KNG M-150/M-400/M-500

Radio User's Manual

Many factors are taken into consideration when implementing features and functionality of KNG Series radios. Easy of use and customer requirements are among the most important to us. Most enhancements are achieved thru radio firmware updates.

Current firmware and radio editor versions, along with the latest user manuals and addendums, are available for download in the support section of the RELM Wireless web site.

We recommend joining our e-mail list to keep informed of updates and enhancements on all your RELM Wireless and BK Radio products.

Visit us at:
www.relm.com

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Introduction

Congratulations on your purchase of the BK Radio KNG Mobile radio from RELM Wireless.

The KNG APCO Project 25 radio offers an array of programmable functionality to help radio users get the most out of their portable communications. Check with your RELM/BK Radio dealer or communications officer for information on the programmed functions of your radio prior to operation.

This manual contains information concerning the operation procedures for the BK Radio KNG Mobile radio. The KNG has been designed to meet the tough requirements of today's communications environment. Please take a moment to read the information in this manual so you can get optimum performance from your new radio.

FCC Requirements

Your radio must be properly licensed by the Federal Communications Commission prior to use. Your BK Radio dealer can assist you in meeting these requirements. Your dealer will program each radio with your authorized frequencies, signaling codes, etc., and will be there to meet your communications needs as your system expands.

Safety Precautions

- Do not operate the transmitter in close proximity to blasting caps.
- Do not operate the radio in an explosive atmosphere (petroleum fuels, solvents, dust, etc.).
- Do not operate the transmitter if a person outside the vehicle is less than three feet from the antenna or touching the antenna.

RF ENERGY EXPOSURE AWARENESS AND CONTROL INFORMATION, AND OPERATIONAL INSTRUCTIONS FOR FCC OCCUPATIONAL USE REQUIREMENTS

BEFORE USING YOUR MOBILE 2-WAY RADIO, READ THE INFORMATION BELOW WHICH CONTAINS IMPORTANT OPERATING INSTRUCTIONS FOR SAFE USAGE AND RF ENERGY AWARENESS AND CONTROL INFORMATION FOR COMPLIANCE WITH RF ENERGY EXPOSURE LIMITS IN APPLICABLE

National and International Standards

NOTICE: This radio is intended for use in occupational/controlled conditions, where users have full knowledge of their exposure and can exercise control over their exposure to meet FCC limits. This radio device is NOT authorized for general population, consumer, or any other use.

This 2-way radio uses electromagnetic energy in the radio frequency (RF) spectrum to provide communications between two or more users over a distance. It uses radio frequency (RF) energy or radio waves to send and receive calls. RF energy is one form of electromagnetic energy; other forms include, but are not limited to, sunlight and x-rays. RF energy, however, should not be confused with these other forms of electromagnetic energy, which when used improperly, can cause biological damage. Very high levels of x-rays, for example, can damage tissues and genetic material.

Experts in science, engineering, medicine, health and industry work with organizations to develop standards for exposure to RF energy. These standards provide recommended levels of RF exposure for both workers and the general public. These recommended RF exposure levels include substantial margins of protection. All 2-way radios are designed, manufactured, and tested to ensure they meet government established RF exposure levels. In addition, manufacturers also recommend specific operating instructions to users of 2-way radios.

These instructions are important because they inform users about RF energy exposure and provide simple procedures on how to control it. Please refer to the

following websites for more information on what RF energy exposure is and how to control your exposure to assure compliance with established RF exposure limits.

http://www.fcc.gov/oet/rfsafety/rf-faqs.html

http://www.osha.gov/SLTC/radiofrequencyradiation/index.html

Federal Communications Commission Regulations

The FCC rules require manufacturers to comply with the FCC RF energy exposure limits for mobile 2-way radios before they can be marketed in the U.S. When 2-way radios are used as a consequence of employment, the FCC requires users to be fully aware of and able to control their exposure to meet occupational requirements. Exposure awareness can be facilitated by the use of a product label directing users to specific user awareness information. Your BK Radio 2-way radio has an RF exposure product label. Also, your BK Radio owner's and service manuals include information and operating instructions required to control your RF exposure and to satisfy compliance requirements.

Compliance with RF Exposure Standards

Your BK Radio 2-way radio is designed and tested to comply with a number of national and international standards and guidelines (listed below) for human exposure

to radio frequency electromagnetic energy. This radio complies with the IEEE and ICNIRP exposure limits for occupational/controlled RF exposure environment at operating duty factors of up to 50% talk-50% listen and is authorized by the FCC for occupational use only. In terms of measuring RF energy for compliance with the FCC exposure guidelines, your radio antenna radiates measurable RF energy only while it is transmitting (during talking), not when it is receiving (listening) or in Standby Mode.

Your BK Radio 2-way radio complies with the following RF energy exposure standards and guidelines:

United States Federal Communications Commission, Code of Federal Regulations; 47 CFR §§ 1.1307, 1.1310, 2.1091 and 2.1093

American National Standards Institute (ANSI) / Institute of Electrical and Electronic Engineers (IEEE) C95. 1-1992

Institute of Electrical and Electronic Engineers (IEEE) C95.1-1999 Edition

Industry Canada Compliance

This Class B digital apparatus complies with Canadian ICES-003.

Cet appareil numerique de la classe B est conforme à la norme NMB-003 Canada.

RF Exposure Compliance and Control Guidelines

To control exposure to yourself and others and to ensure compliance with the RF exposure limits, always adhere to the following procedures.

Guidelines:

- User awareness instructions must accompany device when transferred to other users.

- Do not use this device if the operational requirements described herein are not met.

Operating Instructions:

Transmit no more than the rated duty factor of 50% of the time. To transmit (talk), push the Push-To-Talk (PTT) button. The red LED will illuminate when the radio is transmitting. To receive calls, release the PTT button. The red LED will extinguish when the radio stops transmitting. Transmitting 50% of the time, or less, is important because this radio generates measurable RF energy exposure only when transmitting (in terms of measuring for standards compliance).

Transmit only when persons around the vehicle are at least 3 feet (90 centimeters) away from the vehicle with a properly installed antenna. This separation distance will ensure that there is sufficient distance from a properly installed (according to installation instructions) externally-mounted antenna to satisfy the RF exposure requirements in the standards listed above.

The AMBE® voice compression software included in this product is protected by intellectual property rights including patent rights, copyrights and trade secrets of Digital Voice Systems, Inc. The user of this software is explicitly prohibited from attempting to decompile, reverse engineer, or disassemble the object code, or in any other way convert the object code into a human-readable form. This software is licensed solely for use within this product. US Patent Nos. #6,912,495 B2, #5,870,405, #5,826,222, #5,754,974, #5,715,365, #5,701,390, #5,649,050, #5,630,011, #5,581,656, #5,517,511, #5,491,772, #5,247,579, #5,226,084, and #5,195,166.

Contact Information

For additional information on exposure requirements or other information, visit website http://www.relm.com.

Radio Controls
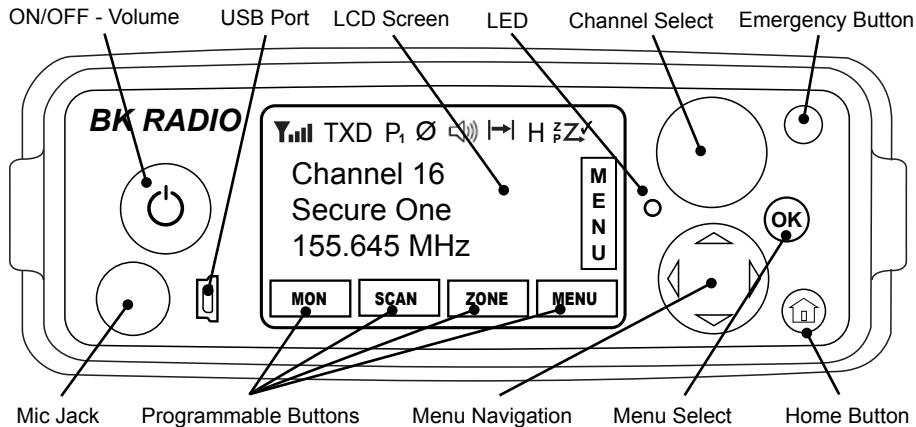
On / Off / Volume: This control is both a push on/off button and a rotate volume knob. Pushing the button in and releasing will toggle the state of the mobile from on to off and back. Rotating this knob will increase or decrease the audio volume setting.

USB Port: This is a USB client port and is used for programming and configuring the radio with the Windows PC programming software.

LCD Touch Screen: The LCD screen is used to show radio status and operating condition as well as receive input from the user via programed buttons. Up to three lines of information can be displayed in the main display window. (See Display Options)

LED: The LED indicator is used to show various operational states such as active receive and active transmit.

Channel Select: The Channel Select knob may be programmed via PC to select channels or zones. Turn the knob to select the desired channel or zone.

Emergency Button: The orange programmable function is typically assigned to enter the Emergency Operation mode but can be programmed for other functions.
(See Button Options)

Microphone Jack: Connector for attaching the microphone.

Programmable Buttons: Up to four touch-activated buttons can be programmed to the LCD display. (See Button Options)

Menu Navigation: The menu navigation pad is used to navigate the menu system. Use the right/left buttons to highlight a menu selection. Press OK to select the currently highlighted menu item.

Home: When navigating a menu pressing the Home button will exit the menu mode and return to normal radio operation.

LCD Touch Screen

KNG mobile radios are equipped with a programmable touch sensitive display.

The bottom line of the display is populated with programmable buttons. Button functions are assigned using the PC radio editor. Buttons are toggled off or on by pressing the displayed icon.

The top line displays radio activity such as transmit and receive indications, scan operations, etc.

The middle section shows programmed information for the selected channel. (See Channel Information Display Options)

Status Indicators —

Programmable Channel Information —

Programmable Buttons —

Channel 16
Secure One
155.645 MHz

MON SCAN ZONE T/A

MENU
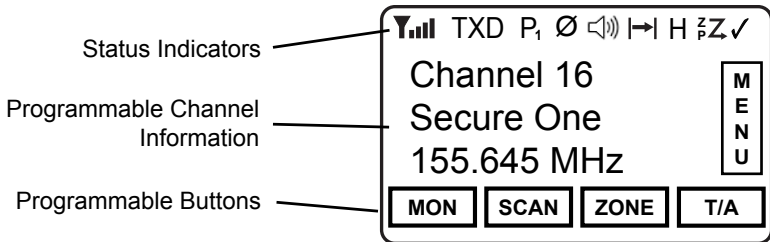
Status Indicators	
$\mathbf{Y_{ull}}$	Receiver Signal Strength
RXD, RXA	Receive Digital, Receive Analog, Hold Time Active
TXD, TXA	Transmit Digital, Transmit Analog
H, L	High or Low Transmit Power
P1, P2	Priority 1 Channel, Priority 2 Channel
Ø	Selected channel is set to transmit encrypted or when Rx incoming signal is encrypted
✓	Scanned Channel
^{c}Z	Channel Scan On

(continued)

Status Indicators	
^{Z}Z	Zone Scan On
$_{P}Z$	Priority Scan On
$\mapsto$	Repeater Talkaround Enabled
◁	Monitor Mode
◁ (flashing)	Flashing indicates Normal Mode in digital operation
◀	Open Audio
◁ (muted)	Voice Mute Enabled

Channel Information Display Options

NOTE: Three channel information lines are programmable with PC Radio Editor.

Channel Number	Channel Number of Currently Selected Channel or Active Scanned Channel
Channel Label	Alphanumeric Label of Currently Selected Channel or Active Scanned Channel
Channel Number and Zone Label	Currently Selected Channel number and Currently Selected Zone Label
Frequency*	Operating Frequency of Currently Selected Channel or Active Scanned Channel
Unit ID	Shows your P25 Unit ID
	While receiving, the ID of the radio transmitting the message is displayed
	If the received ID is programmed in your radio's Call List, the corresponding label will be displayed
Received Talk Group ID	P25 Talk Group ID of the radio transmitting the message currently being received

(cont.)

Channel Information Display Options (continued)	
Rx Picklist Selections*	Displays active Rx picklist NAC, TGID and/or Tone
Tx Picklist Selections*	Displays active Tx picklist NAC, TGID and/or Tone
Zone Number	Number of Currently Selected Zone
Zone Label	Programmed Label of Currently Selected Zone
Zone # and Channel #	Currently Selected Zone and Channel Numbers
RX/TX Key	Currently selected encryption key
Subaudible*	Displays CxCSS value of received signal
DTMF*	Displays the numeric DTMF tones of received signal
MDC*	Displays the numeric MDC ID of received signal

* Conventional channel only.

Programmable Button Options

NOTE: Active functions are indicated by highlighted text.
 SCAN = Active, **SCAN** = Inactive.

Label	Function	Trunk	Conv.
ALRT	Call Alert	x	x
AUX1/2/3	Activate Programmed Auxiliary Input/Output Functions	x	x
CHAN	Channel Select (Direct microphone keypad entry or navigation wheel selection)	x	x
CHAN+/-	Add/Delete Command Zone Channels		x
DEL	Nuisance Channel Delete		x
DSCN	Dual Mode Scan	x	x
INH	Radio Inhibit Menu		x
KEY	User Selectable Encryption Key (Encrypted Models)	x	x
KSET	User Selectable Encryption Keyset (Encrypted OTAR Models)	x	x
LCK	Control Lock	x	x
LITE	Keypad and Display Backlight	x	x

(cont.)

Programmable Button Options (continued)

Label	Function	Trunk	Conv.
MENU	Open the programmed radio menu	x	x
MON	Monitor	x	x
MUTE	Voice Mute		x
PRI	Set Priority Channels		x
PSCN	Priority Scan	x	x
PWR	Transmit in Low Power Mode	x	x
RCHK	Radio Check		x
RKEY	Request OTAR Encryption Rekey	x	x
RXCG	User Selectable RX CTCSS/CDCSS Code Guard (Analog or Mixed Mode Operation)		x
RXNC	User Selectable Receive NAC		x
SCAN	Channel Scan		x
SCN+	Add/Delete Scan Channels		x
SEC	Transmit Secure (Encrypted Models)	x	x

(cont.)

Programmable Button Options (continued)

Label	Function	Trunk	Conv.
SQL	Squelch Adjust		x
STDS	Site Display**	x	
STLK	Site Lock**	x	
STS	User Status Menu		x
STSR	Site Search**	x	
SURV	Surveillance Mode	x	x
T/A	Repeater Talkaround		x
TGID	User Selectable Talk Group (Digital or Mixed Mode Operation)		x
TXAD	Transmit Digital (Mixed Mode Operation)		x
TXCG	User Selectable TX CTCSS/CDCSS Code Guard (Analog or Mixed Mode Operation)		x
TXNC	User Selectable TX NAC (Digital or Mixed Mode Operation)		x
TXT	Text Message Menu		x

(cont.)

Programmable Button Options (continued)

Label	Function	Trunk	Conv.
UNINH	Radio Unihibit Menu		x
UNIT	Unit-to-Unit Call (Digital Operation Only)	x	x
ZERO	Zeroize Encryption Keys and Password (Encrypted Models)	x	x
ZONE	Channel Zone Select	x	x
ZSC+	Add/Delete Zone Scan Zones		x
ZSCN	Zone Scan		x

Microphone Controls

Many functions of the KNG Mobile can be controlled via the optional KAA0290 Smart Microphone.

KAA0290 functions include three programmable function buttons, an alphanumeric keypad and a function select switch.

Push-To-Talk

Programmable Function Buttons

Microphone Element

Alphanumeric Keypad

Function Select
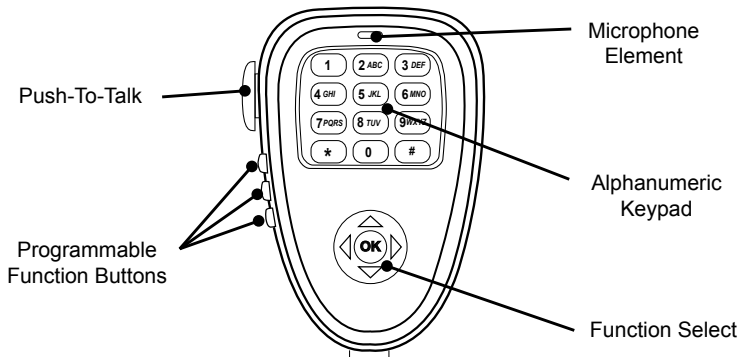
Push-to-Talk: Press and hold the PTT (Push-To-Talk) switch on the microphone to transmit.

Microphone Element: While transmitting, talk in a normal voice with the microphone approximately one to two inches from your mouth.

Function Buttons: The three function buttons on the left side of the microphone can be programmed via PC to access specific radio functions. (See Programmable Button Options)

Alphanumeric Keypad: Depending on radio programming, the keypad can perform a variety of functions. Keypad functions can include DTMF tone generation, direct channel selection, direct P25 ID entry for unit-to-unit calling and field programming.

Function Select: The menu navigation pad is used to navigate the menu system. Use the right/left buttons to highlight a menu selection. Press OK to select the currently highlighted menu item.

Function Selection

Most radio functions can be programmed as Touch Screen selections, microphone button selections or as part of a menu list.

NOTE: Items can be directly accessed from the Touch Screen or by using the navigation wheels on the front panel or microphone.

Touch Screen Selection

To toggle assigned Touch Screen functions on and off, or access the associated menu, press the desired function on the LCD touch screen.
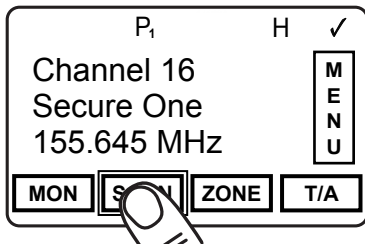
Navigation Wheel Selection

The navigation wheels on the radio front panel and microphone can also be used to toggle functions and access menu lists.

Use the right and left arrows to highlight the desired function. Press the OK button to open the menu or toggle the highlighted item.

The active button will be indicated by an outline.
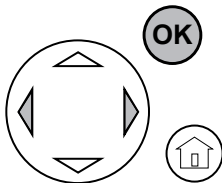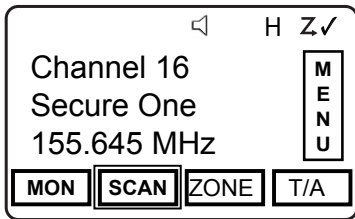
Menu Screen Selection

The "MENU" button accesses a list of additional programmed functions. The list is accessed by pressing the button or highlighting "MENU" with the Navigation Wheel and pressing OK.
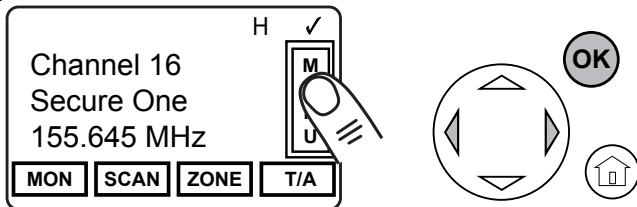
Use the "PREV" and "NEXT" buttons or the up/down arrows to highlight the desire setting and "ENTER" to select or set the function.

Use "ENTER" to select the function.
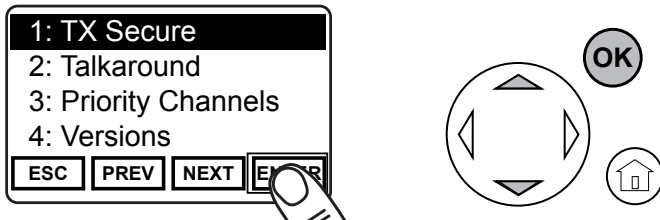
Exiting the Menu

To return to normal operation press the HOME button or press and hold "ESC".
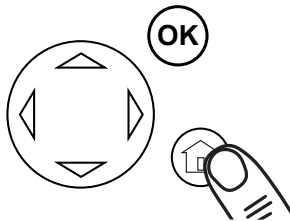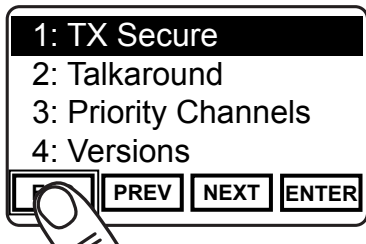
Menu Options

The following items may be programmed as menu items.

Backlight	Monitor	Radio Info	Tx Power
Call Alert	Picklist-Keyset***	Rekey Request***	Tx Secure*
Channel Scan	Picklist-Key*	Talkaround	Unihibit
Channel Scan List	Picklist-Rx CxCSS	Site Display**	Unit Call
Channel Select	Picklist-Rx NAC	Site Lock**	User Status
Cloning	Picklist-TGID	Site Search**	Version
Contrast	Picklist-Tx CxCSS	Squelch Adjust	Voice Mute
Control Lock	Picklist-Tx NAC	Surveillance Mode	Zeroize Keys*
Dual Mode Scan	Pri Channel Select	System Test	Zone Scan
Inhibit	Priority Scan	Text Message	Zone Scan List
Programming[1]	Radio Check	Tx Digital	Zone Select

[1] See Keypad Programming Items chart for details

* Requires Encryption option.

** Requires Trunking options

*** Requires Over-the-Air Rekeying option.

Keypad Programming Items	
Keypad	Allows programming of channels, zones and global settings.
CxCSS Picklist	Allows programming of the selectable Code Guard list.
NAC Picklist	Allows programming of the selectable Network Access Code list.
TGID Picklist	Allows programming of the selectable Talk Group ID list.
Call List	Allows programming of the P25 IDs and associated labels in the call list.

Channel/Zone Selection Options

The KNG can be programmed with up to 2048 individual channels. These channels can be divided into zones of one or more channels. Accessing a channel or zone depends on radio programming.

Channels or zones can be selected using the channel/zone select knob, by an assigned button or menu item or by direct keypad entry. More than one selection mode can be programmed.

Channel/Zone Selector Knob

When programmed with the default setting, the channel/zone knob is used to select a channel from the active zone. If programmed to select zones, active zones will be selected with the knob.

Channels or zones may also be accessed via button, menu or keypad selection. See below.

Button/Menu Item Selection

```
┌─────────────────────────┐
│     Channel Select      │
│  1: Channel One         │
│  2: Channel Two         │
│ ➡ 3: Channel Three      │
│ ESC  PREV  NEXT  ENTER  │
└─────────────────────────┘
```

If programmed to a button, pressing the button will display the list of available channels or zones. If programmed as a menu item, the lists can be displayed by selecting Zone or Channel select from the menu list.

```
┌─────────────────────────┐
│     Channel Select      │
│  1: Channel One         │
│  2: Ch  120  wo         │
│ ➡ 3: Channel Three      │
│ ESC  PREV  NEXT  ENTER  │
└─────────────────────────┘
```

Use the Prev/Next or up/down buttons to scroll to the desired selection.

Alternatively, the KAA0290 microphone number keys can be used to jump directly to the desired channel or zone.

Press ENT to go to the highlighted zone or channel.

Direct Keypad Entry

```
Channel Select
  1: Channel One
  2: Ch  120  wo
➡ 3: Channel Three
ESC   PREV   NEXT   ENTER
```

The KAA0290 numeric keypad may also be programmed to directly select channels or zones. Pressing a number will activate the zone or channel list.
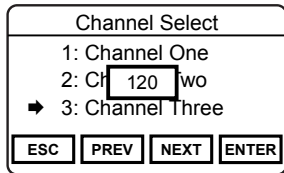
Using Knob and Button Operations Together

When selected via the button, menu or keypad method, the entered channel or zone becomes active regardless of the knob position.

When the knob is turned, the radio leaves the keypad selected channel and goes to the next available channel.

Basic Operation

Receive

1. Turn power on by pushing and releasing the Volume knob. The radio will beep, indicating that it has passed its self test and is operational.

2. Set volume by pressing and holding the [MON] button, to hear squelch noise or by selecting "Monitor" from the menu list and selecting "Open" . Turn the Volume knob to set a comfortable volume level. Press the [MON] button again or select desired monitor mode from the "Monitor" menu to stop squelch noise.

3. Select a channel zone (if applicable) by pressing the [ZONE] button or selecting "Zone Select" from the menu and scrolling to the desired zone. Press the "OK" button to return to Channel Select mode.

4. Select a channel by turning the Channel Selector knob. When the unstopped channel selector is rotated past the highest channel, the radio will return to the lowest channel. When rotated past the lowest (1st) channel, the radio will go to the highest channel.

Transmit

1. Press the PTT (Push-To-Talk) switch on the microphone. The TX annunciator appears on the display and the red Transmit indicator illuminates while the PTT is pressed.

2. Talk in a normal voice with the microphone approximately one to two inches from your mouth.

3. Release the PTT switch to stop transmitting.

4. If the TX annunciator does not appear and a tone is heard, you are on a receive-only channel or the channel is busy and Busy Channel Lockout is enabled. Turn the Channel Selector knob to an authorized transmit channel or wait until the channel is clear.

5. If the length of your transmission exceeds the preset Time-Out Timer setting, the transmitter automatically shuts off and a tone sounds. To continue the transmission, release the PTT switch, then press it again and continue talking.

Command Zone Operation

The KNG portable radio allows construction of Command Zones drawn from any of the programmed channels in standard operating zones. Each zone is designated as a Standard Operating Zone or a Command Zone with the PC radio editor software.

Building a Command Zone [CHAN+]

To build a Command Zone the "Channel Add/Delete" function must be assigned to a programmable button.

```
                           H ᶻₚZ✓
Channel 16
Secure One
155.645 MHz

CHAN+   ZONE   AUX1   SCAN
```
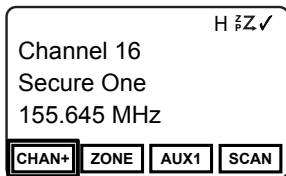
While operating in a standard zone press the "CHAN+" button to add the currently selected channel to a command zone. The list of available command zones will be displayed. Use the 'previous/next or up/down buttons to select the zone to add the channel or use the number keys to move directly to the desired zone.

Pressing the "Enter" button copies the channel information to the first available channel slot in the selected command zone.

Example: If the command zone has three channels, the newly added channel will be channel four.

Editing a Command Zone [CHAN-]

```
                          H ᶻₚZ✓
 Channel 16
 Secure One
 155.645 MHz

 CHAN+   ZONE   AUX1   SCAN
```
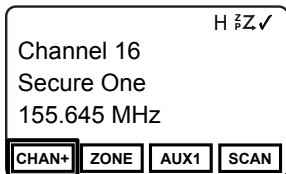
When operating in a Command Zone, press the "CHAN-" button to remove the selected channel from the zone.

When a channel is deleted, the display momentarily shows "Channel Deleted", and the following channels move up in the list. For example, if channel 5 is deleted, channel 6 becomes the new channel 5, channel 7 becomes the new channel 6, etc.

NOTE: Modifications to a command zone channel, such as User Selected Tones, do not affect the original standard zone channel.

Code Guard/NAC Operation

Conventional Channels

Code Guard Transmit

Whenever transmitting on an analog channel, any programmed sub-audible Code Guard is transmitted. Depending on radio programming, the Code Guard can be the default tone assigned to the channel or a tone selected from the Code Guard Picklist (see Pick List Options).

Busy/TX LED
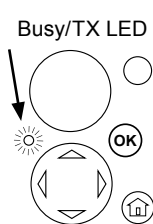
The frequency must be clear prior to transmitting on a Code Guarded channel. If the LED Indicator is yellow do not transmit. Busy Channel Lockout can be programmed to disallow transmitting while a channel is busy.

1. Press the PTT switch. When the transmitter is on, the LED Indicator glows red and TX appears in the display.

2 Talk in a normal voice with the microphone one to two inches from your mouth.

3. Release the PTT switch to stop transmitting.

Code Guard Receive

Analog channels programmed with a receive code guard will be heard only when the proper carrier frequency and Code Guard value is received. Analog and mixed mode receive channels will also unmute when the radio is in monitor mode.

Analog Squelch Control

Sub-audible signaling (CTCSS/CDCSS) is used to allow a group of radios to be selectively called in an analog system. Programming the receive code guard equal to zero allows for Carrier Squelch operation, where the radio will unmute whenever a carrier is detected regardless of the transmitted Code Guard.

APCO Project 25 Digital Squelch Control

Network Access Codes (NACs) provide the digital equivalent of analog sub-audible signaling (CTCSS/CDCSS) allowing a group of radios to be selectively called within a system.

Users in the same area (using the same NAC) can be further divided into Talk Groups, with each group having its own Talk Group ID (TGID). Group Calls are made by designating both the users' NAC and TGID.

Each radio also has an individual P25 unit ID. A Unit-to-Unit call contains the addressee's NAC, and uses the addressee's P25 unit ID instead of the TGID.

When operating in Digital Mode, each channel can be programmed to use either Normal squelch or Selective squelch.

Normal squelch is used to mimic analog operation. Signals are only qualified with the programmed NAC. TGIDs and P25 Unit IDs are ignored. Each digital channel is programmed with a receive NAC and a transmit NAC. When an incoming signal's NAC matches the channel's programmed receive NAC, the radio unmutes. The default NAC is 0659 ($293 hex).

The digital equivalent of carrier squelch is achieved by programming the receive NAC = $F7E (3966 decimal). The radio will unmute when a digital signal with any NAC is detected. The $F7E (3966 decimal) NAC is reserved for receivers and is not allowed as a transmit NAC.

Selective squelch is used for processing Group Calls and Unit-to-Unit Calls. TGIDs are assigned on a per-channel basis. Users can be separated into Talk Groups with each group having its own TGID. Then, on channels programmed for Selective squelch, the incoming signal's NAC and TGID must match the channels programmed receive NAC and TGID for the radio to unmute. The default TGID is 1.

The TGID value 65535 ($FFFF hex) is used to effect an "All Call". If the radio receives a signal with a matching NAC and the TGID = 65535 ($FFFF hex), it will unmute. Also, if the radio's programmed TGID is 65535 ($FFFF hex), it will open on any signal with a matching NAC, ignoring the incoming TGID.

Mixed Mode Operation

The receiver and transmitter are capable of operating in analog wide-band (25 kHz channel spacing), analog narrow-band (12.5 kHz channel spacing) and APCO Project 25 Digital Mode.

Each channel's Receive and Transmit Mode can be set independently as follows:

Mode	RX	TX
Analog	Receive qualified analog signals only	Transmit analog signals only
Digital	Receive qualified digital signals only	Transmit digital signals only
Mixed	Automatically receive qualified analog or digital signals	Transmit analog or digital signal, depending on the status of "TX Digital" switch

```
┌──────────────────────┐
│  TXD          H ⁊Z✓   │
│ Channel 16           │
│ Secure One           │
│ 155.645 MHz          │
│ CHAN+  ZONE  AUX1  SCAN │
└──────────────────────┘
```
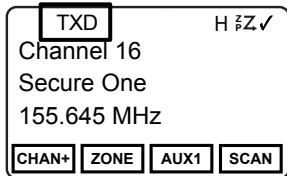
Digital receptions and transmissions will be indicated by illuminating the D annunciator in addition to the RX or TX annunciator.

```
┌─────────────────────────┐
│ ┌──────┐                 │
│ │ TXA  │      H ♂Z✓       │
│ └──────┘                 │
│ Channel 16              │
│ Secure One             │
│ 155.645 MHz            │
│ ┌────┐┌────┐┌────┐┌────┐│
│ │CHAN+││ZONE││AUX1││SCAN││
│ └────┘└────┘└────┘└────┘│
└─────────────────────────┘
```
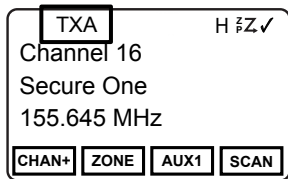
Analog receptions and transmissions will be indicated by illuminating the A annunciator in addition to the RX or TX annunciator.

Mixed Mode Talkback

If Mixed Mode Talkback is enabled, transmissions initiated while hold time remains will be in the same mode as the received signal, if the signal was received on the Ready to Transmit (RTX) channel. Depending on programming, the RTX channel can be the main channel, a held scan or priority channel if Talkback Scan is enabled, or the Priority 1 channel if "TX on PR1" is enabled. TX Mode on the RTX channel must be set to MIXED.

```
┌─────────────────────────┐
│ ┌──────┐                 │
│ ▾ᴵ│ RXA  │    H ♂Z✓       │
│ └──────┘                 │
│ Channel 16              │
│ Secure One             │
│ 155.645 MHz            │
│ ┌────┐┌────┐┌────┐┌────┐│
│ │CHAN+││ZONE││AUX1││SCAN││
│ └────┘└────┘└────┘└────┘│
└─────────────────────────┘
```
Press the PTT while the RX indicator is shown
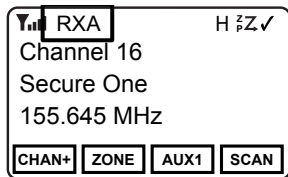
While hold time after a reception remains, transmissions will be in the same mode as the received signal, regardless of the status of the TX Digital switch. As in Talkback Scan, the RTX channel and receive annunciators will be displayed for the duration of the timer.

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Trunking Channel Basic Operation

Some KNG radios are equipped with optional P25 Trunking capability. To determine if your radio is trunking compatible, check the Options Label on the back of the radio. "KZA0579" indicates the trunking option is installed.

Trunking parameters and functions can only be programmed by qualified persons via PC. Contact your system administrator or radio dealer for information on how your radio is programmed.

System Registration

If the radio is powered on when a trunking channel is selected, the radio will attempt to register with the selected trunking system.

The LED will flash twice upon successfully registering with the system and setting talkgroup affiliation.

If the affiliation was unsuccessful the LED will continue to flash.

If the radio is not in range of the system "Out of Range" will be displayed and an alert tone will sound every ten seconds.

If registration is refused or denied, a denied message and tone will appear briefly before switching to "Out of Range" mode.

After successful registration the programmed LCD display criteria is displayed.

Transmitting

When the PTT is pressed, a three beep Talk Permit Tone will be heard if the channel is available.

If there is no channel available the radio will emit a tone and display "BUSY". Release the PTT.

The radio will remain in busy mode until the channel is available.

When the channel becomes available the three beep Talk Permit Tone will be emitted. Re-press the PTT to continue your call.

If the PTT is not pressed within two seconds of the Talk Permit Tone, the radio will return to normal standby mode.

Scan Options

Channel Scan [SCAN]

Conventional Channels

When on, Channel Scan monitors activity on the scan list channels in the currently operating zone. Scan operates only while the radio is not transmitting.

Channels designated as scan channels are identified by the $\checkmark$ symbol at the top of the LCD display. If allowed, the scan list can be edited by the radio user. (See Channel Scan List).

When Channel Scan is on, the ^{c}Z symbol will be shown at the top of the LCD display.

When a signal is detected, scanning stops and the message is received. The received channel is shown in place of the selected channel.

Once the signal ends, the radio continues to monitor the channel for the preset scan delay time before it resumes scanning.

Channel Scan operation can be programmed as a button or menu list item.

Channel Scan may be used in conjunction with Priority Scan operation (see Priority Scan).

Scanning Code Guarded Channels
Conventional Analog Channels

When a signal is detected, scanning stops while the radio checks for the proper Code Guard value. If the signal contains the proper Code Guard value, the radio receives the message. Otherwise, the radio resumes scanning immediately.

Transmitting with Scan On

The radio transmits on the channel selected by the Channel Selector knob unless Talkback Scan is enabled (see Talkback Scan) or Priority Scan is on and Transmit on Priority 1 is enabled (see Priority Scan).

Channel Scan List [SCN+]
Conventional Channels

The Channel Scan List allows the radio user to add or remove channels from the list of channels to be monitored while channel scanning.

Channels designated as scan channels are identified by the ✓ symbol at the top of the LCD display.

The Scan List operation can be assigned as a button or menu list item.

When Channel Scan List is assigned to a button, press the button to add or remove the selected channel from the scan list.

When assigned as a menu item, open the menu and select the channel you wish to add or remove from the scan list. Press "+/-" to add or remove. Channels in the scan list will be indicated with the ☑ symbol.

Talkback Scan
Conventional and Trunking Channels

If your radio is programmed for Talkback Scan, press PTT while a channel is active or while scan delay time remains, you will be responding on the transmit frequency of the received channel. The 'RX' indicator will be shown in the display while scan delay time remains.

Talkback Scan will not work if Priority Scan is on and your radio is also programmed to transmit on the Priority 1 channel (see Priority Scan).

Vote Scan [Requires Option KZA0581]
Conventional Channels

Channels in a multicast conventional systems can be added to the scan list and designated as "voted" channels. When a signal is received on a voted channel the

radio checks all voted channels and selects the channel with the best signal.

If enabled, vote scanning takes place whenever the channel scan switch in on.

NOTE: Channel voting occurs only with Channel Scan and is disabled when Zone Scanning. Channels programmed as Vote channels are treated as normal scan list channels during Zone Scan operation.

See also Priority Scan and Zone Scan.

Dual Mode Scan [DSCN]
Conventional and Trunking Channels

Dual Mode scan provides the ability to scan trunking and conventional channels simultaneously.

NOTE: The Dual Mode Scan list must be setup using the PC radio editor and cannot be changed by the radio user.

When Dual Mode Scan is turned on the $^D Z$ icon is displayed and the radio scans all channels in the dual mode scan list.

Dual Mode Scan can be assigned to a button or menu list item. For best operation, Dual Mode Scan should be assigned in both conventional and trunking global settings with the PC editor.

Priority Scan [PSCN]
Conventional Channels

Two channels can be designated as priority channels. When Priority Scan is on, these channels are monitored for incoming traffic. When a qualified signal is detected the speaker is opened to listen to the message.

If a message is detected on the channel designated as Priority 2, the radio will continue to monitor Priority 1 channel for activity. If activity is detected the radio will switch to the Priority 1 channel.

When used in conjunction with Channel Scan, the radio monitors the Priority channels and will switch from a scanned channel to the Priority channel if a qualified signal is detected.

Depending on radio setup, priority channels can be tied to the currently operating zone or can be assigned to a specific channel regardless of the operating zone.

Channels designated as Priority channels are identified by the P1 or P2 symbol at the top of the LCD display. When Priority Scan is on, the ᵖZ symbol will be shown.

Priority Scan operation can be a button or menu list item.

Trunked Channels
When on trunked channels, Priority Scan is used to turn system scanning on or off.

Priority Channel Select [PRI]
Conventional Channels

Depending on programming, priority channels can be radio-wide (System) or zone specific (Zone). Radio-wide priority channels are monitored regardless of the current operating zone. (See Priority Scan for more details.)

If enabled the user can change the priority channels. Priority Channel Select can be assigned to a button or menu list item.

Selecting a System Priority Channel
Open the menu and select the System Priority channel you wish to change.

Press "ENTER" to open System Priority Channel menu.
  Options:
   Off - Disables the priority channel.
   Use Main - Uses the selected channel as the priority channel.
   Select - Assigns a specific channel as the priority channel.

To assign a specific channel as a System Priority Channel, highlight "Select" and press the "ENTER" button.

The Zone selection menu will be displayed.

Highlight the zone of the desired priority channel and press the "ENTER" button.

The Channel selection menu will then be displayed.

Highlight the desired channel and press the "ENTER" button to set the priority channel.

The display will return to the main Priority Channel Select menu.

Selecting a Zone Priority Channel
Open the menu and select the Zone Priority channel you wish to change.

Press "ENTER" to open Priority Channel menu.
   Options:
   Off - Disables the priority channel.
   Use Main - Uses the selected channel as the priority channel.
   Select - Assigns a specific channel as the priority channel.

To assign a specific channel as a Zone Priority Channel, highlight "Select" and press the "ENTER" button.

The Channel selection menu will be displayed.

Highlight the desired channel and press the "ENTER" button to set the priority channel.

The display will return to the main Priority Channel Select menu.

Zone Scan [ZSCN]
Conventional Channels

When Zone Scan and Channel Scan are on, the radio scans all programmed scan channels in zones designated as Zone Scan zones.

If allowed, the scanned zone list can be edited by the radio user. (See Zone Scan List).

When Zone Scan is on, the $^Z\!Z$ symbol will be shown at the top of the LCD display.

Zone Scan operation can be a button or menu list item and may be used in conjunction with Priority Scan operation.

Zone Scan List [ZSC+]
Conventional Channels

The Zone Scan List allows the radio user to add or remove zones from the list of zones to be scanned.

The Zone Scan List operation can be assigned as a button or menu list item.

When Zone Scan List is assigned to a button [ZSC+], press the button to add or remove the currently operating zone from the scan list.

When assigned as a menu item, open the menu and select the Zone you wish to add or remove from the scan list. Press "ENTER" to add or remove. Zones in the scan list will be indicated with the ☑ symbol.

Pick List Options

The KNG provides users the ability to select and assign Pick List functions to specific channels. Pick List Options can be assigned to a programmed button or as menu list items.

Available Pick List options include:

Transmit Code Guards

Receive Code Guards

Transmit Network Access Codes

Receive Network Access Codes

Talk Group IDs

Encryption Keys (see Encryption Operation)

Encryption Keysets (see Encryption Operation)

TX/RX CxCSS Picklist [TXCG] [RXCG]
Conventional Analog or Mixed Mode Channels

Selecting a CTCSS/CDCSS Code Guard from the Pick List will assign the tone to the currently select analog or mixed-mode channel. All other channels are unaffected.

User assigned Transmit and Receive Code Guards are selected independently.

To change a Code Guard, open the RXCG or TXCG menu, select the desired tone and press "ENTER".

To return the tone to the pre-programmed value select "Default" or "0".

If allowed, picklist values can be changed through keypad programming.

TX/RX Network Access Code Picklist [TNAC] [RNAC]
Conventional Digital or Mixed Mode Channels

Selecting a Network Access Code (NAC) from the Pick List will assign the NAC to the currently select digital or mixed-mode channel. All other channels are unaffected.

User assigned Transmit and Receive NACs are selected independently.

To change a NAC, open the RXNAC or TXNAC menu, select the desired NAC and press "ENTER".

To return the NAC to the pre-programmed value select "Default" or "0".

If allowed, picklist values can be changed through keypad programming.

Talk Group ID Picklist [TGID]
Conventional Digital Channels

Selecting a Talk Group ID from the Pick List will assign the TGID to the currently select channel. All other channels are unaffected.

User selectable menu access can be assigned to a button or menu list item.

Open the menu of available TGIDs.

Select the desired Talk Group ID or, to return the TGID to the pre-programmed value, select "Default" or "0".

Press "ENTER" to set the selection.

If allowed, picklist values can be changed through keypad programming.

Encryption Key Picklist [KEY]
Digital or Mixed Mode Channels
Encryption equipped radios only.

Selecting an Encryption Key from the Pick List will assign the key to all encrypted channels that do not have 'Key Lock' programmed. Locked key channels will continue to use the pre-programmed key.
(See Encryption Operation)

Keyset Picklist [KSET]
Digital or Mixed Mode Channels
OTAR equipped radios only.

Selecting a Keyset from the Pick List will cause the radio to use encryption keys from the selected Keyset.
(See Encryption Operation)

Unit-to-Unit Call Options

Individual Unit Call [UNIT]

Conventional Digital and Trunking Channels

P25 Unit IDs allow for Unit-To-Unit calls when the radio is operating in Digital Mode.

Channels programmed for analog only operation will not be able to transmit or receive Unit-To-Unit calls.

Conventional Channels

Placing an Individual Unit Call

Open the Unit Call menu and select the desired "Unit Call" option.

> **Last Call** = Use the P25 ID of the last Call.
> **Call List** = Use the programmed P25 ID List.
> **Enter ID** = Enter a numeric P25 ID.

Press Enter to enter Unit Call Mode.

The LCD displays the ID number or associate label of the targeted radio.

Press the PTT button to send the unit-to-unit call.

To exit the Individual Call mode press "Exit".

If there is no response to the call after 60 seconds, the radio exits the Unit-to-Unit mode and returns to normal operation.

When receiving non unit-to-unit calls while in the unit call mode, the TGID of the incoming traffic is displayed.

Receiving an Individual Unit Call

When a properly addressed unit call is received, an alert tone sounds and the LCD displays the ID number or associate label of the radio placing the call.

Accept the call
To accept the call and respond in unit-to-unit mode, press "ACPT" and transmit as normal.

To exit the Individual Call mode, press "Exit"

Ignore the call
To ignore the call and continue operating in normal mode, press "INGR".

Call List Programming
If enabled with the PC radio editor, the P25 Call List for conventional channels can be edited via the radio's keypad programming function.

Trunking Channels

Limitations on unit-to-unit calls may programmed in trunking systems. Options include disallowing unit-to-unit operation, limiting operation to only the programmed unit call list or 'response only' which allows the user to respond to incoming calls only. Check with your system administrator for information about your programmed features.

Placing a Call

When placing a unit-to-unit call on a trunking channel, a telephone-type ring tone will be emitted until the targeted radio acknowledges or responds to the call.

Receiving an Individual Unit Call

When receiving a unit call, an alert tone will be emitted and the LCD will display the Unit ID of the radio sending the call.

Press "Accept" to respond to the call or "Ignore" to remain in normal operation.

Emergency Signalling Options

Conventional Digital and Trunking Channels

The KNG mobile radio supports P25 Emergency Operation. When Emergency Operation is engaged the radio will transmit the P25 ID of the radio along with the required P25 Emergency bit. P25 Emergency operation applies only to channels programmed for Digital or Mixed Mode transmissions.

On channels programmed for analog transmissions, pressing PTT in Emergency Mode will result in an MDC emergency analog transmission. The system MDC ID and emergency information is transmitted.

On channels programmed for Mixed Mode transmissions, pressing PTT will result in a digital or analog emergency transmission, dependant on the 'TX Digital' setting or selection.

All scanning and priority functions will be disabled during Emergency operation.

Depending on the radio's PC programmable settings, emergency signal will be sent automatically or with each Push-to-Talk.

Placing an Emergency Call
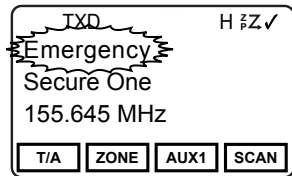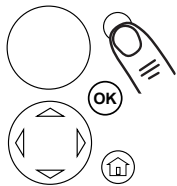
To place an emergency call, press and hold the programmed emergency button until the radio beeps and the display flashes "EMERGENCY".

Radio automatically sends the emergency signal on the pre-programmed emergency channel.

While in the emergency mode, the top display line will alternate between "Emergency" and the programmed line information. Each PTT will re-send the emergency notification.

To return to normal operation press and hold the Emergency button or cycle radio power.

Receiving an Emergency Signal
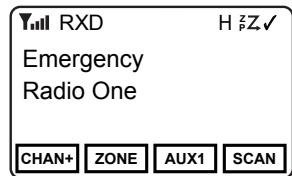
When receiving an emergency call, the radio will beep. The the display will flash the word "Emergency" and the P25 ID of the radio sending the signal for the duration of the reception, and during any hold time. The RX icon will also be lit.

If programmed, the radio will emit an audible alert tone.

Encryption Operation

Conventional Digital and Trunking Channels

The KNG may optionally be configured for Secure communication on channels operating in Digital Mode. No encryption is available for analog channels. To determine if your radio is encryption compatible, check the options label on the back of the radio. "KZA0577" indicates the encryption option is installed.

Required Setup

Radios that have the DES/AES factory option for encryption must have encryption keys loaded with an APCO Project 25 compatible key fill device such as the Motorola KVL 3000 Plus, using a BK Radio keyloader cable. The radio can hold up to 32 AES and/or DES keys.

After loading keys in the radio, the KNG PC programming software must be used to configure the radio's key table and to assign default transmit keys to each channel.

Radios that have the OTAR factory option support Over-the-Air Rekeying of encryption keys (OTAR). The KNG PC programming software must be used to enable OTAR and to mark the channel(s) that will communicate with the Key Management Facility (KMF). In addition, the radio must have key encryption keys (used only to encrypt other keys) loaded with an APCO Project 25 compatible key fill device such as the Motorola KVL 3000 Plus, using a BK Radio keyloader cable.

Basic Operation

The receiver automatically detects both clear and secure signals.

The transmitter selects clear or secure operation based on each channel's programming. Digital channels can be programmed to always transmit encrypted, always transmit clear, or to select the encryption mode with the TX Secure switch.

```
          Ø      H
Channel 16
Secure One
155.645 MHz
 SEC   ZONE   AUX1   SCAN
```
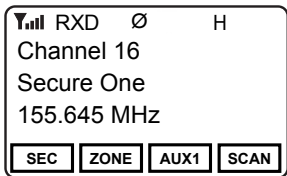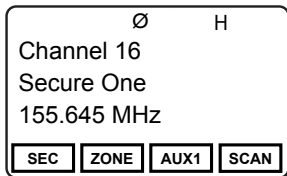
The display indicates Secure Operation as follows:

In Standby Mode, if the radio will transmit in Secure Mode when PTT is pressed, the encrypt icon Ø is displayed.

```
 Yill RXD   Ø      H
Channel 16
Secure One
155.645 MHz
 SEC   ZONE   AUX1   SCAN
```

When receiving or transmitting an encrypted signal, the encrypt icon Ø is displayed.

Transmit Secure [SEC]

Channels programmed for selectable encryption can have "Transmit Secure" programmed as a button or menu item. The default setting uses the collar switch to select Transmit Secure.
Ø = encrypted, O = clear

When SEC is on, encrypted channels programmed for switchable encryption will transmit an encrypted signal.

NOTE: The SEC switch has no effect on channels programmed as Encrypted Only or Clear Only.

Channels in the Ready-to-Transmit Encrypted mode will display the Ø symbol on the top line of the LCD.

Transmit Encryption Key Selection [KEY]

The radio can hold up to 32 DES and/or AES encryption keys. Each channel is assigned a default key for transmit. The key can be locked to the channel, or if programming allows, a transmit key other than the default key can be selected from the radio's Key Pick List.

NOTE: Selecting a user defined transmit key assigns that key to all radio channels programmed for selectable keys.

To change an encryption key, open the User Keys menu. Programmed key labels will be displayed.

Select the desired key and press "ENTER".

To return the key to the pre-programmed value select "Default".

If a key is selected that has not been programmed, the radio will emit a three beep tone and display "Key Fail" before going to standby mode. The radio will not transmit but will beep and display "Key Fail" when PTT is pressed.

User Selectable Encryption Keyset [KEYST]
OTAR equipped radios only.

Selecting a keyset from the Pick List will cause the radio to use encryption keys from the selected keyset.

User selectable menu access can be assigned to a button or menu list item.

To change the encryption keyset, open the KEYST menu. Programmed Keyset labels will be displayed.

Select the desired keyset and press "ENTER".

Rekey Request [RKEY]
OTAR equipped radios only.

On radios equipped with over-the-air rekeying (OTAR), a radio user can manually request an encryption rekey from the Key Management Facility (KMF).

For a radio to receive encryption keys or keysets over-the-air, the selected channel must be designated as an OTAR channel via PC programming. Refer to your PC programming documentation for more information.

To request a re-key:

Open the Rekey Request menu.

Press the "YES" button to Request Keys, or press "ESC" to cancel the operation.

If the "YES" button is pressed while on a channel that has not been marked as an OTAR channel, the radio will boop and "NON-OTAR" will appear on the display.

If a successful rekey occurs, a tone will sound, and the display will momentarily show "REKEYED".

Keyset Viewing and Selecting [KSET]
OTAR equipped radios only.

The radio can hold up to 8 encryption keysets. Only one keyset can be active at any time. The radio will receive messages encrypted with any of the keys in any of the keysets, but transmit keys can only be selected from the active keyset.

To change an encryption keyset, open the KEYST menu. Programmed keyset labels will be displayed. Select the desired keyset and press "ENTER".

Zeroizing [ZERO]

The radio provides a method for the user to "panic-zeroize" all encryption keys. Zeroizing removes all encryption keys from the radio, including keys used for OTAR and Tactical OTAR operation.

Zeroize can be assigned as a button or menu list item.

Open the "Zeroize Keys" menu.

Press "YES" to erase all encryption keys or "ESC" to cancel the action.

When successfully removed the "Keys Removed" message will momentarily be displayed.

Messaging

Digital Conventional P25 channels can be programmed to send and receive text messages and radio status messages.

Text messages can be selected from a pre-programmed list or manually entered using the radio keypad.

Status messages are pre-programmed only.

Text Messaging [TXT]
Conventional Digital Channels

Message types include predefined messages, manually entered messages or locally stored messages.

Predefined messages - Predefined messages are programmed into the radio memory using the radio editor software.

Manually Entered Messages - Text messages can be manually entered via the radio's keypad.

Locally Stored Messages - Up to five manually entered messages can be stored in individual radios.

Sending a Message

To initiate a text message press the "TXT" button or select "Text Message" from the menu.

Select "Send" from the menu and press "ENTER".

Select Message Type

From the "Select Entry Type" menu, choose the type of message to send and press "ENTER".

Predefined List or Manual Entry List

When "Predefined List" or "Manual Entry List" is selected, a list of available messages is displayed.

Select the message to be sent and press "ENTER".

NOTE: When sending a predefined message the message ID is transmitted. The receiving radio will display the message programmed with the corresponding ID. If the receiving radio has no programmed message with the transmitted ID, "Text Message X" is displayed, where "X" is the received message ID number.

Manual Entry

When "Manual Entry" is selected use the keypad to enter the desired message (see keypad character table). Press "ENTER" to select the target radio.

Select Target Radio

Last Call - Select "Last Call" to send the message to same radio you last sent a text message.
Press "Send" to send the message.

Call List - Selecting "Call List" opens a list of labels for the pre-programmed Unit IDs. Select the desired target radio and press "Send" to send the message.

Unit ID - Select "Unit ID" to enter the P25 ID of the target radio.
Use the keypad to enter the ID then press "Send" to send the message

Broadcast - Select "Broadcast" to send the text message to all text enabled radios regardless of unit ID. Press "Send" to send the message.

Message Acknowledgement
When the text message has been received by the targeted radio, an alert tone will sound and the acknowledgment message will be displayed.

Press "OK" or wait for five seconds to return to normal radio operation.

If the targeted radio is unavailable, an alert tone will sound and the failed acknowledgement message will be displayed.

Press "RTRY" to resend the message.

Press "OK" or wait for five seconds to return to normal radio operation.

When sending a "Broadcast" message, no "text received" notification is shown. Only confirmation that the text has been broadcast will be displayed.

Receiving a Message
When an incoming text message is received an alert tone is sounded and the Text Message Received message is momentarily displayed.

The top programmed display line will alternate between the programmed setting and "Text Message" until the message is read.

Reading the message
To read the message press the "TXT" button or select "Text Message" from the menu.

Select "Read" to view the message

Stored Messages
Up to five messages can be programmed into the "Manual Entry List" and are accessed from the "Select Entry Type" menu.

To store a manually entered text message press the "TXT" button or select "Text Message" from the menu.

Select "Store" and press "Enter".

Use the keypad to enter the desired message then press "Enter".
(See keypad character table)

Select the storage slot for the message and press "Enter" to store the message.

User Status Messaging [STS]
Conventional Digital Channels

Sending a Status Update
NOTE: When sending a message the message ID is transmitted. The receiving radio will display the message programmed with the corresponding ID. If the receiving radio has no programmed message with the transmitted ID "Status: Status X" is displayed, where "X" is the received ID number.

Select Status Message
Press the "STS" button or select "Status Update" from the menu.

From the "Select Status" menu, select the programmed message to send and press "Enter".

Select Message Type

From the "Select Target Type" select the type of message to be sent.

    Unit - Send the message to an individual radio ID.

    Group - Send message to a group of radios using the Talk Group ID.

    Dispatch - Send the message to a dispatch console.

Press "Enter".

Unit Call

  Select Target Radio

  Last Call

  Select "Last Call" to send the message to the same radio you last sent a status message.

  Press "Send" to send the message.

  Call List

  Selecting "Call List" opens a list labels for the pre-programmed Unit IDs.
  Select the desired target radio and press "Send" to send the message.

  Unit ID

  Select "Unit ID" to enter the P25 ID of the target radio.
  Use the keypad to enter the ID then press "Send".

Group Call
  Select Target Group ID
  Selecting "Group" opens the menu to send a status message to a group of radios with matching talk group ID.

  Select "Enter" to manually enter the ID or "Select" to choose and ID from the pre-programmed talk group pick list.

Dispatch
  Select "Dispatch" to send a status message to a dispatch console.

Message Acknowledgement
If the message has been received by the targeted radio, an alert tone will sound and the acknowledgment message will be displayed.

If the targeted radio is unavailable, an alert tone will sound and the failed acknowledgement message will be displayed.

Press "OK" or wait for five seconds to return to normal radio operation.

Receiving a Status Update
When an incoming status update is received an alert tone is sounded and the status message is momentarily displayed before returning to normal operation.

Paging and Call Alert

Conventional Two-Tone/DTMF/MDC1200 Paging [MUTE]
Conventional Analog Channels

The KNG can be programmed to receive two-tone, DTMF or MDC1200 pages on conventional analog channels.

Receiving a page
Select an analog or mixed-mode receive channel.

Turn on "Voice Mute" from the programmed button or menu item.

When voice mute is activated the ⊄ icon is displayed.

The radio ignores all voice traffic until the proper tone sequence is received.

When a proper signal is received the radio will emit an alert tone and allow the audio to pass.

If Auto Reset is programmed, the radio will return to the muted standby mode when the time conditions have been met.

Call Alert Paging [ALRT]
Digital Channels

The KNG can be programmed to send and receive Call Alert messages on digital channels.

Sending a Call Alert

Press the "ALRT" button or open "Call Alert" from the menu.

Select Target Radio

Last Call
Select "Last Call" to send the message to the radio which you last sent or received a call alert. Press "Enter" to send the message.

Call List
Selecting "Call List" opens a list alias' for the pre-programmed Unit IDs. Select the desired target radio and press "Enter" to send the Call Alert.

Unit ID
Select "Unit ID" to enter the ID of the target radio. Use the keypad to enter the ID then press "Enter" to send the Call Alert.

Receiving a Call Alert

When a Call Alert is received, an alert tone will sound and the incoming unit ID or alias is displayed for approximately 5 seconds.

The top display line line will alternated between the programmed display information and a Call Alert Received message until.

To clear the message, open the "Call Alert" menu, changing the channel or cycling radio power.

Radio Check [RCHK]
Conventional Digital Channels

The KNG can be programmed to check the availability of a KNG radio with a specific P25 ID.

Requesting a Radio Check
Press the "RCHK" button or open "Radio Check" from the menu list.

 Select Target Radio

   Last Call
   Select "Last Call" to send the request to the radio which you last sent a radio check request. Press "Enter" to send the query.

Call List
Selecting "Call List" opens a list alias' for the pre-programmed Unit IDs.
Select the desired target ID and press "Enter" to send the query.

Unit ID
Select "Unit ID" to enter the P25 ID of the target radio.
Use the keypad to enter the ID then press "Enter" to send the query.

If a successful handshake is performed, an alert tone will sound and the "Unit Available" message will be displayed for approximately five seconds.

If no validation is received from the targeted radio, an alert tone will sound and the "No Response" message will be displayed for approximately five seconds.

A radio receiving a "Radio Check" request shows no indication of the request.

Radio Inhibit/Enable [INH]/[UNINH]

Conventional Digital Channels

With "Inhibit" assigned to a button or menu function, a KNG Radio can temporarily disable other KNG radios using the targeted radio's unit ID number.

The disabled radio can only be re-enabled by sending an "Unhibit" command.

NOTE: Inhibited radios cannot be read with the Neovision radio editor.

Sending a command
To initiate an inhibit/uninhibit message press the programmed button or select from the menu.

Use the keypad to enter the Administrator password.

Press "ENTER" to open the menu.

Select Target Radio

Last Call
Select "Last Call" to send the message to radio you last sent an inhibit or uninhbit message. Press "SEND" to send the message.

Call List
Selecting "Call List" opens a list alias' for the pre-programmed Unit IDs.
Select the desired target radio and press "SEND" to send the message.

Unit ID
Select "Unit ID" to enter the P25 ID of the target radio.
Use the keypad to enter the ID and press "SEND" to send the message.

Message Acknowledgement

When the targeted radio has been disabled, an alert tone will sound and the acknowledgment message will be displayed.

Press "OK" or wait for three seconds to return to normal radio operation.

If the targeted radio is unavailable, an alert tone will sound and the failed acknowledgement message will be displayed.

Press "RTRY" to resend the message.

Press "OK" or wait for three seconds to return to normal radio operation.

Other Options and Functions

Many operational features and functions can be programmed for user selection and control. Items can be programmed to the radio buttons. In addition to these quick set buttons, a menu of multiple functions can be accessed with from the "MENU" button.

Backlight [LITE]

Conventional and Trunked Channels

LCD Backlight control can be assigned to a button or as a menu item.

Lighting Options:

Auto - Automatically adjusts brightness depending on ambient light.

Off - Display, navigation button backlights and microphone lighting are turned off. Touch the display to turn the lights on.

Dim, Medium, Bright - Locks display to selected brightness.

Busy Channel Operation
Conventional Channels

The radio can be programmed for different behaviors when a conventional channel is busy.

How the radio reacts to a busy channel is programmed with the following operation options:

Indicate - When a channel is busy the LED will flash green.

Lockout - When a channel is busy the LED flashes and push-to-talk will be disabled. When PTT is pressed a Busy message will show in the display and an alarm will sound.

Override - LED flashes and first PTT displays the Busy message. Release and press the PTT again to override the lockout and allow transmitting.

Automatic - When a channel is busy the LED flashes and Push-to-talk will be disabled. When PTT is pressed a Busy message will show in the display momentarily, then return to standby mode.

Busy Channel Conditions
With the PC radio editor, each channel is programmed for the conditions under which the channel is considered busy.

Conditions include:

Off - Channel is never declared busy.

Carrier - A busy condition is declared when carrier is present on the selected Rx frequency.

Non-Qualified - A busy condition is declared when a non-qualified signal is present on the Rx frequency. (Non-qualified = Incorrect CTCSS/CDCSS, talk group or NAC)

Status Symbol - *Digital Channels Only*. A busy condition is declared if the P25 busy status symbol is present on the Rx frequency.

Channel Select [CHAN]

Conventional and Trunked Channels

Channel Selection can be assigned to a button or menu item.
(See Channel/Zone Selection Options for details.)

Cloning

Conventional Zones

KNG radios can be set up to send or receive programmed information from other BK Radio products via a cloning cable available from RELM Wireless. Refer to the cloning cable manual for cloning information.

Control Lockout [LCK]
Conventional and Trunking Channels

The KNG portable offers a variety of control lock options. Control lock can be assigned as a button or menu item. Users can select from two lockout settings, "Lock Keypad Only" and "Lock All Controls".

"Lock Keypad Only" locks all front panel a nd touch screen button operations except the Orange emergency button. Also locks the navigation wheel and keypad of the KAA0290 microphone.

"Lock All Controls" locks all buttons and switches as determined by radio programming. Any or all of the following function may be locked when "Lock All Controls" is selected: Microphone keypad and side buttons, channel/zone knob, emergency button and push-to-talk.

To enable the lock function press the assigned button or open the menu and select Control Lock from the list.

Select the desired lockout setting and press "ENTER"

To disable Control Lock press the left arrow twice, followed by the right arrow twice.

Keypad Programming
Conventional Systems and Channels

Much of the information stored in the KNG can be edited using the keypad. Four separate programming functions can be enabled with the PC Radio Editor software.

Refer to the Keypad Programming section for detailed information on how to edit programmed radio information.

Monitor [MON]
Conventional Channels

There are four settings available for monitoring traffic on a selected channel. "Monitor" can be assigned to a button or as a menu item.

Monitor Modes and Indicators

- **Selective** - *Digital channels only.* Required for Unit-to-Unit calls and Talkgroup use. (No indicator)
- **Normal** - Requires NAC or Tone. Ignores Talkgroup and Unit-to-Unit information on digital channels. Flashing ⚞ when selected.
- **Monitor** - Monitors activity on selected channel. Steady ◁ when selected.
- **Open** - Open Squelch. Solid ◀ when selected.

Button Operation - Press the button to cycle to the next mode. Press and hold for Open Squelch. Availability of "Selective" or "Normal" is determined by each channel's programmed Squelch Operation setting.

Menu Operation - Open the Monitor menu, select the desired operation and press "Enter".

Nuisance Channel Delete [DEL]
Conventional Channels

If enabled, a nuisance channel can be temporarily removed from the scan list. Nuisance Channel Delete can only be assigned to a button.

To temporarily remove a channel from the scan list, press the assigned button while the nuisance channel is being received.

To revert to the programmed scan list, turn off Scan, cycle radio power or select another zone or channel.

Radio info
Conventional and Trunking Channels

Radio information can be assigned as a menu item.

When selected, the LCD displays programmed radio settings.

Repeater Talkaround [T/A]
Conventional Channels

In Repeater Talkaround mode, the radio will transmit on the programmed receive frequency of the selected channel. When T/A is enabled the |→| icon will be displayed on the top line of the LCD.

NOTE: Channels programmed as receive only are not affected by the Talkaround selection.

Talkaround selection can be assigned to a button or as a menu list item.

Squelch Adjust [SQL]
Conventional Channels

Squelch Adjust is used to change the signal strength required for the radio's speaker to unmute.

Squelch can be assigned as a button or menu list item.

To adjust the squelch setting, open the squelch menu and select "Adjust Channel Squelch". Select the desired threshold using the -/+ buttons.

Press "ENTER" to set the level.

By selecting "Reset Squelch" from the menu list, preset squelch threshold can be reset for the currently selected channel, currently selected zone or all programmed conventional channels.

Site Display [STDS]
Trunking Channels

When selected, the Site Display functions shows information for the currently operating site.

Displayed information includes: Site ID, Site Alias and RSSI.

Site Display can be assigned as a button or menu list item.

Site Lock [STLK]
Trunking Channels

Site lock prevents the radio from searching for other sites by locking it to the currently selected site.

Site Lock can be assigned as a button or menu list item.

Site Search [STSR]
Trunking Channels

Site Search automatically searches and selects the best available trunking site.
Site Search can be assigned as a button or menu list item.

Surveillance Mode [SURV]
Conventional and Trunking Channels

When Surveillance Mode is on, all audible indicators (beeps etc.), Keypad lighting functions and LED's are disabled. The LCD display is set to "Dim".

Each channel can be programmed for selectable surveillance mode or be set to always or never in surveillance mode.

Surveillance Mode can be assigned as a button or menu list item.

Transmit Digital [TXAD]
Conventional Mixed-Mode Transmit Channels

When Transmit Digital is on, channels programmed for mixed-mode transmit will transmit in digital mode. When off, mixed-mode channels transmit in analog mode.

When transmitting in digital mode the display shows "D" behind the TX indicator. In analog transmit, "A" will follow the indicator.

Transmit Digital selection can be assigned as a button, switch or menu list item.

When assigned as a button function, the "TXAD" button will be highlighted when in the Transmit Digital mode.

Transmit Power [PWR]
Conventional and Trunking Channels

Transmit Power can be selected between the programmed high and low settings. The power output of the settings depend on radio options, model and editor settings.

When operating in the high power mode, "H" will be displayed on the top line of the LCD. In low power mode, "L" is displayed.

Power selection can be assigned as a button or menu list item.

Keypad Programming

Radio programming is to be performed only by authorized personnel. Any or all functions may be password protected to prevent unauthorized access. Check with your communications officer for information on the programmed functions of your radio.

NOTE: Trunking channels and systems cannot be programmed via the radio keypad.

Keypad programmable categories include individual Channel, Zone and Global radio parameters, individual P25 ID Quick Call/Receive List, User Tone List, User NAC List and User Talk Group ID List.

Check with your RELM/BK Radio dealer or communications officer for information on the programmed functions of your radio.

Keypad Programming Navigation

While in programming mode the diamond, arrow up, arrow down and square buttons are used navigate the programming functions. The following table shows possible button functions:

Keypad Programming Buttons	
ENT	Opens the highlighted function or enters the displayed information
ESC	Press once to go back to previous screen or hold to exit programming mode and return to normal radio operation
NEXT	Move to the next item in a displayed list or the next character in a displayed value
PREV	Move to the previous item in a displayed list
EDIT	Used to select and edit individual characters in a displayed value
BACK	Move to the previous character in a displayed value
CLR	Clears the displayed value
EDIT	Used to edit individual characters in a displayed value
INV	Inverts a displayed digital tone value (CDCSS)

Entering Keypad Programming Mode

To enter programming mode open the menu list and select "Keypad Prog" .

Use the keypad to enter the six-digit user or master password and press the Enter button.

Select the item to program and press Enter.

Available programmable functions are:

Keypad - Used to edit individual channel and zone information such as labels, frequencies, operating modes, etc.

Call List - Used to edit the P25 ID Call List entries.

User Tones - Used to edit the user selectable Code Guard entries.

User NACs - Used to edit user selectable Network Access Codes.

User TGIDs - Used to edit user selectable P25 Talk Groups

NOTE: Depending on PC programming, not all functions may be accessible for keypad programming.

Global, System, Zone and Channel Parameters

The "Keypad" programming menu consists of four sub-menus for editing global, system, zone and channel parameters (see table).

Keypad Programming Sub-Menus				
Global	**System**	**Zone**	**Channel**	
Display Top	Sys Pri 1	Add/Delete	Add/Delete	Rx/Tx NAC
Display Middle	Tx on Pri 1	Label	Label	Sq Mode
Display Bottom	Sys Pri 2	Zone Pri 1	Rx/Tx Freq	Bandwidth
User Password		Tx on Pri 1	Rx/Tx Mode	Tx Power
		Zone Pri 2	Rx/Tx Guard	TGID

Global Settings

To edit the programmable Global settings, select "Keypad" from the programing menu then select "Global" from the sub-menu.

Select the item you wish to edit from the Global menu.

Displayed Information Lines

The three main display lines can be programmed to display radio information.
Select top, middle or bottom line to change it's displayed information. Then select
the desired setting from the list (see table).

NOTE: Display changes do not affect the display on trunked channels.

Conventional Display Line Options	
None	No information is displayed.
Channel Label	Programmed label of current channel.
Frequency	Current operating frequency.
Channel Number	Channel number of currently operating channel.
Channel # and Zone Label	Number of currently selected channel followed by the label of the currently select zone.
Rx'd Unit ID	P25 ID of a received digital signal. If the incoming ID is programmed in your Unit ID Call List list, the associated label will be displayed. During standby you radio ID number is displayed.
Rx'd TGID	Talk Group ID of a received digital signal.
Rx Subaudible	Received Code Guard tone value.

Conventional Display Line Options	
Rx DTMF	Received DTMF digits.
Rx MDC	Received MDC ID.
Rx Picklist Selections	Current user selected receiver Code Guard, Network Access Code and Talkgroup.
Tx Picklist Selections	Current user selected transmit Code Guard, Network Access Code and Talkgroup.
Rx/Tx Key	Label of operating encryption key.
Zone Label	Programmed label of current operating zone.
Zone and Channel #	Current operating zone and channel numbers.
Zone Number	Zone number of currently operating zone.

User Password

Select "User Password" from the "Global" menu to edit the keypad programming password. Enter a six-digit numeric.

NOTE: Changing the user password does not affect the power-up or administrator password.

System Settings

To edit the programmable System settings, select "Keypad" from the programing menu then select "System" from the sub-menu.

Select the item you wish to edit from the System menu.

System Priority 1 or 2 Channel

Priority channels can be assigned on a system wide basis. If assigned, a system priority channel will be monitored during priority scan regardless of the currently operation zone priority channel.

When set to "Off", the Priority 1 or Priority 2 Channel is designated by the selected zone setting.

When set to "Use Main" the channel selected by the channel knob operates as the priority channel.

To designate a specific priority channel choose "Select" from the priority channel menu.

Select the Zone and Channel.

Tx on Priority 1 Channel

If on, the radio will transmit on the System Priority 1 channel whenever Priority Scan is on.

Zone Settings

To edit the programmable Zone settings, select "Keypad" from the programing menu then select "Zone" from the sub-menu.

Select Add, Delete or Edit Zone from the Zone menu.

Add Zone
When selected, a new zone is added in the next available slot.

Example: If there are seven zones in the radio, the added zone will be zone eight.

Delete Zone
When selected the list of available zones is displayed. Choose the zone you wish to delete.

When a zone is removed all subsequent zones move up one spot. Example: If there are seven zones in the radio and zone five is deleted, zone six now becomes zone five and zone seven becomes zone six.

Edit Zone
Select "Edit Zone" to change the programmable zone information.

Zone Label
Use the keypad to enter a label of up to sixteen characters.
(See keypad character table)

Zone Priority 1 or 2 Channel
NOTE: If system priority channels are programmed, zone priority settings are ignored.

When set to "Off", the Priority 1 or Priority 2 Channel is designated by the selected zone setting.

When set to "Use Main" the channel selected by the channel knob operates as the priority channel.

To designate a specific priority channel choose "Select" from the priority channel menu and choose from the channel list.

Zone Tx Priority 1 Channel
If on, the radio will transmit on the Zone Priority 1 channel whenever Priority Scan is on and there is no system priority 1 programmed.

Channel Settings

To edit the programmable Channel settings, select "Keypad" from the programing menu then select "Channel" from the sub-menu.

Select Add, Delete or Edit Channel from the Channel menu.

NOTE: REFER TO THE COMMAND ZONE OPERATIONS SECTION FOR ADDING OR DELETING COMMAND ZONE CHANNELS.

DO NOT ADD OR DELETE COMMAND ZONE CHANNELS VIA THE KEYPAD PROGRAMMING METHOD.

Add Channel

Select to add a new channel.

Choose the zone to which the channel is to be added.

Enter a valid channel index number of 1-2048.

Delete Channel

When selected the list of programmed zones is displayed. Choose the zone of the channel you wish to delete.

Select the channel from the list.

Edit Channel
Select "Edit Channel" to change the programmable channel information.
Select the zone and channel to be edited.

Channel Label
Use the keypad to enter a label of up to sixteen characters.
(See keypad character table)

Rx Frequency
Enter a valid receive frequency in MHz. Frequencies must be divisible by
1.25kHz.

Rx Mode
Select Analog, Digital or Mixed Mode.

Rx Guard
Analog or Mixed Mode Receive Channels Only
Select "Off" for analog signals to operate in carrier squelch mode.
Select "Tone" to enter a CTCSS tone,
Select "Digital" to enter a DCS value.
Use "INV" to invert a DCS tone.

RX NAC

Analog or Mixed Mode Receive Channels Only
Select "Enter" to program a receive NAC via the keypad.
Enter the desired value in hexadecimal (000 - FFF).
Choose "Select" to use a receiver NAC from the programmed pick list.

NOTE: $F7F is an invalid receiver NAC. $F7E is the equivalent of carrier squelch in analog operation.

Squelch Mode

Digital or Mixed Mode Receive Channels Only
   Normal - Requires carrier and NAC only to unmute digital signals.
   Selective - Required for Individual Calls and use of Talkgroup IDs.

Bandwidth

Analog or Mixed Mode Channels Only
   Narrowband - 12.5kHz spacing when operating in analog.
   Wideband - 25kHz spacing when operating in analog.

Tx Power

Low Power - Lock channel in low power mode.
High Power - Lock channel in high power mode.
Selectable - Allow high/low transmit power selection form assigned button or menu item.

Tx Frequency

Enter a valid receive frequency in MHz. Frequencies must be divisible by 1.25kHz.

Tx Mode

Select Analog, Digital or Selectable.

Tx Guard

Analog or Mixed Mode Transmit Channels Only
Select "Off" to transmit no Code Guard tone.
Select "Tone" to enter a default CTCSS tone,
Select "Digital" to enter a default DCS value.
Use "INV" to invert a DCS tone.

Tx NAC

Analog or Mixed Mode Transmit Channels Only
Select "Enter" to program a default transmit NAC via the keypad.
Enter the desired value in hexadecimal (000 - FFF).
Choose "Select" to use a transmit NAC from the pick list.

NOTE: $F7E and $F7F are invalid transmit NACs.

TGID

Analog or Mixed Mode Channels Only
Select "Enter" to program a transmit Talk Group ID via the keypad.
Enter the desired value (1- 65535).
Choose "Select" to use a TGID from the pick list.

NOTE: 0 is an invalid transmit Talk Group ID.

P25 ID Unit Call/Receive List

The KNG can be pre-programmed with up to 100 Project 25 IDs and labels. If 'RX'd Unit ID' is designated as a display line, the P25 ID of the radio sending the call will be shown when receiving a digital signal. If the P25 ID of the received call is programmed in the Call List, the alphanumeric label associated with the ID will be displayed. If the P25 ID is not in the Call List, the numeric P25 ID will be displayed.

Select "Call List" from the programing menu.

Select the P25 ID you wish to edit.
The display shows the label and P25 ID of the selected ID.

Select "Label" to edit or add an alphanumeric label

Select "Dest ID" to change the P25 ID

User Selectable Code Guards

The KNG can be pre-programmed with up to 32, user selectable, CTCSS or CDCSS subaudible tones. Tones are selected via a programmed button or menu item (see TX/RX CxCSS Picklist). If enabled, the tones can be programmed via the radio's keypad

Select "User Tones" from the programing menu.

Select the tone to edit.

To enter a CTCSS tone select "Tone" and enter the desired frequency in Hertz (67.0 - 254.1 Hz).

To enter a CDCSS (digital) tone select "Digital" then enter the three digit code. Use the INV button to invert the code.

Valid Code Guard Tone Values				
Group A		**Group B**		**Group C**
67.0 (XZ)	*151.4 (5Z)	71.9 (XA)	146.2 (4B)	74.4
77.0 (XB)	162.2 (5B)	82.5 (YZ)	156.7 (5A)	79.7
88.5 (YB)	173.8 (6A)	94.8 (ZA)	167.9 (6Z)	85.4 (YA)
*100.0 (1Z)	186.2 (7Z)	103.5 (1A)	*179.9 (6B)	91.5 (ZZ)
107.2 (1B)	203.5 (M1)	110.9 (2X)	192.8 (7A)	
114.8 (2A)	218.1 (M3)	*118.8 (2B)	210.7 (M2)	
123.0 (3Z)	233.6	127.3 (3A)	225.7 (M4)	
131.8 (3B)	250.3	136.5 (4Z)	241.8	
141.3 (4A)				
* 50/60 Hz power distribution systems could cause falsing. The assignments in a given area should be made from within one of the Groups: A, B, or C.				

Valid Digital Code Guard Values								
023	025	026	031	032	043	047	051	054
065	071	072	073	074	114	115	116	125
131	132	134	143	152	155	156	162	165
172	174	205	223	226	243	244	245	251
261	263	265	271	306	311	315	331	343
346	351	364	365	371	411	412	423	431
432	445	464	465	466	503	506	516	532
546	565	606	612	624	627	631	632	654
662	664	703	712	723	731	732	734	743
754								

User Selectable Network Access Codes

The KNG can be pre-programmed with up to 32, user selectable NACs. NACS are selected via a programmed button or menu item (see TX/RX Network Access Code Picklist). If enabled, the tones can be programmed via the radio's keypad.

Select "User NACs" from the programing menu.

Select the NAC to edit.

Enter the desired value in hexadecimal (000 - FFF).

NOTE: $F7E and $F7F are invalid as user selectable NAC values.

User Selectable Talkgroup IDs

The KNG can be pre-programmed with up to 32, user selectable TGIDs. TDIDs are selected via a programmed button or menu item (see Talk Group ID Picklist). If enabled, the TGIDs can be programmed via the radio's keypad.

Select "User TGIDs" from the programing menu.

Select the Talk Group ID to edit.

Enter the desired value (1 - 65535).

NOTE: A Talk Group ID value of 0 is not allowed.

Warranty

The KNG portable radio is covered by a two-year warranty. Extended warranties may be available. For information about your warranty contact RELM/BK Radio at (800) 648-0947. Email; sales@relm.com

If you need service, contact your BK Radio dealer. If you find it impractical to have service provided by your dealer, contact the RELM/BK Radio Technical Service Department at (800) 422-6281.

Repairs may be sent to the address below.

RELM Wireless Corporation
Attention: Customer Service
7100 Technology Drive
West Melbourne, FL 32904

Keypad Text/Programming Characters

(1)	1	(7 PQRS)	P, Q, R, S, p, q, r, s, 7
(2 ABC)	A, B, C, a, b, c, 2	(8 TUV)	T, U, V, t, u, v, 8
(3 DEF)	D, E, F, d, e, f, 3	(9 WXYZ)	W, X, Y, Z, w, x, y, z, 9
(4 GHI)	G, H, I, g, h, i, 4	(0)	0, Blank Space
(5 JKL)	J, K, L, j, k, l, 5	(*)	*, ., ,, ;, :, ", ', !, ?, %, &, ', ~, @, _
(6 MNO)	M, N, O, m, n, o, 6	(#)	#, $, +, -, =, ^, /, \, |, <, >, {, }, [,]

Notes:

Notes: