

vertex[®]

VX-3000

OPERATING MANUAL

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Congratulations!

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

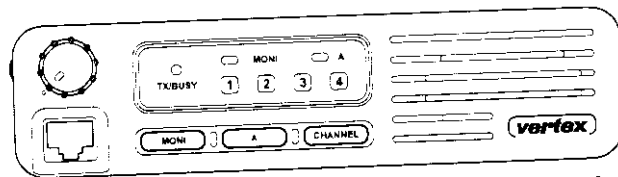
Please take a few minutes to read this manual carefully. The information presented here will allow you to derive maximum performance from your radio. After reading it, keep the manual handy for quick reference, in case questions arise later on.

We're glad you joined the **vertex** team. Call on us any time, because our business is communications. Let us help you get your message across.

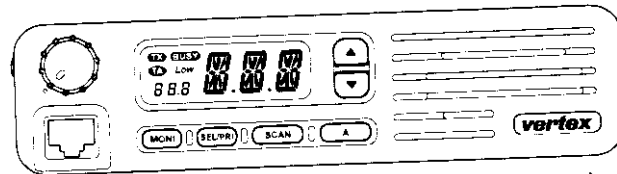
NOTICE

There are no user-serviceable points inside this transceiver. All service jobs must be referred to your Authorized Service Center or Network Administrator.

VX-3000 Operating Manual



4 channel version



48 and 120 channel versions

The VX-3000 Series are full-featured FM transceivers designed for flexible mobile and base station business communications in the VHF Low-Band (70 Watts), VHF High-Band (50 Watts) and UHF (40 Watts) Land Mobile Bands. Each model is designed for reliable business communications in a wide variety of applications, with a wide range of operating capability provided by its leading-edge design.

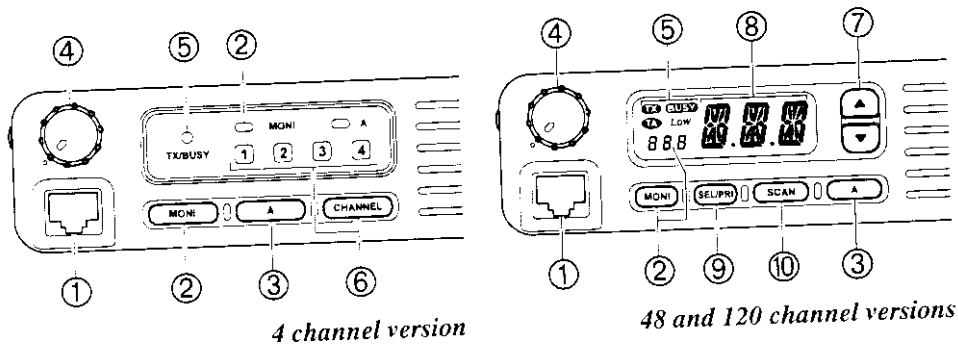
Special built-in features include:

- 4 or 48-channel capability, with 120 channels optionally available for the 48-channel versions.
- CTCSS (Continuous Tone Coded Squelch System);
- DCS (Digitally Coded Squelch);
- Extensive Selective Calling selections; and
- Two sets of scanning channels, one set preset by the dealer and another which is operator-selectable.

The pages which follow will detail the many advanced features provided on the VX-3000 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.

Controls & Connectors

Front Panel



④ Microphone Jack

Press the microphone plug firmly into this jack until it locks. To remove the microphone, press the lever protruding from the bottom side of the plug while pulling it out.

⌚ MONI Button & Indicator

This button selects the squelch (receiver muting) mode. When the indicator is off, tone (or coded) squelch is active. When you press **MONI** momentarily, the "MONI" indicator blinks (4 channel version) or a small Dot [●] will be displayed (48/120 channel versions); in this condition, only the "noise" squelch is active, and any station which transmits on the channel will be heard. Pressing **MONI** and holding it in for more than 1.5 second, on the other hand, will open the squelch completely, and background noise will be heard if no signal is present (both the small Dot and the "BUSY" indicator will appear on the 48/120 channel versions, while "MONI" will glow steadily on the 4-channel version).

If you hear constant background noise, with no signals present ("MONI" glows steadily or "BUSY" and the small Dot are both present), press the **MONI** button once to return to the previous (quiet) tone-squelched mode.

⌚ A (Accessory) Button

In VHF Low-band versions, this button can be set by your dealer to activate the noise blanker. Otherwise, this button (and the orange indicator above it) can be set up for special applications, such as high/low power selection, talk-around, and call alert functions, as determined by your network requirements and programmed by your Yaesu dealer.

➤ **VOLUME and POWER On/Off Knob**

Turn this control clockwise to turn the radio on and to increase the volume. Turn it counterclockwise into the click-stop to turn the radio off.

The following items are unique to 4-channel versions:

➤ **TX/BUSY Indicator Lamp**

This lamp glows green when the channel is busy, and red during transmission by your radio.

➤ **CHANNEL Numbered Indicators & Button**

Press the **CHANNEL** button to select the operating channel; the channel number currently in use will light up on the display.

The remaining items are unique to 48 and 120-channel versions:

➤ **BUSY/TX Indicators**

This "**BUSY**" icon appears when the channel is busy, and "**TX**" appears while transmitting.

➤ **CHANNEL Selector Buttons (p) and (q)**

Push one of these keys to select the operating channel, as shown on the display.

➤ **Numeric Channel Display**

The display includes an 3-character numeric section showing channel and group numbers plus status and identity information. Additional indicators on the display show priority channel assignments ("**Pr1**" and "**Pr2**") and scan channel selection ("**E**" means "**E**nabled for scanning").

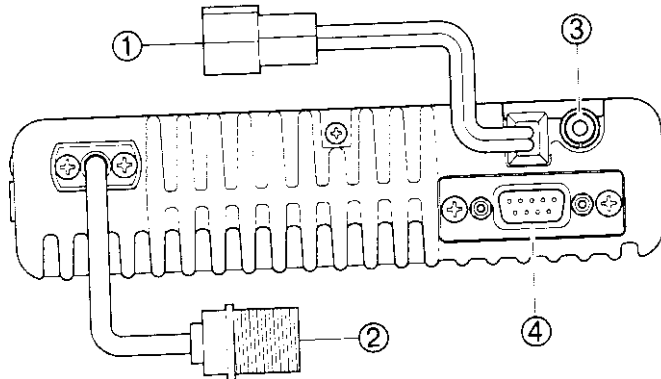
➤ **SEL/PRI Button**

This button allows selection of memory channel groups, and (together with the **SCAN** button) selects scanning modes (Dealer, User, Priority/Dealer, Priority/User, Group/Dealer, Group/User, Dealer DW, User DW) as described in the next chapter, *Basic Operation of the Transceiver*.

➤ **SCAN Button**

This button is used to activate (current group) channel scanning, to select and deselect channels for scanning, and (together with the **SEL/PRI** button) to select scanning modes, as described in the next section. Pressing the **SCAN** button for more than 1.5 second enables scanning of *all* channels (in all groups).

REAR (Heatsink)



⌚ **13.8-V DC Cable Pigtail w/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.

⌚ **Antenna Cable with Connector**

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

⌚ **External Speaker Jack**

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

Caution: Do not connect this line to ground, and be certain that the speaker has adequate capability to handle the audio output from the VX-3000.

👉 **DSUB 9-Pin Data 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, etc.

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.

Turn the **VOLUME/POWER** knob clockwise to turn on the radio. The display will become illuminated (48/120 channel versions), or the channel indicator will light up (4 channel version). The radio will start up on the last channel used prior to shut-down during the previous operating session.

In 4-channel versions, press the **CHANNEL** button to change channels. In the 48/120 channel versions, the display should show either a channel number or scan mode indicator (**DSC, USC, GDS, GUS, PDS, PUS, DDW** or **UDW**). If **"ERR"** is displayed instead, the transceiver has not yet been programmed with channel frequencies; switch off the power and contact your network administrator or Yaesu dealer. If a scan mode indicator is displayed, you can press the **SCAN** button to display a channel number, and then press either the **UP** (p) or **DOWN** (q) button to change channels.

Setting the Volume

If no signals are heard and the **"BUSY"** indicator or **"TX/BUSY"** LED is not illuminated, press and hold the **MONI** button for 1.5 second until background noise is heard and the **"MONI"** or **"BUSY"** indicator glows. Then adjust the volume control for a comfortable level on the background noise. Press **MONI** button again momentarily so the **"MONI"** or **"BUSY"** indicator disappears.

Transmitting

To transmit, wait until the **"BUSY"** indicator is off (the channel is not in use), and press the **PTT** (Push-To-Talk) switch on the side of the microphone (the **"TX"** indicator will appear or the **"TX/BUSY"** lamp will glow red). While holding in the **PTT** switch, speak across the face of the microphone in a clear, normal voice level, and then release the **PTT** switch to receive.

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 five seconds before time-out. Another beep will sound just before the deadline; the **"TX"** indicator will disappear and transmission will cease soon thereafter. To resume transmitting, you must release the **PTT** and wait for the "penalty timer" to expire (if you press the **PTT** before this timer expires, the timer restarts, and you will have to wait another "penalty" period).

The remaining instructions apply to 48-channel or 120-channel versions only:

Selecting Groups and Channels

- Press the **SEL/PRI** button (repeatedly, if necessary) to select a different group of channels.
- Press the **UP** (p) or **DOWN** (q) button to select a different channel *within the current group*.
- When you select a group, its number appears as the first digit in the new channel number which appears on the display (in other words, channel "305" represents channel #05 in channel group #3).

Scanning Modes

There are eight scanning modes, described in the list below. Each channel can be independently enabled or disabled for scanning; only channels selected for scanning within the enabled group are scanned. Also, as mentioned before, each group can have up to two priority channels which are scanned more often than the non-priority channels.

The SCAN modes and their corresponding displays are as follows:

Display	Scanning Function
DSC	Dealer Scan (only within the current group)
USC	User Scan: only user-selected channels (only within the current group)
GDS	Group Dealer Scan: scan all Dealer-selected channels in all groups
GUS	Group User Scan: scan all User-selected channels in all groups
PDS	Priority Dealer Scan: DSC plus priority channel(s)
PUS	Priority User Scan: USC plus user priority channel(s)
DDW	Dealer Dual Watch: Monitor one channel and priority channel(s)
UDW	User Dual Watch: Monitor User-selected channel and priority channel(s)

Scanning Operation

With the microphone in its hanger, press the **SCAN** button momentarily to activate scanning. Typically, "DSC" will initially appear on the display, indicating Dealer Channel Scan as the scanning mode. If you wish to change to one of the modes described in the list above, press the **SEL/PRI** button repeatedly until that mode appears on the display.

If you pick up the microphone while no signal is being received, operation will shift to a particular channel. Which channel that will be depends on which of the following options the dealer has programmed for off-hook channel selection:

Scan Start Channel

Lifting the microphone causes operation to revert to the group and channel last selected before scanning started or resumed.

Priority Revert

Lifting the microphone activates the Priority 1 channel in the current group. If no channel is assigned level 1 priority, operation will be on the Priority 2 channel. If no priority channels have been assigned, operation reverts to the Scan Start Channel.

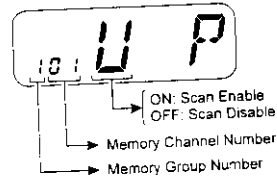
Last Busy

Lifting the microphone causes operation to revert to the group and channel where activity was last detected. If no activity was detected since turning on the radio, operation reverts to the Scan Start Channel.

How to Select Channels to be Scanned

If your radio has been configured by your Dealer to allow you, the operator, to make changes to the list of channels to be scanned, you can make these changes by following this simple process:

1. Turn the transceiver OFF by rotating the **VOLUME/POWER** control fully counter-clockwise into the click-stop.
2. Press and hold in the **SEL/PRI** button; while holding this button in, rotate the **VOLUME/POWER** control clockwise out of the click-stop to turn the radio on. You may now release the **SEL/PRI** button.
3. Press the **A** button, as necessary, until the Memory Group and Memory Channel numbers will appear in small characters in the left side of the display area.
4. You may now push the **SEL/PRI** key momentarily as many times as necessary to choose the Memory Group within which you wish to make changes to the channel scan list. Once you have selected the desired Memory Group, you may use the **UP** (p) or **DOWN** (q) button to choose a particular channel within the current group.



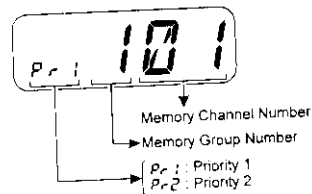
Pressing the **MONI** button will change the scanning status of the selected channel. If you are *adding* the channel to those you wish to scan, pressing the **MONI** button causes a "U" appear on the display, indicating that the channel has been added to the User Scan List. If you are *deleting* the channel from the User Scan List (the channel's data itself will not be deleted; the channel just will not be scanned), the "U" will disappear.

5. Repeat step 4 for each channel you wish to enable or disable for scanning.
6. When you are done making changes to the channels you wish to scan, press and hold in the **SEL/PRI** button for more than 1.5 second. Operation will return to its normal status, and the display will revert to its previous appearance.

How to Change the "User Priority" Channels

Your Dealer may have configured your radio so as to allow you to make changes to the "User Priority" Channels (the channels you designate to be scanned more frequently than the others). The selection process is almost identical to that used for making changes to the User Scan List.

- 1 Turn the transceiver OFF by rotating the **VOLUME/POWER** control fully counter-clockwise into the click-stop.
- 2 Press and hold in the **SEL/PRI** button; while holding this button in, rotate the **VOLUME/POWER** control clockwise out of the click-stop to turn the radio on. You may now release the **SEL/PRI** button.
- 3 Press the **A** button, as necessary, until the Memory Group and Memory Channel numbers will appear in *large* characters in the *right side* of the display area (as compared to *small* characters in the case of changes to the Scan List).
- 4 You may now push the **SEL/PRI** button momentarily as many times as necessary to choose the Memory Group within which you wish to make changes to the User Priority Channel(s). Once you have selected the desired Memory Group, you may use the **UP** (p) or **DOWN** (q) button to choose a particular channel within the current group.



Pressing the **SCAN** button will change/assign the Priority status of the selected channel.

If you are assigning the channel to Priority status, pressing the **SCAN** button causes "Pr1" or "Pr2" to flash on the display, indicating that the channel has been assigned the status of *Priority 1* or *Priority 2*, respectively. Pressing the **SCAN** button repeatedly toggles the Priority Level between "1" and "2." If you are *deleting* the channel from Priority status, the "Prn" indicator will disappear.

- 5 Repeat step 4 for each channel you wish to assign to or delete from Priority status.
- 6 When you are done making changes to the Priority Channels, press and hold in the **SEL/PRI** button for more than 1.5 second. Operation will return to its normal status, and the display will revert to its previous appearance.

The A Button Function

The **A** (Accessory) button can be programmed by the dealer to provide two of the other functions described below. In the case of the VHF Low-Band version of the VX-3000, pressing the **A** button can activate the Noise Blanker (a feature not available on the VHF High-Band or UHF versions).

To activate the primary Accessory function, press the **A** button momentarily. To access the secondary Accessory function (which may include the Alarm), press the **A** button and hold it in for 1.5 seconds or longer.

Call/Reset

When this feature is programmed and an selective call has been received (the "CAL" indicator is flashing), momentarily press the **A** button to reset the flashing indicator and mute the receiver, otherwise press the **A** button to send your radio's identification code (ANI) to the dispatcher.

Low Power

With this feature enabled, the **A** button toggles between high and low transmitter power, as programmed by the dealer.

Talk-Around

The feature causes the **A** button to select simplex operation on semi-duplex channels: the transmit frequency becomes the same as the receive frequency (regardless of any programmed offset for the channel).

Note: This feature has no effect on simplex channels. After pressing the button, "TA" is displayed on the LCD.

Noise Blanker

Because local noise can be particularly troublesome in the VHF Low-Band frequency spectrum, the Low-Band version of the VX-3000 includes a Noise Blanker feature, which may be toggled on and off by pressing the **A** button for the appropriate length of time.

Encryption

When the Voice Scrambler feature is enabled, pressing the **A** button toggles the Scrambler on and off.

A-On

When this function is enabled, the Noise Blanker will be activated (on the VHF Low-Band version); in other versions, this Accessory function is reserved for future optional features.

Alarm Function

When the "alarm" function is enabled, pressing and holding the **A** button for 1.5 seconds causes the radio to revert to a specially-designated channel, and causes the special "Alarm" identifier code to be transmitted automatically.

Note: this feature is only available as a "Secondary" Accessory to prevent accidental activation.

Specifications

General

Frequency Range (version):	29.7 ~ 37 or 37 ~ 50 MHz (VHF Low-band vers. A/B, respectively), 134 ~ 150 or 146 ~ 174 MHz (VHF high-band vers. A/C, respectively), 400 ~ 460 MHz (UHF: A), 450 ~ 490 MHz (UHF: D), 480 ~ 512 MHz (UHF: F)
No. of Channels & Spacing:	4, 48 or 120 channels 30-kHz, 25-kHz and 12.5-kHz spacing (VHF and UHF), 20-kHz spacing (VHF Low-band)
Modes of Emission:	16K0F3E, 11K0F3E (direct frequency modulation)
Frequency Stability:	±0.00025% (VHF and UHF), ±0.002% (VHF Low-band)
Antenna Requirements:	50 Ohms, unbalanced (SO-239 socket)
Voltage Requirements:	11.8 to 15.6 V DC, negative ground
Current Consumption (approx.):	400 mA Stby, 1.4A Rx, 13 A Tx (VHF and UHF), 15 A Tx (VHF Low-band)
Operating Temperature Range:	-30 °C to +60 °C (-22 °F to +140 °F)
Size (WxHxD, approx.):	160 x 40 x 160 mm (6-¼ x 1-½ x 6-¼ inches)
Weight (approx.):	1.4 kg (3.1 lbs.)

Receiver

Receiver Circuit Type:	Double Conversion Superheterodyne
Intermediate Frequencies:	17.7 MHz (VHF Low-band), 21.4 MHz (VHF) or 73.35 MHz (UHF); and 455 kHz (all models)
Sensitivity:	0.25/0.3 µV for 12-dB SINAD, 0.35/0.45 µV for 20 dB NQ
Hum & Noise Ratio:	Better than 46 dB (VHF & UHF) for 25-kHz/step, Better than 38 dB (VHF & UHF) for 12.5-kHz/step, Better than 50 dB (VHF Low-band)
Adjacent Channel Selectivity:	>70 dB (VHF and UHF) for 25-kHz/step, >60 dB (VHF and UHF) for 12.5-kHz/step >70 dB (VHF Low-band)
Intermodulation Distortion:	Better than 70 dB
Spurious Rejection:	Better than 70 dB
External Audio Output Power:	10 watts into 4 Ohms with <10% THD

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Transmitter

Power Output:

70/10 watts (VHF Lowband), 50/5 watts (VHF),
40/5 watts (UHF) (high/low, programmable)

Modulation Type/Deviation:

Frequency Modulation, ± 5 kHz (± 2.5 kHz)

Hum & Noise Ratio:

Better than 46 dB (VHF & UHF) for 25-kHz/step,
Better than 38 dB (VHF & UHF) for 12.5-kHz/step,
Better than 50 dB (VHF Low-band)

Modulation Distortion:

Less than 5%

Spurious Emissions:

Better than 70 dB (below carrier)

Microphone Impedance:

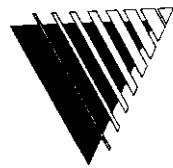
600 Ohms

Specifications are subject to change without notice or obligation.

Optional Accessories

CE-19	Programming Software (for IBM PC/compatibles only)
VPL-1	Programming Cable
T9101411	Radio-to-Radio Cloning Connection Cable
FP-1025A	Heavy-Duty (20A) AC Power Supply
MD-11A8J	Desktop Microphone
MH-600D	DTMF Back-lit Microphone w/Autodial
MLS-100	External Loudspeaker
LF-1	DC Line Filter
VTM-20	VX-Trunk II Trunking Mobile Logic Board

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



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RADIO COMMUNICATIONS

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THE APPLICANT HAS BEEN CAUTIONED AS TO THE FOLLOWING:

15.21 INFORMATION TO USER.

The users manual or instruction manual for an intentional radiator shall caution the user that changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

15.27(a) SPECIAL ACCESSORIES.

Equipment marketed to a consumer must be capable of complying with the necessary regulations in the configuration in which the equipment is marketed. Where special accessories, such as shielded cables and/or special connectors are required to enable an unintentional or intentional radiator to comply with the emission limits in this part, the equipment must be marketed with, i.e. shipped and sold with, those special accessories. However, in lieu of shipping or packaging the special accessories with the unintentional or intentional radiator, the responsible party may employ other methods of ensuring that the special accessories are provided to the consumer, without additional charge.

Information detailing any alternative method used to supply the special accessories for a grant of equipment authorization or retained in the verification records, as appropriate. The party responsible for the equipment, as detailed in § 2.909 of this chapter, shall ensure that these special accessories are provided with the equipment. The instruction manual for such devices shall include appropriate instructions on the first page of text concerned with the installation of the device that these special accessories must be used with the device. It is the responsibility of the user to use the needed special accessories supplied with the equipment.