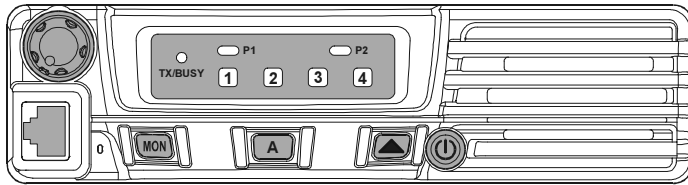




VX-4100 *SERIES*

OPERATING MANUAL



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Congratulations!

You now have at your fingertips a valuable communications tool: a VERTEX STANDARD two-way radio! Rugged, reliable and easy to use, your VERTEX STANDARD radio will keep you in constant touch with your colleagues for years to come, with negligible maintenance downtime.

Please take a few minutes to read this manual carefully. The information presented here will allow you to derive maximum performance from your radio, in case questions arise later on.

We're glad you joined the VERTEX STANDARD team. Call on us anytime, because communications is our business. Let us help you get your message across.

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.

SAFETY/WARNING INFORMATION

WARNING - DO NOT operate the VX-4100 radio when any person(s) (bystanders) outside the vehicle are within the distances shown in the chart at the bottom of this section.

Safety Training information:

Antennas used for this transmitter must not exceed an antenna gain of 0 dBd. The radio must be used in vehicle-mount configurations with a maximum operating duty factor not exceeding 50%, in typical Push-to-Talk configurations.

This radio is restricted to occupational use, work related operations only where the radio operator must have the knowledge to control the exposure conditions of its passengers and bystanders by maintaining the minimum separation distance shown below.

Failure to observe these restrictions will result in exceeding the FCC RF exposure limits.

Antenna Installation:

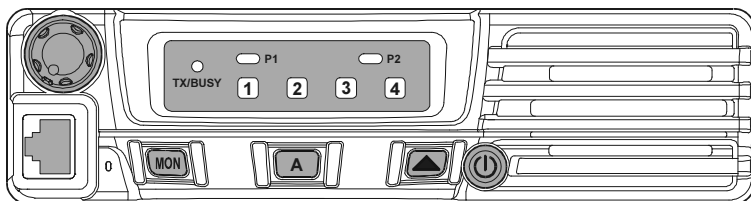
For rear deck trunk installation, the antenna must be located at least the following distance away from rear-seat passengers in order to comply with the FCC RF exposure requirements.

For roof top installations, the antenna must be placed in the center of the roof.

Unsafe Radiation Distance

VX-4104	VX-4107
1.97 Feet (0.60 m)	2.82 Feet (0.86 m)

INTRODUCTION



The **VX-4100** Series are full-featured FM transceiver designed for flexible mobile and base station business communications in the VHF or UHF Land Mobile bands. These transceiver are designed for reliable business communications in a wide variety of applications with a wide range of operating capability provided by their leading-edge design.

Important channel frequency data is stored in EEPROM and flash memory on the CPU, and is easily programmable by dealers using a personal computer and the VERTEX STANDARD **VPL-1** Programming Cable and **CE59** Software.

The pages which follow will detail the many advanced features provided on the **VX-4100** Series transceiver. After reading this manual, you may wish to consult with your Network Administrator regarding precise details of the configuration of this equipment for use in your application

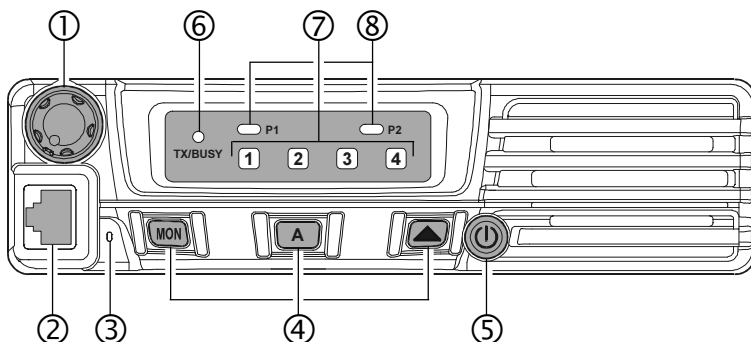
For North American Users Regarding 406 MHz Guard Band

The U.S. Coast Guard and National Oceanographic and Atmospheric Administration have requested the cooperation of the U.S. Federal Communications Commission in preserving the integrity of the protected frequency range 406.0 to 406.1 MHz, which is reserved for use by distress beacons. Do not attempt to program this apparatus, under any circumstances, for operation in the frequency range 406.0 - 406.1 MHz if the apparatus is to be used in or near North America.

CONTROLS & CONNECTORS

Front Panel

Important! - All buttons located on the Front Panel are Programmable Function (PF) Buttons, configured according to your network requirements and programmed by your VERTEX STANDARD dealer. The instructions below describe a typically-configured radio.



① VOL Knob

Turn this control clockwise to increase the volume.

② Microphone Jack

Connect the microphone plug to this jack.

③ Emergency Microphone

The emergency microphone is located behind this small slit. When the emergency feature is activated, this microphone is enabled.

④ [MON], [A], [▲] Buttons (Programmable Function Buttons)

These buttons can be set up for special applications, such as High/Low power selection, Monitor, Talk-Around, etc., as determined by your network requirements and programmed by your VERTEX STANDARD dealer.

⑤ (POWER) Button

Press and hold in this button for 2 seconds to toggle the transceiver's power "on" and "off."

CONTROLS & CONNECTORS

⑥ TX/BUSY Indicator

Indicates the transceiver's Transmit/Receive Status.

Steady Red: Transmitting in progress

Steady Green: Signaling Off

Blinking Green: Busy Channel/Squelch Off

⑦ Channel Number Indicator

Indicates the operating channel.

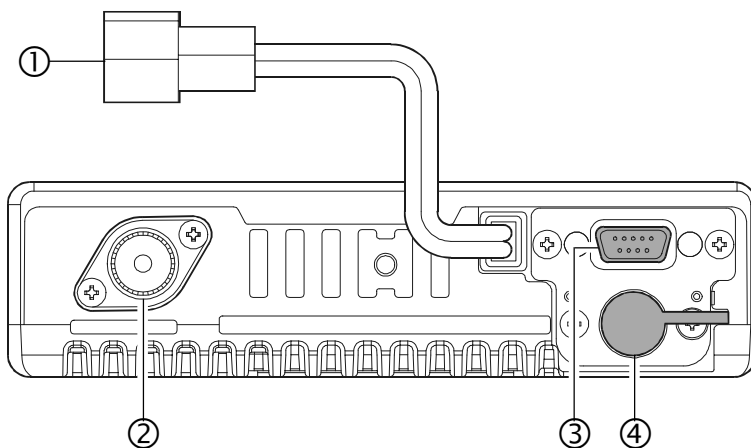
⑧ Transceiver Status Indicator

The "P1" and "P2" indicators show current transceiver status, which can be customized via programming by your VERTEX STANDARD dealer to meet your communications/network requirements. The possible "P1" and "P2" displays are explained below.

STATUS	INDICATOR		DESCRIPTION
	P1	P2	
MONI			This indicator blinks when CTCSS- or DCS-controlled squelch is disabled. The indicator is illuminated constantly while the audio is passing normally.
SCAN Channel			Illuminates the indicator when the operating channel is selected on the SCAN channel.
+4 CH			Illuminates the indicator when the radio recalls the alternate channel list.
LOW			Illuminates the indicator when the radio's transmitter is set to the "Low Power" mode.
TA (Talk Around)			Illuminates the indicator when the "Talk Around" function is activated.
Encryption Disable (Requires optional Unit)			Illuminates the indicator when the "Voice Scrambler" function is disabled temporarily.
Emergency			Illuminates the indicator when the "Emergency" feature is activated.
HOME			Illuminates the indicator when you recall the Home group/channel.
Horn Alert			Illuminates the indicator when the "Horn Alert" feature is activated.
Public Adress			Illuminates the indicator when the radio is turned to a PA amplifier.
Key Lock			Illuminates the indicator when the front panel's keys are locked.
EXT ACC			Illuminates the indicator when the output port on the Accessory Connector is turned to "ON."
REC/PLAY			Blinks the indicator while the received audio is recording. Illuminates the indicator when the voice recording is completed.

CONTROLS & CONNECTORS

Rear Panel



① 13.6V DC Cable Pigtail with Connector

The supplied DC power cable must be connected to this 2-pin connector. Use only the supplied fused cable, extended if necessary, for power connection.

② Antenna Socket

The 50-Ohm coaxial feedline to the antenna must be connected here, using a type-M (PL-259) plug.

③ D-Sub 15-Pin Accessory Connector

External TX audio line input, PTT (Push To Talk), Squelch, and external RX audio line output signals may be obtained from this connector for use with accessories such as data transmission/reception modems, and external Channel control input etc.

④ External Speaker Jack


An external loudspeaker may be connected to this 2-contact, 3.5-mm mini-phone jack.

Caution: Do not connect either wire of this line to ground, and be certain that the speaker has adequate capability to handle the audio output (12 W) from the radio.

BASIC OPERATION OF THE TRANSCEIVER

Important! - Before turning on the radio the first time, confirm that the power connections have been made correctly and that a proper antenna is connected to the antenna jack.

Switching Power ON/OFF

- Press the  (**POWER**) button to turn the radio on. The display will become illuminated.
- Press the PF (Programmable Function) button which is programmed to the Channel Up/Down feature to choose the desired operating channel. A channel number will be displayed. See page 7 for more information on the Programmable Function keys.

Setting the Volume

- Turn the **VOL** knob clockwise to increase the volume, and counterclockwise to decrease it.

Transmitting

- To transmit, monitor the channel and make sure it is clear.
THIS IS AN FCC REQUIREMENT!
- Press the PF button which is programmed to the Monitor feature to listen for channel activity.
- When receiving a call, transmit only after the incoming call ends. The radio cannot receive a call and transmit simultaneously.
- Press the **PTT** switch.
- If the channel is clear, the **BUSY/TX** indicator will glow red. The radio is now transmitting. While holding in the **PTT** switch, speak across the face of the microphone in a clear and normal voice. For best transmission, hold the microphone about 1-1/2 to 2 inches away from your mouth. Release the **PTT** switch to receive.
- If the Busy Channel Lockout feature has been programmed on a channel, the radio will not transmit when a carrier is present. Instead, the radio will generate a short beep three times. Release the **PTT** switch and wait for the channel to be clear of activity.
- If CTCSS or Digital Coded Squelch (DCS) Lockout has been programmed on a channel, the radio can transmit only when there is no carrier being received or when the carrier being received includes the correct CTCSS tone or DCS code.

BASIC OPERATION OF THE TRANSCEIVER

Automatic Time-Out Timer

If the selected channel has been programmed for automatic time-out, you must limit the length of each transmission. While transmitting, a beep will sound 10 seconds before time-out. Another beep will sound just before the deadline; the red “**TX**” indicator will disappear and transmission will cease soon thereafter. To resume transmitting, you must release the **PTT** switch and wait for the “penalty timer” to expire (if you press the **PTT** switch before this timer expires, the timer restarts, and you will have to wait another “penalty” period)

Key Lock

In order to prevent accidental frequency change or inadvertent transmission, various aspects of the **VX-4100**'s keys, and the **PTT** switch, may be locked out. The precise lockout configuration must be programmed by your VERTEX STANDARD dealer

To activate the Locking feature, press and hold in the [**A**] key while turning the radio on. To disable the Locking feature, repeat this power-on procedure.

ADVANCED OPERATION

Programmable Function (PF) Buttons

The **VX-4100** Series includes seven Programmable Function (PF) Buttons. The PF button functions can be customized, 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 PF button programming features are illustrated below, and these functions are explained on the pages to follow.

For further details, contact your VERTEX STANDARD dealer. For future reference, check the box next to the function that has been assigned to each PF button on your particular radio, and keep it handy.

Function	PF Button			Function	PF Button		
	MON	A	▲		MON	A	▲
MONI				CALL 1 to Call 5			
Channel Up				HOME			
Channel Down				Horn Alert			
SCAN				Public Address			
DW (Dual Watch)				EXT. ACC1			
Follow-Me SCAN				EXT. ACC2			
Follow-Me DW				Direct CH#1			
LOW				Direct CH#2			
TA (Talk Around)				Direct CH#3			
Encryption Disable ※				Direct CH#4			
Emergency				REC/PLAY ※			
CALL/RESET							

※: Requires optional unit

ADVANCED OPERATION

Description of Operating Functions

MONITOR (MONI)

Press the assigned programmable key to cancel CTCSS- and DCS-controlled squelch; the **BUSY/TX** indicator will blink green. Press and hold in this button for 1.5 seconds to hear background noise (unmute the audio); the **BUSY/TX** indicator will glow green.

CHANNEL UP/DOWN

Press the assigned programmable key to select a different channel.

CHANNEL SCAN (SCAN)

The Scanning feature is used to monitor multiple channels programmed into the transceiver. While scanning, the transceiver 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 the assigned programmable key to activate scanning.
- The scanner will search the programmed channels, looking for active ones; it will pause each time it finds a channel on which someone is speaking.
- Press the assigned programmable key again to disable scanning. Operation will revert to the programmed revert channel.

Note: Your dealer may have programmed your radio to stay on one of the following channels if you press the **PTT** switch during the scanning pause:

- Current channel (“Talk Back”)
- “Last Busy” channel
- “Priority” channel
- “Home” channel
- “Scan Start” channel

ADVANCED OPERATION

DUAL WATCH (DW)

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 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 the assigned programmable key.
- Operation will revert to the “Dual Watch Start” channel.

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 2 as the “User-assigned” Priority Channel via the “Follow-Me” feature.

To activate “Follow-Me” scanning, first select the channel you want to designate as the “User-Assigned Priority Channel” and press the assigned programmable key. Then press the Channel Up/Down key to recall to the “Scanning Start” channel which has been programmed by your dealer to activate the scanner. When the scanner stops on an “Active” channel, the User-assigned Priority Channel will automatically be checked every few seconds; if activity is found on the User-assigned Priority Channel, the radio will switch between it and the Dealer-Assigned Priority Channel, if any.

ADVANCED OPERATION

FOLLOW-ME DUAL WATCH (DW)

To set up a “Dual Watch” frequency pair using the “Follow-Me” feature, select a channel using the Channel Up/Down key. Now press the assigned programmable key; pressing the assigned programmable key locks the current channel as the User-assigned Priority Channel. Now press the Channel Up/Down key to select another channel (not the “Scanning Start” channel). Your radio will now switch back-and-forth between the currently-selected channel and the User-assigned Priority Channel.

During “Follow-Me” scanning (after you have pressed the key), you can set up the “Dual Watch” feature by pressing the Channel Up/Down key to another channel. The radio will then scan back and forth between the original User-assigned Priority Channel and the newly-selected channel.

The Priority Channel you have assigned (before pressing the key) will be retained in memory until you change it.

LOW POWER (LOW)

Press the assigned programmable key to set the radio’s transmitter to the “Low Power” mode, thus extending battery life. Press the key again to return to “High Power” operation when in difficult terrain.

TALK AROUND (TA)

Press 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.

Note that your dealer may have mode 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.

ENCRYPTION DISABLE (OPTION)

When the Voice Scrambler feature is enabled, press the assigned programmable key to toggle the voice encryption on and off.

ADVANCED OPERATION

EMERGENCY

The **VX-4100** series include an “Emergency” feature which may be useful if you have someone monitoring on the same frequency as your transceiver’s channel.

Press the assigned programmable key to initiate an emergency call. For further details contact your VERTEX STANDARD dealer.

CALL/RESET

This feature, if enabled, allows the user to change the 3-digit Page Call code, used to call other similarly-equipped stations. Press the assigned programmable key, followed by the three digits representing the Page Call code of the station you wish to call. Three tones will be heard after the last key is pressed (the new code will now be transmitted).

The receiver squelch of the other station will be opened, and you can begin communication.

CALL 1 TO CALL 5

Press the assigned programmable key to send a 5-Tone sequential burst which is pre-defined.

HOME CHANNEL (HOME)

Press the assigned programmable key to recall the pre-defined Home channel.

HORN ALERT

Press the assigned programmable key to turn the Horn Alert function “ON” or “OFF.” If you receive a call from the base station with 2-Tone, 5-Tone or DTMF signaling, horn alert will be activated and your vehicle’s will sound.

PUBLIC ADDRESS

Press the assigned programmable key to use the transceiver as a PA amplifier. When you enable this function, a tone sounds. The public address can be used even while scanning and receiving a call.

EXT. ACC1

Press the assigned programmable key to toggle output port “1” “on” and “off.”

EXT. ACC2

Press the assigned programmable key to toggle output port “2” “on” and “off.”

ADVANCED OPERATION

DIRECT CH#1 TO DIRECT CH#4

Press the assigned programmable key to recall the Dealer pre-programmed channel directly.

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 the assigned Rec/Play programmable key for more than 1.5 seconds 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 the assigned Rec/Play key *momentarily* to start playback. During playback, pressing then [▲] key lets you jump forward 8 seconds. To stop playback before the stored message is complete, press the [A] key.

AF MIN VR

Press the assigned programmable key to reduce the audio output to the (lower) level programmed by your Dealer.

ADVANCED OPERATION

ARTS (Auto Range Transpond System)

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 25 seconds (the interval is programmed by the Dealer) in an attempt to shake hands with the other station.

If you move out of range for more than two minutes, your radio senses that no signal has been received, three beeps from the beeper will sound. If you subsequently move back into range, a single beep will be heard whenever your radio shakes hands with the other station.

DTMF Paging System

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.

OPTIONAL ACCESSORIES

FVP-25	Encryption/DTMF Pager Unit
FVP-35	Encryption Unit
DVS-5	Voice Storage Unit
VTP-50	VX-Trunk Unit
FP-1023A	External Power Supply
MLS-100	Mobile Loudspeaker (12 W Peak Power)
LF-1	Line Filter
MH-700D	DTMF Back-lit Microphone
MH-25A8J	Microphone
MD-11A8J	Desktop Microphone
VPL-1	Programming Kit

Availability of accessories may vary; some accessories are supplied standard per local requirements, others may be unavailable in some regions.

Check with your VERTEX STANDARD Dealer for changes to this list.