



VM-3500E

25 Watt VHF/FM

Marine Transceiver

Owner's Manual

- Oversized alphanumeric LCD, knobs and keys
- 30 W Loud Hailer with listen back and 4 fog horns, Bells & Whistles
- Direct keypad entry of a channel using the keypad
- Removable ClearVoice speaker microphone with 16/9 key and channel selection
- Display shows channel names, and repeats GPS information*
- Capable of connecting an optional enhanced **RAM+** second station remote microphone
- DSC distress call automatically broadcasts lat/long and vessel ID*
- DSC position request function and NMEA data input/output to connect to GPS Plotter*
- Versatile user-programmable Scanning, Priority Scan and Dual Watch
- One-button access to Channel 16 and 9

* with GPS attached

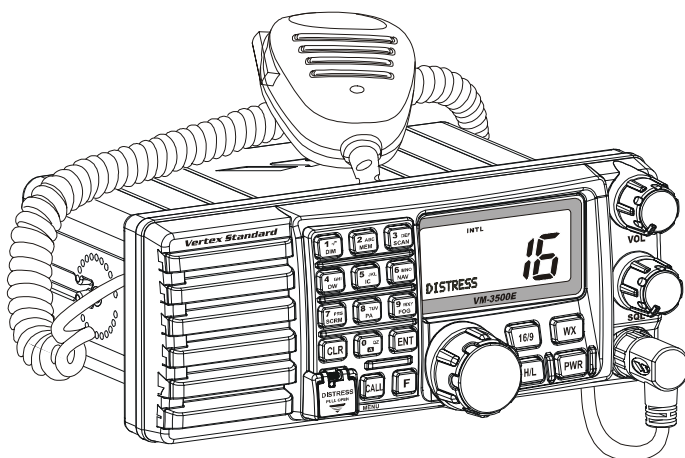


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1 GENERAL INFORMATION

The Vertex Standard **VM-3500E** is a VHF/FM transceiver designed for use in the frequency range of 156.025 to 163.275 MHz. The **VM-3500E** can be operated from 11 to 16 VDC and has a switchable RF output power of 1 watt or 25 watts.

The **VM-3500E** is capable of DSC (Digital Selective Calling) Class D operation and an Enhanced second station RAM+ mic (**CMP25** remote-control speaker/microphone with display).

Other features of the **VM-3500E** include: Direct keypad entry of a channel using the keypad, 30W PA/Fog, multi-station intercom, scanning, priority scanning, submersible speaker mic, high and low voltage warning, and GPS repeatability.

2 PACKING LIST

When the package containing the transceiver is first opened, please check it for the following contents:

- **VM-3500E** Transceiver
- Mounting Bracket and attaching hardware
- Owner's Manual
- Quick-Reference Card
- Power Cord

3 OPTIONS

MMB-84 Flush-Mount Bracket
CMP25B/W Remote-Access Microphone (RAM+ Mic, Black/White)
CT-100 10-foot Extension Cable for RAM+ Mic
CVS2500 Voice Scrambler

4 INSTALLATION NOTE

The installation of this equipment should be made in such a manner as to respect the EC recommended electromagnetic field exposure limits (1999/519/EC).

The maximum RF power available from this device is 25 watts. The antenna should be installed as high as possible for maximum efficiency and that this installation height should be at least 5 meters above ground (or accessible) level. In the case where an antenna can not be installed at a reasonable height, then the transmitter should neither be continuously operated for long periods if any person is within 5 meters of the antenna, nor operated at all if any person is touching the antenna.

In all cases any possible risk depends on the transmitter being activated for long periods (actual recommendation limits are specified as an average of 6 minutes). Normally the transmitter is not active for long periods of time. Some radio licenses will require that a timer circuit automatically cuts the transmitter after 1 - 2 minutes etc.

Attention in Case of Use

This transceiver works on frequencies which are not generally permitted.

For frequency allocation, apply for a licence at your local spectrum management authority.

For actual usage contact your dealer or sales shop in order to get your transceiver adjusted to the allocated frequency range.

List of the practicable area			
AUT	BEL	DNK	FIN
FRA	DEU	GRC	ISL
IRL	ITA	LIE	LUX
NLD	NOR	PRT	ESP
SWE	CHE	GBR	

5 GETTING STARTED

5.1 ABOUT VHF RADIO

The radio frequencies used in the VHF marine band lie between 156 and 158 MHz with some shore stations available between 161 and 163 MHz. The marine VHF band provides communications over distances that are essentially “line of sight” (VHF signals do not travel well through objects such as buildings, hills or trees). Actual transmission range depends much more on antenna type, gain and height than on the power output of the transmitter. On a fixed mount 25W radio transmission expected distances can be greater than 15 miles, for a portable 5W radio transmission the expected distance can be greater than 5 miles in “line of sight”.

5.2 SELECTING AN ANTENNA

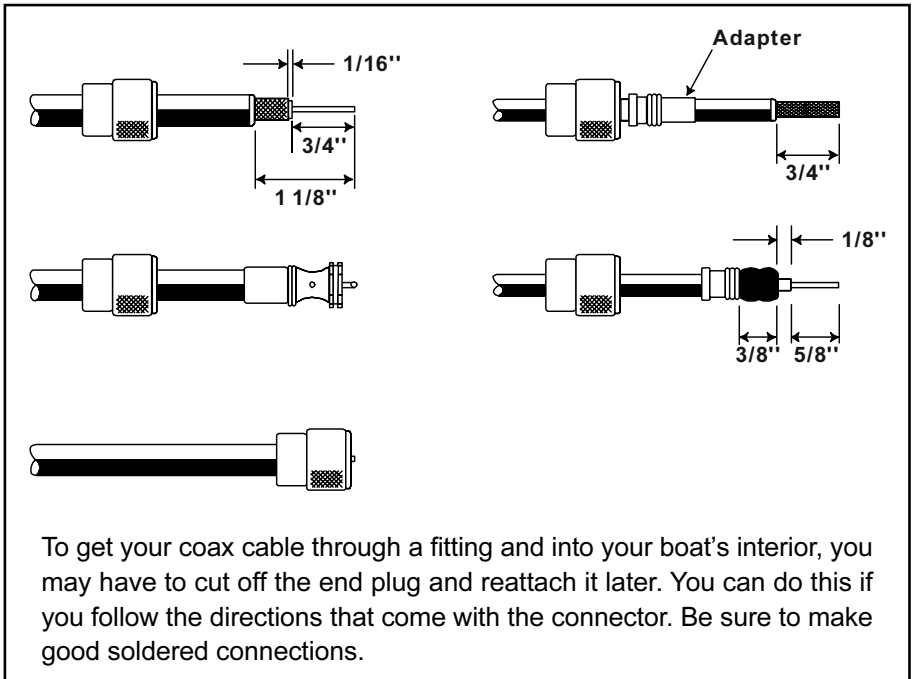
Marine antennas are made to radiate signals equally in all horizontal directions, but not straight up. The objective of a marine antenna is to enhance the signal toward the horizon. The degree to which this is accomplished is called the antenna’s gain. It is measured in decibels (dB) and is one of the major factors in choosing an antenna. In terms of effective radiated power (ERP), antennas are rated on the basis of how much gain they have over a theoretical antenna with zero gain. A 3 foot, 3dB gain antenna represents twice as much gain over the imaginary antenna.

Typically a 3 foot 3dB gain stainless steel whip is used on a sailboat mast. The longer 8 foot 6dB fiberglass whip is primarily used on power boats that require the additional gain.

5.3 COAXIAL CABLE

VHF antennas are connected to the transceiver by means of a coaxial cable – a shielded transmission line. Coaxial cable is specified by it's diameter and construction.

For runs less than 20 feet, RG-58/U, about 1/4 inch in diameter is a good choice. For runs over 20 feet but less than 50 feet, the larger RG-8X or RG-213/U should be used for cable runs over 50 feet RG-8X should be used. For installation of the connector onto the coaxial cable refer to the figure below.



6 INSTALLATION

6.1 LOCATION

The radio can be mounted at any angle. Choose a mounting location that:

- is far enough from any compass to avoid any deviation in compass reading due to the speaker magnet
- provides accessibility to the front panel controls
- allows connection to a power source and an antenna
- has nearby space for installation of a microphone hanger
- the antenna must be mounted at least 3 feet from radio

Note: To insure the radio does not affect the compass or radios performance is not affected by the antenna location, temporarily connect the radio in the desired location and:

- a. Examine the compass to see if the radio causes any deviation
- b. Connect the antenna and key the radio. Check to ensure the radio is operating correctly by requesting a radio check.

6.2 ELECTRICAL CONNECTIONS

CAUTION

Reverse polarity connections will damage the radio!

Connect the power cord and antenna to the radio. Antenna and Power Supply connections are as follows (see Figure 1):

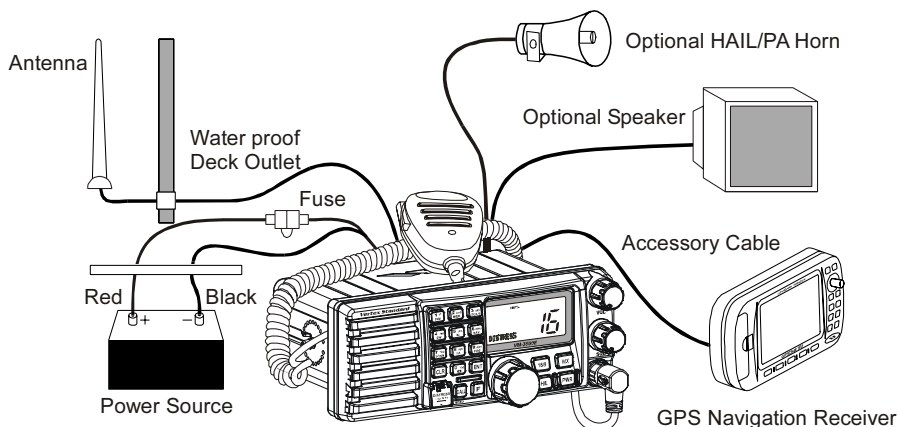


Figure 1. General Installation

1. Mount the antenna at least 3 feet away from the radio. At the rear of the radio, connect the antenna cable. It must have a PL259 connector. RG-8/U coaxial cable must be used if the antenna is 25 feet or more from the radio. RG58 cable can be used for distances less than 25 feet.

2. Connect the red power wire to a 13.8 VDC $\pm 20\%$ power source. Connect the black power wire to a negative ground.
3. If an optional remote extension speaker is to be used, refer to next section for connections.
4. It is advisable to have a Certified Marine Technician check the power output and the standing wave ratio of the antenna after installation.

6.3 ACCESSORY CABLE

White: External speaker (+)

Shield: External speaker (–)

Red: PA speaker (+)

Shield: PA speaker (–)

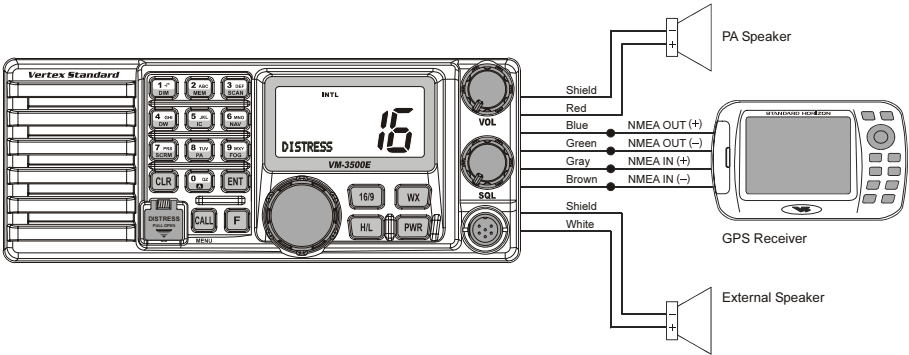
Blue: NMEA IN (+) from GPS navigation receiver

Green: NMEA IN (–) from GPS navigation receiver

Gray: NMEA OUT (+) to GPS navigation receiver

Brown: NMEA OUT (–) to GPS navigation receiver

When connecting the external speaker or GPS navigation receiver, strip off about 1 inch (2.5 cm) of the specified wire's insulation, then splice the ends together using proper waterproofing techniques.



Wire Color/Description	Connection Examples
WHITE - External Speaker (+)	Connect to external 4 Ohm audio speaker
SHIELD - External Speaker (–)	Connect to external 4 Ohm audio speaker
RED - PA Speaker (+)	Connect to external 4 Ohm PA speaker
SHIELD - PA Speaker (–)	Connect to external 4 Ohm PA speaker
BLUE- NMEA Input (+)	Connect to NMEA (+) output of GPS
GREEN - NMEA Input (–)	Connect to NMEA (–) output of GPS
GRAY- NMEA Output (+)	Connect to NMEA (+) input of GPS
BROWN-NMEA Output (–)	Connect to NMEA (–) input of GPS

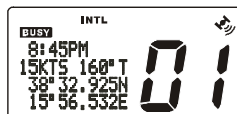
6.4 CONNECTION OF GPS WITH NMEA OUTPUT

- The GPS must have the NMEA Output turned on and set to 4800 Baud in the setup menu. If there is a selection for parity select none.
- For further information on interfacing /setting up your GPS. Please contact the manufacturer of the GPS receiver.
- **VM-3500E** can read NMEA-0183 version 2.0 or higher.
- The NMEA supported sentences are:
Input: GLL, GGA, RMC and GNS (RMC sentence is recommended)
Output: DSC and DSE

(DSC sentences to Standard Horizon Plotter for Position Polling)

6.5 CHECKING GPS CONNECTIONS

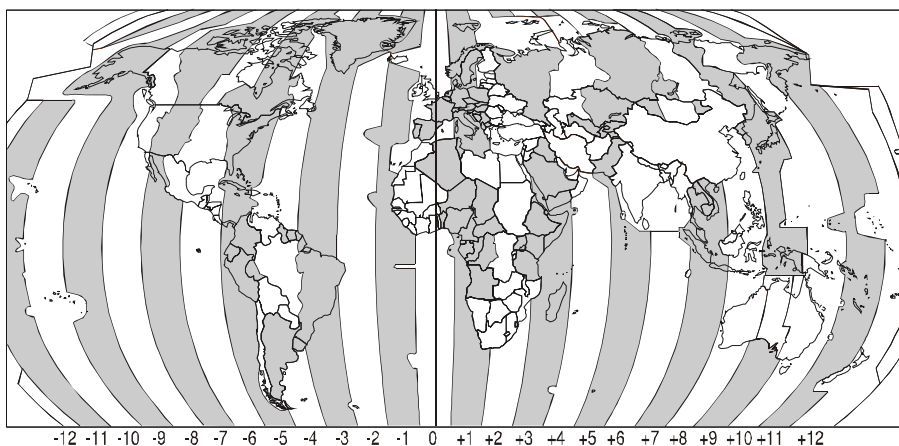
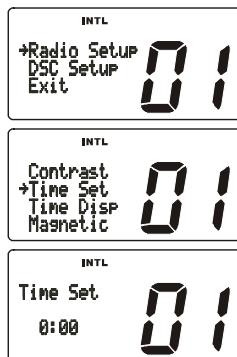
After connections have been made between the **VM-3500E** and the GPS, a small satellite icon will appear on the top right corner of the LCD display. To see additional GPS information, press the [F] key momentarily, then press the [6(NAV)] key. The **VM-3500E** shows the Date, Time, SOG and COG.



6.6 CHANGING THE GPS TIME

From the Factory the **VM-3500E** shows GPS satellite time or UTC time. A time offset is needed to show the local time in your area.

1. Press and hold down the **[CALL]** key until “Radio Setup” menu appears.
2. Press the **[ENT]** key, then select “Time Set” with the **CHANNEL** selector knob.
3. Press the **[ENT]** key.
4. Turn the **CHANNEL** selector knob to select time offset from UTC. See illustration below to find your offset time from UTC. If “0:00” is assigned, the time is the same as UTC (Universal Time Coordinated or GMT Greenwich Mean Time).
5. Press the **[ENT]** key to store the time offset.
6. Press the **[16/9]** key or turn the **CHANNEL** selector knob to select “Exit,” then press the **[ENT]** key to return to the “Radio Setup” menu, select “Exit” and press the **[ENT]** key to return to radio operation.

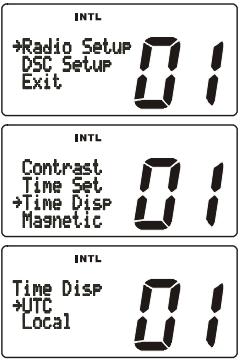


UTC/GMT
OFFSET TIME TABLE

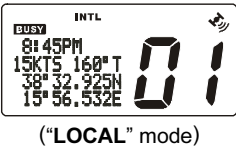
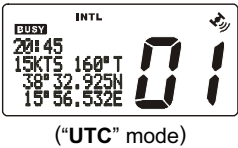
6.7 CHANGING THE TIME LOCATION

You may select the time display between local time and UTC (time GPS sends to radio). Time is displayed when GPS position (LAT/LON) is displayed by pressing the [F] key followed by the [6(NAV)] key.

- 1. Press and hold down the [CALL/SET(MENU)] key until “Radio Setup” menu appears.
- 2. Press the [ENT] key, then select “Time Disp.” in the “Radio Setup” menu with the CHANNEL selector knob.
- 3. Press the [ENT] key.
- 4. Turn the CHANNEL selector knob to select “UTC” or “Local.”
- 5. Press the [ENT] key to store the selected setting.
- 6. To exit this menu and return to radio operation mode press the [16/9] key.



In the local time mode, the display shows the time by the 12-hour system. Meanwhile, the display shows the time by the 24-hour system in the UTC mode.



6.8 CHANGING COG TO TRUE OR MAGNETIC

Allows customizing the NAV data showing GPS Course Over Ground (COG). Factory default is True however following the steps below the COG can be changed to Magnetic.

1. Press and hold down the **[ENT]** key until “Radio Setup” menu appears.
2. Press the **[ENT]** key, then select “Magnetic” with the **CHANNEL** selector knob.
3. Press the **[ENT]** key.
4. Turn the **CHANNEL** selector knob to select “On” (representing “Magnetic”) or “Off” (representing “True”).
5. Press the **[ENT]** key to store the selected setting.
6. Turn the **CHANNEL** selector knob to select “Exit,” then press the **[ENT]** key to return to the “Radio Setup” menu, select “Exit” and press the **[ENT]** key to return to radio operation.



6.9 OPTIONAL MMB-84 FLUSH MOUNT INSTALLATION

1. To assist in flush mounting, a template has been included. Use this template to find the mounting location.
2. Use the template to mark the location where the rectangular hole is to be cut. Confirm the space behind the dash or panel is deep enough to accommodate the transceiver (at least 15 cm deep).
There should be at least 1 cm between the transceiver's heatsink and any wiring, cables or structures.
3. Cut out the rectangular hole and insert the transceiver.
4. Fasten the brackets to the sides of the transceiver with the lock washer nut combination; so that the mounting screw base faces the mounting surface (see Figure 2).
5. Turn the adjusting screw to adjust the tension so that the transceiver is tight against the mounting surface.

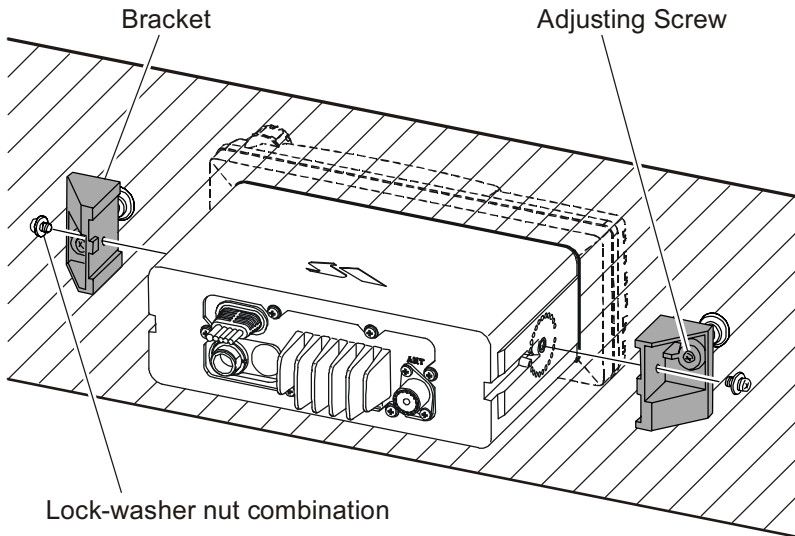


Figure 2. MMB-84 Flush Mount Installation

6.10 OPTIONAL ENHANCED RAM+ SECOND STATION MIC INSTALLATION

The **VM-3500E** is capable of using an Enhanced RAM+ MIC to remotely control the Radio, DSC and PA/Fog functions. In addition the **VM-3500E** can operate as a full function intercom system.

1. Connect the RAM+ MIC Cable to the **RAM MIC CONNECTOR** on the rear panel, then tighten the Cable Nut (See Figure 3).
2. Referring to Figure 3, make a 30 mm hole in the wall, then insert the RAM+ MIC Cable into this hole. Connect the Gasket and Mount Base to the RAM+ MIC Cable Connector using the Nut.
3. Drill the four Screw holes (approx. 2 mm) on the wall, then install the Mounting Base to the wall using four screws.
4. Put the Rubber Cap on to the Nut. The installation is now complete.
5. Wires for a external speaker are provided on the RAM+ mic cable. Connect any 8 Ohm external speaker. When connected the RAM+ controls the volume level of this speaker.

RAM+ or External Speaker Selection

By default the RAM+ internal speaker is turned on, however using the RAM+ mic this speaker can be turned off so the external speaker can be used.

1. Press and hold the **[CALL/SET]** key on the RAM+ Mic.
2. Using the **[▲]** or **[▼]** keys to select "RAM SPK" and press the **[CALL/SET]** key.
3. Press the **[▲]** or **[▼]** key to turn the RAM+ Speaker "oF."
4. Press the **[16/9]** key to exit this mode.

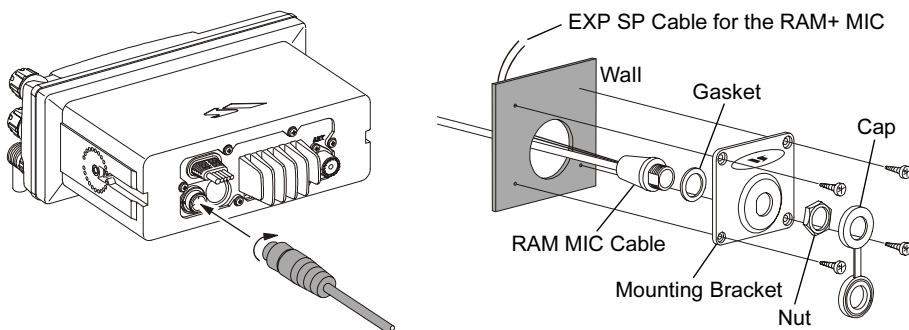
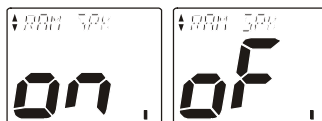


Figure 3. Enhanced RAM+ MIC Installation

7 CONTROLS AND INDICATORS

NOTE

This section defines each control of the transceiver. See Figure 4 for location of controls. For detailed operating instructions refer to chapter 8 of this manual.

① **VOLUME CONTROL (VOL)**

Adjusting this control clockwise, increases the audio volume level.

② **SQUELCH CONTROL (SQL)**

Adjusting this control clockwise, sets the point at which random noise on the channel does not activate the audio circuits but a received signal does. This point is called the squelch threshold. Further adjustment of the squelch control will degrade reception of wanted transmissions.

③ **MICROPHONE CONNECTOR**

Connect the supplied **MH-63A6** Hand Microphone to this jack.

④ **KEY BUTTON**

[16/9] Key

Immediately recalls channel 16 from any channel location. Holding down this key recalls channel 9. Pressing the **[16/9]** key again reverts to the previous selected working channel.

Secondary use (*Depends on the transceiver version*)

Press and hold the **[16/9]** key then press the **[WX]** key to switch the Channel Group.

[WX] Key

Immediately recalls the previously selected NOAA weather channel from any channel.

Secondary use (*Depends on the transceiver version*)

Holding down the **[16/9]** key while pressing the **[WX]** key changes the Channel Group.

[H/L] Key

Toggles between 25 W (High) and 1 W (Low) power. When the **[H/L]** key is pressed while the transceiver is on channel 13 or 67, the power will temporarily switch from LO to HI power until the **PTT** is released.

The **[H/L]** key does not function on transmit inhibited and low power only channels.

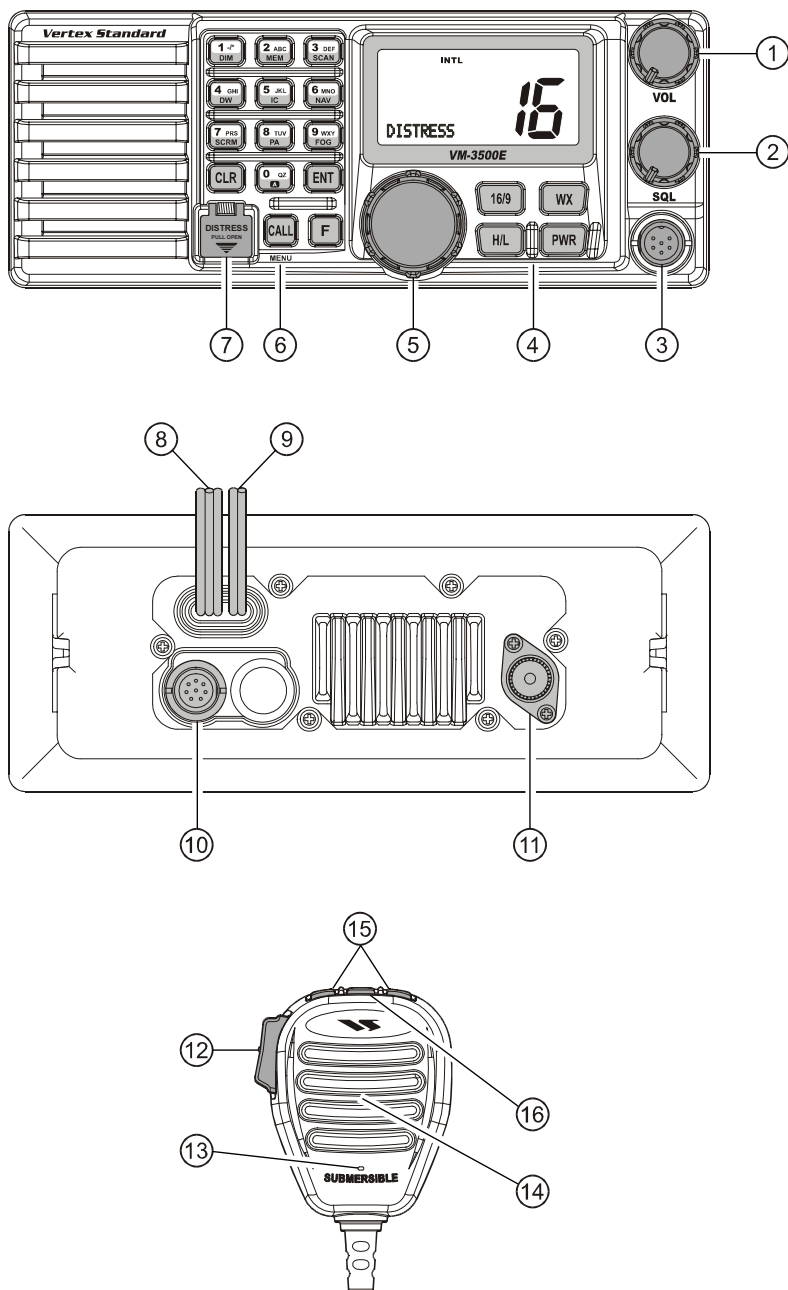


Figure 4. Controls and Connectors

[PWR] Key

Turns the transceiver on and off. To turn the transceiver on, press and hold this key until the LCD turns on. To turn it off, press and hold this key until the LCD turns off. When the power is turned on, the transceiver is set to the last selected channel.

⑤ **CHANNEL SELECTOR KNOB**

Rotary knob used to select channels and to choose menu items (such as the DSC menu, radio setup menu, and DSC setup menu). The **[UP(▲)]** / **[DOWN(▼)]** keys on the microphone can also be used to select channels and menu items.

When the PA/FOG mode is activated, the **CHANNEL** selector knob adjust the audio output level.

Secondary Use (*Depends on the transceiver version*)

While holding down the **[SCAN]** key and turning the **CHANNEL** selector knob, you can confirm memory channels for scanning.

⑥ **KEYPAD**

[1(DIM)] Key

When in radio mode, this key is used to directly select channel digit “1” in a channel number.

Secondary use

Press the **[F]** key first then press the **[1(DIM)]** key, access the LCD Dimmer menu. Refer to section “**8.15 LCD DIMMER**” for details.

[2(MEM)] Key

When in radio mode, this key is used to directly select channel digit “2” in a channel number.

Secondary use (*Depends on the transceiver version*)

Press the **[F]** key first then press the **[2(MEM)]** key, memorize the selected channel into the transceiver scan memory for scanning. When repeat the same procedures (**[F]** → **[2(MEM)]**), DELETES the channel from the scan memory. Refer to section “**8.12 SCANNING**” for details.

[3(SCAN)] Key

When in radio mode, this key is used to directly select channel digit “3” in a channel number.

Secondary use (*Depends on the transceiver version*)

Press the **[F]** key first then press the **[3(SCAN)]** key, start and stop the scanning of programmed channels. Refer to section “**8.12 SCANNING**” for details.

[4(DW)] Key

When in radio mode, this key is used to directly select channel digit “4” in a channel number.

Secondary use *(Depends on the transceiver version)*

Press the **[F]** key first then press the **[4(DW)]** key, scan for voice communications on the priority channel and another selected channel until a signal is received on either channel (Dual Watch). Refer to section “**8.11 DUAL WATCH (TO PRIORITY CHANNEL)**” for details.

[5(IC)] Key

When in radio mode, this key is used to directly select channel digit “5” in a channel number.

Secondary use

Press the **[F]** key first then press the **[5(IC)]** key, when the optional RAM+ Mic is connected, intercom operation will operate between radio and RAM+ Mic. Refer to section “**8.16 INTERCOM OPERATION**” for details.

[6(NAV)] Key

When in radio mode, this key is used to directly select channel digit “6” in a channel number.

Secondary use

Press the **[F]** key first then press the **[6(NAV)]** key, the LCD displays NAV GPS Data, Time, SOG (Speed Over Ground), and COG (Course Over Ground) when a GPS is connected to the accessory cable of the **VM-3500E**. See section “**8.4 CONNECTION OF GPS WITH NMEA OUTPUT**” for details.

[7(SCRM)] Key

When in radio mode, this key is used to directly select channel digit “7” in a channel number.

Secondary use

Press the **[F]** key first then press the **[7(SCRM)]** key, when the optional **CVS2500** Voice Scrambler Unit is installed, available to operate the Voice Scrambler function. Refer to section “**8.17 VOICE SCRAMBLER**” for details.

[8(PA)] Key

When in radio mode, this key is used to directly select channel digit “8” in a channel number.

Secondary use

Press the **[F]** key first then press the **[8(PA)]** key, available to operate the 30 Watt PA function. Refer to section “**8.13 PA/FOG OPERATION**” for details.

[9(FOG)] Key

When in radio mode, this key is used to directly select channel digit “9” in a channel number.

Secondary use

Press the **[F]** key first then press the **[9(FOG)]** key, available to operate the Fog Horn function. Refer to section “**8.13 PA/FOG OPERATION**” for details.

[0] Key

When in radio mode, this key is used to directly select channel digit “0” in a channel number.

[CLR] Key

Press the **[CLR]** Key to cancel the menu selection and/or keypad entry.

[ENT] Key

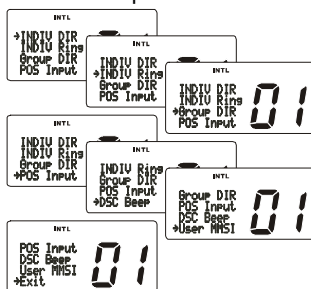
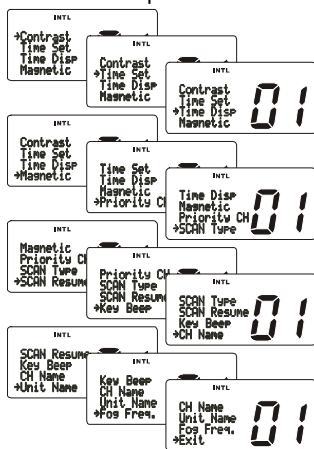
Press the **[ENT]** Key to determine the menu selection and/or keypad entry.

[CALL(MENU)] Key

Press the **[CALL(MENU)]** key to access the DSC OPERATION menu. The "INDIVIDUAL CALL," "GROUP CALL," and "ALL SHIPS CALL" functions can be accessed from the DSC OPERATION menu.


Secondary use

Press and hold the **[CALL(MENU)]** key to access the “Radio Setup” (refer to Section 10) or “DSC Setup” menu (refer to Section 8).



[F] Key

Press the **[F]** key to activate the “Alternate” key function.

- ⑦ **[DISTRESS] Key**
Used to send a DSC Distress Call. To send the distress call refer to section “**9.3.1 (Transmitting A DSC Distress Call)**.”
- ⑧ **ACCESSORY CONNECTION CABLE**
Connects the **VM-3500E** to a GPS, a PA speaker, and an external speaker.
- ⑨ **DC INPUT CABLE**
Connects the radio to a DC power supply capable of delivering 12V DC.
- ⑩ **RAM+ MIC CONNECTORS**
Connects the **VM-3500E** to the enhanced RAM+ MIC (Remote Access Microphone). Refer to section “**11 ENHANCED RAM+ MIC OPERATION**” for details.
- ⑪ **ANTENNA JACK**
Connects an antenna to the transceiver. Use a marine VHF antenna with an impedance of 50 ohms.
-  **Warning!** The 50 V RF voltage (@25 W/50 Ω) is applied to the TX RF section of the transceiver while transmitting.
Do not touch the TX RF section absolutely while transmitting.
- ⑫ **PTT (Push-To-Talk) SWITCH**
Keys the transmitter when the transceiver is in radio mode. If the transceiver is in the intercom operation mode (between the RAM+ and the **VM-3500E**), or PA mode, it activates the **VM-3500E** microphone for voice communications.
- ⑬ **MICROPHONE**
Transmits the voice message with reduction of background noise, using Clear Voice Noise Reduction Technology.
- ⑭ **MICROPHONE SPEAKER**
The audio heard through internal radio speaker is heard through microphone speaker.
- ⑮ **[UP(▲)] / [DOWN(▼)] KEYS**
The **[UP(▲)]** and **[DOWN(▼)]** on the microphone function the same as the **CHANNEL** selector knob on the front panel of the transceiver.
- ⑯ **[16/9] Key**
Pressing the **[16/9]** key immediately recalls channel 16 from any location. Press and hold the **[16/9]** key to recall channel 9. Pressing the **[16/9]** key again will revert the radio to the previous selected channel.

8 BASIC OPERATION

8.1 RECEPTION

1. After the transceiver has been installed, ensure that the power supply and antenna are properly connected.
2. Press and hold the **[PWR]** key until the radio turns on.
3. Turn the **SQL** knob fully counterclockwise. This state is known as “squelch off”.
4. Turn up the **VOL** knob until noise or audio from the speaker is at a comfortable level.
5. Turn the **SQL** knob clockwise until the random noise disappears. This state is known as the “squelch threshold.”
6. Turn the **CHANNEL** selector knob to select the desired channel. Refer to the channel chart on page 61 for available channels.
7. The keypad on the front may be used to directly select channels.

Example to select channel 68.

1. Press **[6(NAV)]**
2. Press **[8(PA)]**
3. Press **[ENT]**

In the USA and Canadian modes, press and hold in the **[0]** key to select the “A” channel. For example, to select channel 01A, press **[0] → [1(DIM)]**, then press and hold in the **[0]** key and press the **[ENT]** key.

8. When a message is received, adjust the volume to the desired listening level. The “**BUSY**” indicator in the LCD is displayed indicating that the channel is being used.

8.2 TRANSMISSION

1. Perform steps 1 through 6 of RECEPTION.
2. Before transmitting, monitor the channel to ensure it is clear.
3. Press the **PTT** (push-to-talk) switch. The “**TX**” indicator in the LCD is displayed.
4. Speak slowly and clearly into the microphone.
5. When the transmission is finished, release the **PTT** switch.

NOTE

This is a noise-canceling microphone. The oval slot on the bottom of microphone should be positioned within 1/2 inch (1.3 cm) from the mouth for optimum performance.

8.3 TRANSMIT TIME - OUT TIMER (TOT)

When the **PTT** switch on the microphone is held down, transmit time is limited to 5 minutes. This limits unintentional transmissions due to a stuck microphone. About 10 seconds before automatic transmitter shutdown, a warning beep will be heard from the speaker(s). The transceiver will automatically go to receive mode, even if the **PTT** switch is continually held down. Before transmitting again, the **PTT** switch must first be released and then pressed again.

8.4 SIMPLEX/DUPLEX CHANNEL USE

Refer to the VHF MARINE CHANNEL CHART (page 61) for instructions on use of simplex and duplex channels.

NOTE

All channels are factory-programmed in accordance with International, Industry Canada (Canada), and FCC (USA) regulations. Mode of operation cannot be altered from simplex to duplex or vice-versa.

8.5 INTERNATIONAL, USA, AND CANADA MODE

1. To change the modes, hold the [**16/9**] key and press the [**WX**] key. The mode changes from International to Canadian to USA with each press of the [**WX**] key.
2. “**INTL**” will be displayed for International mode, and “**CAN**” will be displayed for Canadian mode, and “**USA**” will be displayed on the LCD for USA mode.
3. Refer to the VHF MARINE CHANNEL CHART (page 61) for allocated channels in each mode.

8.6 NOAA WEATHER CHANNELS

NOTE

NOAA Weather channels are available in the waters of USA and Canada only.

1. To receive a NOAA weather channel, press the [**WX**] key from any channel. The transceiver will go to the last selected weather channel.
2. Turn the **CHANNEL** selector knob on the radio or [**UP(▲)**] / [**DOWN(▼)**] keys on the microphone to select a different NOAA weather channel.
3. To exit from the NOAA weather channels, press the [**WX**] key. The transceiver returns to the channel it was on prior to a weather channel.

8.7 NOAA WEATHER ALERT

In the event of extreme weather disturbances, such as storms and hurricanes, the NOAA (National Oceanic and Atmospheric Administration) sends a weather alert accompanied by a 1050 Hz tone and subsequent weather report on one of the NOAA weather channels.

8.8 EMERGENCY (CHANNEL 16 USE)

Channel 16 is known as the Hail and Distress Channel. An emergency is defined as a threat to life or property. In such instances, be sure the transceiver is on and set to CHANNEL 16. Then use the following procedure:

1. Press the microphone push-to-talk switch and say “**Mayday, Mayday, Mayday**. This is __ , __ , __ ” (your vessel’s name).
2. Then repeat once: “**Mayday**, __ ” (your vessel’s name).
3. Now report your position in latitude/longitude, or by giving a true or magnetic bearing (state which) to a well-known landmark such as a navigation aid or geographic feature such as an island or harbor entry.
4. Explain the nature of your distress (sinking, collision, aground, fire, heart attack, life-threatening injury, etc.).
5. State the kind of assistance your desire (pumps, medical aid, etc.).
6. Report the number of persons aboard and condition of any injured.
7. Estimate the present seaworthiness and condition of your vessel.
8. Give your vessel’s description: length, design (power or sail), color and other distinguishing marks. The total transmission should not exceed 1 minute.
9. End the message by saying “**OVER**”. Release the microphone button and listen.
10. If there is no answer, repeat the above procedure. If there is still no response, try another channel.

8.9 CALLING ANOTHER VESSEL (CHANNEL 16 OR 9)

Channel 16 may be used for initial contact (hailing) with another vessel. However, its most important use is for emergency messages. This channel must be monitored at all times except when actually using another channel.

It is monitored by the U.S. and Canadian Coast Guards and by other vessels.

Use of channel 16 for hailing must be limited to initial contact only. Calling should not exceed 30 seconds, but may be repeated 3 times at 2-minute intervals. In areas of heavy radio traffic, congestion on channel 16 resulting from its use as a hailing channel can be reduced significantly in U.S. waters by using **channel 9** as the initial contact (hailing) channel for non-emergency communications. Here, also, calling time should not exceed 30 seconds but may be repeated 3 times at 2-minute intervals.

Prior to making contact with another vessel, refer to the channel charts in this manual, and select an appropriate channel for communications after initial contact. For example, Channels 68 and 69 are some of the channels available to non-commercial (recreational) boaters. Monitor your desired channel in advance to make sure you will not be interrupting other traffic, and then go back to either

channel 16 or 9 for your initial contact.

When the hailing channel (16 or 9) is clear, state the name of the other vessel you wish to call and then **“this is”** followed by the name of your vessel and your Station License (Call Sign). When the other vessel returns your call, immediately request another channel by saying **“go to,”** the number of the other channel, and **“over.”** Then switch to the new channel. When the new channel is not busy, call the other vessel.

After a transmission, say **“over,”** and release the microphone’s push-to-talk (PTT) switch. When all communication with the other vessel is completed, end the last transmission by stating your Call Sign and the word **“out.”** Note that it is not necessary to state your Call Sign with each transmission, only at the beginning and end of the contact.

Remember to return to Channel 16 when not using another channel. Some radios automatically monitor Channel 16 even when set to other channels or when scanning.

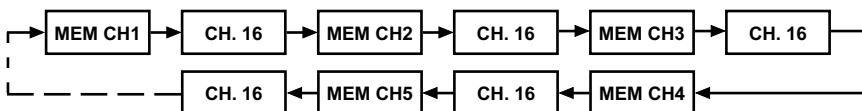
8.10 DUAL WATCH (TO PRIORITY CHANNEL)

This function is only available on some versions. Allows to checks for activity on a “Priority channel” while you are operating on another channel. The default setting for the Priority channel is CH16. However you may change to another channel. Refer to section **“10.5 PRIORITY CHANNEL SET”** for details of the channel change.

1. Adjust the **SQL** knob until the background noise disappears.
2. Select the channel you wish to dual watch to “Priority channel.”
3. Press the **[F]** key followed by the **[4(DW)]** key.

The display will scan between Priority channel and the channel that was selected in step 2.

If a transmission is received on the channel selected in step 2, the **VM-3500M** will dual watch between the working channel and the Priority channel.



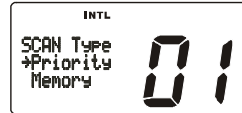
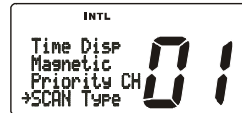
4. To stop Dual Watch, press the **[F]** key followed by the **[4(DW)]** key again.

8.11 SCANNING

This function is only available in some versions. Allows the user to select the scan type from Memory scan or Priority scan. “Memory scan” scans the channels that were programmed into memory. “Priority scan” scans the channels programmed in memory with the priority channel.

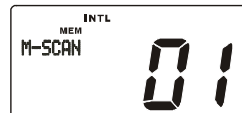
8.11.1 Selecting the Scan Type

1. Press and hold down the [**CALL(MENU)**] key until “Radio Setup” menu appears.
2. Press the [**ENT**] key, then select “SCAN Type” in the “Radio Setup” menu with the **CHANNEL** selector knob.
3. Press the [**ENT**] key.
4. Turn the **CHANNEL** selector knob to select “Priority” or “Memory.”
5. Press the [**ENT**] key to store the selected setting.
6. To exit this menu and return to radio operation mode press the [**16/9**] key.



8.11.2 Memory Scanning (M-SCAN)

1. Adjust the **SQL** knob until background noise disappears.
2. Select a desired channel to be scanned using the **CHANNEL** selector knob. Press the [**F**] key followed by the [**2(MEM)**] key, “MEM” will appear on the LCD which indicates the channel has been programmed into the transceivers memory.
3. Repeat step 2 for all the desired channels to be scanned.
4. To DELETE a channel from the transceiver’s memory, select the channel then press the [**F**] key followed by the [**2(MEM)**] key, “MEM” will disappear in the LCD.
5. To start scanning, press the [**F**] key followed by the [**3(SCAN)**] key. “M-SCAN” appears on the LCD. Scanning will proceed from the lowest to the highest programmed channel number and will stop on a channel when a transmission is received.
6. The channel number will blink during reception.
7. To stop scanning, press the [**16/9**], [**WX**], [**CALL(MENU)**], or **PTT** key.



8.11.3 Priority Scanning (P-SCAN)

In the default setting, Channel 16 is set as the priority channel. You may change the priority channel to the desired channel from the Channel 16 by the Radio Setup Mode, refer to section “**10.5 PRIORITY CHANNEL SET.**”

1. Adjust the **SQL** knob until background noise disappears.
2. Select a desired channel to be scanned using the **CHANNEL** selector knob. Press the [F] key followed by the [2(MEM)] key, “**MEM**” will appear on the LCD which indicates the channel has been programmed into the transceivers memory.
3. Repeat step 2 for all the desired channels to be scanned.
4. To **DELETE** a channel from the transceiver’s memory, select the channel then press the [F] key followed by the [2(MEM)] key, “**MEM**” will disappear in the LCD.
5. To start priority scanning, press the [F] key followed by the [3(SCAN)] key. “**P-SCAN**” appears on the LCD. Scanning will proceed between the memorized channels and the priority channel. CH 16 the priority channel will be scanned after each programmed channel.
3. To stop scanning, press the [16/9], [WX], [CALL(MENU)], or **PTT** key.



You may change the scan resume time by the Radio Setup Mode, refer to section “**10.7 SCAN RESUME TIME.**”

8.12 PA/FOG OPERATION

PA/FOG mode allows the transceiver to be used as a 30W hailer (required HAIL/PA speaker). When in Hail mode the HAIL/PA Listen's Back (acts as a microphone and sends sound to the front panel speaker) through the HAIL/PA speaker which provides two-way communications through the HAIL/PA speaker.

NOTE

When in PA or FOG mode the **VM-3500E** will receive on the last selected VHF channel before entering into the PA or FOG mode and receive DSC calls.

PA HAIL mode: Allows the transceiver to be used as a power hailer. The Hail mode has a listen-back feature which provides two way communication through the HAIL/PA speaker.

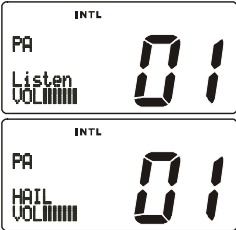
FOG HORN mode: Automatic signaling is transmitted through the HAIL/PA speaker.

8.12.1 Operating the PA HAIL mode

1. Press the **[F]** key followed by the **[8(PA)]** key, activate the PA HAIL mode.
2. Press the **PTT** switch to speak through the HAIL/PA speaker.

Rotate the **CHANNEL** selector knob to control the AF output level. The AF output level can be set from 0 to 30 watts.

3. To exit the PA HAIL mode and return to radio operation mode, press the **[F]** key followed by the **[8(PA)]** key again.

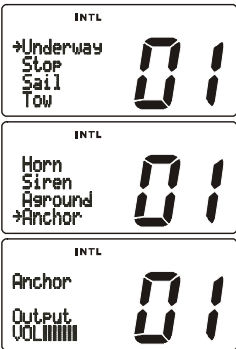


8.12.2 Operating the FOG HORN mode

Operator can select from Underway, Stop, Sail, Tow, Horn, Siren, Aground, or Anchor. Please refer to page 63 for FOG Horn Timing Chart.

1. Press the **[F]** key followed by the **[9(FOG)]** key, activate the “FOG HORN” menu.
2. Turn the **CHANNEL** selector knob to select the one of the eight functions described above.
3. Press the **[ENT]** key.
4. On the “Horn” and “Siren” modes, press the **PTT** switch to activate the tone through the HAIL/PA speaker.

Rotate the **CHANNEL** selector knob to control the AF output level. The AF output level can be set from



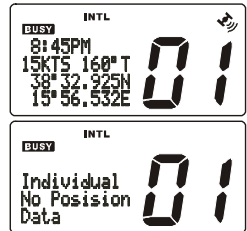
0 to 30 watts.

5. To exit the “FOG HORN” mode and return to radio operation mode, press the [F] key followed by the [9(FOG)] key again.

9.13 NAVIGATION INDICATION

The transceiver has the ability to display the time, SOG and COG date, as well as the vessel's position (LAT/LON), when connected to a GPS receiver.

1. Press the [F] key followed by the [6(NAV)] key, display the position information on the LCD. If the GPS receiver is not receiving a fix, the display will be as shown in the illustration on the right.
2. To hide the position information, press the [F] key followed by the [6(NAV)] key again.



8.14 LCD DIMMER

Allows setting up the backlight intensity or to turn it off.

1. Press the [F] key followed by the [1(DIM)] key to enabling the setting up the backlight intensity.
2. Turn the **CHANNEL** selector knob to select the desired backlight intensity. You will be able to see the effects of your changes.
3. When you have completed the adjustment, press the [F] key followed by the [1(DIM)] key again, return to radio operation mode.



8.15 INTERCOM OPERATION

If the RAM+ Mic is connected to the **VM-3500E**, you may communicate between the **VM-3500E** and RAM+ Mic.

8.15.1 Communication

1. Press the **[F]** key followed by the **[5(IC)]** key, the mode is changed to “INTERCOM” mode.
2. When the “INTERCOM” operation is activated, “Intercom” is displayed on the **VM-3500E**, and “IC” is displayed on the RAM+ Mic.
3. Press the **PTT** switch. “Talk” will be shown on the display.



NOTE: A warning beep will be emitted when the **VM-3500E** microphone’s **PTT** switch is pressed while the RAM+ Mic’s **PTT** switch is pressed.

4. Speak slowly and clearly into the microphone, hold the microphone about 1/2 inch away from your mouth.
5. When finished, release the **PTT** switch.
6. To exit the “INTERCOM” mode and return to radio operation mode, press the **[F]** key followed by the **[5(IC)]** key again.



(**VM-3500E**’s **PTT** switch is pressed)



(**RAM+ Mic**’s **PTT** switch is pressed)

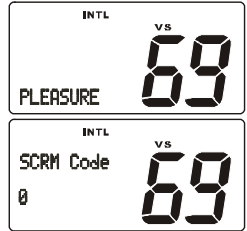
8.15.2 Calling

Press and hold the **[5(IC)]** key for 1 second when the “INTERCOM” operation is activated, a calling beep is emitted twice from the transceiver speaker.

8.16 VOICE SCRAMBLER

If privacy of communications is desired, a **CVS2500** voice scrambler (VS) can be installed in the transceiver. Contact your Dealer to have a **CVS2500** installed.

1. Press the **[F]** key followed by the **[7(SCRM)]** key, the voice scrambler is activated. “**VS**” will appear on the LCD.
2. Press the **[F]** key then press and hold the **[7(SCRM)]** key for 1 second, the “SCRM Code” will appear.
3. Turn the **CHANNEL** selector knob to change the scrambler code. The scrambler code can be set from “0” to “3.”
4. Press the **[ENT]** key to save the scrambler code and return to radio operation mode (with voice scrambler).
5. Monitor the channel before transmitting.
6. To disable the voice scrambler, press the **[F]** key followed by the **[7(SCRM)]** key again.



9 DIGITAL SELECTIVE CALLING

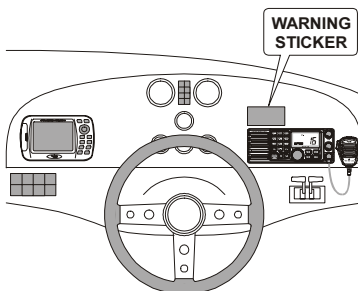
9.1 GENERAL

WARNING

This radio is designed to generate a digital maritime distress and safety call to facilitate search and rescue. To be effective as a safety device, this equipment must be used only within communication range of a shore-based VHF marine channel 70 distress and safety watch system. The range of signal may vary but under normal conditions should be approximately 20 nautical miles.

NOTE

A DSC Warning sticker is included with the **VM-3500E**. This sticker is mounted in a location that can be easily viewed from the location of the **VM-3500E**. Make sure the chosen location is clean and dry before applying the sticker.



Digital Selective Calling is a semi-automated method of establishing a radio call, it has been designated by the International Maritime Organization (IMO) as an international standard for establishing VHF, MF and HF radio calls. It has also been designated as part of the Global Maritime Distress and Safety System (GMDSS). It is planned that DSC will eventually replace aural watches on distress frequencies and will be used to announce routine and urgent maritime safety information broadcasts.

This new system allows mariners to instantly send a distress call with GPS position (when connected to the transceiver) to the Coast Guard and other vessels within range of the transmission. DSC will also allow mariners to initiate or receive Distress, Urgency, Safety, Routine, POSITION REQUEST, POSITION SEND, and Group calls to or from another vessel equipped with a DSC transceiver.

9.2 MARITIME MOBILE SERVICE IDENTITY (MMSI)

9.2.1 What is an MMSI?

An MMSI is a nine digit number used on Marine Transceivers capable of using Digital Selective Calling (DSC). This number is used like a telephone number to selectively call other vessels.

THIS NUMBER MUST BE PROGRAMMED INTO THE RADIO TO OPERATE THE VM-3500E DSC FUCTIONS.

How can I obtain an MMSI assignment?

Please contact your Dealer.

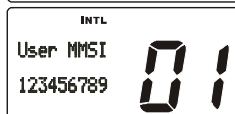
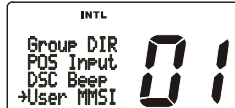
9.2.2 Programming the MMSI

WARNING

User MMSI can be input only twice. If the user tries to input MMSI more than twice, the radio will show the display on the right. If the user needs to change the MMSI more than twice, the transceiver will have to be sent to your Dealer to be reset.



1. Press and hold down the **[CALL(MENU)]** key until the "Radio Setup" menu appears.
2. Turn the **CHANNEL** selector knob to the left to select "DSC Setup" menu.
3. Press the **[ENT]** key, then select "User MMSI" with the **CHANNEL** selector knob.
4. Press the **[ENT]** key. The "User MMSI" number will appear, and the first digit will be flashing.
5. Enter the your MMSI (up to nine digits) from the keypad.
6. Press and hold the **[ENT]** key to store the number in memory.
7. To exit this menu and return to radio operation mode press the **[16/9]** key.



9.3 DSC DISTRESS CALL

The **VM-3500E** is capable of transmitting and receiving DSC Distress messages to all DSC radios. The **VM-3500E** may be connected to a GPS to also transmit the Latitude, Longitude of the vessel.

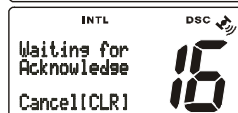
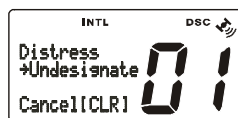
9.3.1 Transmitting a DSC Distress Call

NOTE

To be able to transmit a DSC distress call an MMSI number must be programmed, refer to section 9.2.2 Programming the MMSI

In order for your ships location to be transmitted a GPS must be connected to the **VM-3500E**, refer to section 6.4 CONNECTION OF GPS WITH NMEA OUTPUT.

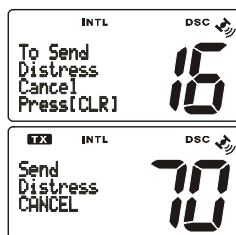
1. Lift the red spring loaded DISTRESS cover and press the **[DISTRESS]** key. The "DISTRESS" menu will appear on the LCD.
2. Press and hold the **[DISTRESS]** key. The radios display will count down (5-4-3-2-1) and then transmit the Distress call.
3. When the distress signal is sent, CH70 and "**TX**" icon will appear on the LCD. After the message has been sent, the radio will sound a Distress Alarm.
4. The transceiver "shadow-watches" for a transmission between CH16 and CH70 until an acknowledgment signal is received. The display will be as shown in the illustration at the right.
5. If an acknowledgement is received, select channel 16 and advise your distress situation.
6. If no acknowledgment is received, the distress call is repeated in 4 minute intervals until an acknowledgment is received.
7. When a DSC Distress acknowledgment is received, a distress alarm sounds and channel 16 is automatically selected. The LCD shows the MMSI of the ship responding to your distress.
RECEIVED ACK: acknowledgment signal is received.
RECEIVED RLY: relay signal is received from another vessel or coast station.
8. To cancel the DSC distress alarm signal from the speaker, press any key.



Cancel a DSC Distress Call

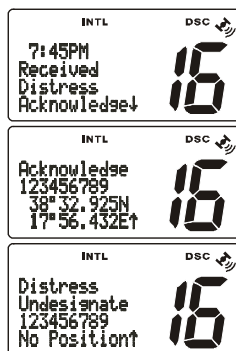
If a DSC Distress call was sent by error the **VM-3500E** allows you to send a message to other vessels to cancel the Distress Call that was made in error.

Press the **[CLR]** key, then press the **[ENT]** key.



9.3.2 Receiving a DSC Distress Call

1. When a DSC Distress call is received, an emergency alarm sounds.
Then channel 16 is automatically selected.
2. Press any key to stop the alarm.
3. Turn the **CHANNEL** selector knob to change the display to show the position of the vessel in distress.
4. If the position of the vessel distress data does not include position, the LCD will show the display on the left.



NOTE

You must continue monitoring channel 16 as a coast station may require assistance in the rescue attempt.

9.4 ALL SHIPS CALL

The All Ships Call function allows contact to be established with other vessel stations without having their ID in the individual calling directory. Also, priority for the call can be designated as Urgency or Safety.

URGENCY Call: This type of call is used when a vessel may not truly be in distress, but have a potential problem that may lead to a distress situation. This call is the same as saying PAN PAN PAN on channel 16.

SAFETY Call: Used to transmit boating safety information to other vessels. This message usually contains information about an overdue boat, debris in the water, loss of a navigation aid or an important meteorological message. This call is the same as saying Securite, Securite, Securite.”

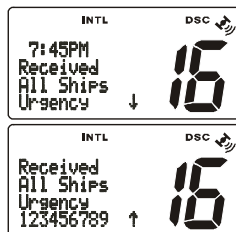
9.4.1 Transmitting an All Ships Call

1. Press the **[CALL/SET(MENU)]** key. The “DSC Operation” menu will appear.
2. Turn the **CHANNEL** selector knob to select “All Ships.”
3. Press the **[ENT]** key. (To cancel, turn the **CHANNEL** selector knob to select “Exit.”)
4. Turn the **CHANNEL** selector knob to select the call (“Urgency” or “Safety”).
5. Press the **[ENT]** key to transmit the selected type of all ships DSC call.
6. After the ALL SHIPS CALL is transmitted, the transceiver will switch to CH16.
7. Listen to the channel to make sure it is not busy, then key the microphone and say PAN PAN PAN or “Securite, Securite, Securite” depending on the priority of the call. Say your call sign and announce the channel you wish to switch to for communications.



9.4.2 Receiving an All Ships Call

1. When an all ships call is received, an emergency alarm sounds.
The radio will automatically change to channel 16.
2. Press any key to stop the alarm.
3. Turn the **CHANNEL** selector knob to see the MMSI of the vessel transmitting the All Ships Call.
4. Monitor channel 16 or traffic channel until the URGENCY voice communication is completed.



9.5 INDIVIDUAL CALL

This feature allows the **VM-3500E** to contact another vessel with a DSC VHF radio and automatically switch the receiving radio to a desired communications channel. This feature is similar to calling a vessel on CH16 and requesting to go to another channel (switching to the channel is private between the two stations).

9.5.1 Setting up the Individual Directory

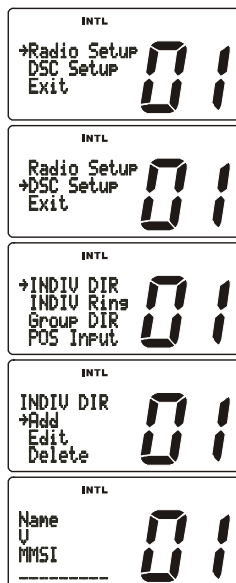
The **VM-3500E** has a DSC directory that allows you to store a vessel or person's name and the MMSI number associated with vessels you wish to transmit Individual calls.

To transmit an Individual call you must program this directory with information of the persons you wish to call, similar to a cellular phones telephone directory.

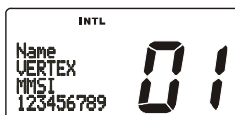
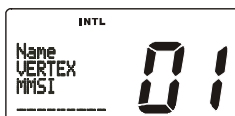
1. Press and hold down the [**CALL(MENU)**] key until "Radio Setup" menu appears.
2. Turn the **CHANNEL** selector knob to select "DSC Setup" menu.
3. Press the [**ENT**] key, then select "INDIV DIR" with the **CHANNEL** selector knob.
4. Press the [**ENT**] key, then select "Add" with the **CHANNEL** selector knob.
5. Press the [**ENT**] key.
6. Press the one of the Keypad keys to enter the first letter of the name of the vessel or person you want to reference in the directory.

Example: Press the [**2(MEM)**] key repeatedly to toggle among the seven available characters associated with that key: A → B → C → a → b → c → 2.

If a mistake was made entering in the name, pressing the [**CLR**] key to delete the wrong character.



7. Press the [ENT] key to store the first letter in the name and step to the next letter to the right.
8. Repeat step 6 and 7 until the name is complete. The name can consist of up to eleven characters, if you do not use all eleven characters press the [ENT] key to move to the next space. This method can also be used to enter a blank space in the name. To clear the previous letter, press the [CLR] key.
9. After the eleventh letter or space has been entered, press the [ENT] key to advance to the MMSI (Maritime Mobile Service Identity Number) number entry.
10. Enter the MMSI number by the keypad. If a mistake was made entering in the number, pressing the [CLR] key to delete the wrong character.
11. To store the data entered, press and hold the [ENT] key.
12. To enter another individual address, repeat steps 4 through 12.
13. To exit this menu and return to radio operation mode press the [16/9] key.



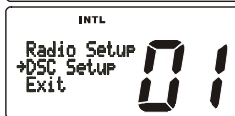
NOTE

Selecting “Next” or “Exit” will automatically save the name and MMSI number into memory.

9.5.2 Setting up the Individual Call Ringer

When a Individual call is received the radio will produce a ringing tone for 3 minutes. This selection allows the Individual Call ringer time to be changed.

1. Press and hold down the [CALL(MENU)] key until “Radio Setup” menu appear.
2. Turn the **CHANNEL** selector knob to select “DSC Setup” menu.
3. Press the [ENT] key, then select “INDIV Ring” with the **CHANNEL** selector knob.
4. Press the [ENT] key.
5. Turn the **CHANNEL** selector knob to select ringing time of a Individual Call.
6. Press the [ENT] key to store the selected setting.
7. To exit this menu and return to radio operation mode press the [16/9] key.

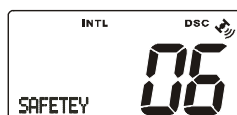
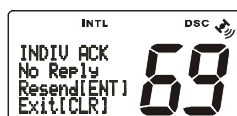
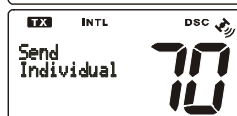


9.5.3 Transmitting an Individual Call

This feature allows the user to contact another vessel with a DSC radio. This feature is similar to calling a vessel on CH16 and requesting to go to another channel.

Pre-Programmable Calling

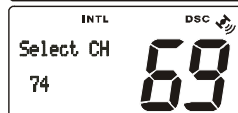
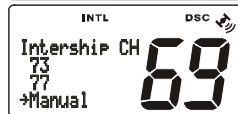
1. Press the **[CALL(MENU)]** key. The “DSC Operation” menu will appear.
2. Turn the **CHANNEL** selector knob to select “Individual.” (To cancel, select “Exit” with the **CHANNEL** selector knob or press the **[16/9]** key.)
3. Press the **[ENT]** key. The transceiver will beep, and the “Individual directory” will appear.
4. Turn the **CHANNEL** selector knob to select the “Individual” you want to contact.
5. Press the **[ENT]** key, then turn the **CHANNEL** selector knob to select the operating channel you want to communicate on and press the **[ENT]** key.
6. Press the **[ENT]** key again to transmit the individual DSC signal.
7. After INDIVIDUAL CALL is transmitted, the transceiver will wait 8 seconds for the acknowledgment. If the reply signal is not received, the transceiver will transmit again.
8. After the second INDIVIDUAL CALL is transmitted, if the reply signal is not received, the display will be as shown in the illustration on the right. To send the call again, press the **[ENT]** key.
9. When an individual call acknowledgment is received, the established channel is automatically changed to the channel which is selected on step 5 above and a ringing tone sounds.
10. Press the any key to listen to the channel to make sure it is not busy, then key the microphone and call the other vessel you desire to communicate with.



Manual Calling

You may enter an MMSI number manually to contact without the Setting up the Individual Directory.

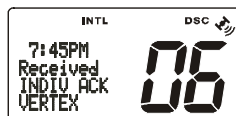
1. Press the [**CALL(MENU)**] key. The “DSC Operation” menu will appear.
2. Turn the **CHANNEL** selector knob to select “Individual.” (To cancel, select “Exit” with the **CHANNEL** selector knob or press the [**16/9**] key.)
3. Press the [**ENT**] key. The transceiver will beep, and the “Individual directory” will appear.
4. Turn the **CHANNEL** selector knob to select “Manual,” then press the [**ENT**] key.
5. Enter the MMSI number (nine digits) which you want to contact by the keypad, then press the [**ENT**] key.
6. Turn the **CHANNEL** selector knob to select “Manual,” then press the [**ENT**] key.
7. Enter the operating channel which you want to communication by the keypad, then press the [**ENT**] key.
8. Press the [**ENT**] key again to transmit the individual DSC signal.
9. After INDIVIDUAL CALL is transmitted, the transceiver will wait 8 seconds for the acknowledgment. If the reply signal is not received, the transceiver will transmit again.
10. After the second INDIVIDUAL CALL is transmitted, if the reply signal is not received, the display will be as shown in the illustration on the right. To send the call again, press the [**ENT**] key or to exit the mode, press the [**CLR**] key.
11. When an individual call acknowledgment is received, the established channel is automatically changed to the channel which is selected on step 5 above and a ringing tone sounds.
9. Press any key to listen to the channel to make sure it is not busy, then key the microphone and call the other vessel you desire to communicate with.



9.5.4 Receiving an Individual Call

When receiving an individual call, an acknowledgment must be sent back to the calling station. The **VM-3500E** default setting is Automatic, but has a selection that allows you to manually send a reply before the radio will switch to the requested calling channel. This selection is useful if you want to see who is calling and requesting you to switch to a channel for communications, similar to caller id on a cellular phone.

1. When an individual call is received, an individual call ringing alarm sounds. The radio automatically switches to the requested channel.
2. Press any key to stop the alarm.
3. Press the **PTT** on the mic and talk to the calling ship.



9.6 GROUP CALL

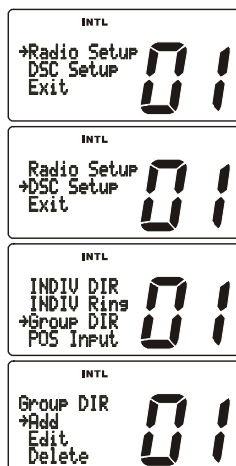
This feature allows the user to contact a group of specific vessels (example members of a yacht club) using DSC radios with Group call function to automatically switch to a desired channel for voice communications.

9.6.1 Setting up a Group Call

For this function to operate the same Group MMSI must be programmed into all the DSC VHF radios within the group of vessels that will be using this feature. The group MMSI is a 9 digit (first digit permanently set to "0") that will allow other radios to call your vessel along with others to automatically switch to a working channel for voice communications. This function is very useful for yacht clubs and vessels traveling together that want to collectively make announcements on a predetermined channel.

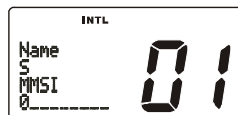
1. Press and hold down the [**CALL(MENU)**] key until "Radio Setup" menu appears.
2. Turn the **CHANNEL** selector knob to select "DSC Setup" menu.
3. Press the [**ENT**] key, then select "Group DIR" with the **CHANNEL** selector knob.
4. Press the [**ENT**] key, then select "Add" with the **CHANNEL** selector knob.
5. Press the [**CALL(MENU)**] key.
6. Press the one of the Keypad keys to enter the first letter of the name of the group you want to reference in the directory.

Example: Press the [**2(MEM)**] key repeatedly to toggle among the seven available characters associated

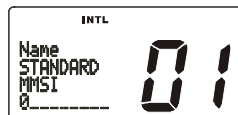


with that key: A → B → C → a → b → c → 2.

If a mistake was made entering in the name, pressing the **[CLR]** key to delete the wrong character.



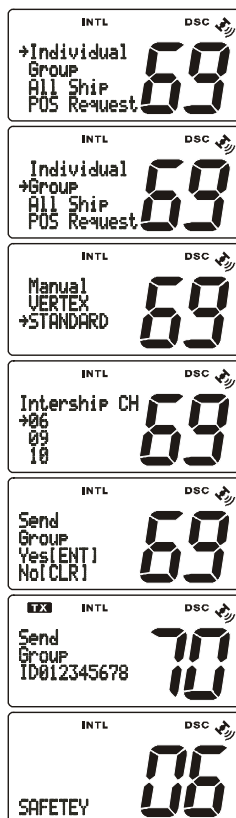
7. Press the **[ENT]** key to enter the desired letter and move the cursor one space to the right.
8. Repeat step 6 and 7 until the name is complete. The name can consist of up to eleven characters, if you do not use all eleven characters press the **[ENT]** key to move to the next space. This method can also be used to enter a blank space in the name. To clear the previous letter, press the **[CLR]** key.
9. After the eleventh letter or space has been entered, press the **[ENT]** key to advance to the GROUP MMSI (Maritime Mobile Service Identity Number) number entry.
10. Enter the MMSI number by the keypad. If a mistake was made entering in the number, pressing the **[CLR]** key to delete the wrong character.
11. To enter the desired number and move one space to the right press the **[ENT]** key. Repeat procedure until all nine spaces of MMSI number are entered.
12. If a mistake was made entering in the name or the MMSI number repeat pressing the **[ENT]** key until the wrong character is selected, then move the **CHANNEL** selector knob to correct the entry.
13. To store the data entered, press and hold the **[ENT]** key.
14. To enter another individual address, repeat steps 4 through 13.
15. To exit this menu and return to radio operation mode press the **[16/9]** key.



9.6.2 Transmitting a Group Call

Pre-Programmable Calling

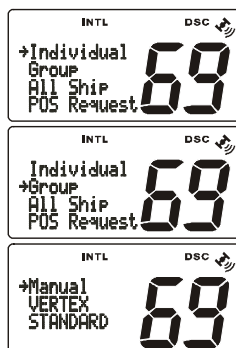
1. Press the **[CALL(MENU)]** key. The “DSC Operation” menu will appear.
2. Turn the **CHANNEL** selector knob to select “Group.” (To cancel, select “Exit” with the **CHANNEL** selector knob or press **[16/9]** key.)
3. Press the **[ENT]** key. The transceiver will beep, and the “Group Directory” will appear.
4. Turn the **CHANNEL** selector knob to select the “Group” you want to contact.
5. Press the **[ENT]** key, then turn the **CHANNEL** selector knob to select the operating channel you want to communicate on and press the **[ENT]** key.
6. Press the **[ENT]** key again to transmit the Group Call signal.
7. After the GROUP CALL is transmitted, all the radios in the group will switch to the designated channel.
8. Listen to the channel to make sure it is not busy, then key the microphone and call the other vessels you desire to communicate with.



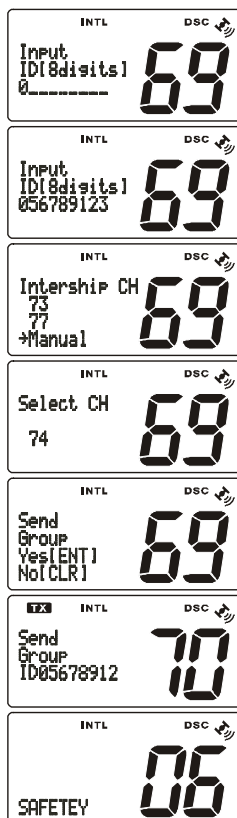
Manual Calling

You may enter an MMSI number manually to contact without the Setting up the Group call number.

1. Press the **[CALL(MENU)]** key. The “DSC Operation” menu will appear.
2. Turn the **CHANNEL** selector knob to select “Group.” (To cancel, select “Exit” with the **CHANNEL** selector knob or press **[16/9]** key.)
3. Press the **[ENT]** key. The transceiver will beep, and the “Group Directory” will appear.
4. Turn the **CHANNEL** selector knob to select the “Manual,” then press the **[ENT]** key.
5. Enter the MMSI number (eight digits) which you want to contact by the keypad, then press the **[ENT]** key.

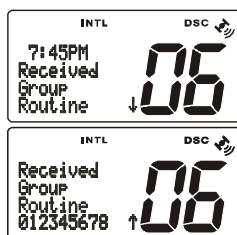


6. Turn the **CHANNEL** selector knob to select “Manual,” then press the [ENT] key. Of course, you may select the operating channel from the channel list, as well.
7. Enter the operating channel which you want to communicate on by the keypad, then press the [ENT] key.
8. Press the [ENT] key again to transmit the Group Call signal.
9. After the GROUP CALL is transmitted, all the radios in the group will switch to the designated channel.
10. Listen to the channel to make sure it is not busy, then key the microphone and call the other vessels you desire to communicate with.



9.6.3 Receiving a Group Call

1. When a group call is received, the **VM-3500E** will produce a ringing alarm sound.
2. The radio automatically switches to the requested channel.
3. Press any key to stop the alarm.
4. Monitor the channel for the person calling the Group for a message.
5. If you want to respond, monitor the channel to make sure it is clear, then press the **PTT** on the mic and talk to the calling ship(s).



NOTE

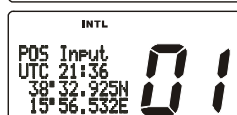
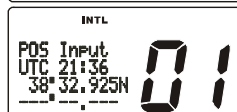
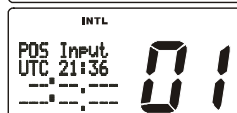
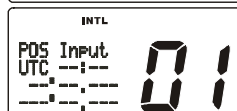
After a Group call is received, the time the call was made and the ships MMSI or vessels name will appear on the LCD.

9.7 Manual Setting of the GPS Location (LAT/LOG)

You may send the Latitude/Longitude of your vessel location manually even if the **VM-3500E** is not connected the GPS receiver unit.

After the position is entered, transmitting a DSC Distress, Position Request, or Position Send will contain the manually entered position.

1. Press and hold down the **[CALL(MENU)]** key until “Radio Setup” menu appears.
2. Turn the **CHANNEL** selector knob to select “DSC Setup” menu.
3. Press the **[ENT]** key, then select “POS Input” with the **CHANNEL** selector knob.
4. Press the **[ENT]** key. The transceiver will beep, and the display will be as shown in the illustration on the right.
5. Enter the your local time from the keypad by the 24-hour system on the UTC time, then press the **[ENT]** key.
6. Enter the Latitude/Longitude of your vessel location by the keypad, then press the **[ENT]** key. To select North (N) press **[6(NAV)]** key, South (S) press the **[7(SCRM)]** key, East (E) press the **[3(SCAN)]** key or West (W) press the **[9(FOG)]** key.
7. To store the data entered, press the **[16/9]** key to exit this menu and return to radio operation mode.



10 RADIO SETUP

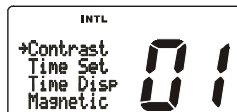
NOTE

The optional RAM+ MIC CMP25 can also change the RADIO SETUP menu. Refer to page 60 for details.

10.1 LCD CONTRAST

This selection sets up the display for best viewabilty for the varying mounting (overhead or below).

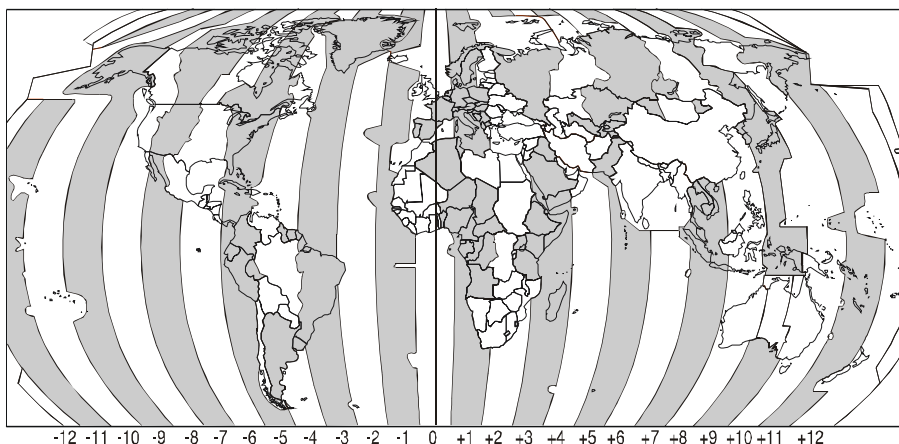
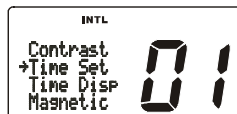
1. Press and hold down the [**CALL(MENU)**] key until "Radio Setup" menu appears.
2. Press the [**ENT**] key, then select "Contrast" in the "Radio Setup" menu with the **CHANNEL** selector knob.
3. Press the [**ENT**] key.
4. Turn the **CHANNEL** selector knob to select the desired level. The contrast level can be set from "0" to "31."
5. Press the [**ENT**] key to store the selected level.
6. To exit this menu and return to radio operation mode press the [**16/9**] key.



10.2 TIME OFFSET

This selection sets the time offset between local time and UTC (time GPS sends to radio). Time is displayed when GPS position (LAT/LON) is displayed by pressing the [F] key followed by the [6(NAV)] key.

1. Press and hold down the [CALL/SET(MENU)] key until "Radio Setup" menu appears.
2. Press the [ENT] key, then select "Time Set" in the "Radio Setup" menu with the **CHANNEL** selector knob.
3. Press the [ENT] key.
4. Turn the **CHANNEL** selector knob to select time offset from UTC. See illustration below to find your offset time from UTC. If "0:00" is assigned, the time is the same as UTC (Universal Time Coordinated or GMT Greenwich Mean Time).
5. Press the [ENT] key to store the time offset.
6. To exit this menu and return to radio operation mode press the [16/9] key.

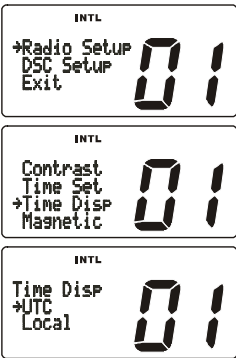


OFFSET TIME TABLE

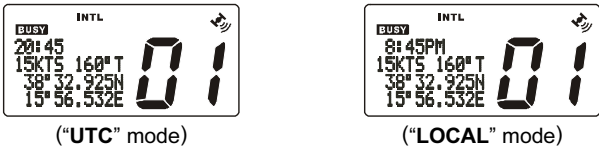
10.3 TIME LOCATION

This selection selects the time display between local time and UTC (time GPS sends to radio). Time is displayed when GPS position (LAT/LON) is displayed by pressing the [F] key followed by the [6(NAV)] key.

- 1. Press and hold down the [CALL/SET(MENU)] key until “Radio Setup” menu appears.
- 2. Press the [ENT] key, then select “Time Disp.” in the “Radio Setup” menu with the CHANNEL selector knob.
- 3. Press the [ENT] key.
- 4. Turn the CHANNEL selector knob to select “UTC” or “Local.”
- 5. Press the [ENT] key to store the selected setting.
- 6. To exit this menu and return to radio operation mode press the [16/9] key.



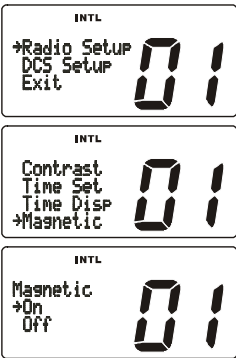
n the local time mode, the display shows the time by the 12-hour system. Meanwhile, the display shows the time by the 24-hour system in the UTC mode.



10.4 TRUE MAGNETIC CHANGE (NAV display)

This selection allows customizing the GPS COG (Course Over Ground) displayed on the LCD to be in True or Magnetic.

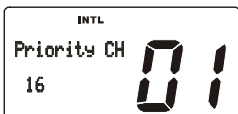
- 1. Press and hold down the [CALL(MENU)] key until “Radio Setup” menu appears.
- 2. Press the [ENT] key, then select “Magnetic” in the “Radio Setup” menu with the CHANNEL selector knob.
- 3. Press the [ENT] key.
- 4. Turn the CHANNEL selector knob to select “On” (representing “Magnetic”) or “Off” (representing “True”).
- 5. Press the [ENT] key to store the selected setting.
- 6. To exit this menu and return to radio operation mode press the [16/9] key.



10.5 PRIORITY CHANNEL SET (Depends on the transceiver version)

Allows selection the priority channel.

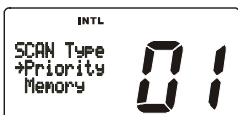
1. Press and hold down the [**CALL(MENU)**] key until “Radio Setup” menu appears.
2. Press the [**ENT**] key, then select “Priority CH” in the “Radio Setup” menu with the **CHANNEL** selector knob.
3. Press the [**ENT**] key.
4. Turn the **CHANNEL** selector knob to select the channel to be a priority.
5. Press the [**ENT**] key to store the selected setting.
6. To exit this menu and return to radio operation mode press the [**16/9**] key.



10.6 SCAN TYPE (Depends on the transceiver version)

This selection selects the scan mode between “Memory Scan” and “Priority Scan.”

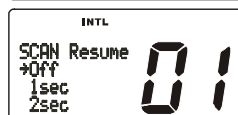
1. Press and hold down the [**CALL(MENU)**] key until “Radio Setup” menu appears.
2. Press the [**ENT**] key, then select “SCAN Type” in the “Radio Setup” menu with the **CHANNEL** selector knob.
3. Press the [**ENT**] key.
4. Turn the **CHANNEL** selector knob to select “Priority” or “Memory.”
5. Press the [**ENT**] key to store the selected setting.
6. To exit this menu and return to radio operation mode press the [**16/9**] key.



10.7 SCAN RESUME TIME (Depends on the transceiver version)

This selection is used to select the time the **VM-3500E** waits after a transmission ends before starting scanning.

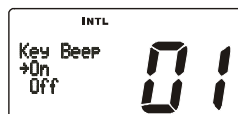
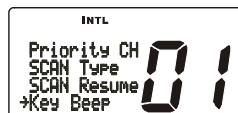
1. Press and hold down the [**CALL(MENU)**] key until “Radio Setup” menu appears.
2. Press the [**ENT**] key, then select “SCAN Resume” in the “Radio Setup” menu with the **CHANNEL** selector knob.
3. Press the [**ENT**] key.
4. Turn the **CHANNEL** selector knob to select the desired resume time. The resume time can be set to “1sec,” “2sec,” “3sec,” or “Off.” In the “Off” selection, the scanner will resume after the other station stops transmitting (carrier drops).
5. Press the [**ENT**] key to store the selected setting.
6. To exit this menu and return to radio operation mode press the [**16/9**] key.



10.8 KEY BEEP (ON/OFF)

This selection allows the beep tone when a key is pressed to be turned off.

1. Press and hold down the [**CALL(MENU)**] key until “Radio Setup” menu appears.
2. Press the [**ENT**] key, then select “Key Beep” in the “Radio Setup” menu with the **CHANNEL** selector knob.
3. Press the [**ENT**] key.
4. Turn the **CHANNEL** selector knob to select “On” or “Off.”
5. Press the [**ENT**] key to set the key beep condition.
6. To exit this menu and return to radio operation mode press the [**16/9**] key.



NOTE

Emergency alarm and beeps for DSC operation cannot be turned OFF.

10.9 CHANNEL NAME CHANGE

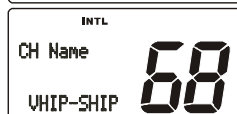
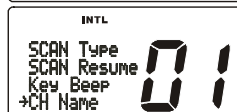
This selection allows you to customize the name of a channel from the default name.

1. Press and hold down the [**CALL(MENU)**] key until “Radio Setup” menu appears.
2. Press the [**ENT**] key, then select “CH Name” in the “Radio Setup” menu with the **CHANNEL** selector knob.
3. Press the [**ENT**] key.
4. Turn the **CHANNEL** selector knob to select the channel to be named, then press the [**ENT**] key.

5. Press the one of the Keypad keys to enter the first letter of the channel name.

Example: Press the [**2(MEM)**] key repeatedly to toggle among the seven available characters associated with that key: A → B → C → a → b → c → 2.

6. Press the [**ENT**] key to enter the desired letter and move the cursor one space to the right.
7. Repeat procedure until the name is complete. The name can consist of up to twelve characters. If you do not use all twelve character, press the [**ENT**] key to move to the next space. To clear the previous letter, press the [**H/L(NAV)**] key.
8. Press and hold the [**ENT**] key to enter the name and exit from the “CH Name” menu. The LCD will return to the “Radio Setup” menu.
9. If you want to enter the name of another channel, repeat steps 3 through 8.
10. To exit this menu and return to radio operation mode press the [**16/9**] key.



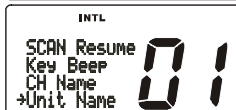
10.10 UNIT NAMING

This selection allows you to provide the name to the radio and optional RAM+ Mic when connected.

1. Press and hold down the [**CALL(MENU)**] key until “Radio Setup” menu appears.
2. Press the [**ENT**] key, then select “Unit Name” in the “Radio Setup” menu with the **CHANNEL** selector knob.
3. Press the [**ENT**] key.
4. Turn the **CHANNEL** selector knob to select the Unit (Radio or RAM1) to be named, then press the [**ENT**] key.
5. Press the one of the Keypad keys to enter the first letter of the unit name.

Example: Press the [**2(MEM)**] key repeatedly to toggle among the seven available characters associated with that key: A → B → C → a → b → c → 2.

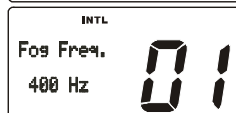
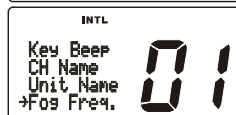
6. Press the [**ENT**] key to enter the desired letter and move the cursor one space to the right.
7. Repeat procedure until the name is complete. The name can consist of up to twelve characters. If you do not use all twelve character, press the [**ENT**] key to move to the next space.
8. Press and hold the [**ENT**] key to enter the name and exit from the “Unit Name” menu. The LCD will return to the “Radio Setup” menu.
9. If you want to enter the name of another unit, repeat steps 3 through 8.
10. To exit this menu and return to radio operation mode press the [**16/9**] key.



10.11 FOG ALERT TONE FREQUENCY

This selection allows you to select the Alert Tone Frequency for the PA/FOG Operation. Available selections are “200 Hz” through “850 Hz” in 50 Hz steps. The default Alert Tone Frequency is 400 Hz.

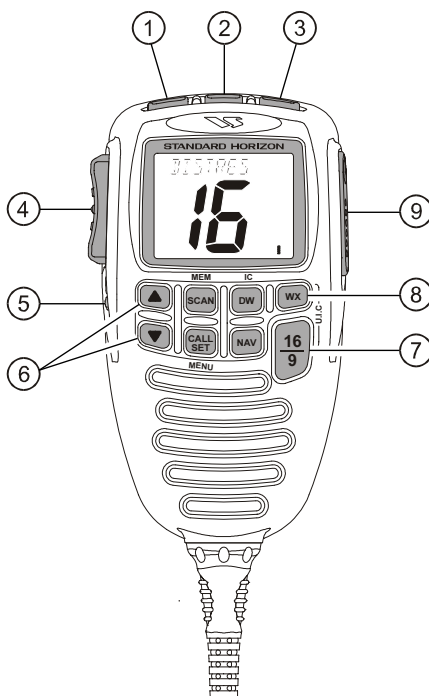
1. Press and hold down the [**CALL(MENU)**] key until “Radio Setup” menu appear.
2. Press the [**ENT**] key, then select “Fog Freq.” in the “Radio Setup” menu with the **CHANNEL** selector knob.
3. Press the [**ENT**] key.
4. Turn the **CHANNEL** selector knob to select desired tone frequency.
5. Press the [**ENT**] key to store the selected setting.
6. To exit this menu and return to radio operation mode press the [**16/9**] key.



11 ENHANCED RAM+ MIC OPERATION

When the RAM+ microphone is connected to the **VM-3500E**, most VHF, DSC, setup menus and PA modes can be remotely operated. The RAM+ Mic supplied with 7 m of routing cable and can be extended up to 21 m using three 7 m extension cables model **CT-100**. The intercom operation can be used between the RAM+ Mic and the transceiver.

11.1 RAM+ MIC CONTROLS



① SQUELCH CONTROL (SQL)

Activates the squelch adjusting mode.

Press this key to activate the squelch adjusting mode. Press the microphone's [▲] or [▼] key to adjust the squelch.

When this key is pressed and held down for 1 second or more, the squelch is turned off.

② VOLUME KEY (VOL)

Activates the volume adjusting mode.

Press this key to activate the volume adjusting mode. Press the microphone's [▲] or [▼] to adjust the volume.

③ **POWER SWITCH (PWR)**

Press and hold down this key to turn to the transceiver and RAM+ Mic on and off.

④ **PTT (Push-To-Talk) SWITCH**

Activates transmission.

⑤ **[H/L] KEY**

Toggles between high and low power. When the **[H/L]** key is pressed while the transceiver is on channel 13 or 67, the power will temporarily switch from LO to HI power until the **PTT** is released. The **[H/L]** key does not function on transmit inhibited and low power only channels.

⑥ **[▲](UP)/[▼](DOWN) KEY**

These keys are used to select channels, adjust the volume and squelch level, and to choose the item selection of different functions (such as the DSC operation). In many ways, these keys emulate the function of the transceiver's **CHANNEL** selector knob.

⑦ **[16/9] KEY**

Immediately recalls channel 16 from any channel location. Holding down this key recalls channel 9. Pressing the **[16/9]** key reverts to the previous selected working channel.

Secondary use

Please see secondary use for the **[WX]** and **[MEM]** key.

⑧ **KEY PAD**

[SCAN] Key

1. Starts and stops scanning of programmed channels.
2. If held while the **[UP(▲)]** or **[DOWN(▼)]** key on the microphone are pressed, the radio will show the channels programmed in scan memory. This function will not work if the unit is scanning.

NOTE: The priority channel by default is Channel 16, however the priority channel can be changed. To select a different priority channel refer to section “**10.6 SCAN TYPE.**”

[CALL/SET] Key

The **[CALL/SET]** key functions as the enter key.

Secondary use

Press the **[CALL/SET]** key to access the DSC OPERATION menu.

Press and hold the **[CALL/SET]** key to access the SETUP menu.

[DW] Key

Watches for a transmission on CH16 and another selected channel until either signal is received. (Dual watch)

Secondary use

Press and hold [DW] key, intercom operation will operate between radio and RAM+ Mic.

[NAV] Key

Press this key, when connected to the GPS receiver, the LCD displays Position Data and Time from the GPS.

Secondary use

Press and hold [NAV] key to access PA/FOG function menu.

[WX] Key

Immediately recalls the previously selected US NOAA weather channel from any channel location.

Secondary use

Holding down the [16/9] key while pressing the [WX] key switch the Channel Group.

NOTE: If position is displayed, this icon will be hidden.

⑨ [DISTRESS] KEY

Used to send a DSC Distress Call. To send the distress call:

1. Lift the red rubber cover.
2. Press and hold the Red button. The RAM+ display will count down (5-4-3-2-1) and then transmit the Distress call.
3. When the distress signal is sent, Ch70 and “TX” icon will appear on the LCD. After the message has been sent, the radio and RAM+ will sound a Distress Alarm.
4. The transceiver “shadow-watches” for a transmission on CH16 or CH70 until an acknowledgment signal is received. “DISTRESS” and “WAITING” will appear on the LCD.
5. If an acknowledgement is received, select channel 16 and advise your distress situation.
6. If no acknowledgment is received, the distress call is repeated in 4 minute intervals until an acknowledgment is received.
7. When a DSC Distress acknowledgment is received, a distress alarm sounds and channel 16 is automatically selected. The LCD shows the MMSI of the ship responding to your distress.



RECEIVED ACK: acknowledgment signal is received.

RECEIVED RLY: relay signal is received from another vessel or coast station.

8. To cancel the DSC distress alarm signal from the speaker, press any key.

11.2 INTERCOM OPERATION

11.2.1 Communication

1. Press and hold the [DW] key while in the “RADIO” mode, the mode is changed to “INTERCOM” mode.
2. When the “INTERCOM” operation is activated, “IC” is displayed on the RAM+ Mic and “INTERCOM” is displayed on the VM-3500E.
3. Press the PTT switch, “TALK” is displayed.

NOTE: A warning beep is emitted when the RAM+ Mic PTT switch is pressed while the transceiver microphone’s PTT switch is pressed.

4. Speak slowly and clearly into the microphone, hold the microphone about 1/2 inch away from your mouth.
5. When finished, release the PTT switch.
6. Press the [DW] key again the mode will revert to “RADIO” mode.



(RAM+ Mic's PTT switch is pressed)



(VM-3500E's PTT switch is pressed)



11.2.2 Calling

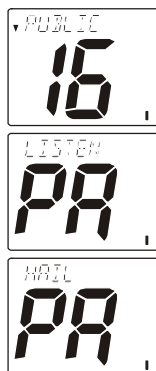
Hold down the [DW] key for 1 second or more, when the “INTERCOM” operation is activated. A calling beep is emitted twice from the transceiver speaker.

11.3 PA/FOG OPERATION

The RAM+ is capable of controlling the 30W Public address, 4 fog horns, bells and whistles.

12.3.1 Operating the PA / Hailer

1. Press and hold the **[NAV]** key then select PA with the **[▲]** or **[▼]** key.
2. Press the **[CALL/SET]** key.
3. Press the **PTT** switch and speak into the microphone.
4. To turn up the PA Volume, press the **PTT** switch and press the **[▲]** or **[▼]** keys to adjust the Audio output level. The level can be set from 0 to 30W.
5. To adjust the listen back volume, (while in listenback mode) press the **[VOL]** Key, then press the **[▲]** or **[▼]** key to the desired listen back volume.

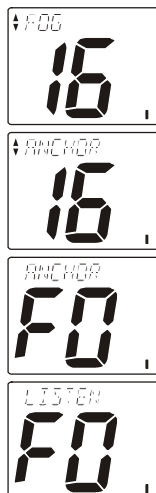


To exit from the PA Hailer mode, press the **[CALL/SET]**, **[16/9]**, or **[WX]** key.

11.3.2 Operating the FOG Horn

The **VM-3500E** is capable of sending Underway, Stop, Sail, Tow, Horn, Siren, Aground and Anchor signals.

1. Press and hold the **[NAV]** key then select FOG with the **[▲]** or **[▼]** key.
2. Press the **[CALL/SET]** key.
3. Select the one of the eight functions described above with the **[▲]** or **[▼]** key and press the **[CALL/SET]** key.
4. On the "Horn" and "Siren" modes, press the **PTT** switch to activate the tone through the HAIL/PA speaker. Press the **[▲]** or **[▼]** keys to adjust the Audio output level. The level can be set from 0 to 30W.
5. To adjust the listen back volume, (while in listenback mode) press the **[VOL]** Key, then press the **[▲]** or **[▼]** key to the desired listen back volume.



To exit from the FOG HORN mode, press the **[16/9]**, **[WX]**, or **[CALL/SET]** key.

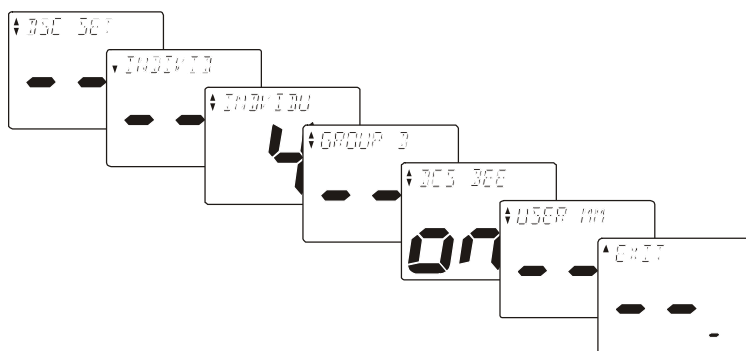
11.4 DSC/RADIO SETUP MODE

The RAM+ can access the DSC / RADIO setup menu (refer to section “**9 DIGITAL SELECTIVE CALLING**” and section “**10 RADIO SETUP**” for details). The LAMP, CONTRAST, and KEY BEEP menu item accessed from the RAM+ only controls the RAM+’s display and speaker.

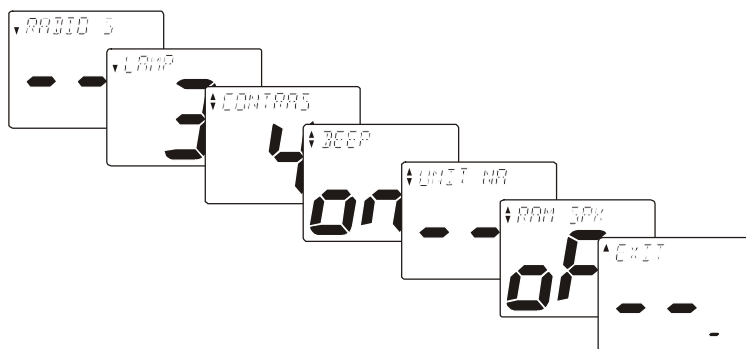
DSC/RADIO Setup mode from the RAM+:

1. Press and hold down the **[CALL/SET]** key until “RADIO SETUP” menu appears.
2. Press the **[▲]/[▼]** key to select “RADIO SETUP” or “DSC SETUP” menu.
3. Press the **[CALL/SET]** key, then select the menu item you wish to work on by pressing the **[▲]/[▼]** key.
4. Press the **[CALL/SET]** key.
5. Press the **[▲]/[▼]** key to change the value or condition for the menu item, then press the **[CALL/SET]** key to save the new setting.
6. Press the **[▲]/[▼]** key to select “EXIT,” then press the **[CALL/SET]** key to return to the normal operation.

RADIO SETUP-menu



DSC SETUP-menu



12 MAINTENANCE

12.1 GENERAL

The inherent quality of the solid-state components used in this transceiver will provide many years of continuous use. Taking the following precautions will prevent damage to the transceiver.

- Keep the microphone connected or the jack covered at all times to prevent corrosion of electrical contacts;
- Never key the microphone unless an antenna or suitable dummy load is connected to the transceiver.
- Ensure that the supply voltage to the transceiver does not exceed 16 VDC or fall below 11 VDC.
- Use only VERTEX STANDARD-approved accessories and replacement parts.

In the unlikely event of serious problems, please contact your Dealer.

12.2 TROUBLESHOOTING CHART

SYMPTOM	PROBABLE CAUSE	REMEDY
Transceiver fails to power up.	No DC voltage to the transceiver, or blown fuse.	a. Check the 12VDC battery connections and the fuse. b. The PWR key needs to be pressed and held to turn the radio on.
Transceiver blows fuse when connected to power supply.	Reversed power wires.	Check the power cable for DC voltage, or replace the fuse (6A 250V). Make sure the red wire is connected to the positive (+) battery post, and the black wire is connected to the negative (-) battery post. If the fuse still blows, contact your Dealer.
Popping or whining noise from the speaker while engine runs.	Engine noise.	Reroute the DC power cables away from the engine. Add noise suppressor on power cable. Change to resistive spark plug wires and/or add an alternator whine filter.
Sound is not emitted from the internal or external speaker.	Accessory cable.	Check the connections of the accessory cable (Possible short circuit on the External speaker cable WHITE/SHIELD).
Receiving station report low transmit power, even with transceiver set to HI power.	Antenna.	Have the antenna checked or test the transceiver with another antenna. If the problem persists, contact your Dealer for servicing.
"HI BATTERY" or "LO BATTERY" message is appeared when the power is turned on.	The power supply voltage is too high or too low.	Confirm that the connected power supply voltage is not 17 volts or lower than 10 volts. Confirm that the generator has not malfunctioned.
"PA ERROR" or "FOG ERROR" message is shown when the PA/FOG mode is activated.	Accessory cable.	Check the accessory cable connection (Possible short circuit on the PA speaker cable RED/SHIELD).
Your position is not displayed.	Accessory cable.	Check the accessory cable connection. Some GPS use the battery ground line for NMEA connection.
	Setting of the GPS navigation receiver.	Check the output signal format of the GPS navigation receiver. This radio requires NMEA0183 format with GLL, RMB, GGA, or GNS sentence as an output signal. If the GPS has a baud rate setting make sure to select 4800 and parity to NONE.

13. CHANNEL ASSIGNMENTS

VHF MARINE CHANNEL CHART			
CH	TX	RX	Remarks
01	156.050	160.650	Duplex
02	156.100	160.700	Duplex
03	156.150	160.750	Duplex
04	156.200	160.800	Duplex
05	156.250	160.850	Duplex
06	156.300		Simplex
07	156.350	160.950	Duplex
08	156.400		Simplex
09	156.450		Simplex
10	156.500		Simplex
11	156.550		Simplex
12	156.600		Simplex
13	156.650		Simplex
14	156.700		Simplex
15	---	156.750	Receive only
15	156.750		Simplex
16	156.800		Simplex
17	156.850		Simplex
18	156.900	161.500	Duplex
19	156.950	161.550	Duplex
20	157.000	161.600	Duplex
21	157.050	161.650	Duplex
22	157.100	161.700	Duplex
23	157.150	161.750	Duplex
24	157.200	161.800	Duplex
25	157.250	161.850	Duplex
26	157.300	161.900	Duplex
27	157.350	161.950	Duplex
28	157.400	162.000	Duplex
60	156.025	160.625	Duplex
61	156.075	160.675	Duplex
62	156.125	160.725	Duplex
63	156.175	160.775	Duplex
64	156.225	160.825	Duplex
65	156.275	160.875	Duplex
65	156.275		Simplex
66	156.325	160.925	Duplex
67	156.375		Simplex
68	156.425		Simplex
69	156.475		Simplex

VHF MARINE CHANNEL CHART			
CH	TX	RX	Remarks
70	156.525		Simplex
71	156.575		Simplex
72	156.625		Simplex
73	156.675		Simplex
74	156.725		Simplex
75	156.775		Simplex
76	156.825		Simplex
77	156.875		Simplex
77	156.875		Simplex
78	156.925	161.525	Duplex
79	156.975	161.575	Duplex
80	157.025	161.625	Duplex
81	157.075	161.675	Duplex
82	157.125	161.725	Duplex
83	157.175	161.775	Duplex
84	157.225	161.825	Duplex
85	157.275	161.875	Duplex
86	157.325	161.925	Duplex
87	157.375	161.975	Duplex
88	157.425	162.025	Duplex
WX01	---	162.550	Weather (RX only)
WX02	---	162.400	Weather (RX only)
WX03	---	162.475	Weather (RX only)
WX04	---	162.425	Weather (RX only)
WX05	---	162.450	Weather (RX only)
WX06	---	162.500	Weather (RX only)
WX07	---	162.525	Weather (RX only)
WX08	---	161.650	Weather (RX only)
WX09	---	161.775	Weather (RX only)
WX10	---	163.275	Weather (RX only)

14. SPECIFICATIONS

Performance specifications are nominal, unless otherwise indicated, and are subject to change without notice.

14.1 GENERAL

Channels	All USA, International and Canadian
Number of Distress Log	30 channel
Number of DSC Log	30 channel
Input Voltage	13.8 VDC $\pm 20\%$
Current Drain	
Standby	0.5 A
Receive	1.5 A
Transmit	5.0 A (Hi); 1.5 A (Lo)
Dimensions	90 H x 230 W x 150 D (mm)
Flush-Mount Dimensions	72 H x 205 W x 130 D (mm)
Weight	1.45 kg

14.2 TRANSMITTER

Frequency Range	156.025 to 157.425 MHz
RF Output	25 W (Hi); 1 W (Lo)
Conducted Spurious Emissions	80 dB (Hi); 60 dB (Lo)
Audio Response	within $\pm 1/-3$ of a 6 dB/octave pre-emphasis characteristic at 300 to 3000 Hz
Audio Distortion	5 %
Modulation	16K0G3E, for DSC 16K0G2B
Frequency Stability (-20°C to $+50^{\circ}\text{C}$)	$\pm 0.0005\%$
FM Hum and Noise	50 dB

14.3 RECEIVER

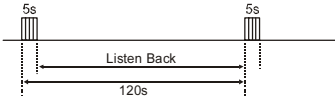
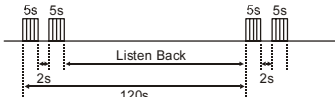
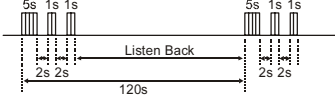
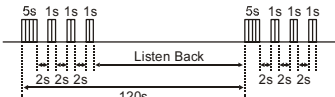
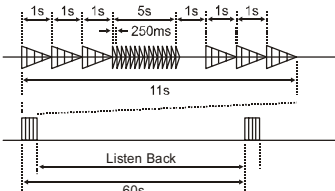
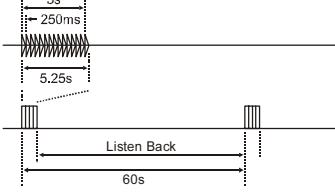
Frequency Range	156.050 to 163.275 MHz
Sensitivity	
20 dB Quieting	0.35 μV
12 dB SINAD	0.25 μV
Squelch Sensitivity (Threshold)	0.13 μV
Modulation Acceptance Bandwidth	± 7.5 kHz
Selectivity	
Spurious and Image Rejection	better than -70 dB
Intermodulation and Rejection at 12 dB SINAD	better than -70 dB
Audio Output	4.5 W
Audio Response	within $\pm 2/-8$ of a 6 dB/octave de-emphasis characteristic at 300 to 3000 Hz
Frequency Stability (-20°C to $+50^{\circ}\text{C}$)	± 0.0005 %
Channel Spacing	25 kHz
DSC Format	Class D
NMEA Input/Output	Output - DSC, DSE Input - GLL, GGA, RMC and GNS

Measurements are made in accordance with EN301 025. All stated specifications are subject to change without notice or obligation.

15 APPENDIX

FOG HORN TIMING CHART

The fog horn function sounds a horn repeatedly until the function is turned off.

TYPE	PATTERN	USAGE
UNDERWAY	<p>One 5-second blasts every 120 seconds.</p> 	Motor vessel underway and making way.
STOP	<p>Two 5-second blasts (separated by 2 seconds) every 120 seconds.</p> 	Motor vessel underway but stopped (not making way).
SAIL	<p>One 5-second blasts followed by two 1-second blasts (separated by 2 seconds) every 120 seconds.</p> 	Sailing vessel underway, fishing vessel (underway or anchored), vessel not under command, a vessel restricted in her ability to maneuver (underway or at anchor), or a vessel towing or pushing another ahead.
TOW	<p>One 5-second blasts followed by three 1-second blasts (separated by 2 seconds) every 120 seconds.</p> 	Vessel under tow (manned).
AGROUND	<p>One 11-second rings every 60 seconds.</p> 	Vessel is aground.
ANCHOR	<p>One 5-second rings every 60 seconds.</p> 	Vessel is at anchor.

MEMO

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MEMO

[illegible]

MEMO

This image shows a full page of white paper with horizontal dashed lines, typical of primary-ruled notebook paper. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings present.



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