DRAFT VER 2

Ray101 Handheld VHF Radio

Owner's Handbook

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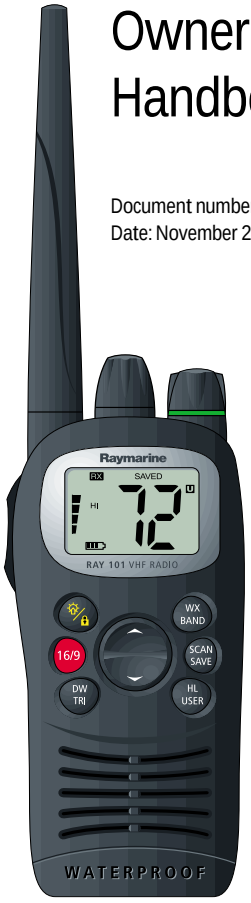

About this Handbook

Introduction

This handbook describes the Ray101 portable VHF marine radio. The Ray101 provides two-way communications on all US, Canadian and International marine channels and ten weather channels.

Conventions Used

Throughout this handbook, the dedicated (labelled) keys are shown in bold capitals (for example: **SCAN/SAVE**). The LCD indicators and functions are shown in normal capitals (for example: TX).

➤ Operating procedures, which may consist of a single key-press or a sequence of numbered steps, are indicated by an arrow icon shown in the margin.

Technical Accuracy

To the best of our knowledge, the information in this handbook was correct as it went to press. However, our policy of continuous product improvement and updating may change specifications without prior notice. As a result, unavoidable differences between the product and handbook may occur from time to time. Raymarine cannot accept liability for any inaccuracies or omissions it may contain.

For the latest product information visit our website:

www.raymarine.com

Warranty

To register your new Raymarine product, please take a few minutes to fill out the warranty registration card found at the end of this handbook. It is very important that you complete the owner information and return the card to the factory in order to receive full warranty benefits.

Important Information

Safety Warnings

WARNING: Navigation Aid
Although we have designed this product to be accurate and reliable, many factors can affect its performance. As a result, it should only be used as an aid to navigation and should never replace common sense and navigational judgement. Always maintain a permanent watch so you can respond to situations as they develop.

WARNING: Battery and Battery Charger Safety
Do not short the terminals in the charger base that recharge the batteries.

Do not put the charger in water.

Do not charge the batteries with + and – terminals reversed.

Do not use charger if power plug or cable is damaged.

Do not recharge batteries if physically deformed or leaking.

EMC Conformance

All Raymarine equipment and accessories are designed to the best industry standards for use in the recreational marine environment. Their design and manufacture conform to the appropriate Electromagnetic Compatibility (EMC) standards but correct installation and use is required to ensure that performance is not compromised.

Raymarine Products and Services

Raymarine products are supported by a network of Authorized Service Representatives. Raymarine's Technical Services representatives or your local dealer will be available to answer any questions you may have. For information on Raymarine products and services, contact either of the following:

United States

Raymarine, Inc.
22 Cotton Road, Unit D
Nashua, NH 03063-4219
USA
Telephone: 1-603-881-5200
1-800-539-5539
Fax: 1-603-864-4756

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Portsmouth, Hampshire
England PO3 5TD
Telephone: +44 (0) 23 9269 3611
Fax: +44 (0) 23 9269 4642

Or, you may contact us on the World Wide Web at:

www.raymarine.com

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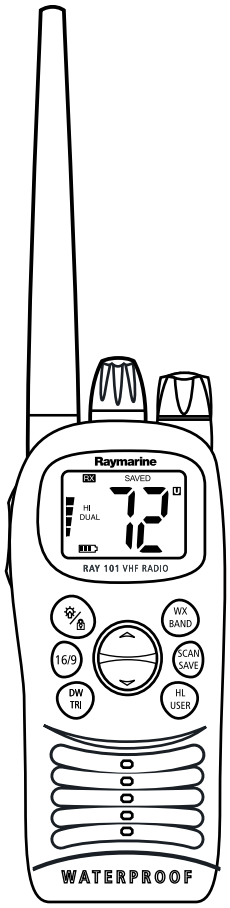
Chapter 1: General Information

1.1 Introduction



The Ray101 is a microprocessor-controlled, portable transceiver that provides reliable simplex (single frequency) and semi-duplex (two frequency) communications. This handbook describes the physical and functional characteristics of the radio.

The Ray101 provides two-way communications on all US, Canadian and International marine channels and ten weather channels. Refer to the Frequency Tables in Appendix B, which list all marine VHF channels available in your radio. You should familiarize yourself with these tables as you are responsible for using the proper channels.

1.2Features

The Ray101 is designed and manufactured to provide ease of operation with excellent reliability. The Ray101 features:

- Waterproof to IPX-7 standard
- Saved-channels Scan and Priority Scan
- Dual/Tri Watch Monitor modes
- Dedicated key for switching to Channel 16
- 10 Weather Channels
- Programmable Secondary Priority channel key
- NiMH batteries (AA size) included
- NiMH Quick Charger included
- 12VDC Cigarette Lighter Adapter included

1.3 Licensing Requirements

Raymarine radios comply with the Federal Communications Commission (FCC) and Industry Canada requirements that regulate marine VHF radio usage for the US and Canada, respectively. Marine VHF radio users in the US must comply with all applicable FCC rules and regulations, some of which are described here and in Section 5.

This information was current at the time this handbook was printed. Up-to-date information, including licensing requirements, can be obtained on the FCC website at:

www.fcc.gov/wtb/marine

Official FCC forms can be obtained on the FCC website at:

www.fcc.gov/formpage.html

FCC Notice

This device complies with Parts 15 and 80 of the FCC Rules. Operation is subject to the conditions that this device does not cause harmful interference. Changes or modifications to this equipment not expressly approved in writing by Raymarine, Incorporated could violate compliance with FCC rules and void the operator's authority to operate the equipment.

Station License

An FCC Ship Radio Station License and Call Sign are not required for most recreational vessels travelling in US waters. Examples of radio equipment that **do not** require a license include: marine VHF radios, any type of Emergency Position Indicating Radio Beacon (EPIRB), any type of radar, GPS or LORAN receivers, depth finders, CB radio, or amateur radio (an amateur license is required). However, you must obtain a license if: (1) you are required by law or treaty to carry a radio on your vessel; (2) your vessel travels to foreign ports; (3) you use marine radio equipment on board your vessel other than the devices listed above. Ships that use MF/HF single side-band radio, satellite communications, or telegraphy must be licensed by the FCC. If necessary, you can obtain a Station License by filing FCC Form 605, which is available from the FCC website listed above.

Operator License

An Operator License is not required to operate a VHF Marine Radio within US territorial waters. However, a license is required to operate the radio if you dock in a foreign port (including Canada and Mexico) or leave a foreign port to dock in a U.S. port. You can request a Restricted Radiotelephone Operator Permit from the FCC by filing Form 753.

INDUSTRY CANADA

You do not need a license to operate this radio within sovereign waters of Canada or the US. You will need a license to operate this radio outside of Canada or the US. To obtain Industry Canada licensing information, contact the nearest field or regional office, or write:

Industry Canada
Radio Regulatory Branch
Attention: DOSP
300 Slater Street
Ottawa, Ontario
Canada, KIA OC8

The following information about the radio is required to complete the license application:

Industry Canada Certification Number 4069823227AD----------
FCC Type Number PJ5RAY230----------
FCC Type Accepted Parts 15 and 80----------
Output Power 1 watt (low) & 25 watts (high)----------
Modulation 16FE (FM)----------
Frequency Range 156.025-157.425----------

Chapter 2: Installation

2.1 Unpacking and Inspection

Use care when unpacking the unit from the shipping carton to prevent damage to the contents. It is also good practice to save the carton and the interior packing material in the event you must return the unit to the factory.

Equipment Supplied

The following is a list of materials supplied with the Ray101:

Table 2-1: Supplied Components

Part Number	Description
E43026	RAY101 Handheld VHF Radio
81229	Ray101 Handbook
—	Antenna
—	Battery Tray
—	NiMH Quick Charger
—	12VDC Cigarette Lighter Adapter [1]
—	Batteries, (6) AA NiMH (1300mAh)
—	Wrist Strap
—	Belt Clip

[1] Only connect Cigarette Lighter Adapter to 12VDC system. Connecting to other voltage systems can damage the charger.

2.2 Attaching the Antenna

Rotate the antenna clockwise to securely fasten it to the threaded connector on the top of the radio.

Note: *Do not operate the radio or press PTT without an antenna attached.*

2.3 Attaching the Belt Clip

➤ To attach the belt clip and adapter:

1. Remove the belt clip and adapter hardware from the packing materials.
2. With the adapter button facing away from the Ray101, slide the adapter into the notch on the rear of the radio until it snaps into place.
3. Hold the belt clip perpendicular to the Ray101 and slide the belt clip notch onto the adapter button until it snaps into place.
4. Rotate the belt clip so that the longer end extends above the top of the radio.
5. Squeeze together the two top ends of the belt clip and attach to your belt or pant waist.

➤ To remove the radio from the belt clip:

1. Rotate the radio perpendicular to the belt clip.
2. Press the release button at the top of the belt clip.
3. Pull the radio up and away from the belt clip.

2.4 Attaching the Wrist Strap

1. Feed the narrow end of the strap through the two mounting holes at the top of the radio behind the antenna.
2. Continue feeding the narrow end of the strap through the loop and pull tight.

2.5 Battery Usage

The Ray101 can be powered by the supplied six (6) Nickel Metal Hydride (NiMH) batteries or with six (6) regular AA alkaline cells (not supplied), using the supplied Battery Tray.

Battery Tray

➤ To open the Battery Tray and insert the battery cells:

1. Using a coin or flat blade screwdriver, turn the screw at the base of the unit counterclockwise1/4 turn to the UNLOCK position.
2. While holding the Ray101 in one hand, use the other hand to push the battery tray downward and then away to separate it from the back of the radio.

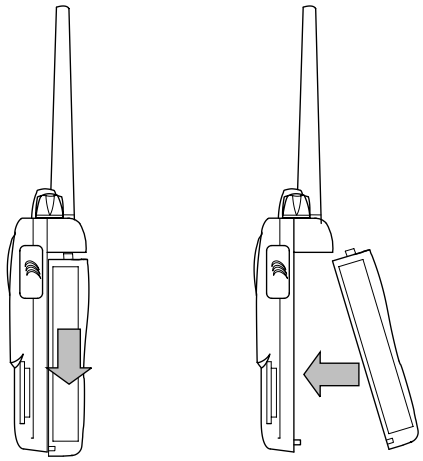


Figure 2-1: Removing and Attaching the Battery Tray

3. Lift up the tab located on the center right side of the battery tray cover and remove it from the battery tray.
4. Locate the Battery Type switch just below the battery compartment and turn to the appropriate position: ALKALINE or NiMH.

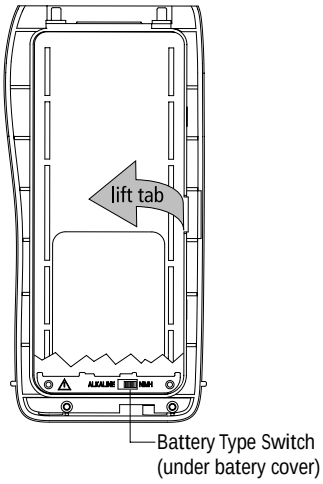


Figure 2-2: Removing the Battery Tray Cover

5. Noting the proper orientation, install the AA cells in three rows of two batteries each.
6. Replace the battery tray cover.

WARNING:
Be sure to set the Battery Type switch to the ALKALINE position before operating the radio with alkaline batteries. Operating the radio with alkaline batteries when the Battery Type switch is set to NiMH can cause battery leakage or explosion resulting in damage or injury.

7. Slide the battery tray up into the rear of the radio and then downward until it snaps into place.
8. Turn the screw at the base of the battery case clockwise to the LOCK position.

Charging Rechargeable NiMH Cells

The NiMH batteries must be fully charged before use. To charge the batteries:

1.Insert the radio with the battery tray attached into the NiMH charger unit.

2.Connect the AC wall adapter into a standard wall outlet.

or

Connect the Cigarette Lighter Adapter into a standard 12VDC Cigarette Lighter.

3.Insert the molded plug into the connector on the side of the battery charger.

The CHARGE indicator LED on the front of the charger lights when it is receiving voltage from the AC adapter.
RED means the batteries are charging.
GREEN means the batteries are fully charged.

Initial charging will complete in approximately 8 hours. Typical time for recharging is 3 to 5 hours.

CAUTION:

1.Make sure the switch just below the battery compartment is set to the NiMH position.

2.Please follow the Battery Safety rules outlined at the front of this handbook.

Chapter 3: Getting Started

3.1 Keypad and Rotary Knobs

Several of the keys on the front panel of the base station serve multiple purposes. For the most part, the function indicated on the first line of the key is accessed by pressing and releasing that key. The function indicated on the second line of the key is accessed by pressing and holding the key for three seconds.

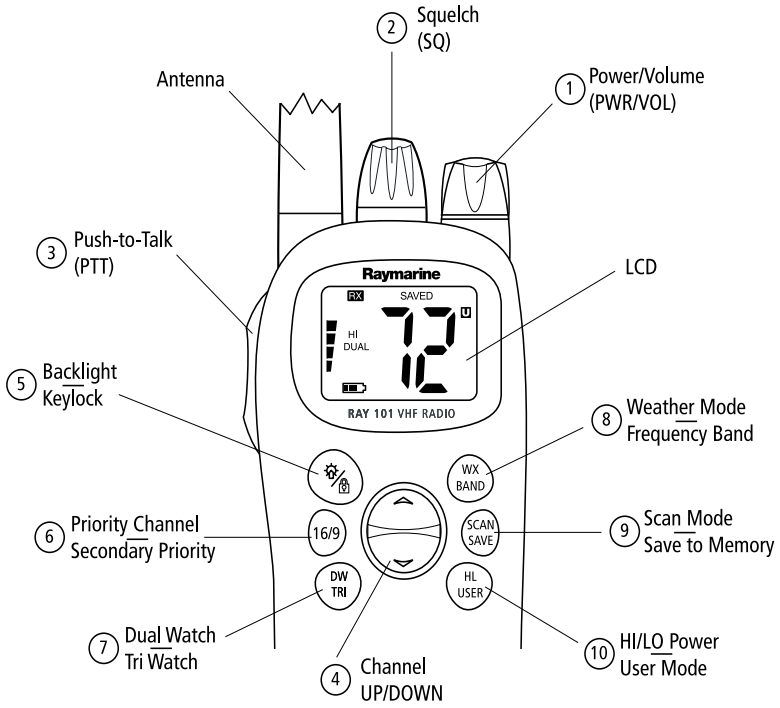


Figure 3-1: Ray101 Keys Layout

Rotary Keys

Key Name	Function
1. PWR/VOL	Power radio ON / OFF and adjust volume level
2. SQ	Adjust squelch threshold level

Push Keys

Key Name	Press & Release (<3 sec)	Press & Hold(>3 sec)
3. PTT	Press-to-talk	Press-to-talk
4. UP/DOWN	Channel increment/decrement	Rapid channel change
5. 	Backlight ON/OFF	Keylock ON/OFF
6. 16/9	Switches between the Priority and Working Channels	Switches to secondary Priority CH (9); If already tuned to secondary channel, programs a new secondary Priority Channel.
7. DW/TRI	Dual Watch Mode	Tri Watch Mode
8. WX/BAND	Weather Channel Mode	Select frequency band
9. SCAN/SAVE	Scan ON/OFF	SAVE/DELETE channel to/from memory
10. HL/USER	TX Power High/Low	USER (Saved Memory Channel) Mode

Description

1. PWR/VOL

Use this knob to turn the radio ON and OFF and to set the volume.

2. SQ

Use this knob to set the squelch threshold, which cuts off the receiver when the signal is too weak for reception of anything but noise.

3. PTT

While pressing this Press-to-Talk key radio transmission is enabled.

4. UP/DOWN

Use the arrow keys to change the current channel number.

5. Backlight / Keylock

Use this key to toggle ON or OFF the display's backlight and the keylock function, which protects the radio from any keypad entry.

6. 16/9

Use this key to switch to the priority channel or to change the value of the Secondary Priority Channel.

7. DW/TRI

Use this key to select either the Dual Watch or Tri Watch modes. Dual Watch monitors the current working channel and CH 16 in cycle. Tri Watch monitors CH 16, the current working channel and the channel you have set as the Secondary Priority Channel in cycle.

8. WX / BAND

Use this key to select the Weather mode or to alternate the frequency band between the USA, International and Canadian channel sets.

9. SCAN / SAVE

Use this key to enter a Scan Mode or to enter a channel into the radio's memory.

10. HL/USER

Use this key to toggle the transmit power from HIGH to LOW and to enter User Channel Mode, which displays only the channels that you have saved to memory.

3.2 LCD Display

The following describes the functional characters on the Ray101's LCD.

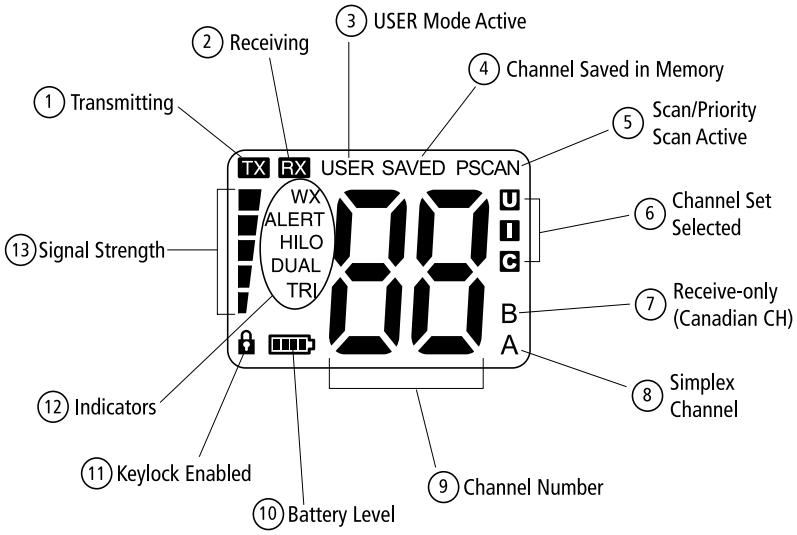


Figure 3-2: Ray101 LCD Layout

1. (TX) Transmitting

Indicates the PTT is being depressed and the radio is transmitting.

2. (RX) Receiving

Indicates that the radio is receiving a radio signal.If the radio receives a signal but the squelch threshold is set so high that the signal cannot be heard, the RX indicator is not displayed but the bar graph on the left side of the LCD is illuminated to show the appropriate signal strength.

3. (USER) Favorite Channel Mode

Indicates the radio is in USER Mode. USER Mode displays only the channels that you have saved to memory, enabling you to easily scan your favorite channels while bypassing unwanted or seldom-used channels.

4. (SAVED) Memory Mode

Indicates the current channel has been saved in memory. Appears during Saved Scan mode. Only saved channels are scanned during USER mode.

5. (PSCAN) All Scan/Saved Scan/Priority Scan

PSCAN appears during Priority Scan mode. SCAN appears during All Scan and Saved Scan. (SAVED also appears during Saved Scan mode.)

6. (U I C) Channel Set

Indicates which channel set is currently selected: **U**S, **I**nternational or **C**anadian.

7. (B) Receive-only Channel

Indicates that you cannot transmit on the currently-selected channel; it is receive-only. Used with Canadian channels only.

8. (A) Simplex Channel

Indicates that the currently-selected channel is simplex; you transmit and receive on the same frequency.

9 Channel Number

Displays the current channel number.

10. Battery Level

Indicates current battery strength. Greater battery strength displays a larger number of segments in the bar graph.

 Fully charged

 Normal operation

 Normal operation

 Needs charging

11. Keylock

Indicates the radio is protected from any keypad entry except for PTT and the backlight function.

12. Indicators

Indicates special conditions:

(WX) Weather Channel
Weather channel mode is active. US and Canada only.

(ALERT) Weather Alert
A weather alert is being received. US and Canada only.

(HI/LO) TX Power
Indicates whether transmit power is set for 5 watts (HI) or 1 watt (LO).

(DUAL) Dual Watch
Indicates the radio is in Dual Watch mode.

(TRI) Tri Watch
Indicates the radio is in Tri Watch mode.

13. Signal Strength

Displays the relative strength of the TX and RX signals.

When transmit output power is set for 1 watt, only two bars are displayed.
When the output power is set for 5 watts, the full scale (5 bars) is displayed.

When receiving, the bar graph indicates the strength of the signal being received. A stronger signal displays a larger number of segments in the bar graph.

Chapter 4: Operations

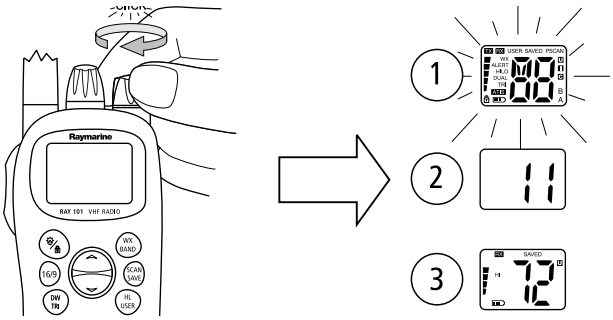
4.1 Turning the Power ON and OFF

Turn the **PWR/VOL** knob clockwise until it clicks.
When the unit powers up in Normal mode it:

1. Beeps, illuminates the backlight at full brightness, and displays all segments and indicators for 2 seconds.
2. Displays the software version number on the LCD but without the decimal point. For example, version 1.1 would appear as 11.
3. Recalls the last CH number, TX power settings and operation mode. If no last-used setting data exists, goes to CH 16 and high TX Power.

➤ To turn the unit OFF:

Rotate the Volume knob completely counterclockwise until it clicks.

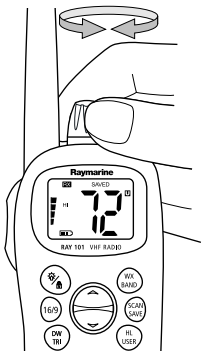


4.2 Setting the Volume

Adjust the **PWR/VOL** knob to control the loudspeaker volume level. Turn clockwise to increase the volume; counterclockwise to decrease the volume.

Note: *Key press beep volume is also controlled by the VOL level.*

4.3 Setting the Squelch



The Squelch circuit sets the threshold for cutting off the receiver when the signal is too weak for reception of anything but noise.

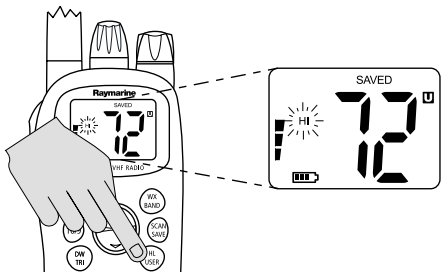
To properly set the squelch, rotate the **SQ** knob counterclockwise until audio is heard.

Then rotate clockwise until background noise disappears.

4.4 Setting the Power Output

The choice of power output is dependent upon the distance of transmission and transmitting conditions.

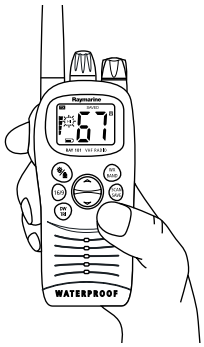
Press and release the **HL/USER** key to toggle the TX power from LOW (1 watt to HIGH (5 watts). The corresponding LO or HI indicator appears on the LCD.



Press and release

Note: *Some channels are limited by regulation to be low power only. If the HILO operation request is denied, an error tone beeps.*

Overriding the Low Output Power Restriction

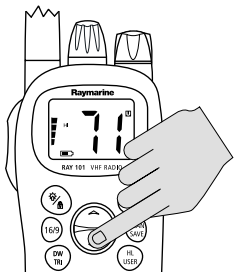


In the US, channels 13 and 67 can temporarily override the low power restriction.

➤ To override the LO power restriction on channels 13 or 67 and transmit at high power:

Press and hold and hold the **HL/USER** key as you press and hold the **PTT** key. The TX power is set to HI power for as long as you hold down both keys.

4.5 Setting the Channel



Press and release the UP arrow to increment the channel number.

Press and release the DOWN arrow to decrement the channel.

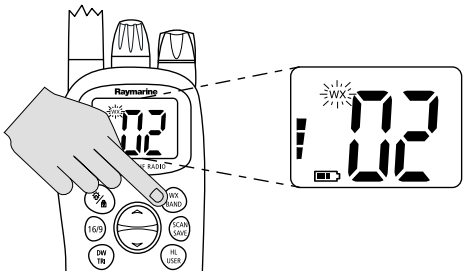
Press and hold either key for rapid channel scrolling.

4.6 Selecting a Weather Channel

The US National Oceanic and Atmospheric Administration (NOAA) broadcasts continuous weather reports and severe weather alerts, as needed. The Ray101 is programmed to receive10 NOAA weather channels and sound an alarm if a weather alert is received.

Press and release the **WX/BAND** key to enter Weather mode. The WX indicator appears.

Press Channel UP/DOWN to change the WX channel 0 through Channel 9.



Press and release

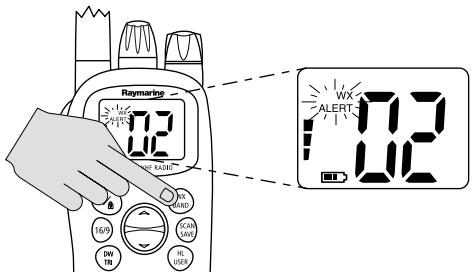
Press and release the **WX/BAND** key again to return to normal operation.

Note:

1. *Weather broadcasts can only be heard in the US and Canada.*
2. *During Weather mode, the PTT, SCAN/SAVE, DW/TRI and HL/USER keys are disabled and an error beep sounds if pressed.*

Weather Alert Operation

Weather Alert is toggled ON and OFF by pressing and holding **WX/BAND** button in the weather mode. The ALERT icon illuminates.



Press and hold

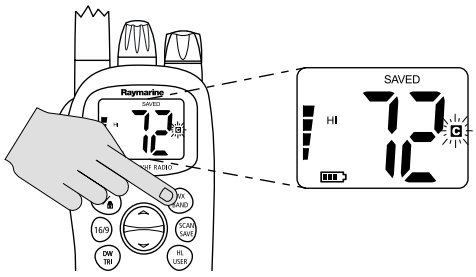
When Weather Alert function is enabled and the radio is tuned to the normal working channel, the last-used weather channel is checked every 30 seconds for weather alert tone. If the alert tone is detected, the WX and ALERT indicators flash and a short alarm tone sounds.

The radio automatically turns to the currently-monitored WX channel where the weather alert has been detected. The alert is detected in all modes of operation (Standby, Dual and Tri Watch, Scan, etc.)

4.7 Setting the Frequency Band

The Ray101 can transmit and receive on all available US, Canadian and International marine VHF radiotelephone channels.

Press and hold the **WX/BAND** key for greater than 3 seconds while in normal operation mode to alternate between the International, US and Canadian channel sets. The appropriate indicator is illuminated in the LCD: U for US, I for International, or C for Canadian channel sets.



Press and hold

Note: *Pressing and holding the WX/BAND key for greater than 3 seconds while in Weather mode toggles the Weather Alert mode.*

4.8 Selecting the Priority Channel

The Ray101E provides you with a dedicated key for switching to the Priority Channel 16.

Press and release

If not already tuned to the Priority Channel 16, **press and release** the **16/9** key to switch to CH16 at high power.

If already on CH 16, **press and release** the **16/9** to return to the last-used working channel.

Note: *When you press the 16/9 key, the radio always switches to HIGH power. You can use the HL/USER key to change to LOW power.*

4.9 Selecting the Secondary Priority Channel

The Ray101E enables you to program the **16/9** key to store a Secondary Priority Channel. The default is CH 9.

Press and hold

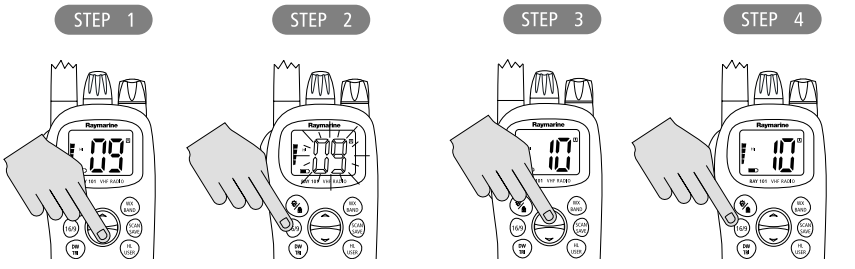
If on a working channel, **press and hold** the **16/9** for greater than 3 seconds to switch to the Secondary Priority Channel at high power. The default is CH 9.

If on primary Priority CH16, **press and hold** the **16/9**for greater 3 seconds to switch to the Secondary Priority Channel at HI power. The default is CH 9.If already on Secondary Priority Channel, **press and release** the **16/9** key to switch to Priority Channel 16 at high power.

Reprogramming the Secondary Priority Channel

1. Switch to the Secondary Priority Channel.
2. **Press and hold** the **16/9** key for greater 3 seconds to switch to Reprogram mode. An alert tone sounds and the current Secondary Priority Channel flashes.
3. Change the channel number with the UP and DOWN arrow keys.
4. **Press and release** the **16/9** key to save the new Secondary Priority selection. An alert tone sounds to indicate that the Secondary Priority has been changed.

During the reprogramming of the Secondary Priority Channel, the PTT, DUAL/TRI, and WX/BAND keys are disabled and sound error beep if pressed.



Switch to current Secondary Priority CH

Press and hold 16/9 key

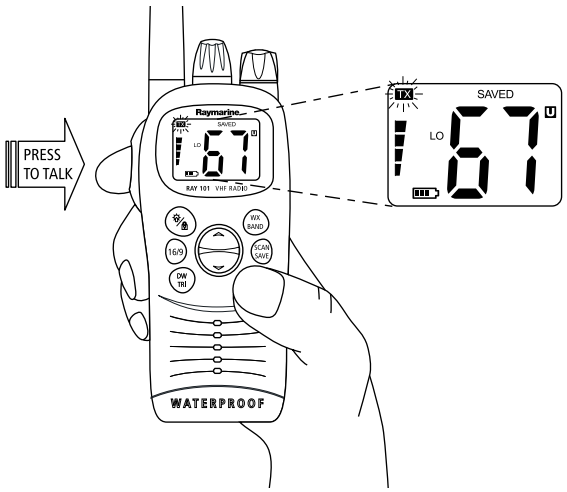
Select new Secondary Priority CH

Press and release 16/9 key

4.10 Transmitting

Press and hold the Press-to-talk (**PTT**) key to transmit on the selected channel, then release to receive. The TX indicator appears during transmission.

The radio is equipped with a timeout timer in the event of a stuck key. After **PTT** has been held continuously for 5 minutes, transmission is discontinued and the radio automatically returns to receive mode. An Error beep is emitted 10 seconds before the time out is triggered and TX flashes on the display until **PTT** is released.



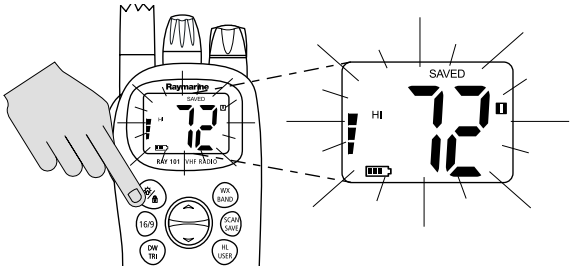
The TX time out timer is reset once the **PTT** key is released.

Note: *If the current channel is a TX-prohibited channel, an alarm sounds when PTT is pressed, indicating such a transmission is not permitted.*

4.11 Turning On the Backlight

To toggle the display's Backlight ON or OFF, **press and release** the key.

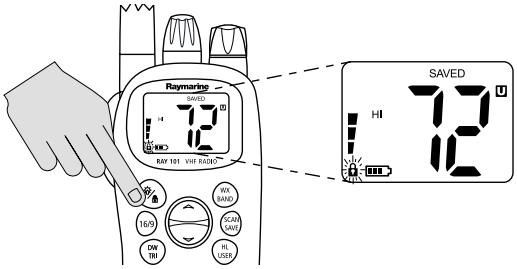
When the Backlight setting is enabled, any key press except **PTT** turns on the backlight for 5 seconds. If a key is pressed within the time frame, the time out is reset. The default setting is ON.



Press and release

4.12 Turning On the Keylock

To toggle the Keylock ON or OFF, **press and hold** the key for 3 seconds. When Keylock is enabled, the lock icon appears on the display.



Press and hold

The Keylock setting protects the radio from any keypad entry except for **PTT** and the backlight function.

Press and hold the key again for 3 seconds to release the keylock.

4.13 Using the Scan Modes

The RAY101 is equipped with three types of scan options: All Scan, Saved (Memory) Scan and Priority Scan. If there are no channels in memory, the default is All Scan.

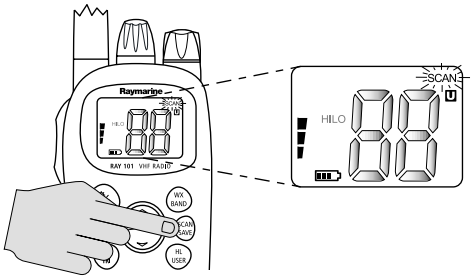
This function automatically searches for broadcasting channels. If a TX signal is received, the scan stops on the receiving channel as long as it is present. If the signal is lost for five seconds, the radio resumes scanning.

During the Scan Modes:

- Press the Channel UP/DOWN key to change the scan direction. UP increments the channel while DOWN decrements it.
- Press and release **SCAN/SAVE** to terminate the SCAN mode and return to the last-used channel
- **DW/TRI** and **WX/BAND** keys will not function and sounds an error beep if pressed

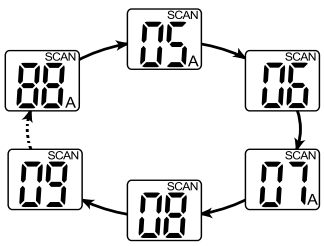
All Scan

Press and release the **SCAN/SAVE** key when no channels are stored in memory to activate the All Scan function.



Press and release

The SCAN indicator appears on the LCD during All Scan.



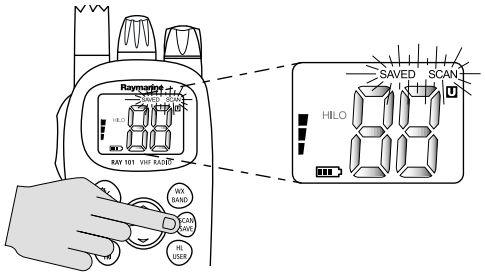
In All Scan mode, all channels in the channel set are scanned in sequence, assuming no channels have been stored in memory. After the last channel number has been scanned, the cycle repeats.

All Scan is demonstrated in the figure to the left.

Note: *Whenever Weather Alert is activated, the WX Alert channel is also monitored during All Scan. If the WX Alert tone is detected, the scan is halted to broadcast the Weather Alert message.*

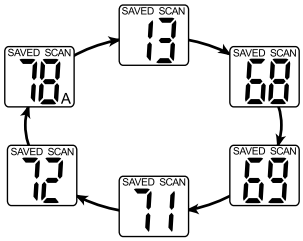
Saved (Memory) Scan

Press and release the **SCAN/SAVE** key when there is at least one channel in memory to activate the Saved Scan function.



Press and release

In Saved Scan Mode, the SAVED and SCAN indicators appear on the LCD.



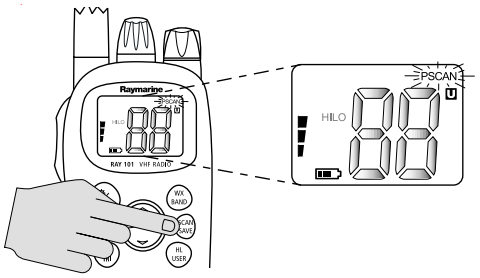
In Saved Scan mode, only the channels that have been saved in memory are scanned in sequence. After the last saved channel number has been scanned, the cycle repeats.

Saved Scan is demonstrated in the figure to the left.

Note: *Whenever Weather Alert is activated, the WX Alert channel is also monitored during Saved Scan. If the WX Alert tone is detected, the scan is halted to broadcast the Weather Alert message.*

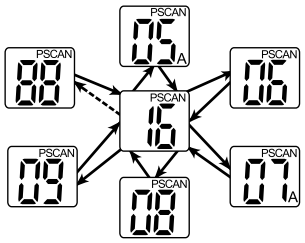
Priority All Scan

Press and hold the **SCAN/SAVE** key while All Scan is active to initiate Priority Scan.



Press and hold

During Priority Scan, the PSCAN indicator appears on the LCD.



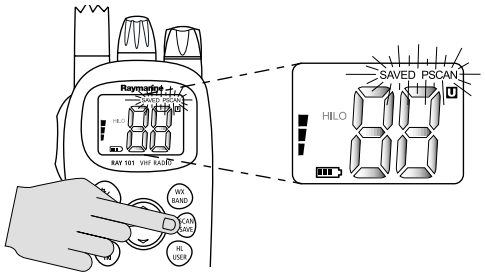
Priority Scan searches for activity on all channels but alternates scanning the Priority Channel 16 after each channel.

Priority Scan is demonstrated in the figure to the left.

Note: *Whenever Weather Alert is activated, the WX Alert channel is also monitored during Priority All Scan. If the WX Alert tone is detected, the scan is halted to broadcast the Weather Alert message.*

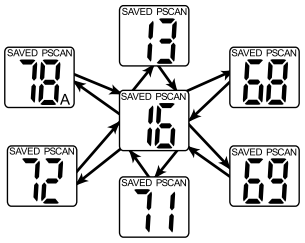
Priority Saved Scan

Press and hold the **SCAN/SAVE** key while Saved Scan is active to initiate Priority Saved Scan.



Press and hold

The PSCAN and SAVED indicators appear on the LCD.



Priority Saved Scan is much like Priority Scan except that the radio alternates searching for activity on the Priority Channel 16 and the channels stored in memory.

Priority Saved Scan is demonstrated in the figure to the left.

Note: *Whenever Weather Alert is activated, the WX Alert channel is also monitored during Priority Saved Scan. If the WX Alert tone is detected, the scan is halted to broadcast the Weather Alert message.*

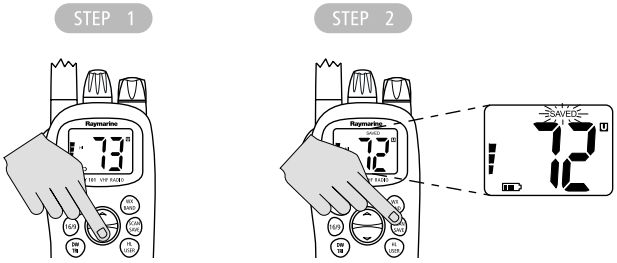
Press and hold SCAN/SAVE for 3 seconds to exit Priority/Priority Saved Scan and return to All/Memory Scan.

4.14 Adding Channels to Memory

The Ray101 can store any channel. The stored channels are the ones scanned in the Saved (Memory) Scan mode.

➤ To Add Channels to Memory

1. During normal operation mode, use the UP/DOWN key to select the desired channel for programming.
2. **Press and hold** the **SCAN/SAVE** key for 3 seconds.



The SAVED icon appears to indicate the current channel has been saved in memory. Any number of channels can be saved as memory channels. Separate memory channel groups exists for USA, International, and Canadian frequency sets.

➤ To Delete Channels from Memory

1. During the normal mode, use the UP/DOWN key to select the channel to be deleted.
2. **Press and hold** the SCAN/SAVE key for 3 seconds.

The selected channel is deleted the channel from memory.

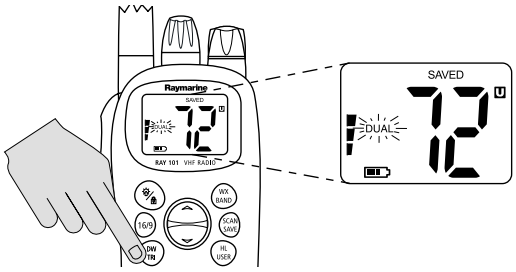
To view the channels set in memory, switch to USER mode, as described in *Section 4.16, USER Channel Mode*.

4.15 Using the Monitor Modes

The Watch Modes monitor the programmed Priority Channel and other user-selected channel(s). The watch is halted when activity is detected on a monitored channel. The Ray101 is equipped with 2 types of monitor operations: Dual Watch and Tri Watch.

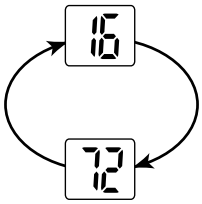
Dual Watch

Press and release the **DW/TRI** key to activate the Dual Watch mode.



Press and release

The DUAL indicator appears on the LCD.



Dual Watch monitors the current working channel and Channel 16 in cycle.

Dual Watch is demonstrated in the figure to the left; the sample working channel is CH 72. Whenever Weather Alert is activated, the WX Alert channel is also monitored during Dual Watch.

Press and release the **DW/TRI** key to terminate Dual Watch and return to the previous working channel.

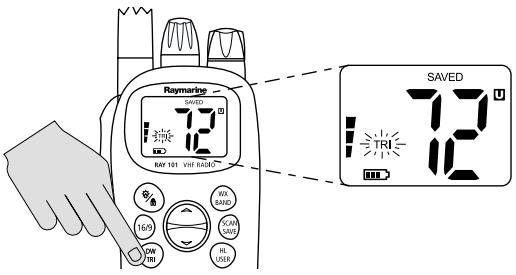
Press and hold the **DW/TRI** key to terminate Dual Watch mode and go into Tri Watch mode.

Press and release the **16/9** key to terminate Dual Watch mode and switch to the Priority Channel.

Note: *During Dual Watch mode, the SCAN/SAVE, USER, WX/BAND, and Channel UP/DOWN keys are inactive and sounds an error beep if pressed.*

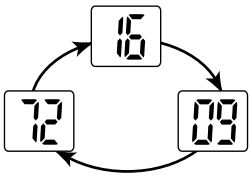
Tri Watch

Press and hold the **DW/TRI** key for 3 seconds to activate Tri Watch mode.



Press and hold

The TRI indicator appears on the LCD.



Tri Watch monitors in cycle Channel 16, the current working channel and the channel you have set as the Secondary Priority Channel.

Tri Watch is demonstrated in the figure to the left; the sample working channel is CH 72.

Note: *Whenever Weather Alert is activated, the WX Alert channel is also monitored during Tri Watch.*

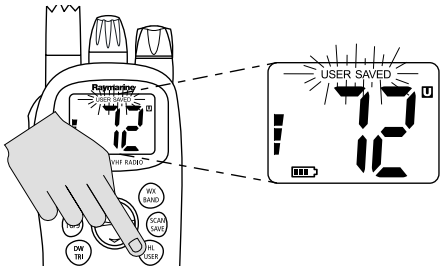
Press and release the **DW/TRI** key to terminate Tri Watch and return to the previous working channel.

Press and release the **16/9** key to terminate Tri Watch mode and switch to the Priority Channel.

Note: *During Tri Watch Mode, the SCAN/SAVE, USER, WX/BAND, and Channel UP/DOWN keys are inactive and sounds an error beep if pressed.*

4.16 USER Channel Mode

Press and hold the **HL/USER** key while in normal operation mode to enter User Mode. The USER and SAVED indicators appear.



Press and hold

USER Channel Mode displays only the channels that you have saved to memory, which enables you to easily use your favorite channels while bypassing unwanted or seldom-used channels during a scan.

Note: *The procedure for saving a channel to memory is outlined in Section 4.14, Adding Channels to Memory.*

While in User Mode:

- **Press and release** the **SCAN/SAVE** key to start Memory Scan mode.
- **Press and hold** the **SCAN/SAVE** key to delete the current channel from memory list.
- Press **16/9** to terminate User mode and switch to the Priority Channel.

Note: *You cannot switch Channel sets while in User Mode. The WX/BAND key does not function and sounds an error beep if pressed.*

Press and hold the **HL/USER** key for 3 seconds to quit User mode and return to the last-used working channel.

4.17 Resetting Factory Defaults

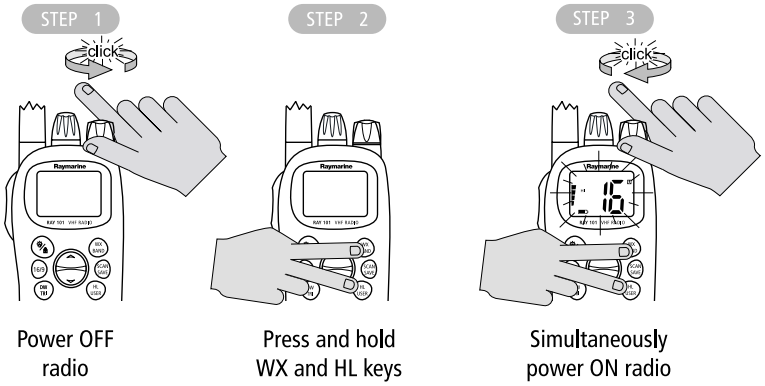
You can reset many radio settings back to their factory defaults:

- Erase any channels stored in memory
- Turn OFF the backlight
- Return to US channels, if another mode is selected
- Turn OFF the Weather Alert setting, if active
- Return power settings to their original state

➤ To perform the reset:

1. Turn the radio OFF.
2. Simultaneously press and hold the **HL/USER** and **WX/BAND** keys.
3. While continuing to hold these keys, power the radio ON.

The LCD remains blank for 2 seconds, and then the unit switches to channel 16.



Appendix A: Specifications

General

Size (H x W x D)	5.55”(141mm) x 2.4” (61mm) x 1.69” (43mm) without antenna
Weight	12.6 oz (357g)
Power Source	7.2V DC (6 x AA Alkaline or AA Ni-MH Batteries)
Environmental: Operating Range: Storage Range: Humidity:	Waterproof to IPX7 -10°C to +55°C -20°C to +70°C up to 95% at 35°C non-condensing
Frequency Range: Transmit Receive	 156.025 To 157.425 MHz 156.050 To 163.275 MHz
Channels	All available US, Canadian and International VHF Marine Band.
Oscillate Mode	PLL
Modulation	FM 16K0G3E
Channel Spacing	25 kHz Increments
Frequency Stability	+/- 10PPM (+/- 0.001%)
Antenna Socket	SMA
Display	38.4mm x 48.3mm LCD
Built in Speaker	Ø36mm / Impedance 8 Ohm

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Receiver

Sensitivity (12dB SINAD)	0.30uV
Squelch Sensitivity (threshold)	0.20uV
Spurious Response Rejection Ratio	>60 dB
Adjacent Channel Selectivity	>60 dB
Intermodulation Rejection Ratio	>60 dB
S/N at 3KHz Dev.	>37 dB
Audio Output Power At THD 10%	400mW max

Audio Distortion		<5%
Audio Response		+1/-3dB from true 6dB de-emphasis from 300 to 2500 Hz, reference 1000Hz. Audio frequencies 3-20 KHz attenuated (at 1KHz by 60 log f / 3 dB; above 20KHz by 50 dB)
Current Drain at:	Max Audio Power Standby Power Saving	 230mA 50mA 20mA

Transmitter

RF Power:	Hi Mode Lo Mode	 5 W 1 W
Modulation		FM 16K0G3E
Maximum Deviation		±5 KHz
Frequency Stability		+/- 10 ppm (-20°C to +50°C)
S/N at 3KHz Dev.		34 dB
Modulation Distortion +/– 3KHz		<5%
Audio Response		+1/-3dB from true 6dB pre-emphasis from 300 to 2500 Hz, reference 1000Hz. Audio frequencies 3-20 KHz attenuated (at 1KHz by 60 log f / 3 dB; above 20KHz by 50 dB)
Spurious/Harmonic Emissions		< 60 dB
Modulation Sensitivity		20mV
Current Drain	Hi Power Lo Power	 1800mA 700mA

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Appendix B: Channel List

U.S. VHF Marine Radio Channels and Frequencies

CH. No	XMIT Freq	RCV Freq	Single Freq	Use
01A	156.050	156.050	x	Port Operations and Commercial, VTS. Available only in New Orleans / Lower Mississippi area.[1]
05A	156.250	156.250	x	Port Operations or VTS in the Houston, New Orleans and Seattle areas.
06	156.300	156.300	x	Intership Safety
07A	156.350	156.350	x	Commercial
08	156.400	156.400	x	Commercial (Intership only)
09	156.450	156.450	x	Boater Calling. Commercial and Non-Commercial.
10	156.500	156.500	x	Commercial
11	156.550	156.550	x	Commercial. VTS in selected areas.
12	156.600	156.600	x	Port Operations. VTS in selected areas.
13	156.650	156.650	x	Intership Navigation Safety (Bridge-to-bridge). Ships >20meters in length maintain a listening watch on this channel in US waters.[2]
14	156.700	156.700	x	Port Operations. VTS in selected areas.
15	-	156.750	x	Environmental (Receive only). Used by Class 'C' EPIRBs.
16	156.800	156.800	x	International Distress, Safety and Calling. Ships required to carry radio, USCG, and most coast stations maintain a listening watch on this channel.[3]
17	156.850	156.850	x	State Control
18A	156.900	156.900	x	Commercial
19A	156.950	156.950	x	Commercial
20	157.000	161.600		Port Operations (duplex)
20A	157.000	157.000	x	Port Operations
21A	157.050	157.050	x	U.S. Coast Guard only

CH. No	XMIT Freq	RCV Freq	Single Freq	Use
22A	157.100	157.100	x	Coast Guard Liaison and Maritime Safety Information Broadcasts. Broadcasts announced on channel 16.
23A	157.150	157.150	x	U.S. Coast Guard only
24	157.200	161.800		Public Correspondence (Marine Operator)
25	157.250	161.850		Public Correspondence (Marine Operator)
26	157.300	161.900		Public Correspondence (Marine Operator)
27	157.350	161.950		Public Correspondence (Marine Operator)
28	157.400	162.000		Public Correspondence (Marine Operator)
63A	156.175	156.175	x	Port Operations and Commercial, VTS. Available only in New Orleans / Lower Mississippi area.
65A	156.275	156.275	x	Port Operations
66A	156.325	156.325	x	Port Operations
67	156.375	156.375	x	Commercial. Used for Bridge-to-bridge communications in lower Mississippi River. Intership only.
68	156.425	156.425	x	Non-Commercial
69	156.475	156.475	x	Non-Commercial
70	156.525	156.525	x	Digital Selective Calling (voice communications not allowed)
71	156.575	156.575	x	Non-Commercial
72	156.625	156.625	x	Non-Commercial (Intership only)
73	156.675	156.675	x	Port Operations
74	156.725	156.725	x	Port Operations
77	156.875	156.875	x	Port Operations (Intership only)
78A	156.925	156.925	x	Non-Commercial
79A	156.975	156.975	x	Commercial. Non-Commercial in Great Lakes only.
80A	157.025	157.025	x	Commercial. Non-Commercial in Great Lakes only
81A	157.075	157.075	x	U.S. Government only – Environmental protection operations.
82A	157.125	157.125	x	U.S. Government only

CH. No	XMIT Freq	RCV Freq	Single Freq	Use
83A	157.175	157.175	x	U.S. Coast Guard only
84	157.225	161.825		Public Correspondence (Marine Operator)
85	157.275	161.875		Public Correspondence (Marine Operator)
86	157.325	161.925		Public Correspondence (Marine Operator)
87	157.375	161.975		Public Correspondence Marine Operator)
88	157.425	162.025		Public Correspondence only near Canadian border
88A	157.425	157.425	x	Commercial, Intership only

Boaters should normally use channels listed as Non-Commercial.

Notes:

1. *The letter "A" following a channel number indicates simplex use of the ship station transmit side of an international duplex channel. Operations are different from that of international operations on that channel.*
2. *Channel 13 should be used to contact a ship when there is danger of collision. All ships of length 20 meters or greater are required to guard VHF channel 13, in addition to VHF channel 16, when operating within U.S. territorial waters.*
3. *Channel 16 is used for calling other stations or for distress alerting.*

Canadian VHF Marine Radio Channels and Frequencies

CH No.	XMIT Freq	RCV Freq	Area of Operation	Use
01	156.050	160.650	PC	Public Correspondence
02	156.100	160.700	PC	Public Correspondence
03	156.150	160.750	PC	Public Correspondence
04A	156.200	156.200	PC	Intership, Ship/Shore and Safety: Canadian Coast Guard search and rescue[1]
04A	156.200	156.200	EC	Intership, Ship/Shore and Commercial: Commercial fishing only
05A	156.250	156.250		Ship Movement
06	156.300	156.300	All areas	Intership, Commercial, Non-commercial and Safety: May be used for search and rescue communications between ships and aircraft.
07A	156.350	156.350	All areas	Intership, Ship/Shore, Commercial
08	156.400	156.400	WC, EC	Intership, Commercial and Safety: Also assigned for operations in the Lake Winnipeg area.
09	156.450	156.450	AC	Intership, Ship/Shore, Commercial, Non-commercial and Ship Movement: May be used to communicate with aircraft and helicopters in predominantly maritime support operations.
10	156.500	156.500	AC, GL	Intership, Ship/Shore, Commercial, Non-commercial, Safety and Ship Movement: May also be used for communications with aircraft engaged in coordinated search and rescue and antipollution operations.
11	156.550	156.550	PC, AC, GL	Intership, Ship/Shore, Commercial, Non-commercial and Ship Movement: Also used for pilotage purposes.
12	156.600	156.600	WC, AC, GL	Intership, Ship/Shore, Commercial, Non-commercial and Ship Movement: Port operations and pilot information and messages.
13	156.650	156.650	All areas	Intership, Commercial, Non-commercial and Ship Movement: Exclusively for bridge-to-bridge navigational traffic.
14	156.700	156.700	AC, GL	Intership, Ship/Shore, Commercial, Non-commercial and Ship Movement: Port operations and pilot information and messages.

CH No.	XMIT Freq	RCV Freq	Area of Operation	Use
15	156.750	156.750	All areas	Intership, Ship/Shore, Commercial, Non-commercial and Ship Movement: All operations limited to 1-watt maximum power. May also be used for on-board communications.
16	156.800	156.800	All areas	International Distress, Safety and Calling[2]
17	156.850	156.850	All areas	Intership, Ship/Shore, Commercial, Non-commercial and Ship Movement: All operations limited to 1-watt maximum power. May also be used for on-board communications.
18A	156.900	156.900	All areas	Intership, Ship/Shore and Commercial: Towing on the Pacific Coast.
19A	156.950	156.950	All areas except PC	Intership and Ship/Shore: Canadian Coast Guard only.
19A	156.950	156.950	PC	Intership and Ship/Shore: Various Government departments.
20	157.000	161.600	All areas	Ship/Shore, Safety and Ship Movement: Port operations only with 1-watt maximum power.
21A	157.050	157.050	All areas	Intership and Ship/Shore: Canadian Coast Guard only.
21B	-	161.650	All areas	Safety: Continuous Marine Broadcast (CMB) service.[3]
22A	157.100	157.100	All areas	Intership, Ship/Shore, Commercial and Non-commercial: For communications between Canadian Coast Guard and non-Canadian Coast Guard stations only.
23	157.150	161.750	PC	Ship/Shore and Public Correspondence: Also in the inland waters of British Columbia and the Yukon.
24	157.200	161.800	All areas	Ship/Shore and Public Correspondence
25	157.250	161.850	PC	Ship/Shore and Public Correspondence: Also assigned for operations in the Lake Winnipeg area.
25B	-	161.850	AC	Safety: Continuous Marine Broadcast (CMB) service.
26	157.300	161.900	All areas	Ship/Shore, Safety and Public Correspondence
27	157.350	161.950	AC, GL, PC	Ship/Shore and Public Correspondence
28	157.400	162.000	PC	Ship/Shore, Safety and Public Correspondence
28B	-	162.000	AC	Safety: Continuous Marine Broadcast (CMB) service.

CH No.	XMIT Freq	RCV Freq	Area of Operation	Use
60	156.025	160.625	PC	Ship/Shore and Public Correspondence
61A	156.075	156.075	PC	Intership and Ship/Shore: Canadian Coast Guard only.
61A	156.075	156.075	EC	Intership, Ship/Shore and Commercial: Commercial fishing only.
62A	156.125	156.125	PC	Intership and Ship/Shore: Canadian Coast Guard only.
62A	156.125	156.125	EC	Intership, Ship/Shore and Commercial: Commercial fishing only.
64	156.225	160.825	PC	Ship/Shore and Public Correspondence
64A	156.225	156.225	EC	Intership, Ship/Shore and Commercial: Commercial fishing only.
65A	156.275	156.275		Intership, Ship/Shore, Commercial, Non-commercial, Safety: Search & rescue and antipollution operations on the Great Lakes. Towing on the Pacific Coast. Port operations only in the St. Lawrence River areas with 1W maximum power. Pleasure craft in the inland waters of Alberta, Saskatchewan and Manitoba (excluding Lake Winnipeg and the Red River).
66A	156.325	156.325		Intership, Ship/Shore, Commercial, Non-commercial, Safety and Ship Movement: Port operations only in the St.Lawrence River/Great Lakes Areas with 1-watt maximum power.
67	156.375	156.375	EC	Intership, Ship/Shore and Commercial: Commercial fishing only.
67	156.375	156.375	All areas except EC	Intership, Ship/Shore, Commercial, Non-commercial, Safety: May also be used for communications with aircraft engaged in coordinated search and rescue and antipollution operations.
68	156.425	156.425	All areas	Intership, Ship/Shore and Non-commercial: For marinas and yacht clubs.
69	156.475	156.475	All areas except EC	Intership, Ship/Shore, Commercial and Non-commercial
69	156.475	156.475	EC	Intership, Ship/Shore and Commercial: Commercial fishing only.
70	156.525	156.525	All areas	Digital Selective Calling for Distress, Safety and Calling

CH No.	XMIT Freq	RCV Freq	Area of Operation	Use
71	156.575	156.575	PC	Intership, Ship/Shore, Commercial, Non-commercial, Safety and Ship Movement
71	156.575	156.575		Intership, Ship/Shore and Non-commercial: For marinas and yacht clubs on the East Coast and on Lake Winnipeg.
72	156.625	156.625	EC, PC	Intership, Commercial and Non-commercial: May be used to communicate with aircraft and helicopters in predominantly maritime support operations.
73	156.675	156.675	EC	Intership, Ship/Shore and Commercial: Commercial fishing only
73	156.675	156.675	All areas except EC	Intership, Ship/Shore, Commercial, Non-commercial, Safety: May also be used for communications with aircraft engaged in coordinated search and rescue and antipollution operations.
74	156.725	156.725	EC, PC	Intership, Ship/Shore, Commercial, Non-commercial and Ship Movement
75	-	-	All areas	Not available – Guard band for Channel 16
76	-	-	All areas	Not available – Guard band for Channel 16
77	156.875	156.875		Intership, Ship/Shore, Safety and Ship Movement: Pilotage on Pacific Coast. Port operations only in the St. Lawrence River/Great Lakes areas with 1W maximum power.
78A	156.925	156.925	EC, PC	Intership, Ship/Shore and Commercial
79A	156.975	156.975	EC, PC	Intership, Ship/Shore and Commercial
80A	157.025	157.025	EC, PC	Intership, Ship/Shore and Commercial
81A	157.075	157.075		Intership and Ship/Shore: Canadian Coast Guard use only in the St. Lawrence River/Great Lakes areas.
81A	157.075	157.075	PC	Intership, Ship/Shore and Safety: Canadian Coast Guard antipollution.
82A	157.125	157.125	PC	Intership, Ship/Shore and Safety: Canadian Coast Guard use only.
82A	157.125	157.125		Intership and Ship/Shore: Canadian Coast Guard use only in the St. Lawrence River/Great Lakes areas.
83	157.175	161.775	PC	Ship/Shore and Safety: Canadian Coast Guard use only.

CH No.	XMIT Freq	RCV Freq	Area of Operation	Use
83A	157.175	157.175	EC	Intership and Ship/Shore: Canadian Coast Guard and other Government agencies.
83B	-	161.775	AC, GL	Safety: Continuous Marine Broadcast (CMB) Service.
84	157.225	161.825	PC	Ship/Shore and Public Correspondence
85	157.275	161.875	AC, GL, NL	Ship/Shore and Public Correspondence
86	157.325	161.925	PC	Ship/Shore and Public Correspondence
87	157.375	161.975	AC, GL, NL	Ship/Shore and Public Correspondence
88	157.425	162.025	AC, GL, NL	Ship/Shore and Public Correspondence

Area of Operation

AC: Atlantic Coast, Gulf and St. Lawrence River up to and including Montreal

EC (East Coast): includes NL, AC, GL and Eastern Arctic areas

GL: Great Lakes (including St. Lawrence above Montreal)

NL: Newfoundland and Labrador

PC: Pacific Coast

WC (West Coast): Pacific Coast, Western Arctic and Athabasca-Mackenzie Watershed areas

All areas: includes East and West Coast areas

Notes:

1. *The letter "A" following a channel number indicates simplex use of the ship station transmit side of an international duplex channel. Operations are different from that of international operations on that channel.*
2. *Channel 16 is used for calling other stations or for distress alerting.*
3. *The letter "B" following a channel number indicates simplex use of the coast station transmit side of an international duplex channel. That is, the channel is Receive Only.*

International VHF Marine Radio Channels & Frequencies

CH No.	XMIT Freq	RCV Freq	Single Freq	Use
01	156.050	160.650		Public Correspondence, Port Operations and Ship Movement
02	156.100	160.700		Public Correspondence, Port Operations and Ship Movement
03	156.150	160.750		Public Correspondence, Port Operations and Ship Movement
04	156.200	160.800		Public Correspondence, Port Operations and Ship Movement
05	156.250	160.850		Public Correspondence, Port Operations and Ship Movement
06	156.300	156.300	x	Intership [1]
07	156.350	160.950		Public Correspondence, Port Operations and Ship Movement
08	156.400	156.400	x	Intership
09	156.450	156.450	x	Intership, Port Operations and Ship Movement
10	156.500	156.500	x	Intership, Port Operations and Ship Movement [2]
11	156.550	156.550	x	Port Operations and Ship Movement
12	156.600	156.600	x	Port Operations and Ship Movement
13	156.650	156.650	x	Intership Safety, Port Operations and Ship Movement [3]
14	156.700	156.700	x	Port Operations and Ship Movement
15	156.750	156.750	x	Intership and On-board Communications at 1W only [4]
16	156.800	156.800	x	Distress, Safety and Calling
17	156.850	156.850	x	Intership and On-board Communications at 1W only [4]
18	156.900	161.500		Public Correspondence
19	156.950	161.550		Public Correspondence, Port Operations and Ship Movement
20	157.000	161.600		Public Correspondence, Port Operations and Ship Movement
21	157.050	161.650		Public Correspondence, Port Operations and Ship Movement
22	157.100	161.700		Public Correspondence, Port Operations and Ship Movement
23	157.150	161.750		Public Correspondence, Port Operations and Ship Movement
24	157.200	161.800		Public Correspondence, Port Operations and Ship Movement

CH No.	XMIT Freq	RCV Freq	Single Freq	Use
25	157.250	161.850		Public Correspondence, Port Operations and Ship Movement
26	157.300	161.900		Public Correspondence, Port Operations and Ship Movement
27	157.350	161.950		Public Correspondence, Port Operations and Ship Movement
28	157.400	162.000		Public Correspondence, Port Operations and Ship Movement
60	156.025	160.625		Public Correspondence, Port Operations and Ship Movement
61	156.075	160.675		Public Correspondence, Port Operations and Ship Movement
62	156.125	160.725		Public Correspondence, Port Operations and Ship Movement
63	156.175	160.775		Public Correspondence, Port Operations and Ship Movement
64	156.225	160.825		Public Correspondence, Port Operations and Ship Movement
65	156.275	160.875		Public Correspondence, Port Operations and Ship Movement
66	156.325	160.925		Public Correspondence, Port Operations and Ship Movement
67	156.375	156.375	x	Intership, Port Operations and Ship Movement
68	156.425	156.425	x	Port Operations and Ship Movement
69	156.475	156.475	x	Port Operations and Ship Movement
70	156.525	156.525	x	Digital Selective Calling for Distress, Safety and Calling [5]
71	156.575	156.575	x	Port Operations and Ship Movement
72	156.625	156.625	x	Intership
73	156.675	156.675	x	Intership [2]
74	156.725	156.725	x	Port operations and Ship movement
75	156.775	156.775	x	See Note 6
76	156.825	156.825	x	See Note 6
77	156.875	156.875	x	Intership
78	156.925	161.525		Public correspondence, Port Operations and Ship Movement
79	156.975	161.575		Public correspondence, Port Operations and Ship Movement
80	157.025	161.625		Public correspondence, Port Operations and Ship Movement
81	157.075	161.675		Public correspondence, Port Operations and Ship Movement

CH No.	XMIT Freq	RCV Freq	Single Freq	Use
82	157.125	161.725	x	Public correspondence, Port Operations and Ship Movement
83	157.175	161.775	x	Public correspondence, Port Operations and Ship Movement
84	157.225	161.825	x	Public correspondence, Port Operations and Ship Movement
85	157.275	161.875	x	Public correspondence, Port Operations and Ship Movement
86	157.325	161.925	x	Public correspondence, Port Operations and Ship Movement
87	157.375	157.375		Port Operations and Ship Movement
88	157.425	157.425		Port Operations and Ship Movement

Intership channels are for communications between ship stations.
Intership communications should be restricted to Channels 6, 8, 72 and 77.
If these are not available, the other channels marked for Intership may be used.
Channels 10, 67 and 73 should be avoided within VHF range of coastal areas in Europe and Canada.

Notes:

1. *Channel 06 may also be used for communications between ship stations and aircraft engaged in coordinated search and rescue operations. Ship stations should avoid harmful interference to such communications on channel 06 as well as to communications between aircraft stations, ice breakers and assisted ships during ice seasons.*
2. *Channels 10 or 73 (depending on location) are also used for the broadcast of Marine Safety Information by the Maritime and Coast Guard Agency in the UK only.*
3. *Channel 13 is designated for use on a worldwide basis as a navigation safety communication channel, primarily for intership navigation safety communications.*
4. *Channels 15 and 17 may also be used for on-board communications provided the effective radiated power does not exceed 1 Watt.*
5. *Channel 70 is to be used exclusively for digital selective calling for distress, safety and calling.*
6. *The use of Channels 75 and 76 should be restricted to navigation related communication only and all precautions should be taken to avoid harmful interference to channel 16, e.g., by limiting power to 1 Watt or by means of geographical location.*

Weather Channel (WX) Frequencies

Weather Channel	Frequency in MHz
WX 0	163.275
WX 1	162.550
WX 2	162.400
WX 3	162.475
WX 4	162.425
WX 5	162.450
WX 6	162.500
WX 7	162.525
WX 8	161.650
WX 9	161.775

Appendix C: Glossary

Term	Meaning
All Scan	A feature that scans all channels.
Canadian Channels	Channel designator as defined by Industry Canada.
CH	Channel selection key
Dual Watch	A feature that monitors the Priority Channel 16 while working on another channel.
Duplex	Transmit and receive on different frequencies
FCC	Federal Communications Commission (US)
International Channels	Channel designator as defined by the ITU
ITU	International Telecommunications Union
LCD	Liquid Crystal Display
NOAA	National Oceanographic and Atmospheric Administration (USA)
Priority Channel	Channel 16 or 9 (or other secondary channel you have programmed)
Priority Scan (PSCAN)	A feature that alternates monitoring the Priority Channel 16 with each of the regular channels
PTT switch	Microphone push-to-talk switch
RF	Radio Frequency
RX	Receive
Saved Scan	Scans only user-selected memory channels
Simplex	Transmit and receive on the same frequency
Squelch	A circuit that sets the threshold for cutting off the receiver when the signal is too weak for reception of anything but noise.
TX	Transmit
Tri Watch	A function that monitors the Priority Channel and Secondary Priority Channel while working on another channel.
US Channels	Channel designations as defined by the FCC.
VOL	Volume key
VHF	Very High Frequency (30MHz to 300MHz)

Term	Meaning
Weather (WX) Channels	Channels for routine and emergency weather information broadcast by NOAA (USA).
WX	Weather Band key
Working Channel	The currently-selected (non-priority, non-WX) channel.

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Warranty Certificate - VHF/Communications Products

In order to ensure that the equipment continues to operate efficiently and reliably, we recommend that before using the product, the customer carefully read the Owner's Handbook and follow the advice on the safe and correct operation and use of the product. We recommend that Raymarine equipment be installed by an approved Raymarine installer.

1. Limited Product Warranty

Raymarine warrants that all of its products, in the course of normal use, will be free from defects in material and workmanship for a period of 3 years (36 months) from date of sale to the original owner, subject to the limitations set forth in this warranty.

Hailer horns, external speakers and accessories are warranted for 1 year (12 months) from date of sale.

The Raymarine warranty covers the parts and labor associated with any warranty repair as described above, provided that the product is returned to Raymarine or one of its approved National distributors, in accordance with part 3 hereof.

2. Warranty Registration

Register your warranty on line at: *http://www.raymarine.com.*

3. Obtaining Warranty Service

In the event of warranty service being required, contact Raymarine or its approved national distributor – a full list of National distributors is available on Raymarine's web site *www.raymarine.com* or directly from Raymarine.

The affected product must be returned to Raymarine, or its approved national distributor with a copy of:

(a) Proof of purchase showing the date of purchase and the name of the seller of the product; and the serial number of the affected product; or

(b) A warranty card completed by the seller containing the information required in part (a) above.

Subject to the limitations and other provisions set forth in this warranty, the product will be either repaired or replaced by Raymarine within a reasonable period of time and at no further cost to the customer. The determination of whether to repair or replace a product shall be at the sole discretion of Raymarine and shall be the sole remedy of the customer under this warranty.

Warranty Limitations

Raymarine warranty does not apply to equipment that has been subjected to accident, abuse or misuse, shipping damage, alterations, corrosion, incorrect and/or non-authorized service, or product on which the serial number has been altered, mutilated or removed.

Raymarine assumes no responsibility for damage incurred during installation or as a result of improper installation.

This warranty does not cover routine system checkouts, alignment/calibration, sea-trials or commissioning, unless required by replacement of part(s) in the area being aligned.

Raymarine is not liable and assumes no responsibility for damage caused by or to other equipment, systems or components occasioned by improper or unauthorized connection, or use, of the product.

Consumable items, including, but not limited to: fuses, batteries and lamps are specifically excluded from this warranty and Raymarine has no liability for such items.
Travel costs, overtime/premium labor portion of services outside of normal working hours is not covered by this warranty.
If repairs are necessary under the warranty, the affected product must be forwarded to a Raymarine facility or an approved Raymarine service agent, at owner's expense in a manner set forth in part 3 hereof.
This warranty does not cover any differences in material, coloring, or size between those alluded to in corporate advertising, literature or published on the Internet, which is not specifically objected to at the time of delivery.
To the extent consistent with State and Federal law:

1. The foregoing warranty is Raymarine's sole warranty and is applicable only to products sold as new. The remedies provided herein are in lieu of (i) any and all other remedies and warranties, whether express or implied including but not limited to, any implied warranty of merchantability or fitness for a particular purpose; and (ii) all obligations of Raymarine for damages including, but not limited to accidental, consequential or special damages (including punitive or multiple), or any financial loss, loss of profit, business, contracts, opportunity, goodwill or other similar loss arising out of or in connection with the purchase, use or performance of any Raymarine product, even if Raymarine has been advised of the possibility of such damages, and no case shall exceed the cost of the product. The remedies to the customer herein are exclusive.
2. Raymarine does not warranty products purchased via discount auctions or web-sites.*

   Some jurisdictions do not allow exclusion or limitation of incidental or consequential damages so the above limitations or exclusions may not apply to you. This warranty gives you specific legal rights and you may also have other rights, which vary from jurisdiction to jurisdiction.

   Raymarine, Inc. is the sole authors of this policy and makes no other warranties, express or implied unless a separate, specific warranty has been written and provided to the customer. This warranty supersedes and replaces all previous warranties.

   The Raymarine warranty terms and conditions herein do not effect the customer's statutory rights and comply with EU Directive 1999/44/EC.

* May not be applicable in EU

All Raymarine products are sold or provided hereunder are merely aids to navigation. It is the responsibility of the user to exercise discretion and proper navigational skill independent of any Raymarine equipment.

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Model number | Serial number

Purchased from | Purchase date

Dealer address

Installed by | Installation date

Commissioned by

Commissioning date

Owner's name

Mailing address

Phone number | E-mail address

This portion should be completed and retained by the owner.