** key switches the AUX Output ID 1 port to low level.	ALL
AUX Output ID 2 (Mobile only)	**If "Off" is configured in State Hold Timer (Active Low):** Each time the **AUX Output ID 2** key is pressed, the AUX Output ID 2 port is toggled from high level to low level or from low level to high level. **If anything other than "Off" is configured in State Hold Timer (Active Low):** Pressing the **AUX Output ID 2** key switches the AUX Output ID 2 port to low level.	ALL
AUX Output ID 3 (Mobile only)	**If "Off" is configured in State Hold Timer (Active Low):** Each time the **AUX Output ID 3** key is pressed, the AUX Output ID 3 port is toggled from high level to low level or from low level to high level. **If anything other than "Off" is configured in State Hold Timer (Active Low):** Pressing the **AUX Output ID 3** key switches the AUX Output ID 3 port to low level.	ALL
Backlight (Portable only)	The backlight of the transceiver lights. **See** Lighting the Backlight (Backlight)	ALL
Battery Status (Portable only)	The transceiver notifies by blinking the LED or emitting a Beep that the remaining battery power is low. **See** Displaying the Remaining Battery Power by Operating the Transceiver (Battery Status)	ALL
Bluetooth	Toggles Bluetooth between On and Off. **See** Toggling Bluetooth On/ Off	ALL
Bluetooth Speaker	Switches the speaker to emit audio between the built-in speaker of the transceiver and the speaker of the Bluetooth-compatible device connected to the transceiver by Headset Profile. **See** Switching the Speaker to Emit Audio (Bluetooth Speaker)	ALL
Bluetooth Connect/ Disconnect	Pairing is started for a Bluetooth-compatible device having an address configured in **Define Bluetooth Device**. The connection to the connected Bluetooth-compatible device is reset. **See** Registering and Connecting a Bluetooth-compatible Device to the Transceiver (Pairing/ HSP Connection)	ALL
Broadcast	Alternates between Broadcast Call and Conference Call. This function can be used only for initiating a Group Call. **See** NXDN FUNC Making an Informative Group Call (Broadcast Group Call)	NXDN Trunking DMR Conventional
Call 1 to Call 6	Sends the signaling (Status List (NXDN), Individual ID List (NXDN)) configured for the transceiver.	NXDN Conventional NXDN Trunking DMR Conventional Analog Conventional

Function Name	Description	Available Communication Systems[1]
Call Interruption	A Call Interruption request message is sent. **See** DMR FUNC Terminating Voice Communications by a Transceiver Other Than the Transmitting Transceiver (Call Interruption)	DMR Conventional
Call Response	Pressing the **Call Response** key when receiving an Individual Call causes the transceiver to respond. **See** • P25 FUNC Making an Individual Call • NXDN FUNC Initiating an Individual Call After Ensuring That the Target Party Is Available for Communications (Individual Call Acknowledge Request) • NXDN FUNC Initiating an Individual Call After Ensuring That the Target Party Is Available for Communications (Message Trunked (Enhanced))	P25 Trunking NXDN Conventional NXDN Trunking
Channel Down	Decreases the channel number in steps of 1.	ALL
Channel Down (Continuous)	Pressing and holding the **Channel Down** key causes the channel number to be decreased in steps of 1 every 200 ms. 📋 Note Channel Down (Continuous) can be configured only in **Hold** for the **Channel Down** key, and the configuration cannot be changed.	ALL
Channel Entry	Directly specify the channel number by pressing a key(s) on the keypad. **See** Changing the Channel by Specifying the Number (Channel Entry)	ALL
Channel Information	Changes the display of the transceiver in order of the channel name, Zone-channel number, frequency, QT/ DQT, and RAN code.	ALL
Channel Recall	Pressing the **Channel Recall** key while scanning causes Channel Recall to be toggled between enabled and disabled. If Channel Recall is enabled, the transceiver migrates to the channel on which a signal was last received. **See** • NXDN FUNC SCAN • P25 FUNC ### Error: NO TOC title. ### • DMR FUNC SCAN	ALL
Channel Up	Increases the channel number in steps of 1.	ALL
Channel Up (Continuous)	Pressing and holding the **Channel Up** key causes the channel number to be increased in steps of 1 every 200 ms. 📋 Note Channel Down (Continuous) can be configured only in **Hold** for the **Channel Up** key, and the configuration cannot be changed.	ALL
Clear	Aborts the current mode, disconnects communication, or cancels data transmission.	P25 Trunking NXDN Conventional NXDN Trunking DMR Conventional
Clock	The current time appears. **See** Displaying the Current Time	ALL
Clock Adjustment	The current time can be adjusted. **See** Adjusting the Time	ALL
CW Message	Sends the CW Message configured for the transceiver. **See** NXDN FUNC Communicating using a CW Message	NXDN Conventional

Function Name	Description	Available Communication Systems[*1]
Digit 10x Down	The code in the 2nd digit from the last digit of the Selcall code of 5-tone decreases by one. **See** 5-tone FUNC Changing the Selcall Code with the Digit Specified	Analog Conventional
Digit 10x Up	The code in the 2nd digit from the last digit of the Selcall code of 5-tone increases by one. **See** 5-tone FUNC Changing the Selcall Code with the Digit Specified	Analog Conventional
Digit 1x Down	The code in the 1st digit from the last digit of the Selcall code of 5-tone decreases by one. **See** 5-tone FUNC Changing the Selcall Code with the Digit Specified	Analog Conventional
Digit 1x Up	The code in the 1st digit from the last digit of the Selcall code of 5-tone increases by one. **See** 5-tone FUNC Changing the Selcall Code with the Digit Specified	Analog Conventional
Direct Channel 1 to Direct Channel 5	Migrates to a channel configured as a Direct Channel. **See** Changing the Channel with a Single Touch	ALL
Direct Channel 1 Select to Direct Channel 5 Select	Determines the displayed channel as a Direct Channel. **See** Changing the Channel with a Single Touch 📋 Note Direct Channel 1 Select to Direct Channel 5 Select can be configured only in **Hold** for the **Direct Channel 1** to **Direct Channel 5** keys, and the configuration cannot be changed.	ALL
Display Format	Toggles between the Channel Name display and the Zone-channel display.	ALL
Eject SD Card	Enters Eject SD Card Mode, and the clearing of microSD card recognition is enabled. **See** Removing the microSD Card	ALL
Emergency	Enters Emergency Mode. **See** • NXDN FUNC COMMUNICATIONS IN AN EMERGENCY • P25 FUNC COMMUNICATIONS IN AN EMERGENCY • DMR FUNC COMMUNICATIONS IN AN EMERGENCY 📋 Note • For Portable, "Emergency" can be assigned to the **AUX** key or the **PF 1** key of the speaker microphone only as the function when the key is held. • For Mobile, "Emergency" can be assigned to the **AUX** key only as the function when the key is held.	ALL
External Speaker	Toggles between the external speaker connected to the transceiver and the internal speaker of the transceiver.	ALL
Fixed Volume	Changes the tone level in the following order: Low → High → Off. **See** SOUND	ALL
Front Panel Programming	Enters Front Panel Programming Mode. In Front Panel Programming mode, data such as the frequency of a Conventional Channel can be changed, or a Conventional Channel can be added. **See** Changing the Configuration of the Transceiver (Front Panel Programming Mode)	Analog Conventional P25 Conventional NXDN Conventional DMR Conventional

Function Name	Description	Available Communication Systems[*1]
Format SD Card	Enters Format SD Card Mode, and the formatting of a microSD card is enabled. **See** Formatting a microSD Card	ALL
Function	Waits for the activation of the Key Function assigned to the 2nd Function and starts counting down the **Mode Reset Timer**. The Function status will be reset if no key is pressed before the amount of time configured in **Mode Reset Timer** elapses.	ALL
GPS	Toggles the built-in GPS receiver between On and Off.	ALL
GPS Position Display	Enters GPS Position Display Mode. **See** GPS POSITION DISPLAY	ALL
Group ID/Channel Entry	If an NXDN Trunking system is selected, the Group ID in the NXDN Trunking system can be specified directly by using the keypad. **See** Changing the Group ID by Specifying the ID (Group ID Entry) (NXDN Trunking System Only) If a system other than an NXDN Trunking system is selected, the channel number can be specified directly by using the keypad. **See** Changing the Channel by Specifying the Number (Channel Entry)	ALL
Group	**Analog Conventional:** The transceiver enters Selcall Mode of FleetSync or of MDC-1200. In Selcall Mode, a call can be initiated by selecting an ID configured in the ID List of FleetSync or of MDC-1200, or by directly entering an ID. **P25 Conventional:** Enters Talkgroup ID Select Mode. In Talkgroup ID Select Mode, the Talkgroup ID configured for a channel can be changed. **See** P25 FUNC Making a Group Call **NXDN Conventional/ DMR Conventional:** Enters Group Call Mode. In Group Call Mode, a Group Call can be initiated by selecting a Group ID registered in the Group ID List. **See** NXDN FUNC Making a Group Call	Analog Conventional P25 Conventional NXDN Conventional DMR Conventional

Function Name	Description	Available Communication Systems[1]
Group + Short Message	**Analog Conventional:** The transceiver enters Selcall Mode of FleetSync or of MDC-1200. Pressing the **[▶]** key while the transceiver is in Selcall Mode of FleetSync places the transceiver in Short Message Mode. Even if the **[▶]** key is pressed while the transceiver is in Selcall Mode of MDC-1200, the transceiver does not respond at all. **P25 Conventional:** Enters Talkgroup ID Select Mode. In Talkgroup ID Select Mode, the Talkgroup ID configured for a channel can be changed. **NXDN Conventional/ DMR Conventional:** Enters Group Call Mode. In Group Call Mode, a call can be initiated by selecting a Group ID registered in the Group ID List. Then, pressing the **[▶]** key while the transceiver is in Group Call Mode allows the transceiver to enter Short Message Mode. In Short Message Mode, a Short Message can be sent by directly entering a Short Message. **NXDN Trunking:** The transceiver enters Short Message Mode. In Short Message Mode, a Short Message can be sent by directly entering a Short Message. **See** NXDN FUNC Sending and Receiving a Short Message (Short Data Call)	Analog Conventional P25 Conventional NXDN Conventional DMR Conventional NXDN Trunking
Group + Status	**Analog Conventional:** The transceiver enters Selcall Mode of FleetSync or of MDC-1200. Pressing the **[▶]** key while the transceiver is in Selcall Mode of FleetSync places the transceiver in Status Mode. Even if the **[▶]** key is pressed while the transceiver is in Selcall Mode of MDC-1200, the transceiver does not respond at all. **P25 Conventional:** Enters Talkgroup ID Select Mode. In Talkgroup ID Select Mode, the Talkgroup ID configured for a channel can be changed. **NXDN Conventional/ DMR Conventional:** Enters Group Call Mode. In Group Call Mode, a call can be initiated by selecting a Group ID registered in the Group ID List. Then, pressing the **[▶]** key while the transceiver is in Group Call Mode allows the transceiver to enter Status Mode. In Status Mode, a Status Message can be sent by selecting a status configured in NXDN Status List or by directly entering a status number. **NXDN Trunking:** The transceiver enters Status Mode. In Status Mode, a Status Message can be sent by selecting a status configured in NXDN Status List or by directly entering a status number. **See** NXDN FUNC Sending and Receiving a Status Message (Status Call)	Analog Conventional P25 Conventional NXDN Conventional DMR Conventional NXDN Trunking

Function Name	Description	Available Communication Systems[*1]
High Transmit Power	**Analog Conventional/ P25 Conventional/ NXDN Conventional/ DMR Conventional:** Selecting a channel configured "Medium" or "Low" for the transmission power and then pressing the **High Transmit Power** key switches the transmission power to "High". **P25 Trunking/ NXDN Trunking:** Selecting a channel in a system configured "Medium" or "Low" for the transmission power and then pressing the **High Transmit Power** key switches the transmission power to "High". **See** Transmit Power	ALL
Home Channel	Migrates to a channel configured as the Home Channel. **See** Changing the Channel with a Single Touch	ALL
Home Channel Select	Determines the displayed channel as the Home Channel. 📋 Note Home Channel Select can be configured only in **Hold** for the **Home Channel** key, and the configuration cannot be changed. **See** Changing the Channel with a Single Touch	ALL
Horn Alert (Mobile only)	Toggles Horn Alert between enabled and disabled. **See** Controlling Vehicle Operation According to the State of the Horn Alert Port (Horn Alert)	ALL
Individual	**Analog Conventional:** The transceiver enters Selcall Mode of FleetSync or of MDC-1200. In Selcall Mode, a call can be initiated by selecting an ID configured in the ID List of FleetSync or of MDC-1200, or by directly entering an ID. **NXDN system/ P25 system/ DMR Conventional:** Enters Individual Call Mode in an NXDN system, P25 system or DMR Conventional. In Individual Call Mode, a call can be initiated by selecting a Unit ID registered in the Individual ID List or by directly entering a Unit ID. **See** • P25 FUNC (Conventional) Making an Individual Call • P25 FUNC (Trunking) Making an Individual Call • NXDN FUNC (Conventional) Making an Individual Call • NXDN FUNC (Conventional) Initiating an Individual Call After Ensuring That the Target Party Is Available for Communications (Individual Call Acknowledge Request) • NXDN FUNC (Trunking) Making an Individual Call (Transmission Trunked) • NXDN FUNC (Trunking) Initiating an Individual Call After Ensuring That the Target Party Is Available for Communications (Message Trunked (Enhanced))	Analog Conventional P25 Conventional P25 Trunking NXDN Conventional DMR Conventional NXDN Trunking

Function Name	Description	Available Communication Systems[*1]
Individual + Short Message	**Analog Conventional:** The transceiver enters Selcall Mode of FleetSync or of MDC-1200. Pressing the [▶] key while the transceiver is in Selcall Mode of FleetSync places the transceiver in Short Message Mode. Even if the [▶] key is pressed while the transceiver is in Selcall Mode of MDC-1200, the transceiver does not respond at all. **P25 Conventional:** Enters Individual Call Mode in a P25 system. In Individual Call Mode, a call can be initiated by selecting a Unit ID registered in the Individual ID List or by directly entering a Unit ID. **NXDN system/ DMR Conventional:** Enters Individual Call Mode in an NXDN system or DMR Conventional. In Individual Call Mode, a call can be initiated by selecting a Unit ID registered in the Individual ID List or by directly entering a Unit ID. Then, pressing the [▶] key while the transceiver is in Individual Call Mode allows the transceiver to enter Short Message Mode. In Short Message Mode, a Short Message can be sent by directly entering a Short Message. **See** NXDN FUNC Sending and Receiving a Short Message (Short Data Call)	Analog Conventional P25 Conventional NXDN Conventional DMR Conventional NXDN Trunking
Individual + Status	**Analog Conventional:** The transceiver enters Selcall Mode of FleetSync or of MDC-1200. Pressing the [▶] key while the transceiver is in Selcall Mode of FleetSync places the transceiver in Status Mode. Even if the [▶] key is pressed while the transceiver is in Selcall Mode of MDC-1200, the transceiver does not respond at all. **P25 Conventional:** Enters Individual Call Mode in a P25 system. In Individual Call Mode, a call can be initiated by selecting a Unit ID registered in the Individual ID List or by directly entering a Unit ID. **NXDN system/ DMR Conventional:** Enters Individual Call Mode in an NXDN system or DMR Conventional. In Individual Call Mode, a call can be initiated by selecting a Unit ID registered in the Individual ID List or by directly entering a Unit ID. Then, pressing the [▶] key while the transceiver is in Individual Call Mode allows the transceiver to enter Status Mode. In Status Mode, a Status Message can be sent by selecting a status configured in NXDN Status List or by directly entering a status number. **See** NXDN FUNC Sending and Receiving a Status Message (Status Call)	Analog Conventional P25 Conventional NXDN Conventional DMR Conventional NXDN Trunking
Intercom (Mobile only)	The communication between Control Head 1 and Control Head 2 can be toggled between enabled and disabled. 📣 Note This function can be used only in a Dual Control Head structure of Mobile.	ALL
Key Delete	Enters Key Delete Mode. In Key Delete Mode, an Encryption Key can be selected and then deleted. **See** • P25 FUNC Deleting the Encryption Key (Key Delete) • NXDN FUNC Deleting the Encryption Key (Key Delete) • DMR FUNC Deleting the Encryption Key (Key Delete)	ALL

Function Name	Description	Available Communication Systems[*1]
Key Lock	Toggles the Key Lock between enabled and disabled. **See** Locking the Transceiver Keys (Key Lock) 📋 Note For Mobile, this function cannot be used in a Multi RF Deck/ Dual Control Head structure.	ALL
Keyset	Enters Keyset Select Mode and then the Active Keyset can be changed. **See** P25 FUNC About the Encryption Key	P25 Conventional P25 Trunking
LCD Brightness	Gradates the brightness of the backlight. **See** Changing the Brightness of the Backlight (LCD Brightness)	ALL
Lone Worker	Toggles the Lone Worker between enabled and disabled. **See** • P25 FUNC Placing the Transceiver in Emergency Mode Using the Lone Worker Function • NXDN FUNC Placing the Transceiver in Emergency Mode Using the Lone Worker Function 📋 Note For Mobile, this function cannot be used in a Multi RF Deck/ Dual Control Head structure.	ALL
Low Transmit Power	**Analog Conventional/ P25 Conventional/ NXDN Conventional/ DMR Conventional:** Selecting a channel configured "High" or "Medium" for the transmission power and then pressing the **Low Transmit Power** key switches the transmission power to "Low". **P25 Trunking/ NXDN Trunking:** Selecting a channel in a system configured "High", "Medium" or "Auto" for the transmission power and then pressing the **Low Transmit Power** key switches the transmission power to "Low". **See** Transmit Power	ALL
Maintenance	Enters Maintenance Display Mode. **See** Displaying the Signal Strength Level (RSSI Level, BER) (Maintenance Display) 📋 Note For Mobile, this function cannot be used in a Multi RF Deck/ Dual Control Head structure.	ALL
Manual Site Hunt	Starts searching for a repeater which can be synchronized by using the Site Roaming function in a DMR Conventional system. **See** DMR FUNC Migrating Automatically to the Site Providing Better Radio Environment (Site Roaming)	DMR Conventional
Menu	Enters Menu Mode. In Menu Mode, various functions can be configured or activated. **See** Using Menu Mode	ALL
Mobile Relay Station (Mobile only)	Places the transceiver in Mobile Relay Station Mode. **See** Relaying the Received Signal (Mobile Relay Station)	Analog Conventional P25 Conventional NXDN Conventional

Function Name	Description	Available Communication Systems[*1]
Monitor	**Analog Conventional:** The transceiver disables the QT tone or DQT code and the Optional Signaling and unmutes the speaker upon detection of a carrier. **P25 Conventional:** The transceiver disables the NAC and unmutes the speaker upon detection of a frame. **NXDN Conventional:** The transceiver resets the matching state of RAN code and Optional Signaling and unmutes the speaker upon detection of an NXDN frame. **See** • P25 FUNC Temporarily Disabling the Signaling (Monitor) • NXDN FUNC Temporarily Disabling the Signaling (Monitor)	Analog Conventional P25 Conventional NXDN Conventional
Multi RF Deck View (Mobile only)	Multi RF Deck View is toggled between On and Off. Note This function can be used only when KCH-20R (Featured Panel) or KCH-21R (Handheld Control Head) is connected to either Control Head 1 or Control Head 2.	ALL
Monitor Momentary	**Analog Conventional:** The transceiver disables the QT tone or DQT code and the Optional Signaling and unmutes the speaker upon detection of a carrier while the **Monitor Momentary** key is pressed and held. **P25 Conventional:** The transceiver disables NAC and unmutes the speaker upon detection of a frame while the **Monitor Momentary** key is pressed and held. **NXDN Conventional:** The transceiver resets the matching state of RAN code and Optional Signaling and unmutes the speaker upon detection of an NXDN frame while the **Monitor Momentary** key is pressed and held. **See** • P25 FUNC Temporarily Disabling the Signaling (Monitor) • NXDN FUNC Temporarily Disabling the Signaling (Monitor)	Analog Conventional P25 Conventional NXDN Conventional
Operator Selectable Tone	Toggles the OST between enabled and disabled. **See** Analog FUNC Changing the Decode/ Encode Combination of the QT/ DQT (OST)	Analog Conventional
OST List	Enters OST List Mode. In OST List Mode, an OST List can be selected. Note OST List can be configured only in **Hold** for the **Operator Selectable Tone** key, and the configuration cannot be changed. **See** Analog FUNC Changing the Decode/ Encode Combination of the QT/ DQT (OST)	Analog Conventional
OST Down	Decreases the OST list number in steps of 1.	Analog Conventional
OST Down (Continuous)	Pressing and holding the **OST Down** key decreases the OST list number in steps of 1 every 100 ms.	Analog Conventional
OST Up	Increases the OST list number in steps of 1.	Analog Conventional
OST Up (Continuous)	Pressing and holding the **OST Up** key increases the OST list number in steps of 1 every 100 ms.	Analog Conventional

Function Name	Description	Available Communication Systems[*1]
OVCM	Toggles the OVCM between enabled and disabled. **See** DMR FUNC Causing Transceivers Other than the Transceiver of the Specified ID to Participate in a Conversation (Open Voice Channel Mode)	DMR Conventional
Playback	Enters Playback Mode. In Playback Mode, the transceiver can play back audio recorded using Auto Recording. **See** Playing Back the Recorded Audio (Playback)	ALL
Priority-channel Select	Enters Priority-channel Select Mode. In Priority-channel Select Mode, the channel selected on the transceiver can be changed as a Priority-channel. **See** • P25 FUNC Scanning the Specific Channel Preferentially (Priority Scan) • NXDN FUNC Scanning the Specific Channel Preferentially (Priority Scan) • DMR FUNC Scanning the Specific Channel Preferentially (Priority Scan)	Analog Conventional P25 Conventional NXDN Conventional DMR Conventional
Public Address (Mobile only)	Toggles the Public Address between enabled and disabled. **See** Using the Transceiver as a Megaphone (Public Address)	ALL
Receive Entry	Places the transceiver in Receive Entry Mode. In Receive Entry Mode, the Receive code can be changed by directly entering a Receive code. **See** 5-tone FUNC Changing the Receive Code	Analog Conventional
Regroup Request	Sends a Dynamic Regrouping command to the system. **See** P25 FUNC Functions of Dynamic Regrouping	P25 Trunking
Remote Control	Places the transceiver in Remote Control Mode. **See** NXDN FUNC Remote Operation by Radio Communication (Remote Control) DMR FUNC Remote Operation by Radio Communication (Remote Control)	NXDN Conventional NXDN Trunking DMR Conventional
RF Deck 1 (Mobile only)	Switches the RF Deck (mobile transceiver) to be operated to RF Deck 1. 📄 Note This function can be used only in a Multi RF Deck system of Mobile.	ALL
RF Deck 2 (Mobile only)	Switches the RF Deck (mobile transceiver) to be operated to RF Deck 2. 📄 Note This function can be used only in a Multi RF Deck system of Mobile.	ALL
RF Deck 3 (Mobile only)	Switches the RF Deck (mobile transceiver) to be operated to RF Deck 3. 📄 Note This function can be used only in a Multi RF Deck system of Mobile.	ALL
RF Deck Down (Mobile only)	The selected RF Deck switches in the order of Deck 1 → Deck 2 → Deck 3.	ALL

Function Name	Description	Available Communication Systems[*1]
RF Deck Select (Mobile only)	Switches the RF Deck (mobile transceiver) to be operated. 📧 Note This function can be used only in a Multi RF Deck system of Mobile.	ALL
RF Deck Up (Mobile only)	The selected RF Deck switches in the order of Deck 3 → Deck 2 → Deck 1.	ALL
Master Volume Control (Mobile only)	Switches the Control Head for controlling the volume of an external speaker between Control Head 1 and Control Head 2. 📧 Note This function can be used only in a Multi RF Deck system of Mobile.	ALL
Rekey Request	Sends a Hello Command (Rekey Request) to the system. **See** P25 FUNC Requesting the Update of an Encryption Key (Rekey Request)	P25 Conventional P25 Trunking
Scan	Starts or stops scanning. **See** • NXDN FUNC SCAN • P25 FUNC ### Error: NO TOC title. ### • DMR FUNC SCAN	ALL
Scan Delete/ Add	The selected channel is added to or excluded from the target channels for scan. **See** • P25 FUNC Adding or Deleting a Channel to/from the Target Channels for Scan (Scan Delete/Add) • NXDN FUNC Adding or Deleting a Channel to/from the Target Channels for Scan (Scan Delete/Add) • DMR FUNC Adding or Deleting a Channel to/from the Target Channels for Scan (Scan Delete/Add)	ALL
Scan Normal	Starts a Non-Priority Scan. **See** • NXDN FUNC SCAN • P25 FUNC ### Error: NO TOC title. ### • DMR FUNC SCAN	ALL
Scan Program	Enters Scan Program Mode. The Scan List can be edited in Scan Program Mode. **See** • P25 FUNC Changing the Scan List (Scan Program) • NXDN FUNC Changing the Scan List (Scan Program) • DMR FUNC Changing the Scan List (Scan Program)	ALL
Scrambler/ Encryption	Toggles the Voice Scrambler/ Encryption between enabled and disabled. **See** • P25 FUNC COMMUNICATION SECURITY • NXDN FUNC COMMUNICATION SECURITY • DMR FUNC COMMUNICATION SECURITY	**Voice Scrambler:** Analog Conventional **Encryption:** P25 Conventional P25 Trunking NXDN Conventional NXDN Trunking DMR Conventional

Function Name	Description	Available Communication Systems[*1]

Scrambler/ Encryption Code	Pressing and holding the **Scrambler/ Encryption** key causes the transceiver to enter Scrambler/ Encryption Code Mode. In Scrambler/Encryption Code Mode, the Scrambler Code or Encryption Key data can be changed.
	
	📋 Note
	  Scrambler/Encryption Code can be configured only in **Hold** for the **Scrambler/Encryption** key, and the configuration cannot be changed.
	See
	• P25 FUNC COMMUNICATION SECURITY
	• NXDN FUNC COMMUNICATION SECURITY
		Voice Scrambler:
		  Analog Conventional
		Encryption:
		  P25 Conventional
		  NXDN Conventional
		  NXDN Trunking

Send the GPS Data	The GPS data received from the GPS receiver unit is manually sent to the base station.	P25 Conventional P25 Trunking NXDN Conventional NXDN Trunking DMR Conventional Analog Conventional
Short Message	The transceiver enters Short Message Mode. In Short Message Mode, a Short Message can be sent by directly entering a Short Message. **See** NXDN FUNC Sending and Receiving a Short Message (Short Data Call)	NXDN Conventional DMR Conventional NXDN Trunking Analog Conventional
Site Down	Decreases the site number in steps of 1. **See** NXDN FUNC Locking the Site to Be Used (Site Lock/ Site Select)	NXDN Trunking
Site Down (Continuous)	Pressing and holding the **Site Down** key causes the site number to be decreased in steps of 1 every 100 ms. 📋 Note Site Down (Continuous) can be configured only in **Hold** for the **Site Down** key, and the configuration cannot be changed.	NXDN Trunking
Site Lock	Toggles the Site Lock between enabled and disabled. **See** NXDN FUNC Locking the Site to Be Used (Site Lock/ Site Select)	NXDN Trunking
Site Select	Pressing and holding the **Site Lock** key causes the transceiver to enter Site Select Mode, and then the site to be stored can be selected. 📋 Note Site Select can be configured only in **Hold** for the **Site Lock** key, and the configuration cannot be changed. **See** NXDN FUNC Locking the Site to Be Used (Site Lock/ Site Select)	NXDN Trunking
Site Up	Increases the site number in steps of 1. **See** NXDN FUNC Locking the Site to Be Used (Site Lock/ Site Select)	NXDN Trunking
Site Up (Continuous)	Pressing and holding the **Site Up** key causes the site number to be increased in steps of 1 every 100 ms. 📋 Note Site Up (Continuous) can be configured only in Hold for the **Site Up** key, and the configuration cannot be changed.	NXDN Trunking

Function Name	Description	Available Communication Systems[1]
Speaker Attenuation	Temporarily attenuates the volume level of the speaker. **See** Temporarily Reducing the Volume Level of the Speaker (Speaker Attenuation)	ALL
Speaker 1-2 Mute (Mobile only)	Pressing the **Speaker 1-2 Mute** key of Control Head 1 mutes the speaker of Control Head 2. Pressing the **Speaker 1-2 Mute** key of Control Head 2 mutes the speaker of Control Head 1. 📋 Note This function can be used only in a Dual Control Head structure of Mobile.	ALL
Squelch Level	Enters Squelch Level Mode. In Squelch Level Mode, the Squelch level can be changed. **See** Analog FUNC Adjusting the Squelch Level (Squelch Level)	Analog Conventional
Squelch Off	**Analog Conventional:** The transceiver opens squelch and unmutes the speaker. **P25 Conventional:** The transceiver disables the NAC and unmutes the speaker upon detection of a frame. **NXDN Conventional:** The transceiver resets the matching state of RAN code and Optional Signaling and unmutes the speaker upon detection of an NXDN frame. **See** • P25 FUNC Temporarily Disabling the Squelch (Squelch Off) • NXDN FUNC Temporarily Disabling the Squelch (Squelch Off)	Analog Conventional P25 Conventional NXDN Conventional
Squelch Off Momentary	**Analog Conventional:** The transceiver opens squelch and unmutes while the Squelch Off Momentary key is pressed and held. **P25 Conventional:** The transceiver disables NAC and unmutes the speaker upon detection of a carrier while the **Squelch Off Momentary** key is pressed and held. **NXDN Conventional:** The transceiver disables the RAN code and Optional Signaling and unmutes the speaker upon detection of a carrier while the **Squelch Off Momentary** key is pressed and held. **See** • P25 FUNC Temporarily Disabling the Squelch (Squelch Off) • NXDN FUNC Temporarily Disabling the Squelch (Squelch Off)	Analog Conventional P25 Conventional NXDN Conventional
Stack	Enters Stack Mode. In Stack Mode, the data stored in the stack memory of the transceiver, such as call records, Status Messages and Short Messages, can be referred or cleared. **See** Viewing the Receive History (Stack)	ALL
Status	The transceiver enters Status Mode. In Status Mode, a status configured in the Status List of FleetSync, P25 Trunking, NXDN, or DMR can be selected. Also, in a FleetSync or NXDN system, a Status Message can be sent by directly entering a status number. **See** • P25 FUNC Notifying the System of the Transceiver Status (Status) • NXDN FUNC Sending and Receiving a Status Message (Status Call)	Analog Conventional P25 Trunking NXDN Conventional DMR Conventional NXDN Trunking

Function Name	Description	Available Communication Systems[*1]
Surveillance	Toggles the Surveillance between enabled and disabled. While the Surveillance function is enabled, the transceiver does not emit a tone or light the backlight even when the transceiver functions. 💬 Note For Mobile, this function cannot be used in a Multi RF Deck/ Dual Control Head structure.	ALL
System Down	Decreases the system name in steps of 1. System Lock is enabled in the selected system.	NXDN Trunking
System Down (Continuous)	Pressing and holding the **System Down** key causes the system name to be decreased in steps of 1 every 100 ms. System Lock is enabled in the selected system.	NXDN Trunking
System Lock	Toggles the System Lock between enabled and disabled.	NXDN Trunking
System Search	**P25 Trunking:** The RFSS ID and Site ID of the site currently being used appears for 2 sec. **NXDN Trunking:** The Site No. appears. **See** • P25 FUNC Manually Searching for a New Site (System Search) • NXDN FUNC Starting the Control Channel Hunt Manually (Forced Search)	P25 Trunking NXDN Trunking
System Search Function	**P25 Trunking:** Pressing and holding the **System Search** key starts a system search. **NXDN Trunking:** Pressing and holding the **System Search** key starts a control channel hunt. 💬 Note System Search Function can be configured only in **Hold** for the **System Search** key, and the configuration cannot be changed. **See** • P25 FUNC Manually Searching for a New Site (System Search) • NXDN FUNC Starting the Control Channel Hunt Manually (Forced Search)	P25 Trunking NXDN Trunking
System Select	Enters System Select Mode.	NXDN Trunking
System Up	Increases the system name in steps of 1. System Lock is enabled in the selected system.	NXDN Trunking
System Up (Continuous)	Pressing and holding the **System Up** key causes the system name to be increased in steps of 1 every 100 ms. System Lock is enabled in the selected system.	NXDN Trunking
Tactical Zone	When the transceiver is not in Tactical Zone Mode, pressing the **Tactical Zone** key registers the selected channel in Tactical Zone.	Analog Conventional P25 Conventional
Tactical Zone (All Channels)	When the transceiver is not in Tactical Zone Mode, pressing the **Tactical Zone (All Channels)** key registers all at once all the corresponding channels of the selected zone in Tactical Zone.	Analog Conventional P25 Conventional
Talk Around	Toggles the Talk Around between enabled and disabled. **See** • P25 FUNC Communicating Without Using a Repeater (Talk Around) • NXDN FUNC Communicating Without Using a Repeater (Talk Around) • DMR FUNC Communicating Without Using a Repeater (Talk Around/ DMR Direct Mode)	Analog Conventional P25 Conventional NXDN Conventional LTR Trunking DMR Conventional

Function Name	Description	Available Communication Systems[1]
Talkgroup Reset	The Talkgroup ID changed in Talkgroup ID Select Mode is restored to the value configured using KPG-D1/ D1N. **See** P25 FUNC Making a Group Call	P25 Conventional
Telephone Disconnect	The transceiver sends a disconnect signal (# of DTMF Code) when the transceiver is connecting to a telephone line of an LTR Trunking system.	LTR Trunking
Transceiver Password	Enters Transceiver Password Mode. In Transceiver Password Mode, the transceiver cannot be used until the correct password is entered. **See** Password for Transceiver Operation (Transceiver Password)	ALL
Transfer (Mobile only)	Toggles the Transfer between enabled and disabled. **See** 5-tone FUNC Transferring the Received 5-tone Code (Transfer)	Analog Conventional
Unselected RF Deck Speaker (Mobile only)	The configuration of **Unselected RF Deck Speaker** switches to "Unmute" or "Mute". **See** Switching the Output Status of the External Speaker (Unselected RF Deck Speaker) 🗨 Note This function can be used only in a Multi RF Deck system of Mobile.	ALL
Vibrator (Portable only)	Toggles the Vibrator between enabled and disabled. **See** Using the Vibrator	ALL
Voice Memo	The transceiver enters Voice Memo Mode and starts recording to a microSD card. **See** Recording Audio to a microSD Card (Voice Memo)	ALL
Volume Down (Mobile only)	Decreases the volume level in steps of 1.	ALL
Volume Down (Continuous) (Mobile only)	Pressing and holding the **Volume Down (Continuous)** key will decrease the volume level in steps of 1 every 100 ms. 🗨 Note Volume Down (Continuous) can be configured only in Hold for the **Volume Down** key, and the configuration cannot be changed.	ALL
Volume Up (Mobile only)	Increases the volume level in steps of 1.	ALL
Volume Up (Continuous) (Mobile only)	Pressing and holding the **Volume Up (Continuous)** key will increase the volume level in steps of 1 every 100 ms. 🗨 Note Volume Up (Continuous) can be configured only in Hold for the **Volume Up** key, and the configuration cannot be changed.	ALL
VOX	Enters VOX Gain Level Mode. In VOX Gain Level Mode, the microphone sensitivity of VOX can be adjusted. **See** VOX	Analog Conventional NXDN Conventional P25 Conventional DMR Conventional

Function Name	Description	Available Communication Systems[1]
VOX Function	Pressing and holding the **VOX** key toggles VOX between enabled and disabled. 📋 Note VOX Function can be configured only in Hold for the VOX key, and the configuration cannot be changed. **See** VOX	Analog Conventional NXDN Conventional P25 Conventional DMR Conventional
Zeroize	Deletes all Encryption Key data stored in the SCM. **See** • P25 FUNC Deleting all Encryption Keys (Zeroize) • NXDN FUNC Deleting All Encryption Keys (Zeroize)	P25 Conventional P25 Trunking NXDN Conventional NXDN Trunking
Zone Delete/Add	The selected zone is added to or excluded from the target for scan.	ALL
Zone Down	Decreases the zone number in steps of 1.	ALL
Zone Down (Continuous)	Pressing and holding the **Zone Down** key will decrease the zone number in steps of 1 every 200 ms. 📋 Note Zone Down (Continuous) can be configured only in Hold for the Zone Down key, and the configuration cannot be changed.	ALL
Zone Up	Increases the zone number in steps of 1.	ALL
Zone Up (Continuous)	Pressing and holding the **Zone Up** key will increase the zone number in steps of 1 every 200 ms. 📋 Note Zone Up (Continuous) can be configured only in Hold for the Zone Up key, and the configuration cannot be changed.	ALL

[1] ALL indicates that a function can be used in all the following communication systems:

- Analog Conventional
- P25 Conventional
- P25 Trunking
- NXDN Conventional
- NXDN Trunking
- DMR Conventional
- LTR Trunking

📋 Note

- The transceiver migrates to the function's own mode by pressing a key to which the following functions are assigned. This mode is referred to as "Function Mode".

Table 19-2 Function Mode

Key Function	Function Mode
2-tone	2-tone Mode
Autodial	Autodial Mode
Autodial Programming	Autodial Programming Mode
Channel Entry	Channel Entry Mode
Clock Adjustment	Clock Adjustment Mode
Eject SD Card	Eject SD Card Mode
Format SD Card	Format SD Card Mode
GPS Position Display	GPS Position Display Mode

Key Function	Function Mode
Group Group + Short Message Group + Status	Group Call Mode Selcall Mode (FleetSync or MDC-1200)
Group ID/Channel Entry	Group ID Entry Mode
Individual Individual + Short Message Individual + Status	Individual Call Mode Selcall Mode (FleetSync or MDC-1200)
Key Delete	Key Delete Mode
Keyset	Keyset Select Mode
Maintenance	Maintenance Display Mode
Menu	Menu Mode
Mobile Relay Station	Mobile Relay Station Mode
OST List	OST List Mode
Playback	Playback Mode
Priority-channel Select	Priority-channel Select Mode
Receive Entry	Receive Entry Mode
Remote Control	Remote Control Mode
Scan Program	Scan Program Mode
Scrambler/Encryption Code	Scrambler/Encryption Code Mode
Short Message Group + Short Message Individual + Short Message	Short Message Mode
Site Select	Site Select Mode
Squelch Level	Squelch Level Mode
Stack	Stack Mode
Status Group + Status Individual + Status	Status Mode
System Select	System Select Mode
Talkgroup Reset	Talkgroup ID Select Mode
Transceiver Password	Transceiver Password Mode
Voice Memo	Voice Memo Mode
VOX	VOX Gain Level Mode

- If the transceiver migrates to each Function Mode, the assigned functions will not be activated by pressing the following keys, but the mode's own behavior will be executed.

    Portable:
    - **[▲]/ [▼]** key
    - **[◀]/ [▶]** key
    - **Menu ([▯])** key
    - **Back ([⮌])** key
    - **Function ([○])** key
    - **Home ([⌂])** key
    - Keypad
    - **PTT** switch

Mobile:

- **[▲]/ [▼]** key
- **[◀]/ [▶]** key
- **Menu** ([▢]) key
- **Back** ([⤺]) key
- **Function** ([◯]) key
- **Home** ([⌂]) key
- Microphone Keypad
- **PTT** switch

- To directly enter a Unit ID or status in FleetSync, MDC-1200, an NXDN system, a P25 system, or a DMR system, Manual Dialing needs to be enabled using KPG-D1/ D1N. (Refer to Manual Dialing.)
- The following functions are the common keys between **Primary** and **Secondary**. If one of the following functions is configured in **Primary**, the same function is automatically configured in **Secondary**.

> Channel Down
> Channel Down (Continuous)
> Channel Up
> Channel Up (Continuous)
> Direct Channel 1 to Direct Channel 5
> Direct Channel 1 Select to Direct Channel 5 Select
> Emergency
> Function
> Home Channel
> Home Channel Select
> Key Lock
> Scan
> Scan Normal
> Zone Down
> Zone Down (Continuous)
> Zone Up
> Zone Up (Continuous)

Configuration using KPG-D1/ D1N

Assigning functions to the **PF** keys on the transceiver (🔍See Transceiver Settings > Key Assignment)

19.2 Available Functions for Menu Mode

Following are the functions that can be configured for Menu Mode. Each function is identical to the corresponding **PF** key. Refer to "Available Functions for the PF Keys" for details of each function.

Table 19-3 Available Functions for Menu Mode

Function Name	Display	Corresponding PF Keys
2-tone	2-tone	2-tone
Activity Detection (Portable only)	Activity Det	Activity Detection
ANR Preset	ANR Preset	-
Audio Profile	Audio Profile	-
Audio Profile	Audio Profile	-
Auto Dimmer (Mobile only)	Auto Dimmer	-
Auto Telephone	Auto Telephone	Auto Telephone
Autodial	Auto Dial	Autodial
Autodial Programming	Auto Dial Prog	Autodial Programming
AUX (Portable only)	AUX	AUX
AUX A (Mobile only)	AUX A	AUX A
AUX B (Mobile only)	AUX B	AUX B
AUX C (Mobile only)	AUX C	AUX C
Battery Information (Portable only)	Battery Info	-
Battery Status (Portable only)	Battery Status	Battery Status
Bluetooth	Bluetooth	Bluetooth
Bluetooth Device	BT Device	-
Bluetooth Discoverable	Discoverable	-
Bluetooth Headset Connection Type	BT Headset Typ	-
Bluetooth Information	Bluetooth Info	-
Bluetooth Speaker	BT Speaker	Bluetooth Speaker
Broadcast	Broadcast	Broadcast
Clock	Clock	Clock
Clock Adjustment	Clock Adjust	Clock Adjustment
Color Scheme	Color Scheme	-
Direct Channel 1 Select to Direct Channel 5 Select	Direct Ch1 Sel	Direct Channel 1 Select to Direct Channel 5 Select
Display Format	Display Format	Display Format
Eject SD Card	Eject Card	Eject SD Card
External Speaker	External SP	External Speaker
External Microphone Sense	Ext Mic Sense	-
Fixed Volume	Fixed Volume	Fixed Volume
Format SD Card	Format Card	Format SD Card

Function Name	Display	Corresponding PF Keys
Front Panel Programming	Panel Program	Front Panel Programming
GPS	GPS	GPS
GPS/Bluetooth Reset	GPS/BT Reset	-
GPS Position Display	GPS Pos Disp	GPS Position Display
Group	Group	Group
Group + Short Message	Group+SDM	Group + Short Message
Group + Status	Group+Status	Group + Status
High Transmit Power	High TX Power	High Transmit Power
Home Channel Select	Home Ch Sel	Home Channel Select
Horn Alert (Mobile only)	Horn Alert	Horn Alert
Individual	Individual	Individual
Individual + Short Message	Indiv+SDM	Individual + Short Message
Individual + Status	Indiv+Status	Individual + Status
Intercom (Mobile only)	Intercom	Intercom
IP Address	IP Address	-
Key Delete	Key Delete	Key Delete
Keyset	Keyset	Keyset
Language	Language	-
LCD Brightness	LCD Brightness	LCD Brightness
Lone Worker[1]	Lone Worker	Lone Worker
Low Transmit Power	Low TX Power	Low Transmit Power
Maintenance	Maintenance	Maintenance
Manual Site Hunt	Manual Hunt	-
Master Volume Control (Mobile only)	Master Volume	Master Volume Control
Medium Transmit Power	Med TX Power	-
Microphone Sense	Mic Sense	-
Microphone Type	Mic Type	-
Monitor	Monitor	Monitor
Multi RF Deck View (Mobile only)	Multi View	Multi RF Deck View
Operator Selectable Tone	OST	Operator Selectable Tone
OST List	OST List	OST List
OVCM	OVCM	OVCM
Playback	Playback	Playback
Priority-channel Select	Pri Ch Select	Priority-channel Select
Public Address	Public Address	Public Address
Radio Check	Radio Check	-
Radio Inhibit	Inhibit	-
Radio Uninhibit	Uninhibit	-
Receive Entry	Receive Entry	Receive Entry

Function Name	Display	Corresponding PF Keys
Rekey Request	Rekey Request	Rekey Request
Regroup Request	Regroup Req	Regroup Request
Remote Control	Remote Control	Remote Control
RF Deck Select	RF Deck Select	RF Deck Select
RX Audio Equalizer (High)	RX EQ High	-
RX Audio Equalizer (High Midrange)	RX EQ High Mid	-
RX Audio Equalizer (Midrange)	RX EQ Midrange	-
RX Audio Equalizer (Low Midrange)	RX EQ Low Mid	-
RX Audio Equalizer (Low)	RX EQ Low	-
RX Auto Gain Control	RX AGC	-
Scan	Scan	Scan
Scan Delete/ Add	Scan Del/Add	Scan Delete/ Add
Scan Normal	Scan Normal	Scan Normal
Scan Program	Scan Program	Scan Program
Scrambler/Encryption	Scram/Encryp	Scrambler/ Encryption
Scrambler/Encryption Code	Scram Code	Scrambler/ Encryption Code
Send the GPS Data	Send GPS Data	Send the GPS Data
Short Message	Short Message	Short Message
Site Lock	Site Lock	Site Lock
Site Number	Site No.	System Search
Site Select	Site	Site Select
Speaker Type	Speaker Type	-
Speaker 1-2 Mute (Mobile only)	Speaker 1-2 Mute	Speaker 1-2 Mute
Squelch Level	Squelch Level	Squelch Level
Squelch Off	Squelch Off	Squelch Off
Stack	Stack	Stack
Status	Status	Status
System Search	System Search	System Search
Surveillance	Surveillance	Surveillance
System Lock	System Lock	System Lock
System Select	System	System Select
Talk Around	Talk Around	Talk Around
Talkgroup Reset	Talkgroup Rst	Talkgroup Reset
Transceiver Password	Password	Transceiver Password
Transfer	Transfer	Transfer
TX Audio Equalizer (High)	TX EQ High	-
TX Audio Equalizer (High Midrange)	TX EQ High Mid	-
TX Audio Equalizer (Midrange)	TX EQ Midrange	-

Function Name	Display	Corresponding PF Keys
TX Audio Equalizer (Low Midrange)	TX EQ Low Mid	-
TX Audio Equalizer (Low)	TX EQ Low	-
TX Auto Gain Control	TX AGC	-
Unselected RF Deck Speaker (Mobile only)	Unsel Deck SP	Unselected RF Deck Speaker
Unselected Speaker Offset (Mobile only)	Unsel Deck Vol	-
Vibrator (Portable only)	Vibrator	Vibrator
Voice Memo	Voice Memo	Voice Memo
VOX (Portable only)	VOX Level	VOX
VOX Function (Portable only)	VOX	VOX Function
Zeroize	Zeroize	Zeroize

*1 If "Transmit/Receive Inhibit" is configured in **Lone Worker Type**, Lone Worker cannot be turned ON or OFF in Menu Mode.

19.3	**Available Functions for the Selector**

Supported Models: Portable

By using KPG-D1/ D1N, the following functions can be assigned to the **Selector**. What function can be selected varies depending on the configuration in **16 Zone/Channel Selector**.

● **If 16 Zone/Channel Selector is enabled**

Table 19-4 Available Functions for the Selector

Function Name	Description	Available Communication Systems[1]
None	No function is activated. Rotating the **Selector** causes the Key-entry Error Tone (1 beep) to sound.	ALL
Channel Select	Rotating the **Selector** causes the transceiver to migrate to the channel having the same number specified by the pointer of **Selector**.	ALL
Zone Select	Rotating the **Selector** causes the transceiver to migrate to the zone indicated by the pointer of the **Selector**.	ALL
Site Select	Turning the **Selector** causes the transceiver to migrate to the site specified by the Selector. (Refer to NXDN FUNC Locking the Site to Be Used (Site Lock/ Site Select).)	NXDN Trunking

[1] ALL indicates a function that can be used in all systems.

● **If 16 Zone/Channel Selector is disabled**

Table 19-5 Available Functions for the Selector

Function Name	Description	Available Communication Systems[1]
None	No function is activated. Rotating the Selector causes the Key-entry Error Tone (1 beep) to sound.	ALL
Channel Up/ Down	Rotating the **Selector** causes the channel number to be increased or decreased in steps of 1.	ALL
Zone Up/Down	Rotating the **Selector** causes the zone number to be increased or decreased in steps of 1.	ALL
Site Up/Down	Turning the **Selector** increases or decreases the site number in steps of 1. (Refer to NXDN FUNC Locking the Site to Be Used (Site Lock/ Site Select).)	NXDN Trunking

[1] ALL indicates that a function can be used in all the following communication systems:

- Analog Conventional
- P25 Conventional
- P25 Trunking
- NXDN Conventional
- NXDN Trunking
- DMR Conventional

Configuration using KPG-D1/ D1N

● Assigning functions to the **Selector** of the transceiver (🔍See Transceiver Settings > Key Assignment > Top/Side)

● Configuring **16 Zone/Channel Selector** to be enabled or disabled (🔍See Transceiver Settings > Key Assignment > Top/Side)

Available Functions for the Lever Switch

Supported Models: Portable

The following are the functions that can be assigned to the **Lever** switch.

Positioning the **Lever** switch to the **[A]** or **[B]** position activates the assigned function.

Table 19-6 Available Functions for the Lever Switch

Function Name	Description	Available Communication Systems[1]
None	No function is activated.	-
AUX	Alternates the status of the AUX Output port. The AUX Output port status is changed to inactive if the status is active; or, the AUX Output port status is changed to active if the status is inactive. The status of the AUX port is changed by operating the **Lever** switch, and an external device connected to the AUX port can be controlled.	ALL
Display Format	Toggles between the Channel Name display and the Zone-channel display.	ALL
Function	Waits for the activation of the Key Function assigned to the 2nd Function and starts counting down the **Mode Reset Timer**. The Function status will be reset if no key is pressed before the amount of time configured in **Mode Reset Timer** elapses.	ALL
GPS Position Display	Enters GPS Position Display Mode. **See** GPS POSITION DISPLAY	ALL
High Transmit Power	**Analog Conventional/ P25 Conventional/ NXDN Conventional:** Selecting a channel where "Medium" or "Low" is configured for the transmission power, and then positioning the **Lever** switch to the position assigned "High Transmit Power" switches the transmission power to "High". **P25 Trunking/ NXDN Trunking:** Selecting a channel in a system where "Medium", "Low" or "Auto" is configured for the transmission power and then positioning the **Lever** switch to the position assigned "High Transmit Power" switches the transmission power to "High". **See** Transmit Power	ALL
Key Lock	Toggles the Key Lock between enabled and disabled. **See** Locking the Transceiver Keys (Key Lock)	ALL
Lone Worker	Toggles the Lone Worker between enabled and disabled. **See** • P25 FUNC Placing the Transceiver in Emergency Mode Using the Lone Worker Function • NXDN FUNC Placing the Transceiver in Emergency Mode Using the Lone Worker Function	ALL

Function Name	Description	Available Communication Systems[1]
Low Transmit Power	**Analog Conventional/ P25 Conventional/ NXDN Conventional:** Selecting a channel where "High" or "Medium" is configured for the transmission power, and then positioning the **Lever** switch to the position assigned "Low Transmit Power" switches the transmission power to "Low". **P25 Trunking/ NXDN Trunking:** Selecting a channel in a system where "High", "Medium" or "Auto" is configured for the transmission power and then positioning the **Lever** switch to the position assigned "Low Transmit Power" switches the transmission power to "Low". **See** Transmit Power	ALL
Monitor	**Analog Conventional:** The transceiver disables the QT tone or DQT code and the Optional Signaling and unmutes the speaker upon detection of a carrier. **P25 Conventional:** The transceiver disables the NAC and unmutes the speaker upon detection of a frame. **NXDN Conventional:** The transceiver resets the matching state of RAN code and Optional Signaling and unmutes the speaker upon detection of an NXDN frame. **See** • P25 FUNC Temporarily Disabling the Signaling (Monitor) • NXDN FUNC Temporarily Disabling the Signaling (Monitor)	Analog Conventional P25 Conventional NXDN Conventional
Scan	Starts or stops scanning. See • NXDN FUNC SCAN • P25 FUNC ### Error: NO TOC title. ###	ALL
Scan Normal	Starts a Non-Priority Scan. **See** • NXDN FUNC SCAN • P25 FUNC ### Error: NO TOC title. ###	ALL
Scan Program	Enters Scan Program Mode. The Scan List can be edited in Scan Program Mode. **See** • P25 FUNC Changing the Scan List (Scan Program) • NXDN FUNC Changing the Scan List (Scan Program)	ALL
Scrambler/Encryption	Toggles the Voice Scrambler/ Encryption between enabled and disabled. **See** • P25 FUNC COMMUNICATION SECURITY • NXDN FUNC COMMUNICATION SECURITY	**Voice Scrambler:** Analog Conventional **Encryption:** P25 Conventional P25 Trunking NXDN Conventional NXDN Trunking

Function Name	Description	Available Communication Systems[1]
Squelch Off	**Analog Conventional:** The transceiver opens squelch and unmutes the speaker. **P25 Conventional:** The transceiver disables the NAC and unmutes the speaker upon detection of a frame. **NXDN Conventional:** The transceiver resets the matching state of RAN code and Optional Signaling and unmutes the speaker upon detection of an NXDN frame. **See** • P25 FUNC Temporarily Disabling the Squelch (Squelch Off) • NXDN FUNC Temporarily Disabling the Squelch (Squelch Off)	Analog Conventional P25 Conventional NXDN Conventional
Stack	Enters Stack Mode. In Stack Mode, the data stored in the stack memory of the transceiver, such as call records, Status Messages and Short Messages, can be referred or cleared. **See** Viewing the Receive History (Stack)	ALL
Surveillance	Toggles the Surveillance between enabled and disabled. While the Surveillance function is enabled, the transceiver does not emit a tone or light the backlight even when the transceiver functions.	ALL
Talk Around	Toggles the Talk Around between enabled and disabled. **See** • P25 FUNC Communicating Without Using a Repeater (Talk Around) • NXDN FUNC Communicating Without Using a Repeater (Talk Around)	Analog Conventional P25 Conventional NXDN Conventional
Vibrator	Toggles the Vibrator between enabled and disabled. **See** Using the Vibrator	ALL
Zeroize	Deletes all Encryption Key data stored in the SCM. **See** • P25 FUNC Deleting all Encryption Keys (Zeroize) • NXDN FUNC Deleting All Encryption Keys (Zeroize)	P25 Conventional P25 Trunking NXDN Conventional NXDN Trunking

[1] ALL indicates that a function can be used in all the following communication systems:

• Analog Conventional
• P25 Conventional
• P25 Trunking
• NXDN Conventional
• NXDN Trunking
• DMR Conventional

19.4 Available Functions for COM Port

Portable

For Portable, the COM port 0 is assigned to the 14-pin universal connector (TXD: Pin No.12/ RXD: Pin No.13).

Table 19-7 Available Functions for COM Ports

Range	Communication Ports
	COM port 0
None	The transceiver can communicate with KPG-D1/ D1N.
Data	The transceiver can remotely be controlled using PC commands. The transceiver can communicate with KPG-D1/ D1N.
GPS	Position data can be acquired from the GPS receiver unit. Also, the transceiver can send the received GPS data when the transceiver receives the GPS data from another transceiver. The transceiver can communicate with KPG-D1/ D1N.
Data + GPS Data Output	The transceiver can remotely be controlled using PC commands. The transceiver will send GPS data by adding STX and ETX when the transceiver receives GPS data from another transceiver. The transceiver can communicate with KPG-D1/ D1N.
Transparent	The port functions as the data communication port for the Transparent data communication using NXDN protocol. The transceiver can communicate with KPG-D1/ D1N. However, the transceiver can communicate only for 10 sec on the COM port 0 after the transceiver is turned ON. **Note** The transceiver can communicate only with KPG-D1/ D1N in an Analog Convention system and P25 system.
Transparent 2 (NXDN)	The port functions as the data communication port for the Transparent data communication using NXDN protocol which the communication method is optimized. By using Transparent 2 (NXDN), data can be sent more efficiently than using Transparent. The transceiver can communicate with KPG-D1/ D1N. However, the transceiver can communicate only for 10 sec on the COM port 0 after the transceiver is turned ON.

Mobile

Mobile has the following 3 communication ports:

● **COM port 0**

  The COM port 0 is assigned to the microphone jack on the front panel. (TXD: Pin No.4/ RXD: Pin No.7)

● **COM port 1**

  The COM port 1 is assigned to the 25-pin connector on the rear panel. (TXD: Pin No.3/ RXD: Pin No.2)

● **COM port 2**

  The COM port 2 is assigned to the 25-pin connector on the rear panel. (TXD: Pin No.9/ RXD: Pin No.10)

  The following functions can be assigned to communication ports by using KPG-D1/ D1N:

Table 19-8 Available Functions for COM Ports

Range	Communication Ports		
	COM port 0	COM port 1	COM port 2
None	The transceiver can communicate with KPG-D1/ D1N.		
Data	The transceiver can remotely be controlled using PC commands. The transceiver can communicate with KPG-D1/ D1N.		
GPS	-	Position data can be acquired from the GPS receiver unit. Also, the transceiver can send the received GPS data when the transceiver receives the GPS data from another transceiver. The transceiver can communicate with KPG-D1/ D1N.	
Data + GPS Data Output	The transceiver can remotely be controlled using PC commands. The transceiver will send GPS data by adding STX and ETX when the transceiver receives GPS data from another transceiver. The transceiver can communicate with KPG-D1/ D1N.		
Transparent	-	The port functions as the data communication port for the Transparent data communication using NXDN protocol.	
Transparent 2 (NXDN)	-	The port functions as the data communication port for the Transparent data communication using NXDN protocol which the communication method is optimized. By using Transparent 2 (NXDN), data can be sent more efficiently than using Transparent.	

COM port Bluetooth

Various functions can be assigned to Bluetooth communication ports.

Table 19-9 Available Functions for Bluetooth Communication Ports

Range	Bluetooth Communication Port
None	The transceiver can communicate with KPG-D1/ D1N.
Data	The transceiver can remotely be controlled using PC commands. The transceiver can communicate with KPG-D1/ D1N.
Data + GPS Data Output	The transceiver can remotely be controlled using PC commands. The transceiver will send GPS data by adding STX and ETX when the transceiver receives GPS data from another transceiver. The transceiver can communicate with KPG-D1/ D1N.
Transparent	The port functions as the data communication port for the Transparent data communication using NXDN protocol.
Transparent 2 (NXDN)	The port functions as the data communication port for the Transparent data communication using NXDN protocol which the communication method is optimized. By using Transparent 2 (NXDN), data can be sent more efficiently than using Transparent.

📝 Note

- For Mobile, the PC command such as J Command which notifies a user that the transceiver status has been changed cannot be sent from the COM port 0.
- If "Display Unit" is configured in **Bluetooth Interface Selection**, "Transparent" and "Transparent 2 (NXDN)" cannot be configured in **COM port Bluetooth**.
- Refer to "Communication Ports" in "Multi RF Deck/ Multi Control Head" for the configuration of COM port in a Multi RF Deck/ Multi Control Head structure for Mobile.
- To use **COM port Bluetooth**, a connection by Serial Port Profile of Bluetooth is required. Refer to "About Serial Port Profile (SPP Connection/ SPP Disconnection)" for the connection by Serial Port Profile.
- The transceiver is equipped with a communication port on the connection of the internal PC board in the transceiver. Refer to the service manual for details.

Configuration using KPG-D1/ D1N

Assigning functions to the **COM port** (🔍See Transceiver Settings > Optional Features > Optional Features 1 > Serial Interface > COM Port)

Flow Control of the Communication Port (Flow Control)

Flow Control is the function that operates a port as the flow control port when the transceiver sends data communications using Transparent. (Refer to NXDN FUNC Transparent.)

Caution

For Portable, if "RTS/CTS" is configured in Flow Control, both the external microphone and the external PTT do not function.

📝 Note

For **COM port Bluetooth**, the flow control does not function regardless of the configuration in **Flow Control**.

Configuration using KPG-D1/ D1N

Configuring **Flow Control** (🔍See Transceiver Settings > Optional Features > Optional Features 1 > Serial Interface > COM Port)

COM Port Functions

The following functions of each communication port can be configured using KPG-D1/ D1N.

Table 19-10 COM Port Functions

Function	Description
Polarity	Polarity is the logic of data lines for sending data using a communication port where "GPS" is assigned.
	However, Polarity of COM port 0 is fixed at Normal in order to communicate with KPG-D1/ D1N and the configuration cannot be changed.
Stop Bit	Stop Bit is the bit information for sending data using a communication port where "Data", "GPS", "Data + GPS Data Output", "Transparent", or "Transparent 2 (NXDN)" is assigned. "1" or "2" can be configured for Stop Bit.
	However, for Mobile, Stop Bit of COM port 0 is fixed at "2" in order to communicate with KPG-D1/ D1N and the configuration cannot be changed.
Baud Rate	Baud Rate is the communication rate for sending data using a communication port where "Data", "GPS", "Data + GPS Data Output", "Transparent", or "Transparent 2 (NXDN)" is assigned.
	Baud Rate can be configured by selecting from 1200 bps, 2400 bps, 4800 bps, 9600 bps or 19200 bps.

Configuration using KPG-D1/ D1N

- Configuring **Polarity** (🔍See Transceiver Settings > Optional Features > Optional Features 1 > Serial Interface > COM Port)

- Configuring **Stop Bit** (🔍See Transceiver Settings > Optional Features > Optional Features 1 > Serial Interface > COM Port)

- Configuring **Baud Rate** (🔍See Transceiver Settings > Optional Features > Optional Features 1 > Serial Interface > COM Port)

Serial Protocol Types

There are 2 types of serial protocols to be used for controlling a transceiver by using PC commands: Version 1 and Version 2. The serial protocol type (PC Interface Protocol) can be configured using KPG-D1/ D1N.

Table 19-11 Serial Protocol Types

Configuration	Description
Version 1	The command sequence of this version starts with STX (Start of Text) and ends with ETX (End of Text). This version is compatible with transceivers that support the KENWOOD PC Interface Protocol.
Version 2	This version is almost the same as the Version 1 data format, but it has the command sequence of Version 1 and a sequence number (SEQ).

Configuration using KPG-D1/ D1N

Configuring **PC Interface Protocol** (🔍See Transceiver Settings > Optional Features > Optional Features 1 > Serial Interface)

Key operations for selecting a list or entering characters are described for each mode in this section. Refer to "Operating the Transceiver in Each Mode (Common Operation)" for operation methods.

Key		Transceiver Password Mode	Menu Mode Menu Icon Size: Large
Menu ([☐])	Press	Confirms the code (while the code blinks). Checks the code (after the code is confirmed).	Migrates to the Function List.
Back ([↰])	Press	Deletes a code.	-
	Hold Down	Deletes all codes.	-
Function ([○])	Press	-	
Home ([🏠])	Press	Restores the "Input Password" display.	Aborts the current mode.
Side 1*1 or [+]*2	Press	-	The configured function functions.
Side 2*1 or [-]*2	Press	-	The configured function functions.
Side 3*1	Press	-	The configured function functions.
[▲]/ [▼]	Press	Selects a code one at a time.	Moves the cursor up or down.
	Hold Down	Selects codes continuously.	Moves the cursor up or down continuously.
[◀]/ [▶] or [△]/ [▢]*2	Press	-	Moves the cursor to the left or right.
	Hold Down		Moves the cursor to the left or right continuously.
Selector*3	-	-	The configured function functions after aborting the current mode.
Lever Switch*4	-	-	The configured function functions after aborting the current mode.
[0] to [9]	Press	Enters a code.	Directly selects an option registered in the list.
[*]	Press	Confirms the code (while the code blinks). Checks the code (after the code is confirmed).	Migrates to the Function List.
[#]	Press	Deletes a code.	-
	Hold Down	Deletes all codes.	-
PTT Switch	Press	-	Transmits after aborting the current mode.

*1 Portable/ KCH-21R (Handheld Control Head) only
*2 KCH-20R (Featured Panel) only
*3 Portable/ KCH-20R (Featured Panel) only
*4 Portable only

Key		Menu Mode	Channel Entry Mode
		Menu Icon Size: Small	
		12:34 AM — Menu 1 / Audio/Tone / Call / Scan / Next	12:34 AM — Channel Entry [001] Channel No / OK
Menu ([▢])	Press	Migrates to the Function List.	Confirms the channel number and then aborts the current mode.
Back ([↰])	Press	-	Deletes a channel number.
	Hold Down	-	Deletes all channel numbers.
Function ([◯])	Press	-	-
Home ([⌂])	Press	Aborts the current mode.	Aborts the current mode.
Side 1[*1] or [+][*2]	Press	The configured function functions.	
Side 2[*1] or [-][*2]	Press	The configured function functions.	
Side 3[*1]	Press	The configured function functions.	
[▲]/ [▼]	Press	Moves the cursor up or down.	Changes the channel number.
	Hold Down	Moves the cursor up or down continuously.	Changes the channel number continuously.
[◀]/ [▶] or [△]/ [▢][*2]	Press	-	
	Hold Down	-	
Selector[*3]	-	The configured function functions after aborting the current mode.	
Lever Switch[*4]	-	The configured function functions after aborting the current mode.	
[0] to [9]	Press	Directly selects an option registered in the list.	Enter the channel number.
[*]	Press	Migrates to the Function List.	Confirms the channel number and then aborts the current mode.
[#]	Press	-	Deletes a channel number.
	Hold Down	-	Deletes all channel numbers.
PTT Switch	Press	Transmits after aborting the current mode.	

[*1] Portable/ KCH-21R (Handheld Control Head) only
[*2] KCH-20R (Featured Panel) only
[*3] Portable/ KCH-20R (Featured Panel) only
[*4] Portable only

Key		Stack Mode	
		Selecting a list (Category)	**Selecting a list (Caller ID)**
		▓ H ⌐ ⌄ ✉ 12:34 ᴬᴹ **Stack** **1** 👤 **Caller ID** 💬 **Status Message** ✉ **Short Message** Next Back	▓ H ⌐ ⌄ ✉ 12:34 ᴬᴹ **Caller ID** **001** ⏺ **TRUCK 824** **TRUCK 824** **TRUCK 825** Call Delete
Menu ([▢])	Press	Migrates to the list selection for Caller ID, Status Message or Short Message.	Initiates a Paging Call or Individual Call after aborting the current mode.
	Hold Down	-	
Back ([⮐])	Press	Returns to the menu (if the transceiver enters this mode by pressing the **Menu** key).	Deletes one stack data of Caller ID.
	Hold Down	-	Deletes all stack data of Caller ID.
Function ([◯])	Press	-	
	Hold Down	-	
Home ([⌂])	Press	Aborts the current mode.	
	Hold Down	-	
Side 1*1 or [+]*2	Press	The configured function functions.	
	Hold Down	-	
Side 2*1 or [-]*2	Press	The configured function functions.	
	Hold Down	-	
Side 3*1	Press	The configured function functions.	
	Hold Down	-	
[▲]/ [▼]	Press	Selects a category one at a time.	Selects stack data one at a time.
	Hold Down	Selects a category continuously.	Selects stack data continuously.
[◀] or △ *2	Press	-	Switches the display. Caller ID → Receive Channel → Receive Date and Time → Caller ID → ...
			-
[▶] or ☐ *2	Press	-	Switches the display. Caller ID → Receive Date and Time → Receive Channel → Caller ID → ...
			-
Selector*3	-	The configured function functions after aborting the current mode.	
Lever Switch*4	-	The configured function functions after aborting the current mode.	
[0] to [9]	Press	Selects a category.	Selects stack data.
[*]	Press	Migrates to the list selection for Caller ID, Status Message or Short Message.	Initiates a Paging Call or Individual Call after aborting the current mode.
	Hold Down	-	
[#]	Press	Returns to the menu (if the transceiver enters this mode by pressing the **Menu** key).	Deletes one stack data of Caller ID.
	Hold Down	-	Deletes all stack data of Caller ID.
PTT Switch	Press	Transmits after aborting the current mode.	

*1 Portable/ KCH-21R (Handheld Control Head) only

*2 KCH-20R (Featured Panel) only

*3 Portable/ KCH-20R (Featured Panel) only

*4 Portable only

Key		Stack Mode	
		Selecting a list (Status Message)	**Selecting a list (Short Message)**

		▭H ♫ ⌄ ✉ 12:34 ᴬᴹ
		
		Status Message 001
		⊙In Service
		  Call Office
		  Call Home
		                    Delete
			▭H ♫ ⌄ ✉ 12:34 ᴬᴹ
			
			Short Message 001
			⊙Please pick up ▸
			  Good morning
			  Good night
			  View Delete
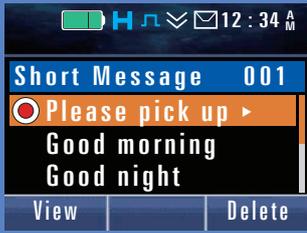
Menu ([▢])	Press	-	Migrates to the Message View display.
	Hold Down	-	
Back ([↰])	Press	Deletes one stack data of Status Message.	Deletes one stack data of Short Message.
	Hold Down	Deletes all stack data of Status Message.	Deletes all stack data of Short Message.
Function ([○])	Press	-	
	Hold Down	-	
Home ([⌂])	Press	Aborts the current mode.	
	Hold Down	-	
Side 1*1 or [+]*2	Press	The configured function functions.	
	Hold Down	-	
Side 2*1 or [-]*2	Press	The configured function functions.	
	Hold Down	-	
Side 3*1	Press	The configured function functions.	
	Hold Down	-	
[▲]/ [▼]	Press	Selects stack data one at a time.	Selects stack data one at a time.
	Hold Down	Selects stack data continuously.	Selects stack data continuously.
[◀] or △*2	Press	Switches the display. Message → Caller ID → Receive Channel → Receive Date and Time → Message → ... -	
[▶] or ◻*2	Press	Switches the display. Message → Receive Date and Time → Receive Channel → Caller ID → Message → ... -	
Selector*3	-	The configured function functions after aborting the current mode.	
Lever Switch*4	-	The configured function functions after aborting the current mode.	
[0] to [9]	Press	Selects stack data.	
[*]	Press	Initiates a Paging Call or Individual Call after aborting the current mode.	Migrates to the Message View display.
	Hold Down	-	
[#]	Press	Deletes one stack data of Status Message.	Deletes one stack data of Short Message.
	Hold Down	Deletes all stack data of Status Message.	Deletes all stack data of Short Message.
PTT Switch	Press	Transmits after aborting the current mode.	

*1 Portable/ KCH-21R (Handheld Control Head) only

*2 KCH-20R (Featured Panel) only

*3 Portable/ KCH-20R (Featured Panel) only

*4 Portable only

Common FUNC (K, F)/Ver 2.20

Key		Maintenance Display Mode	
		Conventional	**P25 Trunking**
		Maintenance ---- / RSSI Level -96dBm / Back	Maintenance 5 / RSSI Level -96dBm / Site 123-45 / Select Back
Menu ([☐])	**Press**	-	Confirms the channel.
Back ([⬑])	**Press**	Returns to the menu (if the transceiver enters this mode by pressing the **Menu** key).	
Function ([◯])	**Press**	-	
Home ([⌂])	**Press**	Aborts the current mode.	
Side 1[*1] or [+][*2]	**Press**	The configured function functions.	
Side 2[*1] or [-][*2]	**Press**	The configured function functions.	
Side 3[*1]	**Press**	The configured function functions.	
[▲]/ [▼]	**Press**	-	Changes the channel number.
	Hold Down	-	Changes the channel number continuously.
[◀] or [△][*2]	**Press**	-	Switches the display.
			RSSI/ Site Display → ID/ CH No. Display → Frequency Display → RSSI/ Site Display → ...
[▶] or [■][*2]	**Press**	-	Switches the display.
			RSSI/ Site Display → Frequency Display → ID/ CH No. Display → RSSI/ Site Display → ...
Selector[*3]	**-**	The configured function functions after aborting the current mode.	
Lever Switch[*4]	**-**	The configured function functions after aborting the current mode.	
[0] to [9]	**Press**	-	
[*]	**Press**	-	Confirms the channel.
[#]	**Press**	Returns to the menu (if the transceiver enters this mode by pressing the **Menu** key).	
PTT Switch	**Press**	Transmits.	

[*1] Portable/ KCH-21R (Handheld Control Head) only
[*2] KCH-20R (Featured Panel) only
[*3] Portable/ KCH-20R (Featured Panel) only
[*4] Portable only

Key		Maintenance Display Mode	GPS Position Display Mode
		NXDN Trunking Maintenance 1 / RSSI Level -96dBm / Site No. 1 / Back / 12:34	GPS Pos Disp / North 35°33.206′ / East 139°33.546′ / Altitude 1000m / Exit Back / 12:34
Menu ([☐])	Press	-	Aborts the current mode.
	Hold Down	-	Pauses or resumes the automatic switching of the display (Mobile only).
Back ([⤺])	Press	Returns to the menu (if the transceiver enters this mode by pressing the **Menu** key).	
Function ([○])	Hold Down	-	Pauses or resumes the automatic switching of the display (Mobile only).
Home ([⌂])	Press	Aborts the current mode.	
Side 1[*1] or [+][*2]	Press	The configured function functions.	
Side 2[*1] or [-][*2]	Press	The configured function functions.	
Side 3[*1]	Press	The configured function functions.	
[▲]/ [▼]	Press	Changes the channel number.	Selects the displayed latitude, longitude or altitude by changing each of them one at a time. (Mobile only)
	Hold Down	Changes the channel number continuously.	Selects display of latitude, longitude or altitude by changing each of them continuously. (Mobile only)
[◀]/ [▶] or [△]/ [▢][*2]	Press	Switches the display. RSSI/ Site Number Display → RSSI/ BER Display → Frequency Display → RSSI/ Site Number Display → ... RSSI/ Site Number Display → Frequency Display → RSSI/ BER Display → RSSI/ Site Number Display → ...	-
Selector[*3]	-	The configured function functions after aborting the current mode.	
Lever Switch[*4]	-	The configured function functions after aborting the current mode.	
[0] to [9]	Press	-	
[*]	Press	-	Aborts the current mode.
	Hold Down	-	Pauses or resumes the automatic switching of the display (Mobile only).
[#]	Press	Returns to the menu (if the transceiver enters this mode by pressing the **Menu** key).	
PTT Switch	Press	Transmits.	

[*1] Portable/ KCH-21R (Handheld Control Head) only

[*2] KCH-20R (Featured Panel) only

[*3] Portable/ KCH-20R (Featured Panel) only

[*4] Portable only

Key		Playback Mode	Clock Adjustment Mode
Key		▬ H ⎍ ⌄ SD 12:34 AM **Playback 1** 01/23/'14 9 23 01/23/'14 9 35 01/23/'14 14 20 Play Delete	▬ H ⎍ ⌄ 12:34 AM **Clock Adjust** Date 13/04/19 Time 12:34 PM OK Back
Menu ([⊡])	Press	Starts the playback of audio data.	Confirms the configuration and then aborts the current mode.
Back ([⤺])	Press	**With a microSD card:** Returns to the folder list display of each function. **Without a microSD card:** Returns to the menu (if the transceiver enters this mode by pressing the **Menu** key).	Returns to the menu (if the transceiver enters this mode by pressing the **Menu** key).
	Hold Down	-	
Function ([◯])	Hold Down	Switches the key operation mode.	-
Home ([⌂])	Press	Aborts the current mode.	
Side 1*1 or [+]*2	Press	The configured function functions.	
Side 2*1 or [-]*2	Press	The configured function functions.	
Side 3*1	Press	The configured function functions.	
[▲]/ [▼]	Press	Selects audio data one at a time.	Changes the year/ month/ date/ hour/ minute one at a time.
	Hold Down	Selects audio data continuously.	Changes the year/ month/ date/ hour/ minute continuously.
[◀] or [△]*2	Press	Switches the display. Recording Start Date and Time Display → ID Display → Recording Start Date and Time Display → ...	Moves to the previous configuration item.
[▶] or [▢]*2	Hold Down	-	Selects the previous configuration item continuously.
[◀] or [△]*2	Press	Switches the display. Recording Start Date and Time Display → ID Display → Recording Start Date and Time Display → ...	Moves to the next configuration item.
[▶] or [▢]*2	Hold Down	-	Selects the next configuration item continuously.
Selector*3	-	The configured function functions after aborting the current mode.	
Lever Switch*4	-	The configured function functions after aborting the current mode.	
[0] to [9]	Press	-	
[*]	Press	Starts the playback of audio data.	Confirms the configuration and then aborts the current mode.
[#]	Press	**With a microSD card:** Returns to the folder list display of each function. **Without a microSD card:** Returns to the menu (if the transceiver enters this mode by pressing the **Menu** key).	Returns to the menu (if the transceiver enters this mode by pressing the **Menu** key).
	Hold Down	-	
PTT Switch	Press	Transmits after aborting the current mode.	

*1 Portable/ KCH-21R (Handheld Control Head) only

*2 KCH-20R (Featured Panel) only

*3 Portable/ KCH-20R (Featured Panel) only

*4 Portable only

● **Power-on Tone**

Tone Name	Pattern	Reference
Power-on Tone A	1 beep 1480 Hz (500 ms)	Power-on Power-on Tone Panel Test Mode Panel Tuning Mode
Power-on Tone B	2 beeps 1630 Hz (50 ms)	Power-on Tone

● **Control Tone**

Tone Name	Pattern	Reference
Key Beep A	1 beep 1630 Hz (50 ms)	Home Channel Direct Channel Control Tone Format SD Card Eject SD Card Playback Bluetooth On Bluetooth Find Device Bluetooth Find Device (pairing) Define Bluetooth Device Pairing Request Bluetooth My Devices GPS/Bluetooth Reset Clock Adjustment
Key Beep B	2 beeps 1630 Hz (50 ms)	Home Channel Direct Channel Control Tone Bluetooth Off Bluetooth My Devices
Key Beep C	3 beeps 1630 Hz (50 ms)	Home Channel Direct Channel Control Tone Clock Adjustment
Key-entry Error Tone	1 beep 700 Hz (50 ms)	Keypad Operation Group ID Entry Stack Key Lock Control Tone Format SD Card Define Bluetooth Device Bluetooth My Devices Bluetooth Speaker Off-hook Speaker Revert AUX Input Selector

Tone Name	Pattern	Reference
Rollover Tone	1 beep 1630 Hz (200 ms)	Menu Mode Rollover/ End Stop Control Tone
Stop Tone	1 beep 700 Hz (50 ms)	Rollover/ End Stop Control Tone
Password Authorization Tone	2 beeps 1630 Hz (50 ms)	Power-on Control Tone Transceiver Password
Priority-channel Tone	1 beep 2000 Hz (50 ms)	Control Tone
Scan Stop Tone	2 beeps 700 Hz (50 ms)	Home Channel Direct Channel Control Tone
Search Mode Tone	1 beep 770 Hz (400 ms)	Control Tone
Out of Range Tone	1 beep 770 Hz (400 ms)	Control Tone
Call Request Tone	1 beep 1630 Hz (50 ms)	Control Tone
Call In Progress Tone	2 beeps 980 Hz (100 ms)	Control Tone
Disconnect Indication Tone	2 beeps 980 Hz (300 ms) 490 Hz (300 ms)	Control Tone
Key Load Alert Tone	1 beep 1633 Hz (1 sec)	Control Tone

Tone Name	Pattern	Reference
Bluetooth Find Device Mode Tone	2 beeps 940 Hz (50 ms)	Control Tone Bluetooth Find Device
Bluetooth Connect Tone	2 beeps 980 Hz 1920 Hz (100 ms) (100 ms)	Control Tone Bluetooth Find Device Define Bluetooth Device Pairing Request
Bluetooth Disconnect Tone	2 beeps 980 Hz 490 Hz (300 ms) (100 ms)	Control Tone Bluetooth My Devices HSP Disconnection
Complete Tone	5 beeps 980 Hz (20 ms)	Control Tone
Record Stopped Tone	4 beeps 940 Hz 700 Hz (300 ms) (100 ms) 940 Hz 700 Hz (300 ms) (100 ms)	Voice Memo

● **Warning Tone**

Tone Name	Pattern	Reference
Warning Tone A	continuous beep 700 Hz (until the **PTT** switch is released)	Stack Warning Tone
Warning Tone B	1 beep 700 Hz (1 sec)	Warning Tone
Warning Tone C	1 beep 700 Hz (50 ms)	Warning Tone
TOT Pre-alert Tone	3 beeps 1630 Hz (50 ms)	Warning Tone

Tone Name	Pattern	Reference
Battery Warning Tone	3 beeps 700 Hz (50 ms)	Warning Tone Battery Warning
PLL Unlock Tone	1 beep 1400 Hz (50 ms)	Warning Tone
Busy Tone	continuous beep 940 Hz (150 ms)	Warning Tone
Busy Tone 2	3 beeps 940 Hz (150 ms)	Warning Tone
Timed Power-off Pre-alert Tone A	2 beeps 1480 Hz (50 ms)	Warning Tone Timed Power-off
Timed Power-off Pre-alert Tone B	4 beeps 1480 Hz (50 ms)	Warning Tone Timed Power-off
Timed Power-off Pre-alert Tone C	1 beep 1480 Hz (2 sec)	Warning Tone Timed Power-off
Call Queue Tone	2 beeps 940 Hz (50 ms)	Warning Tone
System Busy Tone	3 beeps 440 Hz (200 ms)	Warning Tone
System Search Tone	1 beep 1630 Hz (50 ms)	Warning Tone
System Search End Tone	3 beeps 940 Hz (150 ms)　770 Hz (150 ms)　940 Hz (150 ms)	Warning Tone
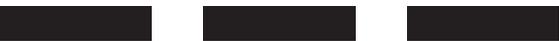
Tone Name	Pattern	Reference
System Select Tone	4 beeps 980 Hz (50 ms)　1220 Hz (50 ms)　980 Hz (50 ms)　1220 Hz (50 ms)	Warning Tone
Call Invalid Tone	4 beeps 440 Hz (1 sec)　　　440 Hz (50 ms)	Warning Tone
Invalid Dial Tone	5 beeps 440 Hz (50 ms)　440 Hz (700 ms)　440 Hz (50 ms)	Warning Tone
Not Authorized Tone	4 beeps 440 Hz (300 ms)　440 Hz (50 ms)　440 Hz (800 ms)	Warning Tone
No Reply Tone	4 beeps 440 Hz (50 ms)　　440 Hz (1 sec)	Warning Tone
Call Fail Tone	2 beeps 440 Hz (50 ms)　440 Hz (1 sec)	Warning Tone
Call Deny Tone	3 beeps 440 Hz (200 ms)　440 Hz (80 ms)　440 Hz (900 ms)	Warning Tone
Lone Worker Tone	2 beeps 1630 Hz (150 ms)　940 Hz (150 ms)	Warning Tone
Group-registration Invalid Tone	2 beeps 440 Hz (50 ms)	Warning Tone
Call Processing Tone	2 beeps 940 Hz (50 ms)	Warning Tone
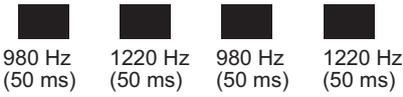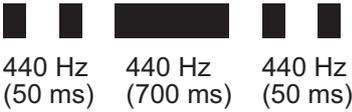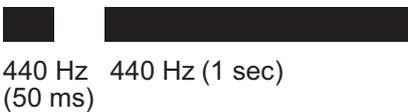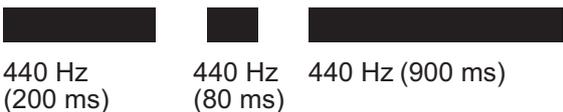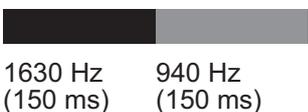
Tone Name	Pattern	Reference
Network Failure Tone A	2 beeps 620 Hz (100 ms) 930 Hz (100 ms)	Warning Tone
Network Failure Tone B	1 beep 1630 Hz (1 sec)	Warning Tone
Man-down Pre-alert Tone	1 beep 1630 Hz (50 ms)	Warning Tone
Stationary Pre-alert Tone	1 beep 770 Hz (50 ms)	Warning Tone
Motion Pre-alert Tone	1 beep 1210 Hz (50 ms)	Warning Tone
Key Fail Alert Tone	6 beeps 940 Hz (100 ms)	Warning Tone
Ignore Encryption Switch Alert Tone	continuous beep 697 Hz (until the **PTT** switch is released)	Warning Tone
Site Trunking Tone	2 beeps 620 Hz (100 ms) 930 Hz (100 ms)	Warning Tone
Bluetooth No Response Tone	1 beep 440 Hz (1 sec)	Warning Tone Bluetooth No Response (Pairing) Bluetooth No Response(Headset Profile)
Bluetooth Connect Denied Tone	2 beep 440 Hz (1 sec) 440 Hz (100 ms)	Warning Tone Bluetooth No Response (Pairing) Bluetooth No Response(Headset Profile)
Bluetooth Connect Invalid Tone	3 beeps 440 Hz (1 sec) 440 Hz (50 ms)	Warning Tone Bluetooth Connect Invalid (Pairing)

Tone Name	Pattern	Reference
Bluetooth No Service Tone	3 beeps 440 Hz (50 ms)	Warning Tone Bluetooth No Service (Pairing) Bluetooth No Service (Headset Profile)
Battery Level Tone	1 beep 700 Hz (500 ms)	Warning Tone Battery Status
Delay Tone	1 beep 940 Hz (150 ms)	Warning Tone
Intercept Tone	2 beeps 940 Hz (200 ms) 770 Hz (200 ms)	Warning Tone
Intercept Tone 2	6 beeps 940 Hz (200 ms) 770 Hz (200 ms) 940 Hz (200 ms) 770 Hz (200 ms) 940 Hz (200 ms) 770 Hz (200 ms)	Warning Tone
Deny Tone	3 beeps 940 Hz (150 ms) 770 Hz (150 ms) 940 Hz (150 ms)	Warning Tone
Low SD Memory Tone	3 beeps 940 Hz (50 ms)	Low Memory Warning

● **Locator Tone**

Tone Name	Pattern	Reference
Emergency Locator Tone	2 beeps 1630 Hz (90 ms) 940 Hz (90 ms)	Locator Tone

● **Sidetone**

Tone Name	Pattern	Reference
Proceed Tone	3 beeps 1000 Hz (20 ms)	Sidetone PTT Proceed Tone
VOX Proceed Tone	1 beep 1550 Hz (30 ms)	Sidetone
PTT ID Sidetone	4 beeps 1210 Hz (30 ms) 1630 Hz (30 ms) 1210 Hz (30 ms) 1630 Hz (30 ms)	Sidetone

● **Alert Tone**

Tone Name	Pattern	Reference
Transmit Clear Alert Tone	1 beep 1477 Hz (50 ms)	Alert Tone
Site Trunking Alert	2 beeps 622 Hz (100 ms) 932 Hz (100 ms)	Alert Tone
Ack Wait Enter Tone	7 beeps 770 Hz (30 ms)	Alert Tone
Emergency Indicator Alert Tone	1 beep 880 Hz (150 ms)	Alert Tone

● **Volume Level Tone**

Tone Name	Pattern	Reference
Volume Key Tone	1 beep 1630 Hz (50 ms)	Volume Level Tone
Fixed Volume Key Tone	1 beep 1630 Hz (50 ms)	Volume Level Tone

● **Transmit Tone**

Tone Name	Pattern	Reference
Transpond Tone	1 beep 2100 Hz (1 sec)	Transmit Tone
Stun-on Tone	1 beep 1477 Hz (2 sec)	Transmit Tone
Stun-off Tone	2 beeps 1477 Hz (2 sec) 1477 Hz (2 sec)	Transmit Tone
PTT Release Tone	1 beep 1397 Hz (100 ms)	Transmit Tone
Background Tone	1 beep 1630 Hz (50 ms)	Transmit Tone

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