



**NX-240/ NX-240V/
NX-340/ NX-340U/
NX-740H/ NX-740HV/
NX-840H/ NX-840HU**

Function Reference (FUNC)

Version:	1.20
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Type:	K

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About this Manual

This In-depth manual describes the functions of the NX-240/ NX-240V/ NX-340/ NX-340U/ NX-740H/ NX-740HV/ NX-840H/ NX-840HU transceiver.

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

NX-240/ NX-240V/ NX-340/ NX-340U

Item	Specifications	How to Verify
Model Name	Canadian market NX-240: P NX-340: P U.S. market NX-240V: K NX-340U: K/ K2 Other markets NX-240: K NX-340: K/ K2/ K3	Printed or labeled on the outside of carton and locations with model name.
Firmware Version of the Transceiver	3.01.00	Can be viewed in the Transceiver Information dialog box of KPG-169D/ KPG-170D.
Version of KPG-169D/ KPG-170D	V 3.02	Can be viewed in the About KPG-169D dialog box of KPG-169D or in the About KPG-170D dialog box of KPG-170D.

NX-740H/ NX-740HV/ NX-840H/ NX-840HU

Item	Specifications	How to Verify
Model Name	U.S. market NX-740HV: K NX-840HU: K Other markets NX-740H: K NX-840H: K/ K2	Printed or labeled on the outside of carton and locations with model name.
Firmware Version of the Transceiver	3.01.00	Can be viewed in the Transceiver Information dialog box of KPG-175D/ KPG-175DN.
KPG-175D/ KPG-175DN version number	V 3.03	Can be viewed in the About KPG-175D dialog box of KPG-175D or in the About KPG-175DN dialog box of KPG-175DN.

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-169D/ KPG-170D/ KPG-175D/ KPG-175DN or the LCD display of the transceiver.

Bold Letters

The characters in bold letters indicate the name of the windows, tabs, checkboxes in KPG-169D/ KPG-170D/ KPG-175D/ KPG-175DN 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. When the notation is **[Shift] + [a]**, a subscriber must press the **[a]** 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 the Transceiver Model Names

The model names are described collectively as “NX-240/ 240V” or “NX-240/ 240V/ 340/ 340U” in this manual.

Also, “Portable” and “Mobile” are designated in this manual as the generic name for a type of transceivers. Transceivers applicable to Portable and Mobile are as follows.

Portable:

NX-240/ 240V/ 340/ 340U

Mobile:

NX-740H/ 740HV/ 840H/ 840HU

Notations for FPU names

KPG-175D and KPG-175DN are referred to collectively as “KPG-175D” in this document.

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
BCL	Busy Channel Lockout
BOT	Beginning of Transmit
CH	Channel
COM port	Communications port
CW	Continuous Wave
DQT	Digital Quiet Talk
DTMF	Dual Tone Multi-frequency
EOT	End of Transmit
FPU	Field Programming Unit
GPS	Global Positioning System
GTC	Go to Channel
ID	Identification
Mic	Microphone
MSK	Minimum Shift Keying
PC	Personal Computer
PF	Programmable Function
PTT	Push to Talk
PTT ID	PTT (Push-to-talk) ID code
QT	Quiet Talk
RAN	Radio Access Number
RX	Receive
TA	Talk Around
TOT	Time-out Timer
TX	Transmit
UTC	Universal Time Coordinated
VOX	Voice-operated Transmission

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About NXDN

NXDN[®] is the name of the digital air interface protocol and trademark of JVC KENWOOD Corporation and ICOM Inc. It is comprised of a digital radio communications protocol using 4-Level FSK (4LFSK) modulation.

About NEXEDGE

NEXEDGE[®] is the trade name for KENWOOD's digital radio systems using the NXDN[®] digital air interface.

About the Programming Software

Various functions and parameters of the following transceivers can be configured by using the KPG-169D/ KPG-170D/ KPG-175D/ KPG-175DN software.

FPU	Supported Transceiver
KPG-169D	NX-240/ NX-340
KPG-170D	NX-240V/ NX-340U
KPG-175D/ KPG-175DN	NX-740H/ NX-740HV/ NX-840H/ NX-840HU

Various functions can be enabled by connecting the transceiver to a PC by use of the programming cable and writing the data configured using KPG-169D/ KPG-170D/ KPG-175D/ KPG-175DN to the transceiver. In this manual, the description of each function in the Function Reference may have a corresponding reference in the help texts attached to KPG-169D/ KPG-170D/ KPG-175D/ KPG-175DN. Therefore, you can configure the function by referring to the function also appearing in the help texts of KPG-169D/ KPG-170D/ KPG-175D/ KPG-175DN.

About KPG-170D/ KPG-175DN

KPG-170D/ KPG-175DN is the programming software to configure functions for the transceiver to be used in the U.S.A. KPG-170D/ KPG-175DN is compliant with the FCC Part 90 standard so that the specification does not allow to configure "25.0 kHz (Wide)" for Channel Spacing with a VHF or UHF transceiver in the frequency band regulated by the FCC Part 90.

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	<ul style="list-style-type: none"> • KMC-48GPS (Speaker Microphone with GPS) • KMC-21 (Speaker Microphone) • KMC-45 (Speaker Microphone) • KHS-21 (Headset with Boom Microphone) • KPG-22A/ KPG-22U (Radio Programming Interface Cable)
Mobile	<ul style="list-style-type: none"> • KCT-18 (Ignition Sense Cable) • KCT-36 (Extension Cable) • KCT-60 (Connection Cable) • KES-3 (External Speaker) • KES-5 (External Speaker) • KMC-9C (Desktop Microphone) • KMC-27A/B (Microphone) • KMC-28B (Keypad Microphone) • KMC-30 (Microphone) • KMC-32 (16 Keys Keypad Microphone) • KMC-35 (Microphone) • KMC-36 (12 Keys Keypad Microphone) • KPG-46A/ KPG-46U (Radio Programming Interface Cable)

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 (☞).

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Blue Characters in the Main Text

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3.3 Using Function Keys

Functions can be assigned to each key of the transceiver using KPG-169D/ which a function is assigned activates the assigned function. (Refer to Available Functions for the PF Keys on page 195.)

Blue Characters at the Bottom of Each Page

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

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Outline of This Transceiver

NX-240/ NX-240V/ NX-340/ NX-340U/ NX-740H/ NX-740HV/ NX-840H/ NX-840HU are VHF/ UHF transceivers for the use of professionals. The transceiver is equipped with the existing analog FM mode and the digital communications system which complies with the NXDN common air interface specifications.

GENERAL FEATURES

Portable

Zone/ Channel

- 2 Zones, 16 Channels per Zone

Models

- 1 W/ 5 W (136 MHz to 174 MHz) Model
- 1 W/ 5 W (350 MHz to 400 MHz) Model
- 1 W/ 5 W (400 MHz to 470 MHz) Model
- 1 W/ 5 W (450 MHz to 520 MHz) Model

Specifications

- On/ Off Volume Knob
- Red/ Green/ Orange/ Blue LED
- 16-Position Mechanical Selector
- 2 Side PF Keys
- 1.0 W Speaker Audio

Main Functions

- Analog/ Digital Mode*¹
- Voice Announcement
- GPS Connectivity (with Optional KMC-48GPS Mic)
- Emergency Function
- Stun Function

Others

- MIL-STD-810 C/ D/ E/ F/ G
- IP54/ 55 Water & Dust Intrusion

Mobile

Zone/ Channel

- 2 Zones, 16 Channels per Zone

Models

- 5 W/ 25 W/ 50 W (136 MHz to 174 MHz) Model
- 5 W/ 25 W/ 45 W (400 MHz to 470 MHz) Model
- 5 W/ 25 W/ 45 W (450 MHz to 520 MHz) Model

Specifications

- 2-digit 7-segment LED Display
- Red/ Green/ Orange LED
- Blue LED
- 9 PF Keys
- 4 W/ 4 Ω Audio Output Power
- DB15 Accessory Interface
- 8 Programmable I/O Ports

Main Functions

- Analog/ Digital Mode*¹
- Voice Announcement
- Timed Power-off
- Ignition Sense
- Public Address/ Horn Alert Function
- GPS Connectivity (with 3rd-party GPS Module)
- Emergency Function
- Stun Function

Others

- MIL-STD-810 C/ D/ E/ F/ G
- IP54 Water & Dust Intrusion

*¹ NX-240/ NX-240V/ NX-340/ NX-340U/ NX-740H/ NX-740HV/ NX-840H/ NX-840HU does not support the Mixed Mode.

DIGITAL MODES

GENERAL

- NXDN Digital Air Interface
- AMBE+2 VOCODER
- 6.25 kHz Channels (Very Narrow) / 12.5 kHz Channels (Narrow)
- 64 Radio Access Numbers (RAN) (None and 1 to 63)
- Over-the-Air Alias
- Individual Call & Group Call
- Paging Call
- Emergency Call
- All Group Call
- Status Message Sending
- Remote Stun/ Kill
- Scan, Priority Scan
- NXDN Encryption Included
- Site Roaming

ANALOG MODES

GENERAL

- 12.5 kHz Channels (Narrow) / 25.0 kHz Channels (Wide) *¹
- FleetSync, MDC-1200, DTMF
- QT/ DQT/ 2-tone
- Scan, Priority Scan
- Voice Inversion Scrambler (16 Codes)
- Wireless Clone (Portable)
- Wired Clone (Mobile)

FleetSync

- PTT ID ANI/ Caller ID Sending
- Selective/ Group Call
- Status Message
- Emergency Call

MDC-1200

- PTT ID ANI/ Caller ID Sending
- Emergency, Radio Check (Decode), Stun (Decode)

*¹ For KPG-170D/ KPG-175DN, "25.0 kHz (Wide)" cannot be configured for 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

About Zones

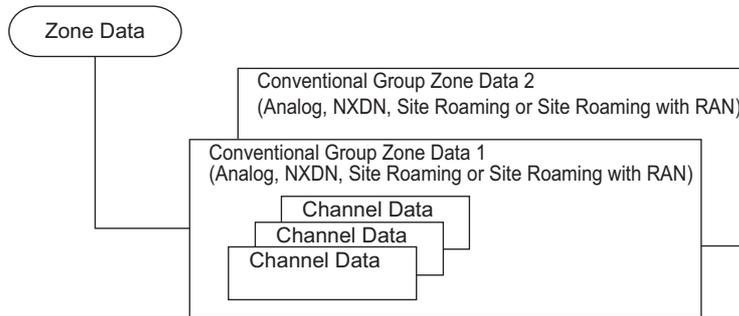


Figure 1-1 Zone Description

Zone data in a Conventional Group (Analog) or Conventional Group (NXDN) can be configured using KPG-169D/ KPG-170D/ KPG-175D/ KPG-175DN.

In addition, zone data for Site Roaming (NXDN) and Site Roaming with RAN (NXDN) can be configured as an NXDN Conventional system zone. (Refer to [8.9 Site Roaming on page 76.](#))

- **Conventional Group (Analog)**

A zone in an Analog Conventional system consists of Conventional channels that are used for communicating in analog mode.

- **Conventional Group (NXDN)**

A zone in an NXDN Conventional system consists of Conventional channels that are used for communicating in digital mode using the NXDN protocol.

- **Site Roaming**

This zone consists of channels in an NXDN Conventional system in which Site Roaming is enabled.

- **Site Roaming with RAN**

This zone consists of channels in an NXDN Conventional system in which Site Roaming is enabled.

Two zone data can be configured for the transceiver. A maximum of 16 channels data per zone can be configured for the transceiver. A maximum of 32 channels data can be configured for the transceiver in total.

About Communications Systems

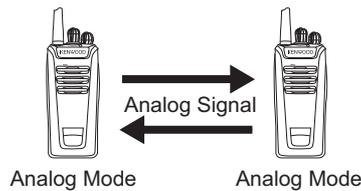
The transceiver can transmit and receive by using two communications systems, an Analog Conventional system and an NXDN Conventional system.

In each system, the transceiver can communicate in analog mode or the NXDN digital mode.

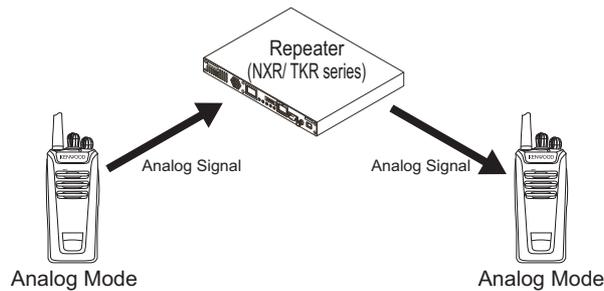
To use the transceiver in each system of the Conventional Group, various parameters for a channel, such as transmit and receive frequencies, and parameters for other various functions related to transmission and reception must be configured for a zone in the Conventional Group by using KPG-169D/ KPG-170D/ KPG-175D/ KPG-175DN.

● Analog Mode

Analog mode is the mode to transmit and receive an analog signal. This mode is available only in Narrow.

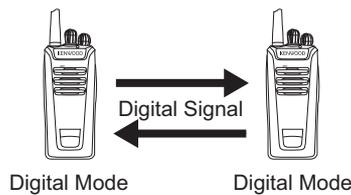


To communicate via a repeater in analog mode, a repeater supporting analog signals (an NXR/ TKR series repeater) is required.

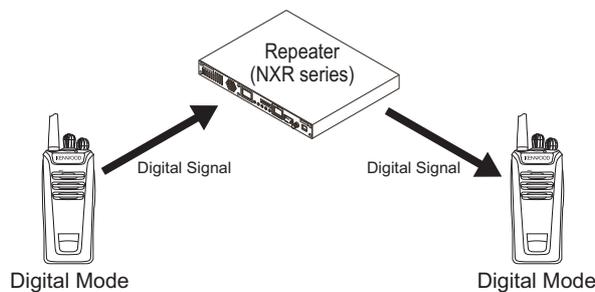


● NXDN Digital Mode

NXDN digital mode is the mode to transmit and receive an NXDN digital signal. This mode is available only in Very Narrow.



To communicate via a repeater in NXDN digital mode, a repeater supporting NXDN (an NXR series repeater) is required.



About Communication Methods

Following are the communication methods that the transceiver can use.

Communication Method	Description	Available System
Voice calls using an NXDN ID	The transceiver can make following individual or group calls by using an NXDN ID. <ul style="list-style-type: none"> • Individual Call • Group Call 	NXDN Conventional System ^{*1}
Data communications using an NXDN ID	The transceiver can make a Status Call by using an NXDN protocol.	NXDN Conventional System ^{*1}
Voice calls using a FleetSync ID	The transceiver can make following voice calls by using a FleetSync ID. <ul style="list-style-type: none"> • Individual Call • Group Call • Fleet Call • Supervisor Call • Broadcast Call 	Analog Conventional System ^{*2}
Data communications using a FleetSync ID	The transceiver can make a Status Message Call by using a FleetSync ID.	Analog Conventional System ^{*2}
Data communications using the MDC-1200 format	The transceiver can use following functions by using the MDC-1200 format. <ul style="list-style-type: none"> • PTT ID Encode • Emergency Encode • Radio Check Decode • Stun/ Revive Decode 	Analog Conventional System ^{*2}
Individual calls using an Optional Signaling	The transceiver can make an individual call by using following Optional Signalings. <ul style="list-style-type: none"> • DTMF • 2-tone • FleetSync ID • NXDN ID 	Analog Conventional System NXDN Conventional System • DTMF, 2-tone, and FleetSync can be used only in an Analog Conventional system. ^{*2} • NXDN ID can be used only in an NXDN Conventional system. ^{*1}
Direct communications between transceivers (Talk Around)	The transceiver can communicate directly with a target transceiver by using the Talk Around function when the transceiver is operated via a repeater.	Analog Conventional System ^{*2} NXDN Conventional System ^{*1}

^{*1} This mode is available only in Very Narrow.

^{*2} This mode is available only in Narrow.

Revision History

日付	内容
2016.9.9	<ol style="list-style-type: none"> 1) Corrected each version information in "About this Manual". 2) Added the FPU name "KPG-175DN" and related information. 3) Added "1 W/ 5 W (350 MHz to 400 MHz) Model" and "5 W/ 25 W/ 45 W (400 MHz to 470 MHz) Model" in "GENERAL FEATURES". 4) Added "12.5 kHz Channels (Narrow)" in "DIGITAL MODES". 5) Added "25.0 kHz Channels (Wide)" in "ANALOG MODES". 6) Added "Revision History". 7) Added the range "350 MHz to 400 MHz" and the step size "3.125 kHz" in "Table 4-1 Transmit/ Receive Frequency Range and Step Size". 8) Added "25.0 kHz (Wide)" and "12.5 kHz (Narrow)" in "Table 4-4 Channel Spacing". 9) Deleted the note from "8 NXDN CONVENTIONAL SYSTEM". 10) Deleted the note from "9 ANALOG CONVENTIONAL SYSTEM". 11) Changed the version number from 1.10 to 1.20.

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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-169D/ KPG-170D/ KPG-175D/ KPG-175DN.

2 GETTING STARTED

Page 4

Assigning Functions to the Keys on the Transceiver

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

3.3 Using Function Keys

Page 10

Writing the Configuration Data to the Transceiver

The data configured by using KPG-169D/ KPG-170D/ KPG-175D/ KPG-175DN can be written to the transceiver. Writing the data configured by using KPG-169D/ KPG-170D/ KPG-175D/ KPG-175DN to the transceiver allows the transceiver to work according to the configuration data.

2.1 Connecting the Transceiver to a PC

Page 4

2.2 Writing the Configuration Data to the Transceiver

Page 6

Reading the Configuration Data from the Transceiver

The configuration data in the transceiver can be read into KPG-169D/ KPG-170D/ KPG-175D/ KPG-175DN. By reading the configuration data written in the transceiver into KPG-169D/ KPG-170D/ KPG-175D/ KPG-175DN, the configuration data can be changed or written to another transceiver.

2.1 Connecting the Transceiver to a PC

Page 4

2.3 Reading the Configuration Data from the Transceiver

Page 7

Transmission/ Reception

Changing Transmit Power

The transmission power of the transceiver can be changed to high power, mid power (Mobile only), or low power.

4.2 Transmission Power

Page 17

Changing the Input Sensitivity of the Microphone

The input sensitivity of the microphone can be changed.

Input Sensitivity of the Microphone (Microphone Sensitivity)

Page 15

Restricting the Duration of Continuous Transmission

Setting the available duration of continuous transmission prevents the transceiver from occupying the frequency.

Restricting the Continuous Transmission Duration (Time-out Timer)
NXDN Conventional

Page 50

Analog Conventional

Page 89

Checking If the Transceiver Receives a Call

The transceiver can search whether the transceiver is receiving a call from another party.

16 SCAN

Page 172

Using Function Keys

Pressing a key to which a function is assigned activates the assigned function.

3.3 Using Function Keys

Page 10

Lighting the LED When Receiving a Call

The LED can be configured to blink orange or blue when the transceiver receives a call with signaling such as DTMF, 2-tone, FleetSync, or NXDN.

5.3 Selective Call Alert LED

Page 19

Sound	<p>Tones Used for the Transceiver</p> <p>Various tones sound from the transceiver according to the operation of the transceiver.</p> <p>6.1 Tones that Sound When a User Operates the Transceiver or When the Transceiver Status Is Changed</p> <p style="text-align: right;">Page 26</p>	<p>Changing the Calling Alert Tone</p> <p>The tone that sounds from the transceiver when the transceiver receives an Individual Call or a Group Call can be changed to the desired tone.</p> <p>6.2 Tones that Sound When the Transceiver Receives a Call</p> <p style="text-align: right;">Page 31</p>
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Functions for NXDN Conventional System	<p>Making an Individual Call</p> <p>A user can call an individual transceiver and initiate voice communication.</p> <p>8.3 Making an Individual Call/ Paging Call</p> <p style="text-align: right;">Page 58</p>	<p>Making a Group Call</p> <p>A user can call a group of transceivers registered as a call group, and initiate two-way voice communication.</p> <p>8.5 Making a Group Call</p> <p style="text-align: right;">Page 66</p>
	<p>Initiating an Individual Call After Ensuring That the Target Party Is Available for Communications</p> <p>A user can initiate an Individual Call after distinguishing that the receiving transceiver is available for communications.</p> <p>8.4 Initiating an Individual Call After Ensuring That the Target Party Is Available for Communications (Individual Call Acknowledge Request)</p> <p style="text-align: right;">Page 61</p>	<p>Sending a Status Message</p> <p>A user can send a simple message called a status.</p> <p>8.7 Sending a Status Message (Status Call)</p> <p style="text-align: right;">Page 72</p>
	<p>Sending the GPS Data (Optional)</p> <p>By using an optional GPS receiver unit, the transceiver can send its own location information to the base station.</p> <p>8.10 Sending GPS Data</p> <p style="text-align: right;">Page 82</p>	<p>Avoiding Interference with Other Communications</p> <p>If a channel to be used for the transceiver to transmit is being used by other parties, the transmission of the transceiver on the channel is automatically restricted.</p> <p>Avoiding Interference with Other Communications (Busy Channel Lockout (NXDN))</p> <p style="text-align: right;">Page 52</p>

Functions for Analog Conventional System	<p>Making a Selective Call Using Signaling</p> <p>A user can initiate a selective call using signaling such as 2-tone, FleetSync, and DTMF. Message communications including a status message are also available by using FleetSync.</p> <p>9.4 Using 2-tone to Initiate a Selective Call</p> <p style="text-align: right;">Page 100</p> <p>9.5 Using FleetSync to Initiate a Selective Call</p> <p style="text-align: right;">Page 104</p> <p>9.6 Using DTMF to Initiate a Selective Call</p> <p style="text-align: right;">Page 104</p>	<p>Sending the GPS Data (Optional)</p> <p>By using an optional GPS receiver unit, the transceiver can send its own location information to the base station. GPS data can be sent by using FleetSync.</p> <p>10.7 Sending GPS Data</p> <p style="text-align: right;">Page 121</p>
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	<p>Avoiding Interference with Other Communications</p> <p>If a channel to be used for the transceiver to transmit is being used by other parties, the transmission of the transceiver on the channel is automatically restricted.</p> <p>Avoiding Interference with Other Communications (Busy Channel Lockout (Analog))</p> <p style="text-align: right;">Page 91</p>	<p>Using Sound to Notify the Reception</p> <p>By sending a tone, a user can notify the other party that the transceiver is receiving a call.</p> <p>6.4 Using Sound to Notify the Reception (Calling Alert Tone) (Analog Conventional System Only)</p> <p style="text-align: right;">Page 33</p>
<p>Security</p>	<p>Enhancing Communication Security</p> <p>The transceiver is equipped with functions to enhance secrecy in communications on each analog channel and digital channel.</p> <p>15 COMMUNICATION SECURITY</p> <p style="text-align: right;">Page 163</p>	<p>Using a Password to Protect the Transceiver</p> <p>A user can set a password to the transceiver so that the transceiver cannot be used by others without the user's permission.</p> <p>20.1 Password for Transceiver Operation (Transceiver Password)</p> <p style="text-align: right;">Page 192</p>
	<p>Using a Password to Protect the Configuration Data of the Transceiver</p> <p>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.</p> <p>20.2 Password for Reading Configuration Data in a PC (Read Authorization Password)</p> <p style="text-align: right;">Page 194</p> <p>20.3 Password for Writing Configuration Data (Overwrite Password)</p> <p style="text-align: right;">Page 194</p>	
<p>Functions of Transceivers for Vehicles (Mobile only)</p>	<p>Turning the Transceiver ON or OFF by Linking with a Vehicle Ignition</p> <p>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.</p> <p>19.1 Turning the Transceiver ON or OFF by Linking with the Ignition Sense Port Status (Ignition Sense)</p> <p style="text-align: right;">Page 188</p>	<p>Turning the Headlights On of the Vehicle or Making the Horn Sound When the Transceiver Receives a Call</p> <p>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.</p> <p>19.2 Controlling Car Behavior by Linking with the Horn Alert Port Status (Horn Alert)</p> <p style="text-align: right;">Page 189</p>

Other Convenient Functions

Locking the Transceiver Keys (Portable Only)

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.

3.8 Locking the Transceiver Keys (Key Lock)
Page 16

Reducing Battery Consumption (Portable Only)

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

7.2 Reducing Battery Consumption (Battery Saver)
Page 47

Using Voice Announcement

Voice announcement can be used to inform a user by voice which zone number and channel number have been selected when a Zone-channel is changed, or whether the Scrambler, Encryption, or VOX function is enabled.

6.7 Using Voice Announcement
Page 37

1.1 NX-240/ 240V/ 340/ 340U



Figure 1-1 NX-240/ 240V/ 340/ 340U Front View

- | | |
|---|---|
| <p>1 Antenna</p> <p>2 Selector
A channel can be changed.</p> <p>3 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.</p> <p>4 Transmit LED/ Busy LED
This LED lights when the transceiver transmits or receives a signal. The LED blinks orange or blue when the transceiver receives various calls.</p> | <p>5 Microphone
Audio is input to the microphone.</p> <p>6 Speaker
The received audio and various tones sound from the speaker.</p> <p>7 2.5 mm/ 3.5 mm Connector
External equipments such as a PC and an optional equipment can be connected to the 2.5 mm/ 3.5 mm connector.</p> |
|---|---|

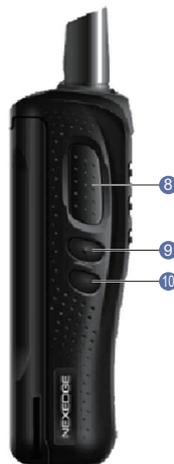


Figure 1-2 NX-240/ 240V/ 340/ 340U Side View

- | | |
|--|--|
| <p>8 PTT Switch
Pressing the PTT switch allows a user to transmit.</p> <p>9 Side 1 Key
The preassigned function will be activated or will be changed to the active state.</p> | <p>10 Side 2 Key
The preassigned function will be activated or will be changed to the active state.</p> |
|--|--|

1.2

NX-740H/ 740HV/ 840H/ 840HU



Figure 1-3 NX-740H/ 740HV/ 840H/ 840HU Front View (Front 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. The [⏻] (Power) switch is described as the **Power** switch in this manual.
- 2 [▲]/ [▼] (Left Up/ Left Down) Key**
The preassigned function will be activated or will be changed to the active state. “Volume Up” and “Volume Down” are assigned to these keys as default to adjust the volume level of the speaker. These [▲] (Left Up) and [▼] (Left Down) keys are described as [▲] and [▼] in this manual.
- 3 LED Display**
The channel number and the transceiver’s status appear with the 2-digit 7-segment LED and dot LEDs.
- 4 [▶]/ [◻] (Right Up/ Right Down) Key**
The preassigned function will be activated or will be changed to the active state. “Zone Up” and “Zone Down” are assigned to these keys as default to change a zone. These [▶] (Right Up) and [◻] (Right Down) keys are described as [▶] and [◻] in this manual.
- 5 Speaker**
The received audio and Alert Tone sound from the speaker.
- 6 LED (Blue)**
If “Blue” is configured for Alert LED Color, the LED blinks blue when the transceiver receives various calls.
In addition, the LED lights blue when various functions, such as Talk Around or Horn Alert, are enabled. (Refer to [5.5 Lighting the LEDs According to the Transceiver’s Status](#) on page 25.)
- 7 Transmit LED/ Busy LED**
This LED lights when the transceiver transmits or receives a signal. The LED blinks orange when the transceiver receives various calls.
- 8 Microphone Connector**
A microphone can be connected to this connector.
- 9 [S] Key**
The preassigned function will be activated or will be changed to the active state.
- 10 [A] Key**
The preassigned function will be activated or will be changed to the active state.
- 11 [Key**
The preassigned function will be activated or will be changed to the active state.
- 12 [<C> Key**
The preassigned function will be activated or will be changed to the active state.
- 13 [▲] (Triangle) Key**
The preassigned function will be activated or will be changed to the active state. The [▲] (Triangle) key is described as the **Triangle** key in this manual.

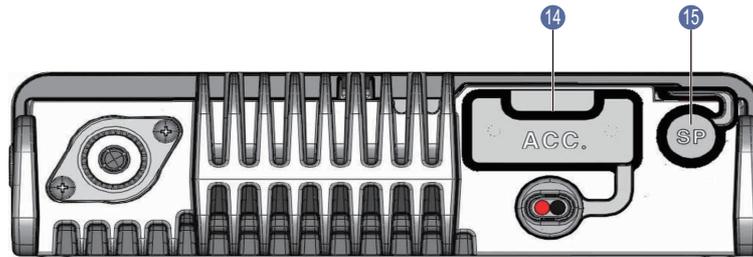


Figure 1-4 NX-740H/ 740HV/ 840H/ 840HU Back View (Rear Panel)

14 D-sub 15-pin Connector (Mobile Only)

A PC or external equipment can be connected to the D-sub 15-pin connector via a connection cable, such as KCT-60.

15 3.5D Jack Connector

An external speaker can be connected to the 3.5D jack connector. An external speaker, such as KES-3, can be connected to the 3.5D jack connector. In this case, the output to the speaker inside the front panel is switched to an external speaker connecting to the 3.5D jack connector. This manual treats an external speaker connecting to the 3.5D jack connector as an internal speaker in the descriptions.

When the transceiver is turned ON after the battery (Portable) or the power source (Mobile) 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-169D/ KPG-170D/ KPG-175D and written to the transceiver.

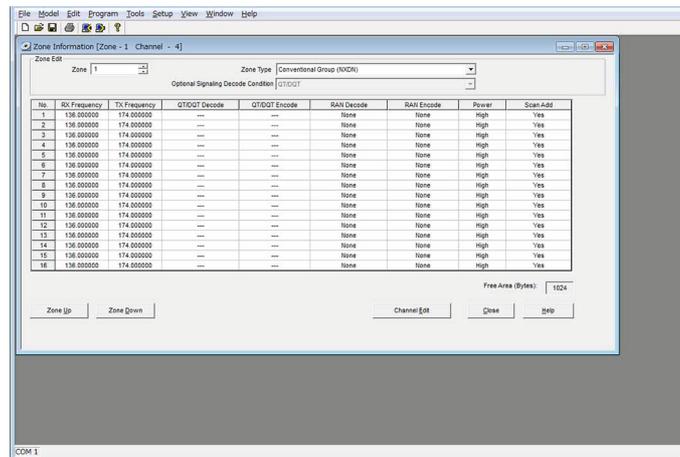


Figure 2-1 KPG-169D/ KPG-170D/ KPG-175D Main Window

By using KPG-169D/ KPG-170D/ KPG-175D, the zone and channel data needs to be configured and then the parameters for various functions can be configured. Refer to the help texts attached to KPG-169D/ KPG-170D/ KPG-175D for the configuration methods.

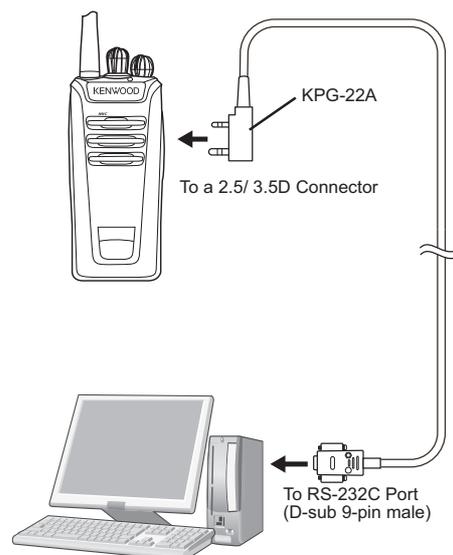
2.1 Connecting the Transceiver to a PC

To write the configuration data to or read the configuration data from the transceiver, the transceiver and a PC with KPG-169D/ KPG-170D/ KPG-175D installed need to be connected by using the programming cable.

Portable

The transceiver and a PC need to be connected by using the KPG-22A or KPG-22U programming cable. Refer to the figure below:

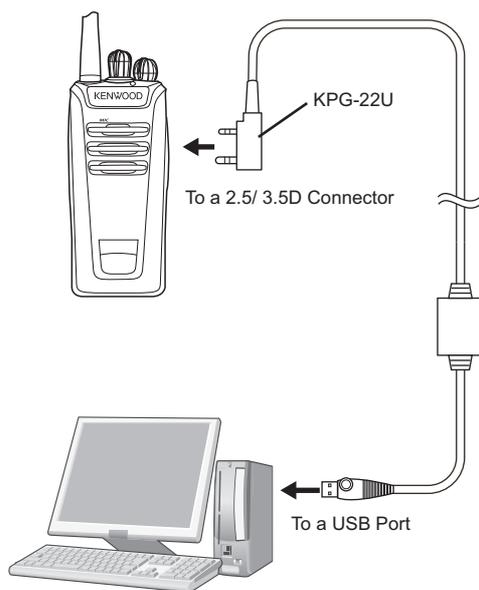
- Using the KPG-22A:



Note

If no RS-232C communication port is available on a PC, convert by using KCT-53U the USB port on the PC to DB 9-pin, and then connect the KPG-22A.

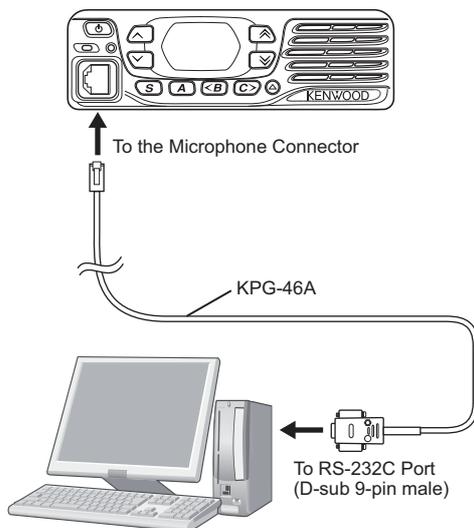
● Using the KPG-22U:



Mobile

The transceiver and a PC need to be connected by using the KPG-46A or KPG-46U programming cable. Refer to the figure below:

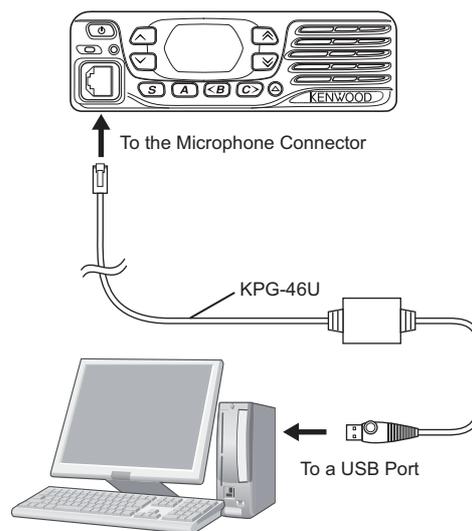
● Using the KPG-46A:



Note

If no RS-232C communication port is available on a PC, convert by using KCT-53U the USB port on the PC to DB 9-pin, and then connect the KPG-46A.

- Using the KPG-46U:



2.2 Writing the Configuration Data to the Transceiver

Selecting “Write Data to the Transceiver” from the **Program** pulldown menu in the main window of KPG-169D/ KPG-170D/ KPG-175D opens the **Write Data to the Transceiver** dialog box. Clicking the “Write” button starts writing the configuration data to the transceiver.

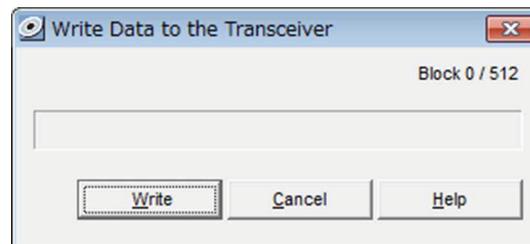


Figure 2-2 Write Data to the Transceiver Dialog Box

Configuration using KPG-169D/ KPG-170D/ KPG-175D

Writing the configuration data to the transceiver ( See Program > Write Data to the Transceiver)

2.3 Reading the Configuration Data from the Transceiver

To change the data configured in the transceiver, read the configuration data from the transceiver to KPG-169D/ KPG-170D/ KPG-175D, and then write the configuration data to the transceiver after the configuration data has been changed.

Selecting “Read Data from the Transceiver” from the **Program** pulldown menu in the main window of KPG-169D/ KPG-170D/ KPG-175D opens the **Read Data from the Transceiver** dialog box. Clicking the “Read” button starts reading the configuration data from the transceiver.

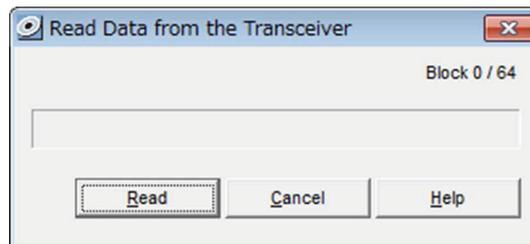


Figure 2-3 Read Data from the Transceiver Dialog Box

Configuration using KPG-169D/ KPG-170D/ KPG-175D

Reading the configuration data from the transceiver ( See Program > Read Data from the Transceiver)

2.4 Embedding a Message in the Transceiver (Embedded Message)

The message can be written to the transceiver by using KPG-169D/ KPG-170D/ KPG-175D.

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-169D/ KPG-170D/ KPG-175D. 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-169D/ KPG-170D/ KPG-175D.

Configuration using KPG-169D/ KPG-170D/ KPG-175D

Configuring the Embedded Message ( See Edit > 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-169D/ KPG-170D/ KPG-175D. The Embedded Message with Password is stored in the transceiver as independent data from the configuration data.

The password must be entered to write a message. 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-169D/ KPG-170D/ KPG-175D.

Configuration using KPG-169D/ KPG-170D/ KPG-175D

Configuring the Embedded Message with Password ( See Edit > Embedded Message with Password)

3.1 Turning the Transceiver ON/ OFF

Turning the Transceiver ON

Portable

A Power-on Tone sounds from the transceiver by rotating the **Power** switch clockwise and the transceiver will be turned ON.

If no data is written to the transceiver when the transceiver is turned ON, the LED lights orange and red alternately and a Blank Channel Tone continues to sound from the transceiver.

If Transceiver Password is configured for the transceiver, a Power-on Tone sounds from the transceiver when the transceiver is turned ON, and then the transceiver enters Transceiver Password Mode and the LED lights blue. The password protection of the transceiver is disabled after the correct password is entered. (Refer to [20.1 Password for Transceiver Operation \(Transceiver Password\)](#) on page 192.)

Mobile

Pressing and holding 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 [19.1 Turning the Transceiver ON or OFF by Linking with the Ignition Sense Port Status \(Ignition Sense\)](#) on page 188.)

If no data is written to the transceiver when the transceiver is turned ON, "--" appears on the LED display.

If Transceiver Password is configured for the transceiver, a Power-on Tone sounds from the transceiver when the transceiver is turned ON, and then the transceiver enters Transceiver Password Mode and "PS" appears on the LED display. The password protection of the transceiver is disabled after the correct password is entered. (Refer to [20.1 Password for Transceiver Operation \(Transceiver Password\)](#) on page 192.)

Turning the Transceiver OFF

Portable

Rotating the **Power** switch counterclockwise until it clicks turns the transceiver OFF.

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 [19.1 Turning the Transceiver ON or OFF by Linking with the Ignition Sense Port Status \(Ignition Sense\)](#) on page 188.)

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.

If “Volume Up (Continuous)” or “Volume Down (Continuous)” is assigned to the **Volume Up** or **Volume Down** key, the volume level will be increased or decreased continuously every 100 ms by holding down the **Volume Up** or **Volume Down** key.

3.3 Using Function Keys

Functions can be assigned to each key of the transceiver using KPG-169D/ KPG-170D/ KPG-175D. Pressing a key to which a function is assigned activates the assigned function. (Refer to [A.1 Available Functions for the PF Keys on page 197.](#))

The following are configuration examples for the **Triangle** key for Mobile and the **Side 2** key for Portable:

Table 3-1 Configuration Examples for Keys

Key	Function		Hold Delay [s]
	Press	Hold	
Triangle	Autodial	None	1.0
Side 2	None	Key Lock	3.0

● Press

The function is activated by pressing a key.

In the configuration example above, pressing the **Triangle** key activates the 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 **Side 2** key for 3 sec activates the function.

A function can be assigned to Hold if Hold Edit is enabled.

Configuration using KPG-169D/ KPG-170D

- Assigning functions to the PF keys ( See Edit > Key Assignment > Key)
- Configuring the Hold Edit to be enabled or disabled ( See Edit > Key Assignment > Key)

Configuration using KPG-175D

- Assigning functions to the PF keys ( See Edit > Key Assignment > Panel)
- Configuring the Hold Edit to be enabled or disabled ( See Edit > Key Assignment > Panel)

Mode Reset Timer

Supported Models: Mobile

Mode Reset Timer is the timer to exit Function Mode of the transceiver. By using this function, a user does not need to exit the Function Mode manually. It also helps a user by exiting 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 LED display and the Mode Reset Timer starts counting down the time. If no key is pressed before the Mode Reset Timer expires, the transceiver reverts to the previous mode.

Mode Reset Timer is used for the following Function Modes:

Table 3-2 Objective Function Modes for Mode Reset Timer

Squelch Level Mode
Scrambler/Encryption Code Mode
Transceiver Password Mode ^{*1}
Channel Entry Mode
Autodial Mode

^{*1} "PS" reappears on the LED display when the duration configured for Mode Reset Timer elapses.

Configuration using KPG-175D

Configuring the Mode Reset Timer ( See Edit > Optional Features > Common 1)

Keypad Operation

Supported Models: Mobile

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

Table 3-3 Keypad Operation

Configuration	Description
None	Pressing a key on the microphone keypad of the transceiver causes an Error Tone to sound, but it has no effect to the transceiver.
Channel Entry	Pressing a key on the microphone keypad can directly specify a channel. (Refer to Changing the Channel by Specifying the Number (Channel Entry) on page 12.)
Operator Selectable Tone	Pressing a key on the microphone keypad can directly select the OST from the OST List 1 to OST List 16. (Refer to 9.3 Changing the Decode/ Encode Combination of QT/DQT to Communicate (OST) on page 97.)
DTMF (Autodial)	Pressing a key on the microphone keypad can select and send a DTMF code configured for the Autodial List. (Refer to 12 DTMF on page 132.)
DTMF (Keypad Auto PTT)	Every time a key on the microphone keypad is pressed, the DTMF code is instantly sent. (Refer to 12 DTMF on page 132.)

Configuration using KPG-175D

Configuring the Keypad Operation ( See Edit > Key Assignment > Microphone Key)

3.4 Changing the Zone

To change a zone, a **PF** key can be used.

Pressing the **Zone Up** key or the **Zone Down** key while Zone 1 is selected changes the zone to Zone 2. Pressing the **Zone Up** key or the **Zone Down** key again changes the zone to Zone 1.

Note

For Mobile, a Minimum Ch Beep sounds from the transceiver when the minimum zone number is selected.

Configuration using KPG-169D/ KPG-170D/ KPG-175D

Assigning functions to the PF keys ( See Edit > Key Assignment)

3.5 Changing the Channel

Portable

To change a channel, the **Selector** can be used.

Rotating the **Selector** causes the transceiver to migrate to the channel having the same number specified by the **Selector**. The transceiver behavior when a Zone-channel is changed varies according to the configurations for Voice Announcement and Zone Type. (Refer to [3.6 Transceiver Behavior When the Zone-channel Is Changed on page 14.](#))

If an unprogrammed channel is selected, a Blank Channel Tone sounds from the transceiver and the LED blinks orange while the channel is selected.

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.

If “Channel Up (Continuous)” or “Channel Down (Continuous)” is assigned to the **Channel Up** or **Channel Down** key, the channel number will be increased or decreased continuously by holding down the **Channel Up** or **Channel Down** key.

The transceiver behavior when a Zone-channel is changed varies according to the configurations for Voice Announcement and Zone Type. (Refer to [3.6 Transceiver Behavior When the Zone-channel Is Changed on page 14.](#))

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

Note

For Mobile, a Minimum Ch Beep sounds from the transceiver when the minimum channel number is selected.

Changing the Channel by Specifying the Number (Channel Entry)

Supported Models: Mobile

Channel Entry can be used to directly migrate to the channel a user wishes to use.

For use of this function, the transceiver needs to enter Channel Entry Mode by pressing the **Channel Entry** key.

After pressing the **Channel Entry** key, a channel in the selected zone can be specified by selecting the channel number by pressing the [**^**] or [**v**] key or the [**<B**] or [**C>**] key, or by directly entering the channel number.

Also, if “Channel Entry” is configured for Keypad Operation, a channel can be specified by pressing the [**0**] to [**9**] keys on the microphone keypad even if the **Channel Entry** key is not pressed.

Operating the Transceiver

● Using the [^]/[v] key or the [<B] or [C>] key

1 Press the Channel Entry key.

The transceiver enters Channel Entry Mode.

If the maximum channel number is a two-digit number, “_ _.” appears on the LED display and the dot on the right side blinks.

If the maximum channel number is a single-digit number, “_.” appears on the LED display and the dot on the right side blinks.

2 Select a channel number by pressing the [^] or [v] key or the [<B] or [C>] key.

Note

- The transceiver behavior when a channel is selected varies according to the configurations for Voice Announcement and Zone Type. (Refer to 3.6 Transceiver Behavior When the Zone-channel Is Changed on page 14.)
- If no key is pressed before the amount of time configured for Mode Reset Timer elapses, the transceiver exits Channel Entry Mode. If a channel number has been selected, the transceiver migrates to the selected channel.

3 Press the [S], [A], or Triangle key.

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

● Using the Microphone Keypad

1 Press the Channel Entry key.

The transceiver enters Channel Entry Mode.

If the maximum channel number is a two-digit number, “_ _.” appears on the LED display and the dot on the right side blinks.

If the maximum channel number is a single-digit number, “_.” appears on the LED display and the dot on the right side blinks.

Note

The following operations are identical even if the transceiver enters Channel Entry Mode with microphone keypad entry (Keypad Operation).

2 Enter a channel number by pressing the [0] to [9] keys on the microphone keypad.

A channel number can be entered as follows:

- **If the maximum channel number has 2 digits:**
To make a call on channel 10, press the [1] and [0] keys in this order.
To make a call on channel 7, press the [0] and [7] keys in this order or [7] and [*] keys in this order.
- **If the maximum channel number has 1 digit:**
To make a call on channel 7, press the [7] key.
If a channel number is entered, the transceiver exits Channel Entry Mode and then migrates to the channel of the number entered.

Note

- If an unprogrammed channel number is entered, an Error Tone sounds from the transceiver and the transceiver exits Channel Entry Mode.
- Pressing the [#] or [A] key deletes the entered number if the maximum channel number has 2 digits. The transceiver exits Channel Entry Mode by pressing the [*] or [A] key while no number is entered.
- If no key is pressed before the amount of time configured for Mode Reset Timer elapses while the transceiver is in Channel Entry Mode, the transceiver exits Channel Entry Mode.

Configuration using KPG-175D

- Assigning functions to the PF keys ( See Edit > Key Assignment)
- Configuring the Keypad Operation ( See Edit > Key Assignment > Microphone Key)

Changing the Zone-channel with a Single Touch (Direct Zone-Channel)

Supported Models: Mobile

Direct Zone-Channel is the function to migrate to the minimum channel in the minimum zone by pressing the **Direct Zone-Channel** key.

Note

The transceiver cannot migrate to a zone of Site Roaming or Site Roaming with RAN.

Configuration using KPG-175D

Assigning functions to the PF keys ( See Edit > Key Assignment)

3.6 Transceiver Behavior When the Zone-channel Is Changed

The transceiver behavior when a Zone-channel is changed varies as below according to the configuration for Voice Announcement or configuration for Zone Type of the newly selected zone: (Refer to [6.7 Using Voice Announcement on page 37.](#))

Table 3-4 Transceiver Behavior When the Zone-channel Is Changed

Configuration for Voice Announcement	Zone Type	Transceiver Behavior		
		LED ^{*1}	Tone ^{*2}	Voice Announcement
Off ^{*3}	Analog	Orange	Zone Indicator Tone Analog Zone Type Tone	-
	NXDN (Digital)	Blue	Zone Indicator Tone Digital Zone Type Tone	-
Zone-Channel ^{*4}	Analog	Orange	-	The zone number, channel number, and zone type ("Analog") are announced vocally.
	NXDN (Digital)	Blue	-	The zone number, channel number, and zone type ("Digital") are announced vocally.
Zone-Channel + Others ^{*4}	Analog	Orange	-	The zone number, channel number, zone type ("Analog"), "Scrambler", and the VOX configuration information (Portable only) are announced vocally.
	NXDN (Digital)	Blue	-	The zone number, channel number, zone type ("Digital"), "Encryption", and the VOX configuration information (Portable only) are announced vocally.

^{*1} The LED lights for 1 sec.

^{*2} A Zone Indicator Tone is the tone used only for Portable. A Zone Indicator Tone sounds first and then an Analog/ Digital Zone Type Tone sounds.

^{*3} If the configuration for Zone Type of the changed zone is the same as the configuration of the zone before the change, the LED does not light. In addition, an Analog/ Digital Zone Type Tone does not sound.

^{*4} If the configuration for Zone Type of the changed zone is the same as the configuration of the zone before the change, the zone type ("Analog" or "Digital") is not announced vocally. Also, the LED does not light.

Note

- For Mobile, if “Off” is configured for Voice Announcement, a Tone A sounds from the transceiver when the **Zone Up/ Zone Down** key or **Channel Up/ Channel Down** key is pressed.
- For Mobile, the zone number is not announced when the **Channel Up** or **Channel Down** key is pressed.

3.7 Transmitting/ Receiving

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 the following chapters for communication methods in each system:

→ [8 NXDN CONVENTIONAL SYSTEM on page 48](#)

→ [9 ANALOG CONVENTIONAL SYSTEM on page 87](#)

Input Sensitivity of the Microphone (Microphone Sensitivity)

Microphone Sensitivity is the input sensitivity of the microphone.

For Portable, the configuration for Microphone Sensitivity is applied to both the built-in microphone and an optional speaker microphone.

For Mobile, the configuration for Microphone Sensitivity is applied to an optional microphone.

The microphone sensitivity can be configured as “Normal”, “High”, or “Low” by using KPG-169D/ KPG-170D/ KPG-175D.

Note

- The microphone input sensitivity in Emergency Mode can be configured for Emergency Microphone Gain. (Refer to [Emergency Microphone Gain on page 156](#).)
- Refer to the service manual for the microphone for Emergency to be installed in the Mobile transceiver.

Configuration using KPG-169D/ KPG-170D/ KPG-175D

Configuring the Microphone Sensitivity ( [See](#) Edit > Optional Features > Optional Features 1 > Common Page 1)

3.8 Locking the Transceiver Keys (Key Lock)

Supported Models: Portable

Key Lock is used to disable the transceiver key operation.

This function can be used to avoid erroneous operation of the transceiver by physically contacting the transceiver while a user is carrying it around the waist, etc.

Using the **Key Lock** or **Key Lock with Status Memory** key toggles Key Lock between activated and deactivated.

● Key Lock key

Pressing the **Key Lock** key toggles Key Lock between activated and deactivated. If the transceiver is turned OFF with Key Lock activated, turning the Transceiver ON again activates the transceiver with Key Lock deactivated.

● Key Lock with Status Memory key

Pressing the **Key Lock with Status Memory** key toggles Key Lock between activated and deactivated. If the transceiver is turned OFF with Key Lock activated, turning the Transceiver ON again activates the transceiver with Key Lock still activated by using the Status Memory.

Even if a key is pressed while Key Lock is activated, the Key-entry Error Tone sounds from the transceiver, but the action has no effect. However, keys assigned with the following functions, the **PTT** switch, and the **Selector** can be used even if Key Lock is activated:

- Key Lock
- Key Lock with Status Memory
- Squelch Off
- Squelch Off Momentary
- Monitor
- Monitor Momentary
- Lone Worker
- Emergency

Operating the Transceiver

● Activating the Key Lock

1 Press the **Key Lock** or **Key Lock with Status Memory** key while Key Lock is deactivated.

A Tone A sounds, and Key Lock will be activated.

● Deactivating the Key Lock

1 Press the **Key Lock** or **Key Lock with Status Memory** key while Key Lock is activated.

A Tone B sounds, and Key Lock will be deactivated.

Configuration using KPG-169D/ KPG-170D

Assigning functions to the PF keys ( Edit > Key Assignment)

4.1 Transmit/ Receive Frequencies

Transmit/ Receive Frequencies is a pair of frequencies used for transmitting and receiving. Transmit and receive frequencies can be configured for each channel.

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

Model	Transmit/ Receive Frequencies	
	Range	In steps of
NX-240/ NX-240V NX-740H/ NX-740HV	136 MHz to 174 MHz	2.5 kHz, 3.125 kHz, 5 kHz, 6.25 kHz, 7.5 kHz
NX-340	450 MHz to 520 MHz 400 MHz to 470 MHz 350 MHz to 400 MHz	3.125 kHz, 5 kHz, 6.25 kHz
NX-340U NX-840H/ NX-840HU	450 MHz to 520 MHz 400 MHz to 470 MHz ^{*1}	3.125 kHz, 5 kHz, 6.25 kHz

^{*1} The range from 400 MHz to 470 MHz does not exist in NX-840HU.

Configuration using KPG-169D/ KPG-170D/ KPG-175D

Configuring the transmit and receive frequencies for a channel ( See Edit > Zone Information > Channel Edit > Page 1)

4.2 Transmission Power

Transmit Power is the transmission power of the transceiver.

Portable

For Portable, a user can use the transceiver by switching the transmission power to high power or low power.

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

Table 4-2 Transmission Power (Portable)

Model	Transmission Power	
	Low	High
NX-240/ NX-240V	1 W	5 W
NX-340/ NX-340U		

Either “High” or “Low” can be configured for Transmit Power for each channel.

If “High” is configured for Transmit Power of the selected channel, the transmit power can be changed to low power by a press of the **Low Transmit Power** key. The low power state is retained even after the transceiver is turned OFF. The transmit power of a channel for which high power is preconfigured can be changed to low power according to the usage environment.

Mobile

For Mobile, a user can use the transceiver by switching the transmission power to high, mid, or low power. If the transceiver is located near repeaters or target party, a user can set the transmission power to be lower in order to avoid causing unnecessary radio interference to other transceivers.

Table 4-3 Transmission Power (Mobile)

Model	Transmission Power		
	Low	Mid	High
NX-740H/ NX-740HV	5 W	25 W	50 W
NX-840H/ NX-840HU	5 W	25 W	45 W

One of “High”, “Mid”, or “Low” can be configured for Transmit Power for each channel.

Configuration using KPG-169D/ KPG-170D/ KPG-175D

Configuring the Transmit Power ( See Edit > Zone Information > Channel Edit > Page 1)

4.3 Channel Spacing

Channel Spacing is the channel spacing used by the transceiver to transmit and receive. The channel spacing is the frequency bandwidth of a channel which the transceiver uses. The following are the channel spacing to be used by a transceiver for transmission and reception:

Table 4-4 Channel Spacing

Zone Type	Bandwidth
Analog	12.5 kHz (Narrow)/ 25.0 kHz (Wide)
NXDN (Digital)	6.25 kHz (Very Narrow)/ 12.5 kHz (Narrow)

Note

The channel spacing value is fixed as shown above; hence, it cannot be changed.

4.4 Beat Shift

Beat Shift can be used to eliminate the influences of heterodyning in the transceiver 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. Beat Shift can be configured for each channel.

Configuration using KPG-169D/ KPG-170D/ KPG-175D

Configuring the Beat Shift to be enabled or disabled ( See Edit > Zone Information (Conventional Group) > Channel Edit > Page 2)

The transceiver is equipped with the LED to be used for notifying a user of the transceiver status, such as transmitting or receiving.

The timing to light or blink the LED or the color of the LED can be configured by using KPG-169D/ KPG-170D/ KPG-175D. In addition, for Mobile, the LED display can be configured by using KPG-175D.

5.1 Busy LED

Busy LED is used to notify a user visually that the transceiver has received a signal.

The Busy LED lights green while the transceiver is receiving a signal.

Also, whether the Busy LED will light while the transceiver receives in Emergency Mode can be configured. (Refer to [Emergency LED on page 158.](#))

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. (Refer to [Emergency LED on page 158.](#))

5.3 Selective Call Alert LED

Selective Call Alert LED is used to notify a user visually that the transceiver has received various calls.

The LED blinks as follows when the transceiver receives a call using such signaling as DTMF, 2-tone, FleetSync, or NXDN:

- **Portable**

The Busy LED blinks orange or blue.

- **Mobile**

The Busy LED blinks orange, or the LED blinks blue.

Whether to use the Selective Call Alert LED can be configured for each signaling. The color of the blinking LED can also be configured for each signaling.

Configuration using KPG-169D/ KPG-170D/ KPG-175D

- Configuring the Selective Call Alert LED (DTMF) ( See Edit > DTMF > Decode)
- Configuring the Selective Call Alert LED (2-tone) ( See Edit > 2-tone > Decode (2-tone 1 to 3))
- Configuring the Selective Call Alert LED (FleetSync) ( See Edit > FleetSync > General 2 > LED)
- Configuring the Selective Call Alert LED (NXDN) ( See Edit > NXDN > Conventional)
- Configuring the color of the LED of when receiving a call (DTMF) ( See Edit > DTMF > Decode > LED)
- Configuring the color of the LED while receiving a call (2-tone) ( See Edit > 2-tone > Decode (2-tone 1 to 3) > Decode LED)
- Configuring the color of the LED while receiving a call (FleetSync) ( See Edit > FleetSync > General 2 > LED)
- Configuring the color of the LED while receiving a call (NXDN) ( See Edit > NXDN > Conventional > Alert LED Color)

5.4 LED Display

Supported Models: Mobile

Mobile is equipped with the 2-digit 7-segment LED display. A channel number or the transceiver status appears on the LED display.

The transceiver displays alphanumeric characters and symbols, or the transceiver status by lighting the 7 bars and the dots.

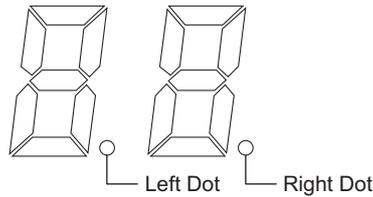


Figure 5-1 LED Display

The following are the alphanumeric characters and symbols that can be displayed on the LED display:

0	1	2	3	4	5	6	7	8	9
A	B	C	D	E	F	G	H	I	J
K	L	M	N	O	P	Q	R	S	T
Not Available		Not Available							
U	V	W	X	Y	Z	-	-	SPACE	
	Not Available	Not Available	Not Available		Not Available				

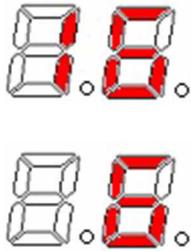
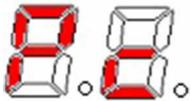
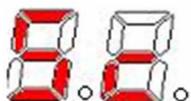
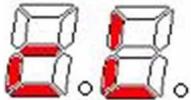
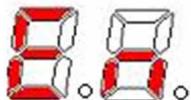
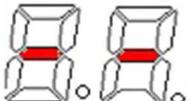
Figure 5-2 Displayable Alphanumeric Characters and Symbols

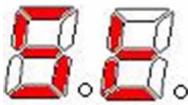
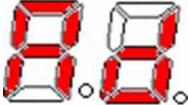
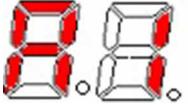
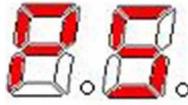
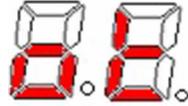
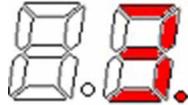
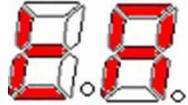
Indication on the LED Display

Supported Models: Mobile

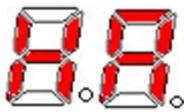
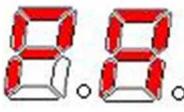
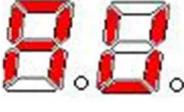
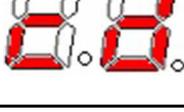
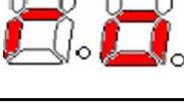
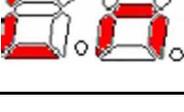
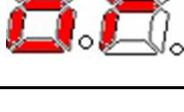
Alphanumeric characters and symbols appear on the LED display as below according to the transceiver status:

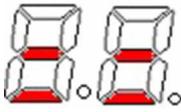
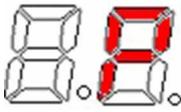
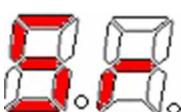
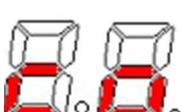
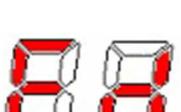
Table 5-1 Indication on the LED Display

Status	Indication	Remarks
Displaying the channel number		Refer to 3.5 Changing the Channel on page 12.
<ul style="list-style-type: none"> Communicating with a PC Receiving data in Clone Mode (Target Radio) 		Refer to 21.1 Copying the Configuration Data to Another Transceiver (Clone Mode) on page 195.
Scanning		Refer to 16 SCAN on page 172.
Sending data in Clone Mode (Source Radio)		Refer to 21.1 Copying the Configuration Data to Another Transceiver (Clone Mode) on page 195.
Clone behavior completed (Source Radio)		Refer to 21.1 Copying the Configuration Data to Another Transceiver (Clone Mode) on page 195.
<ul style="list-style-type: none"> Error occurred during Clone behavior (Target Radio) No response received from the receiving transceiver when sending a Status Message 		Refer to 21.1 Copying the Configuration Data to Another Transceiver (Clone Mode) on page 195. NXDN: Refer to 8.7 Sending a Status Message (Status Call) on page 72. FleetSync: Refer to 10.6 Sending a Status Message (Status Call) on page 118.
<ul style="list-style-type: none"> No data written in the transceiver Kill state 		Refer to Turning the Transceiver ON on page 9. NXDN: Refer to 8.11 Disabling the Transceiver Capability by Remote Control (Stun/ Kill) on page 85. FleetSync: Refer to 10.8 Disabling the Transceiver Capability by Remote Control (Stun/ Kill) on page 125.

Status	Indication	Remarks
Stun state		NXDN: Refer to 8.11 Disabling the Transceiver Capability by Remote Control (Stun/ Kill) on page 85. Analog: Refer to 9.10 Disabling the Transceiver Capability by Remote Control (Stun) on page 106.
Autodial Mode	Autodial  Autodial list number  Redial 	Refer to 12 DTMF on page 132.
Transceiver Password Mode		Refer to 20.1 Password for Transceiver Operation (Transceiver Password) on page 192.
Operator Selectable Tone Mode		Appears for 1 sec when the transceiver enters Operator Selectable Tone Mode. Refer to 9.3 Changing the Decode/ Encode Combination of QT/DQT to Communicate (OST) on page 97.
Squelch Level Mode	 	"SL" appears for 1 sec when the transceiver enters Squelch Level Mode. Subsequently, the current squelch level appears and the right dot blinks. Refer to Adjusting the Squelch Level (Squelch Level) on page 88.
Talk Around		Appears for 1 sec when Talk Around becomes enabled. NXDN: Refer to Communicating Without Using a Repeater (Talk Around) on page 53. Analog: Refer to Communicating Without Using a Repeater (Talk Around) on page 92.

5.4 LED Display

Status	Indication	Remarks
Horn Alert		Appears for 1 sec when Horn Alert becomes enabled. Refer to 19.2 Controlling Car Behavior by Linking with the Horn Alert Port Status (Horn Alert) on page 189.
Public Address		Appears for 1 sec when Public Address becomes enabled. Refer to 6.6 Using the Transceiver as a Megaphone (Public Address) on page 35.
AUX		Appears for 1 sec when AUX becomes enabled. Refer to 18.2 Available Functions for AUX Output Ports on page 185.
Displaying the zone		Refer to 3.4 Changing the Zone on page 12.
Scan Add channel		Refer to Adding or Deleting a Channel to/from the Target Channels for Scanning (Scan Delete/Add) on page 176.
Scan Delete channel		Refer to Adding or Deleting a Channel to/from the Target Channels for Scanning (Scan Delete/Add) on page 176.
Site Roaming		Refer to 8.9 Site Roaming on page 76.
Lone Worker Mode		Appears for 1 sec when the transceiver enters Lone Worker Mode. Refer to 14.6 Placing the Transceiver in Emergency Mode Using Lone Worker on page 161.
Operator Selectable Tone Off		Refer to Disabling the QT/DQT Decode/ Encode (Tone Off) on page 99.
<ul style="list-style-type: none"> Sending or receiving a Status Message Sending GPS data 		NXDN: Refer to 8.7 Sending a Status Message (Status Call) on page 72. Refer to 8.10 Sending GPS Data on page 82. FleetSync: Refer to 10.6 Sending a Status Message (Status Call) on page 118. Refer to 10.7 Sending GPS Data on page 121.

Status	Indication	Remarks
Busy state while sending GPS data		NXDN: Refer to 8.10 Sending GPS Data on page 82 . FleetSync: Refer to 10.7 Sending GPS Data on page 121 .
Priority Channel		Appears for 1 sec when selecting a Priority Channel or when the selected channel is changed to a Priority Channel by using the Priority Zone-Channel Select key. Refer to 16.2 Scanning the Specific Channel Preferentially (Priority Scan) on page 172 .
Voice Scrambler		Appears for 1 sec when Voice Scrambler becomes enabled. Refer to 15.1 Built-in Voice Scrambler (Analog) on page 163 .
Encryption Display		Appears for 1 sec when Encryption becomes enabled. Refer to 15.2 Encryption (NXDN Digital) on page 166 .
Scrambler/Encryption Code Mode		Analog: Refer to Configuring the Scrambler Code on page 164 . NXDN: Refer to Configuring the Encryption Key Data Used for Communications on page 168 .
Status Message transmission completed		NXDN: Refer to 8.7 Sending a Status Message (Status Call) on page 72 . FleetSync: Refer to 10.6 Sending a Status Message (Status Call) on page 118
Writing the Voice Announcement data to the transceiver		Refer to 6.7 Using Voice Announcement on page 37

Changing the Brightness of the LED Display (LED Brightness)

Supported Models: Mobile

LED Brightness is the function to adjust the brightness of the LED display. The transceiver can be used in dark places or at night by obscuring the brightness of the LED display.

Pressing the **LED Brightness** key gradates the brightness of the LED display. The brightness level changes in the following order: High → Low → Off. If the brightness level is changed to "Off", the LED of the **PF** key will also be turned off. Status of the backlight's brightness (High or Low) that was changed by the **LED Brightness** key is retained even after the transceiver is turned OFF. If the backlight's brightness level is set to "Off", the status is not retained even after the transceiver is turned OFF. In this case, the transceiver starts up with Low state when the transceiver is turned ON. The brightness of the LED display can also be changed using KPG-175D.

Configuration using KPG-175D

- Configuring the LED Brightness Level ( Edit > Optional Features > Common 1)
- Assigning functions to the PF keys ( Edit > Key Assignment)

5.5 Lighting the LEDs According to the Transceiver's Status

Supported Models: Mobile

By using the combination of lighting LED (blue) and 2 dots on the LED display (the left dot and the right dot), the status of each of the following functions can be indicated (either enabled or disabled):

- Talk Around
- Priority Zone-Channel
- Scan-Delete/Add
- Scrambler/ Encryption
- Horn Alert
- AUX
- Lone Worker
- Public Address
- External Speaker

By using KPG-175D, which LEDs can light when each function is enabled can be configured for each function.

Configuration using KPG-175D

Configuring the lighting behavior of LEDs ( Edit > Optional Features > LED)

6.1

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

Below is a list of the tones used for the transceiver.

Table 6-1 Tone List

Tone	Description and Type	Remarks
Power-on Tone	Power-on Tone	
Control Tone	Tone A Tone B Error Tone Priority-channel Stop Tone Analog Zone Type Tone Digital Zone Type Tone Zone Indicator Tone Busy Tone FleetSync Side Tone FleetSync Individual Tone FleetSync Group Tone Call Request Tone Call in Progress Tone Disconnect Indication Tone Volume Tone Minimum Ch Beep	Portable: Whether to emit the tone can be configured using KPG-169D/ KPG-170D. Mobile: The volume level of various tones can be configured by using KPG-175D.
Alert Tone	Special Alert Tone	
Warning Tone	Warning Tone A Warning Tone B Warning Tone C Blank Channel Tone Battery Low Warning Tone TOT Pre-Alert Tone Unlock Tone No Reply Tone Lone Worker Tone Call Processing Tone Timed Power-off Pre-alert Tone 1 Timed Power-off Pre-alert Tone 2 Timed Power-off Pre-alert Tone 3	
Locator Tone	Locator Tone	
Sidetone	PTT Proceed Tone VOX Proceed Tone	For Mobile, the volume level of various tones can be configured by using KPG-175D. However, VOX Proceed Tone is not available for Mobile.
Transmit Tone	PTT Release Tone Stun On Tone Stun Off Tone Transpond Tone Group Call Beep	

Power-on Tone

A Power-on Tone sounds from the transceiver when the transceiver is turned ON.

For Portable, whether to emit the Power-on Tone can be configured using KPG-169D/ KPG-170D.

For Mobile, the volume level of Power-on Tone can be configured using KPG-175D. (Refer to [Configuring the Volume Level of Various Tones \(Tone Volume\)](#) on page 35.)

Table 6-2 Power-on Tone

Function	Description
Power-on Tone	This tone sounds from the transceiver when the transceiver is turned ON.

Configuration using KPG-169D/ KPG-170D

Configuring whether to emit the Power-on Tone from the transceiver ( Edit > Optional Features > Common 2 > Tone)

Configuration using KPG-175D

Configuring the volume level of Power-on Tone ( Edit > Optional Features > Common 2 > Tone Volume)

Control Tone

A Control Tone sounds when a function is activated by a user operating the transceiver.

For Portable, whether to emit the Control Tone can be configured using KPG-169D/ KPG-170D.

For Mobile, the volume level of Control Tone can be configured by using KPG-175D. (Refer to [Configuring the Volume Level of Various Tones \(Tone Volume\)](#) on page 35.)

Table 6-3 Control Tone

Function	Description
Tone A	This tone sounds from the transceiver when a function is enabled by pressing a key.
Tone B	This tone sounds from the transceiver when the transceiver exits from each mode. This tone sounds from the transceiver when a function is disabled by pressing a key.
Error Tone	This tone sounds from the transceiver when the operation activated by pressing a key is denied.
Priority-channel Stop Tone	This tone sounds from the transceiver when the scan is paused on a Priority-channel.
Analog Zone Type Tone	This tone sounds from the transceiver when an analog zone is selected.
Digital Zone Type Tone	This tone sounds from the transceiver when an NXDN digital zone is selected.
Zone Indicator Tone (Portable only)	This tone sounds from the transceiver when the Zone-channel is changed.
Busy Tone	This tone sounds from the transceiver if the transceiver cannot send the GPS data or Status Message since the channel is busy. This tone also sounds from the transceiver if no transmit frequency is configured when the transceiver sends the GPS data or Status Message on a Data Zone-Channel.
FleetSync Side Tone	This tone sounds from the transceiver when the transceiver transmits a FleetSync PTT ID (BOT).
FleetSync Individual Tone	This tone sounds from the transceiver when the transceiver transmits a FleetSync Individual Call.
FleetSync Group Tone	This tone sounds from the transceiver when the transceiver transmits a FleetSync Group Call.

Function	Description
Call Request Tone	This tone sounds from the transceiver when the transceiver initiates an Individual Call Acknowledge Request in an NXDN Conventional system. (Refer to Notifying the User with a Tone That a Call Request Has Been Initiated (Call Request Tone) on page 64.)
Call in Progress Tone	This tone sounds from the transceiver when the transceiver initiates an Individual Call Acknowledge Request and becomes available for communication,
Disconnect Indication Tone	This tone sounds from the transceiver when the transceiver terminates an Individual Call Acknowledge Request.
Volume Tone (Mobile only)	This tone sounds from the transceiver when the Volume Up or Volume Down key is pressed.
Minimum Ch Beep (Mobile only)	This tone sounds from the transceiver when the zone or channel having the lowest number is selected.

Configuration using KPG-169D/ KPG-170D

Configuring whether to emit the Control Tone from the transceiver ( [See](#) Edit > Optional Features > Common 2 > Tone)

Configuration using KPG-175D

Configuring the volume level of Control Tone ( [See](#) Edit > Optional Features > Common 2 > Tone Volume)

Alert Tone

Alert Tone sounds from the transceiver when the transceiver receives a call by the Optional Signaling.

For Portable, whether to emit the Alert Tone can be configured using KPG-169D/ KPG-170D.

For Mobile, the volume level of Alert Tone can be configured using KPG-175D. (Refer to [Configuring the Volume Level of Various Tones \(Tone Volume\)](#) on page 35.)

Table 6-4 Alert Tone

Function	Description
Special Alert Tone	This tone sounds from the transceiver when the transceiver receives a call by the Optional Signaling. A maximum of 8 types of tones can be arbitrarily configured or changed. (Refer to Configuring the Alert Tone (Alert Tone Pattern) on page 31.)

Configuration using KPG-169D/ KPG-170D

Configuring whether to emit the Alert Tone from the transceiver ( [See](#) Edit > Optional Features > Common 2 > Tone)

Configuration using KPG-175D

Configuring the volume level of Alert Tone ( [See](#) Edit > Optional Features > Common 2 > Tone Volume)

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.

For Portable, whether to emit the Warning Tone can be configured using KPG-169D/ KPG-170D.

For Mobile, the volume level of Warning Tone can be configured using KPG-175D. (Refer to [Configuring the Volume Level of Various Tones \(Tone Volume\) on page 35.](#))

Table 6-5 Warning Tone

Function	Description
Warning Tone A	This tone sounds from the transceiver if the PTT switch is pressed in the following conditions. <ul style="list-style-type: none"> The transceiver cannot transmit due to the Busy Channel Lockout, Time-out Timer, or Stun function. No transmit frequency is configured for the selected channel.
Warning Tone B (Portable only)	This tone sounds from the transceiver if the transceiver transmits by using the VOX function in the following conditions. <ul style="list-style-type: none"> The transceiver cannot transmit due to the Busy Channel Lockout, Time-out Timer, or Stun function. No transmit frequency is configured for the selected channel.
Warning Tone C (Portable only)	This tone sounds from the transceiver if the transceiver transmits by means other than by using the PTT switch or VOX function in the following conditions. <ul style="list-style-type: none"> The transceiver cannot transmit due to the Busy Channel Lockout, Time-out Timer, or Stun function. No transmit frequency is configured for the selected channel.
Blank Channel Tone	This tone sounds from the transceiver if an unprogrammed channel is selected.
Battery Low Warning Tone (Portable only)	This tone sounds from the transceiver when the battery voltage level goes lower than the warning voltage level.
TOT Pre-alert Tone	This tone sounds from the transceiver when the transmit inhibit period configured in the Time-out Timer is about to expire.
Unlock Tone	This tone sounds from the transceiver when PLL is unlocked.
No Reply Tone	This tone sounds from the transmitting transceiver if no response has been received from the receiving transceiver during the data communication in an NXDN Conventional system.
Lone Worker Tone	This tone sounds from the transceiver when the amount of time configured for Lone Worker Interval elapses after the transceiver enters Lone Worker Mode.
Call Processing Tone	This tone sounds from the transceiver while the transceiver initiates an Individual Call Acknowledge Request until the call request is established. (Refer to Notifying the User with a Tone That a Call Request Is in Progress (Call Processing Tone) on page 65.)
Timed Power-off Pre-alert Tone 1 (Mobile only)	This tone sounds from the transceiver 1 min before the time configured for Timed Power-off elapses.
Timed Power-off Pre-alert Tone 2 (Mobile only)	This tone sounds from the transceiver 10 sec before the time configured for Timed Power-off elapses.
Timed Power-off Pre-alert Tone 3 (Mobile only)	This tone sounds from the transceiver 2 sec before the time configured for Timed Power-off elapses.

Configuration using KPG-169D/ KPG-170D

Configuring whether to emit the Warning Tone from the transceiver ( See Edit > Optional Features > Common 2 > Tone)

Configuration using KPG-175D

Configuring the volume level of Warning Tone ( See Edit > Optional Features > Common 2 > Tone Volume)

Locator Tone

A Locator Tone sounds from the transceiver before the automatic transmission in Emergency Mode starts and when the automatic transmission ends.

Only for Mobile, the volume level of Locator Tone can be configured using KPG-175D. (Refer to [Configuring the Volume Level of Various Tones \(Tone Volume\)](#) on page 35.)

Table 6-6 Locator Tone

Function	Description
Locator Tone	A Locator Tone 1 sounds from the transceiver before the automatic transmission in Emergency Mode starts. A Locator Tone 2 sounds from the transceiver when the automatic transmission in Emergency Mode ends. The transceiver automatically repeat the transmission and reception in Emergency Mode for the number of times specified for Emergency Cycle. (Refer to 14.3 Automatically Transmitting and Receiving in Emergency Mode on page 155.)

Configuration using KPG-175D

Configuring the volume level of Locator Tone ( Edit > Optional Features > Common 2 > Tone Volume)

Sidetone

Sidetone sounds from the transceiver when the transceiver can communicate or the transceiver completes a transmission. Only for Mobile, the volume level of Sidetone can be configured using KPG-175D. However, VOX Proceed Tone is not available for Mobile. (Refer to [Configuring the Volume Level of Various Tones \(Tone Volume\)](#) on page 35.)

Table 6-7 Sidetone

Function	Description
PTT Proceed Tone	This tone sounds from the transceiver when the transceiver becomes available for communications after the PTT switch is pressed. (Refer to Using Sound to Notify the Timing to Start Communications (PTT Proceed Tone) on page 32.)
VOX Proceed Tone (Portable only)	This tone sounds from the transceiver when the transceiver transmits by using the VOX function. (Refer to 17.6 Notifying a User of the Start of a VOX Transmission with a Tone (VOX Proceed Tone) on page 181.)

Configuration using KPG-175D

Configuring the volume level of Sidetone ( Edit > Optional Features > Common 2 > Tone Volume)

Transmit Tone

This tone sounds from the transceiver when the transmission ends or when the Stun status is activated or deactivated.

Table 6-8 Transmit Tone

Function	Description
PTT Release Tone	This tone sounds from the transceiver when the PTT switch is released after the communication ends. (Refer to Using Sound to Notify the Other Party that the Communication Ends (PTT Release Tone) on page 33.)
Stun On Tone	This tone sounds from the transceiver when the transceiver is placed in the Stun state.
Stun Off Tone	This tone sounds from the transceiver when the Stun state of the transceiver is reset.
Transpond Tone	This tone is sent if the received DTMF code or 2-tone code matches the preconfigured DTMF code or 2-tone code in the transceiver while "Alert" is configured for Transpond.
Group Call Beep	This tone sounds from the transceiver when the transceiver receives a group call with a DTMF Group Code.

6.2 Tones that Sound When the Transceiver Receives a Call

An Alert Tone sounds from the transceiver when the transceiver receives an Individual Call or a Group Call and notifies the user of the reception.

The Alert Tone pattern can be configured by selecting from 8 types of tones configured for Special Alert Tone. (Refer to [Configuring the Alert Tone \(Alert Tone Pattern\) on this page.](#))

Following are the types of Alert Tone.

Table 6-9 Alert Tone

DTMF	
Alert Tone (Individual Call)	This tone sounds from the transceiver when the transceiver receives an Individual Call using DTMF.
Alert Tone (Group Call)	This tone sounds from the transceiver when the transceiver receives a Group Call using DTMF.
2-tone	
Alert Tone	This tone sounds from the transceiver when the transceiver receives a call using a 2-tone code.
FleetSync	
Alert Tone (Individual Call)	This tone sounds from the transceiver when the transceiver receives an Individual Call using FleetSync.
Alert Tone (Other Selective Calls)	This tone sounds from the transceiver when the transceiver receives a Group Call, Fleet Call, Supervisor Call, or Broadcast Call using FleetSync.
Alert Tone (Paging Call)	This tone sounds from the transceiver when the transceiver receives a Paging Call using FleetSync.
NXDN	
Alert Tone (Individual Call)	This tone sounds from the transceiver when the transceiver receives an Individual Call using NXDN.
Alert Tone (Group Call)	This tone sounds from the transceiver when the transceiver receives a Group Call using NXDN.
Alert Tone (Paging Call)	This tone sounds from the transceiver when the transceiver receives a Paging Call using NXDN.

Configuration using KPG-169D/ KPG-170D/ KPG-175D

- Configuring various Alert Tones (DTMF) ( [See](#) Edit > DTMF > Decode > Alert Tone)
- Configuring the Alert Tone (2-tone) ( [See](#) Edit > 2-tone > Decode (2-tone 1 to 3))
- Configuring various Alert Tones (FleetSync) ( [See](#) Edit > FleetSync > General 2 > Alert Tone)
- Configuring various Alert Tones (NXDN) ( [See](#) Edit > NXDN > Conventional > 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 selected from 8 patterns of Alert Tones. An Alert Tone pattern consists of 16 tones.

Alert Tone Pattern can be configured by using KPG-169D/ KPG-170D/ KPG-175D. The following table shows the configuration items.

Table 6-10 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. 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-169D/ KPG-170D/ KPG-175D

Configuring the Alert Tone Pattern ( See Edit > 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 a tone that sounds from the transceiver when the transceiver becomes available by a user pressing the **PTT** switch.

A user must wait to start communications until the transceiver becomes available for communications 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. If a user starts speaking at the time when the PTT Proceed Tone sounds from the transceiver in this situation, this allows communications to start without losing the first part of the call.

The PTT Proceed Tone sounds from the transceiver if the transceiver can modulate the audio signals after starting transmission, and the amount of time configured for Proceed Tone Delay Time elapses.

Note

- The transceiver does not transmit audio signals until the PTT Proceed Tone stops sounding even if the transceiver starts transmitting by a user pressing the **PTT** switch.
- The PTT Proceed Tone does not sound on a channel in an Analog Conventional system where a PTT ID (DTMF, FleetSync, or MDC-1200) is configured to be sent when the transmission starts. In this case, a tone sounds from the transceiver according to the configuration for Sidetone (DTMF/ 2-tone) or PTT ID Sidetone (FleetSync/ MDC-1200).

Configuration using KPG-169D/ KPG-170D/ KPG-175D

- Configuring whether to emit the PTT Proceed Tone ( See Edit > Optional Features > Common 2 > PTT Proceed Tone)
- Configuring the Proceed Tone Delay Time ( See Edit > Optional Features > Common 2 > PTT Proceed Tone)

Using Sound to Notify the Other Party that the Communication Ends (PTT Release Tone)

PTT Release Tone can be used to notify the receiving party by audible tone that the communication has completed by releasing the **PTT** switch. 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 and then finishes the actual transmission when the call is ended by releasing the **PTT** switch.

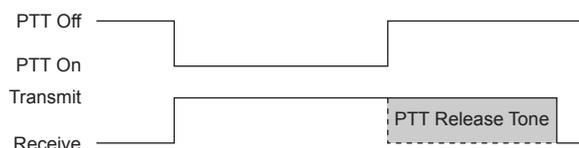


Figure 6-1 PTT Release Tone

For Mobile, the volume level of PTT Release Tone outputting from the caller (Transmit Tone Deviation) can also be configured.

Configuration using KPG-169D/ KPG-170D/ KPG-175D

Configuring the PTT Release Tone ( See Edit > Optional Features > Common 1)

Configuration using KPG-175D

Configuring the Transmit Tone Deviation ( See Edit > Optional Features > Common 1)

6.4

Using Sound to Notify the Reception (Calling Alert Tone) (Analog Conventional System Only)

Supported Models: Portable

Calling Alert Tone is the function sending the tone to notify the other party that the transceiver is receiving a call.

A Calling Alert Tone is sent to the other party if the **Calling Alert** key is pressed while transmitting by pressing the **PTT** switch. The sent Calling Alert Tone sounds from the receiving transceiver.

Releasing the **Calling Alert** key stops sending the Calling Alert Tone. The Calling Alert Tone stops sounding from the receiving transceiver.

By using KPG-169D/ KPG-170D, the Calling Alert Tone pattern can be configured by selecting from 10 types of tones.

Note

- If the Time-out Timer expires, the transmission ends and the transceiver stops sending the Calling Alert Tone. After the Time-out Timer expires, the Warning Tone A sounds from the transceiver if the **PTT** switch and the **Calling Alert** key are still being pressed.
- The Calling Alert Tone cannot be sent while transmitting by using the VOX function.
- The Calling Alert Tone cannot be sent while transmitting a PTT ID.

Configuration using KPG-169D/ KPG-170D

Configuring the Calling Alert Tone ( See Edit > Optional Features > Common 1)

6.5 Functions Related to the Volume Configuration

The following functions are relevant to the volume configuration:

- Minimum Volume
- Maximum Volume
- Tone Volume

Configuring the Minimum Volume Level (Minimum Volume)

Portable

For Portable, Minimum Volume can be used to retain the minimum volume level even if the **Volume** control is turned to its lowest level.

The remaining volume of audio prevents the user from failing to hear the received audio even if the **Volume** control has been fully turned down erroneously. If Minimum Volume is not configured, received audio does not sound when the **Volume** control is fully turned down.

Mobile

For Mobile, how the Minimum Volume will function varies depending on the configuration for Minimum Volume Type.

● If “Preset” is configured for Minimum Volume Type

Minimum Volume enables the volume level configured for Minimum Volume to be applied when the transceiver is turned ON again after the volume level was fully turned down and the transceiver was turned OFF.

● If “Lowest Limit” is configured for Minimum Volume Type

Minimum Volume can be used to maintain an audible volume level even if the volume level is turned down.

The remaining volume of audio prevents the user from failing to hear the received audio even if the **Volume** control has been fully turned down erroneously. Turning up the volume causes the volume level to be increased from the audio level configured for the volume level. If “0” is configured for Minimum Volume, received audio does not sound when the **Volume** control is fully turned down.

Configuration using KPG-169D/ KPG-170D

Configuring the Minimum Volume ( See Edit > Optional Features > Common 2 > Minimum Volume)

Configuration using KPG-175D

- Configuring the Minimum Volume ( See Edit > Optional Features > Common 2 > Audio Tone)
- Configuring the Minimum Volume Type ( See Edit > Optional Features > Common 2 > Audio Tone)

Configuring the Maximum Volume Level (Maximum Volume)

Supported Models: Mobile

Maximum Volume can be used 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-175D

Configuring the Maximum Volume ( See Edit > Optional Features > Common 2 > Audio Tone)

Configuring the Volume Level of Various Tones (Tone Volume)

Supported Models: Mobile

Tone Volume can be used 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 of the following tones can be configured using KPG-175D:

- Power-on Tone
- Control Tone
- Warning Tone
- Alert Tone
- Sidetone
- Locator Tone

Following are the types of tone volume that can be configured:

Table 6-11 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.

Configuration using KPG-175D

Configuring the Tone Volume of various tones ( See Edit > Optional Features > Common 2 > Tone Volume)

6.6 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 emit from the external speaker for Public Address that is connected to the D-sub 15-pin connector of the transceiver rear panel.

Operating the Transceiver

● Enabling the Public Address

1 Press the **Public Address** key while **Public Address** is disabled.

A Tone A sounds from the transceiver and Public Address becomes enabled. "PA" appears for 1 sec on the LED display. If the 2 dots on the LED display (the left dot and the right dot) and the LED (blue) are configured to light, each LEDs lights while Public Address is enabled.

● Disabling the Public Address

1 Press the **Public Address** key while **Public Address** is enabled.

A Tone B sounds from the transceiver and Public Address becomes disabled.

 Note

- While Public Address is enabled, the transceiver cannot transmit.
- To use Public Address, an external speaker for Public Address is required. Refer to the service manual for instructions on how to connect an external speaker for Public Address to the transceiver.
- While the Public Address function is used by pressing the **PTT** switch, only the following keys are activate.
 - Emergency
 - LED Brightness
 - Volume Down/ Volume Up
- While Public Address is enabled, Public Address is disabled by operating one of the following keys:
 - AUX
 - Autodial
 - Call 1/ Call 2
 - Channel Down/ Channel Up
 - Channel Entry
 - CW Message
 - Direct Zone-Channel
 - Emergency
 - External Speaker
 - Lone Worker
 - Operator Selectable Tone
 - Paging Call
 - Priority Zone-Channel Select
 - Public Address
 - Scan
 - Scrambler/Encryption Code
 - Send the GPS data
 - Squelch Level
 - Talk Around
 - Zone Down/ Zone Up
- The transceiver can be configured to light the 2 dots on the LED display (the left dot and the right dot) and the LED (blue) when the Public Address is enabled. (Refer to [5.5 Lighting the LEDs According to the Transceiver's Status on page 25.](#))

Configuration using KPG-175D

Assigning functions to the PF keys ( See Edit > Key Assignment)

6.7 Using Voice Announcement

Voice Announcement is the function to inform a user by voice which zone number and channel number have been selected when a Zone-channel is changed. Whether the Scrambler, Encryption, or VOX function (Portable only) is enabled can also be informed by voice.

This function allows a user to easily change a Zone-channel using a voice announcement.

Table 6-12 Voice Announcement

Configuration	Description
Off	Voice Announcement is not activated.
Zone-Channel	The zone number and channel number are announced when the transceiver is turned ON or when a Zone-channel is changed.
Zone-Channel + Others	The zone number and channel number are announced when the transceiver is turned ON or when a Zone-channel is changed. Portable: “Scrambler”, “Encryption”, or “VOX” is announced if a user selects a channel where Scrambler (analog), Encryption (NXDN digital), or VOX (NXDN digital) is enabled. If both functions of Scrambler and VOX, or Encryption and VOX are enabled, “Scrambler” or “Encryption” is announced first, and then “VOX” is announced. Mobile: “Scrambler” or “Encryption” is announced if a user selects a channel where Scrambler (analog) or Encryption (NXDN digital) is enabled.

The following example shows how the voice announcement works if “Zone-Channel” or “Zone-Channel + Others” is configured for Voice Announcement.

Table 6-13 Examples of Announcement

Configuration for Voice Announcement	Zone/ Channel		Description of Announcement
	Before Change	After Change	
Zone-Channel	Zone 1 (Analog) Channel 1	Zone 1 (Analog) Channel 2	“Zone One Channel Two”
	Zone 1 (Analog) Channel 1	Zone 2 (NXDN digital) Channel 1	“Zone Two Channel One Digital”
Zone-Channel + Others	Zone 1 (Analog) Channel 1	Zone 1 (Analog) Channel 3 (Scrambler is enabled)	“Zone One Channel Three Scrambler”
	Zone 1 (Analog) Channel 1	Zone 2 (NXDN digital) Channel 2 (Encryption is enabled)	“Zone Two Channel Two Digital Encryption”
		Zone 2 (NXDN digital) Channel 2 (with Portable, Encryption and VOX are enabled)	“Zone Two Channel Two Digital Encryption VOX”

Note

- Also refer to [3.6 Transceiver Behavior When the Zone-channel Is Changed](#) on page 14 for details on how the transceiver operates when a Zone-channel is changed.
- The audio data used for Voice Announcement can be written into the transceiver by using KPG-169D/ KPG-170D/ KPG-175D.

- Available languages for Voice Announcement are as follows:

Portable:

English, Spanish, French, and Russian

Mobile:

English, Spanish, and Russian

- The audio of Voice Announcement sounds from the speaker of the transceiver. However, the audio sounds from the external speaker if the external speaker is connected to the transceiver. For Mobile, the audio sounds from the internal or external speaker according to the External Speaker configuration if the external speaker is connected to the D-sub connector of the transceiver. (Refer to [6.9 Switching the Internal/ External Speaker \(External Speaker\)](#) on page 40.)
- For Mobile, the configuration for Control Tone applies to the volume level of Voice Announcement. Voice Announcement does not sound if "Off" is configured for Control Tone. (Refer to [Configuring the Volume Level of Various Tones \(Tone Volume\)](#) on page 35.)
- For Portable, Voice Announcement does not sound if Control Tone is disabled.

6.8

Restricting Alert Tone When Consecutively Receiving a Call (Alert Tone Restriction from 2nd Call) (NXDN Conventional System Only)

Alert Tone Restriction from 2nd Call is the function that disables the activation of Alert Tone, if the transceiver consecutively receives an Individual Call from the transceiver having the same Unit 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.

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 when the transceiver receives an Individual Call again from the transceiver having the same Unit ID before the time configured for Auto Reset Timer elapses.

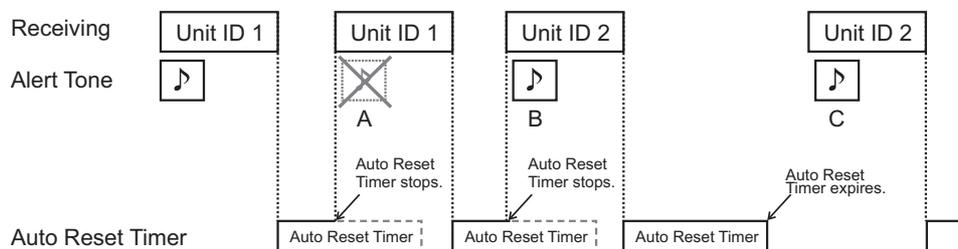


Figure 6-2 Alert Tone Restriction from 2nd Call (Individual Call)

- A:** The transceiver receives an Individual Call from the transceiver (Unit ID 1) having the same Unit ID before the time configured for Auto Reset Timer elapses, so an Alert Tone does not sound.
- B:** Even though the time configured for Auto Reset Timer has not elapsed yet, the transceiver receives an Individual Call from the transceiver (Unit ID 2) having a different Unit ID, so an Alert Tone sounds.
- C:** Even though the transceiver receives an Individual Call from the transceiver (Unit ID 2) again, the time configured for Auto Reset Timer has already elapsed, so an Alert Tone sounds.

● Behavior examples of when the transceiver receives a Group Call

If the transceiver receives a Group Call, an Alert Tone does not sound when the transceiver receives a Group Call again using the same Group ID before the time configured for Auto Reset Timer elapses. In this case, even if the Unit ID of the transmitting transceiver is either the same or different, an Alert Tone does not sound 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.

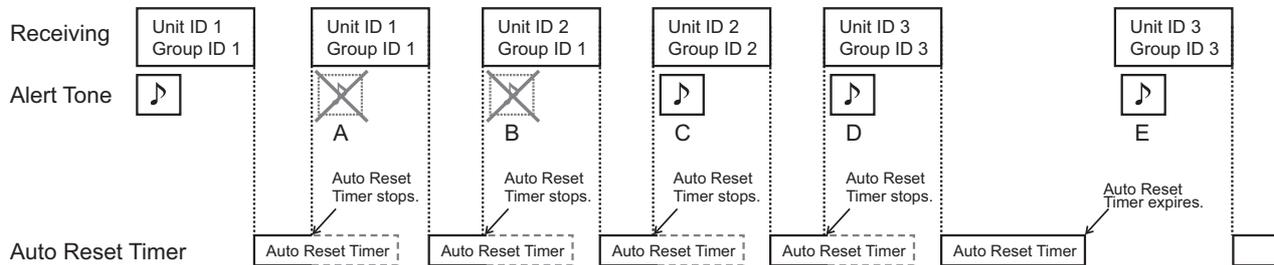


Figure 6-3 Alert Tone Restriction from 2nd Call (Group Call)

- A:** The transceiver receives a Group Call using the same Group ID from the transceiver (Unit ID 1) having the same Unit ID before the time configured for Auto Reset Timer elapses, so an Alert Tone does not sound.
- B:** Even though the transmitting transceiver has the different Unit ID, the transceiver receives a Group Call using the same Group ID before the time configured for Auto Reset Timer elapses, so an Alert Tone does not sound.
- C:** Even though the transmitting transceiver has the same Unit ID, the transceiver receives a Group Call using the different Group ID before the time configured for Auto Reset Timer elapses, so an Alert Tone sounds.
- D:** The transceiver receives a Group Call using the different Group ID from the transceiver having the different Unit ID before the time configured for Auto Reset Timer elapses, so an Alert Tone sounds.
- E:** Even though the transceiver receives a Group Call using the same Group ID, the time configured for Auto Reset Timer has already elapsed, so an Alert Tone sounds.

Note

If the Alert Tone Restriction from 2nd Call is enabled, an Alert Tone does not sound upon the reception of the second and subsequent calls from the same transceiver even if "Off" is configured for Auto Reset Timer.

Configuration using KPG-169D/ KPG-170D/ KPG-175D

Configuring the Alert Tone Restriction from 2nd Call to be enabled or disabled ( See Edit > NXDN > General 1)

6.9 Switching the Internal/ External Speaker (External Speaker)

Supported Models: Mobile

External Speaker is the function to switch the speaker to be used between the external speaker connected to the D-sub connector of the transceiver and the internal speaker of the transceiver.

External Speaker can be enabled or disabled by pressing the **External Speaker** key.

The audio sounds from the external speaker if External Speaker is enabled. The audio sounds from the internal speaker if External Speaker is disabled.

Operating the Transceiver

● Making the External Speaker Ready for Use

1 Press the **External Speaker** key while External Speaker is disabled.

External Speaker becomes enabled and Tone A sounds from the internal speaker. "SP" appears for 1 sec on the LED display. If the 2 dots on the LED display (the left dot and the right dot) and the LED (blue) are configured to light, each LED lights while External Speaker is enabled.

● Making the Internal Speaker Ready for Use

1 Press the **External Speaker** key while External Speaker is enabled.

External Speaker becomes disabled and Tone B sounds from the internal speaker.

Note

- The external and internal speakers can be switched only if the external speaker is connected to the D-sub connector of the transceiver. Refer to the service manual for instructions on how to connect an external speaker to the D-sub connector of the transceiver.
- Pressing the **External Speaker** key while Public Address is enabled, Public Address becomes disabled and External Speaker becomes enabled. Pressing the **Public Address** key while External Speaker is enabled, Public Address also becomes enabled. (Refer to [6.6 Using the Transceiver as a Megaphone \(Public Address\)](#) on page 35.)
- The transceiver can be configured to light the 2 dots on the LED display (the left dot and the right dot) and the LED (blue) when the External Speaker is enabled. (Refer to [5.5 Lighting the LEDs According to the Transceiver's Status](#) on page 25.)

Configuration using KPG-175D

Assigning functions to the PF keys ( [See](#) Edit > Key Assignment)

6.10 Adjusting Audio Characteristics (NXDN Conventional System Only)

Audio characteristics for digital communications can be adjusted according to the operating environment of the transceiver. The combination of configurations for each function can customize the audio characteristic according to a user's operating environment and adjust the audio characteristic of the external microphone connected to the transceiver so that the audio characteristic can be optimal.

- External Microphone Type
- Low Cut
- Auto Gain Control (RX Audio Response)
- Audio Equalizer (RX Audio Response)
- External Speaker Type (Mobile only)
- Noise Suppressor
- Auto Gain Control (TX Audio Response)
- Audio Equalizer (TX Audio Response)

External Microphone Type

External Microphone Type is the function to configure the type of the external microphone to be connected to the transceiver and keep the audio in optimum condition.

The external microphones to be connected to the transceiver have different audio characteristics. Use of this function equalizes audio characteristics and adjusts the condition appropriate for digitalization.

Table 6-14 External Microphone Type

External Microphone Type	Description
None	Disables the capability to adjust audio characteristics. This needs to be configured if an external microphone is not connected or if other external devices are connected to the transceiver.
Microphone 1	Enables the capability to adjust the audio characteristics of the following microphones. Portable: KMC-45 Mobile: KMC-35, KMC-36
Microphone 2	Enables the capability to adjust the audio characteristics of the following microphones. Portable: KMC-48GPS Mobile: KMC-30, KMC-32
Microphone 3	Enables the capability to adjust the audio characteristics of the following microphones. Portable: KMC-21 Mobile: KMC-9C
Microphone 4	Enables the capability to adjust the audio characteristics of the following microphones. Portable: KHS-7, KHS-8, KHS-9, KHS-21, KHS-22, KHS-25, KHS-26, KHS-27 Mobile: KMC-27

External Microphone Type	Description
Microphone 5	Enables the capability to adjust the audio characteristics of the following microphones. Portable: KHS-23 Mobile: KMC-28
Microphone 6 (Portable only)	Enables the capability to adjust the audio characteristics of the following microphones. KHS-10
Microphone 7 (Portable only)	Enables the capability to adjust the audio characteristics of the following microphones. KHS-29F
Microphone 8 (Portable only)	Enables the capability to adjust the audio characteristics of the following microphones. KHS-1
Microphone 6 (Portable only)	Enables the capability to adjust the audio characteristics of the following microphones. EMC-11

 **Note**

In order to use the external microphone unlisted in the description of the table above, we recommend to configure External Microphone Type as "None".

Low Cut

Low Cut can be used to cut off the frequencies outside of the audible frequency band when the transceiver receives a signal in Digital Mode.

The received audio may not be clearly audible in Digital Mode when a user communicates using an earphone or while communicating in noisy environments.

In this case, frequencies of 300 Hz and lower can be cut off in the receiving transceiver using Low Cut. By this, the sound of the received audio in Digital Mode will be similar to the received audio in Analog Mode; hence, the received audio may be understood easily.

Table 6-15 Audio Response

Audio Response	Description
Enabled	While the transceiver receives in Digital Mode, audio frequencies of 300 Hz and lower will be cut off.
Disabled	Audio frequencies of 300 Hz and lower will not be cut off even if the transceiver receives in Digital Mode.

Auto Gain Control (RX Audio Response)

Auto Gain Control 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 cannot automatically be adjusted.
High	Auto Gain Control (RX Audio Response) is enabled and the volume level of the received audio can automatically be 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 can automatically be adjusted to a certain level according to the configuration for the volume level. However, the volume level to be controlled will be lower than that of when "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 receiving transceiver can keep a certain level. Refer to [Auto Gain Control \(TX Audio Response\)](#) on page 44 for details.

Audio Equalizer (RX Audio Response)

Audio Equalizer is the function to adjust audio characteristics to be applied to play the received audio. The received audio may sound differently depending on an usage environment of the transceiver and whether to use a speaker or headphones to play 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 select according to user convenience or preference an audio characteristic of the received audio sounding from the speaker.

Table 6-17 Audio Equalizer (RX Audio Response)

Audio Equalizer	Description
Flat	This is a standard audio characteristic.
High Boost	This audio characteristic emphasizes the treble range of the transmitted audio, compared with the characteristic provided by selecting Flat. The quality of the received audio will be clear with the focus on hearing conversations for certain.
Low Boost	This audio characteristic suppresses the treble range and boosts the bass range in the transmitted audio, compared with the characteristic provided by selecting Flat. The quality of the received audio will be natural.

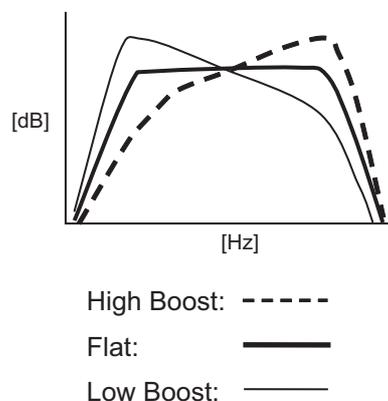


Figure 6-4 The Image of the Frequency Characteristic

External Speaker Type

Supported Models: Mobile

External Speaker Type is the function to configure audio output characteristics for optimal audio quality according to the type of speaker connected to the transceiver.

The following are audio sound characteristics of each configuration:

Table 6-18 External Speaker Type

External Speaker Type	Speaker Terminal			Description
	Internal Speaker	Jack Connector on the Rear Panel	D-sub Connector on the Rear Panel	
None	For the Internal Speaker	For the Internal Speaker	No Equalization	If using the internal speaker, this configuration is recommended. An audio signal optimal to the internal speaker is output from the internal speaker.
Speaker 1	For KES-3	For KES-3	No Equalization	If using KES-3, this configuration is recommended. An audio signal optimal to KES-3 is output from the 3.5D jack connector of the transceiver rear panel.
Speaker 2	For the Internal Speaker	For the Internal Speaker	For KES-5	If using KES-5, this configuration is recommended. An audio signal optimal to KES-5 is output from the D-sub 15-pin connector of the transceiver rear panel.
Speaker 3	No Equalization	No Equalization	No Equalization	If using an external speaker other than KES-3 or KES-5, this configuration is recommended. An audio signal without equalization is emitted from each terminal.

Note

- The internal and external speakers can be switched with the **External Speaker** key. (Refer to [6.9 Switching the Internal/ External Speaker \(External Speaker\) on page 40.](#))
- If KES-5 is connected to the 3.5D jack connector of the transceiver rear panel, the front speaker is disabled.

Noise Suppressor

Noise Suppressor is the function to transmit a signal by reducing the background noise when the transceiver transmits an NXDN digital signal.

If this function is enabled, the transceiver transmits a signal by reducing the background noise so that the noise of the received audio will be less in the receiving transceiver. However, a part of audio component may be omitted, so that an inward received audio will sound. In this case, configuring this function disabled allows the transceiver to transmit an audio signal which is similar to an analog signal; therefore the received audio may be heard clearly in the receiving transceiver.

Auto Gain Control (TX Audio Response)

Auto Gain Control 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 can automatically be adjusted to the proper volume level.
Off	Auto Gain Control (TX Audio Response) is disabled and the volume level of the transmitted audio cannot automatically be adjusted.

Note

Microphone Sensitivity can be enabled even if “On” or “Off” is configured for the Auto Gain Control (TX Audio Response). However, configuring this function as “Off” allows Microphone Sensitivity to function more effectively. (Refer to [Input Sensitivity of the Microphone \(Microphone Sensitivity\)](#) on page 15.)

Audio Equalizer (TX Audio Response)

Audio Equalizer is the function to adjust audio characteristics to be applied to play the transmitted audio. 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.

Table 6-20 Audio Equalizer (TX Audio Response)

Audio Equalizer	Description
Flat	This is a standard audio characteristic.
High Boost	This audio characteristic emphasizes the treble range of the transmitted audio, compared with the characteristic provided by selecting Flat. The quality of the transmitted audio will be clear with the focus on hearing conversations for certain.
Low Boost	This audio characteristic suppresses the treble range and boosts the bass range in the transmitted audio, compared with the characteristic provided by selecting Flat. The quality of the transmitted audio will be natural.

Configuration using KPG-169D/ KPG-170D/ KPG-175D

- Configuring the External Microphone Type ( See Edit > NXDN > General 2 > Audio)
- Configuring the Low Cut to be enabled or disabled ( See Edit > NXDN > General 2 > Audio > Audio > RX Audio Response)
- Configuring the Auto Gain Control (RX Audio Response) ( See Edit > NXDN > General 2 > Audio > Audio > RX Audio Response)
- Configuring the Audio Equalizer (RX Audio Response) ( See Edit > NXDN > General 2 > Audio > Audio > RX Audio Response)
- Configuring the Noise Suppressor to be enabled or disabled ( See Edit > NXDN > General 1 > Audio > TX Audio Response)
- Configuring the Auto Gain Control (TX Audio Response) ( See Edit > NXDN > General 1 > Audio > TX Audio Response)
- Configuring the Audio Equalizer (TX Audio Response) ( See Edit > NXDN > General 1 > Audio > TX Audio Response)

Configuration using KPG-175D

Configuring the External Speaker Type ( See Edit > NXDN > General 2 > Audio > Audio > RX Audio Response)

Supported Models: Portable

A user can be notified on the level of the remaining battery power by LED. And, a user can also use the function to save the battery consumption.

7.1 Warning that the Battery Voltage Is Low (Battery Warning)

Battery Warning can be used to notify a user by emitting a beep or blinking the LED when the battery power is low.

Table 7-1 Battery Warning

Configuration	Description
While Transmitting	The transceiver monitors whether the battery voltage goes low while transmitting, and notifies a user that the remaining battery power is low in the following way. If the battery voltage level goes lower than the warning voltage level of 6.2 V while transmitting: The Transmit LED blinks red. If the battery voltage level goes lower than the warning voltage level of 5.8 V while transmitting: The transmission ends. If the PTT switch is pressed, a Warning Tone A sounds from the transceiver and the transceiver cannot transmit.
Always	The transceiver always monitors while the transceiver is turned ON whether the battery voltage goes low, and notifies a user that the remaining battery power is low in the following way. If the battery voltage level reaches the warning voltage level of 6.4 V: The Transmit LED blinks red. If the battery voltage level goes lower than the warning voltage level of 5.8 V: The transmission ends. If the PTT switch is pressed, a Warning Tone A sounds from the transceiver and the transceiver cannot transmit.
Always - Late Warning	The transceiver always monitors while the transceiver is turned ON whether the battery voltage goes low, and notifies a user that the remaining battery power is low in the following way. If the battery voltage level reaches the warning voltage level of 6.2 V: The warning voltage level is configured as the voltage lower than the configuration for Always (6.2 V) and the Transmit LED starts blinking red later than normal. The transceiver does not behave differently. Transmission is still available at this point. If the battery voltage level goes lower than the warning voltage level of 5.8 V: The transmission ends. If the PTT switch is pressed, a Warning Tone A sounds from the transceiver and the transceiver cannot transmit.

* Values for the warning voltage level are reference values and these values are not guaranteed for all transceivers.

Also, if Battery Warning Tone is enabled, the transceiver notifies a user that the remaining battery capacity is low by making the Battery Warning Tone sound from the transceiver if the **PTT** switch is not pressed when the battery voltage level goes lower than the warning voltage level.

Configuration using KPG-169D/ KPG-170D

- Configuring the Battery Warning ( See Edit > Optional Features > Common 2 > Battery)
- Configuring the Battery Warning Tone to be enabled or disabled ( See Edit > Optional Features > Common 2 > Battery)

7.2 Reducing Battery Consumption (Battery Saver)

Battery Saver is the function that the transceiver intermittently monitors the presence of a signal while in the standby state to save the battery consumption.

By switching the receiver circuit of the transceiver on or off at certain intervals, a user can reduce the battery consumption. If a key has not been pressed for 5 sec or more while no carrier (analog/ digital) or frame synchronization word (digital) exists, the transceiver intermittently monitors the presence of a signal. In an Analog Conventional system, if a key has not been pressed for 5 sec or more while a carrier is detected, but the received QT tone or DQT code does not match the preconfigured value for the transceiver, the transceiver intermittently monitors the presence of a signal.

When Battery Saver is activated, the transceiver behaves as follows.

Analog Conventional:

- The transceiver checks the presence of a carrier at 800-ms intervals.
- The transceiver checks whether the received Optional Signaling (DTMF/ FleetSync/ 2-tone) and QT tone or DQT code match the Optional Signaling and QT tone or DQT code preconfigured for the transceiver at 200-ms intervals.

NXDN Conventional:

- The transceiver checks the presence of a carrier or a frame synchronization word at 200-ms intervals regardless of the configuration for Optional Signaling.

Note

Battery Saver is not activated while the transceiver is scanning.

Configuration using KPG-169D/ KPG-170D

Configuring the Battery Saver to be enabled or disabled ( See Edit > Optional Features > Common 2 > Battery)

NXDN is a generic name for a digital communication system protocol utilizing 4-level FSK. Using NXDN, the transceiver can initiate an Individual Call or Group Call for voice calls, communicate messages using statuses, or send GPS data. In an NXDN Conventional system, communications are realized by sending and receiving digital signals on an NXDN digital channel. Using an NXDN ID (Unit ID or Group ID) allows the various communications.

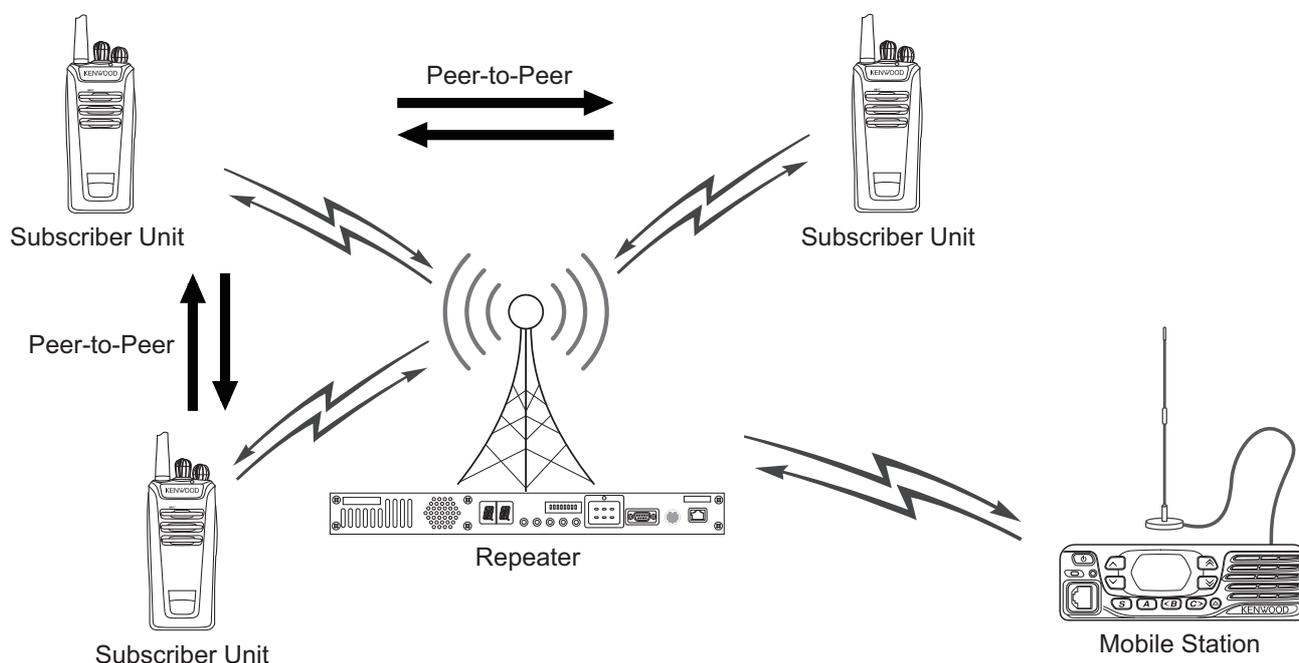


Figure 8-1 Image of Communications in an NXDN Conventional System

8.1 Initiating Voice Communications (Basic Transmission and Reception)

This section describes the basic methods for transmission and reception in an NXDN Conventional system and the relevant functions.

About Own ID

To initiate various communications using NXDN, a Unit ID (Own), the identification code of a transceiver, needs to be configured for the transceiver.

One Unit ID (Own) can be configured for each transceiver. Also, a name specific to the transceiver can be configured for Unit ID (Own).

Configuration using KPG-169D/ KPG-170D/ KPG-175D

Configuring the Unit ID (Own) and Unit ID Name (Own) ([See](#) Edit > NXDN > General 1)

Receiving

Received audio sounds from the speaker if the transceiver receives digital signals, and the frequency matches the frequency of the channel on which the transceiver has waited for or the NXDN ID matches the NXDN ID preconfigured for the transceiver. When a signaling (RAN) is used, communications are possible if the received RAN code matches the RAN code which the transceiver waits for.

Auto Reset Timer

Auto Reset Timer is the amount of time from when the received Unit ID or Group ID matches the Unit ID or Group ID preconfigured for the transceiver until blinking of the LED and emission of an Alert Tone will automatically be reset.

Auto Reset Timer can be configured by using KPG-169D/ KPG-170D/ KPG-175D.

Table 8-1 Auto Reset Timer

Configuration	Description
Off	Auto Reset Timer will not be activated.
1 s to 300 s	After the configured time elapses, the matching state of the Unit ID or Group ID is automatically reset.

Note

- For Portable, Auto Reset Timer is canceled if the channel is changed or any **PF** key is used while the Auto Reset Timer is counting down. The Alert Tone stops sounding and the blinking LED is turned Off at this time.
- For Mobile, Auto Reset Time is canceled if any **PF** key other than the **Emergency**, **Volume Up**, **Volume Down**, and **LED Brightness** key is used while the Auto Reset Timer is counting down. The Alert Tone stops sounding and the blinking LED is turned Off at this time.

Configuration using KPG-169D/ KPG-170D/ KPG-175D

Configuring the Auto Reset Timer ( [See](#) Edit > NXDN > General 2 > Auto Reset)

Selective Call Alert LED

Selective Call Alert LED is the function to make the LED blink orange or blue when the transceiver receives a call using an NXDN ID.

A user can notice by the LED that the transceiver is receiving a call.

Note

The color of the blinking LED can be configured by types of calls by using KPG-169D/ KPG-170D/ KPG-175D.

Configuration using KPG-169D/ KPG-170D/ KPG-175D

- Configuring the Selective Call Alert LED ( [See](#) Edit > NXDN > Conventional)
- Configuring the Alert LED Color ( [See](#) Edit > NXDN > Conventional > Alert LED Color)

Over-the-Air Alias

Over-the-Air Alias allows the receiving transceiver having the display function to display the ID Name of the transmitting transceiver when receiving a call even if the ID Name of the transmitting transceiver is not configured for the receiving transceiver.

Using this function, Unit ID Name of the added unit does not need to be configured such as when a unit is added to the system in service.

The transmitting transceiver sends Unit ID Name when making voice calls. If the receiving transceiver having the display function receives a call such as an Individual Call, the Unit ID Name stored in the reception frame will appear on the main display.

Note

- The received Unit ID Name appears after displaying differently from the received Unit ID Name in the following cases.
 - The Unit ID of the transmitting transceiver is not configured in the Unit ID List.
 - The Unit ID of the transmitting transceiver is not stored as Caller ID.
 - The received Unit ID Name is different from the ID configured in the Unit ID List or the ID Name stored in the transceiver.
- NX-240/ 240V/ 340/ 340U/ 740H/ 740HV/ 840H/ 840HU does not support the function to display the ID Name.

Configuration using KPG-169D/ KPG-170D/ KPG-175D

Configuring the Over-the-Air Alias to be enabled or disabled ( See Edit > NXDN > General 1)

Searching Whether the Transceiver Receives a Call (Scan)

Using the Scan function, the transceiver can check each channel in turn whether the channel has a signal. If a channel has a signal, the transceiver receives the signal on the channel.

Refer to [16 SCAN on page 172](#) for details of Scan.

Transmitting

Pressing the **PTT** switch starts transmitting. When a signaling (RAN) is used, the transceiver sends the RAN code. In this case, if the transmitted RAN code matches the RAN code preconfigured for the receiving transceiver, the transceivers can communicate.

Restricting the Continuous Transmission Duration (Time-out Timer)

Time-out Timer (TOT) is the function to restrict the duration for the transceiver to continuously transmit.

This function is used to prevent a user from occupying a repeater or frequency which is shared with other users. The transceiver automatically stops transmitting and releases the channel if it continuously transmits longer than the configured time. A Warning Tone A sounds from the transceiver at this time.

Timers, such as TOT Pre-alert, TOT Rekey Time, and TOT Reset Time, relevant to Time-out Timer can be configured.

TOT Pre-alert

TOT Pre-alert is the function to notify a user that a continuous transmission is about to end by the Time-out Timer. The TOT Pre-alert Tone sounds from the transceiver before the transceiver stops the continuous transmission by the Time-out Timer.

Example: Time-out Timer: 30 s, TOT Pre-alert: 4 s

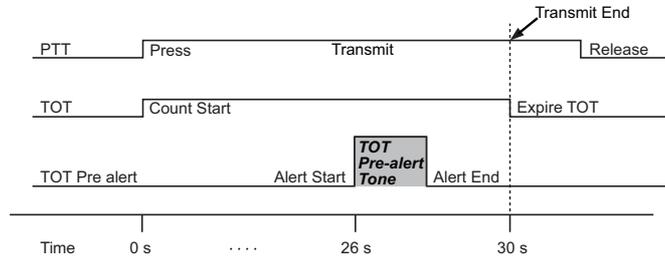


Figure 8-2 TOT Pre-alert

Note

If "Off" is configured for TOT Pre-alert, no TOT Pre-alert tone will sound from the transceiver.

TOT Rekey Time

TOT Rekey Time is the amount of time from when the transceiver stops the transmission by the Time-out Timer until transmission becomes possible again.

Example: Time-out Timer: 30 s, TOT Rekey Time: 20 s

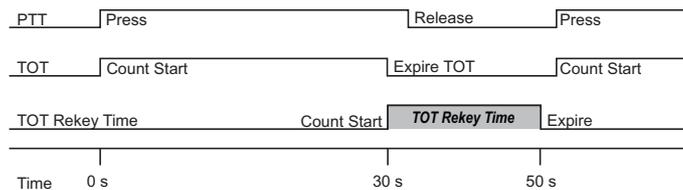


Figure 8-3 TOT Rekey Time

Note

- If "Off" is configured for TOT Rekey Time, the transceiver will immediately be ready to transmit.
- The timer will be reset if the zone or channel is changed while the TOT Rekey Time is counting down.

TOT Reset Time

TOT Reset Time is the time required to initialize and reset the elapsed time for Time-out Timer.

Example 1: Time-out Timer: 30 s, TOT Reset Time: 10 s

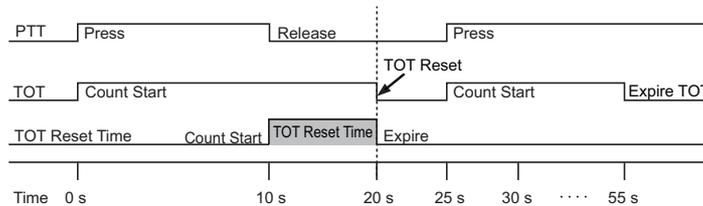


Figure 8-4 TOT Reset Time 1

The transceiver considers a retransmission within this configured length of time as a continuous transmission. In the following example, the counting of Time-out Timer continues because the transmission was started by a user pressing the **PTT** switch while the TOT Reset Time was counting down.

Example 2: Time-out Timer: 30 s, TOT Reset Time: 10 s

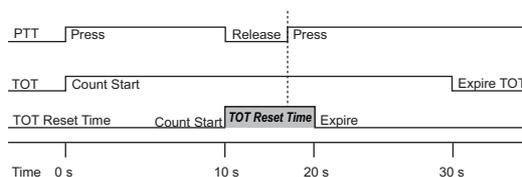


Figure 8-5 TOT Reset Time 2

Note

- If "Off" is configured for TOT Reset Time, the Time-out Timer will be reset immediately after the transceiver finishes transmitting.
- The timer will be reset if the zone or channel is changed while the TOT Reset Time is counting down.

Configuration using KPG-169D/ KPG-170D/ KPG-175D

- Configuring the Time-out Timer (See Edit > Optional Features > Common 1)
- Configuring the TOT Pre-alert (See Edit > Optional Features > Common 1)
- Configuring the TOT Rekey Time (See Edit > Optional Features > Common 1)
- Configuring the TOT Reset Time (See Edit > Optional Features > Common 1)

Avoiding Interference with Other Communications (Busy Channel Lockout (NXDN))

Busy Channel Lockout is the function to automatically restrict the transmission so as not to interfere with other communications.

If an attempt is made to transmit on a channel that is already being used by other groups, the transceiver automatically restricts the transmission.

A Warning Tone A sounds from the transceiver and the transceiver cannot transmit if the **PTT** switch is pressed when Busy Channel Lockout is enabled. The Warning Tone A sounds from the transceiver until the **PTT** switch is released.

Also, a Warning Tone B sounds from the transceiver and the transceiver cannot transmit if the transceiver attempts to transmit by using the VOX function when Busy Channel Lockout is enabled.

Following are conditions to disable transmission by Busy Channel Lockout (NXDN).

Table 8-2 Busy Channel Lockout (NXDN)

Configuration	Description
No	Busy Channel Lockout is disabled. Transmission is not restricted even if the channel on which the transceiver attempts to transmit is busy.
Carrier Only	The transceiver cannot transmit while the transceiver is receiving a carrier.
Incorrect RAN	The transceiver cannot transmit if the transceiver receives a carrier and the received RAN code does not match the RAN code preconfigured for the transceiver.
Correct RAN	The transceiver cannot transmit if the transceiver receives a carrier and the received RAN code matches the RAN code preconfigured for the transceiver.
Any RAN	The transceiver cannot transmit while receiving a RAN code.

Note

- Busy Channel Lockout cannot be activated in Emergency Mode. Also, Busy Channel Lockout cannot be activated while the Monitor function is enabled by a user pressing the **Monitor** key.
- GPS data is not sent automatically while Busy Channel Lockout is enabled.

Configuration using KPG-169D/ KPG-170D/ KPG-175D

Configuring the Busy Channel Lockout (NXDN) ( See Edit > Zone Information > Channel Edit > Page 1)

Preferentially Using a Channel Being Used by Other Parties (BCL Override)

BCL Override can be used to transmit on a busy channel even if Busy Channel Lockout is activated and transmission is restricted. This function is used when a top priority transmission is required.

Operating the Transceiver

1 Press the **PTT** switch while transmission is restricted by Busy Channel Lockout.

2 Release the **PTT** switch, then press the **PTT** switch again within 500 ms.

Busy Channel Lockout is temporarily disabled and the transceiver will start transmitting.

Note

This function is also activated while the transceiver is transmitting using VOX (Portable only). For a transmission using VOX, Busy Channel Lockout will temporarily be disabled and the transceiver can transmit if audio is input within 500 ms after the Warning Tone B starts sounding from the transceiver.

Configuration using KPG-169D/ KPG-170D/ KPG-175D

Configuring the BCL Override to be enabled or disabled ( See Edit > Optional Features > Common 1)

Communicating Without Using a Repeater (Talk Around)

Talk Around is the function to communicate directly between transceivers without using a repeater.

If the transceiver cannot link to a repeater due to too great distance between the transceiver and the repeater, the transceiver can directly communicate with the target transceiver using Talk Around.

The transceiver, with Talk Around enabled, transmits on the receive frequency and uses the Decode Signaling (RAN code) configured for the selected channel.

Pressing the **Talk Around** key toggles Talk Around between enabled and disabled.

Operating the Transceiver

● Enabling the Talk Around

1 Press the **Talk Around** key while Talk Around is disabled.

A Tone A sounds from the transceiver and Talk Around becomes enabled. For Mobile, "tA" appears on the LED display for 1 sec. In addition, if the 2 dots on the LED display (the left dot and the right dot) and the LED (blue) are configured to light, each LED lights while Talk Around is enabled.

● Disabling the Talk Around

1 Press the **Talk Around** key while Talk Around is enabled.

A Tone B sounds from the transceiver and Talk Around becomes disabled.

Note

- Talk Around is disabled by changing the zone or channel while Talk Around is enabled.
- Talk Around is disabled in Emergency Mode.
- Even if the **Talk Around** key is pressed once to disable Talk Around while the Auto Reset Timer is counting down, only Auto Reset Timer is canceled. To disable Talk Around, press the **Talk Around** key again after the Auto Reset Timer is canceled. (Refer to [Auto Reset Timer on page 49](#).)
- For Mobile, the transceiver can be configured to light the 2 dots on the LED display (the left dot and the right dot) and the LED (blue) when Talk Around is enabled. (Refer to [5.5 Lighting the LEDs According to the Transceiver's Status on page 25](#).)

Configuration using KPG-169D/ KPG-170D/ KPG-175D

Assigning functions to the PF keys ( See Edit > Key Assignment)

8.2 Using the Signaling

RAN code is the signaling to be used for facilitating communication within a group if the same channel is shared by several groups. Also, NXDN ID can be used as the Optional Signaling to initiate a selective call.

Sharing the Same Channel (Frequency) by Several Groups (RAN)

RAN (Radio Access Number) is a digital signaling type having the same function as analog QT tone or DQT code. This signaling is used when the transceiver transmits or receives on a digital channel.

By configuring a RAN code for each channel, the transceiver mutes calls from a group having a RAN code which is not preconfigured for the transceiver. Therefore, a user can communicate in a group without listening to conversations from other groups.

The transceiver can distinguish the signaling even if the transceiver receives any signaling during a call since this signaling type has a continuous waveform.

Following is transmission and reception behavior of a RAN code.

Table 8-3 RAN Transmission/ Reception Behavior

Reception	If the RAN code in a received signal matches the preconfigured RAN code in the transceiver, the transceiver unmutes the speaker and emits the received audio from the speaker.
Transmission	The transceiver sends the preconfigured RAN code while transmitting. Pressing the PTT switch causes the transceiver to send the RAN code.

Configuration using KPG-169D/ KPG-170D/ KPG-175D

Configuring the RAN Decode/Encode ( See Edit > Zone Information > Channel Edit > Page 1)

Using the Optional Signaling (NXDN)

Optional Signaling is the signaling used to initiate a selective call. NXDN ID is the Optional Signaling which can be used in an NXDN Conventional system.

NXDN ID is the signaling type using the Unit ID or Group ID stored in the NXDN data frame. The transceiver emits a ringing tone (Alert Tone) in the case that the received RAN code matches the RAN code preconfigured in the transceiver and the received Unit ID or Group ID matches the Unit ID or Group ID preconfigured in the transceiver.

Configuration using KPG-169D/ KPG-170D/ KPG-175D

Configuring the Optional Signaling (NXDN) ( See Edit > Zone Information > Channel Edit > Page 1)

Unmuting the Speaker (Audio Control (NXDN))

Audio Control is the condition which allows the transceiver to unmute the speaker by a RAN code and an Optional Signaling. The conditions on which the transceiver unmutes the speaker can be configured for each channel.

The transceiver unmutes the speaker and emits received audio if the conditions configured for Audio Control are satisfied. Conditions to unmute the speaker can be changed by a combination of the RAN code and the Optional Signaling.

Following are the conditions to unmute the speaker.

Table 8-4 Audio Control (NXDN)

Configuration	Description
RAN	The transceiver unmutes the speaker if the received RAN code matches the RAN code preconfigured for the transceiver. Conditions remain unchanged even if the transceiver transmits.
RAN and Optional Signaling	The transceiver unmutes the speaker if the received RAN code matches the RAN code preconfigured for the transceiver and if the received Optional Signaling matches the Optional Signaling preconfigured for the transceiver.

Configuration using KPG-169D/ KPG-170D/ KPG-175D

Configuring the Audio Control (NXDN) ( See Edit > Zone Information > Channel Edit > Page 1)

Temporarily Disabling the Signaling (Monitor)

Monitor is the function that temporarily disables the RAN code and Optional Signaling that are configured for a channel on which the transceiver waits.

Monitor is used to check the availability of channels prior to transmitting in order to prevent from interfering with other parties.

To use this function, the **Monitor** key or the **Monitor Momentary** key must be used.

While Monitor is enabled, the RAN code and Optional Signaling will be disabled.

Operating the Transceiver

● Monitor key

1 Press the **Monitor** key while Monitor is disabled.

A Tone A sounds from the transceiver.

The transceiver disables the RAN code and Optional Signaling and unmutes the speaker upon detection of an NXDN frame.

2 Press the **Monitor** key while Monitor is enabled.

A Tone B sounds from the transceiver.

A channel where a RAN Decode is configured resumes Signaling Squelch.

● Monitor Momentary key

1 Press and hold the **Monitor Momentary** key.

The transceiver disables the RAN code and Optional Signaling and unmutes the speaker upon detection of an NXDN frame.

2 Release the **Monitor Momentary** key.

A channel where a RAN Decode is configured resumes Signaling Squelch.

Note

Pressing the **Monitor** key or the **Monitor Momentary** key while the Optional Signaling matches resets the matching state of the Optional Signaling.

Configuration using KPG-169D/ KPG-170D/ KPG-175D

Assigning functions to the PF keys ( See Edit > Key Assignment)

Transceiver Operation during the Scan

If the **Monitor** key is pressed during the scan, the scan continues. In this case, the transceiver disables the RAN code and Optional Signaling, and unmutes the speaker upon detection of an NXDN frame in the same manner as when the scan is deactivated.

If the **Monitor Momentary** key is pressed during the scan, the transceiver disables the RAN code and Optional Signaling, and unmutes the speaker upon detection of an NXDN frame in the same manner as when the scan is deactivated. The scan continues in this case, too. Pressing the **Monitor Momentary** key never causes the scan to be deactivated.

Unmuting the Speaker by Linking with the Microphone (Off-hook Decode)

Supported Models: Mobile

Off-hook Decode is the function to enable the transceiver to decode Optional Signaling even if the microphone is in the off-hook state.

The transceiver behaves as follows according to the configuration for Off-hook Decode.

Table 8-5 Off-hook Decode

Configuration	Description
Enabled	The transceiver opens the squelch according to the configuration for Audio Control while the microphone is in either the on-hook state or off-hook state.
Disabled	The transceiver unmutes the speaker when the transceiver detects a frame if the microphone is in the off-hook state. The transceiver opens squelch according to the configuration for Audio Control if the microphone is in the on-hook state.

Note

- Stun can be activated regardless of the status of Off-hook Decode and the microphone on- or off-hook state.
- The matching state of Optional Signaling will be reset by hooking the microphone on a hanger (On-hook state) after receiving a call by Optional Signaling.
- The microphone hook status can also be switched on by the AUX Input port to which "External Hook" is assigned. (Refer to [18.1 Available Functions for AUX Input Ports on page 182.](#))

Configuration using KPG-175D

Configuring the Off-hook Decode to be enabled or disabled ( Edit > Optional Features > Common 1)

8.3 Making an Individual Call/ Paging Call

Individual Call can be used to initiate a call to a target transceiver individually to establish voice calls. By specifying a Unit ID, the transceiver can initiate a call to the transceiver having the Unit ID. Paging Call is also available to initiate a call to a target transceiver without voice communications.

Initiating an Individual Call/ Paging Call

An Individual Call or Paging Call can be activated by one of the following methods.

- **Selcall on PTT**

The transceiver initiates an Individual Call when the **PTT** switch is pressed on a channel where "Individual Call" is configured for Selcall on PTT (NXDN). Pressing the **Paging Call** key initiates a Paging Call.

A Unit ID of the target transceiver can be configured for each channel by selecting one Unit ID from the Unit ID List by using KPG-169D/ KPG-170D/ KPG-175D.

- **Talkback**

By pressing the **PTT** switch while the Auto Reset Timer is counting down after the transceiver receives an Individual Call or a Paging Call, the transceiver can respond (Talkback) to the transceiver which made the Individual Call or Paging Call.

Operating the Transceiver

- **Initiating an Individual Call using Selcall on PTT**

1 Select a channel where the Unit ID of the target transceiver is configured.

2 Select one of the following operations.

- **Press the PTT switch.**
The LED lights red and audio is transmitted.
If PTT Proceed Tone is enabled, a Proceed Tone sounds from the transceiver when the transceiver becomes ready for communications after the **PTT** switch is pressed. (Refer to [Using Sound to Notify the Timing to Start Communications \(PTT Proceed Tone\)](#) on page 32.)
- **Press the Paging Call key.**
The LED lights red and a Paging Call is initiated.

- **Initiating an Individual Call using the Talkback**

1 Receive an Individual Call or Paging Call.

An Alert Tone (Individual Call or Paging Call) sounds from the transceiver. If Selective Call Alert LED is enabled, the LED blinks orange or blue. (Refer to [Transceiver Behavior When Receiving an Individual Call/ Paging Call](#) on page 59)

2 Press the **PTT** switch while the Auto Reset Timer is counting down.

The transceiver can respond (Talkback) to the transceiver which made the Individual Call or Paging Call.

Configuration using KPG-169D/ KPG-170D/ KPG-175D

- Assigning functions to the PF keys ( [See](#) Edit > Key Assignment)
- Configuring the Selcall on PTT (NXDN) ( [See](#) Edit > Zone Information > Channel Edit > Page 1)
- Configuring the ID List Number (NXDN) ( [See](#) Edit > Zone Information > Channel Edit > Page 1)

Receiving an Individual Call/ Paging Call

The transceiver can receive an Individual Call or Paging Call if the received Unit ID matches the Unit ID (Own) preconfigured in the transceiver.

Note

To receive an Individual Call or Paging Call in an NXDN Conventional system, "NXDN ID" needs to be configured as the Optional Signaling to be used on the channel. (Refer to [Using the Optional Signaling \(NXDN\) on page 55](#))

Transceiver Behavior

1 Receive an Individual Call or Paging Call.

An Alert Tone (Individual Call or Paging Call) sounds from the transceiver. If Selective Call Alert LED is enabled, the LED blinks orange or blue. (Refer to [Transceiver Behavior When Receiving an Individual Call/ Paging Call on this page.](#))

By pressing the **PTT** switch while the Auto Reset Timer is counting down, the transceiver can respond (Talkback) to the transceiver which made the Individual Call or Paging Call.

Transceiver Behavior When Receiving an Individual Call/ Paging Call

● Alert Tone

If the received Unit ID is configured in the Unit ID List, an Alert Tone sounds from the transceiver according to the configuration of Alert Tone (Individual) or Alert Tone (Paging) for the corresponding Unit ID.

However, if "Common" is configured for Alert Tone (Individual) or Alert Tone (Paging) in the Unit ID List, or if the received Unit ID is not configured in the Unit ID List, an Alert Tone sounds from the transceiver according to the configuration for Alert Tone (Individual Call) or Alert Tone (Paging Call) used in common in an NXDN Conventional system.

● LED

If the received Unit ID is configured in the Unit ID List, the LED blinks according to the configuration of Alert LED Color (Individual) or Alert LED Color (Paging) for the corresponding Unit ID.

However, if "Common" is configured for Alert LED Color (Individual) or Alert LED Color (Paging) in the Unit ID List, or if the received Unit ID is not configured in the Unit ID List, the LED blinks according to the configuration for Alert LED Color (Individual Call) or Alert LED Color (Paging Call) used in common in an NXDN Conventional system.

Note

- The transceiver cannot respond (Talkback) if any key other than the **PTT** switch is used when the transceiver receives an Individual Call or Paging Call.
- For Portable, if any **PF** key other than the **Emergency** key is used, the matching state of the Individual Call or Paging Call is reset.
- For Mobile, if the **Volume Up**, **Volume Down**, or **LED Brightness** key is used when an Individual Call or a Paging Call is received, each of the functions is activated. In this case, the Alert Tone stops sounding but the LED continues to blink. In addition, if any **PF** key other than the **Emergency**, **Volume Up**, **Volume Down**, and **LED Brightness** key is used when an Individual Call is received, the transceiver reverts to the normal standby display.

Configuration using KPG-169D/ KPG-170D/ KPG-175D

- Configuring the Alert Tone (Individual) (Unit ID List) ( See Edit > NXDN > Unit ID List > Alert Tone > Individual)
- Configuring the Alert Tone (Paging) (Unit ID List) ( See Edit > NXDN > Unit ID List > Alert Tone > Paging)
- Configuring the Alert LED Color (Individual) (Unit ID List) ( See Edit > NXDN > Unit ID List > Alert LED Color > Individual)
- Configuring the Alert LED Color (Paging) (Unit ID List) ( See Edit > NXDN > Unit ID List > Alert LED Color > Paging)
- Configuring the Alert Tone (Individual Call) used in common in the NXDN Conventional system ( See Edit > NXDN > Conventional > Alert Tone)
- Configuring the Alert Tone (Paging Call) used in common in the NXDN Conventional system ( See Edit > NXDN > Conventional > Alert Tone)
- Configuring the Alert LED Color (Individual Call) used in common in the NXDN Conventional system ( See Edit > NXDN > Conventional > Alert LED Color)
- Configuring the Alert LED Color (Paging Call) used in common in the NXDN Conventional system ( See Edit > NXDN > Conventional > Alert LED Color)

Unit ID List

To make an Individual Call or Paging Call, the desired Unit IDs must be preconfigured in the transceiver using KPG-169D/ KPG-170D/ KPG-175D prior to use of the transceiver. A maximum of 8 Unit IDs can be configured in the Unit ID List.

Table 8-6 Unit ID List

Configuration	Operation
ID	A Unit ID can be configured in the range between 1 and 65519.
Transmit Inhibit	The permission or inhibition of transmission of the receiving party can be configured. If "Yes" is configured for Transmit Inhibit, the ID cannot be configured as the target ID of the Selcall on PTT. Also, if the transceiver receives the call from the transceiver with the ID where "Yes" is configured for Transmit Inhibit, the transceiver cannot respond (Talkback) even if a user presses the PTT switch.
Individual (Alert Tone)	A user can configure the type of the tone that sounds from the transceiver when the transceiver receives an Individual Call from the Unit ID which is configured in the Unit ID List.
Paging (Alert Tone)	A user can configure the type of the tone that sounds from the transceiver when the transceiver receives a Paging Call from the Unit ID which is configured in the Unit ID List.
Individual (Alert LED Color)* ¹	Whether to blink the LED orange or blue when the transceiver receives an Individual Call from the Unit ID which is configured in the Unit ID List can be configured.
Paging (Alert LED Color)* ¹	Whether to blink the LED orange or blue when the transceiver receives a Paging Call from the Unit ID which is configured in the Unit ID List can be configured.

*¹ To use this function, Selective Call Alert LED must be enabled.

Configuration using KPG-169D/ KPG-170D/ KPG-175D

Configuring the Unit ID List ( See Edit > NXDN > Unit ID List)

Restricting IDs for Which the Talkback Is Available (Unit ID Encode Block)

Unit ID Encode Block is the Unit ID range that the transceiver can respond (Talkback).

Unit IDs to which a user is allowed to respond (Talkback) can be restricted using KPG-169D/ KPG-170D/ KPG-175D. The transceiver unmutes the speaker and emits received audio when the transceiver receives the Unit ID satisfying the receiving conditions. The receiving transceiver can respond (Talkback) to the transmitting transceiver by a user pressing the **PTT** switch. However, the transceiver cannot respond (Talkback) if the transceiver is inhibited to respond (Talkback) to the Unit ID of the transmitting transceiver.

Note

- The transceiver can respond (Talkback) to a Unit ID configured in the Unit ID List even if it is outside the Unit ID Encode Block range.
- The transceiver for which Unit ID Encode Block is not configured can respond (Talkback) to all transceivers.

Configuration using KPG-169D/ KPG-170D/ KPG-175D

Configuring the Unit ID Encode Block ( See Edit > NXDN > General 1)

8.4

Initiating an Individual Call After Ensuring That the Target Party Is Available for Communications (Individual Call Acknowledge Request)

Individual Call Acknowledge Request is the function that allows a user to distinguish whether or not the receiving transceiver is available to communicate so as to initiate an Individual Call.

The Individual Call Acknowledge Request enables a call to the particular transceiver having the specified Unit ID, in the same way as a normal Individual Call does; however, an acknowledgment message must be received from the receiving transceiver before the communication starts (or receiving an Individual Call from the receiving transceiver also allows the communication to start).

The transmitting transceiver sends a message requesting an acknowledgment when initiating an Individual Call. Upon receipt of the message requesting an acknowledgment, the receiving transceiver sends to the transmitting transceiver an acknowledgment message to notify that the receiving transceiver is available for the call. The transmitting transceiver becomes enabled for the communication upon receipt of the acknowledgment message from the receiving transceiver.

To use this function, Individual Call Acknowledge Request must be enabled on the transmitting transceiver by using KPG-169D/ KPG-170D/ KPG-175D. Also, using KPG-169D/ KPG-170D/ KPG-175D, the parameters of the following various functions to be used with Individual Call Acknowledge Request can be configured.

- Call Request Tone
- Call Processing Tone
- Call Processing Tone Delay Time
- Automatic Response
- Initiating/Incoming Reset Time

Note

- Individual Call Acknowledge Request cannot be used while the transceiver is placed in Emergency Mode. A normal Individual Call, which does not require the sending of a message requesting an acknowledgment, can only be used.
- For an Individual Call (Individual Call Acknowledge Request), the following functions used for a normal Individual Call are available. (Refer to [8.3 Making an Individual Call/ Paging Call on page 58.](#))
 - Unit ID List
 - Unit ID Encode Block
- For Portable, if Individual Call Acknowledge Request is enabled, the VOX function cannot be used in an NXDN Conventional system.

Configuration using KPG-169D/ KPG-170D/ KPG-175D

Configuring the Individual Call Acknowledge Request to be enabled or disabled ( See Edit > NXDN > Conventional > Individual Call Acknowledge Request)

Initiating an Individual Call (Individual Call Acknowledge Request)

An Individual Call (Individual Call Acknowledge Request) can be activated by one of the following methods.

● Selcall on PTT

The transceiver initiates an Individual Call (Individual Call Acknowledge Request) and sends a message requesting an acknowledgment when the **PTT** switch is pressed on a channel where “Individual Call” is configured for Selcall on PTT (NXDN).

A Unit ID of the target transceiver can be configured for each channel by selecting one Unit ID from the Unit ID List by using KPG-169D/ KPG-170D/ KPG-175D.

● Call key

Pressing the **Call 1** key or the **Call 2** key initiates an Individual Call (Individual Call Acknowledge Request) and sends a message requesting an acknowledgment to the Unit ID allocated to the key pressed.

Call 1 or Call 2 can be assigned to the **PF** keys by using KPG-169D/ KPG-170D/ KPG-175D and the Unit ID corresponding to each key can be selected from the Unit ID List.

● Talkback

By pressing the **PTT** switch while the Auto Reset Timer is counting down after the transceiver receives an Individual Call (Individual Call Acknowledge Request), the transceiver can respond (Talkback) to the transceiver which made the Individual Call (Individual Call Acknowledge Request).

Operating the Transceiver

1 Follow one of the methods mentioned above to initiate an Individual Call (Individual Call Acknowledge Request).

A message requesting an acknowledgment is sent.

A transceiver waits to receive the acknowledgment message from the receiving transceiver.

2 Receive an acknowledgment message from the receiving transceiver.

The Call in Progress Tone sounds from the transceiver, the LED blinks orange, and the transceiver becomes enabled for the transmission by means of an Individual Call.

Receiving an acknowledgment message while the **PTT** switch is being pressed initiates an Individual Call. If PTT Proceed Tone is configured to be enabled, a PTT Proceed Tone sounds from the transceiver at this time.

3 Press the **PTT** switch.

The Individual Call is initiated.

Note

- If the Call Request Tone is enabled, a Call Request Tone sounds from the transceiver when a call request for an Individual Call (Individual Call Acknowledge Request) is initiated. Also, if the Call Processing Tone is enabled, a Call Processing Tone sounds from the transceiver until the transceiver receives an acknowledgment message from the receiving transceiver after the call request for an Individual Call (Individual Call Acknowledge Request) is sent.
- If PTT Proceed Tone is enabled, a Proceed Tone sounds from the transceiver when the transceiver becomes ready for communications after the **PTT** switch is pressed. (Refer to [Using Sound to Notify the Timing to Start Communications \(PTT Proceed Tone\) on page 32.](#))
- While the transceiver is on standby to receive an acknowledgment message from the receiving transceiver, canceling the call is possible by pressing the **Side 1** key (Portable) or the **Triangle** key (Mobile).

- The transmitting transceiver sends a message requesting another acknowledgment if the time configured for Maximum Acknowledgment Wait Time elapses before receiving a response message from the receiving transceiver. The transmitting transceiver can send a message requesting an acknowledgment up to the number of times configured for Number of Retries until the transceiver receives a response message. (Refer to [Maximum ACK Wait Time on page 70](#), [Number of Retries on page 69](#).)
- The transceiver cancels the call processing for the following.
 - If the transceiver cannot receive an acknowledgment message from the receiving transceiver even if a message requesting an acknowledgment has been sent for the number of times configured in the Number of Retries. (Refer to [Number of Retries on page 69](#).)
 - If the receiving transceiver rejects the incoming call, and the transmitting transceiver receives the notification message for cancellation.
 - If the time configured for the Initiating/Incoming Reset Time elapses before the transceiver receives an acknowledgment message from the receiving transceiver. (Refer to [Configuring the Maximum Length of Time to Wait to Receive an Acknowledgment Message \(Initiate/Incoming Reset Time\) on page 65](#).)

Configuration using KPG-169D/ KPG-170D/ KPG-175D

- Assigning functions to the PF keys ( [See](#) Edit > Key Assignment)
- Configuring the Selcall on PTT (NXDN) ( [See](#) Edit > Zone Information > Channel Edit > Page 1)
- Configuring the ID List Number (NXDN) ( [See](#) Edit > Zone Information > Channel Edit > Page 1)
- Configuring the Unit ID corresponding to the Call 1 or Call 2 key ( [See](#) Edit > Key Assignment > Call)

Receiving an Individual Call (Individual Call Acknowledge Request)

The transceiver can receive an Individual Call if the received Unit ID matches the Unit ID (Own) preconfigured for the transceiver.

To receive an Individual Call (Individual Call Acknowledge Request), the receiving transceiver must receive a message requesting an acknowledgment from the transmitting transceiver. The transceiver becomes enabled for the communication after the transmitting transceiver receives an acknowledgment message.

Note

To receive an Individual Call (Individual Call Acknowledge Request) in an NXDN Conventional system, "NXDN ID" needs to be configured as the Optional Signaling to be used on the channel. (Refer to [Using the Optional Signaling \(NXDN\) on page 55](#).)

Operating the Transceiver

The transceiver's behavior varies depending on the configuration for Automatic Response.

● If Automatic Response is disabled:

1 Receive a message requesting an acknowledgment.

An Alert Tone (Paging Call) sounds from the transceiver. If Selective Call Alert LED is enabled, the LED blinks orange or blue. (Refer to [Transceiver Behavior When Receiving an Individual Call/ Paging Call on page 59](#).)

2 Press the **Side 2** key (Portable) or the **[S]** key (Mobile).

An acknowledgment message is sent.
After sending the acknowledgment message, by receiving an Individual Call from the transmitting transceiver which has been enabled for the communication, an Alert Tone (Individual Call) sounds from the transceiver. (Refer to [Transceiver Behavior When Receiving an Individual Call/ Paging Call on page 59](#).)

Note

- If the time configured for Initiating/Incoming Reset Time elapses while the transceiver is placed in the state mentioned at Step 1, the transceiver resets the standby state, and the display reverts to the channel display. (Refer to [Configuring the Maximum Length of Time to Wait to Receive an Acknowledgment Message \(Initiate/Incoming Reset Time\)](#) on page 65.)
- During Step 1, the transceiver can reject an incoming call by pressing the **Side 1** key (Portable) or the **Triangle** key (Mobile).
- Pressing the **PTT** switch at Step 2 initiates an Individual Call to the transmitting transceiver. Not only receiving an acknowledgment message, but also receiving an Individual Call makes the transmitting transceiver available for the communication.

● **If Automatic Response is enabled:****1 Receive a message requesting an acknowledgment.**

An Alert Tone (Individual Call) sounds from the transceiver. If Selective Call Alert LED is enabled, the LED blinks orange or blue. (Refer to [Transceiver Behavior When Receiving an Individual Call/ Paging Call on page 59.](#))

An acknowledgment message is automatically sent to the transmitting transceiver.

After sending the acknowledgment message, by receiving an Individual Call from the transmitting transceiver which has been enabled for the communication, an Alert Tone (Individual Call) sounds from the transceiver. (Refer to [Transceiver Behavior When Receiving an Individual Call/ Paging Call on page 59.](#))

Note

Pressing the **PTT** switch initiates an Individual Call to the transmitting transceiver. Not only receiving an acknowledgment message, but also receiving an Individual Call makes the transmitting transceiver available for the communication.

Configuration using KPG-169D/ KPG-170D/ KPG-175D

- Configuring the Alert Tone (Individual) (Unit ID List) ([See](#) Edit > NXDN > Unit ID List > Alert Tone > Individual)
- Configuring the Alert Tone (Paging) (Unit ID List) ([See](#) Edit > NXDN > Unit ID List > Alert Tone > Paging)
- Configuring the Alert LED Color (Individual) (Unit ID List) ([See](#) Edit > NXDN > Unit ID List > Alert LED Color > Individual)
- Configuring the Alert LED Color (Paging) (Unit ID List) ([See](#) Edit > NXDN > Unit ID List > Alert LED Color > Paging)
- Configuring the Alert Tone (Individual Call) used in common in the NXDN Conventional system ([See](#) Edit > NXDN > Conventional > Alert Tone)
- Configuring the Alert Tone (Paging Call) used in common in the NXDN Conventional system ([See](#) Edit > NXDN > Conventional > Alert Tone)
- Configuring the Alert LED Color (Individual Call) used in common in the NXDN Conventional system ([See](#) Edit > NXDN > Conventional > Alert LED Color)
- Configuring the Alert LED Color (Paging Call) used in common in the NXDN Conventional system ([See](#) Edit > NXDN > Conventional > Alert LED Color)

Notifying the User with a Tone That a Call Request Has Been Initiated (Call Request Tone)

The Call Request Tone is the function to sound a Call Request Tone from the transceiver when a call request for an Individual Call (Individual Call Acknowledge Request) is initiated.

The Call Request Tone from the transceiver notifies the user that a call request for an Individual Call (Individual Call Acknowledge Request) has been initiated. The user can initiate the communication after the call request has been established.

Configuration using KPG-169D/ KPG-170D/ KPG-175D

Configuring the Call Request Tone to be enabled or disabled ([See](#) Edit > NXDN > Conventional > Individual Call Acknowledge Request)

Notifying the User with a Tone That a Call Request Is in Progress (Call Processing Tone)

The Call Processing Tone is the function to sound a Call Processing Tone from the transceiver until the transceiver receives an acknowledgment message from the receiving transceiver, after the call request for an Individual Call (Individual Call Acknowledge Request) is initiated.

The Call Processing Tone from the transceiver notifies a user that the call request for an Individual Call (Individual Call Acknowledge Request) is in progress. A Call Processing Tone stops when the call request is established, and the user can initiate the communication.

After the call request for an Individual Call (Individual Call Acknowledge Request) is initiated, a Call Processing Tone sounds from the transceiver upon the elapse of the time configured for Call Processing Tone Delay Time.

Configuration using KPG-169D/ KPG-170D/ KPG-175D

- Configuring the Call Processing Tone to be enabled or disabled ( See Edit > NXDN > Conventional > Individual Call Acknowledge Request > Call Processing Tone)
- Configuring the Call Processing Tone Delay Time ( See Edit > NXDN > Conventional > Individual Call Acknowledge Request > Call Processing Tone)

Sending an Acknowledgment Automatically (Automatic Response)

Automatic Response is the function to automatically send an acknowledgment message upon receipt of a message requesting an acknowledgment of an Individual Call.

If this function is enabled, the transceiver automatically sends an acknowledgment message upon receipt of a message requesting an acknowledgment of an Individual Call.

If this function is disabled, the transceiver automatically sends no acknowledgment message even if the transceiver has received a message requesting an acknowledgment of an Individual Call. In this case, an acknowledgment message can be sent manually by operating the transceiver. Refer to "If Automatic Response is disabled:" in [Receiving an Individual Call \(Individual Call Acknowledge Request\) on page 63](#) for instruction.

Configuration using KPG-169D/ KPG-170D/ KPG-175D

Configuring the Automatic Response to be enabled or disabled ( See Edit > NXDN > Conventional > Individual Call Acknowledge Request)

Configuring the Maximum Length of Time to Wait to Receive an Acknowledgment Message (Initiate/Incoming Reset Time)

Initiating/Incoming Reset Time is the maximum length of time for which the transmitting transceiver is on standby to receive an acknowledgment message from the receiving transceiver after sending a message requesting an acknowledgment of an Individual Call.

If Automatic Response is disabled, Initiating/Incoming Reset Time can also be used as the maximum length of time that allows the transceiver to send an acknowledgment message by operating the transceiver after receiving a message requesting an acknowledgment of an Individual Call. If the time configured for Initiating/Incoming Reset Time elapses, the transceiver resets the standby state, and the display reverts to the channel display.

Configuration using KPG-169D/ KPG-170D/ KPG-175D

Configuring the Initiating/Incoming Reset Time ( See Edit > NXDN > Conventional > Individual Call Acknowledge Request)

8.5 Making a Group Call

Group Call can be used to initiate a call to a group and establish voice calls in the group.

The transceiver can initiate a call to the transceivers having the same Group ID by specifying the Group ID. The transceiver can also initiate a call to all transceivers by specifying the Group ID for which "ALL" is configured.

Initiating a Group Call

Group Call can be started by one of the following methods.

- **Selcall on PTT**

The transceiver initiates a Group Call when the **PTT** switch is pressed on a channel where "Group Call" is configured for Selcall on PTT (NXDN). A Group ID of the target transceiver can be configured for each channel by selecting one Group ID from the Group ID List by using KPG-169D/ KPG-170D.

- **Talkback**

By pressing the **PTT** switch while the Auto Reset Timer is counting down after the transceiver receives a Group Call, the transceiver can respond (Talkback) with Group Call to the received Group ID.

Operating the Transceiver

- **Initiating a Group Call using Selcall on PTT**

1 Select a channel where the Group ID of the target transceiver is configured.

2 Press the **PTT** switch.

The LED lights red and audio is transmitted.

If PTT Proceed Tone is enabled, a Proceed Tone sounds from the transceiver when the transceiver becomes ready for communications after the **PTT** switch is pressed. (Refer to [Using Sound to Notify the Timing to Start Communications \(PTT Proceed Tone\)](#) on page 32.)

- **Initiating a Group Call using the Talkback**

1 Receive a Group Call.

An Alert Tone (Group Call) sounds from the transceiver. If Selective Call Alert LED is enabled, the LED blinks orange or blue. (Refer to [Transceiver Behavior When Receiving a Group Call](#) on page 67.)

2 Press the **PTT** switch while the Auto Reset Timer is counting down.

The transceiver can respond (Talkback) to the received Group ID by using Group Call.

Configuration using KPG-169D/ KPG-170D/ KPG-175D

- Configuring the Group ID List ( [See](#) Edit > NXDN > Group ID List)
- Configuring the Selcall on PTT (NXDN) ( [See](#) Edit > Zone Information > Channel Edit > Page 1)
- Configuring the ID List Number (NXDN) ( [See](#) Edit > Zone Information > Channel Edit > Page 1)

Receiving a Group Call

If the received Group ID matches the Group ID configured for the transceiver, the transceiver can receive the Group Call.

Note

To receive a Group Call in an NXDN Conventional system, "NXDN ID" needs to be configured as the Optional Signaling to be used on the channel. (Refer to [Using the Optional Signaling \(NXDN\) on page 55](#))

Transceiver Behavior

1 Receive a Group Call.

An Alert Tone (Group Call) sounds from the transceiver. If Selective Call Alert LED is enabled, the LED blinks orange or blue. (Refer to [Transceiver Behavior When Receiving a Group Call on this page.](#))

By pressing the **PTT** switch while the Auto Reset Timer is counting down, the transceiver can respond (Talkback) with Group Call to the received Group ID.

Transceiver Behavior When Receiving a Group Call

● Alert Tone

If the received Group ID is configured in the Group ID List, an Alert Tone sounds from the transceiver according to the configuration for Alert Tone of the corresponding Group ID.

However, if "Common" is configured for Alert Tone in the Group ID List, or if the received Group ID is not configured in the Group ID List, an Alert Tone sounds from the transceiver according to the configuration for Alert Tone (Group Call) used in common in an NXDN Conventional system.

● LED

If the received Group ID is configured in the Group ID List, the LED blinks according to the configuration for Alert LED Color of the corresponding Group ID.

However, if "Common" is configured for Alert LED Color in the Group ID List, or if the received Group ID is not configured in the Group ID List, the LED blinks according to the configuration for Alert LED Color used in common in an NXDN Conventional system.

Note

- When the transceiver receives the Group ID for which "ALL" is configured, the transceiver can respond (Talkback) using the Group ID if the received Group ID is configured in the Group ID List. If the received Group ID is not configured in the ID List, the transceiver can receive the call but cannot respond (Talkback).
- The transceiver cannot respond (Talkback) if any key other than the **PTT** switch is used when the transceiver receives a Group Call.
- For Portable, if any **PF** key other than the **Emergency** key is used when the transceiver receives a Group Call, the transceiver reverts to the normal standby state.
- For Mobile, if the **Volume Up**, **Volume Down**, or **LED Brightness** key is used when a Group Call is received, each of the functions is activated. In this case, the Alert Tone stops sounding but the LED continues to blink. In addition, if any **PF** key other than the **Emergency**, **Volume Up**, **Volume Down**, and **LED Brightness** key is used when a Group Call is received, the transceiver reverts to the normal standby display.

Configuration using KPG-169D/ KPG-170D/ KPG-175D

- Configuring the Alert Tone (Group ID List) ( [See](#) Edit > NXDN > Group ID List)
- Configuring the Alert LED Color (Group ID List) ( [See](#) Edit > NXDN > Group ID List)
- Configuring the Alert Tone (Group Call) used in common in the NXDN Conventional system ( [See](#) Edit > NXDN > Conventional > Alert Tone)
- Configuring the Alert LED Color (Group Call) used in common in the NXDN Conventional system ( [See](#) Edit > NXDN > Conventional > Alert LED Color)

Group ID List

The transceiver uses a Group ID configured in the Group ID List to initiate a Group Call in an NXDN Conventional system. The desired Group IDs must be preconfigured using KPG-169D/ KPG-170D/ KPG-175D for the transceiver to initiate a Group Call. A maximum of 8 Group IDs can be configured in the Group ID List.

Table 8-7 Group ID List

Configuration	Description
ID	A Group ID can be configured in the range between 1 and 65519 inclusive and ALL. ALL allows initiation of a call to all IDs.
Transmit Inhibit	The permission or inhibition of transmission of the receiving party can be configured. If "Yes" is configured for Transmit Inhibit, the ID cannot be configured as the target ID of the Selcall on PTT. Also, if the transceiver receives the call from the transceiver with the ID where "Yes" is configured for Transmit Inhibit, the transceiver cannot respond (Talkback) even if a user presses the PTT switch.
Alert Tone	A user can configure the type of the tone that sounds from the transceiver when the transceiver receives a Group Call from the Group ID which is configured in the Group ID List.
Alert LED Color* ¹	Whether to blink the LED orange or blue when the transceiver receives a Group Call from the Group ID which is configured in the Group ID List can be configured.

*¹ To use this function, Selective Call Alert LED must be enabled.

Configuration using KPG-169D/ KPG-170D/ KPG-175D

Configuring the Group ID List ( See Edit > NXDN > Group ID List)

Preventing the Functions Working with Group Call Reception from Activating (Call Alert Inhibit (Group Calls only))

Call Alert Inhibit (Group Calls only) is the function that disables the Alert Tone function when the transceiver receives a Group Call.

Use of this function prevents specific functions from activating as follows even if these functions are enabled or configured to be enabled when the transceiver receives a Group Call.

- **Alert Tone**
The following Alert Tones do not sound from the transceiver even if the transceiver receives a Group Call.
Alert Tone (Group Call List)
Group Call (Alert Tone) (Conventional)
- **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 Group Call.

Configuration using KPG-169D/ KPG-170D/ KPG-175D

Configuring the Call Alert Inhibit (Group Calls only) to be enabled or disabled ( See Edit > NXDN > General 1)

Preventing Reception of a Group Call While the Transceiver Is Receiving an Individual Call (Ignore Group Call during Individual Call)

Ignore Group Call during Individual Call is the function that prevents reception of a Group Call while the transceiver is receiving an Individual Call.

This function is used to avoid the target to which the transceiver responds (Talkback) from being changed for receiving a Group Call during the Individual Call.

If this function is enabled, the transceiver cannot receive a Group Call while receiving an Individual Call and the Auto Reset Timer is counting down.

Note

Even if this function is enabled, the following Group Calls can be received.

- A Group Call using All Group ID
- A Group Call for Emergency

Configuration using KPG-169D/ KPG-170D/ KPG-175D

Configuring the Ignore Group Call during Individual Call to be enabled or disabled ( See Edit > NXDN > General 1)

8.6 Common Functions for Data Communications

The following functions are used in common for data communications such as Status Call or GPS data transmission.

- Number of Retries
- Transmit Busy Wait Time
- Maximum ACK Wait Time
- GTC Count
- ACK Delay Time
- Transmit Delay Time (Receive Capture)
- Data Transmit Modulation Delay Time
- Random Access (Contention)
- Preamble Length

Number of Retries

If the transceiver does not receive the acknowledgment after the transceiver sends data and the time configured for Maximum ACK Wait Time elapses, the transceiver resends data. Number of Retries is the number of times for the transceiver to resend data. A smaller number can be configured if there is good communicating conditions, and a larger number can be configured if there are inferior communicating conditions.

Configuration using KPG-169D/ KPG-170D/ KPG-175D

Configuring the Number of Retries ( See Edit > NXDN > General 1 > Parameter)

Transmit Busy Wait Time

The transceiver confirms that the communication channel is available before sending data and then starts sending data when the channel is available. Transmit Busy Wait Time is the duration to wait for the communication channel to become available.

A transmission is canceled if the channel is still busy when the Transmit Busy Wait Time elapses.

The default configuration is normally used.

Configuration using KPG-169D/ KPG-170D/ KPG-175D

Configuring the Transmit Busy Wait Time ( See Edit > NXDN > General 1 > Parameter)

Maximum ACK Wait Time

Maximum ACK Wait Time is the length of time that the transceiver stands by to receive the acknowledgment after the transceiver sends data. If the transceiver does not receive the acknowledgment within the time configured for Maximum ACK Wait Time, the transceiver resends data.

The default configuration is normally used.

Note

This period can also be used for waiting on a data channel, after migrating to the data channel using the GTC.

Configuration using KPG-169D/ KPG-170D/ KPG-175D

Configuring the Maximum ACK Wait Time ( See Edit > NXDN > General 1 > Parameter)

GTC Count

GTC Count is the number of times that the transmitting transceiver transmits the GTC.

GTC (Go To Channel) is a message that allows the transmitting transceiver to induce the receiving transceiver to the data channel.

The transmitting transceiver will migrate to the data channel after transmitting the GTC if Status Message on Data Zone-Channel is configured. When the receiving transceiver receives the GTC, it automatically migrates to the data channel and stands by to receive the data.

Default value for the number of times is normally used.

Note

- The receiving transceiver waits to receive the data after the receiving transceiver migrates to the data channel. The transceiver restores the voice channel if the transceiver does not receive the data within the time configured for Maximum ACK Wait Time.
- The transmitting transceiver sends the data and waits to receive the acknowledgment after the transmitting transceiver migrates to the data channel. The transceiver restores the voice channel if the transceiver does not receive the acknowledgment within the time configured for Maximum ACK Wait Time.

Configuration using KPG-169D/ KPG-170D/ KPG-175D

Configuring the GTC Count ( See Edit > NXDN > Conventional > Parameter)

ACK Delay Time

ACK Delay Time is the length of time from when the transceiver receives data until the transceiver sends the acknowledgment.

ACK Delay Time must be shorter than Maximum ACK Wait Time configured for the transmitting transceiver. The default configuration is normally used.

Configuration using KPG-169D/ KPG-170D/ KPG-175D

Configuring the Ack Delay Time ( See Edit > NXDN > Conventional > Parameter)

Transmit Delay Time (Receive Capture)

Transmit Delay Time is the period of time to transmit the IDLE frame prior to the first data transmission.

The transmitting transceiver transmits the IDLE frame and the receiving transceiver temporarily pauses scanning to receive the data. Using this function, the data can reliably be sent even if the receiving transceiver is scanning or using the Battery Saver.

The default configuration is normally used.

Configuration using KPG-169D/ KPG-170D/ KPG-175D

Configuring the Transmit Delay Time ( See Edit > NXDN > Conventional > Parameter)

Data Transmit Modulation Delay Time

Data Transmit Modulation Delay Time is the duration from when the transceiver starts transmitting until the transceiver starts to modulate the data frame.

Data Transmit Modulation Delay Time is used to allow the transmitted radio signal to stabilize before applying data. However, it may be difficult to establish data communications when the transmit and receive frequencies are widely separated or the transceiver is always used in extremely cold areas. In such cases, Data Transmit Modulation Delay Time must be extended in order to improve the reliability of data communications.

The default configuration is normally used.

Configuration using KPG-169D/ KPG-170D/ KPG-175D

Configuring the Data Transmit Modulation Delay Time ( See Edit > NXDN > Conventional > Parameter)

Random Access (Contention)

Random Access allows the transceiver to randomize the transmission start time for each transceiver to send data when the channel becomes available.

If a large number of transceivers begin transmitting immediately after the channel becomes available, transmission contention may occur. This function prevents this contention.

Configuration using KPG-169D/ KPG-170D/ KPG-175D

Configuring the Random Access ( See Edit > NXDN > Conventional)

Preamble Length

Preamble Length is the function to extend time for sending a preamble when the NXDN frame is sent.

Extending the time for sending a preamble at the beginning of transmission makes the receiving transceiver easier to receive a call and reduces missing of the beginning of the audio during the scan.

The extended time of a preamble is determined by using the following equation.

Very Narrow:

Time [s] = 1/2400 x 4 x Configuration value for Preamble Length

Configuration using KPG-169D/ KPG-170D/ KPG-175D

Configuring the Preamble Length ( See Edit > NXDN > Conventional > Parameter)

8.7 Sending a Status Message (Status Call)

Status Call is a simple messaging system that allows a user to send a status (Status Message). Since the message is replaced by status, communications can take place quickly and communication traffic can be reduced.

Pressing the **Call 1** or **Call 2** key causes the transceiver to send the preconfigured Status Message. The Status Message is addressed to the Base ID.

Call 1 or Call 2 can be assigned to the **PF** keys by using KPG-169D/ KPG-170D/ KPG-175D and the Status Message corresponding to each key can be selected from the Status List in NXDN.

Note

NX-240/ 240V/ 340/ 340U/ 740H/ 740HV/ 840H/ 840HU cannot receive a Status Message.

Configuration using KPG-169D/ KPG-170D/ KPG-175D

- Configuring the Status List ( See Edit > NXDN > Status List)
- Assigning functions to the PF keys ( See Edit > Key Assignment)
- Configuring the Status Message corresponding to the Call 1 or Call 2 key ( See Edit > Key Assignment > Call)

Transceiver Behavior When Receiving the Radio Check Status Message

The Radio Check status message is the status message which is sent by the base station transceiver to confirm the operation status of the mobile station transceiver.

When the transceiver receives a Radio Check status message, if the transceiver has never sent any status yet, for instance, right after the transceiver is turned ON, the transceiver sends the status configured for Default Status. However, the transceiver sends status 207 if Default Status is not configured.

When the transceiver receives a Radio Check status message after once sending a status by a user pressing the **Call 1** or **Call 2** key, the transceiver sends the last sent status.

The transceiver sends the status configured for Stun Response Status while Stun is enabled (Transmit Inhibit or Transceiver Inhibit). However, the transceiver sends the status configured for Default Status if Stun Response Status is not configured. The transceiver sends status 207 if neither Default Status nor Stun Response Status is configured.

Note

NX-240/ 240V/ 340/ 340U/ 740H/ 740HV/ 840H/ 840HU cannot send a Radio Check status message.

Configuration using KPG-169D/ KPG-170D/ KPG-175D

- Configuring the Default Status ( See Edit > NXDN > Status > Option)
- Configuring the Stun Response Status ( See Edit > NXDN > Status > Option)

Status List

Status Message must be preconfigured in the transceiver using KPG-169D/ KPG-170D/ KPG-175D prior to the transmission. A maximum of 2 statuses can be configured in the Status List.

Configuration using KPG-169D/ KPG-170D/ KPG-175D

Configuring the Status List ( See Edit > NXDN > Status List)

Status Message on Data Zone-Channel

Status Message on Data Zone-Channel is the function that allows the transceiver to automatically change the channel to the Data Zone-Channel (NXDN) to send a Status Message in an NXDN Conventional system.

The channel in an NXDN Conventional system is automatically changed to the channel configured for Data Zone-Channel (NXDN) to send a Status Message. When the transmission ends, the transceiver restores the Zone-channel which was used for receiving before sending the Status Message. Status Message on Data Zone-Channel can be used to send data on a specific dedicated channel.

Configuration using KPG-169D/ KPG-170D/ KPG-175D

- Configuring the Status Message on Data Zone-Channel to be enabled or disabled ( See Edit > NXDN > Conventional)
- Configuring the Data Zone-Channel (NXDN) ( See Edit > Optional Features > Common 1)

Power-on Status Message

Power-on Status Message allows the transceiver to send the selected Status Message when the transceiver is turned ON. Using the Power-on Status Message, the base station can recognize that the transceiver has been turned ON. The transceiver sends the message to the ID configured for Base ID.

Configuration using KPG-169D/ KPG-170D/ KPG-175D

Configuring the Power-on Status Message ( See Edit > NXDN > Status > Option)

Base ID

Base ID is the target transceiver's ID used to send GPS data or the following Status Messages.

- Power-on Status Message
- Status Message that is sent by a user pressing the **Call 1** or **Call 2** key

Base ID can be configured using KPG-169D/ KPG-170D/ KPG-175D. Either Unit ID or Group ID can be configured. ID of the base station that manages operations is normally configured for Base ID.

Configuration using KPG-169D/ KPG-170D/ KPG-175D

Configuring the Base ID Type and Base ID ( See Edit > NXDN > General 1)

AUX Input Status Message

Supported Models: Mobile

AUX Input Status Message can be used to send the specified Status Message when the AUX Input port goes high level to low level or goes low level to high level.

The transceiver can send a Status Message when a sensor is attached to the AUX Input port and the status of the AUX Input port changes. The target ID is the ID configured for the Base ID. (Refer to [Base ID on page 73.](#))

To use this function, AUX Input Status Message must be assigned to one of AUX Input ports.

Configuration using KPG-175D

- Configuring the AUX Input Status Message ( [See](#) Edit > NXDN > Status)
- Assigning functions to the AUX Input ( [See](#) Edit > Extended Function > AUX)

AUX Output Status Message

Supported Models: Mobile

AUX Output Status Message is the function to switch the status of the AUX Output port from high to low or from low to high when the transceiver receives the specified Status Message. This function can be used to remotely turn the external device On or Off.

To use this function, AUX Output Status Message must be assigned to one of AUX Output ports.

Configuration using KPG-175D

- Configuring the AUX Output Status Message ( [See](#) Edit > NXDN > Status)
- Assigning functions to the AUX Output ( [See](#) Edit > Extended Function > AUX)

Storing the Selected or Sent Status (Status Hold)

Supported Models: Mobile

Status Hold is the function to store a sent status in the transceiver.

When the transceiver receives a status request message, the status stored in the transceiver will automatically be transmitted. Also, the status stored in the transceiver will automatically be stored in GPS data and transmitted.

Table 8-8 Status Hold

Configuration	Description
Enabled	The transceiver stores a status sent by one of the following method: <ul style="list-style-type: none"> • A status sent when the status of the AUX Input Status Message port changes. • The status transmitted when the transceiver is turned ON (Power-on Status) • A status sent by pressing the Call 1 or Call 2 key.
Disabled	The transceiver stores in the transceiver the status configured for Default Status.

Configuration using KPG-175D

Configuring the Status Hold to be enabled or disabled ( [See](#) Edit > Optional Features > Common 2)

8.8 Communicating using a CW Message

Continuous Wave (CW) is a radio emission type that is used to send and receive Morse code messages over the air. CW Message is used to send Morse code messages preconfigured in the transceiver by using the **PF** keys.

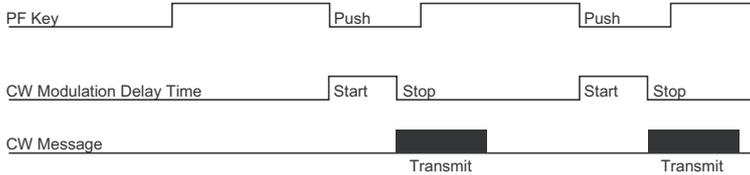
Pressing the **CW Message** key causes the transceiver to send a CW Message.

The transceiver will switch to analog modulation mode when the transceiver sends a CW Message.

A maximum of 32 alphanumeric characters and symbols can be configured and sent.

The CW Message to be sent can be configured using KPG-169D/ KPG-170D/ KPG-175D. The following functions are relevant to sending a CW Message.

Table 8-9 Various Functions of CW Message

Function	Description
CW Speed	CW Speed refers to how fast the CW Message is sent by using Morse code.
CW Modulation Delay Time	<p>CW Modulation Delay Time is the amount of time from when the transceiver starts transmitting until the transceiver starts sending the CW Message.</p>  <p style="text-align: center;">Figure 8-6 CW Modulation Delay Time</p> <p>Note If "Off" is configured for CW Modulation Delay Time, the transceiver sends a CW Message immediately after the transceiver starts transmitting.</p>
Audio Frequency	Audio Frequency is the frequency used to send the CW Message.
CW Sidetone	CW Sidetone is the function to emit tones from the speaker while the transceiver sends a CW Message.

Note

- A CW message is always sent in analog mode regardless of the configuration for Zone Type.
- CW specifications are compliant with articles in FCC 90.425 Station Identification and International Morse Code.

Configuration using KPG-169D/ KPG-170D

- Configuring the various functions of CW Message ([See](#) Edit > Optional Features > Common 3 > CW ID)
- Assigning functions to the PF keys ([See](#) Edit > Key Assignment)

Configuration using KPG-175D

- Configuring the various functions of CW Message ([See](#) Edit > Optional Features > Common 2 > CW ID)
- Assigning functions to the PF keys ([See](#) Edit > Key Assignment)

8.9 Site Roaming

Site Roaming is the function to migrate automatically to the site (channel) providing better radio environment if a transceiver is operated in the NXDN Conventional system.

The transceiver receives a synchronization signal transmitted from the repeaters in multiple sites at regular time intervals, and detects the RSSI level. Therefore, the transceiver migrates automatically to the channel providing better radio environment.

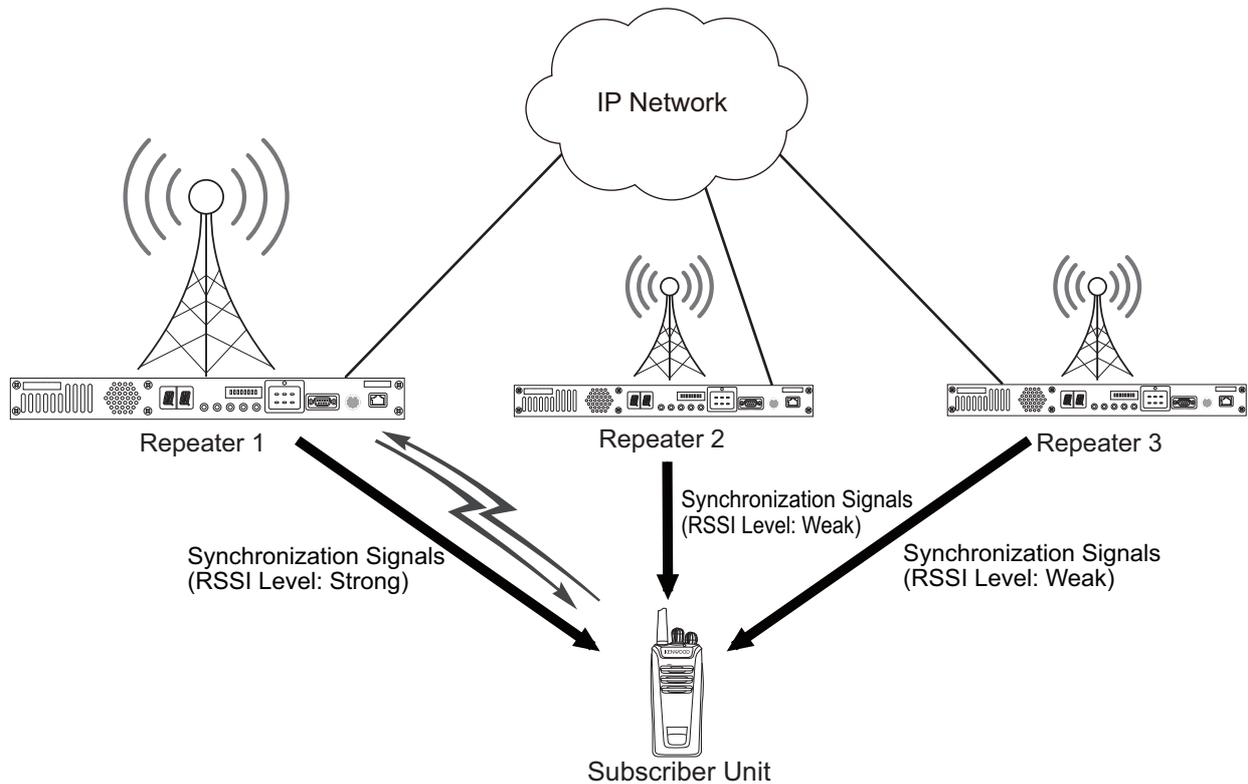


Figure 8-7 Image of Communications of Site Roaming

This function can be used by configuring channels for each zone in Site Roaming or Site Roaming with RAN (a maximum of 16 channels for each) by using KPG-169D/ KPG-170D/ KPG-175D.

Site Roaming Behaviors

If the zone configured as Site Roaming or Site Roaming with RAN is selected, the transceiver automatically initiates Site Roaming on the channels configured for the zone.

For Portable, the LED blinks green upon the initiation of Site Roaming.

For Mobile, "ro" appears on the LED display upon the initiation of Site Roaming.

When the transceiver transmits, the RAN code configured for Revert Channel is multiplexed on a signal.

The channel the transceiver received last time is retained even if the transceiver is turned OFF. When the transceiver is turned ON and transmits next time, the channel will be used as the Revert Channel. If there is no Revert Channel, the channel of the lowest number configured for the zone will be used as the Revert Channel. While the transceiver is receiving, or if the transceiver transmits while the length of time configured for Dropout Delay Time or Dwell Time is elapsing, the transceiver transmits using the Revert Channel.

When the transceiver receives a synchronization signal from the repeater, the transceiver basically behaves as follows.

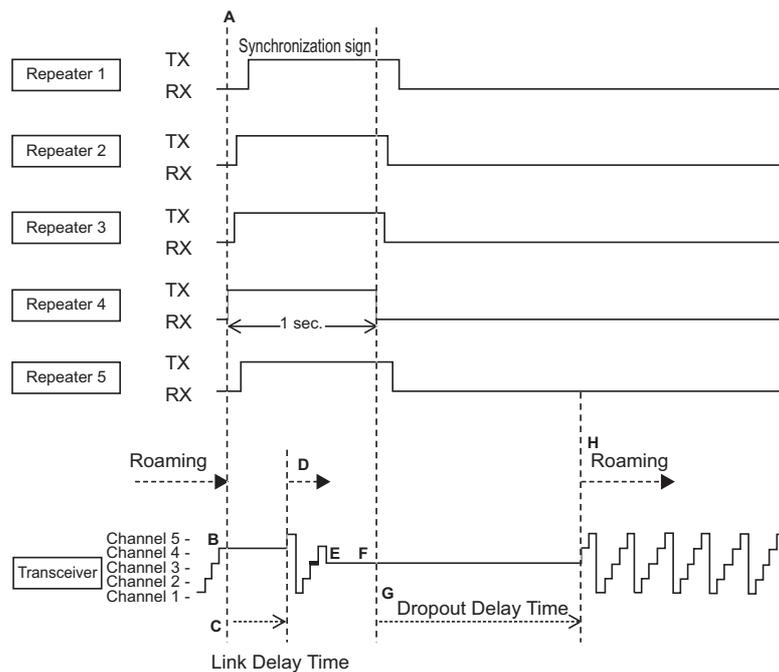


Figure 8-8 Site Roaming

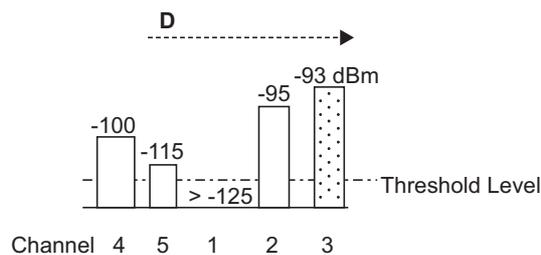


Figure 8-9 Threshold Level

- A:** The repeater in an NXDN Conventional system transmits a synchronization signal at regular time intervals. Or, the repeater in an NXDN Conventional system transmits a call signal according to a transmission request from another transceiver.
- B:** For example, the transceiver in the zone configured as Site Roaming or Site Roaming with RAN detects an adequate RSSI level on Channel 4.
- C:** The transceiver activates Site Roaming Link Delay Time.
- D:** Upon elapsing the length of time configured for Site Roaming Link Delay Time, the transceiver goes around all the channels and searches for the channel having the strongest RSSI level.
- E:** After going around all the channel, the transceiver migrates to the channel having the strongest RSSI level (for example, Channel 3) and examines whether the received RAN code matches the RAN code preconfigured for the channel.
- **If “Site Roaming” is configured for Zone Type:**

If the received RAN code matches that preconfigured for the channel, the transceiver unmutes the speaker and the channel will be the Revert Channel.

If the received RAN code does not match that preconfigured for the channel, the transceiver continues to mute the speaker but the channel will be Revert Channel. Then the transceiver migrates to the channel having the second strongest RSSI level (for example, Channel 2) and examines whether the received RAN code matches that preconfigured for the channel. If the received RAN code matches the RAN Code preconfigured for the channel, the transceiver unmutes the speaker and the channel becomes a Revert Channel.

- **If “Site Roaming with RAN” is configured for Zone Type:**

If the received RAN code matches that preconfigured for the channel, the transceiver unmutes the speaker and the channel will be the Revert Channel.

If the received RAN code does not match the RAN code preconfigured for the channel or if no RAN code is configured for the channel, the transceiver migrates to the channel having the second strongest RSSI level (for example, Channel 2) and examines whether the received RAN code matches the RAN code preconfigured for the channel. If the received RAN code matches the RAN Code preconfigured for the channel, the transceiver unmutes the speaker and the channel becomes a Revert Channel.

F: While the received RAN code matches the RAN code preconfigured for the channel, the transceiver will remain on the channel and will not resume Site Roaming.

G: If the received signal disappear or the received RAN code does not match that preconfigured for the channel, Dropout Delay Time will be activated.

H: After the time configured for the Dropout Delay Time elapses, the transceiver resumes Site Roaming.

 **Note**

- For Mobile, the Scan Add function cannot be used on a channel in the zone configured as Site Roaming or Site Roaming with RAN.
- The following functions cannot be used in a zone configured as Site Roaming or Site Roaming with RAN.
 - Data Zone-Channel (Analog)
 - Data Zone-Channel (NXDN)
 - **Direct Zone-Channel** key (Mobile only)
 - **Scan** key
- The number of a zone configured as Site Roaming or Site Roaming with RAN cannot be configured for the following functions.
 - Data Zone-Channel (Analog)
 - Data Zone-Channel (NXDN)
 - Priority Zone-Channel (Analog)
 - Priority Zone-Channel (NXDN)
 - Emergency Zone-Channel (Analog)
 - Emergency Zone-Channel (NXDN)
- If the transceiver initiates an Emergency Call in the zone configured as Site Roaming or Site Roaming with RAN, the transceiver transmits on the Revert Channel regardless of the configuration for Emergency Zone-Channel Type (Selected or Fixed).
- The Revert Channel used for Site Roaming is not retained when the zone is changed.
- If the zone configured as Site Roaming or Site Roaming with RAN is selected while the transceiver is scanning, the transceiver resumes Site Roaming.

Configuration using KPG-169D/ KPG-170D/ KPG-175D

Configuring the Zone Type ( **See** Edit > Zone Information)

Site Roaming Link Delay Time

The length of time until the repeater in each site is activated may vary depending on the site. Site Roaming Link Delay Time is a function to configure the length of time to tolerate, by delaying the time to start searching for a signal on other channel, a variation in time of when each repeater is activated.

If the transceiver detects a signal on a channel after Site Roaming is initiated, Site Roaming Link Delay Time will be activated. Upon the elapse of the time configured for Site Roaming Link Delay Time after detecting the signal, the transceiver goes around other channels in the same zone to search for a signal. After going around all the channel, the transceiver migrates to the channel having the strongest RSSI level and examines whether the received RAN code matches that preconfigured for the channel. If the received RAN code does not match that preconfigured for the channel or if no RAN code is configured for the channel, the transceiver migrates to the channel having the second strongest RSSI level and examines whether the received RAN code matches that preconfigured for the channel.

Configuration using KPG-169D/ KPG-170D/ KPG-175D

Configuring the Site Roaming Link Delay Time ( See Edit > Scan Information > Site Roaming (NXDN))

Dropout Delay Time (Site Roaming)

If the transceiver receives a synchronization signal or call from the repeater during Site Roaming, Site Roaming temporarily pauses.

Dropout Delay Time is the time from when the transceiver finishes receiving signals until the transceiver resumes Site Roaming.

If the received signal disappear or the received RAN code does not match that preconfigured for the channel, Dropout Delay Time will be activated. After the time configured for Dropout Delay Time elapses, the transceiver resumes Site Roaming.

Configuration using KPG-169D/ KPG-170D/ KPG-175D

Configuring the Dropout Delay Time ( See Edit > Scan Information > Site Roaming (NXDN))

Dwell Time

When the transceiver starts transmitting by a user pressing the **PTT** switch during Site Roaming, Site Roaming temporarily pauses.

Dwell Time is the length of time from when the transceiver completes transmitting until the transceiver resumes Site Roaming.

After the transceiver completes transmitting, Dwell Time will be activated. After the time configured for Dwell Time elapses, the transceiver resumes Site Roaming.

If "Off" is configured for Dwell Time, Site Roaming will restart immediately after the transceiver has terminated the transmission. Even if the transceiver receives a signal after the transceiver has terminated the transmission, Site Roaming will promptly restart. However, Site Roaming will not restart if the transceiver responds to the received signal and the transceiver terminates the transmission. The transceiver behaves in this manner since the channel in use provides the better radio environment and the transceiver remains on the channel even after the transmission.

Configuration using KPG-169D/ KPG-170D/ KPG-175D

Configuring the Dwell Time ( See Edit > Scan Information > Site Roaming (NXDN))

Quick Site Roaming Level

Quick Site Roaming Level is the function to allow Site Roaming to behave faster when the transceiver is in an area with a strong signal.

If the transceiver receives a signal of which level is higher than that configured for Quick Site Roaming Level during Site Roaming, the channel will be the Revert Channel. In this case, Site Roaming Link Delay Time is disabled and the transceiver unmutes the speaker if the received RAN code matches that preconfigured for the channel.

However, if "Off" is configured for Quick Site Roaming Level and Standard Site Roaming Level, the transceiver initiates Site Roaming using the threshold value preconfigured in the transceiver.

Configuration using KPG-169D/ KPG-170D/ KPG-175D

Configuring the Quick Site Roaming Level ( Edit > Scan Information > Site Roaming (NXDN))

Standard Site Roaming Level

Standard Site Roaming Level is the function to allow Site Roaming to behave faster when the transceiver is in an area with a strong signal.

The transceiver searches a signal of which level is higher than that configured for Standard Site Roaming Level during Site Roaming.

Since a channel having a signal of which level is lower than that configured for Standard Site Roaming Level is excluded from Site Roaming, the transceiver does not search the channel. If the transceiver receives a signal of which level is higher than that configured for Standard Site Roaming Level during Site Roaming, Site Roaming will temporarily pause and then Site Roaming Link Delay Time will be activated. If the received RAN code matches the RAN code preconfigured for the channel, the transceiver unmutes the speaker.

However, if "Off" is configured for Quick Site Roaming Level and Standard Site Roaming Level, the transceiver initiates Site Roaming using the threshold value preconfigured in the transceiver.

Configuration using KPG-169D/ KPG-170D/ KPG-175D

Configuring the Standard Site Roaming Level ( Edit > Scan Information > Site Roaming (NXDN))

Site Roaming Resume Level

Site Roaming Resume Level is the threshold value of the RSSI level used for determining whether to resume Site Roaming according to the rise and fall of the RSSI level for the signal received by the transceiver.

If the RSSI level of the received signal is lower than the level preconfigured for Site Roaming Resume Level while the transceiver remains on the channel synchronized by Site Roaming, Dropout Delay Time will be activated. After the time configured for Dropout Delay Time elapses, the transceiver resumes Site Roaming. If the RSSI level of the received signal is higher than the level preconfigured for Site Roaming Resume Level while the Dropout Delay Time is counting down, the Dropout Delay Time will be extended and the transceiver will not resume Site Roaming.

Configuration using KPG-169D/ KPG-170D/ KPG-175D

Configuring the Site Roaming Resume Level ( Edit > Scan Information > Site Roaming (NXDN))

Off-hook Site Roaming

Supported Models: Mobile

Off-hook Site Roaming is the function to start the Site Roaming depending on the status of microphone, either on-hook or off-hook.

The transceiver behaves as follows according to the configuration for Off-hook Site Roaming.

Table 8-10 Off-hook Site Roaming

Configuration	Description
Enabled	The transceiver can start Site Roaming while the microphone is in either the on-hook state or off-hook state. Even if the microphone changes from the On-hook state to Off-hook state during Site Roaming, Site Roaming will not pause.
Disabled	The transceiver can start Site Roaming if the microphone is in the on-hook state. The transceiver cannot start Site Roaming if the microphone is in the off-hook state. If the microphone changes from the On-hook state to Off-hook state during Site Roaming, Site Roaming will temporarily pause on the Revert Channel. Even if the microphone changes from the On-hook state to Off-hook state while Site Roaming pauses, the channel will not be changed. When the microphone goes to On-hook state, the transceiver resumes Site Roaming.

Note

The microphone hook status can be switched on the AUX Input port to which "External Hook" is assigned. (Refer to [18.1 Available Functions for AUX Input Ports on page 182.](#))

Configuration using KPG-175D

Configuring the Off-hook Site Roaming to be enabled or disabled ([See](#) Edit > Scan Information > Site Roaming (NXDN))

8.10 Sending GPS Data

Global Positioning System (GPS) is the system to acquire the current location information of the own transceiver by receiving signals from the Global Positioning System satellites orbiting the earth.

The transceiver can send the acquired own location information (GPS data) to the base station.

A GPS receiver unit compatible with the NMEA-0183 standard is required and it must be connected to the communication port of the mobile station transceiver to send GPS data.

Transmission Method of GPS Data

The following are the methods to send GPS data:

- **Automatic GPS data transmission**
 - [Sending GPS Data Automatically at Certain Intervals \(GPS Report Mode\)](#)
 - [Sending GPS Data According to the Request from the Base Station \(GPS Report Mode\)](#)
- **Manual GPS data transmission**
 - [Sending GPS Data Manually by Using a Key \(Send the GPS Data\)](#)
- **GPS data transmission together with voice communications**
 - [Sending GPS Data Together With Voice Communications \(GPS Combination\)](#)
- **GPS data transmission together with Status Message**
 - [Sending GPS Data Together With Status Call \(GPS Combination\)](#)
- **GPS data transmission together with Emergency Call**
 - [Sending GPS Data Together With Emergency Call \(GPS Combination\)](#)

Note

For a transceiver sending GPS data, "GPS" must be assigned to the communication port. (Refer to [A.2 Available Functions for COM Port on page 202.](#))

The ID of the Target Transceiver (Base ID)

Base ID is the ID of the target transceiver used for sending GPS data.

By using KPG-169D/ KPG-170D/ KPG-175D, either Unit ID or Group ID can be configured as Base ID. The ID of the base station which is responsible for operation and administration of system is normally configured for Base ID.

GPS data will be sent to the ID configured in the **Base ID (GPS)** edit box of the **NXDN** window > **GPS** tab in KPG-169D/ KPG-170D/ KPG-175D. If Base ID (GPS) is not configured, the GPS data is sent to the ID configured in the **Base ID** edit box in the **NXDN** window > **General 1** tab.

Configuration using KPG-169D/ KPG-170D/ KPG-175D

- Configuring the Base ID Type and Base ID ( [See](#) Edit > NXDN > General 1)
- Configuring the Base ID Type (GPS) and Base ID (GPS) ( [See](#) Edit > NXDN > GPS)

Sending GPS Data Automatically at Certain Intervals (GPS Report Mode)

GPS data can be sent automatically at the intervals configured for GPS Report Interval.

This function is used for position management or monitoring of transceivers on a time base by periodically transmitting location information to the base station.

To use this function, "Auto" must be configured for GPS Report Mode by using KPG-169D/ KPG-170D/ KPG-175D.

Note

- The transceiver sends the GPS data upon receipt of the GPS data transmission request from the base station even if "Auto" is configured for GPS Report Mode.
- If the transceiver is under the following conditions, the automatic transmission of GPS data at certain intervals will be canceled. To avoid a collision with a GPS transmission from other transceivers while sending GPS data, Transmit Busy Wait Time will not suspend the transmission. (Refer to [Transmit Busy Wait Time on page 70.](#))
 - While the transceiver is transmitting
 - While the transceiver is in busy state
 - While the transceiver unmutes the speaker
 - While the Public Address function is used (Mobile only)
 - If Transmit Frequency is not configured
 - If transmission is disabled by the Time-out Timer
 - While the transceiver is sending or receiving the NXDN data
 - Transceiver Password Mode
 - Emergency Mode

Configuration using KPG-169D/ KPG-170D/ KPG-175D

Configuring the GPS Report Mode ( See Edit > Optional Features > GPS)

Sending GPS Data According to the Request from the Base Station (GPS Report Mode)

The transceiver can send GPS data when a GPS data transmission request is received from the base station.

This function is used when the base station controls the timing to require GPS data. This function is also used to avoid transmit collisions if there are many subscriber units.

To use this function, "Poll" must be configured for GPS Report Mode by using KPG-169D/ KPG-170D/ KPG-175D.

Note

The transceiver sends GPS data to the ID configured for Base ID (GPS) or Base ID, not to the ID that sent the data transmission request.

Configuration using KPG-169D/ KPG-170D/ KPG-175D

Configuring the GPS Report Mode ( See Edit > Optional Features > GPS)

Sending GPS Data Manually by Using a Key (Send the GPS Data)

GPS data can be sent manually by a user pressing the **Send the GPS data** key.

Configuration using KPG-169D/ KPG-170D/ KPG-175D

Assigning functions to the PF keys ( See Edit > Key Assignment)

Sending GPS Data Together With Voice Communications (GPS Combination)

The transceiver can send GPS data by adding the GPS data to a signal while making voice calls.

To use this function, Voice Call for GPS Combination must be enabled by using KPG-169D/ KPG-170D/ KPG-175D.

Note

The GPS data added to a signal is sent to the ID configured for Base ID (GPS) or Base ID.

Configuration using KPG-169D/ KPG-170D/ KPG-175D

Configuring the GPS Combination (Voice Call) ( See Edit > NXDN > GPS > GPS Combination)

Sending GPS Data Together With Status Call (GPS Combination)

The transceiver can send GPS data by adding the GPS data to a Status Message using NXDN.

To use this function, Status for GPS Combination must be enabled by using KPG-169D/ KPG-170D/ KPG-175D. The range of status numbers to which GPS data can be added can be configured.

Note

The GPS data added to a Status Message is sent to the ID configured for Base ID (GPS) or Base ID.

Configuration using KPG-169D/ KPG-170D/ KPG-175D

- Configuring the GPS Combination (Status) ( See Edit > NXDN > GPS > GPS Combination)
- Configuring the GPS Report Status Number Block ( See Edit > NXDN > GPS > GPS Combination)

Sending GPS Data Together With Emergency Call (GPS Combination)

The transceiver can send GPS data by adding the GPS data to the Emergency Status (Status 224).

To use this function, Emergency for GPS Combination must be enabled by using KPG-169D/ KPG-170D/ KPG-175D.

Note

The GPS data added to the Emergency Status is sent to the ID configured for Base ID (GPS) or Base ID.

Configuration using KPG-169D/ KPG-170D/ KPG-175D

Configuring the GPS Combination (Emergency) ( See Edit > NXDN > GPS > GPS Combination)

GPS Functions

The following functions are relevant to GPS data transmission:

- Number of Times
- GPS Report Interval Time
- GPS Time Mark
- GPS Message Type
- GPS Report on Data Zone-Channel
- GPS Report Back to Requested ID

Refer to [13 GPS FUNCTIONS](#) on [page 145](#) for details of each function.

8.11 Disabling the Transceiver Capability by Remote Control (Stun/ Kill)

This is the function that is used to disable the transceiver capability by remote control. This function allows a system administrator to remotely disable the transceiver, for instance, if the transceiver is lost.

The transceiver which has been disabled by this function can be enabled to be usable again by remote control from an external device using radio communication.

The transceiver behaves as follows according to the type of a message when a Remote Control Message is received.

Table 8-11 Remote Control

Remote Control Message	Description
Remote Stun	The transceiver is disabled if the transceiver receives the Remote Stun Message. Whether to accept the Remote Stun Message upon the reception can be configured using KPG-169D/ KPG-170D/ KPG-175D. If the transceiver receives the Remote Revive Message, the Stun state will be reset.
Remote Revive	If the transceiver receives the Remote Revive Message, the Stun state will be reset.
Remote Kill	If the transceiver receives the Remote Kill Message, the transceiver is disabled and all operations will be prohibited. All configuration data of the transceiver is cleared; hence Stun state will not be reset even if the transceiver receives the Remote Revive Message. However, the configuration data can be written to the transceiver using KPG-169D/ KPG-170D/ KPG-175D. Whether to accept the Remote Kill Message upon the reception can be configured using KPG-169D/ KPG-170D/ KPG-175D.

Note

- NX-240/ 240V/ 340/ 340U/ 740H/ 740HV/ 840H/ 840HU can receive the Remote Control Message; however, it cannot send the Remote Control Message.
- GPS data is automatically sent while the transceiver is in Stun state.
- The transceiver cannot be placed in Emergency Mode while the transceiver is in Stun state.
- The LED cannot light or blink while the transceiver is in Stun state.

Configuration using KPG-169D/ KPG-170D/ KPG-175D

Configuring the Remote Stun/Kill to be enabled or disabled ( [See](#) Edit > NXDN > General 1)

8.12 Monitoring the Situation Around Another Transceiver by Remote Control (Remote Monitor)

Remote Monitor is the function to remotely operate using radio communication an individually specified transceiver to transmit continuously. Use of this function allows the base station to monitor the situation around the transceiver. If a PC sends the Remote transmission command to the transceiver, the transceiver will send a message requesting the Remote transmission using Individual Call. The target ID of the Individual Call will be specified by the Remote transmission command. The transceiver which has received the message requesting the Remote transmission sends an acknowledgment to the transmitting transceiver, and then unmutes the speaker and initiates a continuous transmission using Individual Call. The length of time for a continuous transmission will be specified by the Remote transmission command.

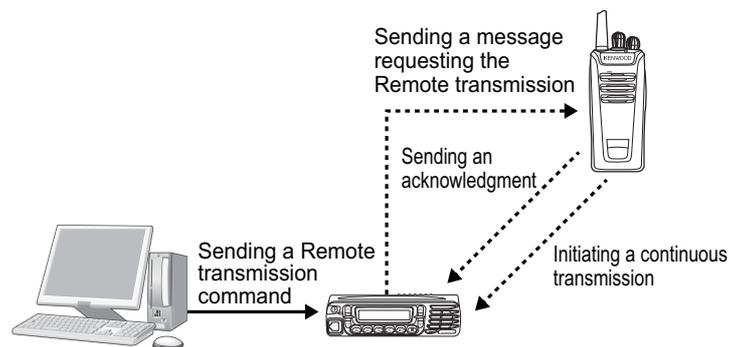


Figure 8-10 Remote Monitor

This function has a Normal Mode and a Silence Mode: the former is a mode notifying a user of the transceiver's status of continuous transmission by an indication on the LCD and by lighting the Transmit LED, and the latter is a mode not notifying a user of the transceiver's status of continuous transmission. The mode will be specified by the Remote transmission command.

If in Normal Mode

The transceiver which received the message requesting the Remote transmission sends an acknowledgment to the transmitting transceiver, and then transmits with the Transmit LED lighting.

If in Silence Mode

The transceiver which received the message requesting the Remote transmission sends an acknowledgment to the transmitting transceiver, and then transmits without lighting the Transmit LED. For Mobile, the LED display remains unchanged.

Note

- NX-240/ 240V/ 340/ 340U/ 740H/ 740HV/ 840H/ 840HU can receive the message requesting the Remote transmission; however, it cannot send the message requesting the Remote transmission.
- The transceiver initiates a continuous transmission only if the message requesting the Remote transmission is received by an Individual Call. The transceiver does not initiate a continuous transmission even if the message requesting the Remote transmission is received using anything other than Individual Call.
- While the transceiver is in the status of a continuous transmission because of the Remote Monitor, Time-out Timer and Busy Channel Lockout are disabled.
- To receive a message requesting a Remote transmission, the received RAN code needs to match the RAN code preconfigured in the transceiver.

In an Analog Conventional system, communications are realized by sending and receiving analog signals on an analog channel. The transceiver can make an Individual Call or a Group Call using Optional Signaling such as DTMF, 2-tone, and FleetSync.

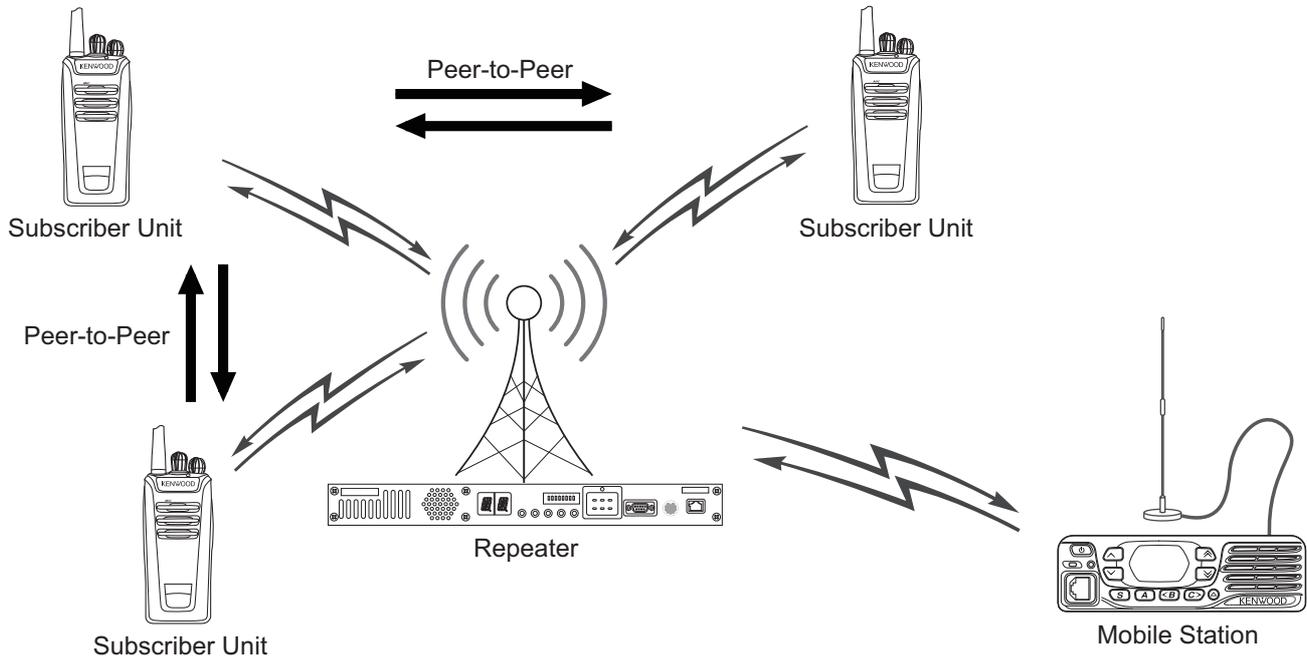


Figure 9-1 Image of Communications in an Analog Conventional System

9.1 Initiating Voice Communications (Basic Transmission and Reception)

This section describes the basic methods for transmission and reception in an Analog Conventional system and the relevant functions.

Receiving

Received audio sounds from the speaker, if the transceiver receives analog signals on the same frequency as that of the channel on which the transceiver has waited for and the Optional Signaling matches the Optional Signaling preconfigured for the transceiver. When the signaling (QT/DQT) is used, communications are possible if the received QT tone or DQT code matches the QT tone or DQT code for which the transceiver waits.

Temporarily Disabling the Squelch (Squelch Off)

Squelch Off is the function to allow the transceiver to open the squelch and unmute the speaker. With this function, the transceiver can unmute the speaker without receiving a carrier. A user can use this function to monitor the availability of channels prior to transmitting in order to prevent from interfering with other parties. To use this function, the **Squelch Off** or **Squelch Off Momentary** key must be assigned.

Operating the Transceiver

● Squelch Off key

1 Press the **Squelch Off** key while **Squelch Off** is disabled.

The Busy LED lights and the transceiver unmutes the speaker and opens squelch regardless of the configuration for QT/DQT Decode. White noise is audible if no carrier is received.

2 Press the **Squelch Off** key while **Squelch Off** is enabled.

On a channel where QT tone or DQT code is configured, the transceiver restores Signaling Squelch, and on a channel where no QT tone or DQT code is configured, the transceiver restores Carrier Squelch.

● Squelch Off Momentary key

1 Press and hold the **Squelch Off Momentary** key.

The Busy LED lights and the transceiver unmutes the speaker and opens squelch regardless of the configuration for QT/DQT Decode. White noise is audible if no carrier is received.

2 Release the **Squelch Off Momentary** key.

On a channel where QT tone or DQT code is configured, the transceiver restores Signaling Squelch, and on a channel where no QT tone or DQT code is configured, the transceiver restores Carrier Squelch.

Note

- Pressing the **Squelch Off** key or the **Squelch Off Momentary** key while the Optional Signaling matches resets the matching state of the Optional Signaling.
- If Squelch Off becomes enabled during the scan, the transceiver pauses scanning on a channel where the transceiver is scanning, and then unmutes the speaker. The transceiver does not resume scanning until Squelch Off is disabled.

Configuration using KPG-169D/ KPG-170D/ KPG-175D

Assigning functions to the PF keys ( See Edit > Key Assignment)

Adjusting the Squelch Level (Squelch Level)

Squelch Level is the threshold receive level by which the transceiver can determine that the received signal has a carrier. If the received signal is weak, a low (decreased) Squelch Level value must be configured. If unwanted weak signals exist, raising (increasing) the Squelch Level improves the quality of communication.

Table 9-1 Squelch Level

Range	0	1 to 9
	Squelch Function Completely Disabled	Low ↔ High
In steps of	1	

For Mobile, pressing the **Squelch Level** key changes the Squelch Level.

Note

Squelch Level can be configured for a channel only in an Analog Conventional system. Squelch Level 5 is configured for channels not in an Analog Conventional system.

Configuration using KPG-169D/ KPG-170D/ KPG-175D

Configuring the Squelch Level ( **See** Edit > Optional Features > Common 1)

Searching Whether the Transceiver Receives a Call (Scan)

Using the Scan function, the transceiver can check each channel in turn whether the channel has a signal. If a channel has a signal, the transceiver receives the signal on the channel.

Refer to [16 SCAN on page 172](#) for details of Scan.

Transmitting

Pressing the **PTT** switch starts transmitting. When the signaling (QT/ DQT) is used, the transceiver sends the QT tone or DQT code. In this case, if the transmitted QT tone or DQT code matches the QT tone or DQT code preconfigured for the receiving transceiver, the transceivers can communicate.

Restricting the Continuous Transmission Duration (Time-out Timer)

Time-out Timer (TOT) is the function to restrict the duration for the transceiver to continuously transmit. This function is used to prevent a user from occupying a repeater or frequency which is shared with other users. The transceiver automatically stops transmitting and releases the channel if it continuously transmits longer than the configured time. A Warning Tone A sounds from the transceiver at this time.

Timers, such as TOT Pre-alert, TOT Rekey Time, and TOT Reset Time, relevant to Time-out Timer can be configured.

TOT Pre-alert

TOT Pre-alert is the function to notify a user that a continuous transmission is about to end by the Time-out Timer. The TOT Pre-alert Tone sounds from the transceiver before the transceiver stops the continuous transmission by the Time-out Timer.

Example: Time-out Timer: 30 s, TOT Pre-alert: 4 s

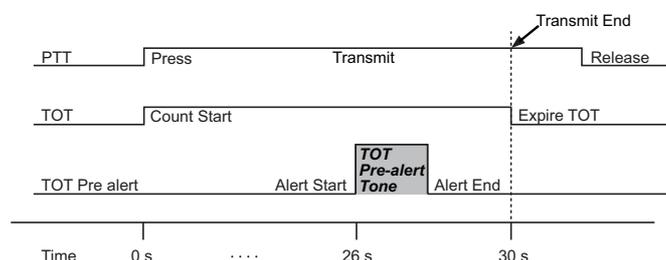


Figure 9-2 TOT Pre-alert

Note

- If "Off" is configured for TOT Pre-alert, no TOT Pre-alert tone will sound from the transceiver.
- Time-out Timer cannot be set to Off.

TOT Rekey Time

TOT Rekey Time is the amount of time from when the transceiver stops the transmission by the Time-out Timer until transmission becomes possible again.

Example: Time-out Timer: 30 s, TOT Rekey Time: 20 s

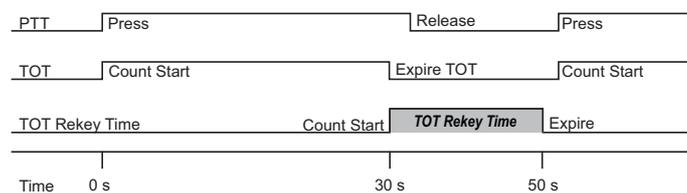


Figure 9-3 TOT Rekey Time

Note

- If "Off" is configured for TOT Rekey Time, the transceiver will immediately be ready to transmit.
- The timer will be reset if the zone or channel is changed while the TOT Rekey Time is counting down.

TOT Reset Time

TOT Reset Time is the time required to initialize and reset the elapsed time for Time-out Timer.

Example 1: Time-out Timer: 30 s, TOT Reset Time: 10 s

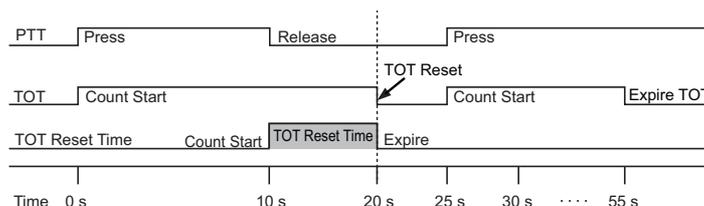


Figure 9-4 TOT Reset Time 1

The transceiver considers a retransmission within this configured length of time as a continuous transmission. In the following example, the counting of Time-out Timer continues because the transmission was started by a user pressing the PTT switch while the TOT Reset Time was counting down.

Example 2: Time-out Timer: 30 s, TOT Reset Time: 10 s

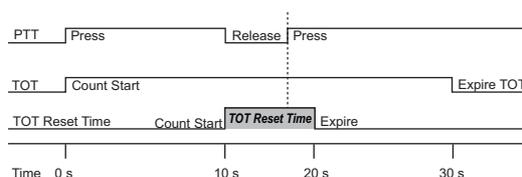


Figure 9-5 TOT Reset Time 2

Note

- If "Off" is configured for TOT Reset Time, the Time-out Timer will be reset immediately after the transceiver finishes transmitting.
- The timer will be reset if the zone or channel is changed while the TOT Reset Time is counting down.

Configuration using KPG-169D/ KPG-170D/ KPG-175D

- Configuring the Time-out Timer ( See Edit > Optional Features > Common 1)
- Configuring the TOT Pre-alert ( See Edit > Optional Features > Common 1)
- Configuring the TOT Rekey Time ( See Edit > Optional Features > Common 1)
- Configuring the TOT Reset Time ( See Edit > Optional Features > Common 1)

Avoiding Interference with Other Communications (Busy Channel Lockout (Analog))

Busy Channel Lockout is the function to automatically restrict the transmission so as not to interfere with other communications.

If an attempt is made to transmit on a channel that is already being used by other groups, the transceiver automatically restricts the transmission.

A Warning Tone A sounds from the transceiver and the transceiver cannot transmit if the **PTT** switch is pressed when Busy Channel Lockout is enabled. The Warning Tone A sounds from the transceiver until the **PTT** switch is released.

Also, a Warning Tone B sounds from the transceiver and the transceiver cannot transmit if the transceiver attempts to transmit by using the VOX function when Busy Channel Lockout is enabled (Portable only).

Following are conditions to disable transmission by Busy Channel Lockout (Analog):

Table 9-2 Busy Channel Lockout (Analog)

Configuration	Description
Off	Busy Channel Lockout is disabled. Transmission is not restricted even if the channel on which the transceiver attempts to transmit is busy.
Carrier only	The transceiver cannot transmit while the transceiver is receiving a carrier.
Incorrect QT/DQT	The transceiver cannot transmit if the transceiver receives a carrier and the received QT tone or DQT code does not match the QT tone or DQT code preconfigured for the transceiver. However, the transceiver can transmit if the received QT tone or DQT code matches the QT tone or DQT code preconfigured for the transceiver.
Correct QT/DQT	The transceiver cannot transmit if the transceiver receives a carrier and the received QT tone or DQT code matches the QT tone or DQT code preconfigured for the transceiver.
Optional Signaling	The transceiver cannot transmit until the received Optional Signaling matches the Optional Signaling preconfigured for the transceiver.

Note

- Busy Channel Lockout cannot be activated in Emergency Mode.
- GPS data is not sent automatically while Busy Channel Lockout is enabled.

Configuration using KPG-169D/ KPG-170D/ KPG-175D

Configuring the Busy Channel Lockout (Analog) ( See Edit > Zone Information > Channel Edit > Page 1)

Preferentially Using a Channel Being Used by Other Parties (BCL Override)

BCL Override can be used to transmit on a busy channel even if Busy Channel Lockout is activated and transmission is restricted. This function is used when a top priority transmission is required.

Operating the Transceiver

1 Press the **PTT** switch while transmission is restricted by Busy Channel Lockout.

2 Release the **PTT** switch, then press the **PTT** switch again within 500 ms.

Busy Channel Lockout is temporarily disabled and the transceiver will start transmitting.

Note

For Portable, this function is also activated while the transceiver is transmitting using VOX. For a transmission using VOX, Busy Channel Lockout will temporarily be disabled and the transceiver can transmit if audio is input within 500 ms after the Warning Tone B starts sounding from the transceiver.

Configuration using KPG-169D/ KPG-170D/ KPG-175D

Configuring the BCL Override to be enabled or disabled ( See Edit > Optional Features > Common 1)

Communicating Without Using a Repeater (Talk Around)

Talk Around is the function to communicate directly between transceivers without using a repeater.

If the transceiver cannot link to a repeater due to too great distance between the transceiver and the repeater, the transceiver can directly communicate with the target transceiver using Talk Around.

The transceiver, with Talk Around enabled, transmits on the receive frequency and uses the Decode Signaling (QT tone or DQT code) configured for the selected channel.

Operating the Transceiver**● Enabling the Talk Around****1 Press the **Talk Around** key while Talk Around is disabled.**

A Tone A sounds from the transceiver and Talk Around becomes enabled.

For Mobile, "tA" appears on the LED display for 1 sec. In addition, if the 2 dots on the LED display (the left dot and the right dot) and the LED (blue) are configured to light, each LED lights while Talk Around is enabled.

● Disabling the Talk Around**1 Press the **Talk Around** key while Talk Around is enabled.**

A Tone B sounds from the transceiver and Talk Around becomes disabled.

Note

- Talk Around is disabled by changing the zone or channel while Talk Around is enabled.
- If the transceiver migrates to a data channel by FleetSync GTC, Talk Around is disabled on the data channel. Talk Around will be enabled if the transceiver returns to the voice channel.
- Talk Around is disabled in Emergency Mode.
- Even if the **Talk Around** key is pressed once to disable Talk Around while the Auto Reset Timer is counting down, only Auto Reset Timer is canceled. To disable Talk Around, press the **Talk Around** key again after the Auto Reset Timer is canceled. (Refer to [Auto Reset Timer on page 114.](#))
- For Mobile, the transceiver can be configured to light the 2 dots on the LED display (the left dot and the right dot) and the LED (blue) when Talk Around is enabled. (Refer to [5.5 Lighting the LEDs According to the Transceiver's Status on page 25.](#))

Configuration using KPG-169D/ KPG-170D/ KPG-175D

Assigning functions to the PF keys ( See Edit > Key Assignment)

9.2 Using the Signaling

QT/ DQT is the signaling to be used for facilitating communication within a group if the same channel is shared by several groups. Also, DTMF, 2-tone and FleetSync can be used as the Optional Signaling to initiate a selective call.

Sharing the Same Channel (Frequency) by Several Groups (QT/DQT)

QT/ DQT is the signaling to be used for facilitating communication within a group if the same channel is shared by several groups.

QT tone or DQT code has no effect on normal voice communication since QT tone or DQT code uses a subaudible tone. The transceiver mutes unwanted group calls if QT tone or DQT code is configured for each channel. Therefore, a user can communicate in a group without listening to conversations from other groups.

This signaling does not affect voice communication since the signaling does not use the audible frequency spectrum above 300 Hz. Also, the transceiver can discriminate the signaling even if reception starts midway through a call since this signaling type has a continuous waveform.

- **QT (Quiet Talk):**

QT is signaling using a continuous subaudible sine wave (67.0 Hz to 254.1 Hz). The frequency can be configured in steps of 0.1 Hz.

- **DQT (Digital Quiet Talk):**

DQT is a signaling that uses “1” and “0” in 23-bit words. An octadecimal code with a number between 000 and 777 can be configured. The DQT signal has a polarity and can be configured as Normal or Inverted, corresponding to the circuit configuration of repeater or the target transceiver.

Following are transmission and reception characteristics of QT tone or DQT code:

Table 9-3 QT/ DQT Transmission/ Reception

Reception	If the received QT tone or DQT code matches the QT tone or DQT code preconfigured for the transceiver, the transceiver resets muting the speaker, and received audio sounds from the speaker. The audio mutes when the transceiver receives a Reverse Burst (QT) or Turn-off Code (DQT).
Transmission	The transceiver sends the configured QT tone or DQT code when the transceiver transmits. Pressing the PTT switch causes the transceiver to transmit the preconfigured QT tone or DQT code.

Configuration using KPG-169D/ KPG-170D/ KPG-175D

Configuring the QT/ DQT Decode/ Encode ( See Edit > Zone Information > Channel Edit > Page 1)

Using the Optional Signaling (Analog)

Optional Signaling is the signaling used to initiate a selective call. DTMF, 2-tone, or FleetSync is the Optional Signaling which can be used in an Analog Conventional system. All signaling types use audible frequencies. (Refer to [9.4 Using 2-tone to Initiate a Selective Call on page 100](#), [10 FleetSync on page 107](#), and [12 DTMF on page 132](#).)

The transceiver behaves as follows according to the configuration for Optional Signaling Decode Condition:

“QT/DQT” is configured for Optional Signaling Decode Condition:

If the received QT tone or DQT code matches the QT tone or DQT code preconfigured for the transceiver and the received Optional Signaling matches the Optional Signaling preconfigured for the transceiver, the transceiver emits the Alert Tone or starts Transpond.

“Carrier” is configured for Optional Signaling Decode Condition:

If the transceiver receives a carrier and the received Optional Signaling matches the Optional Signaling preconfigured for the transceiver, the transceiver emits the Alert Tone or starts Transpond. In this case, the received QT tone or DQT code does not need to match the QT tone or DQT code preconfigured for the transceiver.

Configuration using KPG-169D/ KPG-170D/ KPG-175D

- Configuring the Optional Signaling (Analog) ( See Edit > Zone Information > Channel Edit > Page 1)
- Configuring the Optional Signaling Decode Condition ( See Edit > Zone Information > Zone Edit)

Unmuting the Speaker (Audio Control (Analog))

Audio Control is the condition which allows the transceiver to unmute the speaker. The conditions on which the transceiver unmutes the speaker can be configured for each channel.

The transceiver unmutes the speaker and emits received audio if the conditions configured for Audio Control are satisfied.

Conditions to unmute the speaker can be changed by a combination of QT tone or DQT code and Optional Signaling.

Conditions to unmute the speaker can also be changed by changing a combination of carrier and Optional Signaling.

The conditions to unmute the speaker when the transceiver uses a QT tone or a DQT code are as follows:

Table 9-4 Audio Control (Analog) (QT/DQT)

Configuration	Description
QT/DQT	If the transceiver receives a carrier and the received QT tone or DQT code matches the QT tone or DQT code preconfigured for the channel, the transceiver unmutes the speaker.
QT/DQT + Optional Signaling	If the transceiver receives a carrier and all the following conditions are satisfied, the transceiver unmutes the speaker: The received QT tone or DQT code matches the QT tone or DQT code preconfigured for the channel. The received Optional Signaling matches the Optional Signaling preconfigured for the channel.
QT/DQT or Optional Signaling	If the transceiver receives a carrier and the received QT tone or DQT code matches the QT tone or DQT code preconfigured for the channel, the transceiver unmutes the speaker. Or, if the transceiver receives a carrier and the received Optional Signaling matches the Optional Signaling preconfigured for the channel, the transceiver unmutes the speaker.

The conditions to unmute the speaker when the transceiver does not use a QT tone or a DQT code are as follows:

Table 9-5 Audio Control (Analog) (Carrier)

Configuration	Description
Carrier	If the transceiver receives a carrier, the transceiver unmutes the speaker.
Carrier + Optional Signaling	If the transceiver receives a carrier and the received Optional Signaling matches the Optional Signaling preconfigured for the channel, the transceiver unmutes the speaker.
Carrier or Optional Signaling (Portable Only)	If the transceiver receives a carrier, the transceiver unmutes the speaker. Or, if the transceiver receives a carrier and the received Optional Signaling matches the Optional Signaling preconfigured for the channel, the transceiver unmutes the speaker.

Configuration using KPG-169D/ KPG-170D/ KPG-175D

Configuring the Audio Control (Analog) ( See Edit > Zone Information > Channel Edit > Page 1)

Temporarily Disabling the Signaling (Monitor)

Monitor is the function that temporarily disables the QT/DQT and Optional Signaling that are configured for a channel on which the transceiver waits.

Monitor is used to check the availability of channels prior to transmitting in order to prevent from interfering with other parties.

To use this function, the **Monitor** key or the **Monitor Momentary** key must be used.

While Monitor is enabled, the QT tone or DQT code, and Optional Signaling will be disabled.

Operating the Transceiver

● Monitor key

1 Press the **Monitor** key while Monitor is disabled.

A Tone A sounds from the transceiver.

On a channel where QT/DQT Decode is configured, the QT tone or DQT code is deactivated and the received signal will be audible upon receipt of a carrier.

2 Press the **Monitor** key while Monitor is enabled.

A Tone B sounds from the transceiver.

A channel where QT/DQT Decode is configured resumes Signaling Squelch.

● Monitor Momentary key

1 Press and hold the **Monitor Momentary** key.

On a channel where QT/DQT Decode is configured, the QT tone or DQT code is deactivated and the received signal will be audible upon receipt of a carrier.

2 Release the **Monitor Momentary** key.

A channel where QT/DQT Decode is configured resumes Signaling Squelch.

Note

Pressing the **Monitor** key or the **Monitor Momentary** key while the Optional Signaling matches resets the matching state of the Optional Signaling.

Configuration using KPG-169D/ KPG-170D/ KPG-175D

Assigning functions to the PF keys ( See Edit > Key Assignment)

Transceiver Operation during the Scan

If the **Monitor** key is pressed during the scan, the scan continues. The transceiver operates with Carrier Squelch in the same manner as when not scanning.

Pressing and holding the **Monitor Momentary** key during the scan causes the transceiver to enable the Carrier Squelch in the same manner as when the scan is deactivated, and the scan continues. Pressing the **Monitor Momentary** key never causes the scan to be deactivated.

Unmuting the Speaker by Linking with the Microphone (Off-hook Decode)

Supported Models: Mobile

Off-hook Decode is the function to enable the transceiver to decode QT/DQT and Optional Signaling even if the microphone is in the off-hook state.

The transceiver behaves as follows according to the configuration for Off-hook Decode:

Table 9-6 Off-hook Decode

Configuration	Description
Enabled	While the microphone is in either the on-hook state or off-hook state, the transceiver behaves with Signaling Squelch using QT/DQT, and Optional Signaling is enabled according to the configuration for Audio Control.
Disabled	While the microphone is in the off-hook state, the transceiver behaves with Carrier Squelch. While the microphone is in the on-hook state, the transceiver behaves with Signaling Squelch using QT/DQT, and Optional Signaling is enabled according to the configuration for Audio Control.

Note

- Stun can be activated regardless of the status of Off-hook Decode and the microphone on- or off-hook state.
- The matching state of Optional Signaling will be reset by hooking the microphone on a hanger (On-hook state) after receiving a call by Optional Signaling.
- The microphone hook status can also be switched on by the AUX Input port to which "External Hook" is assigned. (Refer to [18.1 Available Functions for AUX Input Ports on page 182.](#))

Configuration using KPG-175D

Configuring the Off-hook Decode to be enabled or disabled ( See Edit > Optional Features > Common 1)

9.3 Changing the Decode/ Encode Combination of QT/DQT to Communicate (OST)

Supported Models: Mobile

Operator Selectable Tone (OST) is the function to change the decode/ encode combination of QT/DQT signaling to communicate without changing the transmit and receive frequencies.

If there are multiple groups using the same frequency but a different QT tone or DQT code, this function can be used to allow a dispatcher to specify the target group to command.

To use this function, the transceiver needs to enter Operator Selectable Tone Mode. Only in Operator Selectable Tone Mode, the transceiver can transmit and receive with the decode/ encode combination of QT/DQT signaling changed temporarily.

To place the transceiver in Operator Selectable Tone Mode, the **Operator Selectable Tone** key or the microphone keypad can be used.

A maximum of 16 pairs of decode/ encode combinations of QT/DQT signaling for OST can be configured in the OST Table by using KPG-175D. (Refer to [OST Table on page 99.](#))

Placing the Transceiver in Operator Selectable Tone Mode by using the Operator Selectable Tone Key

Using the **Operator Selectable Tone** key, the transceiver can enter Operator Selectable Tone Mode, and the OST number to be used can be selected by using keys on the transceiver front panel.

Pressing the **Operator Selectable Tone** key causes the transceiver to enter Operator Selectable Tone Mode.

Operating the Transceiver

1 Press the **Operator Selectable Tone** key.

The transceiver enters Operator Selectable Tone Mode.

“ot” appears on the LED display for 1 sec and then the currently selected OST number appears. The right dot blinks at this time.

If “OFF” is configured for OST, “oF” appears.

2 Select an OST number by pressing the [**B**] or [**C**] key.

During Operator Selectable Tone Mode, the Decode/ Encode pair of QT/DQT corresponding to the selected OST number can be used to communicate.

Note

QT/DQT Encode and QT/DQT Decode can be disabled if “oF” is selected. (Refer to [Disabling the QT/DQT Decode/ Encode \(Tone Off\) on page 99.](#))

3 Press the [**S**] key.

The transceiver exits Operator Selectable Tone Mode and reverts to the state controlled by the QT/DQT signaling configured for the channel.

Configuration using KPG-175D

Assigning functions to the PF keys ( See Edit > Key Assignment)

Placing the Transceiver in Operator Selectable Tone Mode by using the Microphone Keypad (Direct OST)

If “Operator Selectable Tone” is configured for Keypad Operation, the transceiver can enter Operator Selectable Tone Mode and the OST number to be used can be selected using the microphone keypad. (Refer to [Keypad Operation on page 11.](#))

Operating the Transceiver

1 Press and hold the [*] key for 2 sec or more.

The transceiver enters Operator Selectable Tone Mode.

“ot” appears on the LED display for 1 sec and then the currently selected OST number appears. The right dot blinks at this time.

If “OFF” is configured for OST, “oF” appears.

2 Enter an OST number by pressing the [0] to [9] keys.

During Operator Selectable Tone Mode, the Decode/ Encode pair of QT/DQT corresponding to the selected OST number can be used to communicate.

An OST number can be entered as follows:

- **If the number has 2 digits:**
To select OST number 10, press the [1] and [0] keys in this order.
- **If the number has 1 digit:**
To select OST number 7, press the [0] and [7] keys in this order or [7] and [*] keys in this order.
- **If selecting “oF”:**
Press the [0] key twice.

Note

- QT/DQT Encode and QT/DQT Decode can be disabled if “oF” is selected. (Refer to [Disabling the QT/DQT Decode/ Encode \(Tone Off\) on page 99.](#))
- Pressing the [#] key deletes the entered number. A Tone A sounds from the transceiver and the last selected OST number appears.

3 Press the [*] key.

The transceiver exits Operator Selectable Tone Mode and reverts to the state controlled by the QT/DQT signaling configured for the channel.

Configuration using KPG-175D

- Assigning functions to the PF keys ( [See](#) Edit > Key Assignment)
- Configuring the Keypad Operation ( [See](#) Edit > Key Assignment > Microphone Key)

Key Operations in Operation Selectable Tone Mode

Supported Models: Mobile

If the [^]/[v] key or [^]/[v] key to which **Zone Up/ Zone Down** or **Channel Up/ Channel Down** is assigned is used while the transceiver is in Operator Selectable Tone Mode, the transceiver exits Operator Selectable Tone Mode and each of the functions is activated.

If the [^]/[v] key or [^]/[v] key to which **Volume Up/ Volume Down** or **LED Brightness** is assigned is used while the transceiver is in Operator Selectable Tone Mode, the transceiver remains in Operator Selectable Tone Mode and each of the functions is activated.

If one of the **PF** keys to which the following functions are assigned is used while the transceiver is in Operator Selectable Tone Mode, the transceiver remains in Operator Selectable Tone Mode and each of the functions is activated.

- Squelch Off
- Squelch Off Momentary
- Monitor
- Monitor Momentary

Disabling the QT/DQT Decode/ Encode (Tone Off)

Tone Off is the function to allow a user to select “oF” on a main display by using the keys on the transceiver.

If this function is enabled, “oF” can be selected from the OST List.

If “oF” is selected, QT/DQT Encode and QT/DQT Decode can be disabled.

Configuration using KPG-175D

Configuring the Tone Off to be enabled or disabled ( See Edit > Operator Selectable Tone)

OST Table

OST Table can be used to configure an encode and decode pair for QT tone or DQT code signaling used for OST. A maximum of 16 pairs can be configured. The following functions can be configured in the OST Table:

Table 9-7 OST Table

Configuration	Configuration
QT/DQT Decode	The QT tone or DQT code to be used to receive a call can be configured. The following QT/DQT Decode range is available: QT: 67.0 Hz to 254.1 Hz (in steps of 0.1 Hz) DQT: 000N to 777N, 000I to 777I
QT/DQT Encode	The QT tone or DQT code to be used to make a call can be configured. The following QT/DQT Encode range is available: QT: 67.0 Hz to 254.1 Hz (in steps of 0.1 Hz) DQT: 000N to 777N, 000I to 777I

Configuration using KPG-175D

Configuring the OST Table ( See Edit > Operator Selectable Tone)

9.4 Using 2-tone to Initiate a Selective Call

2-tone signaling uses a pair of 2 different tone frequencies in series. 2-tone is used for a selective call initiated in an Analog Conventional system.

A series of two different tone frequencies or single tone is used for 2-tone signaling. Tone frequencies between 288.5 Hz and 3106.0 Hz inclusive are used.

Pressing the **Call 1** or **Call 2** key causes the transceiver to send the preconfigured 2-tone code.

By using KPG-169D/ KPG-170D/ KPG-175D, the function of Call 1 or Call 2 must be assigned to a **PF** key, and each key must be configured as a key to send a 2-tone code.

Configuration using KPG-169D/ KPG-170D/ KPG-175D

- Assigning Call 1 or Call 2 to the PF keys ( See Edit > Key Assignment)
- Configuring the Call key as a key to send a 2-tone code ( See Edit > Key Assignment > Call)

Functions Related to 2-tone Code Encoding

Functions related to 2-tone code encoding are shown below:

Table 9-8 2-tone Encode

Configuration	Description
Duration of 1st Tone	Duration of 1st Tone is the duration of time for 1st Tone Encode when the transceiver sends a 2-tone code.
Duration of 2nd Tone	Duration of 2nd Tone is the duration of time for 2nd Tone Encode when the transceiver sends a 2-tone code.
Duration of Single Tone	Duration of Single Tone is the duration of time for Single Tone Encode when the transceiver sends a Single Tone.
Single Tone	Single Tone is the function to send the 1st Tone as a Single Tone. If "Yes" is configured for Single Tone, the 1st Tone is sent for the duration of time configured for Duration of Single Tone. In this case, the 2nd Tone is not sent.
1st Tone	1st Tone is one of the tone frequencies of a 2-tone code, which is sent first. 1st Tone is sent for the duration of time configured for Duration of 1st Tone. 1st Tone can be configured in the range between 288.5 Hz and 3106.0 Hz.
2nd Tone	2nd Tone is one of the tone frequencies of a 2-tone code, which is sent after the 1st Tone. 2nd Tone is sent for the duration of time configured for Duration of 2nd Tone. 2nd Tone can be configured in the range between 288.5 Hz and 3106.0 Hz. If "Yes" is configured for Single Tone, 2nd Tone is not sent.
Gap Time	Gap Time is the unmodulated duration between the 1st Tone and 2nd Tone when sending the 2-tone code.
First Tone Delay Time	First Tone Delay Time is the delay time from when the transceiver starts transmitting until the transceiver actually starts transmitting the 2-tone code. The transceiver transmits an unmodulated signal until the amount of time configured for First Tone Delay Time elapses.
Sidetone	Sidetone is the function to emit the tone of the 2-tone code from the speaker while the transceiver transmits the 2-tone code.

Configuration using KPG-169D/ KPG-170D/ KPG-175D

Configuring various functions associated with the 2-tone code encoding ( See Edit > 2-tone > Encode)

Functions Related to 2-tone Code Decoding

To decode a 2-tone code using the transceiver, “2-tone 1”, “2-tone 2”, or “2-tone 3” must be configured as an Optional Signaling to be used for the channel. (Refer to [Using the Optional Signaling \(Analog\) on page 94.](#))

The following functions associated with 2-tone Decode can be configured for each 2-tone 1, 2-tone 2, and 2-tone 3:

- Decoder 1 to Decoder 2
- A Tone/ B Tone/ C Tone/ D Tone
- Auto Reset Timer
- Clear to Transpond
- Short Decode
- Selective Call Alert LED

Standby Code (Decoder 1 and Decoder 2)

Two types of Decoders can be configured for 2-tone 1, 2-tone 2, or 2-tone 3. The transceiver can be set to receive multiple 2-tone codes configured for Decoder 1 and Decoder 2 at the same time.

The following options can be configured for each Decoder:

● Call Format

Call Format is the combination of A Tone, B Tone, C Tone, and D Tone for which the transceiver waits. The following combinations are available:

Table 9-9 List of Call Format Combinations

Combination	Description	Call Type
A and B	The transceiver waits to receive A tone and B tone.	Individual call
A and C	The transceiver waits to receive A tone and C tone.	
A and D	The transceiver waits to receive A tone and D tone.	
B and A	The transceiver waits to receive B tone and A tone.	
B and C	The transceiver waits to receive B tone and C tone.	
B and D	The transceiver waits to receive B tone and D tone.	
C and A	The transceiver waits to receive C tone and A tone.	Individual call
C and B	The transceiver waits to receive C tone and B tone.	
C and D	The transceiver waits to receive C tone and D tone.	
D and A	The transceiver waits to receive D tone and A tone.	
D and B	The transceiver waits to receive D tone and B tone.	
D and C	The transceiver waits to receive D tone and C tone.	
Long A	The transceiver waits to receive A tone. (Single Tone)	Group call
Long B	The transceiver waits to receive B tone. (Single Tone)	
Long C	The transceiver waits to receive C tone. (Single Tone)	
Long D	The transceiver waits to receive D tone. (Single Tone)	

Note

If “Long A”, “Long B”, “Long C”, or “Long D” is configured for Call Format, the transceiver waits to receive the target tone for more than 4 sec.

● Transpond/ Alert Tone

Transpond and Alert Tone are functions that allow the transceiver to transmit the multiplexed Transpond tone, or that allow an Alert Tone to sound from the transceiver when the transceiver is called with 2-tone signaling.

Table 9-10 Transpond/ Alert

Transpond	Alert	Description
No	Off	Nothing will be activated.
Yes	Off	The transceiver transmits the Transpond Tone.
No	Anything other than Off	An Alert Tone sounds from the transceiver.
Yes	Anything other than Off	An Alert Tone sounds from the transceiver after transmitting a Transpond Tone.

● Alert Tone

Alert Tone is an alert tone to sound when the transceiver receives a call by 2-tone.

The tone can be selected from 8 tones configured in the Alert Tone Pattern. (Refer to [Configuring the Alert Tone \(Alert Tone Pattern\)](#) on page 31.)

● Decode LED

Decode LED is the function to make the LED blink orange or blue when the transceiver receives a call using a 2-tone code.

To use this function, Selective Call Alert LED must be enabled.

Configuration using KPG-169D/ KPG-170D/ KPG-175D

Configuring the Call Format, Transpond, Decode LED, and Alert Tone ( See Edit > 2-tone > Decode (2-tone 1 to 3))

Frequencies for Standby Code (A Tone/ B Tone/ C Tone/ D Tone)

A Tone/ B Tone/ C Tone/ D Tone is the frequency of the tone signal which the receiving transceiver waits to receive. The frequency can be configured in the range between 288.5 Hz and 3106.0 Hz inclusive.

Configuration using KPG-169D/ KPG-170D/ KPG-175D

Configuring the A Tone/ B Tone/ C Tone/ D Tone ( See Edit > 2-tone > Decode (2-tone 1 to 3))

Auto Reset Timer

Auto Reset Timer allows you to configure the amount of time from when the received 2-tone code matches the 2-tone code preconfigured for the transceiver until the matching status is automatically reset.

Auto Reset Timer can be configured using KPG-169D/ KPG-170D.

Table 9-11 Auto Reset Timer

Configuration	Description
Off	Auto Reset Timer will not be activated.
1 s to 300 s	After the configured time elapses, the matching state of the 2-tone code is automatically reset.

Configuration using KPG-169D/ KPG-170D/ KPG-175D

Configuring the Auto Reset Timer ( See Edit > 2-tone > Decode (2-tone 1 to 3))

Clear to Transpond

Clear to Transpond allows the transceiver to wait to Transpond until the channel becomes available while other users are using the channel.

Configuration using KPG-169D/ KPG-170D/ KPG-175D

Configuring the Clear to Transpond to be enabled or disabled ( See Edit > 2-tone > Decode (2-tone 1 to 3))

Short Decode

Short Decode is the function that the transceiver identifies the call type before the transceiver completes receiving the 2-tone code.

The transceiver determines whether the received 2-tone code or Single Tone (Long Tone) matches the tone preconfigured for the transceiver. If the tone matches, the transceiver immediately receives the tone.

Configuration using KPG-169D/ KPG-170D/ KPG-175D

Configuring the Short Decode to be enabled or disabled ( See Edit > 2-tone > Decode (2-tone 1 to 3))

Selective Call Alert LED

Selective Call Alert LED can be used to make the LED blink orange or blue when the transceiver receives a 2-tone code. Whether to make the LED blink orange or blue can be configured in Decode LED.

A user can notice by the LED that the transceiver is receiving a call.

Configuration using KPG-169D/ KPG-170D/ KPG-175D

- Configuring the Selective Call Alert LED to be enabled or disabled ( See Edit > 2-tone > Decode (2-tone 1 to 3))
- Configuring the Decode LED ( See Edit > 2-tone > Decode (2-tone 1 to 3))

9.5 Using FleetSync to Initiate a Selective Call

Using FleetSync, the transceiver can initiate an Individual Call, a Group Call, or various message communications in an Analog Conventional system.

Refer to [10 FleetSync on page 107](#) for details about FleetSync.

9.6 Using DTMF to Initiate a Selective Call

DTMF Encode and the related functions can be used in an Analog Conventional system.

To decode a DTMF code in an Analog Conventional system, “DTMF” needs to be configured as the Optional Signaling to be used on the channel. (Refer to [Using the Optional Signaling \(Analog\) on page 94.](#))

Refer to [12 DTMF on page 132](#) for details about DTMF.

9.7 Using MDC-1200 to Communicate

The communication using MDC-1200 is available in an Analog Conventional system. Refer to [11 MDC-1200 on page 126](#) for details about MDC-1200.

9.8 Sending a PTT ID

PTT ID is a unique transceiver identification code transmitted by pressing or releasing the **PTT** switch. There are 3 types of PTT ID formats: DTMF, FleetSync, and MDC-1200. Refer to the following for details of each format:

- FleetSync
[10.3 Sending a PTT ID on page 108](#)
- MDC-1200
[11.1 Sending a PTT ID on page 126](#)
- DTMF
[12.6 Sending a PTT ID on page 136](#)

9.9 Improving the Sound Quality for Transmitting and Receiving (Compander)

Compander is a compound term made from “COMpressor” and “exPANDER”, and is a function designed to improve sound quality.

This function is used to improve the S/N ratio of voice communications by compressing the audio at the transmitting end of the communication path and expanding the audio at the receiving end of the path.

The transmitting party and the receiving party must have the same configuration to use this function.

Configuration using KPG-169D/ KPG-170D/ KPG-175D

Configuring the Compander to be enabled or disabled for each channel ( Edit > Zone Information > Channel Edit > Page 2)

9.10 Disabling the Transceiver Capability by Remote Control (Stun)

By using the DTMF code, FleetSync status, or MDC-1200 message, it is available to remotely disable the transceiver capability. This function allows a system administrator to remotely disable the transceiver, for instance, if the transceiver is lost.

The transceiver which has been disabled by this function can be enabled to be usable again by remote control from an external device using radio communication.

Refer to the following for details of the Stun (or Kill) function for each format:

- FleetSync
[10.8 Disabling the Transceiver Capability by Remote Control \(Stun/ Kill\) on page 125](#)
- MDC-1200
[11.4 Disabling the Transceiver Capability by Remote Control \(Stun\) on page 131](#)
- DTMF
[12.7 Disabling the Transceiver Capability by Remote Control \(Stun\) on page 138](#)

FleetSync is a general term for the proprietary KENWOOD message communication system using MSK (Minimum Shift Keying) modulation. The function identifies individual transceivers, and allows for text message and GPS data communications.

Note

FleetSync can be only used in an Analog Conventional system.

10.1 Basic Configuration for FleetSync

This section describes the basic parameters used for various communications using FleetSync.

About Own ID (Fleet (Own)/ ID (Own))

Communications using FleetSync use a FleetSync ID, an identification code which consists of a 3-digit (100 to 349) Fleet number and a 4-digit (1000 to 4999) ID number.

Each transceiver is identified by the FleetSync ID. To initiate various communications using FleetSync, own FleetSync ID (Fleet (Own)/ ID (Own)) needs to be configured for the transceiver. One Fleet (Own)/ ID (Own) can be configured for each transceiver.

Configuration using KPG-169D/ KPG-170D/ KPG-175D

Configuring the Fleet (Own) and ID (Own) ( Edit > FleetSync > General 1)

FleetSync Baud Rate

FleetSync Baud Rate is the data baud rate for the MSK modem used for FleetSync.

FleetSync Baud Rate configuration for the transmitting and receiving parties must be configured for the same baud rate.

Table 10-1 FleetSync Baud Rate

Configuration	Description
1200 bps	This configuration is recommended for regular data communications.
2400 bps	With this configuration, a user can transmit more data in shorter time as compared with 1200 bps. However, errors are more likely to occur as communication proceeds at higher speeds. The optimum data communication area is smaller than that of 1200 bps.

Configuration using KPG-169D/ KPG-170D/ KPG-175D

Configuring the FleetSync Baud Rate ( Edit > FleetSync > General 1)

10.2 Available Calls

The following various calls are available by using FleetSync IDs. Refer to the instruction for each call for the transceiver operation and behavior.

- PTT ID Communications
- Individual Call
- Group Call
- Fleet Call
- Supervisor Call
- Broadcast Call
- Paging Call
- Status Call

Note

The type of a selective call is determined by the match pattern of the Fleet and the ID. (Refer to [10.4 Making a Selective Call/ Paging Call on page 111.](#))

10.3 Sending a PTT ID

A PTT ID is a unique identification code of the transceiver transmitted by pressing or releasing the **PTT** switch. The administrator or dispatcher who is using the transceiver that can display IDs can identify by a PTT ID who is using a channel without asking by voice for the caller's name.

PTT ID Type

PTT ID Type is the type of PTT ID to be sent.

In order to send a FleetSync ID as the PTT ID, "FleetSync" must be configured for PTT ID Type by using KPG-169D/ KPG-170D/ KPG-175D. In addition, Fleet (Own) and ID (Own) must be configured. (Refer to [About Own ID \(Fleet \(Own\)/ ID \(Own\)\) on page 107.](#))

Configuration using KPG-169D/ KPG-170D

Configuring the PTT ID Type ( See Edit > Zone Information > Channel Edit > Page 2)

Configuration using KPG-175D

Configuring the PTT ID Type ( See Edit > Zone Information > Channel Edit > Page 1)

Timing for Sending the PTT ID

The PTT ID is sent with the following timing:

- **BOT (Beginning of Transmit)**

The PTT ID is added to a signal at the beginning of the transmission.

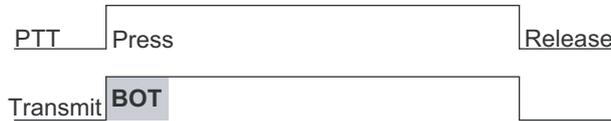


Figure 10-1 BOT

- **EOT (End of Transmit)**

The PTT ID is added to a signal at the end of the transmission.

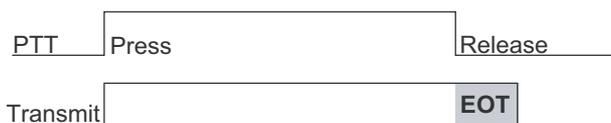


Figure 10-2 EOT

- **Both (BOT and EOT)**

The PTT ID is added to a signal at the beginning and end of the transmission.

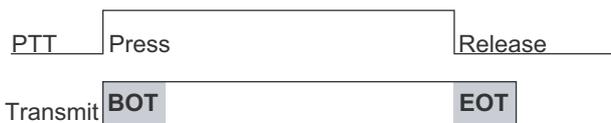


Figure 10-3 Both

The timing to send the PTT ID can be configured for each channel by using KPG-169D/ KPG-170D/ KPG-175D.

Table 10-2 Timing to Send the PTT ID

Configuration	Description
Off	No PTT ID is sent.
BOT	Own Fleet (Own) and ID (Own) are sent as the PTT ID when the PTT switch of the transmitting transceiver is pressed.
EOT	Own Fleet (Own) and ID (Own) are sent as the PTT ID when the PTT switch of the transmitting transceiver is released.
Both	Own Fleet (Own) and ID (Own) are sent as the PTT ID at the timing of both BOT and EOT.
List	The transceiver initiates a Selcall using the FleetSync ID configured in the ID List for FleetSync by pressing the PTT switch on the transmitting transceiver. The FleetSync ID to be sent can be selected from the ID List by using KPG-169D/ KPG-170D/ KPG-175D. (Refer to 10.4 Making a Selective Call/ Paging Call on page 111.)

Configuration using KPG-169D/ KPG-170D/ KPG-175D

- Configuring the PTT ID (Analog) (See Edit > Zone Information > Channel Edit > Page 1)
- Configuring the ID List Number of FleetSync ID to be sent (See Edit > Zone Information > Channel Edit > Page 1)

Emitting a Tone at the Timing to Send the PTT ID (PTT ID Sidetone)

PTT ID Sidetone is the function to emit a PTT ID Sidetone from the speaker of the transmitting transceiver after the transceiver sends the FleetSync ID.

The calling user can notice the timing to start speaking by the PTT ID Sidetone.

If the calling user starts speaking without noticing that the FleetSync ID is still being sent, the beginning of the transmitted audio may not be emitted from the speaker of the receiving transceiver. To prevent this problem, this function needs to be used.

Configuration using KPG-169D/ KPG-170D/ KPG-175D

Configuring the PTT ID Sidetone to be enabled or disabled ( See Edit > FleetSync > General 1)

Muting the PTT ID Tone (PTT ID Mute)

PTT ID Mute can be used to unmute after a certain amount of time elapses when the transceiver receives an analog signal. This function is used to mute data tones of the PTT ID (BOT) sent by the other party.

The transceiver resets mute if conditions to unmute are satisfied when amount of time configured for the Mute Hold Time elapses after the transceiver receives an analog signal being in the receive mode.

Even if QT tone or DQT code or Optional Signaling is configured, the transceiver starts counting down the Mute Hold Time upon receipt of an analog signal. If the received signal disappears while the transceiver is counting down the Mute Hold Time, the timer will be reset. In this case, the timer restarts counting down from the beginning upon receipt of an analog signal again.

Configuration using KPG-169D/ KPG-170D/ KPG-175D

- Configuring the PTT ID Mute (Analog) to be enabled or disabled ( See Edit > Zone Information > Channel Edit > Page 2)
- Configuring the Mute Hold Time ( See Edit > Optional Features > Common 1)

Preventing the PTT ID from Sending Repeatedly (PTT ID Pause)

PTT ID Pause can be used to keep the PTT ID from being sent when the transceiver alternates between transmit and receive in a certain period of time. This function can be used to prevent sending the PTT ID repeatedly to the receiving party.

The transceiver does not send PTT ID if the transceiver transmits again within the amount of time configured for PTT ID Pause Time after the transceiver transmits and restores the normal state. The transceiver sends PTT ID if the transceiver transmits after the amount of time configured for PTT ID Pause Time elapses.

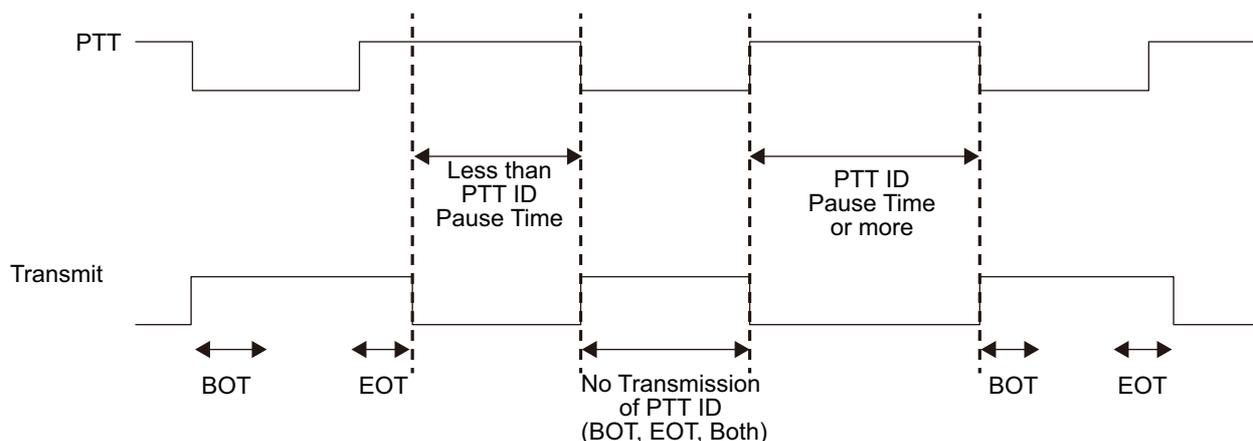


Figure 10-4 Timing to Activate PTT ID Pause

Configuration using KPG-169D/ KPG-170D/ KPG-175D

- Configuring the PTT ID Pause (Analog) to be enabled or disabled ( Edit > Zone Information > Channel Edit > Page 2)
- Configuring the PTT ID Pause Time ( Edit > Optional Features > Common 1)

10.4 Making a Selective Call/ Paging Call

Various selective calls are available by using FleetSync IDs.
 Paging Call is also available to initiate a call to a target transceiver without voice communications.

Initiating a Selective Call/ Paging Call

The transceiver initiates a Selective Call when the **PTT** switch is pressed on a channel where “List” is configured for PTT ID (Analog). (Refer to [10.3 Sending a PTT ID on page 108.](#))

Pressing the **Paging Call** key initiates a Paging Call.

A FleetSync ID of the target transceiver can be configured for each channel by selecting one FleetSync ID from the ID List by using KPG-169D/ KPG-170D.

By pressing the **PTT** switch while the Auto Reset Timer is counting down after the transceiver receives a Selective Call or a Paging Call, the transceiver can respond (Talkback) with Selective Call or Paging Call to the target transceiver.

Operating the Transceiver

1 Select a channel where the FleetSync ID of the target transceiver is configured.

2 Select one of the following operations:

- Press the **PTT** switch.
The LED lights red and audio is transmitted.
- Press the **Paging Call** key.
The LED lights red and a Paging Call is initiated.

Configuration using KPG-169D/ KPG-170D/ KPG-175D

- Configuring the PTT ID (Analog) ( Edit > Zone Information > Channel Edit > Page 1)
- Configuring the ID List Number (Analog) ( Edit > Zone Information > Channel Edit > Page 1)
- Assigning functions to the PF keys ( Edit > Key Assignment)

The following Selective Call types are available:

Table 10-3 Selective Call Type

Call Type	Description
Individual Call	This function is used to initiate a call to the specified transceiver. The transceiver determines that the received call is an Individual Call when receiving a Selective Call having the Fleet and the ID matching its own ID.
Group Call	This function is used to initiate a call to several transceivers in the specified Fleet. The transceiver determines that the received call is a Group Call when receiving a Selective Call having the ID configured for Group ID and the same Fleet. (Refer to Group ID on page 113.)

Call Type	Description
Fleet Call	This function is used to initiate a call to a party having a FleetSync ID in the same Fleet. The transceiver determines that the received call is a Fleet Call when receiving a Selective Call having the ID configured as "0 (ALL)" and the same Fleet.
Supervisor Call	This function is used to initiate a call to a party having the same ID in each Fleet. The transceiver determines that the received call is a Supervisor Call when receiving a Selective Call having the Fleet configured as "0 (ALL)" and the same ID
Broadcast Call	This function is used to initiate a call to all transceivers having a FleetSync ID. The transceiver determines that the received call is a Broadcast Call when receiving a Selective Call having the ID configured as "0 (ALL)" and Fleet configured as "0 (ALL)".

Receiving a Selective Call/ Paging Call

Conditions for the FleetSync ID to match are as follows:

Table 10-4 Conditions to Unmute the Speaker

Call Type	Conditions to Unmute the Speaker	
	Fleet fff: 100 to 349	ID iiii: 1000 to 4999
Individual Call	Match	Match
Group Call	Match	Group ID matches
Fleet Call	Match	ALL ID
Supervisor Call	ALL Fleet	Match
Broadcast Call	ALL Fleet	ALL ID

Note

To receive a Selective Call, "FleetSync" must be configured as the Optional Signaling used on the channel. (Refer to [Using the Optional Signaling \(Analog\) on page 94.](#))

Transceiver Behavior

1 Receive a Selective Call.

An Alert Tone (Individual Call, Other Selective Calls, or Paging Call) sounds from the transceiver. If Selective Call Alert LED is enabled, the LED blinks orange or blue.

By pressing the **PTT** switch while the Auto Reset Timer is counting down, the transceiver can respond (Talkback) to the transceiver which made the Individual Call or Paging Call.

Configuration using KPG-169D/ KPG-170D/ KPG-175D

- Configuring the Alert Tone (Individual Call) (See Edit > FleetSync > General 2 > Alert Tone)
- Configuring the Alert Tone (Other Selective Calls) (See Edit > FleetSync > General 2 > Alert Tone)
- Configuring the Alert Tone (Paging Call) (See Edit > FleetSync > General 2 > Alert Tone)
- Configuring the LED (Individual Call/Group Call) (See Edit > FleetSync > General 2 > LED)
- Configuring the LED (Other Selective Calls) (See Edit > FleetSync > General 2 > LED)

ID List

The transceiver uses an individual FleetSync ID to establish communication if FleetSync is enabled. The desired FleetSync IDs must be preconfigured in the transceiver using KPG-169D/ KPG-170D/ KPG-175D prior to use of the transceiver. A maximum of 8 FleetSync IDs can be configured in the FleetSync ID List.

Table 10-5 ID List Configuration

Configuration	Description
Fleet	Fleet of the FleetSync ID is configured. A user can register "ALL" or a number between 100 and 349. ALL allows initiation of a call to all Fleets.
ID	ID of the FleetSync ID can be configured. A user can register "ALL" or a number between 1000 and 4999. "ALL" allows initiation of a call to all IDs.

Configuration using KPG-169D/ KPG-170D/ KPG-175D

Configuring the ID List ( See Edit > FleetSync > ID List)

Group ID

Group ID is an ID used to initiate a Group Call in FleetSync.

A Group Call can be initiated by using FleetSync assigning the same Group ID to transceivers that form a group. The call can be initiated on a smaller scale than a Fleet Call and Supervisor Call. It is usually used within the same fleet.

Table 10-6 Group ID Response

Call Type	Response	
	ID Configured in ID List	ID Not Configured in ID List
Group Call	A user can respond with a Group Call.	A user can respond with a Group Call. However, a user may not be able to respond to a call, depending on the Interfleet configuration and the configuration for Unit Encode Block.

Whether to use Group ID can be configured using KPG-169D/ KPG-170D/ KPG-175D, and also a Group ID can be configured using KPG-169D/ KPG-170D/ KPG-175D. A maximum of 10 Group IDs can be configured.

Configuration using KPG-169D/ KPG-170D/ KPG-175D

- Configuring the Group ID to be enabled or disabled ( See Edit > FleetSync > General 1)
- Configuring the Group ID (1 to 10) ( See Edit > FleetSync > General 1)

Selective Call Alert LED

Selective Call Alert LED is the function to make the LED blink orange or blue when the transceiver receives a call. A user can notice by the LED that the transceiver is receiving a call.

Note

The color of the blinking LED can be configured by types of calls by using KPG-169D/ KPG-170D/ KPG-175D.

Configuration using KPG-169D/ KPG-170D/ KPG-175D

- Configuring the Selective Call Alert LED ( See Edit > FleetSync > General 2 > LED)
- Configuring the LED (Individual Call/Group Call) ( See Edit > FleetSync > General 2 > LED)
- Configuring the LED (Other Selective Calls) ( See Edit > FleetSync > General 2 > LED)

Restricting IDs for Which the Talkback Is Available (Unit ID Encode Block)

Unit ID Encode Block is the FleetSync ID range that the transceiver can respond (Talkback).

FleetSync IDs to which a user is allowed to respond (Talkback) can be restricted using KPG-169D/ KPG-170D/ KPG-175D.

The transceiver unmutes the speaker and emits received audio when the transceiver receives the FleetSync ID satisfying the receiving conditions. The receiving transceiver can respond (Talkback) to the transmitting transceiver by a user pressing the **PTT** switch. However, the transceiver cannot respond (Talkback) if the transceiver is inhibited to respond (Talkback) to the FleetSync ID of the transmitting transceiver.

Note

- The transceiver can respond (Talkback) to a FleetSync ID configured in the ID List even if it is outside the Unit ID Encode Block range.
- The transceiver for which Unit ID Encode Block is not configured can respond (Talkback) to all transceivers.

Configuration using KPG-169D/ KPG-170D/ KPG-175D

Configuring the Unit ID Encode Block ( See Edit > FleetSync > General 1)

Auto Reset Timer

Auto Reset Timer counts down the amount of time from when the received FleetSync ID matches the FleetSync ID (Own) preconfigured for the transceiver until the matching status is automatically reset. The matching state means that a user can communicate only using QT tone or DQT code after the FleetSync ID is matched.

Auto Reset Timer can be configured by using KPG-169D/ KPG-170D/ KPG-175D.

Table 10-7 Auto Reset Timer

Configuration	Description
Off	Auto Reset Timer will not be activated.
1 s to 300 s	After the time configured for Auto Reset Timer elapses, the matching state of the FleetSync ID is automatically reset.

Note

- For Portable, Auto Reset Timer is canceled if the channel is changed or any **PF** key is used while the Auto Reset Timer is counting down. The Alert Tone stops sounding and the blinking LED is turned Off at this time.
- For Mobile, Auto Reset Time is canceled if any **PF** key other than the **Emergency**, **Volume Up**, **Volume Down**, and **LED Brightness** key is used while the Auto Reset Timer is counting down. The Alert Tone stops sounding and the blinking LED is turned Off at this time.

Configuration using KPG-169D/ KPG-170D/ KPG-175D

Configuring the Auto Reset Timer ( See Edit > FleetSync > General 2 > Auto Reset)

10.5 Common Functions for Data Communications

The following functions are used in common for data communications such as Status Call or GPS data transmission.

- GTC Count
- Number of Retries
- Transmit Busy Wait Time
- Maximum ACK Wait Time
- ACK Delay Time
- Transmit Delay Time (Receive Capture)
- Data Transmit Modulation Delay Time
- Random Access (Contention)

GTC Count

GTC Count is the number of times that the transmitting transceiver transmits the GTC.

GTC (Go To Channel) is a message that allows the transmitting transceiver to induce the receiving transceiver to the data channel.

The transmitting transceiver will migrate to the data channel after transmitting the GTC if Status Message on Data Zone-Channel is configured. When the receiving transceiver receives the GTC, it automatically migrates to the data channel and stands by to receive the data.

Default value for the number of times is normally used.

Note

- The receiving transceiver waits to receive the data after the receiving transceiver migrates to the data channel. The transceiver restores the voice channel if the transceiver does not receive the data within the time configured for Maximum ACK Wait Time.
- The transmitting transceiver sends the data and waits to receive the acknowledgment after the transmitting transceiver migrates to the data channel. The transceiver restores the voice channel if the transceiver does not receive the acknowledgment within the time configured for Maximum ACK Wait Time.

Configuration using KPG-169D/ KPG-170D/ KPG-175D

Configuring the GTC Count ( See Edit > FleetSync > Parameter)

Number of Retries

If the transceiver does not receive the acknowledgment after the transceiver sends data and the time configured for Maximum ACK Wait Time elapses, the transceiver resends data. Number of Retries is the number of times for the transceiver to resend data. A smaller number can be configured if there is good communicating conditions, and a larger number can be configured if there are inferior communicating conditions.

Configuration using KPG-169D/ KPG-170D/ KPG-175D

Configuring the Number of Retries ( See Edit > FleetSync > Parameter)

Transmit Busy Wait Time

The transceiver confirms that the communication channel is available before sending data and then starts sending data when the channel is available. Transmit Busy Wait Time is the duration to wait for the communication channel to become available.

A transmission is canceled if the channel is still busy when the Transmit Busy Wait Time elapses.

The default configuration is normally used.

Note

Transmit Busy Wait Time is not activated if Busy Channel Lockout is enabled and the channel is busy.

Configuration using KPG-169D/ KPG-170D/ KPG-175D

Configuring the Transmit Busy Wait Time ([See](#) Edit > FleetSync > Parameter)

Maximum ACK Wait Time

Maximum ACK Wait Time is the length of time that the transceiver stands by to receive the acknowledgment after the transceiver sends data. If the transceiver does not receive the acknowledgment within the time configured for Maximum ACK Wait Time, the transceiver resends data.

The default configuration is normally used.

Note

This period can also be used for waiting on a data channel, after migrating to the data channel using the GTC.

Configuration using KPG-169D/ KPG-170D/ KPG-175D

Configuring the Maximum ACK Wait Time ([See](#) Edit > FleetSync > Parameter)

ACK Delay Time

ACK Delay Time is the length of time from when the transceiver receives data until the transceiver sends the acknowledgment.

ACK Delay Time must be shorter than Maximum ACK Wait Time configured for the transmitting transceiver.

The default configuration is normally used.

Configuration using KPG-169D/ KPG-170D/ KPG-175D

Configuring the ACK Delay Time ([See](#) Edit > FleetSync > Parameter)

Transmit Delay Time (Receive Capture)

Transmit Delay Time is a short period of time to transmit an unmodulated signal prior to transmitting the introductory part of data.

When the transmitting transceiver transmits an unmodulated signal, the receiving transceiver temporarily stops scanning to receive the data. Using this function, the data can reliably be sent even if the receiving transceiver is scanning or using the Battery Saver.

The default configuration is normally used.

Configuration using KPG-169D/ KPG-170D/ KPG-175D

Configuring the Transmit Delay Time ([See](#) Edit > FleetSync > Parameter)

Data Transmit Modulation Delay Time

Data Transmit Modulation Delay Time is the duration from when the transceiver starts transmitting until the transceiver starts to modulate MSK data.

It may be difficult to establish data communications when the transmit and receive frequencies are widely separated or the transceiver is always used in extremely cold areas. In such cases, Data Transmit Modulation Delay Time must be extended in order to improve the reliability of data communications.

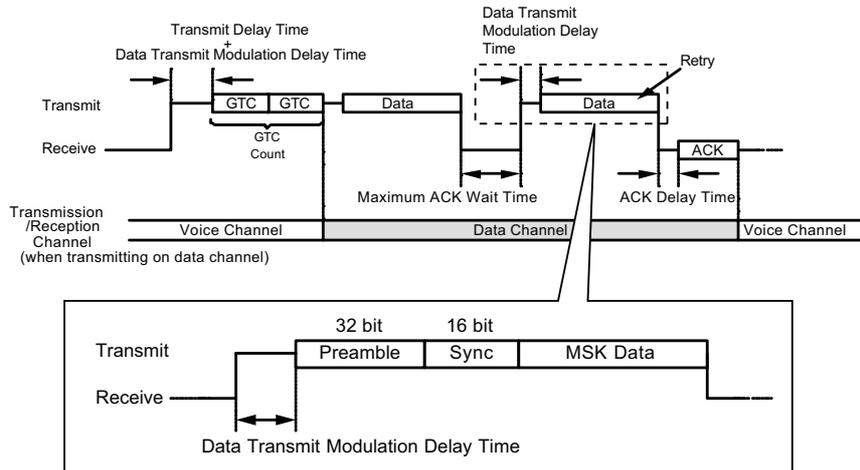


Figure 10-5 Timing to Activate the Transmit Delay Time and Data Transmit Modulation Delay Time

The default configuration is normally used.

Configuration using KPG-169D/ KPG-170D/ KPG-175D

Configuring the Data Transmit Modulation Delay Time ([See](#) Edit > FleetSync > Parameter)

Random Access (Contention)

Random Access allows the transceiver to randomize the transmission start time for each transceiver to send data when the channel becomes available.

If a large number of transceivers begin transmitting immediately after the channel becomes available, transmission contention may occur. This function prevents this contention.

Configuration using KPG-169D/ KPG-170D/ KPG-175D

Configuring the Random Access ([See](#) Edit > FleetSync > Parameter)

Multiplexing QT/DQT during Data Transmission (Data Transmit with QT/DQT)

Data Transmit with QT/DQT is the function to be used to multiplex the QT tone or DQT code configured for channels during data transmission.

This function is available on the channels in an Analog Conventional system that send a Status Message. This function is also used for data communications by use of an external device using Data PTT.

If a QT tone or DQT code is used by repeaters, enabling this function allows the data communications with the QT tone or DQT code multiplexed.

If data communication and a voice call are established on the same channel, the data transmission sound can be muted during data communication without multiplexing the QT tone or DQT code by disabling this function.

Note

This function can be only used in an Analog Conventional system.

Configuration using KPG-169D/ KPG-170D/ KPG-175

Configuring the Data Transmit with QT/DQT to be enabled or disabled ( See Edit > Optional Features > Common 1)

10.6 Sending a Status Message (Status Call)

Status Message is a simplified messaging system that allows a user to send or receive a status message (Statuses 10 to 99) by selecting numbers. With this function enabled, the dispatcher, etc. can send a message to the transceiver.

Pressing the **Call 1** or **Call 2** key causes the transceiver to send the preconfigured Status Message. The Status Message is addressed to the Target Fleet/ ID.

Call 1 or Call 2 can be assigned to the **PF** keys by using KPG-169D/ KPG-170D/ KPG-175D and the Status Message corresponding to each key can be selected from the Status List in FleetSync.

Configuration using KPG-169D/ KPG-170D/ KPG-175D

- Assigning Call 1 or Call 2 to the PF keys ( See Edit > Key Assignment)
- Configuring the Status Message corresponding to the Call 1 or Call 2 key ( See Edit > FleetSync > Target)

Reserved Statuses of Status Messages

There are reserved statuses for Status Messages. Below is a list of the reserved statuses:

Table 10-8 Reserved Statuses

Status	Function	Receiving Transceiver Behavior
10 to 79	Statuses intended for users	Reception of a normal status
80	Default Status	
81 - 86	Undefined	
87	Remote Kill Command	The transceiver sends an acknowledgment. The receiving transceiver will be in the Kill state.
88	Emergency Reset Command	This status resets Emergency.
89	Horn Alert Activation Command	Activates the Horn Alert.*1
90	Remote Stun Transmit Inhibit Command	The transceiver sends an acknowledgment. Transmission is restricted. In this case, Current Status becomes "93".
91	Remote Stun Transmit/Receive Inhibit Command	The transceiver sends an acknowledgment. Transmission and reception are restricted. In this case, Current Status becomes "94".
92	Remote Stun Reset Command	The transceiver sends an acknowledgment. The Stun is disabled. In this case, Current Status becomes "80".
93	Response status when status "90" is received.	-
94	Response status when status "91" is received.	-
95 to 99	Reserved Statuses for Emergency 95: Lone Worker Status 96: Motion Detection Status*2 97: Stationary Detection Status*2 98: Man-down Status*2 99: Emergency Key Status	-

*1 The function is not activated for NX-240/ 240V/ 340/ 340U even if the transceiver receives this status.

*2 The functions of Motion Detection, Stationary Detection, and Man-down cannot be used for NX-240/ 240V/ 340/ 340U/ 740H/ 740HV/ 840H/ 840HU.

Note

Refer to [10.8 Disabling the Transceiver Capability by Remote Control \(Stun/ Kill\)](#) on page 125 for details of Remote Stun/ Kill.

Status Message on Data Zone-Channel

Status Message on Data Zone-Channel allows the transceiver to automatically change the channel to the Data Zone-Channel (Analog) to send a Status Message.

The transceiver automatically changes the channel to the Data Zone-Channel (Analog) to send a Status Message. When the transmission ends, the transceiver restores the Zone-channel which was used for receiving before sending the Status Message. Status Message on Data Zone-Channel can be used to send data on a specific dedicated channel.

If Data Transmit with QT/DQT is enabled, the QT tone or DQT code configured for the channel can be multiplexed during data transmission.

Configuration using KPG-169D/ KPG-170D/ KPG-175D

- Configuring the Status Message on Data Zone-Channel to be enabled or disabled ( See Edit > FleetSync > Parameter)
- Configuring the Data Transmit with QT/DQT to be enabled or disabled ( See Edit > Optional Features > Common 1)
- Configuring the Data Zone-Channel (Analog) ( See Edit > Optional Features > Common 1)

Status List

Status Message must be preconfigured in the transceiver using KPG-169D/ KPG-170D/ KPG-175D prior to the transmission. A maximum of 2 statuses can be configured in the Status List.

The status number between 10 and 99 can be configured.

Configuration using KPG-169D/ KPG-170D/ KPG-175D

Configuring the Status List ( See Edit > FleetSync > Target)

Target Fleet/ ID

Target Fleet/ ID is the target FleetSync ID used for sending a Status Message.

Target Fleet and Target ID can be configured using KPG-169D/ KPG-170D/ KPG-175D. FleetSync ID of the base station which is responsible for operation and administration is normally configured for Target Fleet/ ID (Status Message).

Configuration using KPG-169D/ KPG-170D/ KPG-175D

Configuring the Target Fleet/ ID ( See Edit > FleetSync > Target)

AUX Input Status Message

Supported Models: Mobile

AUX Input Status Message can be used to send the specified Status Message when the AUX Input port goes high level to low level or goes low level to high level.

The transceiver can send a Status Message when a sensor is attached to the AUX Input port and the status of the AUX Input port changes. The transceiver sends the message to the FleetSync ID configured for Target Fleet/ID. (Refer to [Target Fleet/ ID on page 119.](#))

To use this function, AUX Input Status Message must be assigned to one of AUX Input ports.

Configuration using KPG-175D

- Configuring the AUX Input Status Message ( [See](#) Edit > FleetSync > Target)
- Assigning functions to the AUX Input ( [See](#) Edit > Extended Function > AUX)

AUX Output Status Message

Supported Models: Mobile

AUX Output Status Message is the function to switch the status of the AUX Output port from high to low or from low to high when the transceiver receives the specified Status Message. This function can be used to remotely turn the external device On or Off.

To use this function, AUX Output Status Message must be assigned to one of AUX Output ports.

Configuration using KPG-175D

- Configuring the AUX Output Status Message ( [See](#) Edit > FleetSync > Target)
- Assigning functions to the AUX Output ( [See](#) Edit > Extended Function > AUX)

Storing the Selected or Sent Status (Status Hold)

Supported Models: Mobile

Status Hold is the function to store a sent status in the transceiver.

When the transceiver receives a status request message, the status stored in the transceiver will automatically be transmitted. Also, the status stored in the transceiver will automatically be stored in GPS data and transmitted.

Table 10-9 Status Hold

Configuration	Description
Enabled	The transceiver stores a status sent by one of the following method: <ul style="list-style-type: none"> • A status sent when the status of the AUX Input Status Message port changes. • A status sent by pressing the Call 1 key or Call 2 key.
Disabled	The transceiver stores the status 80.

Configuration using KPG-175D

Configuring the Status Hold to be enabled or disabled ( [See](#) Edit > Optional Features > Common 2)

10.7 Sending GPS Data

Global Positioning System (GPS) is the system to acquire the current location information of the own transceiver by receiving signals from the Global Positioning System satellites orbiting the earth.

The transceiver can send the acquired own location information (GPS data) to the base station.

A GPS receiver unit compatible with the NMEA-0183 standard is required and it must be connected to the communication port of the mobile station transceiver to send GPS data.

Transmission Method of GPS Data

The following are the methods to send GPS data:

- **Automatic GPS data transmission**
 - [Sending GPS Data Automatically at Certain Intervals \(GPS Report Mode\)](#)
 - [Sending GPS Data According to the Request from the Base Station \(GPS Report Mode\)](#)
- **Manual GPS data transmission**
 - [Sending GPS Data Manually by Using a Key \(Send the GPS data\)](#)
- **GPS data transmission together with operation of the PTT switch**
 - [Sending GPS Data Together With Operation of the PTT Switch \(GPS Combination\)](#)
- **GPS data transmission together with Status Message**
 - [Sending GPS Data Together With Status Call \(GPS Combination\)](#)
- **GPS data transmission together with Emergency Call**
 - [Sending GPS Data Together With Emergency Call \(GPS Combination\)](#)

Note

For a transceiver sending GPS data, "GPS" must be assigned to the communication port. (Refer to [A.2 Available Functions for COM Port on page 202.](#))

The ID of the Target Transceiver (Base Fleet/ Base ID)

Base Fleet and Base ID are the target FleetSync ID to send GPS data.

The FleetSync ID of the base station which is responsible for operation and administration of system is normally configured for Base ID.

Configuration using KPG-169D/ KPG-170D/ KPG-175D

Configuring the Base Fleet and Base ID ([See](#) Edit > FleetSync > GPS)

Sending GPS Data Automatically at Certain Intervals (GPS Report Mode)

GPS data can be sent automatically at the intervals configured for GPS Report Interval.

This function is used for position management or monitoring of transceivers on a time base by periodically transmitting location information to the base station.

To use this function, "Auto" must be configured for GPS Report Mode by using KPG-169D/ KPG-170D/ KPG-175D.

Note

- The transceiver sends the GPS data upon receipt of the GPS data transmission request from the base station even if "Auto" is configured for GPS Report Mode.
- If the transceiver is under the following conditions, the automatic transmission of GPS data at certain intervals will be canceled. To avoid a collision with a GPS transmission from other transceivers while sending GPS data, Transmit Busy Wait Time will not suspend the transmission. (Refer to [Transmit Busy Wait Time on page 116](#))
 - While the transceiver is transmitting
 - While the transceiver is receiving
 - While the Public Address function is used (Mobile only)
 - While the transceiver unmutes the speaker
 - While Transmit Frequency is not configured
 - While transmission is disabled by the Time-out Timer
 - While the transceiver is sending or receiving FleetSync data
 - While the transceiver is waiting to send the Transpond tone
 - Transceiver Password Mode
 - Emergency Mode

Configuration using KPG-169D/ KPG-170D/ KPG-175D

Configuring the GPS Report Mode ( See Edit > Optional Features > GPS)

Sending GPS Data According to the Request from the Base Station (GPS Report Mode)

The transceiver can send GPS data when a GPS data transmission request is received from the base station.

This function is used when the base station controls the timing to require GPS data. This function is also used to avoid transmit collisions if there are many subscriber units.

To use this function, "Poll" must be configured for GPS Report Mode by using KPG-169D/ KPG-170D/ KPG-175D.

Note

The transceiver sends the GPS data to the ID configured for Base Fleet/ Base ID, not to the ID that sent the data transmission request.

Configuration using KPG-169D/ KPG-170D/ KPG-175D

Configuring the GPS Report Mode ( See Edit > Optional Features > GPS)

Sending GPS Data Manually by Using a Key (Send the GPS data)

GPS data can be sent manually by a user pressing the **Send the GPS data** key.

Configuration using KPG-169D/ KPG-170D/ KPG-175D

Assigning functions to the PF keys ( See Edit > Key Assignment)

Sending GPS Data Together With Operation of the PTT Switch (GPS Combination)

The transceiver can send GPS data by adding the GPS data to the PTT ID (FleetSync) of the transmitting transceiver. To use this function, PTT ID for GPS Combination must be enabled by using KPG-169D/ KPG-170D/ KPG-175D. GPS data is added to the PTT ID as follows according to the configurations for PTT ID (Analog) and GPS Report Timing: (Refer to [10.3 Sending a PTT ID on page 108.](#))

Table 10-10 Timing for Adding GPS Data

GPS Report Timing	PTT ID (Analog)			
	Off	BOT	EOT	Both
BOT	-	BOT + GPS	EOT	BOT + GPS EOT
EOT	-	BOT	EOT + GPS	BOT EOT + GPS
Both (BOT)	-	BOT + GPS	EOT + GPS	BOT + GPS EOT
Both (EOT)	-	BOT + GPS	EOT + GPS	BOT EOT + GPS
Both	-	BOT + GPS	EOT + GPS	BOT + GPS EOT + GPS

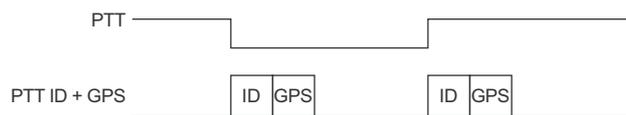


Figure 10-6 Timing for GPS Combination (PTT ID)

Configuration using KPG-169D/ KPG-170D/ KPG-175D

- Configuring the GPS Combination (PTT ID) ( See Edit > FleetSync > GPS > GPS Combination)
- Configuring the GPS Report Timing ( See Edit > FleetSync > GPS > GPS Combination)

Sending GPS Data Together With Status Call (GPS Combination)

The transceiver can send GPS data by adding the GPS data to a Status Message using FleetSync.

To use this function, Status for GPS Combination must be enabled by using KPG-169D/ KPG-170D/ KPG-175D. The range of status numbers to which GPS data can be added can be configured.

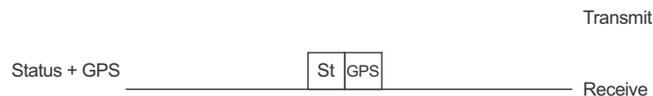


Figure 10-7 Timing for GPS Combination (Status)

Configuration using KPG-169D/ KPG-170D/ KPG-175D

Configuring the GPS Combination (Status) ( See Edit > FleetSync > GPS > GPS Combination)

Configuring the GPS Report Status Number Block ( See Edit > FleetSync > GPS > GPS Combination)

Sending GPS Data Together With Emergency Call (GPS Combination)

The transceiver can send GPS data by adding the GPS data to the Emergency ID (FleetSync).

To use this function, Emergency for GPS Combination must be enabled by using KPG-169D/ KPG-170D/ KPG-175D.



Figure 10-8 Timing for Combination (Emergency)

Configuration using KPG-169D/ KPG-170D/ KPG-175D

Configuring the GPS Combination (Emergency) ( See Edit > FleetSync > GPS > GPS Combination)

GPS Functions

The following functions are relevant to GPS data transmission:

- Number of Times
- GPS Report Interval Time
- GPS Time Mark
- GPS Message Type
- GPS Report on Data Zone-Channel
- GPS Report Back to Requested ID

Refer to [13 GPS FUNCTIONS](#) on [page 145](#) for details of each function.

10.8 Disabling the Transceiver Capability by Remote Control (Stun/ Kill)

Stun/ Kill is the function for an administrator to remotely disable the transceiver by using a Remote Stun/ Kill status, for instance, if the transceiver is stolen. (Refer to [Reserved Statuses of Status Messages on page 118](#))

Following is the transceiver behavior when the transceiver receives a Remote Stun/ Kill Status:

Table 10-11 Remote Stun/ Kill Statuses

Status	Description
Remote Stun	The transceiver becomes unable to transmit when the transceiver receives the Remote Stun status (Status 90). The transceiver becomes unable to transmit and receive when the transceiver receives the Remote Stun status (Status 91). The Stun state is reset when the transceiver receives the Remote Revive status (Status 92). Whether to accept reception of the Remote Stun status can be configured by using KPG-169D/ KPG-170D/ KPG-175D.
Remote Revive	The Stun state is reset when the transceiver receives the Remote Revive status (Status 92).
Remote Kill	The transceiver is disabled and all operations will be prohibited when the transceiver receives the Remote Kill status (Status 87). All configuration data of the transceiver is cleared; hence the Stun state will not be reset even if the transceiver receives the Remote Revive status (Status 92). However, the configuration data can be written to the transceiver using KPG-169D/ KPG-170D/ KPG-175D. Whether to accept reception of the Remote Kill status can be configured by using KPG-169D/ KPG-170D/ KPG-175D.

Note

- GPS data is automatically sent while the transceiver is in Stun state.
- The transceiver cannot be placed in Emergency Mode while the transceiver is in Stun state.
- The LED cannot light or blink while the transceiver is in Stun state.

Configuration using KPG-169D/ KPG-170D/ KPG-175D

- Configuring the Stun Status Validation to be enabled or disabled ( [See](#) Edit > FleetSync > General 1)
- Configuring the Kill Status Validation to be enabled or disabled ( [See](#) Edit > FleetSync > General 1)

MDC-1200 is the data system using Audio Frequency Shift Keying (AFSK). In this data system, the transceivers communicate at a 1200 baud data rate using 1200 Hz and 1800 Hz tones.

Using this data system, a user can send the ID (Own) of the own transceiver as an PTT ID or Emergency ID in the MDC-1200 format. In addition, a dispatcher can determine whether or not the transceiver is available, or disable the transceiver to be operated by sending a message to the transceiver.

Note

- The transceiver cannot receive both FleetSync signaling and MDC-1200 signaling on the same channel. Channels using FleetSync and channels using MDC-1200 must be configured separately. Options other than “FleetSync” must be configured for Optional Signaling (Analog) of a channel where the transceiver receives an MDC-1200 signaling.
- If “2400 bps” is configured for FleetSync Baud Rate, the transceiver cannot receive the control command for Radio Check/ Stun in MDC-1200. In addition, the control command for Radio Check/ Stun in MDC-1200 needs to be received on the channel where “MDC-1200” is configured for PTT ID Type.
- MDC-1200 can be used only in an Analog Conventional system.

11.1 Sending a PTT ID

A PTT ID is an unique identification code of the transceiver transmitted by pressing or releasing the **PTT** switch. The administrator or dispatcher can identify by a PTT ID who is using a channel without asking by voice for the caller’s name.

PTT ID Type

PTT ID Type is the type of PTT ID to be sent.

To send an MDC-1200 format ID (Own) as the PTT ID, “MDC-1200” must be configured for PTT ID Type by using KPG-169D/ KPG-170D.

In addition, an ID (Own) in the MDC-1200 format must be configured. An ID (Own) is a unique ID number of the transceiver to be used for communications in the MDC-1200 format.

Configuration using KPG-169D/ KPG-170D/ KPG-175D

- Configuring the PTT ID Type ( See Edit > Zone Information > Channel Edit > Page 2)
- Configuring the ID (Own) ( See Edit > MDC-1200 > General 1)

Timing for Sending the PTT ID

The PTT ID is sent with the following timing:

● BOT (Beginning of Transmit)

The PTT ID is added to a signal at the beginning of the transmission.

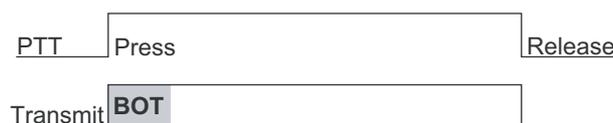


Figure 11-1 BOT

● **EOT (End of Transmit)**

The PTT ID is added to a signal at the end of the transmission.

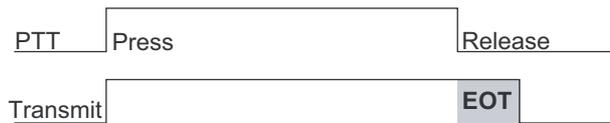


Figure 11-2 EOT

● **Both (BOT and EOT)**

The PTT ID is added to a signal at the beginning and end of the transmission.

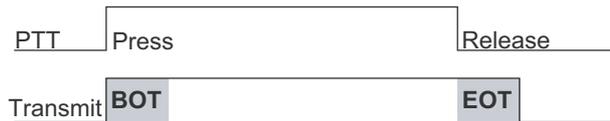


Figure 11-3 Both

The timing to send the PTT ID can be configured for each channel by using KPG-169D/ KPG-170D/ KPG-175D.

Table 11-1 Timing to Send the PTT ID

Configuration	Description
Off	No PTT ID is sent.
BOT	When the PTT switch on the transmitting transceiver is pressed, the ID (Own) in the MDC-1200 format is sent as the PTT ID.
EOT	When the PTT switch on the transmitting transceiver is released, the ID (Own) in the MDC-1200 format is sent as the PTT ID.
Both	At both timing of BOT and EOT, the ID (Own) in the MDC-1200 format is sent as the PTT ID.

Note

- If Data Transmit Modulation Delay Time is configured, the transceiver sends the ID (Own) in the MDC-1200 format when the amount of time configured for Data Transmit Modulation Delay Time elapses after the transceiver starts transmitting.
- If PTT ID with QT/DQT is enabled, a QT tone or a DQT code is sent when the transceiver sends the PTT ID on the channel where QT/DQT is used. This function reduces the MSK data burst tones that occur at the receiving transceiver.

Configuration using KPG-169D/ KPG-170D/ KPG-175D

- Configuring the PTT ID (Analog) (See Edit > Zone Information > Channel Edit > Page 1)
- Configuring the Data Transmit Modulation Delay Time (See Edit > MDC-1200 > General 1)
- Configuring the PTT ID with QT/DQT to be enabled or disabled (See Edit > MDC-1200 > General 1)

Emitting a Tone at the Timing to Send the PTT ID (PTT ID Sidetone)

PTT ID Sidetone is the function to emit a PTT ID Sidetone from the speaker of the transmitting transceiver after the transceiver sends the ID (Own) in the MDC-1200 format.

The calling user can notice the timing to start speaking by the PTT ID Sidetone.

If the calling user starts speaking without noticing that the ID (Own) in the MDC-1200 format is still being sent, the beginning of the transmitted audio may not be emitted from the speaker of the receiving transceiver. To prevent this problem, this function needs to be used.

Configuration using KPG-169D/ KPG-170D/ KPG-175D

Configuring the PTT ID Sidetone to be enabled or disabled ( See Edit > MDC-1200 > General 1)

Muting the PTT ID Tone (PTT ID Mute)

PTT ID Mute is the function to unmute after a certain amount of time elapses when the transceiver receives an analog signal. This function is used to mute data tones of the PTT ID (BOT) sent by the other party.

Refer to [10.3 Sending a PTT ID on page 108](#) for details.

Preventing Sending the PTT ID Repeatedly (PTT ID Pause)

PTT ID Pause is the function to keep the PTT ID from being sent when the transceiver alternates between transmit and receive in a certain period of time. This function can be used to prevent sending the PTT ID repeatedly to the receiving party.

Refer to [10.3 Sending a PTT ID on page 108](#) for details.

11.2 The Transceiver Behavior in Emergency Mode

Emergency Mode can be used to transmit and receive with the transceiver in emergencies. In such emergency situations, a user can immediately contact the base station by using this function. The transceiver can notify the base station of an occurrence of an emergency situation by sending an Emergency Alarm Request message or an Emergency ID in the MDC-1200 format.

Emergency Alarm

Emergency Alarm is the function to send an Emergency Alarm Request message before the transceiver enters Emergency Mode to notify the base station that the transceiver is in an emergency situation.

Using this function, the transceiver can reliably notify the base station having the decode function in MDC-1200 that the transceiver is in an emergency situation.

The transceiver sends an Emergency Alarm Request message in the MDC-1200 format by pressing the **Emergency** key. Upon receipt of an acknowledgment, the transceiver enters Emergency Mode.

If the transceiver receives no acknowledgment until the time configured for Maximum ACK Wait Time elapses after sending the Emergency Alarm Request message, the transceiver resends the Emergency Alarm Request message. If the transceiver still cannot receive an acknowledgment after sending the message 5 times, the transceiver enters Emergency Mode.

Emergency ID (MDC-1200)

The transceiver can notify the base station of an occurrence of an emergency situation by sending an Emergency ID in the MDC-1200 format when the transceiver starts transmitting in Emergency Mode. (Refer to [Emergency ID on page 159](#).)

Note

- To use this function, "MDC-1200" needs to be configured for Emergency ID.
- Pressing the **PTT** switch while the transceiver in Emergency Mode causes the transceiver to send the Emergency ID in the MDC-1200 format at the timing of BOT regardless of the configuration for PTT ID.

Configuration using KPG-169D/ KPG-170D/ KPG-175D

Configuring the Maximum ACK Wait Time ([See](#) Edit > MDC-1200 > General 1)

11.3 Confirming Whether the Transceiver Is Available for Communications (Radio Check)

Radio Check is the function that is used to confirm whether the transceiver is available for communications. The transceiver sends an acknowledgment to the base station if the transceiver receives a Radio Check command in the MDC-1200 format sent from the base station and the received ID matches the ID preconfigured for the transceiver. The base station can determine whether or not the transceiver is available for communications by receiving this acknowledgment.

Note

- Upon elapse of the time configured for ACK Delay Time after the transceiver receives a Radio Check command in the MDC-1200 format, the transceiver sends an acknowledgment.
- The transceiver does not send an acknowledgment if the received ID does not match the ID preconfigured for the transceiver.
- If this function is disabled, the transceiver does not send an acknowledgment.
- NX-240/ 240V/ 340/ 340U/ 740H/ 740HV/ 840H/ 840HU cannot send a Radio Check command in the MDC-1200 format.

Configuration using KPG-169D/ KPG-170D/ KPG-175D

- Configuring the Radio Check to be enabled or disabled ( See Edit > MDC-1200 > General 1)
- Configuring the ACK Delay Time ( See Edit > MDC-1200 > General 1)

11.4 Disabling the Transceiver Capability by Remote Control (Stun)

Stun is the function that is used to disable the transceiver capability by remote control. This function allows a system administrator to remotely disable the transceiver, for instance, if the transceiver is lost.

The transceiver which has been disabled by this function can be enabled to be usable again by remote control from an external device using radio communication.

Placing the Transceiver in the Stun State

The transceiver sends an acknowledgment to the base station if the transceiver receives a Stun Request message in the MDC-1200 format sent from the base station and the received ID matches the ID preconfigured for the transceiver. Then, the transceiver enters the Stun state and cannot be used.

If the transceiver enters the Stun state, the transceiver is in the status as the same as that when the transceiver is turned OFF: the LED is turned Off and no key is usable.

Resetting the Stun State of the Transceiver

While the transceiver is in the Stun state, the transceiver sends an acknowledgment to the base station if the transceiver receives a Stun Revive Request message in the MDC-1200 format sent from the base station and the received ID matches the ID preconfigured for the transceiver. Then, the Stun state is reset and the transceiver can be used again.

Note

- Whether the Stun function is enabled or disabled can be configured in Stun Validation. If Stun Validation is disabled, the status of the transceiver does not change even if the transceiver received the Stun command or the Stun Revive command in the MDC-1200 format.
- Upon a lapse of the time configured for ACK Delay Time after the transceiver receives a Stun Request or a Stun Revive Request message in the MDC-1200 format, the transceiver sends an acknowledgment.
- The transceiver does not send an acknowledgment if the received ID does not match the ID preconfigured for the transceiver.
- NX-240/ 240V/ 340/ 340U/ 740H/ 740HV/ 840H/ 840HU cannot send a Stun Request or a Stun Revive Request message in the MDC-1200 format.

Configuration using KPG-169D/ KPG-170D/ KPG-175D

- Configuring the Stun Validation to be enabled or disabled ( See Edit > MDC-1200 > General 1)
- Configuring the ACK Delay Time ( See Edit > MDC-1200 > General 1)

DTMF (Dual Tone Multi-frequency) is the signaling type that uses 2 different frequency tones simultaneously. DTMF code can be used as a PTT ID or for initiating an individual call, calling a telephone number while connected to a phone line, and remote control of the transceiver.

DTMF signaling uses 2 different frequencies combined (one lower and one higher frequency) and consists of the 0 to 9, A to D, * and # tones.

Table 12-1 DTMF Tone Frequency List

DTMF Code	Frequency	
	Low Frequency	High Frequency
0	941 Hz	1336 Hz
1	697 Hz	1209 Hz
2	697 Hz	1336 Hz
3	697 Hz	1477 Hz
4	770 Hz	1209 Hz
5	770 Hz	1336 Hz
6	770 Hz	1477 Hz
7	852 Hz	1209 Hz
8	852 Hz	1336 Hz
9	852 Hz	1477 Hz
A	697 Hz	1633 Hz
B	770 Hz	1633 Hz
C	852 Hz	1633 Hz
D	941 Hz	1633 Hz
*	941 Hz	1209 Hz
#	941 Hz	1477 Hz

Following are methods available to send the DTMF code:

- Autodial (Portable only)
- Manual Dialing (Mobile only)
- Keypad Auto PTT (Mobile only)
- Autodial List Selection (Mobile only)
- Redial (Mobile only)
- PTT ID Communications

Note

For NX-240/ 240V/ 340/ 340U/ 740H/ 740HV/ 840H/ 840HU, DTMF can be used only in an Analog Conventional system.

12.1 Sending a DTMF Code Using the Autodial Key (Autodial)

Supported Models: Portable

Pressing the **Autodial** key sends a DTMF code. By using KPG-169D/ KPG-170D, the DTMF code to be sent can be configured for each channel by selecting one of the DTMF codes in the Autodial List.

Configuration using KPG-169D/ KPG-170D

- Assigning functions to the PF keys ( See Edit > Key Assignment)
- Configuring the DTMF code to be sent by selecting from the Autodial List ( See Edit > Zone Information > Channel Edit > Page 2)

Autodial List

Supported Models: Portable

Autodial List is the list in which the DTMF code to be sent by pressing the **Autodial** key is configured. A list number in the Autodial List can be configured for each channel by using KPG-169D/ KPG-170D.

When the **Autodial** key is pressed, the DTMF code corresponding to the list number in the Autodial List configured for the selected channel is sent.

A maximum of 8 DTMF codes can be configured in the Autodial List by using KPG-169D/ KPG-170D.

Note

The DTMF code configured for No.1 in the Autodial List is also used as a code for Transpond when receiving an Individual Call. (Refer to [Transceiver Behavior When Receiving a Selective Call on page 143.](#))

Configuration using KPG-169D/ KPG-170D

- Configuring the Autodial List ( See Edit > DTMF > Autodial List)
- Configuring the DTMF code to be sent by selecting from the Autodial List ( See Edit > Zone Information > Channel Edit > Page 2)

12.2 Sending the DTMF Code While Transmitting (Manual Dialing)

Supported Models: Mobile

If Manual Dialing is enabled, the DTMF code corresponding to a particular key on the microphone keypad can be sent when pressing the key while transmitting by pressing the **PTT** switch.

Operating the Transceiver

- 1 Press the **PTT** switch.**
- 2 Press the key corresponding to the DTMF code to be sent.**
The transceiver sends the DTMF code.
- 3 Repeat Step 2 as necessary.**

Configuration using KPG-175D

Configuring the Manual Dialing to be enabled or disabled ( See Edit > DTMF > Encode)

12.3 Sending the DTMF Code by Pressing a Key on the Microphone Keypad without Using the PTT Switch (Keypad Auto PTT)

Supported Models: Mobile

If “Keypad Auto PTT” is configured for Keypad Operation, the transceiver can immediately initiate transmission by pressing a key on the microphone keypad and send the DTMF code corresponding to the key. This function can be used to send the DTMF code by pressing keys on the microphone keypad without pressing the **PTT** switch.

Operating the Transceiver

- 1 Press the key corresponding to the DTMF code to be sent.**
The transceiver sends the DTMF code.
- 2 Repeat Step 1 as necessary.**

Configuration using KPG-175D

Configuring the Keypad Operation ( See Edit > Key Assignment > Microphone Key)

12.4 Sending a DTMF Code by Selecting from a List (Autodial Mode)

Supported Models: Mobile

A DTMF code configured for the Autodial List can be selected and sent.

The transceiver can enter Autodial Mode and the DTMF codes can be selected using one of the following operations:

- **Autodial key**

Pressing the **Autodial** key causes the transceiver to enter Autodial Mode.

- **Keypad entry**

If "Autodial" is configured for Keypad Operation, pressing the [*] key on the microphone keypad causes the transceiver to enter Shortcut Entry Mode for Autodial Mode. (Refer to [Keypad Operation on page 11.](#))

Operating the Transceiver

1 Press the **Autodial** key or the [*] key on the microphone keypad.

The transceiver enters Autodial Mode. "Ad" appears on the LED display.

2 Enter the number in the Autodial List to be sent by pressing the [1] to [9] keys, [↑]/[↓] key, or [←B] or [C>] key.

For example, to select the number 7, press the [7] key. On the LED display, the entered number appears after "AR" as "A7".

3 Press the **PTT** switch.

The transceiver sends the DTMF code.

Configuration using KPG-175D

- Assigning functions to the PF keys ( [See](#) Edit > Key Assignment)
- Configuring the Keypad Operation ( [See](#) Edit > Key Assignment > Microphone Key)

Autodial List

Supported Models: Mobile

Audio List is the list in which the DTMF code is configured. A DTMF code can be sent by selecting a list number in Autodial Mode and pressing the **PTT** switch.

A maximum of 9 DTMF codes can be configured in the Autodial List by using KPG-175D.

Configuration using KPG-175D

Configuring the Autodial List ( [See](#) Edit > DTMF > Autodial List)

12.5 Redialing

Supported Models: Mobile

A previously sent DTMF code can be sent again.

Operating the Transceiver

1 Press the **Autodial** key or the **[*]** key on the microphone keypad.

The transceiver enters Autodial Mode. "Ad" appears on the LED display.

2 Press the **[0]** key.

"rd" appears on the LED display and the previously sent DTMF code is selected. To cancel the operation, the **Triangle** key needs to be pressed.

3 Press the **PTT** switch.

The transceiver sends the DTMF code.

Configuration using KPG-175D

- Assigning functions to the PF keys ( See Edit > Key Assignment)
- Configuring the Keypad Operation ( See Edit > Key Assignment > Microphone Key)

12.6 Sending a PTT ID

A PTT ID is a unique identification code of the transceiver transmitted by pressing or releasing the **PTT** switch.

The administrator or dispatcher can identify by a PTT ID who is using a channel without asking by voice for the caller's name.

PTT ID Type

PTT ID Type is the type of PTT ID to be sent.

To send a DTMF code as the PTT ID, "DTMF" must be configured for PTT ID Type by using KPG-169D/ KPG-170D/ KPG-175D. And the DTMF code to be sent needs to be configured in accordance with the configuration of the timing for sending the PTT ID. (Refer to [Timing for Sending the PTT ID on page 137](#))

Configuration using KPG-169D/ KPG-170D/ KPG-175D

Configuring the PTT ID Type ( See Edit > Zone Information > Channel Edit > Page 2)

Timing for Sending the PTT ID

The PTT ID is sent with the following timing:

- **BOT (PTT ID (BOT))**

The PTT ID is added to a signal at the beginning of the transmission.

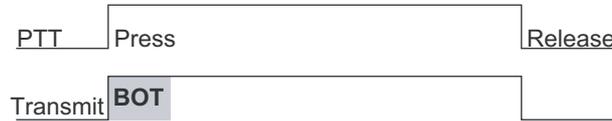


Figure 12-1 BOT

- **EOT (PTT ID (EOT))**

The PTT ID is added to a signal at the end of the transmission.

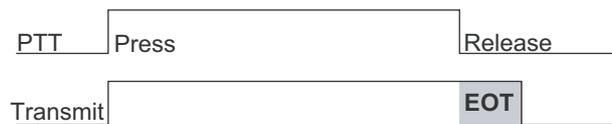


Figure 12-2 EOT

- **Both (BOT and EOT)**

The PTT ID is added to a signal at the beginning and end of the transmission.

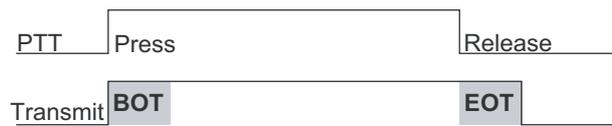


Figure 12-3 Both

The timing to send the PTT ID can be configured for each channel by using KPG-169D/ KPG-170D.

Table 12-2 Timing to Send the PTT ID

Configuration	Description
Off	No PTT ID is sent.
BOT	When the PTT switch on the transmitting transceiver is pressed, the DTMF code configured for PTT ID (BOT) will be sent as the PTT ID.
EOT	When the PTT switch on the transmitting transceiver is released, the DTMF code configured for PTT ID (EOT) will be sent as the PTT ID.
Both	At both timing of BOT and EOT, the DTMF codes configured for PTT ID (BOT) and PTT ID (EOT) will be sent as the PTT ID.

Configuration using KPG-169D/ KPG-170D

- Configuring the PTT ID (Analog) (See Edit > Zone Information > Channel Edit > Page 1)
- Configuring the PTT ID (BOT) (See Edit > Zone Information > Channel Edit > Page 2)
- Configuring the PTT ID (EOT) (See Edit > Zone Information > Channel Edit > Page 2)

Configuration using KPG-175D

- Configuring the PTT ID (Analog) (See Edit > Zone Information > Channel Edit > Page 1)
- Configuring the PTT ID (BOT) (See Edit > Zone Information > Channel Edit > Page 1)
- Configuring the PTT ID (EOT) (See Edit > Zone Information > Channel Edit > Page 1)

Muting the PTT ID Tone (PTT ID Mute)

PTT ID Mute is the function to unmute after a certain amount of time elapses when the transceiver receives an analog signal. This function is used to mute data tones of the PTT ID (BOT) sent by the other party. Refer to [10.3 Sending a PTT ID on page 108](#) for details.

Preventing Sending the PTT ID Repeatedly (PTT ID Pause)

PTT ID Pause is the function to keep the PTT ID from being sent when the transceiver alternates between transmit and receive in a certain period of time. This function can be used to prevent sending the PTT ID repeatedly to the receiving party. Refer to [10.3 Sending a PTT ID on page 108](#) for details.

12.7 Disabling the Transceiver Capability by Remote Control (Stun)

The transceiver capability can be disabled by wireless remote control. This function allows a system administrator to remotely disable the transceiver, for instance, if the transceiver is lost.

The transceiver which has been disabled by this function can be enabled to be usable again by remote control from an external device using radio communication.

When the transceiver receives the Stun Code, the transceiver multiplexes the Stun-on Tone and starts transponding. Then, the function configured in the Stun Code Response will be activated.

The function configured in the Stun Code Response is stored even if the transceiver is turned OFF. The state of Stun Code Response cannot be reset by Auto Reset Timer or by the user's operation. The transceiver transmits the Stun-off Tone and then will reset the state of Stun Code Response when the transceiver receives the Revive Code (Stun Code + "#").

Stun Code and Stun Code Response can be configured in the transceiver using KPG-169D/ KPG-170D/ KPG-175D.

Table 12-3 Stun

Configuration	Description
Stun Code	Stun Code is the standby code for Stun preconfigured for the transceiver.
Stun Code Response	Stun Code Response can configure as below how the transceiver will respond when the Stun Code matches: Transmit Inhibit: Transmit capability is disabled. User operations of the transceiver are also inhibited. Automatic transmission, such as Transpond, is still available. Transceiver Inhibit: Transmit and receive capabilities are disabled. User operations of the transceiver are also inhibited.

Note

- The transceiver cannot be placed in Emergency Mode while the transceiver is in Stun state.
- The LED cannot light or blink while the transceiver is in Stun state.

Configuration using KPG-169D/ KPG-170D/ KPG-175D

- Configuring the Stun Code ( [See](#) Edit > DTMF > Decode > Stun)
- Configuring the Stun Code Response ( [See](#) Edit > DTMF > Decode > Stun)

12.8 Functions Related to DTMF Code Encoding

Functions related to DTMF code encoding are shown below:

- DTMF Speed
- First Digit Delay Time
- First Digit Time
- * and # Digit Time
- D Code Assignment
- DTMF Hold Time
- Sidetone
- Auto Telephone
- PTT ID with QT/DQT

DTMF Speed

DTMF Speed is the speed to send out the DTMF codes. Transmit speed of the DTMF code can be configured by entering the number of digits to be sent per second. The transceiver sends the DTMF code at the configured speed.

The transmission speed of the DTMF code can be selected from 6, 8, 10 or 15 digits/ second using KPG-169D/ KPG-170D/ KPG-175D.

Following are durations for Digit Time (transmit time) and Gap Time (muted time) depending on the selected value:

Table 12-4 DTMF Speed

Range	Digit Time (Transmission Duration)	Gap Time (Silent Duration)
6 digits/s	83.3 ms	83.3 ms
8 digits/s	62.5 ms	62.5 ms
10 digits/s	50.0 ms	50.0 ms
15 digits/s	33.3 ms	33.3 ms

Note

If "15 Digit/s" is configured for DTMF Speed, some transceivers may fail to correctly decode due to the DTMF decoding capability of the transceiver. In that case, configure the lower transmission speed to use the transceiver.

Configuration using KPG-169D/ KPG-170D/ KPG-175D

Configuring the DTMF Speed ( See Edit > DTMF > Encode)

First Digit Delay Time

First Digit Delay Time is the amount of time from when the transceiver starts transmitting until the first digit of the DTMF code is sent out.

The transceiver transmits an unmodulated signal until the amount of time configured for First Digit Delay Time elapses.

Configuration using KPG-169D/ KPG-170D/ KPG-175D

Configuring the First Digit Delay Time ( See Edit > DTMF > Encode)

First Digit Time

First Digit Time is used to extend the amount of time to send the first digit of the DTMF code when the transceiver starts transmitting the DTMF code.

Extending the transmission time for sending the first digit of the DTMF code will prevent the receiving transceiver from failing to receive the incoming DTMF code while the battery saver is active or the transceiver is scanning. This will enable the receiving transceiver to reliably decode the received DTMF code.

The time for sending the first digit of the DTMF code is the sum of the transmission time configured for DTMF Speed and First Digit Time.

$$\text{Transmit Time for the 1st digit of DTMF} = \text{value configured for DTMF Speed (Digit Time)} + \text{value configured First Digit Time}$$

Example: First Digit Time: 100 ms, Encode Code: 123

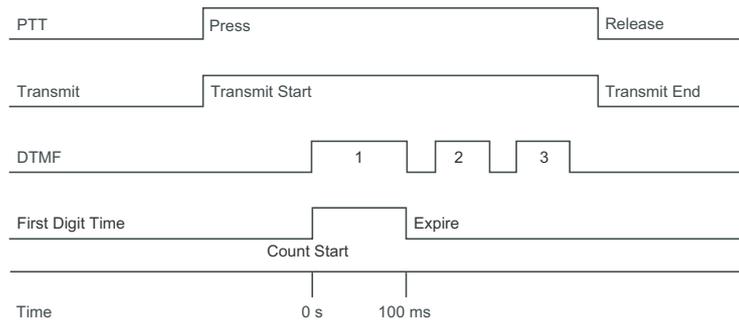


Figure 12-4 First Digit Time

Configuration using KPG-169D/ KPG-170D/ KPG-175D

Configuring the First Digit Time ( See Edit > DTMF > Encode)

* and # Digit Time

* and # Digit Time is used to extend the transmit duration to send the * tone and # tone of the DTMF code.

* tone and # tone tend to be used for special functions. * and # Digit Time enables the receiving transceiver to reliably decode these tones.

The duration to send the * tone and # tone is the sum of the transmission time configured for DTMF Speed and the * and # Digit Time.

$$\text{DTMF transmission time of the * and # tones} = \text{DTMF Speed (Digit Time)} + \text{* and # Digit Time}$$

Example: * and # Digit Time: 100 ms, Encode Code: *01

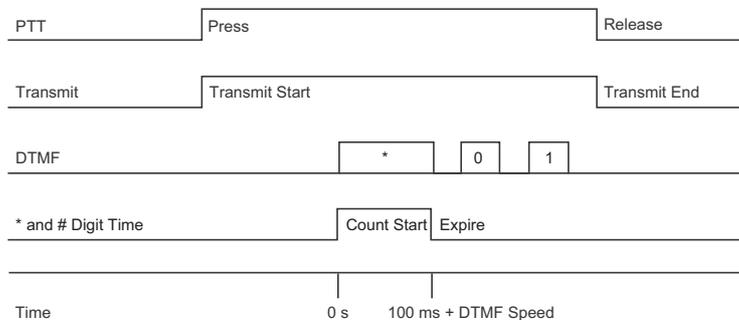


Table 12-5 * and # Digit Time

Note

If the first digit of the DTMF code is the * tone or # tone, the transceiver compares the extension time to send the first digit configured for the First Digit Time with the * and # Digit Time and uses the longer extension time to send the first digit.

Configuration using KPG-169D/ KPG-170D/ KPG-175D

Configuring the * and # Digit Time ( See Edit > DTMF > Encode)

D Code Assignment

D Code Assignment can be used to configure whether the D Code is used for the D tone of DTMF or a dialing pause (unmodulated transmission).

Configuration using KPG-169D/ KPG-170D/ KPG-175D

Configuring the D Code Assignment ( See Edit > DTMF > Encode)

DTMF Hold Time

Supported Models: Mobile

DTMF Hold Time is the amount of time from when the microphone keypad is disabled until the transceiver restores the receive mode while sending the DTMF code using Keypad Auto PTT or Manual Dialing.

The DTMF signal received until its transmission is interrupted may be treated as one string of code depending on the devices on the receiving side. Therefore, the transceiver holds the transmission not to interrupt the digit sequence when sending a continuous DTMF signal.

Configuration using KPG-175D

Configuring the DTMF Hold Time ( See Edit > DTMF > Encode)

Emitting the DTMF Code Tone (Sidetone)

Sidetone is the function to emit the tone of the DTMF code from the speaker while the transceiver transmits the DTMF code.

Note

If "Silent" is configured for Emergency Mode Type, the DTMF Sidetone does not sound while the transceiver sends the DTMF code (Emergency ID) in Emergency Mode. (Refer to [Emergency Mode Type on page 158.](#))

Configuration using KPG-169D/ KPG-170D/ KPG-175D

Configuring the DTMF Sidetone to be enabled or disabled ( See Edit > DTMF > Encode)

Reducing the DTMF Data Burst Tones (PTT ID with QT/DQT)

PTT ID with QT/DQT is the function to send a QT tone or a DQT code when the transceiver sends a DTMF code on the channel where QT/DQT is used.

If PTT ID with QT/DQT is enabled, a QT tone or a DQT code is sent when the transceiver sends a DTMF code on the channel where QT/DQT is used. This function reduces the DTMF data burst tones that occur at the receiving transceiver.

Configuration using KPG-169D/ KPG-170D/ KPG-175D

Configuring the PTT ID with QT/DQT to be enabled or disabled ( Edit > DTMF > Encode)

12.9 Functions Related to DTMF Code Decoding

To decode a DTMF code using the transceiver, "DTMF" needs to be configured as the Optional Signaling to be used on the channel. (Refer to [Using the Optional Signaling \(Analog\) on page 94.](#))

Functions related to DTMF code decoding are shown below:

- ID Code
- Group Code
- Transpond
- Alert Tone
- Selective Call Alert LED
- Auto Reset Timer
- Clear to Transpond

Note

Refer to [12.7 Disabling the Transceiver Capability by Remote Control \(Stun\) on page 138](#) for details of Stun Code and Stun Code Response.

Standby Code (ID Code)

ID Code is the standby DTMF code preconfigured for the transceiver for receiving an Individual Call.

If the received DTMF code matches the standby DTMF code preconfigured for the transceiver, Alert Tone, Transpond and LED (Selective Call Alert LED) will be activated.

Configuration using KPG-169D/ KPG-170D/ KPG-175D

Configuring the ID Code ( Edit > DTMF > Decode)

Code Used for Receiving a Group Call (Group Code)

Group Code is a code used for receiving a Group Call.

If the received DTMF code includes a Group Code of one or more digits, the receiving transceiver recognizes the Group Code as a wildcard and receives the Group Call by replacing the Group Code with a DTMF code from 0 to 9.

The table below shows an example when Transceiver V to Transceiver Y wait to receive a call from the base station with the following configurations:

Table 12-6 Transceiver Configuration

Transceiver	Standby Code (ID Code)	Group Code
V	123	A
W	223	
X	235	
Y	355	

If the base station initiates a call using the DTMF code “A23”:

Only Transceiver V and Transceiver W can receive the call.

If the base station initiates a call using the DTMF code “AA5”:

Only Transceiver X and Transceiver Y can receive the call.

If the base station initiates a call using the DTMF code “AAA”:

All the transceivers from Transceiver V to Transceiver Y can receive the call.

Note

A Group Call Beep sounds from the transceiver when the transceiver receives a group call with a Group Code.

Transceiver Behavior When Receiving a Selective Call

If the received DTMF code matches the standby DTMF code preconfigured for the transceiver, the transceiver can transmit the multiplexed Transpond tone, emit an Alert Tone, or blink the LED orange or blue.

Transpond

Upon receipt of an Individual Call, the transceiver behaves as follows according to the configuration for Transpond:

Table 12-7 Transpond Operation

Configuration	Description
Off	Transpond is not activated.
Alert	The transceiver sends an Alert Tone to the transmitting transceiver.
ID Code	The transceiver sends an ID Code to the transmitting transceiver.
Transpond Code	The transceiver sends the DTMF code configured for No.1 in the Autodial List to the transmitting transceiver.

Alert Tone

Upon receipt of an Individual Call, the transceiver emits an Alert Tone according to the configuration for Individual Call (Alert Tone).

Upon receipt of a Group Call, the transceiver emits an Alert Tone according to the configuration for Group Call (Alert Tone).

Selective Call Alert LED

When the transceiver receives an Individual Call, the LED blinks orange or blue according to the configuration for Individual Call (LED).

When the transceiver receives a Group Call, the LED blinks orange or blue according to the configuration for Group Call (LED).

Note

- Transpond is not activated when the transceiver receives a Group Call.
- If both Alert Tone and Transpond are enabled, an Alert Tone sounds from the transceiver after the Transpond operation is complete.
- With the Clear To Transpond enabled, if the Transpond operation is suspended since the channel is busy, the Alert Tone operation is also suspended. (Refer to [Clear to Transpond on this page.](#))
- The matching state of the DTMF codes will be reset in the following conditions:
 - The Auto Reset Timer expires.
 - The **Monitor** key is pressed.
 - A channel is changed.

Configuration using KPG-169D/ KPG-170D/ KPG-175D

- Configuring the Transpond ( [See](#) Edit > DTMF > Decode)
- Configuring the Individual Call (Alert Tone) ( [See](#) Edit > DTMF > Decode > Alert Tone)
- Configuring the Group Call (Alert Tone) ( [See](#) Edit > DTMF > Decode > Alert Tone)
- Configuring the Selective Call Alert LED to be enabled or disabled ( [See](#) Edit > DTMF > Decode)
- Configuring the Individual Call (LED) ( [See](#) Edit > DTMF > Decode > LED)
- Configuring the Group Call (LED) ( [See](#) Edit > DTMF > Decode > LED)

Auto Reset Timer

Auto Reset Timer is the amount of time from when the received DTMF code matches the DTMF code preconfigured for the transceiver until the matching state is automatically reset.

Auto Reset Timer can be configured by using KPG-169D/ KPG-170D/ KPG-175D.

Table 12-8 Auto Reset Timer

Configuration	Description
Off	Auto Reset Timer will not be activated.
1 s to 300 s	After the time configured for Auto Reset Timer elapses, the matching state of the DTMF code is automatically reset.

Configuration using KPG-169D/ KPG-170D/ KPG-175D

Configuring the Auto Reset Timer ( [See](#) Edit > DTMF > Decode > Auto Reset)

Clear to Transpond

Clear to Transpond is the function that allows the transceiver to wait the Transpond operation until the channel is no longer in use if the channel is occupied by other users when the transceiver attempts to initiate the Transpond operation.

Configuration using KPG-169D/ KPG-170D/ KPG-175D

Configuring the Clear to Transpond to be enabled or disabled ( [See](#) Edit > DTMF > Decode)

This chapter describes the common functions relevant to GPS data transmission.

The following functions are relevant to GPS data transmission:

- GPS Report Mode
- Number of Times
- GPS Report Interval Time
- GPS Time Mark
- GPS Message Type
- GPS Report on Data Zone-Channel
- GPS Report Back to Requested ID

13.1 GPS Report Mode

GPS Report Mode can be used to send the GPS data automatically or send after receiving the command.

Refer to the following for details:

NXDN:

- [Sending GPS Data Automatically at Certain Intervals \(GPS Report Mode\) on page 83](#)
- [Sending GPS Data According to the Request from the Base Station \(GPS Report Mode\) on page 83](#)

FleetSync:

- [Sending GPS Data Automatically at Certain Intervals \(GPS Report Mode\) on page 122](#)
- [Sending GPS Data According to the Request from the Base Station \(GPS Report Mode\) on page 122](#)

13.2 Number of Times

Number of Times is the function to automatically send GPS data for the configured number of times when the transceiver receives a transmission request for GPS data if "Poll" is configured for GPS Report Mode.

The transceiver sends GPS data for the number of times configured for Number of Times at the intervals configured for GPS Report Interval Time.

Configuration using KPG-169D/ KPG-170D/ KPG-175D

Configuring the Number of Times ( [See](#) Edit > Optional Features > GPS)

13.3 GPS Report Interval Time

GPS Report Interval Time is the interval to send GPS data if “Auto” is configured for GPS Report Mode.

GPS data is sent at the intervals configured for GPS Report Interval Time after auto transmission of GPS data is started by the GPS Report Mode function.

For Mobile, GPS Report Interval Time is divided into 2 functions, Ignition On and Ignition Off. The interval to send GPS data can be configured according to the vehicle engine status.

Ignition On (Mobile Only)

Ignition On is the interval to send the GPS data while the vehicle’s engine is running.

Ignition Off (Mobile Only)

Ignition Off is the interval to send GPS data while the vehicle is parked. Also, if Ignition Sense function is not used (nothing is entered in the Ignition Sense port), GPS data will be sent according to the configuration for Ignition Off. (Refer to [19.1 Turning the Transceiver ON or OFF by Linking with the Ignition Sense Port Status \(Ignition Sense\)](#) on page 188.)

Note

GPS Report Interval Time can be used to configure the trigger cycle to start transmitting GPS data. The timing at which the receiving transceiver completes receiving GPS data may vary depending on the conditions at the transmitting transceiver.

Configuration using KPG-169D/ KPG-170D/ KPG-175D

Configuring the GPS Report Interval Time ([See](#) Edit > Optional Features > GPS)

13.4 GPS Time Mark

GPS Time Mark is the offset time from UTC (Coordinated Universal Time) to send the GPS data.

This function is useful for avoiding transmit collisions if there are many transceivers that send GPS data.

Configuring a different timing for each transceiver allows each transceiver to send GPS data with different timing. This allows a user to avoid transmit collisions.

Configuration using KPG-169D/ KPG-170D/ KPG-175D

Configuring the GPS Time Mark ([See](#) Edit > Optional Features > GPS)

13.5 GPS Message Type

GPS Message Type allows the transceiver to change the length of the message to send GPS data.

Table 13-1 GPS Message Type

Configuration	Operation
Full	The message to be sent is the GPS data corresponding to \$GPGGA, \$GPRMC and \$GPGLL.
Short	The message to be sent is the GPS data corresponding to \$GPGLL.

Configuration using KPG-169D/ KPG-170D/ KPG-175D

Configuring the GPS Message Type ( See Edit > Optional Features > GPS)

13.6 GPS Report on Data Zone-Channel

GPS Report on Data Zone-Channel allows the transceiver to automatically change the channel to the Data Zone-Channel to send GPS data.

The transceiver automatically changes the channel to the Data Zone-Channel to send GPS data. When the transmission ends, the transceiver restores the Zone-channel which was used for receiving before sending the GPS data. GPS Report on Data Zone-Channel can be used to send data using a specific dedicated channel.

If Data Transmit with QT/DQT is enabled in an Analog Conventional system, the QT tone or DQT code configured for the channel can be multiplexed during data transmission.

Note

- The channel configured for Data Zone-Channel (Analog) is used as the Data Zone-Channel in an Analog Conventional system.
- The channel configured for Data Zone-Channel (NXDN) is used as the Data Zone-Channel in an NXDN Conventional system.

Configuration using KPG-169D/ KPG-170D/ KPG-175D

- Configuring the GPS Report on Data Zone-Channel to be enabled or disabled ( See Edit > Optional Features > GPS)
- Configuring the Data Transmit with QT/DQT to be enabled or disabled ( See Edit > Optional Features > Common 1)
- Configuring the Data Zone-Channel (Analog) ( See Edit > Optional Features > Common 1)
- Configuring the Data Zone-Channel (NXDN) ( See Edit > Optional Features > Common 1)

13.7 GPS Report Back to Requested ID

GPS Report Back to Requested ID is the function that enables the receiving transceiver to send the GPS data to the ID of the transceiver, which sends a GPS Polling Request, upon receipt of the following GPS Polling Requests:

- GPS Data Single Polling Request
- GPS Data Multiple Polling Request

Table 13-2 Configuring GPS Report Back to Requested ID

Configuration	Description
Enabled	Upon receipt of a GPS Polling Request, the transceiver sends the GPS data to the ID of the transceiver that sent the GPS Polling Request.
Disabled	<p>NXDN: Upon receipt of a GPS Polling Request, the transceiver sends the GPS data to the ID configured for Base ID (GPS). If Base ID (GPS) is not configured, the GPS data is sent to the ID configured for Base ID. (Refer to The ID of the Target Transceiver (Base ID) on page 82.)</p> <p>FleetSync: Upon receipt of a GPS Polling Request, the transceiver sends the GPS data to the FleetSync ID configured for Base Fleet and Base ID. (Refer to The ID of the Target Transceiver (Base Fleet/ Base ID) on page 121.)</p>

Note

NX-240/ 240V/ 340/ 340U/ 740H/ 740HV/ 840H/ 840HU cannot send a GPS Polling Request.

Configuration using KPG-169D/ KPG-170D/ KPG-175D

Configuring the GPS Report Back to Requested ID to be enabled or disabled ( See Edit > Optional Features > GPS)

Emergency is the function to be used for the transceiver to transmit and receive for emergency purposes. This function is used for a user to immediately contact the base station in emergency situations.

The transceiver behaves according to the configurations in Emergency Mode when the transceiver is placed in Emergency Mode. The base station transceiver can notice an occurrence of an emergency situation in the transmitting transceiver upon receipt of a call by use of Emergency.

Portable

For Portable, pressing and holding the **Emergency** key for longer than the time configured for Hold Delay causes the transceiver to enter Emergency Mode. (Refer to [14.1 Placing the transceiver in Emergency Mode on page 151.](#))

“Emergency” can be assigned for the **Side 1** key or **Side 2** key only as the function when the key is held.

The following figure shows a configuration example when “Emergency” is assigned for Hold of the **Side 1** key by using KPG-169D/ KPG-170D. In this case, the transceiver enters Emergency Mode if the **Side 1** key is pressed and held for 2 sec or more.

	Press	Hold	Hold Delay [s]
Side 1	None	Emergency	2.0
Side 2	None	None	1.0

Figure 14-1 Configuration Example using KPG-169D/ KPG-170D

Mobile

For Mobile, pressing and holding the **Emergency** key for longer than the time configured for Emergency-key Delay Time causes the transceiver to enter Emergency Mode. (Refer to [14.1 Placing the transceiver in Emergency Mode on page 151.](#))

“Emergency” can be assigned for the **Triangle** key only as the function when the key is held.

The following figure shows a configuration example when “Emergency” is assigned for Hold of the **Triangle** key by using KPG-175D. In this case, the transceiver enters Emergency Mode if the **Triangle** key is pressed and held for 2 sec or more. For Mobile, the value of Hold Delay varies according to the configuration for Emergency-key Delay Time.

	Press	Hold	Hold Delay [s]
Left Up	Volume Up	Volume Up (Continuous)	1.0
Left Down	Volume Down	Volume Down (Continuous)	1.0
Triangle	None	Emergency	2.0

Figure 14-2 Configuration Example using KPG-175D

If the Lone Worker function is enabled, the transceiver enters Emergency Mode when the time configured for Lone Worker Interval elapses in Lone Worker Mode and then the time configured for Duration of Lone Worker Tone elapses. The Lone Worker Tone sounds from the transceiver for the time configured for Duration of Lone Worker Tone. (Refer to [14.6 Placing the Transceiver in Emergency Mode Using Lone Worker on page 161.](#))

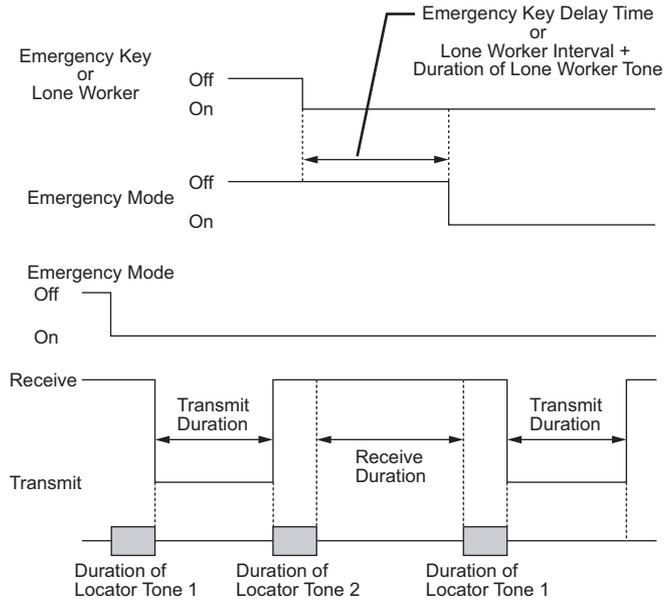


Figure 14-3 Emergency Mode

Note

- While the transceiver is in Stun state, the transceiver does not enter Emergency Mode.
- The **PTT** switch can be used even if the transceiver is in Emergency Mode. The transceiver reverts to automatic receive mode when the transceiver completes transmitting by releasing the **PTT** switch.
- The configuration for Emergency Microphone Gain applies to the microphone sensitivity in Emergency Mode. (Refer to [Emergency Microphone Gain on page 156.](#))
- Busy Channel Lockout configured for a channel is disabled in Emergency Mode.
- The transceiver does not decode the Stun Code and Optional Signaling in Emergency Mode.

14.1 Placing the transceiver in Emergency Mode

The transceiver can be manually placed in Emergency Mode using the **Emergency** key.

Operating the Transceiver

Portable

● Placing the transceiver in Emergency Mode

1 Press and hold the **Emergency** key for longer than the time configured for Hold Delay.

The transceiver enters Emergency Mode.

● Exiting Emergency Mode

1 Select one of the following operations:

- Press and hold the **Emergency** key for longer than the time configured for Hold Delay while the transceiver is in Emergency Mode.
- Turn the transceiver OFF.

Mobile

● Placing the transceiver in Emergency Mode

1 Press and hold the **Emergency** key for longer than the time configured for Emergency-key Delay Time.

The transceiver enters Emergency Mode.

● Exiting Emergency Mode

1 Select one of the following operations:

- Press and hold the **Emergency** key for longer than the time configured for Emergency-key Delay Time while the transceiver is in Emergency Mode. (However, Manual Emergency Reset needs to be enabled to do this operation.)
- Turn the transceiver OFF.

Note

- For Mobile, the transceiver can enter Emergency Mode if the AUX Input port to which "Emergency" is assigned goes low level. (Refer to [18.1 Available Functions for AUX Input Ports on page 182.](#))
- The transceiver exits Emergency Mode if receiving an Emergency Termination Status (FleetSync: 88, NXDN: 226) while in Emergency Mode.

Configuration using KPG-169D/ KPG-170D/ KPG-175D

Assigning functions to the PF keys ( See Edit > Key Assignment)

Emergency-key Delay Time

Supported Models: Mobile

Emergency-key Delay Time is the duration from when the **Emergency** key is pressed until the transceiver enters Emergency Mode. Pressing and holding the **Emergency** key for the duration configured for Emergency-key Delay Time causes the transceiver to enter Emergency Mode. This function can be used to prevent the transceiver from erroneously entering Emergency Mode.

Configuration using KPG-175D

Configuring the Emergency-key Delay Time ( Edit > Emergency Information)

Manual Emergency Reset

Supported Models: Mobile

Manual Emergency Reset is the function to exit Emergency Mode by pressing and holding the **Emergency** key for longer than the time configured for Emergency-key Delay Time while the transceiver is in Emergency Mode.

Configuration using KPG-175D

Configuring the Manual Emergency Reset to be enabled or disabled ( Edit > Emergency Information)

Suspended Power-off

Supported Models: Mobile

Suspended Power-off is the function to continue Emergency Mode without turning the transceiver OFF even if the **Power** switch is pressed when the transceiver is in Emergency Mode.

When Ignition Sense is enabled, Emergency Mode continues without turning the transceiver OFF even if the Ignition Sense port changes from the high level to the low level while the transceiver is in Emergency Mode. (Refer to [19.1 Turning the Transceiver ON or OFF by Linking with the Ignition Sense Port Status \(Ignition Sense\) on page 188.](#))

The LED display is turned Off while Emergency Mode continues with the Suspended Power-off function.

Configuration using KPG-175D

Configuring the Suspended Power-off to be enabled or disabled ( Edit > Emergency Information)

14.2 Zone-Channel Used for Emergency Mode

The Zone-channel to be used when the transceiver enters Emergency Mode can be configured.

Emergency Zone-Channel Type

Emergency Zone-Channel Type is the type of a Zone-channel used when the transceiver is placed in Emergency Mode. Emergency Zone-Channel Type can be configured using KPG-169D/ KPG-170D/ KPG-175D.

Table 14-1 Emergency Zone-Channel Type

Configuration	Description
Selected	When the transceiver enters Emergency Mode, the transceiver initiates the Emergency operation on the selected Zone-channel.
Fixed	When the transceiver enters Emergency Mode, the transceiver migrates to the Zone-channel configured for Emergency Zone-Channel, and then the transceiver initiates the Emergency operation.

The transceiver behaves as below according to the configuration for Emergency Zone-Channel Type:

● Selected

- **A Zone-channel in the Analog Conventional system is selected.**
The transceiver behaves according to the configuration for Emergency ID (Analog).

Table 14-2 Emergency ID (Analog)

Configuration	Description
None	The transceiver transmits only using a QT tone or a DQT code.
DTMF, FleetSync, MDC-1200	The transceiver transmits according to the configuration for DTMF, FleetSync or MDC-1200.

- **A Zone-channel in the NXDN Conventional system is selected.**
The transceiver behaves according to the configuration for Emergency ID (NXDN Conventional).

Table 14-3 Emergency ID (NXDN Conventional)

Configuration	Description
None	The transceiver transmits only using the RAN code.
NXDN	If "Group ID" is configured for Emergency NXDN ID Type, the transceiver initiates a Group Call using the Group ID configured for Emergency NXDN ID. If "Unit ID" is configured for Emergency NXDN ID Type, the transceiver initiates an Individual Call using the Unit ID configured for Emergency NXDN ID.

● **Fixed**

• **Analog Conventional system**

The transceiver migrates to the Zone-channel configured for Emergency Zone-Channel (Analog), and then behaves according to the configuration for Emergency ID (Analog).

Table 14-4 Emergency ID (Analog)

Configuration	Description
None	The transceiver transmits only using a QT tone or a DQT code.
DTMF, FleetSync, MDC-1200	The transceiver transmits according to the configuration for DTMF, FleetSync or MDC-1200.

• **NXDN Conventional system**

The transceiver migrates to the Zone-channel configured for Emergency Zone-Channel (NXDN), and then behaves according to the configuration for Emergency ID (NXDN Conventional).

Table 14-5 Emergency ID (NXDN Conventional)

Configuration	Description
None	The transceiver transmits only using the RAN code.
NXDN	If "Group ID" is configured for Emergency NXDN ID Type, the transceiver initiates a Group Call using the Group ID configured for Emergency NXDN ID. If "Unit ID" is configured for Emergency NXDN ID Type, the transceiver initiates an Individual Call using the Unit ID configured for Emergency NXDN ID.

Configuration using KPG-169D/ KPG-170D/ KPG-175D

- Configuring the Emergency Zone-Channel Type ( See Edit > Emergency Information)
- Configuring the Emergency ID (Analog) ( See Edit > Emergency Information)
- Configuring the Emergency ID (NXDN Conventional) ( See Edit > Emergency Information)

Emergency Zone-Channel

Emergency Zone-Channel is the Zone-channel used in Emergency Mode if "Fixed" is configured for Emergency Zone-Channel Type.

In an Analog Conventional system, the Zone-channel configured for Emergency Zone-Channel (Analog) is used.

In an NXDN Conventional system, the Zone-channel configured for Emergency Zone-Channel (NXDN) is used.

Configuration using KPG-169D/ KPG-170D/ KPG-175D

Configuring the Emergency Zone-Channel ( See Edit > Emergency Information)

14.3 Automatically Transmitting and Receiving in Emergency Mode

The number of times for which the transceiver toggles between transmission and reception, or the duration for a single session of automatic transmission or reception in Emergency Mode can be configured. It is also available to change the microphone sensitivity for Emergency Mode or to multiplex the Background Tone on the audio to be transmitted.

Emergency Cycle

Emergency Cycle is the number of times for which the transceiver toggles between transmission and reception in Emergency Mode.

Table 14-6 Emergency Cycle

Configuration	Description
1 to 200	The transceiver repeats automatic transmission and automatic reception for the configured number of times, and then the transceiver exits Emergency Mode.
Infinite	The transceiver continues to alternate between automatic transmission and reception until the Emergency key is pressed again or the transceiver is turned OFF.

Configuration using KPG-169D/ KPG-170D/ KPG-175D

Configuring the Emergency Cycle ( See Edit > Emergency Information)

Duration of Locator Tone 1

Duration of Locator Tone 1 is the duration to emit an Alert Tone which notifies that the transceiver will start a transmission before the transceiver starts automatic transmission in Emergency Mode.

The transceiver automatically repeat transmitting and receiving in Emergency Mode. When the transceiver switches reception to transmission, a Locator Tone 1 sounds from the transceiver for the length of time configured for Duration of Locator Tone 1.

When the tone sounds, a user can easily recognize without viewing the transceiver that the transceiver is about to automatically transmit in Emergency Mode. This tone can also be used to locate a user who is in emergency situations.

Note

This function is enabled if “Audible” is configured for Emergency Mode Type.

Configuration using KPG-169D/ KPG-170D/ KPG-175D

Configuring the Duration of Locator Tone 1 ( See Edit > Emergency Information)

Duration of Locator Tone 2

Duration of Locator Tone 2 is the duration to emit an Alert Tone which notifies that the transceiver has completed an automatic transmission in Emergency Mode, and starts receiving.

The transceiver automatically repeat transmitting and receiving in Emergency Mode. When the transceiver switches transmission to reception, a Locator Tone 2 sounds from the transceiver for the length of time configured for Duration of Locator Tone 2.

When the tone sounds, a user can easily recognize without viewing the transceiver that the transceiver ends to automatically transmit in Emergency Mode. This tone can also be used to locate a user who is in emergency situations.

Note

This function is enabled if “Audible” is configured for Emergency Mode Type.

Configuration using KPG-169D/ KPG-170D/ KPG-175D

Configuring the Duration of Locator Tone 2 ( See Edit > Emergency Information)

Transmit Duration

Transmit Duration is the duration for a single session of automatic transmission in Emergency Mode.

The transceiver switches to automatic reception in Emergency Mode when the time configured for Transmit Duration elapses after the transceiver starts automatic transmission in Emergency Mode.

Configuration using KPG-169D/ KPG-170D/ KPG-175D

Configuring the Transmit Duration ( See Edit > Emergency Information)

Receive Duration

Receive Duration is the duration for a single session of automatic reception in Emergency Mode.

The transceiver switches to automatic transmission in Emergency Mode when the time configured for Receive Duration elapses after the transceiver starts automatic reception in Emergency Mode.

Configuration using KPG-169D/ KPG-170D/ KPG-175D

Configuring the Receive Duration ( See Edit > Emergency Information)

Emergency Microphone Gain

Emergency Microphone Gain is the function used to adjust the microphone input sensitivity in Emergency Mode.

The microphone sensitivity can be configured as “Normal”, “High”, or “Low”.

Configuration using KPG-169D/ KPG-170D/ KPG-175D

Configuring the Emergency Microphone Gain ( See Edit > Emergency Information)

Emergency Microphone

Supported Models: Mobile

Emergency Microphone is the microphone used while the transceiver is in Emergency Mode.

Whether to use the microphone for Emergency installed in the transceiver while the transceiver is in Emergency Mode can be configured using KPG-175D.

Table 14-7 Emergency Microphone

Configuration	Description
Normal	The microphone for Emergency installed in the transceiver is not used while the transceiver is in Emergency Mode. While the transceiver is in Emergency Mode, the transceiver transmits an audio signal by using an optional external microphone.
Internal Microphone	The microphone for Emergency installed in the transceiver is used while the transceiver is in Emergency Mode. While the transceiver is in Emergency Mode, the transceiver transmits an audio signal by using both the internal microphone and an optional external microphone.

 **Note**

Refer to the service manual for the microphone for Emergency to be installed in the Mobile transceiver.

Configuration using KPG-175D

Configuring the Emergency Microphone ( **See** Edit > Emergency Information)

Background Transmission

Background Transmission is the function to multiplex a Background Tone on the transmitted audio when the transceiver transmits in Emergency Mode. Background Tone is multiplexed every 1 sec while the transceiver is transmitting audio data.

The audio signal is not muted since the Background Tone is transmitted with lower deviation than normal. The receiving transceiver can easily recognize that the transmitting transceiver is in Emergency Mode if the tone is multiplexed while initiating a voice call.

Configuration using KPG-169D/ KPG-170D/ KPG-175D

Configuring the Background Transmission ( **See** Edit > Emergency Information)

14.4 Indication and Sound in Emergency Mode

Functions related to the tone that sounds from the transceiver when the automatic transmission starts or ends in Emergency Mode, and the LED notification in Emergency Mode can be configured.

Locator Tone

A Locator Tone sounds from the transceiver before the automatic transmission in Emergency Mode starts and when the automatic transmission ends.

A Locator Tone 1 sounds from the transceiver before the automatic transmission in Emergency Mode starts. A Locator Tone 2 sounds from the transceiver when the automatic transmission in Emergency Mode ends. The transceiver automatically repeat the transmission and reception in Emergency Mode for the number of times specified for Emergency Cycle. (Refer to [14.3 Automatically Transmitting and Receiving in Emergency Mode on page 155.](#))

Emergency Mode Type

Emergency Mode Type is the function to determine whether the received audio or various tones are muted while the transceiver is in Emergency Mode.

Table 14-8 Emergency Mode Type

Configuration	Description
Silent	The transceiver mutes the received audio and various tones while in Emergency Mode.
Audible	The transceiver emits the received audio and various tones in the same manner as in normal mode even while in Emergency Mode.

Configuration using KPG-169D/ KPG-170D/ KPG-175D

Configuring the Emergency Mode Type ( [See](#) Edit > Emergency Information)

Emergency LED

Emergency LED is the function to make the Transmit LED light when the transceiver transmits in Emergency Mode and the Busy LED light when the transceiver receives in Emergency Mode.

Configuration using KPG-169D/ KPG-170D/ KPG-175D

Configuring the Emergency LED ( [See](#) Edit > Emergency Information)

14.5 ID to Be Sent When Emergency Mode Is Activated

DTMF code, FleetSync ID, or NXDN ID can be sent as an Emergency ID each time the transceiver starts automatic transmission and reception in Emergency Mode.

Emergency ID

Emergency ID is the code to be sent or the control type each time the transceiver starts automatic transmission and reception in Emergency Mode.

Emergency ID can be configured separately for an Analog Conventional system and an NXDN Conventional system using KPG-169D/ KPG-170D/ KPG-175D.

Table 14-9 Emergency ID (Analog)

Configuration	Description
None	The transceiver transmits and receives according to the configuration for the Zone-channel used for Emergency Mode.
DTMF	The transceiver first sends the DTMF code configured for Emergency DTMF ID (Key) or Emergency DTMF ID (Lone Worker) when transmitting in Emergency Mode.
FleetSync	The transceiver first sends the FleetSync SelCall ID configured for Emergency Call Fleet and Emergency Call ID when transmitting in Emergency Mode.
MDC-1200	The transceiver first sends the MDC-1200 packet when transmitting in Emergency Mode.

Table 14-10 Emergency ID (NXDN Conventional)

Configuration	Description
None	The transceiver transmits and receives according to the configuration for the Zone-channel used for Emergency Mode.
NXDN	The transceiver sends a call configured for Emergency NXDN ID Type when transmitting in Emergency Mode.

Configuration using KPG-169D/ KPG-170D/ KPG-175D

Configuring the Emergency ID (Analog) ( [See](#) Edit > Emergency Information)

Configuring the Emergency ID (NXDN Conventional) ( [See](#) Edit > Emergency Information)

Emergency DTMF ID

Emergency DTMF ID is the DTMF code to be sent first in Emergency Mode if "DTMF" is configured for Emergency ID (Analog).

The DTMF code to be sent varies as below depending on what caused the transceiver to enter Emergency Mode:

- **Emergency DTMF ID (Key)**
This is the DTMF code to be sent first when the transceiver starts transmitting after the transceiver enters Emergency Mode by pressing the **Emergency** key.
- **Emergency DTMF ID (Lone Worker)**
This is the DTMF code to be sent first when the transceiver starts transmitting after the transceiver enters Emergency Mode by Lone Worker.

Configuration using KPG-169D/ KPG-170D/ KPG-175D

Configuring the Emergency DTMF ID ( See Edit > Emergency Information > Emergency ID (Analog))

Emergency Call Fleet

Emergency Call Fleet is the Call Fleet to be sent first in Emergency Mode if “FleetSync” is configured for Emergency ID (Analog).

Configuration using KPG-169D/ KPG-170D/ KPG-175D

Configuring the Emergency Call Fleet ( See Edit > Emergency Information > Emergency ID (Analog))

Emergency Call ID

Emergency Call ID is the Call ID to be sent first in Emergency Mode if “FleetSync” is configured for Emergency ID (Analog).

Configuration using KPG-169D/ KPG-170D/ KPG-175D

Configuring the Emergency Call ID ( See Edit > Emergency Information > Emergency ID (Analog))

Emergency NXDN ID Type

Emergency NXDN ID Type is the type of NXDN ID used for automatic transmissions while the transceiver is in Emergency Mode in an NXDN Conventional system.

Either Group ID or Unit ID can be configured for Emergency NXDN ID Type using KPG-169D/ KPG-170D/ KPG-175D.

Configuration using KPG-169D/ KPG-170D/ KPG-175D

Configuring the Emergency NXDN ID Type ( See Edit > Emergency Information > Emergency ID (NXDN Conventional))

Emergency NXDN ID

Emergency NXDN ID is the NXDN ID used for transmissions and receptions while the transceiver is in Emergency Mode in an NXDN Conventional system.

If “Unit ID” is configured for Emergency NXDN ID Type, the Unit ID used for initiating an Individual Call in Emergency Mode can be configured.

If “Group ID” is configured for Emergency NXDN ID Type, the Group ID used for initiating a Group Call in Emergency Mode can be configured.

Configuration using KPG-169D/ KPG-170D/ KPG-175D

Configuring the Emergency NXDN ID ( See Edit > Emergency Information > Emergency ID (NXDN Conventional))

14.6 Placing the Transceiver in Emergency Mode Using Lone Worker

Lone Worker is the function that automatically places the transceiver in Emergency Mode if the transceiver is not operated for a certain period of time.

If the transceiver is placed in Lone Worker Mode while the user has a task at a dangerous place, for instance, the transceiver automatically enters Emergency Mode and notifies the base station of the emergency status because a user cannot operate the transceiver due to an accident.

Since the Lone Worker Tone sounds from the transceiver prior to entering Emergency Mode if the transceiver is in the Lone Worker Mode, the Lone Worker function can also be used to warn a user.

Placing the Transceiver in Lone Worker Mode/ Exiting Lone Worker Mode

The transceiver enters or exits Lone Worker Mode by a user operating the keys on the transceiver.

Operating the Transceiver

● Placing the transceiver in Lone Worker Mode

1 Do either of the following operations while the transceiver is not in Lone Worker Mode:

- Press the **Lone Worker** key.
- Select a channel where Lone Worker is enabled.

The transceiver enters Lone Worker Mode, and then the timer for Lone Worker Interval starts counting down. The Tone A sounds from the transceiver by pressing the **Lone Worker** key. In addition, for Mobile, “Ln” appears on the LED display for 1 sec.

If no key is pressed after the timer for Lone Worker Interval starts counting down, the Lone Worker Tone sounds from the transceiver when the time configured for Lone Worker Interval elapses. The Lone Worker Tone sounds for the time configured for Duration of Lone Worker Tone. If no key is pressed while the Lone Worker Tone continues to sound from the transceiver, and if the time configured for Duration of Lone Worker Tone elapses, the transceiver enters Emergency Mode.

The transceiver behaves according to the configuration of Emergency after the transceiver enters Emergency Mode. (Refer to [14 COMMUNICATIONS IN AN EMERGENCY on page 149.](#))

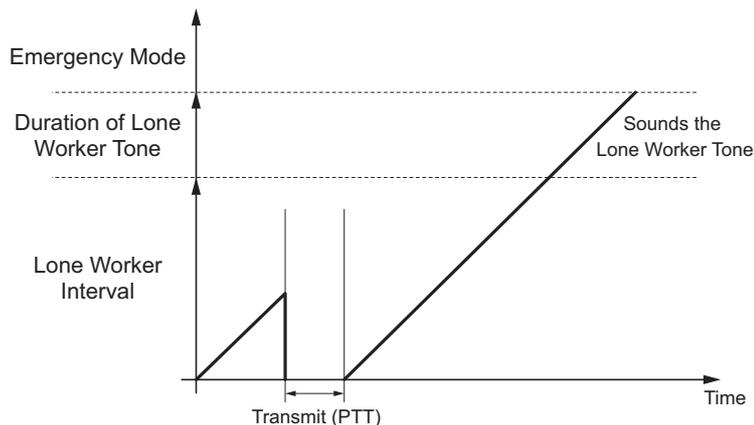


Figure 14-4 Lone Worker Mode

Note

For Mobile, the transceiver can be configured to light the 2 dots on the LED display (the left dot and the right dot) and the LED (blue) when Lone Worker is enabled. (Refer to [5.5 Lighting the LEDs According to the Transceiver’s Status on page 25.](#))

● Exiting Lone Worker Mode

1 Do either of the following operations while the transceiver is in Lone Worker Mode:

- Press the **Lone Worker** key.
- Select a channel where Lone Worker is disabled.

The transceiver exits Lone Worker Mode. The Tone B sounds from the transceiver by pressing the **Lone Worker** key.

Note

- If a **PF** key is pressed or the transceiver transmits by a user pressing the **PTT** switch while the timer for Lone Worker Interval is counting down, the timer for Lone Worker Interval is reset and then restarts counting down from the beginning.
- Lone Worker is not activated while the transceiver is in Stun state.
- Pressing the **Emergency** key while the transceiver is in Lone Worker Mode causes the transceiver to exit Lone Worker Mode and to enter Emergency Mode.
- Even if the transceiver enters Emergency Mode from Lone Worker Mode, the transceiver exits Emergency Mode by a user pressing the **Emergency** key.

Configuration using KPG-169D/ KPG-170D/ KPG-175D

Assigning functions to the PF keys ( See Edit > Key Assignment)

Configuring the Lone Worker to be enabled or disabled ( See Edit > Zone Information > Channel Edit > Page 2)

Lone Worker Interval

Lone Worker Interval is the interval time from when the transceiver enters Lone Worker Mode until the Lone Worker Tone sounds from the transceiver.

If no key is pressed after the transceiver enters Lone Worker Mode and then a timer for Lone Worker Interval starts counting down, and if the time configured for Lone Worker Interval elapses, the Lone Worker Tone sounds from the transceiver. The Lone Worker Tone sounds from the transceiver for the time configured for Duration of Lone Worker Tone. If any key is pressed before the time configured for Lone Worker Interval elapses, the timer for Lone Worker Interval is reset and restarts counting down from the beginning. Also, if the **Lone Worker** key is pressed before the time configured for Lone Worker Interval elapses, Lone Worker Mode becomes disabled and then the transceiver reverts to the normal mode.

Configuration using KPG-169D/ KPG-170D/ KPG-175D

Configuring the Lone Worker Interval ( See Edit > Emergency Information > Lone Worker)

Duration of Lone Worker Tone

Duration of Lone Worker Tone is the length of time that the Lone Worker Tone sounds from the transceiver.

If no key is pressed after the transceiver enters Lone Worker Mode and then a timer for Lone Worker Interval starts counting down, and if the time configured for Lone Worker Interval elapses, the Lone Worker Tone sounds from the transceiver. The Lone Worker Tone sounds from the transceiver for the time configured for Duration of Lone Worker Tone. If no key is pressed while the Lone Worker Tone continues to sound from the transceiver, and if the time configured for Duration of Lone Worker Tone elapses, the transceiver enters Emergency Mode.

If any key is pressed while the Lone Worker Tone continues to sound from the transceiver, the Lone Worker Tone stops sounding, and the timer for Lone Worker Interval is reset and then restarts counting down from the beginning.

Configuration using KPG-169D/ KPG-170D/ KPG-175D

Configuring the Duration of Lone Worker Tone ( See Edit > Emergency Information > Lone Worker)

The transceiver is equipped with functions to enhance secrecy in communications on each analog channels and NXDN digital channels.

15.1 Built-in Voice Scrambler (Analog)

Voice Scrambler is the function to scramble the audio signal so that the contents of communications can be prevented from being intercepted.

The transceiver is equipped with an entry-level speech inversion scrambler.

Note

Voice Scrambler can be only used in an Analog Conventional system.

Enabling the Voice Scrambler

Voice Scrambler is enabled by a user selecting an analog channel where Voice Scrambler is enabled.

Voice Scrambler can be enabled or disabled for each channel by using KPG-169D/ KPG-170D/ KPG-175D.

A Scrambler Code from 1 to 16, which is used for when the transceiver scrambles and sends the audio signal and when the transceiver receives the scrambled audio signal, can be configured for each channel.

Note

- The inversion frequency of each Scrambler Code from 1 to 16 can be configured to “Kenwood” or in the range from 2000 Hz to 4096 Hz by using KPG-169D/ KPG-170D/ KPG-175D.
- If “Zone-Channel + Others” is configured for Voice Announcement, “Scrambler” is announced following the announcement of the zone number and channel number when a channel where Voice Scrambler is enabled is selected. (Refer to [6.7 Using Voice Announcement on page 37.](#))
- For Mobile, the transceiver can be configured to light the 2 dots on the LED display (the left dot and the right dot) and the LED (blue) when Voice Scrambler is enabled. (Refer to [5.5 Lighting the LEDs According to the Transceiver’s Status on page 25.](#))

Configuration using KPG-169D/ KPG-170D/ KPG-175D

- Configuring the Voice Scrambler to be enabled or disabled ( [See](#) Edit > Zone Information > Channel Edit > Page 2 > Scrambler Setting)
- Configuring the Scrambler Code ( [See](#) Edit > Zone Information > Channel Edit > Page 2 > Scrambler Setting)
- Configuring the inversion frequency of a Scrambler Code ( [See](#) Edit > Optional Features > Scrambler > Inversion Frequency)

Toggling the Voice Scrambler between Enabled and Disabled

The configuration status of Voice Scrambler for each channel can be toggled between enabled and disabled by using the **Scrambler/ Encryption** key.

Pressing the **Scrambler/ Encryption** key toggles Voice Scrambler between enabled and disabled.

Operating the Transceiver

● Enabling the Voice Scrambler

1 Press the **Scrambler/ Encryption** key while Voice Scrambler is disabled.

A Tone A sounds from the transceiver and Voice Scrambler becomes enabled.

For Mobile, "Sr" appears for 1 sec. In addition, for Mobile, if the 2 dots on the LED display (the left dot and the right dot) and the LED (blue) are configured to light, each LED lights while Voice Scrambler is enabled.

● Disabling the Voice Scrambler

1 Press the **Scrambler/ Encryption** key while Voice Scrambler is enabled.

A Tone B sounds from the transceiver and Voice Scrambler becomes disabled.

Note

If "Zone-Channel + Others" is configured for Voice Announcement, "Scrambler" is announced when Voice Scrambler becomes enabled. In this case, a Tone A does not sound. (Refer to 6.7 Using Voice Announcement on page 37.)

Configuration using KPG-169D/ KPG-170D/ KPG-175D

Assigning functions to the PF keys ( See Edit > Key Assignment)

Configuring the Scrambler Code

Supported Models: Mobile

Pressing and holding the **Scrambler/ Encryption Code** key causes the transceiver to enter Scrambler/ Encryption Code Mode. In Scrambler/ Encryption Code Mode, the Scrambler Code, which is used for when the transceiver scrambles and sends the audio signal and when the transceiver receives the scrambled audio signal, can be configured for each channel. Only if the received Scramble Code matches the Scrambler Code preconfigured for the transceiver, the scrambled signal can be descrambled and the received audio sounds normally from the transceiver.

Note

- For Mobile, the Scrambler Code can also be configured for each channel by using KPG-175D. In addition, the Scrambler Code configured for each channel by using KPG-175D can be changed by the operation of the transceiver.
- For Portable, the Scrambler Code can be configured for each channel by using KPG-169D/ KPG-170D.
- The Scrambler Code whose inversion frequency is configured to "Kenwood" has compatibility with the AQUA scrambler installed in the TK-2200/ TK-3200 series transceiver.

Operating the Transceiver

1 Press and hold the **Scrambler/ Encryption Code** key.

The transceiver enters Scrambler/ Encryption Code Mode. "co" appears on the LED display for 1 sec and then the Scrambler Code configured for the selected channel appears. The right dot blinks at this time.

2 Select a Scrambler Code by pressing the [**<B**] or [**<C**] key.

3 Press the [**S**] key.

The transceiver exits Scrambler/ Encryption Code Mode and the selected Scrambler Code is configured for the transceiver.

Configuration using KPG-169D/ KPG-170D

Configuring the Scrambler Code ( See Edit > Zone Information > Channel Edit > Page 2 > Scrambler Setting, Edit > Optional Features > Scrambler)

Configuration using KPG-175D

- Assigning functions to the PF keys ( See Edit > Key Assignment)
- Configuring the Scrambler Code ( See Edit > Zone Information > Channel Edit > Page 2 > Scrambler Setting, Edit > Optional Features > Scrambler)

Key Operations in Scrambler/ Encryption Code Mode

Supported Models: Mobile

If the [**^**]/ [**v**] key or [**^**]/ [**∨**] key to which **Zone Up/ Zone Down** or **Channel Up/ Channel Down** is assigned is used while the transceiver is in Scrambler/ Encryption Code Mode, the transceiver exits Scrambler/ Encryption Code Mode and each of the functions is activated.

If the [**^**]/ [**v**] key or [**^**]/ [**∨**] key to which **Volume Up/ Volume Down** or **LED Brightness** is assigned is used while the transceiver is in Scrambler/ Encryption Code Mode, the transceiver remains in Scrambler/ Encryption Code Mode and each of the functions is activated.

If one of the **PF** keys to which the following functions are assigned is used while the transceiver is in Scrambler/ Encryption Code Mode, the transceiver remains in Scrambler/ Encryption Code Mode and each of the functions is activated.

- Squelch Off
- Squelch Off Momentary
- Monitor
- Monitor Momentary

Scrambler/Encryption Status Memory

Scrambler/Encryption Status Memory is the function to retain in the transceiver the Voice Scrambler status of each channel, either enabled or disabled.

If this function is enabled, the Voice Scrambler status, either enabled or disabled, is retained even if the channel is changed or the transceiver is turned OFF when the status of Voice Scrambler between enabled or disabled is changed by using the **Scrambler/ Encryption** key.

Also, the Voice Scrambler status, either enabled or disabled, retained in the transceiver is read and applied to the parameters for each channel when the data is read from the transceiver using KPG-169D/ KPG-170D/ KPG-175D.

Configuration using KPG-169D/ KPG-170D/ KPG-175D

Configuring the Scrambler/Encryption Status Memory to be enabled or disabled ( See Edit > Optional Features > Common 1)

15.2 Encryption (NXDN Digital)

Encryption is the function that enhances secrecy in communications on the NXDN digital channels by encrypting audio data.

The Encryption function can provide bit scramble encryption using the encryption module embedded in a transceiver. To transmit or receive a signal, the communication data can be encrypted or decrypted using the encryption key data configured in the transceiver.

Transmission

If Encryption is enabled, the transceiver encrypts and then sends audio data. If Encryption is disabled, the transceiver transmits audio data without encryption.

Reception

Upon receipt of the encrypted communication data, the transceiver decrypts the received data using the encryption key data configured in the transceiver. If the data is properly decrypted, the received audio sounds from the speaker. The receive behavior of the transceiver, however, differs depending on the Encryption status (enabled or disabled) and the configuration for Encryption Type. (Refer to [Transceiver's Behavior upon Receipt of the Encrypted Communication Data on page 169.](#))

The encryption key data that is used for the Encryption function can be configured up to 16 entries in the Multi-key List by the use of KPG-169D/ KPG-170D/ KPG-175D. (Refer to [Multi-key List on page 170.](#))

Encryption can be enabled or disabled for each channel by using KPG-169D/ KPG-170D/ KPG-175D.

A Multi-key List Number from 1 to 16 having an encryption key data to be used for encryption and decryption of communication data can be configured for each channel.

Note

Encryption can be used only in an NXDN Conventional system.

Configuration using KPG-169D/ KPG-170D/ KPG-175D

- Configuring the encryption key data ( See Edit > Encryption)
- Configuring the Encryption to be enabled or disabled ( See Edit > Zone Information > Channel Edit > Page 2 > Encryption Settings)
- Configuring the Multi-key List Number ( See Edit > Zone Information > Channel Edit > Page 2 > Encryption Settings)

Enabling the Encryption

Encryption is enabled by a user selecting an NXDN digital channel where Encryption is enabled.

Note

If “Zone-Channel + Others” is configured for Voice Announcement, “Encryption” is announced following the announcement of the zone number and channel number when a channel where Encryption is enabled is selected. (Refer to [6.7 Using Voice Announcement on page 37.](#))

Toggleing the Encryption between Enabled and Disabled

The configuration status of Encryption for each channel can be toggled between enabled and disabled by using the **Scrambler/ Encryption** key.

Pressing the **Scrambler/ Encryption** key toggles the status of Encryption between enabled and disabled.

Operating the Transceiver

● Enabling the Encryption

1 Press the **Scrambler/ Encryption** key while Encryption is disabled.

A Tone A sounds from the transceiver and Encryption becomes enabled.

For Mobile, “Ec” appears for 1 sec. In addition, for Mobile, if the 2 dots on the LED display (the left dot and the right dot) and the LED (blue) are configured to light, each LED lights while Encryption is enabled.

● Disabling the Encryption

1 Press the **Scrambler/ Encryption** key while Encryption is enabled.

A Tone B sounds from the transceiver and Encryption becomes disabled.

Note

- If “Zone-Channel + Others” is configured for Voice Announcement, “Encryption” is announced when Encryption becomes enabled. In this case, a Tone A does not sound. (Refer to [6.7 Using Voice Announcement on page 37.](#))
- For Mobile, the transceiver can be configured to light the 2 dots on the LED display (the left dot and the right dot) and the LED (blue) when Encryption is enabled. (Refer to [5.5 Lighting the LEDs According to the Transceiver’s Status on page 25.](#))

Configuration using KPG-169D/ KPG-170D/ KPG-175D

Assigning functions to the PF keys ( See Edit > Key Assignment)

Configuring the Encryption Key Data Used for Communications

Supported Models: Mobile

Pressing and holding the **Scrambler/ Encryption Code** key causes the transceiver to enter Scrambler/ Encryption Code Mode. In the Scrambler/ Encryption Code Mode, the encryption key data used for communications can be configured by selecting the key data from the Multi-key List. (Refer to [Multi-key List on page 170.](#))

Note

- For Mobile, the Multi-key List number having the encryption key data can also be configured for each channel by using KPG-175D. In addition, the Multi-key List number configured for each channel by using KPG-175D can be changed by the operation of the transceiver.
- For Portable, the Multi-key List number having the encryption key data can be configured for each channel by using KPG-169D/ KPG-170D.

Operating the Transceiver

1 Press and hold the **Scrambler/ Encryption Code** key.

The transceiver enters Scrambler/ Encryption Code Mode. "co" appears on the LED display for 1 sec and then the Multi-key List number configured for the selected channel appears. The right dot blinks at this time.

2 Select a Multi-key List number by pressing the [**B**] or [**C**>] key.

3 Press the [**S**] key.

The transceiver exits Scrambler/ Encryption Code Mode and the selected Multi-key List number is configured for the transceiver.

Configuration using KPG-169D/ KPG-170D

Configuring the Multi-key List Number ( [See](#) Edit > Zone Information > Channel Edit > Page 2 > Encryption Settings)

Configuration using KPG-175D

- Assigning functions to the PF keys ( [See](#) Edit > Key Assignment)
- Configuring the Multi-key List Number ( [See](#) Edit > Zone Information > Channel Edit > Page 2 > Encryption Settings)

Key Operations in Scrambler/ Encryption Code Mode

Supported Models: Mobile

If the [^]/[v] key or [^]/[v] key to which **Zone Up/ Zone Down** or **Channel Up/ Channel Down** is assigned is used while the transceiver is in Scrambler/ Encryption Code Mode, the transceiver exits Scrambler/ Encryption Code Mode and each of the functions is activated.

If the [^]/[v] key or [^]/[v] key to which **Volume Up/ Volume Down** or **LED Brightness** is assigned is used while the transceiver is in Scrambler/ Encryption Code Mode, the transceiver remains in Scrambler/ Encryption Code Mode and each of the functions is activated.

If one of the **PF** keys to which the following functions are assigned is used while the transceiver is in Scrambler/ Encryption Code Mode, the transceiver remains in Scrambler/ Encryption Code Mode and each of the functions is activated.

- Squelch Off
- Squelch Off Momentary
- Monitor
- Monitor Momentary

Transceiver's Behavior upon Receipt of the Encrypted Communication Data

Upon receipt of the encrypted communication data, the transceiver behaves as follows according to the Encryption status (enabled or disabled) and the configuration for Encryption Type:

If Encryption Is Enabled:

Regardless of the configuration for Encryption Type, the received audio sounds from the speaker according to the audio control conditions and the configuration in the Multi-key List.

The transceiver's behavior varies as follows depending on whether 0 is configured for only one Key ID, or for more than one Key ID in the Multi-key List:

● If 0 is configured for only one Key ID in the Multi-key List:

The transceiver searches the encryption key data configured for the transceiver. If the Key ID included in the encryption key data, which was used for encryption of the received communication data, matches the Key ID included in the encryption key data which is configured for the transceiver, the transceiver can use the encryption key data to decrypt the data. If the data is properly decrypted, the received audio sounds from the speaker. If the data is decrypted incorrectly, the received audio sounds incompletely from the speaker. The transceiver mutes the speaker if the Key IDs do not match.

● If 0 is configured for more than one Key ID in the Multi-key List:

The transceiver's behavior varies as follows depending on the value for Key ID contained in the encryption key data which has been utilized for encryption of the received communication data, either 0 or a value other than 0:

Key ID: 0

Without searching the encryption key data, the transceiver decrypts the data using the encryption key data corresponding to the Multi-key List Number configured for the channel where the transceiver has been on standby to receive the encrypted signal. If the data is properly decrypted, the received audio sounds from the speaker. If the data is decrypted incorrectly, the received audio sounds from the speaker without being decrypted.

Key ID: Any value other than 0

The transceiver searches the encryption key data configured for the transceiver. If the Key ID included in the encryption key data, which was used for encryption of the received communication data, matches the Key ID included in the encryption key data which is configured for the transceiver, the transceiver can use the encryption key data to decrypt the data. If the data is properly decrypted, the received audio sounds from the speaker. If the data is decrypted incorrectly, the received audio sounds incompletely from the speaker. The transceiver mutes the speaker if the Key IDs do not match.

If Encryption Is Disabled:

Following are the transceiver behaviors that may vary depending on the configuration for Encryption Type (Type 1 or Type 2):

- **Type 1**

The transceiver behaves in the same manner as with Encryption enabled.

- **Type 2**

The received audio does not sound from the speaker.

 **Note**

Upon receipt of unencrypted communication data, the transceiver emits the received audio from the speaker according to the audio control conditions regardless of the Encryption status (enabled or disabled) or configuration for Encryption Type.

Configuration using KPG-169D/ KPG-170D/ KPG-175D

Configuring the Encryption Type ( Edit > Encryption)

Multi-key List

Multi-key List is the list to configure the encryption key data, that is used for encryption and decryption of communication data. A maximum of 16 sets of encryption key data can be configured in the Multi-key List by using KPG-169D/ KPG-170D/ KPG-175D.

- **Key Data**

Key Data allows you to configure the encryption key data in the range of 1 to 32767.

- **Key ID**

Key ID allows you to configure an ID code to identify the encryption key data in the range of 0 to 63. 0 can redundantly be configured for more than one Key ID. The transceiver's behavior upon receipt of the encrypted communication data varies depending on the configuration for Key ID. (Refer to [Transceiver's Behavior upon Receipt of the Encrypted Communication Data on page 169.](#))

The encryption key data configured in the Multi-key List can be allocated to each channel by specifying the corresponding Multi-key List Number.

Configuration using KPG-169D/ KPG-170D/ KPG-175D

Configuring the encryption key data ( Edit > Encryption)

Scrambler/Encryption Status Memory

Scrambler/Encryption Status Memory is the function to retain the Encryption status, either enabled or disabled, in the transceiver.

If this function is enabled, the Encryption status, either enabled or disabled, is retained even if the channel is changed or the transceiver is turned OFF when the status of Encryption between enabled or disabled is changed by using the **Scrambler/ Encryption** key.

Also, the stored configuration for Encryption, either enabled or disabled, is read as default when data is read from a transceiver using KPG-169D/ KPG-170D/ KPG-175D.

Configuration using KPG-169D/ KPG-170D/ KPG-175D

Configuring the Scrambler/Encryption Status Memory ( See Edit > Optional Features > Common 1)

Scan is the function to check whether the transceiver receives a call from other transceivers.

The transceiver sequentially checks for availability of a signal on each channel, and the transceiver receives a signal on the channel where the signal is detected.

Note

Refer to [8.9 Site Roaming on page 76](#) for instructions on scanning by Site Roaming in an NXDN Conventional system.

16.1 Starting the Scan

Pressing the **Scan** key causes the transceiver to start the Scan.

For Portable, the LED blinks green during the scan.

For Mobile, "Sc" appears on the LED display during the scan.

The transceiver scans all channels to be scanned in the zone where the transceiver starts the scan.

Channels to be scanned are the channels where Scan Add is enabled by using KPG-169D/ KPG-170D/ KPG-175D. The channels configured to be scanned using the **Scan Delete/Add** key will also be scanned (Mobile only).

One of the following conditions must be satisfied to start the scan. An Error tone sounds from the transceiver when no condition is satisfied.

- Two or more channels to be scanned must coexist in the selected zone.
- One channel to be scanned must exist in the selected zone and the Priority Channel must exist in the zone or another zone.

The Priority Channel will be scanned even if the Priority Channel exists in another zone. However, the configuration for Zone Type (Analog or NXDN) of the zone where the Priority Channel exists must be the same as the configuration of the zone where the transceiver starts the scan.

Configuration using KPG-169D/ KPG-170D/ KPG-175D

- Configuring the Scan Add to be enabled or disabled for each channel ([See](#) Edit > Zone Information > Channel Edit > Page 1)
- Assigning functions to the PF keys ([See](#) Edit > Key Assignment)

16.2 Scanning the Specific Channel Preferentially (Priority Scan)

Priority Scan can be used to scan the high priority channel regardless of the scan configuration for each channel.

If Priority Channel is configured, the Priority Channel is monitored by using Lookback even when the scan pauses on a normal channel (a channel other than the Priority Channel).

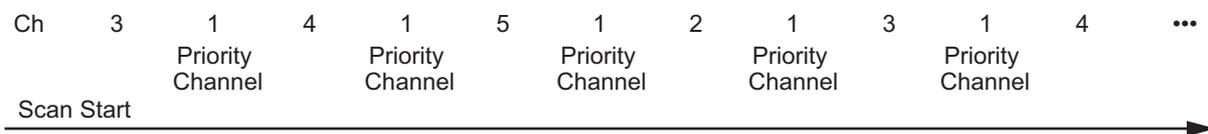


Figure 16-1 Priority Scan

The transceiver scans the Priority Channel at the intervals configured for Lookback Time A and Lookback Time B. (Refer to [Lookback on page 177](#))

Priority Channel can be configured separately for analog channels and NXDN digital channels by using KPG-169D/ KPG-170D/ KPG-175D. Also, Priority Scan type can be configured for the Priority Channel as below:

Table 16-1 Priority Scan

Configuration	Description
Fixed	The channel configured for Priority Zone-Channel (Analog) or Priority Zone-Channel (NXDN) is used as the Priority Channel. For Mobile, "P" appears for 1 sec.
Selected	The selected channel is used as the Priority Channel.
Operator Selectable	The channel selected by a user is used as the Priority Channel. By pressing the Priority Zone-Channel Select key while the transceiver is in normal mode, a Tone A sounds from the transceiver and the selected channel becomes the Priority Channel. For Mobile, "P" appears for 1 sec.

 Note

- The transceiver does not monitor the Priority Channel by using Lookback while the transceiver pauses the scan on the Priority Channel. (Refer to [Lookback on page 177.](#))
- For Mobile, the transceiver can be configured to light the 2 dots on the LED display (the left dot and the right dot) and the LED (blue) when Priority Zone-Channel is enabled. (Refer to [5.5 Lighting the LEDs According to the Transceiver's Status on page 25.](#))

Configuration using KPG-169D/ KPG-170D/ KPG-175D

- Configuring the Priority ( Edit > Scan Information > Scan)
- Configuring the Priority Zone-Channel (Analog) ( Edit > Scan Information > Scan)
- Configuring the Priority Zone-Channel (NXDN) ( Edit > Scan Information > Scan)
- Assigning functions to the PF keys ( Edit > Key Assignment)

16.3 Transceiver Behavior during the Scan

 Note

The amount of time from when the transceiver pauses scanning for transmission or reception until the transceiver resumes scanning can be configured using Dropout Delay Time and Transmit Dwell Time. (Refer to [Dropout Delay Time on page 177](#), [Transmit Dwell Time on page 177.](#))

Conditions to Resume the Scan

One of the following conditions must be met to resume scanning while the transceiver pauses scanning. If no condition is satisfied, the scan continues pausing.

- Two or more channels to be scanned must coexist in the selected zone.
- One channel to be scanned must exist in the selected zone and the Priority Channel must exist in the zone or another zone. However, the configuration for Zone Type (Analog or NXDN) of the zone where the Priority Channel exists must be the same as the configuration of the zone where the transceiver starts the scan.

 Note

For Mobile, if Off-hook Scan is disabled, the scan is resumed when the microphone status is switched from the off-hook to the on-hook. However, the scan cannot be resumed under the condition that neither of the above requirements is satisfied. (Refer to [Starting Scanning by Linking with the Microphone \(Off-hook Scan\) on page 178.](#))

Transceiver Behavior in the Case that the Scan Cannot Be Resumed

During the scan, if the zone is changed manually to a zone that does not satisfy the requirement to resume the scan, the scan continues pausing.

During the scan, if the **PTT** switch is pressed under the condition that does not satisfy the requirement to resume the scan, the transceiver transmits on the Revert Channel. Upon elapse of the time configured for Transmit Dwell Time after completion of the transmission, the transceiver reverts to the selected channel; however, the scan does not resume. (Refer to [Transmit Dwell Time on page 177.](#))

Note

For Mobile, if Off-hook Scan is disabled, the scan is not resumed when the microphone remains in the off-hook state. (Refer to [Starting Scanning by Linking with the Microphone \(Off-hook Scan\) on page 178.](#))

Transceiver Behavior in the Case that the Zone-channel Is Changed Manually

- **In the case that the channel is changed while the scan pauses for transmission or reception:**

The transceiver restarts the scan on the channel where the scan was started last time.

- **In the case that the zone is changed during the scan:**

The scan pauses and the zone is changed if the configuration for Zone Type of the new zone is the same as the configuration of the zone where the transceiver started the scan.

The scan pauses, a Zone Indicator Tone sounds from the transceiver or the zone number is announced, and the zone is not changed if the configuration for Zone Type of the new zone is different from the configuration of the zone where the transceiver started the scan.

Reception during the Scan

The transceiver receives as below according to the configuration for Audio Control:

QT/ DQT/ RAN Behavior

If the received QT tone, DQT code, or RAN code on each channel matches the QT tone, DQT code, or RAN code preconfigured for the receiving transceiver, the transceivers pauses scanning. Dropout Delay Time is activated if the QT tone, DQT code, or RAN code matching state is reset. After the time configured for Dropout Delay Time elapses, the transceiver resumes the scan.

QT/ DQT/ RAN - Optional Signaling: AND Behavior

If the received QT tone, DQT code, or RAN code matches the QT tone, DQT code, or RAN code preconfigured for the receiving transceiver, the transceivers pauses scanning. The transceiver does not emit the received audio and then waits to receive an Optional Signaling (2-tone, DTMF, FleetSync, or NXDN ID).

The transceiver resumes scanning after the amount of time configured for Dropout Delay Time elapses if the QT tone, DQT code, or RAN code matching state is reset while waiting to receive the Optional Signaling.

The transceiver emits the received audio and Alert Tone or starts transponding when the received Optional Signaling matches the Optional Signaling preconfigured for the transceiver while waiting to receive the Optional Signaling. The transceiver stands by on the channel when the Optional Signaling matches.

QT/ DQT - Optional Signaling: OR Behavior

If the received QT tone or DQT code matches the QT tone or DQT code preconfigured for the receiving transceiver, the transceivers pauses scanning. The transceiver emits the received audio and then waits to receive an Optional Signaling. The transceiver resumes scanning after the amount of time configured for Dropout Delay Time elapses if the QT tone or DQT code matching state is reset while waiting to receive the Optional Signaling.

If the transceiver pauses scanning when the received Optional Signaling matches the Optional Signaling preconfigured for the transceiver, the transceiver does not resume scanning until the matching state of the Optional Signaling is reset.

Configuration using KPG-169D/ KPG-170D/ KPG-175D

- Configuring the Audio Control (Analog) ( See Edit > Zone Information > Channel Edit > Page 1)
- Configuring the Audio Control (NXDN) ( See Edit > Zone Information > Channel Edit > Page 1)

16.4 Common Functions for Scan

The following functions are relevant to the scan:

- Scan Temporary Delete (Portable Only)
- Scan Delete/Add (Mobile Only)
- Revert Channel
- Dropout Delay Time
- Transmit Dwell Time
- Lookback
- Off-hook Scan (Mobile Only)
- Priority-channel Stop Tone

Temporarily Deleting a Channel to Be Scanned (Scan Temporary Delete)

Supported Models: Portable

Scan Temporary Delete is the function to temporarily delete a channel from a group of channels to be scanned.

With this function, a user can reliably receive a call from a primary channel by deleting unnecessary channels from a group of channels to be scanned to increase the scan speed.

By selecting a channel to be scanned and pressing the **Scan Temporary Delete** key while the scan pauses, the channel can be deleted temporarily from a group of channels to be scanned. This status is retained until the scanning is terminated by pressing the **Scan** key and will be cleared when the scan completes.

Configuration using KPG-169D/ KPG-170D

Assigning functions to the PF keys ( See Edit > Key Assignment)

Adding or Deleting a Channel to/from the Target Channels for Scanning (Scan Delete/Add)

Supported Models: Mobile

Scan Delete/Add is the function to add a channel to the target channels for scanning or delete a channel from the target channels for scanning.

With this function, a user can reliably receive a call from a primary channel by deleting unnecessary channels to increase the scan speed.

Following are the transceiver's behavior:

- Pressing the **Scan Delete/Add** key while the transceiver turns Off the scanning adds or deletes a channel to/from the target channels for scanning.
- Pressing the **Scan Delete/Add** key while the transceiver pauses scanning temporarily adds or deletes a channel to/from the target channels for scanning. This status is retained until the scanning is terminated by pressing the **Scan** key and will be cleared when the scan completes.
- An Entry Tone sounds from the transceiver by pressing the **Scan Delete/Add** key while the transceiver is scanning and this operation has no effect to the transceiver.

Operating the Transceiver

1 Press the Scan Delete/Add key.

If the selected channel is not configured to be scanned, the channel is added to the target channels for scanning. "cA" appears on the LED display.

If the selected channel is configured to be scanned, the channel is deleted from the target channels for scanning. "cd" appears on the LED display.

If the 2 dots on the LED display (the left dot and the right dot) and the LED (blue) are configured to light, each LED lights while Scan Delete/Add is enabled.

Note

The transceiver can be configured to light the 2 dots on the LED display (the left dot and the right dot) and the LED (blue) when Scan Delete/Add is enabled. (Refer to [5.5 Lighting the LEDs According to the Transceiver's Status on page 25.](#))

Configuration using KPG-175D

Assigning functions to the PF keys ( See Edit > Key Assignment)

Revert Channel

Revert Channel is the Zone-channel which is used when the transceiver transmits by a user pressing the **PTT** switch during the scan.

Table 16-2 Revert Channel

Configuration	Description
Last Called + Selected	The transceiver transmits on the last-called Zone-channel by a user pressing the PTT switch during the scan. The transceiver transmits on the Zone-channel where the transceiver pauses scanning by a user pressing the PTT switch while the scan pauses. If the Zone-channel is changed, the transceiver transmits using the new Zone-channel after the Zone-channel is changed until the transceiver receives another call.
Selected	The transceiver transmits on the new Zone-channel after the Zone-channel is changed regardless of the scanning status.
Selected + Talkback	The transceiver transmits on the new Zone-channel after the Zone-channel is changed during the scan. The transceiver transmits on the Zone-channel where the transceiver pauses scanning while the scan pauses.

Configuration	Description
Priority	The transceiver transmits on the Priority Channel regardless of the scanning status.
Priority + Talkback	The transceiver transmits on the Priority Channel during the scan. The transceiver transmits on the Zone-channel where the transceiver pauses scanning while the scan pauses.

 **Note**

Talkback is an operation to transmit on the Zone-channel on which the transceiver pauses scanning while the scan pauses.

Configuration using KPG-169D/ KPG-170D/ KPG-175D

Configuring the Priority Channel ( **See** Edit > Scan Information > Scan)

Dropout Delay Time

Dropout Delay Time is the time from when the transceiver finishes receiving signals until the transceiver resumes scanning.

The transceiver pauses scanning when the transceiver receives a call during the scan. The transceiver resumes scanning after the transceiver finishes receiving and then the time configured for Dropout Delay Time elapses.

Following are the conditions to resume scanning:

- There is no signal to receive.
- The QT tone, DQT code, or RAN code matching state is reset.

 **Note**

Dropout Delay Time becomes disabled if the channel is changed manually during the scan. When 1 sec elapses after the channel is changed, the transceiver restarts scanning.

Configuration using KPG-169D/ KPG-170D/ KPG-175D

Configuring the Dropout Delay Time ( **See** Edit > Scan Information > Scan)

Transmit Dwell Time

The scan pauses when the **PTT** switch is pressed during the scan. Transmit Dwell Time is the time from when the transceiver completes transmitting until the transceiver resumes scanning.

Configuration using KPG-169D/ KPG-170D/ KPG-175D

Configuring the Transmit Dwell Time ( **See** Edit > Scan Information > Scan)

Lookback

Lookback is used to check the Priority Channel at a constant interval while the transceiver is receiving on a normal channel (a channel other than the Priority Channel) if Priority Channel is configured for the transceiver.

The transceiver selects the interval time to check the Priority Channel (Lookback Time A or Lookback Time B) based on the receiving status of the Priority Channel.

Lookback Time A

Lookback Time A is the interval time to check the Priority Channel in Priority Scan if there is no carrier on the Priority Channel while the transceiver is receiving on a normal channel having a different carrier from the Priority Channel.

Lookback Time B

Lookback Time B is the interval time to check the Priority Channel in Priority Scan if the QT tone or DQT code, or RAN code does not match that preconfigured for the transceiver though there is a carrier on the Priority Channel while the transceiver is receiving on a normal channel having a different carrier from the Priority Channel.

In this case, it is supposed that another transceiver is using the channel; therefore, configuring longer time than the time configured for Lookback Time A as the interval to check decreases the influence on the normal channel.

Configuration using KPG-169D/ KPG-170D/ KPG-175D

- Configuring the Lookback Time A ( Edit > Scan Information > Scan)
- Configuring the Lookback Time B ( Edit > Scan Information > Scan)

Starting Scanning by Linking with the Microphone (Off-hook Scan)

Supported Models: Mobile

Off-hook Scan is a function to start scanning regardless of the microphone hook status.

The transceiver scans as follows according to the configuration for Off-hook Scan:

Table 16-3 Off-hook Scan

Configuration	Description
Enabled	Pressing the Scan key causes the transceiver to start scanning regardless of the microphone On- or Off-hook state.
Disabled	If the microphone is in the On-hook state, pressing the Scan key causes the transceiver to start scanning; however if the microphone is in the Off-hook state, the transceiver cannot start scanning. If the microphone changes from the On-hook state to Off-hook state in Scan Mode, the scan pauses on the Revert Channel. When the microphone goes to On-hook state, the transceiver resumes scanning.

Note

The microphone hook status can also be switched on by the AUX Input port to which “External Hook” is assigned. (Refer to [18.1 Available Functions for AUX Input Ports on page 182.](#))

Configuration using KPG-175D

Configuring the Off-hook Scan to be enabled or disabled ( Edit > Scan Information > Scan)

Priority-channel Stop Tone

Priority-channel Stop Tone is the function to emit the Priority-channel tone from the transceiver when the transceiver receives during the scan on the Priority Channel and then pauses scanning.

Configuration using KPG-169D/ KPG-170D/ KPG-175D

Configuring the Priority-channel Stop Tone to be enabled or disabled ( Edit > Scan Information > Scan)

Supported Models: Portable

VOX is the function to start transmitting 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 can be used only when a user wears the headset.

Note

A user cannot use VOX 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.

17.1 Enabling the VOX

VOX becomes enabled by a user selecting a channel where VOX is configured to be enabled.

VOX can be configured to be enabled or disabled for each channel by using KPG-169D/ KPG-170D.

Transmission is started by a user speaking into the microphone on a channel where VOX is enabled.

Note

- VOX Function must be enabled to enable VOX for each channel by using KPG-169D/ KPG-170D.
- If "Zone-Channel + Others" is configured for Voice Announcement, "VOX" is announced following the announcement of the zone number and channel number when a channel where VOX is enabled. (Refer to [6.7 Using Voice Announcement on page 37.](#))
- The transceiver cannot transmit using VOX when the transmission is restricted, such as when the transceiver is in the Stun state.
- If the time configured for Time-out Timer elapses during transmission using VOX, a Warning Tone B sounds from the transceiver and the transmission ends.

Configuration using KPG-169D/ KPG-170D

- Configuring the VOX Function to be enabled or disabled ([See](#) Edit > Optional Features > Common 1 > VOX)
- Configuring the VOX to be enabled or disabled ([See](#) Edit > Zone Information > Channel Edit > Page 2)

17.2 Configuring the Input Sensitivity of the Microphone (VOX Gain Level)

VOX Gain Level is the input sensitivity of the microphone.

VOX Gain Level can be configured using KPG-169D/ KPG-170D. VOX Gain Level can also be adjusted by user operation. Larger value for VOX Gain Level results in higher sensitivity.

Operating the Transceiver

- 1 Turn the transceiver ON by pressing and holding the **Side 1** key and keep holding the **Side 1** key more than 2 sec.

A Tone A sounds from the transceiver, the LED lights orange, and the transceiver enters VOX Setup Mode. Subsequently, the current value for VOX Gain Level is announced. A Tone B sounds from the transceiver if "Off" is configured for VOX Gain Level.

- 2 Change the VOX Gain Level by pressing the **Side 1** key.

The VOX Gain Level is changed as follows and the value is announced every time the **Side 1** key is pressed. A Tone B sounds from the transceiver if "Off" is configured.

1 → 2 → 3 ... 9 → 10 → Off → 1 ...

3 Press the PTT switch after VOX Gain Level is changed.

A tone sounds from the transceiver and the determined VOX Gain Level value is announced. The transceiver needs to be turned OFF and ON again and activated in user mode.

Configuration using KPG-169D/ KPG-170D

Configuring the VOX Gain Level ( See Edit > Optional Features > Common 1 > VOX)

17.3 Remaining in Transmit Mode after a VOX Transmission Has Finished (VOX Delay Time)

VOX Delay Time is the duration in which the transceiver remains in transmit mode after a VOX transmission has finished. If the transceiver reverts to receive mode too quickly after a user pauses speaking, the end portion of the speech may not be transmitted. To avoid this, an appropriate VOX Delay Time must be configured allowing all words to be transmitted without an overly long delay after the user stops speaking.

Upon the elapse of the time configured for VOX Delay Time after no audio is inputted to the microphone, the transceiver terminates VOX transmission.

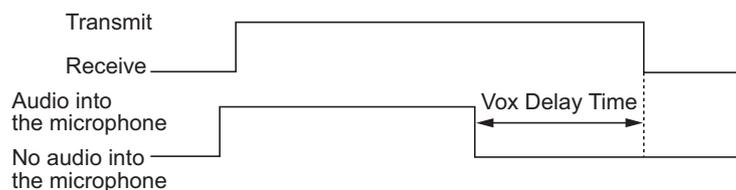


Figure 17-1 VOX Delay Time

Configuration using KPG-169D/ KPG-170D

Configuring the VOX Delay Time ( See Edit > Optional Features > Common 1 > VOX)

17.4 Restricting a VOX Transmission while the Audio Sounds from the Transceiver (Transmit Inhibit while Receiving)

Transmit Inhibit while Receiving is the function to restrict a VOX transmission while the speaker is unmuted. This function can be used to prevent the VOX function from being activated by audio emitted from the speaker.

Configuration using KPG-169D/ KPG-170D

Configuring the Transmit Inhibit while Receiving ( See Edit > Optional Features > Common 1 > VOX)

17.5 Disabling the VOX by using the PTT Switch (Cancel Operation)

Cancel Operation is the function to disable the VOX on a channel when the transceiver transmits on a channel where VOX is enabled by a user pressing the **PTT** switch.

VOX becomes enabled again after the transceiver is turned ON again even if VOX is disabled by a user pressing the **PTT** switch.

Configuration using KPG-169D/ KPG-170D

Configuring the Cancel Operation ( See Edit > Optional Features > Common 1 > VOX)

17.6 Notifying a User of the Start of a VOX Transmission with a Tone (VOX Proceed Tone)

VOX Proceed Tone is the tone notifying a user that a transmission using the VOX has been started.

If this function is enabled, a VOX Proceed Tone sounds from the transceiver to notify the start of transmission when the transmission using the VOX starts.

Note

A VOX Proceed Tone does not sound from the transceiver in the following configuration:

- “DTMF”, “FleetSync”, or “MDC-1200” is configured for PTT ID Type.
- An option other than “Off” and “EOT” is configured for PTT ID (Analog).
- Sidetone of the corresponding signaling is enabled.

However, if “Off” or “EOT” is configured for PTT ID (Analog), a VOX Proceed Tone sounds from the transceiver regardless of the configuration for Sidetone of the corresponding signaling.

Configuration using KPG-169D/ KPG-170D

Configuring the VOX Proceed Tone ( See Edit > Optional Features > Common 1 > VOX)

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 15-pin connector located on the rear panel of the transceiver.

18.1 Available Functions for AUX Input Ports

Following functions can be assigned to AUX Input ports:

Table 18-1 Available Functions for AUX Input Ports

Function Name	Description
None	No function is assigned.
External PTT	<p>External PTT is the transmission request PTT 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 port goes low level. The transceiver ends transmitting if the External PTT port goes high level.</p> <p> Note If “Data PTT” is assigned to another port, “External PTT” cannot be assigned.</p>
Data PTT	<p>Data PTT is the transmission request port for data communications used in an Analog Conventional system. The transceiver migrates to an analog channel configured for Data Zone-Channel (Analog) to start transmitting if the Data PTT port goes low level. The transceiver ends transmitting if the Data PTT port goes high level.</p> <p> Note</p> <ul style="list-style-type: none"> • If “External PTT” or “DTC” is assigned to another port, “Data PTT” cannot be assigned. • The Data PTT port does not function while the transceiver is in the following modes: <ul style="list-style-type: none"> • Scrambler/Encryption Code • Channel Entry • Squelch Level • OST List • Autodial • Public Address • Key functions other than Emergency and LED Brightness do not function while the Data PTT port is active.

Function Name	Description
Channel Select A to Channel Select D	<p>Channel Select is the Channel Select port to be used with the Remote Zone-Channel List. The zone-channel of the transceiver can be changed using the external device that is connected to the transceiver. (Refer to 18.4 Migrating to a Zone-channel by Using a Connected External Device (Remote Zone-Channel) on page 186.)</p> <p> Note</p> <ul style="list-style-type: none"> • Channel Select ports do not function while the transceiver is in the following modes: <ul style="list-style-type: none"> • Time-out Timer • Busy Channel Lockout • Channel Entry • Squelch Level • OST List • Scrambler/Encryption Code • Autodial • Key functions other than Emergency, LED Brightness, and AUX do not function while Channel Select ports are active. • The AUX (Output), Emergency, and External PTT ports function while any Channel Select port is active. • The Data PTT and DTC ports do not function while any Channel Select port is active.
Audio Mute	<p>Audio Mute is the port that is used to mute the received audio circuit. The transceiver mutes the received audio circuit when the Audio Mute port goes low level. The transceiver unmutes the received audio circuit when the Audio Mute port goes high level.</p>
Speaker On	<p>Speaker On is the port that is used to switch on the audio amplifier. The audio amplifier of the transceiver is switched on when the Speaker On port goes low level. The audio amplifier of the transceiver is switched off when the Speaker On port goes high level.</p>
Microphone Mute	<p>Microphone Mute is the port that is used to mute the microphone modulation line. The microphone modulation line is muted when the Microphone Mute port goes low level. The microphone modulation line is unmuted when the Microphone Mute port goes high level.</p>
External Monitor	<p>External Monitor is the port that is used to activate the Monitor. Monitor is enabled when the External Monitor port goes low level. The matching state of the DTMF code or the FleetSync ID is reset. Monitor is disabled when the External Monitor port goes high level.</p>
External Hook	<p>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. 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.</p>
Emergency	<p>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-175D in Emergency Mode. Emergency Key Delay Time must be configured for this port and used to avoid erroneously placing the transceiver in Emergency Mode unintentionally. (Refer to 14 COMMUNICATIONS IN AN EMERGENCY on page 149.)</p>

Function Name	Description
AUX Input Status Message	<p>AUX Input Status Message is the trigger port that is used to send a FleetSync or NXDN Status Message. The transceiver sends a Status Message to the ID configured for Target Fleet/ ID (FleetSync) or Base ID (NXDN) when the AUX Input Status Message port goes high level to low level or goes low level to high level. Two statuses (High → Low, Low → High) can be configured for AUX Input Status Message by using KPG-175D. These ports are normally used as the sensor ports for telemetry purposes. (Refer to AUX Input Status Message on page 74, AUX Input Status Message on page 120.)</p> <p>The transceiver sends a Status Message as below depending on the channel selected when the AUX Input Status Message port is activated:</p> <p>Conventional Zone-Channel (Analog): The transceiver sends a Status Message by using the FleetSync protocol. The destination is the ID configured for Target Fleet/ ID (FleetSync).</p> <p>Conventional Zone-CH (NXDN): The transceiver sends a Status Message by using the NXDN protocol. The destination is the ID configured for Base ID (NXDN).</p> <p> Note</p> <ul style="list-style-type: none"> The AUX Input Status Message port does not function while the transceiver is in one of the following modes: <ul style="list-style-type: none"> Time-out Timer Busy Channel Lockout If the AUX Input Status Message becomes active while the transceiver is in one of the following modes, the transceiver exits the mode and the AUX Input Status Message port starts to function: <ul style="list-style-type: none"> Squelch Level OST Scrambler/Encryption Code Autodial
DTC	<p>DTC is the port that is used to make the transceiver migrate to the Data Zone-Channel (Analog) used for data communications in an Analog Conventional system. The transceiver migrates to an analog channel configured for Data Zone-Channel (Analog) if the DTC port goes low level. The transceiver reverts to the previous channel if the DTC port goes high level.</p> <p> Note</p> <ul style="list-style-type: none"> If “Data PTT” is assigned to another port, “DTC” cannot be assigned. The DTC port does not function while the transceiver is in the following modes: <ul style="list-style-type: none"> Time-out Timer Busy Channel Lockout Channel Entry Squelch Level OST List Scrambler/Encryption Code Autodial Key functions other than Emergency and LED Brightness do not function while the DTC port is active. The following ports do not function while the DTC port is active: <ul style="list-style-type: none"> Status Message Channel Select A to Channel Select D

Configuration using KPG-175D

Assigning functions to the AUX Input port ( [See](#) Edit > Extended Function > AUX)

18.2 Available Functions for AUX Output Ports

The following functions can be assigned to AUX Output ports:

Table 18-2 Available Functions for AUX Output Ports

Function Name	Description
None	No function is assigned.
COR	The output port goes low level while the transceiver is receiving a carrier. Otherwise, the output port goes high level.
TOR	The output port goes low level while the received QT tone, DQT code (Analog), or RAN code (NXDN) matches the QT tone, DQT code (Analog), or RAN code (NXDN) preconfigured for the transceiver. If QT/ DQT Decode is not configured, the output port goes low level while the transceiver is receiving a carrier. If RAN Decode is not configured, the output port goes low level while the transceiver is receiving a RAN code. Otherwise, the output port goes high level.
AUX	The port output is changed with the state of the AUX key. An external device connected to the AUX port can be controlled.
PTT Output	The output port goes low level while the PTT switch is being pressed. Otherwise, this port goes high level.
TXS	The output port goes low level while the transceiver is transmitting. Otherwise, this port goes high level.
AUX Output Status Message	The status of the port is changed when the transceiver receives a FleetSync or NXDN Status Message. The status of the port is toggled (High to Low or Low to High) when the received Status Message matches the Status number preconfigured for the port. Two statuses (High → Low, Low → High) can be configured for AUX Output Status Message by using KPG-175D. The port is usually used to remotely control the transceiver by connecting an external device to the AUX Output port. (Refer to AUX Output Status Message on page 74 , AUX Output Status Message on page 120) Also, the port status can be retained even if the transceiver is turned OFF. (Refer to 18.3 Status Memory (AUX Output Status Message) on page 186.)

Configuration using KPG-175D

Assigning functions to the AUX Output port ( See Edit > Extended Function > AUX)

18.3 Status Memory (AUX Output Status Message)

Status Memory (AUX Output Status Message) is the function used to retain the output status of AUX Output Status Message.

If this function is enabled, the output status of AUX Output Status Message 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 AUX Output Status Message is not retained and the port always goes high level when the transceiver is turned ON.

Configuration using KPG-175D

Configuring the Status Memory (AUX Output Status Message) ( Edit > Extended Function > AUX)

18.4 Migrating to a Zone-channel by Using a Connected External Device (Remote Zone-Channel)

Remote Zone-Channel is the function used to migrate to one of a maximum of 15 Zone-channels by using Channel Select A to Channel Select D ports.

The transceiver migrates to the Zone-channel registered in the Remote Zone-Channel List if one of the Channel Select A to Channel Select D ports goes low level.

Table 18-3 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 no Remote Zone-Channel is configured, the transceiver cannot migrate to a Zone and 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-175D

- Assigning functions to the AUX Input port ( **See** Edit > Extended Function > AUX)
- Configuring the Remote Zone-Channel List ( **See** Edit > Extended Function > Remote Zone-Channel)

Supported Models: Mobile

When the transceiver is installed in a vehicle, functions linking with a vehicle, such as Ignition Sense or Horn Alert, can be used.

19.1 Turning the Transceiver ON or OFF by Linking with the Ignition Sense Port Status (Ignition Sense)

Ignition Sense can be used to automatically turn the transceiver ON or OFF linked with the status of the Ignition Sense port of a vehicle. While the vehicle engine is running, the Ignition Sense port should be in the high state and when the vehicle engine is not running, the Ignition Sense port should be in the low state.

The transceiver is automatically turned ON when the Ignition Sense port goes high and is automatically turned OFF when the port goes low.

Ignition Sense can be enabled or disabled using KPG-175D.

Note

To use Ignition Sense, the Ignition Sense cable (KCT-18) and the Ignition Line of the vehicle must be connected using the KCT-60.

Configuration using KPG-175D

Configuring the Ignition Sense to be enabled or disabled ( Edit > Extended Function > AUX > Ignition)

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 stops running (the status of the Ignition Sense port is low) until the transceiver is automatically turned OFF.

If the amount of time configured for Timed Power-off elapses after the vehicle's engine stops running, the transceiver is automatically turned OFF. This function is convenient for continuing communications even if the vehicle engine is not running.

The Timed Power-off Pre-alert Tone sounds from the transceiver in the following way if anything other than "Off" is configured for Warning Tone:

- 1 min before the transceiver is turned OFF: The transceiver beeps twice. (Timed Power-off Pre-alert Tone 1)
- 10 sec before the transceiver is turned OFF: The transceiver beeps 4 times. (Timed Power-off Pre-alert Tone 2)
- 2 sec before the transceiver is turned OFF: The transceiver beeps continuously. (Timed Power-off Pre-alert Tone 3)

Note

Timed Power-off is reset if the Ignition Sense port goes high.

Configuration using KPG-175D

Configuring the Timed Power-off ( Edit > Extended Function > AUX > Ignition)

19.2 Controlling Car Behavior by Linking with the Horn Alert Port Status (Horn Alert)

Horn Alert can be used 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 causes the Horn Alert to be enabled or disabled.

Operating the Transceiver

● Enabling the Horn Alert

1 Press the **Horn Alert** key while Horn Alert is disabled.

Horn Alert will be enabled. "HA" appears for 1 sec on the LED display.

If the 2 dots on the LED display (the left dot and the right dot) and the LED (blue) are configured to light, each LED lights while Horn Alert is enabled.

● Disabling the Horn Alert

1 Press the **Horn Alert** key while Horn Alert is enabled.

Horn Alert will be disabled.

Note

- The Horn Alert port functions according to the configuration for the Horn Alert Logic Signal. (Refer to [Horn Alert Logic Signal](#) on page 190)
- While the Ignition Sense port is high level, the Horn Alert port does not become active even if the transceiver receives a call. (Refer to [19.1 Turning the Transceiver ON or OFF by Linking with the Ignition Sense Port Status \(Ignition Sense\)](#) on page 188.)
- The transceiver can be configured to light the 2 dots on the LED display (the left dot and the right dot) and the LED (blue) when Horn Alert is enabled. (Refer to [5.5 Lighting the LEDs According to the Transceiver's Status](#) on page 25.)

Configuration using KPG-175D

Assigning functions to the PF keys ( See Edit > Key Assignment)

Conditions to Activate the Horn Alert

The conditions to activate the Horn Alert are as follows. The conditions vary between analog and digital (NXDN).

Table 19-1 Conditions to Activate the Horn Alert

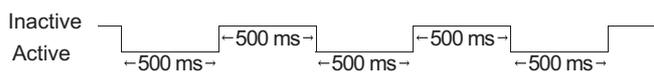
Zone Type	Conditions
Conventional Group (Analog)	<ul style="list-style-type: none"> If the received Optional Signaling matches the Optional Signaling preconfigured for the transceiver while Horn Alert is enabled If the transceiver receives a Paging Call while Horn Alert is enabled If the transceiver receives FleetSync Status 89 regardless of the Horn Alert configuration
Conventional Group (NXDN)	<ul style="list-style-type: none"> If the received Optional Signaling matches the Optional Signaling preconfigured for the transceiver 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 <p>Note Horn Alert Status can be configured using KPG-175D. (See Edit > NXDN > Status > Option)</p>

Horn Alert Logic Signal

Horn Alert Logic Signal is the function to activate the Horn Alert port according to the configuration upon activation of Horn Alert.

How the Horn Alert port is activated when Horn Alert is activated can be configured using KPG-175D.

Table 19-2 Horn Alert Logic Signal

Configuration	Description
Until Reset	The Horn Alert port remains active until the matching state of Optional Signaling is reset.
1 s to 30 s	The Horn Alert port remains active for configured amount of time.
Pulse	<p>The Horn Alert port is activated 3 times at 500-ms intervals.</p>  <p style="text-align: center;">Figure 19-1 Pulse 1</p>

Note

- The Horn Alert port is not deactivated even if the matching state of DTMF and 2-tone is reset, and if the amount of time configured for the Horn Alert Logic Signal is longer than the length of time configured for the Auto Reset Timer for DTMF or 2-tone. The Horn Alert port is deactivated when the amount of time configured for Horn Alert Logic Signal elapses.
- Horn Alert is deactivated if one of the following operations is enabled while Horn Alert is activated:
 - If the **Horn Alert** key is pressed (Horn Alert will be disabled)
 - If the status of the microphone hook is changed
 - If a key is pressed

Configuration using KPG-175D

Configuring the Horn Alert Logic Signal ([See](#) Edit > Optional Features > Common 1 > Horn Alert)

Activating the Horn Alert by Linking with the Microphone Hook (Off-hook Horn Alert)

Off-hook Horn Alert can be used to activate the Horn Alert function linked with the microphone hook status. Refer to [Conditions to Activate the Horn Alert on page 190](#) for conditions to activate the Horn Alert.

Table 19-3 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 the On-hook state.

Note

The microphone hook status can also be switched on by the AUX Input port to which “External Hook” is assigned. (Refer to [18.1 Available Functions for AUX Input Ports on page 182.](#))

Configuration using KPG-175D

Configuring the Off-hook Horn Alert ( [See](#) Edit > Optional Features > Common 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 according to the configuration when the transceiver is turned ON.

The status of Horn Alert when the transceiver is turned ON can be configured using KPG-175D.

Table 19-4 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, 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 status 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-175D

Configuring the Horn Alert Mode ( [See](#) Edit > Optional Features > Common 1 > Horn Alert)

The transceiver has password functions for protecting the transceiver operation and the security of the configuration data.

20.1 Password for Transceiver Operation (Transceiver Password)

Transceiver Password is the function to protect the transceiver from unauthorized usage.

When the transceiver with Transceiver Password configured is turned ON, the transceiver enters Transceiver Password Mode. For Portable, the LED lights blue. For Mobile, "PS" appears on the LED display.

After the password is entered and it matches, the password protection for the transceiver is removed and the transceiver is activated in user mode.

A password can be configured for the transceiver by using KPG-169D/ KPG-170D/ KPG-175D. The password can be configured using any numbers between 0 and 9999 inclusive.

Operating the Transceiver (Entering the Password)

Portable

1 Select a digit of the password by rotating the **Selector**.

The positions from 1 to 4 of the **Selector** correspond to each digit of the password. For example, the **Selector** must be positioned at 1 to enter "9" in the first digit of "9876".

2 Press the **Side 1** or **Side 2** key to select the number (0 to 9).

The selected number is announced when the **Side 1** or **Side 2** key is pressed. By pressing the **Side 1** key, the number increases by one step. By pressing the **Side 2** key, the number decreases by one step.

3 Enter numbers in all digits by repeating Step 1 and 2.

4 Press the **PTT** switch after entering the password.

If the password matches, "confirm" is announced, the LED is turned Off, and the transceiver is activated in user mode.

Mobile

● Using the Panel keys

1 Press the [**▲**] or [**▼**] key to select the number (0 to 9).

2 Press the [**C>**] key.

The number selected in Step 1 is confirmed.

3 Enter numbers in all digits by repeating Step 1 and 2.

 **Note**

Pressing the [**A**] key deletes the value in the rightmost digit. Pressing and holding the [**A**] key or the **Triangle** key deletes the values in all entered digits.

4 Press the [**S**] key after entering the password.

If the password matches, the transceiver is activated in user mode.

● Using the Microphone Keypad

1 Enter a number by pressing the [**0**] to [**9**] keys on the microphone keypad.

For example, to enter "1234", press the [**1**], [**2**], [**3**] and [**4**] keys in this order.

2 Press the [*****] key after entering the password.

If the password matches, the transceiver is activated in user mode.

 **Note**

Pressing the [**#**] key deletes the value in the rightmost digit. Pressing and holding the [**#**] key deletes the values in all entered digits.

Configuration using KPG-169D/ KPG-170D/ KPG-175D

Configuring the Transceiver Password ( **See** Edit > Optional Features > Common 1)

20.2 Password for Reading Configuration Data in a PC (Read Authorization Password)

Read Authorization Password protects the configuration data, such as the operating frequencies, from being read by unauthorized persons if the transceiver should ever be stolen.

To read the configuration data using KPG-169D/ KPG-170D/ KPG-175D from a transceiver having a Read Authorization Password, the Read Authorization Password must be entered at 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 by using KPG-169D/ KPG-170D/ KPG-175D. Read Authorization Password can be configured using any numbers between 0 and 999999 inclusive.

Configuration using KPG-169D/ KPG-170D/ KPG-175D

Configuring the Read Authorization Password ( See Edit > Optional Features > Common 1 > Data Password)

20.3 Password for Writing Configuration Data (Overwrite Password)

Overwrite Password protects the configuration data from being overwritten by unauthorized persons if the transceiver should ever be stolen.

To write data using KPG-169D/ KPG-170D/ KPG-175D to a transceiver for which the Overwrite Password is configured, the password must be entered at a PC.

Overwrite Password can be configured for the transceiver by using KPG-169D/ KPG-170D/ KPG-175D. Overwrite Password can be configured using any numbers between 0 and 999999 inclusive.

Configuration using KPG-169D/ KPG-170D/ KPG-175D

Configuring the Overwrite Password ( See Edit > Optional Features > Common 1 > Data Password)

The transceiver is equipped with Clone Mode to be used for copying the transceiver data to another transceiver and VOX Gain Level Setup Mode to be used for adjusting the VOX Gain Level.

The transceiver is also equipped with PC Test Mode to be used for testing transmit and receive capabilities of the transceiver and PC Tuning Mode to be used for adjusting the transceiver by using KPG-169D/ KPG-170D/ KPG-175D.

21.1 Copying the Configuration Data to Another Transceiver (Clone Mode)

Clone Mode is the mode to copy the data configured for the transceiver to another transceiver by using radio communications.

Clone Mode is only available for a user with permission to use this mode. Therefore, details for Clone Mode are described only in the service manual.

Note

For Portable, the cloning is executed by using radio communications in analog mode. For Mobile, the cloning is executed by connecting the transceivers with a cable.

21.2 Adjusting the VOX Gain Level (VOX Setup Mode)

Supported Models: Portable

VOX Setup Mode is the mode to adjust the input sensitivity of the microphone to be used for the VOX function.

Operating the Transceiver

- 1 Turn the transceiver ON by pressing and holding the **Side 1** key and keep holding the **Side 1** key more than 2 sec.

A Tone A sounds from the transceiver, the LED lights orange, and the transceiver enters VOX Setup Mode. Subsequently, the current value for VOX Gain Level is announced. A Tone B sounds from the transceiver if "Off" is configured for VOX Gain Level.

Note

- Refer to [17.2 Configuring the Input Sensitivity of the Microphone \(VOX Gain Level\)](#) on page 179 for transceiver operations in VOX Setup Mode.
- To exit VOX Setup Mode, the transceiver must be turned OFF.

21.3 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-169D/ KPG-170D/ KPG-175D.

PC Tuning Mode can be used to adjust transmit and receive capabilities of the transceiver by using KPG-169D/ KPG-170D/ KPG-175D.

To test or adjust the transceiver in each mode, the transceiver and a PC with KPG-169D/ KPG-170D/ KPG-175D installed need to be connected by using the programming cable. (Refer to [2.1 Connecting the Transceiver to a PC on page 4.](#))

After connecting the transceiver and the PC, selecting “Test Mode” from the **Program** pulldown menu in the main window of KPG-169D/ KPG-170D/ KPG-175D 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.

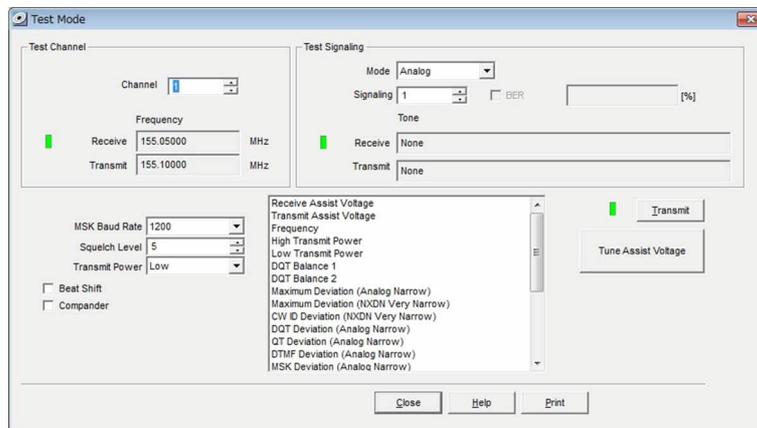


Figure 21-1 Test Mode Dialog Box

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.

A.1 Available Functions for the PF Keys

Portable

The following functions can be assigned to the PF keys of the transceiver using KPG-169D/ KPG-170D:

Table A-1 Available Functions for the PF Keys

Function Name	Description	Available System ^{*1}
None	Nothing will be activated.	ALL
Autodial	The DTMF code corresponding to the list number in the Autodial List configured for the selected channel is sent. Refer to 12.1 Sending a DTMF Code Using the Autodial Key (Autodial) on page 133.	Analog Conventional system
Call 1, Call 2	A 2-tone code, FleetSync status, or NXDN status assigned to the Call 1 key or Call 2 key is sent. In addition, an Individual Call (Individual Call Acknowledge Request) can be initiated to the NXDN Unit ID assigned to the Call 1 key or Call 2 . Refer to 8.4 Initiating an Individual Call After Ensuring That the Target Party Is Available for Communications (Individual Call Acknowledge Request) on page 61. Refer to 8.7 Sending a Status Message (Status Call) on page 72. Refer to 9.4 Using 2-tone to Initiate a Selective Call on page 100. Refer to 10.6 Sending a Status Message (Status Call) on page 118.	ALL
Calling Alert	A Calling Alert Tone is sent to the other transceiver. Refer to 6.4 Using Sound to Notify the Reception (Calling Alert Tone) (Analog Conventional System Only) on page 33.	Analog Conventional system
CW Message	A CW Message is sent. Refer to 8.8 Communicating using a CW Message on page 75.	NXDN Conventional system
Emergency	The transceiver enters Emergency Mode.  Note "Emergency" can be assigned for the Side 1 key or Side 2 key only as the function when the key is held. Refer to 14.1 Placing the transceiver in Emergency Mode on page 151.	ALL
Key Lock	A user can toggle the Key Lock between enabled and disabled. Refer to 3.8 Locking the Transceiver Keys (Key Lock) on page 16.	ALL
Key Lock with Status Memory	A user can toggle the Key Lock between enabled and disabled. The configuration of Key Lock will be retained even if the transceiver is turned OFF. Refer to 3.8 Locking the Transceiver Keys (Key Lock) on page 16.	ALL
Lone Worker	A user can toggle the Lone Worker between enabled and disabled. Refer to 14.6 Placing the Transceiver in Emergency Mode Using Lone Worker on page 161.	ALL
Low Transmit Power	The transmission power of the transceiver is changed to high power or low power. This function is available only on the channel where "High" is configured for Transmit Power in KPG-169D/ KPG-170D. Refer to 4.2 Transmission Power on page 17.	ALL

A.1 Available Functions for the PF Keys

Function Name	Description	Available System ^{*1}
Monitor	In an Analog Conventional system, the transceiver disables QT tone or DQT code and Optional Signaling, and unmutes the speaker upon detection of a carrier. Refer to Temporarily Disabling the Signaling (Monitor) on page 95 . In an NXDN Conventional system, the transceiver disables RAN code and Optional Signaling, and unmutes the speaker upon detection of an NXDN frame. Refer to Temporarily Disabling the Signaling (Monitor) on page 56 .	ALL
Monitor Momentary	While the Monitor Momentary key is pressed and held in an Analog Conventional system, the transceiver disables QT tone or DQT code and Optional Signaling, and unmutes the speaker upon detection of a carrier. Refer to Temporarily Disabling the Signaling (Monitor) on page 95 . While the Monitor Momentary key is pressed and held in an NXDN Conventional system, the transceiver disables RAN code and Optional Signaling, and unmutes the speaker upon detection of an NXDN frame. Refer to Temporarily Disabling the Signaling (Monitor) on page 56 .	ALL
Paging Call	A Paging Call is initiated to the target ID configured for the selected channel. Refer to 8.3 Making an Individual Call/ Paging Call on page 58 . Refer to 10.4 Making a Selective Call/ Paging Call on page 111 .	ALL
Priority Zone-Channel Select	The selected channel will be a Priority Channel. Refer to 16.2 Scanning the Specific Channel Preferentially (Priority Scan) on page 172 .	ALL
Scan	The transceiver starts or stops scanning. Refer to 16 SCAN on page 172 .	ALL
Scan Temporary Delete	By selecting a channel to be scanned and pressing the Scan Temporary Delete key, the channel will be deleted temporarily from the channels to be scanned. Refer to Temporarily Deleting a Channel to Be Scanned (Scan Temporary Delete) on page 175	ALL
Scrambler/ Encryption	A user can toggle the Voice Scrambler/ Encryption between enabled and disabled. Refer to 15 COMMUNICATION SECURITY on page 163 .	ALL
Send the GPS data	A user can manually send the received GPS data from the microphone with an optional GPS receiver unit to the base station via a communication port of the transceiver. Refer to 8.10 Sending GPS Data on page 82 . Refer to 10.7 Sending GPS Data on page 121 .	ALL
Squelch Off	The transceiver opens squelch and unmutes the speaker. Refer to Temporarily Disabling the Squelch (Squelch Off) on page 87	Analog Conventional system
Squelch Off Momentary	The transceiver opens squelch and unmutes the speaker while the Squelch Off Momentary key is pressed and held. Refer to Temporarily Disabling the Squelch (Squelch Off) on page 87	Analog Conventional system
Talk Around	A user can toggle the Talk Around between enabled and disabled. Refer to Communicating Without Using a Repeater (Talk Around) on page 53 Refer to Communicating Without Using a Repeater (Talk Around) on page 92	ALL
Zone Down	The zone number decreases in steps of 1.	ALL
Zone Up	The zone number increases in steps of 1.	ALL

*1 ALL indicates that the function can be used in all systems.

Mobile

The following functions can be assigned to the **PF** keys of the transceiver using KPG-175D:

Table A-2 Available Functions for the PF Keys

Function Name	Description	Available System ^{*1}
None	Nothing will be activated.	ALL
Autodial	The DTMF code corresponding to the list number in the Autodial List configured for the selected channel is sent. Refer to 12.1 Sending a DTMF Code Using the Autodial Key (Autodial) on page 133.	Analog Conventional system
AUX	The status of the AUX Output port is alternated. 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 port can be changed by pressing the AUX key, hence an external device connected to the AUX port can be controlled.  Note The transceiver can be configured to light the 2 dots on the LED display (the left dot and the right dot) and the LED (blue) when the AUX Output port becomes active. (Refer to 5.5 Lighting the LEDs According to the Transceiver's Status on page 25.)	ALL
Call 1, Call 2	A 2-tone code, FleetSync status, or NXDN status assigned to the Call 1 key or Call 2 key is sent. In addition, an Individual Call (Individual Call Acknowledge Request) can be initiated to the NXDN Unit ID assigned to the Call 1 key or Call 2 . Refer to 8.4 Initiating an Individual Call After Ensuring That the Target Party Is Available for Communications (Individual Call Acknowledge Request) on page 61. Refer to 8.7 Sending a Status Message (Status Call) on page 72. Refer to 9.4 Using 2-tone to Initiate a Selective Call on page 100. Refer to 10.6 Sending a Status Message (Status Call) on page 118.	ALL
Channel Down	The channel number decreases in steps of 1.	ALL
Channel Down (Continuous)	Pressing and holding the Channel Down (Continuous) key will decrease the channel number in steps of 1 every 200 ms.	ALL
Channel Up	The channel number increases in steps of 1.	ALL
Channel Up (Continuous)	Pressing and holding the Channel Up (Continuous) key will increase the channel number in steps of 1 every 200 ms.	ALL
Channel Entry	A channel number can be directly specified using the microphone keypad. Refer to Changing the Channel by Specifying the Number (Channel Entry) on page 12.	ALL
CW Message	A CW Message is sent. Refer to 8.8 Communicating using a CW Message on page 75.	NXDN Conventional system
Direct Zone-Channel	The transceiver migrates to the lowest number channel in the lowest number zone. Refer to Changing the Zone-channel with a Single Touch (Direct Zone-Channel) on page 14.	
Emergency	The transceiver enters Emergency Mode.  Note "Emergency" can be assigned to the Triangle key only as the function when the key is held. Refer to 14.1 Placing the transceiver in Emergency Mode on page 151.	ALL
External Speaker	A user can toggle the speaker to be used between the external speaker connected to the transceiver and the internal speaker of the transceiver. Refer to 6.9 Switching the Internal/ External Speaker (External Speaker) on page 40.	ALL

A.1 Available Functions for the PF Keys

Function Name	Description	Available System ^{*1}
Horn Alert	A user can toggle the Horn Alert between enabled and disabled. Refer to 19.2 Controlling Car Behavior by Linking with the Horn Alert Port Status (Horn Alert) on page 189.	ALL
LED Brightness	A user can gradually change the brightness of the LED display. Refer to Changing the Brightness of the LED Display (LED Brightness) on page 24.	ALL
Lone Worker	A user can toggle the Lone Worker between enabled and disabled. Refer to 14.6 Placing the Transceiver in Emergency Mode Using Lone Worker on page 161.	ALL
Monitor	In an Analog Conventional system, the transceiver disables QT tone or DQT code and Optional Signaling, and unmutes the speaker upon detection of a carrier. Refer to Temporarily Disabling the Signaling (Monitor) on page 95. In an NXDN Conventional system, the transceiver disables RAN code and Optional Signaling, and unmutes the speaker upon detection of an NXDN frame. Refer to Temporarily Disabling the Signaling (Monitor) on page 56.	ALL
Monitor Momentary	While the Monitor Momentary key is pressed and held in an Analog Conventional system, the transceiver disables QT tone or DQT code and Optional Signaling, and unmutes the speaker upon detection of a carrier. Refer to Temporarily Disabling the Signaling (Monitor) on page 95. While the Monitor Momentary key is pressed and held in an NXDN Conventional system, the transceiver disables RAN code and Optional Signaling, and unmutes the speaker upon detection of an NXDN frame. Refer to Temporarily Disabling the Signaling (Monitor) on page 56.	ALL
Operator Selectable Tone	The user can toggle the OST between enabled and disabled. Refer to 9.3 Changing the Decode/ Encode Combination of QT/DQT to Communicate (OST) on page 97.	Analog Conventional system
Paging Call	A Paging Call is initiated to the target ID configured for the selected channel. Refer to 8.3 Making an Individual Call/ Paging Call on page 58. Refer to 10.4 Making a Selective Call/ Paging Call on page 111.	ALL
Priority Zone-Channel Select	The selected channel will be a Priority Channel. Refer to 16.2 Scanning the Specific Channel Preferentially (Priority Scan) on page 172.	ALL
Public Address	The user can toggle the Public Address between enabled and disabled. Refer to 6.6 Using the Transceiver as a Megaphone (Public Address) on page 35.	ALL
Scan	The transceiver starts or stops scanning. Refer to 16 SCAN on page 172.	ALL
Scan Delete/Add	For scanning, the selected channel is added to or deleted from the target channels. Refer to 16 SCAN on page 172.	ALL
Scrambler/ Encryption	A user can toggle the Voice Scrambler/ Encryption between enabled and disabled. Refer to 15 COMMUNICATION SECURITY on page 163.	ALL
Scrambler/ Encryption Code	Pressing and holding the Scrambler/Encryption Code key causes the transceiver to enter Scrambler/ Encryption Code Mode. In Scrambler/Encryption Code Mode, the Scrambler Code and Encryption Key data can be changed. Refer to 15 COMMUNICATION SECURITY on page 163.	Voice Scrambler: Analog Conventional system Encryption: NXDN Conventional system

A.1 Available Functions for the PF Keys

Function Name	Description	Available System ^{*1}
Send the GPS data	A user can manually send the received GPS data from an optional GPS receiver unit to the base station via a communication port of the transceiver. Refer to 8.10 Sending GPS Data on page 82 . Refer to 10.7 Sending GPS Data on page 121 .	ALL
Squelch Level	The transceiver enters Squelch Level Mode. In Squelch Level Mode, the Squelch level can be changed. Refer to Adjusting the Squelch Level (Squelch Level) on page 88 .	Analog Conventional system
Squelch Off	The transceiver opens squelch and unmutes the speaker. Refer to Temporarily Disabling the Squelch (Squelch Off) on page 87	Analog Conventional system
Squelch Off Momentary	The transceiver opens squelch and unmutes the speaker while the Squelch Off Momentary key is pressed and held. Refer to Temporarily Disabling the Squelch (Squelch Off) on page 87	Analog Conventional system
Talk Around	A user can toggle the Talk Around between enabled and disabled. Refer to Communicating Without Using a Repeater (Talk Around) on page 53 Refer to Communicating Without Using a Repeater (Talk Around) on page 92	ALL
Volume Down	The volume level decreases in steps of 1.	ALL
Volume Down (Continuous)	Pressing and holding the Volume Down (Continuous) key will decrease the volume level in steps of 1 every 200 ms.	ALL
Volume Up	The volume level increases in steps of 1.	ALL
Volume Up (Continuous)	Pressing and holding the Volume Up (Continuous) key will increase the volume level in steps of 1 every 200 ms.	ALL
Zone Down	The zone number decreases in steps of 1.	ALL
Zone Down (Continuous)	Pressing and holding the Zone Down (Continuous) key will decrease the zone number in steps of 1 every 200 ms.	ALL
Zone Up	The zone number increases in steps of 1.	ALL
Zone Up (Continuous)	Pressing and holding the Zone Up (Continuous) key will increase the zone number in steps of 1 every 200 ms.	ALL

*1 ALL indicates that the function can be used in all systems.

Configuration using KPG-169D/ KPG-170D/ KPG-175D

Assigning functions to the PF keys ( See Edit > Key Assignment)

A.2 Available Functions for COM Port

Portable

For Portable, the COM port 0 is assigned to the 2.5/ 3.5D connector (TXD/ RXD).

The following functions can be assigned to the communication port using KPG-169D/ KPG-170D:

Table A-3 Available Functions for COM Ports (Portable)

Configuration	Communication Port	
	COM port 0	
None	The transceiver can communicate with KPG-169D/ KPG-170D.	
GPS	Position data can be acquired from the microphone with a GPS receiver unit. The received GPS data can be transferred. The transceiver can communicate with KPG-169D/ KPG-170D.	

Configuration using KPG-169D/ KPG-170D

Assigning functions to COM port ( See Edit > Optional Features > Common 3 > Function)

Mobile

Mobile has the following 2 communication ports:

- **COM port 0**

COM port 0 is assigned to the microphone jack on the front panel (TXD: Pin No.4/ RXD: Pin No.7).

- **COM port 1**

COM port 1 is assigned to the D-sub 15-pin connector on the rear panel (TXD: Pin No.6/ RXD: Pin No.7).

The following functions can be assigned to communication ports using KPG-175D:

Table A-4 Available Functions for COM Ports (Mobile)

Configuration	Communication Port	
	COM port 0	COM port 1
None	The transceiver can communicate with KPG-175D.	
Data	The transceiver can communicate with a PC by using PC commands. The transceiver can communicate with KPG-175D.	
GPS	-	Position data can be acquired from the GPS receiver unit. The received GPS data can be transferred. The transceiver can communicate with KPG-175D.

 **Note**

“Data” cannot be assigned to both COM port 0 and COM port 1 one at a time.

Configuration using KPG-175D

Assigning functions to COM port ( See Edit > Extended Function > AUX > Function)

COM Port Settings

Portable

By using KPG-169D/ KPG-170D, the following configurations are available for the communication port:

Table A-5 COM Port Settings (Portable)

Configuration	Description
Polarity	Polarity is the logic of data lines for sending GPS data using a communication port. Polarity is fixed at Normal, and this configuration cannot be changed.
Stop Bit	Stop Bit is the bit information for sending GPS data using a communication port. "1" or "2" can be configured for Stop Bit. To use a KMC-48GPS, "1" needs to be configured for Stop Bit.
Baud Rate	Baud Rate is the communication rate for sending GPS data using a communication port. Baud Rate can be configured to 4800 bps or 9600 bps. To use a KMC-48GPS, Baud Rate needs to be configured to 9600 bps.

Configuration using KPG-169D/ KPG-170D

- Configuring the Polarity ( See Edit > Optional Features > Common 3)
- Configuring the Stop Bit ( See Edit > Optional Features > Common 3)
- Configuring the Baud Rate ( See Edit > Optional Features > Common 3)

Mobile

By using KPG-175D, the following configurations are available for the communication port:

Table A-6 COM Port Settings (Mobile)

Configuration	Description
Polarity	Polarity is the logic of data lines for sending GPS data using a communication port. Polarity is fixed at Normal, and this configuration cannot be changed.
Stop Bit	Stop Bit is the bit information for data communications or GPS data communications by using a communication port. "1" or "2" can be configured for Stop Bit.
Baud Rate	Baud Rate is the communication rate for data communications or GPS data communications by using a communication port. Baud Rate can be configured by selecting from 1200 bps, 2400 bps, 4800 bps, 9600 bps or 19200 bps.

Configuration using KPG-175D

- Configuring the Polarity ( See Edit > Extended Function > AUX)
- Configuring the Stop Bit ( See Edit > Extended Function > AUX)
- Configuring the Baud Rate ( See Edit > Extended Function > AUX)

Serial Protocol Types

Supported Models: Mobile

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-175D.

Table A-7 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-175D

Configuring the PC Interface Protocol ( See Edit > Extended Function > AUX)

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* and # Digit Time 140

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