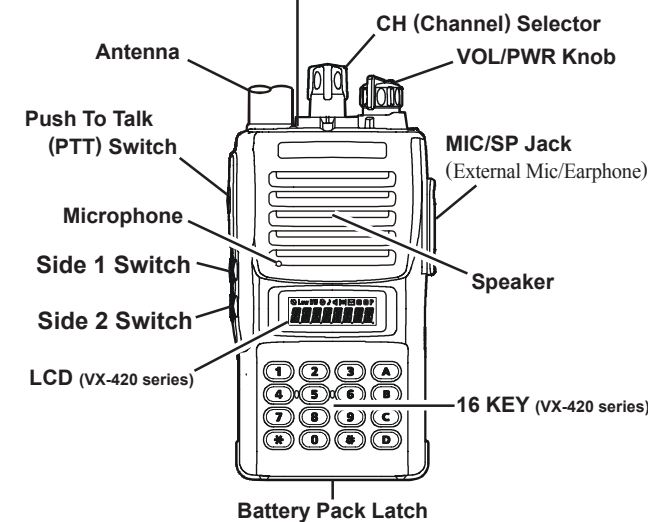


VX-410/-420 Series Operating Manual

Controls & Connectors

LED Indicator

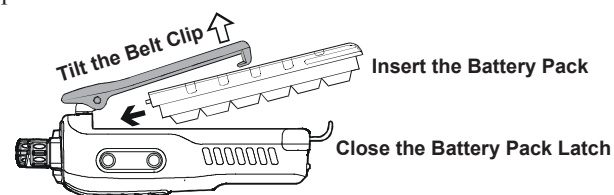
Glows Green	Monitor on (or Side 1, 2 switch is activated : VX-410 series only)
Blinking Green	Busy Channel (or SQL off)
Glows Red	Transmitting
Blinking Red	Battery Voltage is low
Yellow	Receiving a Selective Call



Before You Begin

Battery Pack Installation and Removal

- To install the battery, hold the transceiver with your left hand, so your palm is over the speaker and your thumb is on the top of the belt clip. Insert the battery pack into the battery compartment on the back of the radio while tilting the Belt Clip outward, then close the Battery Pack Latch until it locks in place with a "Click."



- To remove the battery, turn the radio off and remove any protective cases. Open the Battery Pack latch on the bottom of the radio, then slide the battery downward and out from the radio while holding the Belt Clip.

Caution!

Do not attempt to open any of the rechargeable Battery packs, as they could explode if accidentally short-circuited.

Low Battery Indication

- As the battery discharges during use, the voltage gradually becomes lower. When the battery voltage becomes to low, substitute a freshly charged battery and recharge the depleted pack. The **TX/BUSY** indicator on the top of the radio will blink **red** when the battery voltage is low.
- Avoid recharging batteries often with little use between charges, as this can degrade the charge capacity. We recommend that you carry an extra, fully-charged pack with you so the operational battery may be used until depletion (this "deep cycling" technique promotes better long-term battery capacity).

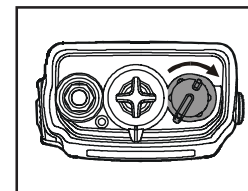
Operation

Preliminary Steps

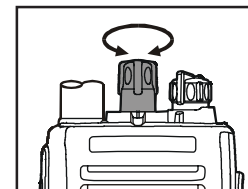
- Install a charged battery pack onto the transceiver, as described previously.
- Screw the supplied antenna onto the Antenna jack. Never attempt to operate this transceiver without an antenna connected.
- If you have a Speaker/Microphone, we recommend that it not be connected until you are familiar with the basic operation of the **VX-410/-420**.

Operation Quick Start

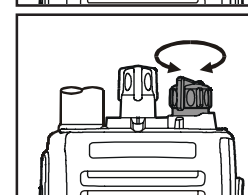
- Turn the top panel's **VOL/PWR** knob clockwise to turn on the radio on.



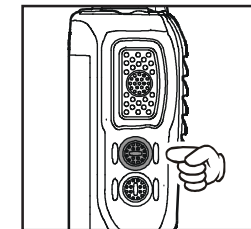
- Turn the top panel's **CH** selector knob to choose the desired operating channel.



- Rotate the **VOL/PWR** knob to set the volume level. If no signal is present, press and hold in the **Programmable** key assigned to "MONITOR" for more than 1 second; background noise will now be heard, and you may use this to set the **VOL/PWR** knob for the desired audio level.

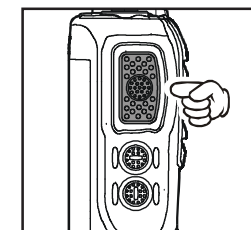


- Press and hold in the **Programmable** key assigned to "MONITOR" for more than 1 seconds (or press the **MONITOR** key twice) to quiet the noise and resume normal (quiet) monitoring.



- To transmit, monitor the channel and make sure it is clear. **THIS IS AN FCC REQUIREMENT!**

- To transmit, press and hold in the **PTT** switch. Speak into the microphone area of the front panel grille (lower left-hand corner) in a normal voice level. To return to the Receive mode, release the **PTT** switch.



- If a Speaker/Microphone is available, remove the plastic cap and its two mounting screws from the right side of the transceiver, then insert the plug from the Speaker/Microphone into the **MIC/SP** jack; secure the plug using the screws supplied with the Speaker/Microphone. Hold the speaker grille up next to your ear while receiving. To transmit, press the **PTT** switch on the Speaker/Microphone, just as you would on the main transceiver's body.

Note: Save the original plastic cap and its mounting screws. They should be re-installed when not using the Speaker/Microphone.

SAFETY TRAINING INFORMATION

This Radio has been tested and complies with the Federal Communications Commission (FCC) RF exposure limits for Occupational Use/ Controlled exposure environment. In addition, it complies with the following Standards and Guidelines:

- FCC 96-326, Guidelines for Evaluating the Environmental Effects of Radio-Frequency Radiation.
- FCC OET Bulletin 65 Edition 97-01 (1997) Supplement C, Evaluating Compliance with FCC Guidelines for Human Exposure to Radio Frequency Electromagnetic Fields.
- ANSI/IEEE C95.1-1992, IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3kHz to 300 GHz.
- ANSI/IEEE C95.3-1992, IEEE Recommended Practice for the Measurement of Potentially Hazardous Electromagnetic Fields-RF and Microwave.

WARNING: This radio generates RF electromagnetic energy during transmit mode. This radio is designed for and classified as **Occupational Use Only**, meaning it must be used only during the course of employment by individuals aware of the hazards, and the ways to minimize such hazards. This radio is not intended for use by the **General Population** in an uncontrolled environment.

CAUTION: To ensure that your expose to RF electromagnetic energy is within the FCC allowable limits for occupational use, always adhere to the following guidelines:

- This radio is **NOT** approved for use by the general population in an uncontrolled environment. This radio is restricted to occupational use, work related operations only where the radio operator must have the knowledge to control its RF exposure conditions.
- When transmitting, hold the radio in a vertical position with its microphone 1 to 2 inches (2.5 to 5 cm) away from your mouth and keep the antenna at least 1 inch (2.5cm) away from your head and body.

- The radio must be used with a maximum operating duty cycle not exceeding 50 %, in typical Push-to-Talk (PTT) configurations. **DO NOT** transmit for more than 50 % of total radio use time (50 % duty cycle). Transmitting more than 50 % of the time can cause FCC RF exposure compliance requirements to be exceeded.

The radio is transmitting when the red LED on the top of the radio is illuminated. You can cause the radio to transmit by pressing the PTT button or by using the VOX headset, model VC-25.

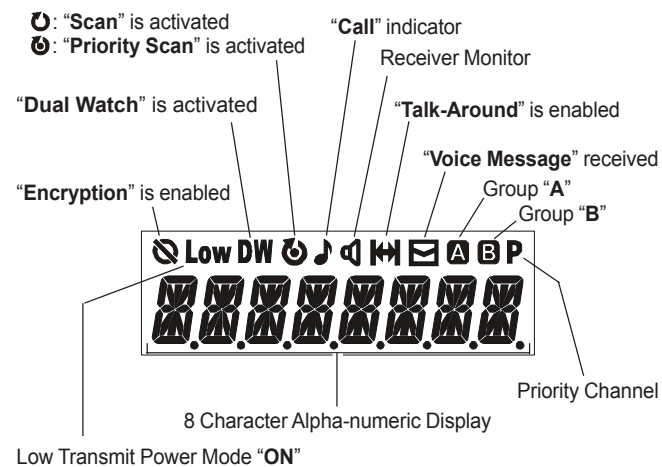
- DO NOT** transmit when the radio is used in Body Worn configuration with the following accessory: belt-clip. It must be used **ONLY** for (1) there is a 4 cm distance from the body during transmitting, (2) monitoring purposes, using the speaker only and (3) for carrying purposes.
- Always use Vertex Standard authorized accessories.

The information listed above provides the user with the information needed to make him or her aware of RF exposure, and what to do to assure that this radio operates with the FCC RF exposure limits of this radio.

Electromagnetic Interference/Compatibility
During transmissions, this radio generates RF energy that can possibly cause interference with other devices or systems. To avoid such interference, turn off the radio in areas where signs are posted to do so.
Do not operate the transmitter in areas that are sensitive to electromagnetic radiation such as hospitals, health care facilities, aircraft, and blasting sites.

FCC LICENSE INFORMATION
This radio operates on communications frequencies which are subject to FCC (Federal Communications Commission) Rules and Regulations. FCC Rules require that all operators using Private Land Mobile radio frequencies obtain a radio license before operating their equipment.

Display Icons & Indicators (VX-420 Only)



This device complies with Part 15 of the FCC rules. Operation is subject to the condition that this device does not cause harmful interference.

Notice !

There are no owner-serviceable parts inside the transceiver. All service jobs must be referred to an authorized VERTEX STANDARD Service Representative. Consult your Authorized VERTEX STANDARD Dealer for installation of optional accessories.

Accessories & Options

FNB-83	7.2 V 1400 mAh Ni-MH Battery
FNB-V94	7.2 V 1800 mAh Ni-MH Battery
FNB-V67LI	7.4 V 2000 mAh Lithium-Ion Battery
FBA-25A	Alkaline Battery Case
VAC-10	Desktop Charger (for FNB-83/FNB-V94)
VAC-810	Desktop Rapid Charger (for FNB-V67LI)
VAC-6010	6-unit Multi Charger (for FNB-83/FNB-V94)
VAC-6810	6-unit Multi Charger (for FNB-V67LI)
MH-45^{B4B}	Speaker/Microphone
MH-360S	Speaker/Microphone (Miniature Type)
MH-450S	Speaker/Microphone (Small Type)
MH-37^{A4B}	Earpiece Microphone
VH-110S	Over the Head, Heavy Duty Headset
VH-115S	Lightweight headset w/Boom
VH-120S	3-Wire Earpiece, Mic, Palm PTT Switch
VH-130S	2-Wire Earpiece, Mic, Palm PTT Combo
VH-215S	Over-the-head Single Muff Headset
VC-25	VOX Headset
VCM-1	Mobile Mounting Bracket (for VAC-810)
DCM-1	Desktop Charger Bracket (for VAC-10)
VCM-3	Mobile Mounting Bracket (for VAC-10)
FVP-25	Encryption/DTMF pager Unit
FVP-35	Encryption Unit (Rolling code voice scrambler)
DVS-5	Voice Storage Unit
VME-100	MDC1200®/GE-STAR® ANI Encoder Unit
VMDE-200	MDC1200®/GE-STAR® ANI Encoder/Decoder Unit
ATU-6A	Rubber Antenna 400-430 MHz
ATU-6D	Rubber Antenna 450-490 MHz
ATV-6XL	Rubber Antenna 134-174 MHz (Untuned)
ATV-8A	Rubber Antenna 134-151 MHz
ATV-8B	Rubber Antenna 150-163 MHz
ATV-8C	Rubber Antenna 161-174 MHz

Key Functions

The **VX-420 series** provides programmable [A], [B], [C], and [D] function keys, and both the **VX-410 series** and **VX-420 series** provide programmable **Side 1** and **2** switches. These “**Programmable**” keys functions can be customized (set to other functions), via programming by your **VERTEX STANDARD** dealer, to meet your communications/network requirements. Some features may require the purchase and installation of optional internal accessories. The possible **Programmable** key programming features are illustrated below, and their functions are explained in the next chapter. For further details, contact your **VERTEX STANDARD** dealer.

For future reference, check the box next to each function that has been assigned to the **Programmable** key on your particular radio, and keep it handy.

Function	Programmable Key (Press / Press and Hold)					
	[A]	[B]	[C]	[D]	Side 1	Side 2
Monitor	/	/	/	/	/	/
Squelch Off	/	/	/	/	/	/
Low Power	/	/	/	/	/	/
Lock*	/	/	/	/	/	/
Lamp*	/	/	/	/	/	/
Channel Up*	/	/	/	/	/	/
Channel Down*	/	/	/	/	/	/
Scan	/	/	/	/	/	/
Follow-Me Scan	/	/	/	/	/	/
Dual Watch	/	/	/	/	/	/
Talkaround	/	/	/	/	/	/
Add/Del*	/	/	/	/	/	/
Reset	/	/	/	/	/	/
Speed Dial*	/	/	/	/	/	/
Tx Save Off	/	/	/	/	/	/
Call 1	/	/	/	/	/	/
Call 2	/	/	/	/	/	/
Call 3	/	/	/	/	/	/
Code Select*	/	/	/	/	/	/
Code Up*	/	/	/	/	/	/
Code Down*	/	/	/	/	/	/
Emergency	-/	-/	-/	-/	-/	-/
Group	/	/	/	/	/	/
ACC 1	/	/	/	/	/	/
ACC 2	/	/	/	/	/	/
Play	/	/	/	/	/	/
Record	/	/	/	/	/	/
Encryption	/	/	/	/	/	/
Lone Worker	-/	-/	-/	-/	-/	-/

* VX-420 series only

VERTEX STANDARD CO., LTD.

4-8-8 Nakameguro, Meguro-Ku, Tokyo 153-8644, Japan

VERTEX STANDARD

US Headquarters

10900 Walker Street, Cypress, CA 90630, U.S.A.

YAESU UK LTD.

Unit 12, Sun Valley Business Park, Winnall Close

Winchester, Hampshire, SO23 0LB, U.K.

VERTEX STANDARD HK LTD.

Unit 5, 20/F., Seaview Centre, 139-141 Hoi Bun Road,

Kwun Tong, Kowloon, Hong Kong

VERTEX STANDARD (AUSTRALIA) PTY., LTD.

Normanby Business Park, Unit 14/45 Normanby Road

Notting Hill 3168, Victoria, Australia

Description of Operating Functions

Talk Around

Press (or Press and hold) the assigned **Programmable** key to activate the Talk Around feature when you are operating on duplex channel systems (separate receive and transmit frequencies, utilizing a “repeater” station). The Talk Around feature allows you to bypass the repeater station and talk directly to a station that is nearby. This feature has no effect when you are operating on “Simplex” channels, where the receive and transmit frequencies are already the same.

When the “TA” function is activated, the “**M**” icon will be indicated on the display.

Note that your dealer may have made provision for “Talk Around” channels by programming “repeater” and “Talk Around” frequencies on two adjacent channels. If so, the key may be used for one of the other Pre-Programmed Functions.

Add/Del

The Add/Del feature allows the user to arrange a custom Scan.

Press (or Press and hold) the assigned **Programmable** key to delete/restore the current channel to/from your scanning list.

When you delete a current channel, “**SKIP**” will appear on the LCD for one second after pressing the **Programmable** key. When you restore a current channel, “**STOP**” will appear on the LCD for one second after pressing the **Programmable** key.

Speed Dial

Your Dealer may have pre-programmed Auto-Dial telephone number memories into your radio.

To dial a number, press (or Press and hold) the Dealer-assigned **Programmable** key for Speed Dialing, then press the number key (0 - 9) corresponding to the telephone number memory you wish to send. The DTMF tones sent during the dialing sequence will be heard in the speaker.

TX Save Off

Press (or Press and hold) the assigned **Programmable** key to disable the Transmit Battery Saver, if you are operating in a location where high power is almost always needed.

The Transmit Battery Saver helps extend battery life by reducing transmit power when a very strong signal from an apparently nearby station is being received. Under some circumstances, though, your hand-held radio may not be heard well at the other end of the communication path, and high power may be necessary at all times.

Call 1, 2, 3/Reset

When the 2-tone or 5-Tone selective calling unit is installed, press (or Press and hold) the assigned **Programmable** key to silence the receiver and reset for another call, when a communication is finished.

Code Select

Press (or Press and hold) the assigned **Programmable** key to enable the changing the 5-Tone Paging code which is recalled by the “**Call 1**” key.

Code Up, Down

Press (or Press and hold) the assigned **Programmable** key to switch to a higher (or lower) paging code number for the 5-Tone Paging System.

Emergency

The **VX-410/-420** series includes an “Emergency” feature, which may be useful, if you have someone monitoring on the same frequency as your transceiver’s channel. For further details contact your **VERTEX STANDARD** dealer.

Group

Press (or Press and hold) the assigned **Programmable** key to select a “**A**” or “**B**” group of channels.

Once the desired Group is reached, rotate the **CH** knob to select the desired channel within the selected Group.

Monitor

Press (or Press and hold) the assigned **Programmable** key momentarily to disable the Tone squelch.

Squelch Off

Press (or Press and hold) the assigned **Programmable** key to disable the Noise and Tone squelch. Again press (or Press and hold) the assigned **Soft** key to resume normal (quiet) Noise and Tone squelch action.

Low Power

Press (or Press and hold) the assigned **Programmable** key to set the radio’s transmitter to the “Low Power” mode, thus extending battery life. Press (or Press and hold) the assigned **Programmable** key again to return to “High Power” operation when in difficult terrain.

When the radio’s transmitter is set to “Low Power” mode, the “**Low**” icon will be indicated on the display.

Lock

Press (or Press and hold) the assigned **Programmable** key to lock the **Programmable** keys (except **Lock** key); thus, the [A], [B], [C], and [D] keys can be disabled to prevent radio settings from being disturbed.

Lamp

Press (or Press and hold) the assigned **Programmable** key to illuminate the LCD for five seconds.

Channel Up

Press (or Press and hold) the assigned **Programmable** key to switch to a higher operating channel number.

Channel Down

Press (or Press and hold) the assigned **Programmable** key to switch to a lower operating channel number.

Scan

The Scanning feature is used to monitor multiple channels programmed into the transceiver. While scanning, the radio will check each channel for the presence of a signal, and will stop on a channel if a signal is present.

- To activate scanning:

Press (or Press and hold) the assigned **Programmable** key.

The scanner will search the channels, looking for active ones; it will pause each time it finds a channel on which someone is speaking.

- To stop scanning:

Press (or Press and hold) the assigned **Programmable** key.

Operation will revert to the channel to which the **CH** knob is set.

Follow-Me Scan

“Follow-Me” Scan feature checks a *User-assigned* Priority Channel regularly as you scan the other channels. Thus, if only Channels 1, 3, and 5 (of the 8 available channels) are designated for “Scanning,” the user may nonetheless assign Channel as the “User-assigned” Priority Channel via the “Follow-Me” feature. Press the assigned **Programmable** key to activate “Follow-Me” scanning, then turn the **CH** selector knob to the channel which you want to designate as the “User-Assigned Priority Channel”. When the scanner stops on an “active” channel, the User-assigned Priority Channel will automatically be checked every few seconds.

Dual Watch

The Dual Watch feature is similar to the Scan feature, except that only two channels are monitored: the current operating channel, and the “Priority” channel.

- To activate Dual Watch:

Press (or Press and hold) the assigned **Programmable** key.

The scanner will search the two channels; it will pause each time it finds a channel on which someone is speaking.

- To stop Dual Watch:

Press (or Press and hold) the assigned **Programmable** key.

Operation will revert to the channel to which the **CH** knob is set.

ACC 1, 2

When the optional unit is installed, these functions are various uses.

For further details, contact your **VERTEX STANDARD** dealer.

REC/PLAY (VOICE STORAGE: OPTION)

This function, which requires the optional Voice Storage Unit, Allows you to record and play back incoming receiver audio.

Recording:

Press (or Press and hold) the assigned **Programmable** key to toggle the recording feature “on” and “off.” If the incoming signal is being heard through the speaker when the recording feature is set to “on,” the received audio will be recorded. The last 2 minutes of incoming audio will be stored on a first-in, first-out basis.

Playback:

Press (or Press and hold) the assigned **Programmable** key to start playback. During playback, pressing then “#” key lets you jump forward 8 seconds, while pressing the “*” key lets you go back 8 seconds. To stop playback before the stored message is complete, press (or Press and hold) the assigned **Programmable** key.

Encryption

When the Voice Scrambler feature is enabled, pressing the assigned **Programmable** key of the “Encryption” toggles the Scrambler “on” and “off.”

Lone Worker

Press and hold the assigned **Programmable** key to toggle the Lone Worker feature “ON” and “OFF.”

The Lone Worker feature perform to emit an alarm for 30 seconds at one second interval when the Lone Worker Timer is expired. If the user does not reset the timer by pressing **PTT** switch, the radio switches to the Emergency modo.

ARTS (Auto Range Transpond System : VX-420 only)

This system is designed to inform you when you and another **ARTS**-equipped station are within communication range.

During **ARTS** operation, your radio automatically transmits for about 1 second every 55 seconds in an attempt to shake hands with the other station.

If you have out of range for more than two minutes, your radio senses that no signal has been receives, a ringing beeper will sound, and “**OUT RANGE**” will appear on the LCD. If you subsequently move back into range, as soon as the other station transmits, your beeper will sound and “**IN RANGE**” will appear on the LCD.

DTMF Paging System (VX-420 only)

This system allows paging and selective calling, using DTMF tone sequences.

When your radio is paged by a station bearing a tone sequence which matches yours, your radio’s squelch will open and the alert will sound. The three-digit code of the station which paged you will be displayed on your radio’s LCD.