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RAY100VHF

► Instruction Manual

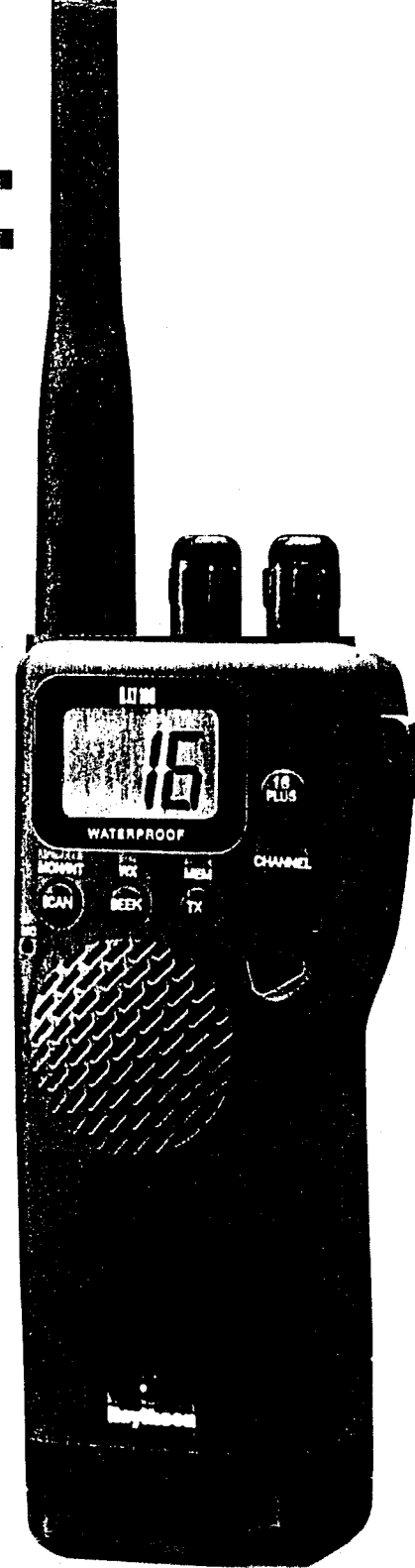


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VHF.....	Very High Frequency (30 MHz to 300 MHz)
FM	Frequency Modulation.
MODULATION	To vary a carrier wave.
CARRIER WAVE	radio frequency on which intelligence is superimposed.
WATCH	Monitors channel 16 while working on another channel.
USA CHANNELS.....	Channel designations as defined by the FCC.
INTERNATIONAL CHANNELS	Channel designations as defined by the International Telecommunication Union.
CANADIAN CHANNELS.....	Channel designations as defined by the Canadian Govt.
WEATHER CHANNELS	Channels for routine and emergency weather information broadcast by NOAA.
SIMPLEX	Transmit and receive on the same frequency.
DUPLEX	Transmit and receive on different frequencies.
SQUELCH	To suppress totally.
LCD.....	Liquid Crystal Display.
TX	Transmit.
R X	Receive.
RF	Radio Frequency.
CPU	Control Processor Unit.
PLL	Phase Locked Loop (A type of Frequency Synthesizer).
VCO	Voltage Controlled Oscillator.
PTT.....	Microphone Push-To-Talk switch.

SECTION 1

GENERAL DESCRIPTION

1.1 INTRODUCTION

Congratulations on your purchase, of Raytheon RAY100 handheld marine radiotelephone. The RAY100 is a CPU-controlled, digitally synthesized, compact handheld transceiver, that provides reliable simplex and duplex (two-frequency) communications between ships at sea and from ships at sea to public or private shore stations. The RAY100 provides two-way communications on all U.S., International, and Canadian channel Marine band frequencies, plus reception on 10 separate weather channels.

This manual describes the physical and functional characteristics of the radiotelephone.

1.2 EQUIPMENT FEATURES

The RAY 100 is designed and manufactured to provide ease of operation with excellent reliability. Some important built-in features of this radio are listed below:

- Waterproof to U.S.C.G. standard CFR-46.
- All solid-state circuitry for low current drain (longer battery life) and maximum reliability.
- High-performance receiver section with optimum selectivity.
- Access to all available U.S., International, and Canadian VHF Marine band channels.
- Exclusive circuit that automatically selects **CH16** when the radio is turned on.
- Exclusive weather alert feature (when in Monitor Mode).
- No limit for channels that can be programmed into memory for Memory Scan.
- Selected channel number is always shown on the digital LCD display.
- Aluminum die cast housing to prevent interference of offending RF.
- "Quick" 16 PLUS, for instant, selection of the emergency calling channel CH16, or an alternate priority channel.
- Easy direct mode access to 10 weather channels WX 0 through WX 9.

SECTION 2

INSTALLATION

2.1 UNPACKING AND INSPECTION

Use care when unpacking your new RAY100 from the shipping carton to prevent damage to the contents. It is also good practice to save the carton and the interior packing material. The original packing material should be used in the unlikely event it becomes necessary to return the unit for service.

2.2 EQUIPMENT SUPPLIED

The following is a list of the standard equipment included with your RAY100.

Description	Part No.
RAY 100 Radiotelephone	M56801
Instruction Manual	G624698-5
Wall Charger w/Bracket 11 OVAC	G624698-2
NiCad Battery Pack	G624698-1
AA Battery Holder	G624698-4
Rubber Helical Antenna	G624698-6
Leatherette Carrying Case	G624698-7
Belt Clip w/Screws	G624698-8
Wrist Strap	G624700-9
NiCad Battery Safety Message	G263695-1

Table 2-1 Equipment Supplied

2.2.1 Optional Accessories

Description	Part No.
12V Cigarette Lighter Adapter	E46002
High Gain Antenna	M99-127
Leather Holster/Carrying Case	M99-128
Soft Carrying Case	M99-118

Table 2-2 Optional Accessories

These optional accessories may be ordered by calling our Customer Service Department directly at (603) 647-7530 ext.2333 Monday through **Friday 8:30** am-5:00 pm E.S.T.

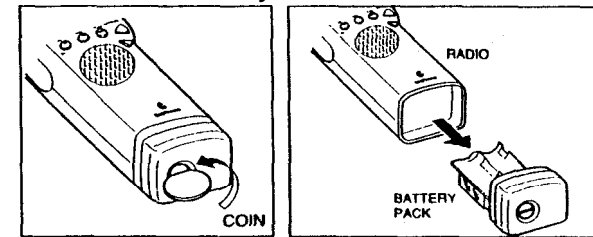
2.3 ASSEMBLY

2.3.1 AA Battery Holder

Removal and Installation of this battery holder is as follows:

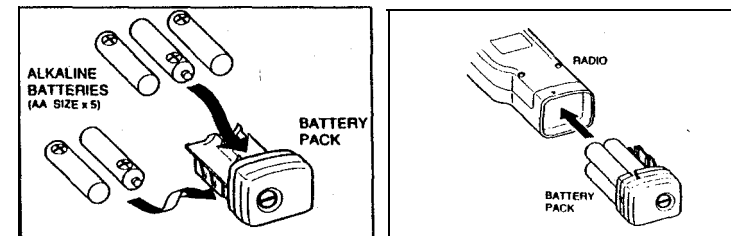
- Using a coin or screwdriver, turn the screw at the base of the AA battery holder counter-clockwise. This will allow you to remove the holder from the radio.

AA Battery Holder Removal



- There are no batteries installed in the AA battery holder from the factory. To install batteries, carefully follow the battery insertion diagram found on the battery holder.

Installation of AA Batteries



AA BATTERY HOLDER USAGE

- Always carefully note the correct installation of batteries into the battery holder.
- Only use Alkaline or NiCad AA batteries in the AA battery holder.
- You may wish to use the AA battery holder as a "backup" battery pack, for use should your NiCad pack become discharged at an inconvenient time.
- If rechargeable alkalines or NiCads are used, they must be removed from the AA battery holder to be recharged. The AA battery holder cannot be used with the desktop charger included with your radio.
- Always note the safety, handling, and storage instructions that is included with AA batteries you may purchase. Especially when storing batteries inside the AA battery holder for extended periods of time, or emergency use.

- **Since Alkaline batteries do not possess the power capacity of NiCad batteries, we recommend using the 1 Watt power setting with this radio when the Alkaline battery pack is installed. This will increase the life of your Alkaline batteries.**

Your RAY100 also has the capability of calibrating the battery indicator for use with Alkaline cells. To obtain an accurate representation of the level of the Alkaline batteries when the Alkaline pack is utilized, perform the following :

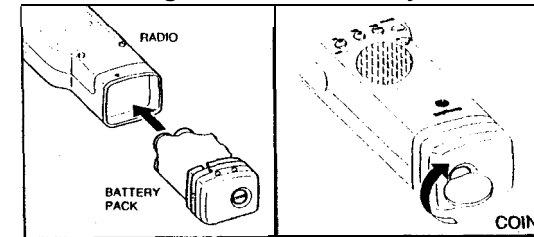
1. With the radio in an OFF condition, press and hold the MON keys.
2. Turn the radio ON.
3. "Al" will display on LCD. This indicates the battery indicator is calibrated for the Alkaline Battery pack.
4. Turn the radio OFF to exit this setting mode.

The battery indicator is now calibrated for Alkaline cells. To re-calibrate for NiCa battery pack, perform the same steps as above and "Cd" will display in step 3 to indicate NiCad calibration.

2.3.2 NiCad Battery Pack

Remove the battery pack from the poly bag, and attach it to the radio housing. Using a coin or screwdriver, turn the screw at the base of the NiCad battery pack clockwise to secure the battery to the radio housing.

installing the NiCad Battery Pack



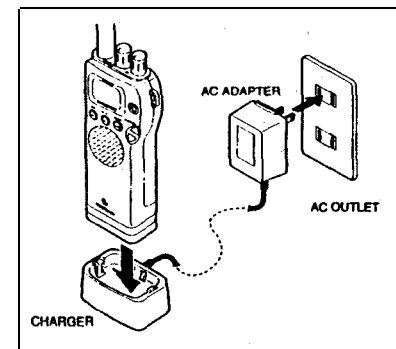
Note : Please confirm that the ▼ mark on radio and battery pack is matching.

2.3.3 Charging the NiCad Battery Pack

Although some voltage may be measured on the NiCad battery pack initially, it must be fully charged before normal use.

- 1) Insert the radio with the battery pack attached into the battery charger.
- 2) Connect the AC wall adapter into a standard 110VAC wall outlet.
- 3) A typical time to recharge the battery pack can be up to 15 hours. Normal operating time will be an average of 6 to 6 hours on a fully charged battery. To conserve battery life, use the low (1 W) power setting when using the radio for primarily short range communications.

Charging the NiCad Battery Pack



4 Getting the most out of your Nicad Battery Pack

Extend the life of your NiCad Battery Pack and maintain its best performance during the use of your radio, follow the guidelines listed below.

Recharge the radio's battery pack safely, always use only the AC adapter that comes with your radio or an equivalent replacement.

The radio should always be turned OFF while recharging the battery pack.

Avoid short charging cycles. In general, the battery should only be recharged when fully discharged.

Avoid high ambient temperatures (over 110°F) while recharging the battery pack.

When the battery pack becomes warm to the touch, it is fully charged and should be removed from the charger.

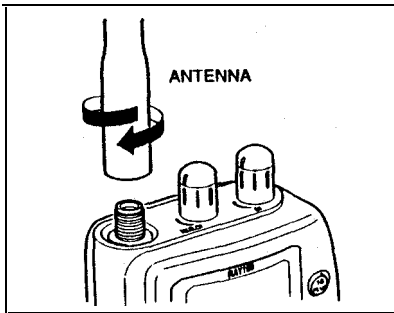
When the radio is to be stored for an extended period of time, remove the battery pack to avoid possible damage and/or resultant battery failure.

When it is determined that the battery is no longer useful, it should be disposed of properly.

4.5 Attaching the Antenna

Securely fasten the rubber helical antenna to the TNC type connector on the top of the radio.

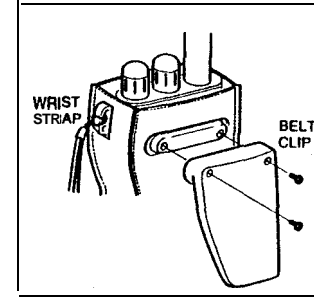
Attaching the Antenna



2.3.6 Attaching the Belt Clip and Wrist Strap

- 1) Put the radio into the supplied leatherette carrying case if desired.
- 2) Remove the belt clip and hardware from the packing materials. Using the two screws provided attach the belt clip to the rear housing of the radio.
- 3) Attach the wrist strap by looping it through the mounting hole.

Belt Clip and Wrist Strap Installation



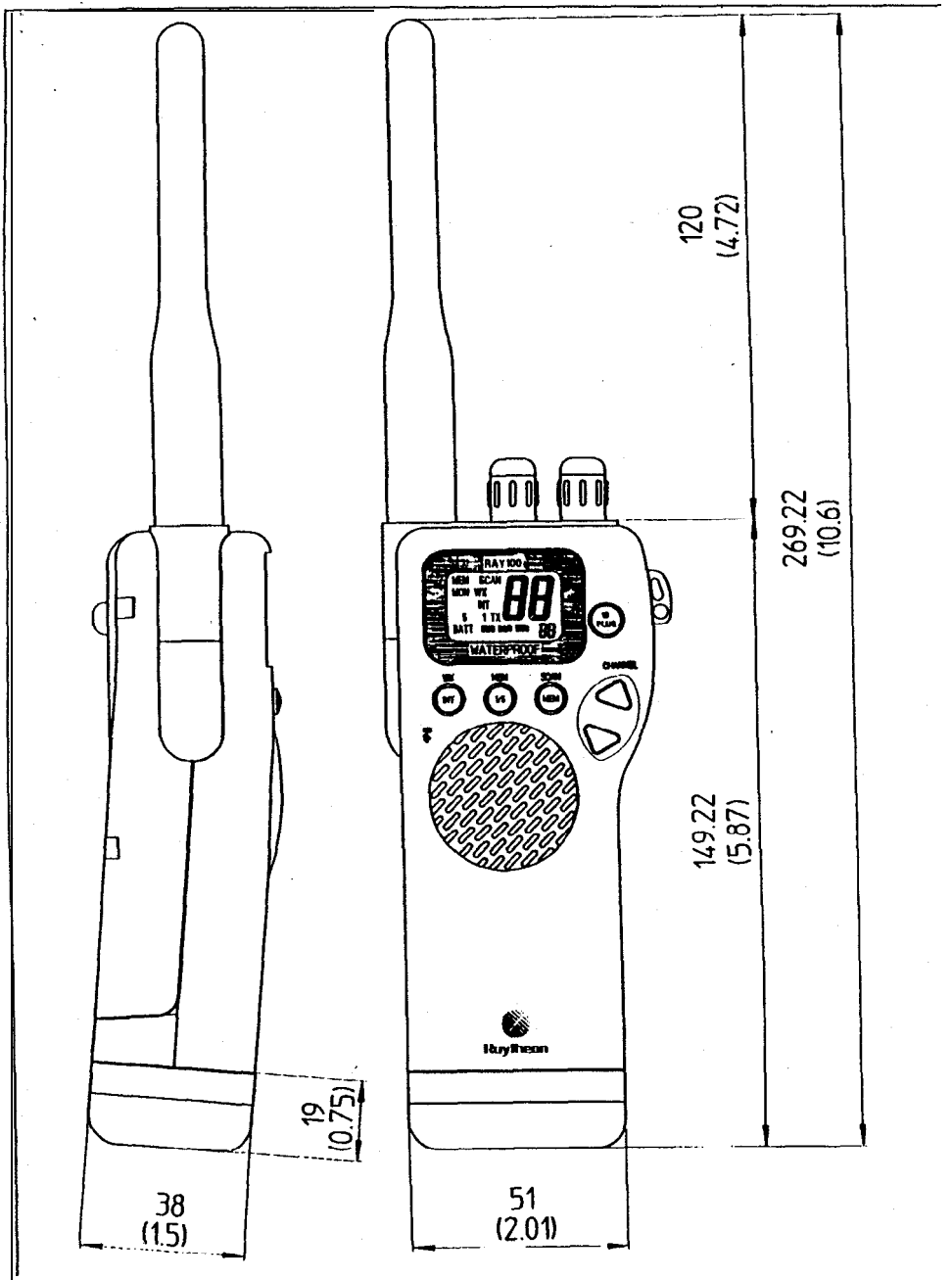


Fig. 2-1 OUTLINE DIMENSIONS

SECTION 3

OPERATIONS

3.1 INTRODUCTION

Your RAY100 has the capability to transmit on all legally available Marine VHF radiotelephone channels. There are channels that are FCC approved but may only be used by authorized stations for specific purposes, depending on the type of vessel (commercial or non-commercial). Carefully review section 3.3.7 which lists all of the marine VHF channels available in your RAY100 for U.S., International, and Canadian radiotelephone use. Full familiarization with this table is essential when selecting your channels. The U.S. channels are those channels authorized for use in the U.S. by the FCC. The international frequencies were agreed upon by the attending countries at the 1966 International Telecommunication Union meeting in Geneva and are in active use around the world.

3.2 CONTROLS AND LCD DISPLAY

Refer to Figure 3-1 for familiarization with the controls and display modes.

3.2.1 Controls

- 1) VOLUME Control (On/Off)
 - Turns the radio On and controls the Volume of the audio output from the speaker.
- 2) SQUELCH Control
 - Allows the user to "quiet" the receiver when no signals are being received.
- 3) PTT (Push-To-Talk) Switch
 - When pressed puts the radio into the transmit mode, and "TX" is displayed on the LCD.
- 4) SCAN / MEM Key
 - When pressed, puts the radio into the All scan or Memory scan mode. In this mode, the radio scans through the channels, stopping when radio traffic is detected, then resumes scanning after the traffic ceases. If the scanning has stopped on a particular channel, and you wish to continue, press the SCAN / MEM key again to continue scanning.
 - When pressed and held for 1 second, the present channel will be programmed into memory, or will be cleared from memory. The radio will beep to confirm when channels are being stored or cleared from memory.
- 5) WX / INT Key
 - When pressed, selects the Weather mode. "WX" is displayed on the LCD along with a weather channel number (0 • 9). Use the ▲/▼ channel keys to select your local NOAA weather channel. In the WX mode, the transmitter is disabled.
 - Press and hold for 1 second, to change from U.S. mode to INT (international) or CA (Canada) mode. The U.S. mode is the default operating mode.

IMPORTANT NOTE

The INT and CA modes are not legal for use while operating in US waters.

MON / TX.Key

- , When pressed, selects the Monitor mode and "MON" and "WX" appear on the LCD. In this mode, the radio will monitor the currently selected working channel and the priority channel (16plus) and also the last used weather channel is monitored for severe weather alert broadcasts.
- When pressed, and held for 1 second, a beep will be heard and the transmit output power setting alternately changes between 5 and 1 Watt.

16PLUS Key

This key is used to instantly select the priority channel (16plus). CH16 is the default priority channel from the factory. However an alternate channel can be programmed as the priority channel if desired.

▲▼ Channel Keys

The up and down arrow keys are used to change the currently selected channel. The channel number is increased or decreased once with each keypress or if held, will continue scrolling through the channels until released.

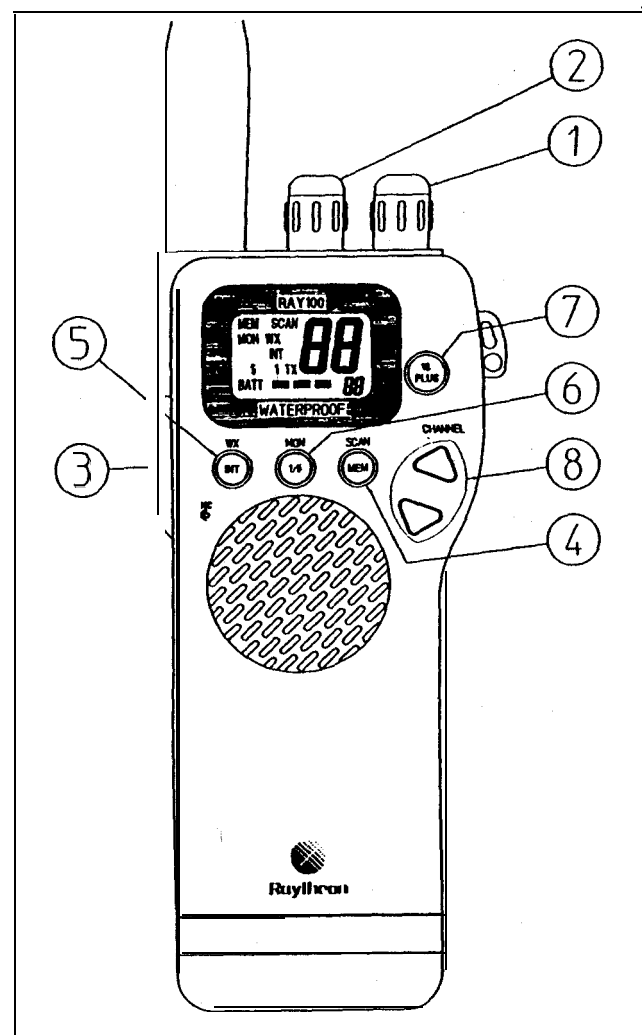


Fig. 3-1 LAYOUT OF CONTROLS

3.2.2 LCD Display

A number of indicators appear on the LCD display in different locations. The following list describes each indicator and when it will appear.

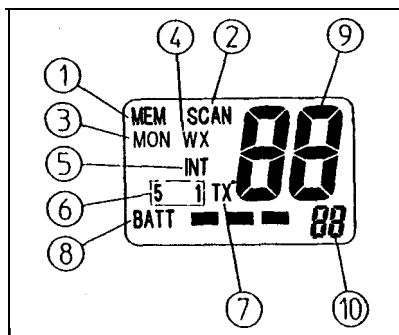


Fig. 3-2 LCD DISPLAY

- ① **MEM** (Memory) : will be displayed when the current channel is a memory channel, and in Memory Scan mode.
- ② **SCAN** (All Scan/Memory Scan) : will be displayed when the radio is in the All Scan or Memory Scan mode.
- ③ **MON** (Monitor) : will be displayed when the radio is in the Monitor mode.
- ④ **WX** (Weather) : will be displayed when a weather channel is selected. The "WX" indicator will blink when a severe weather alert tone is received (in Monitor mode).
- ⑤ **INT** (International) : will be displayed when International channels are programmed for use.
- ⑥ **5 / 1** : will be displayed to indicate the current TX power setting.
- ⑦ **TX** (Transmit) : will be displayed on the LCD when the Push-To-Talk (PTT) switch on the radio is engaged and the transmitter circuits are providing RF signals to the antenna.
- ⑧ **BATT** : is always shown on the display along with the battery voltage bar indicators to provide a battery level status. The "BATT" indicator will blink when the battery voltage is low, and the battery needs charging. If a low battery condition is detected during transmission, "LO" will be shown and the radio will stop transmitting. The battery level is shown on the LCD as follows:

<u>Battery condition</u>	<u>LCD Indicator</u>
Fully charged	BATT - - - -
Normal operation	BATT - -
Needs charging	BAT-T - -

- ⑨ **LARGE CHANNEL #** : displays the channel number currently in use.
- ⑩ **SMALL CHANNEL #** : displays the channel number of the priority channel in Monitor mode. Other indicators shown in the Small Channel segment area:
C : indicates Canada mode.
P : indicates Priority mode.

3.3 OPERATING PROCEDURES

Specific operating procedures for the **RAY100** are presented in this section. General information regarding correct marine channel usage may be found in the Appendix section. Refer to the Control section 3.2.1 beginning on page 9 for a thorough description of all RAY100 functions.

3.3.1 Turning the Power On

- 1) **Rotate** the ON/OFF/Volume control clockwise to turn the radio on. Continue rotating the knob clockwise and set it at approximately the midpoint of its range.
- 2) Rotate the SQUELCH control fully counterclockwise. (Background noise will be heard.)
- 3) Set the VOLUME control to the desired listening level.
- 4) Rotate the SQUELCH control slowly clockwise until the background noise in the speaker ceases.
- 5) When the power is initially turned on, the priority channel (**16plus**) will be selected. Press the **▲/▼** channel keys to select the desired working channel. Refer to section 3.3.7 on pages 16 • 16 for the available VHF Marine channels and their frequencies.

To Select A Weather Channel

- 1) Press the WX / INT key, then the **▲/▼** channel keys to select your local NOAA weather channel (0 to 9). When the WX mode is selected, the transmitter is inhibited.

To Transmit

- 1) To select or change the transmitter output power, press and hold the MON / 1/5 key for 1 second. There are two output power settings: 5 Watts, and 1 Watt. The appropriate power setting depends on the distance the message is to be transmitted, transmitting conditions, and desired battery life.
- 2) Press the Push-To Talk (PTT) switch and speak into the microphone using a clear normal voice.

NOTES:

- **Initial communication contacts are usually made over channel 16 as all ships and shore stations monitor this channel, then a shift to a working channel will be necessary.**
- **In certain US harbors and on certain channels, the FCC requires the power to be limited to 1 watt. On these "required" channels, the radio automatically selects the 1 watt power output setting when the channel is selected.**
- **The RAY100 is designed to meet the new FCC Rules Part 60.203, which states. If the Push-To Talk (PTT) switch is pressed for over five minutes continuously, the transmitter will disengage. If this occurs, audible beeps will sound continuously until the PTT switch is released. Upon release of the PTT switch, normal radio operation will resume.**

3.7 RAY100 Marine Channels and Their Usage

- Caution : Operation on channels not designated for use by your classification of craft, or in **International** or Canadian frequency mode while operating in US territorial waters is a violation of FCC **Rules** and Regulations and may result in severe penalties.

USA Mode Frequency Table for the RAY100 VHF Radiotelephone

USA Mode			Function	
CH	Freq.(MHz)		Ship	Shore
	TX	RX		
01	156.050	156.050	VTS, Port Operations	✓
02	156.100	156.100	Port Operations	✓
03	156.150	156.150	Port Operations	✓
04	156.200	156.200	Port Operations	f
05	156.250	156.250	Port Operations	✓
06	156.300	156.300	Intership Safety	✓
07	156.350	156.350	Commercial	✓
08	156.400	156.400	Commercial	✓
09	156.450	156.450	Calling	✓
10	156.500	156.500	Commercial	✓
11	156.550	156.550	Commercial	✓
12	156.600	156.600	Port Operations	✓
13	156.650	156.650	Navigation, Bridge to Bridge	✓
14	156.700	156.700	Port Operations	✓
15	—	156.750	Environmental	—
16	156.800	156.800	Emergency, Calling	✓
17	156.850	156.850	State Controlled	✓
18	156.900	156.900	Commercial	✓
19	156.950	156.950	Commercial	✓
20	157.000	157.000	Port Operations	✓
21	157.050	157.050	Coast Guard	✓
22	157.100	157.100	Coast Guard	✓
23	157.150	157.150	Coast Guard	✓
24	157.200	161.800	Marine Operator	✓
25	157.250	161.850	Marine Operator	✓
26	157.300	161.900	Marine Operator	✓
27	157.350	161.950	Marine Operator	✓
28	157.400	162.000	Marine Operator	✓
61	156.075	156.075	Canadian Coast Guard	✓
63	156.175	156.175	Canadian Coast Guard	✓
64	156.225	156.225	Canadian Coast Guard	✓
65	156.275	156.275	Port Operations	f
66	156.325	156.325	Port Operations	✓
67	156.375	156.375	Commercial	f
68	156.425	156.425	Boat Operations, Recreational	f
69	156.475	156.475	Boat Operations, Recreational	f
70	—	156.525	Digital Selective Calling	—
71	156.575	156.575	Boat Operations, Recreational	✓
72	156.625	156.625	Boat Operations, Recreational	✓
73	156.675	156.675	Port Operations	✓
74	156.725	156.725	Port Operations	✓
75	—	156.775	CH16 Guard Band	—
76	—	156.825	CH16 Guard Band	—
77	156.875	156.875	Port Operations	✓
78	156.925	156.925	Boat Operations, Recreational	✓
79	156.975	156.975	Commercial	✓
80	157.025	157.025	Commercial	✓
81	157.075	157.075	Coast Guard	✓
82	157.125	157.125	Coast Guard	✓
83	157.175	157.175	Coast Guard	✓
84	157.225	161.825	Marine Operator	✓
85	157.275	161.875	Marine Operator	✓
86	157.325	161.925	Marine Operator	✓
87	157.375	161.975	Marine Operator	✓
88	157.425	162.025	Commercial	✓

Notes:

- Transmitter is automatically disabled on channels 15, 75, and 76 in USA mode.
- 1 Watt initially. User can override to high power setting via front panel controls.
- 1 Watt only.
- Not for use by general public. Requires special authorization from the U.S. Coast Guard, or under private land mobile license.
- Channel 70 is now used for Digital Selective Calling only, therefore transmission is disabled on channel 70 in this radio.

"IMPORTANT NOTICE"

[SHADING]

Channels 3, 21, 23, 61, 64, 81, 82, and 83, (shaded) are not for use by the general public in U.S. waters. These frequencies may be used only under authorization by the U.S. Coast Guard, or under private land mobile license.

International Mode Frequency Table for the RAY100 VHF Radio

INT (International) Mode			Function	
CH	Freq.(MHz)		Ship to Ship	Ship To Shore
	TX	RX		
01	156.050	160.650	VTS, Port Operations	✓
02	156.100	160.700	Port Operations	✓
03	156.150	160.750	Port Operations	✓
04	156.200	160.800	Port Operations	f
05	156.250	160.850	Port Operations	f
06	156.300	156.300	Intership Safety	f
07	156.350	156.950	Commercial	f
08	156.400	156.400	Commercial	f
09	156.450	156.450	Calling	f
10	156.500	156.500	Commercial	f
11	156.550	156.550	Commercial	f
12	156.600	156.600	Port Operations	✓
13	156.650	156.650	Navigation, Bridge to Bridge	✓
14	156.700	156.700	Port Operations	✓
15	—	156.750	Environmental	—
16	156.800	156.800	Emergency, Calling	—
17	156.850	156.850	State Controlled	✓
18	156.900	161.500	Commercial	✓
19	156.950	161.550	Commercial	✓
20	157.000	161.600	Port Operations	✓
21	157.050	161.650	Coast Guard	✓
22	157.100	161.700	Coast Guard	✓
23	157.150	161.750	Coast Guard	✓
24	157.200	161.800	Marine Operator	✓
25	157.250	161.850	Marine Operator	✓
26	157.300	161.900	Marine Operator	✓
27	157.350	161.950	Marine Operator	✓
28	157.400	162.000	Marine Operator	✓
60	156.025	160.625	Canadian Coast Guard	✓
61	156.075	160.675	Canadian Coast Guard	✓
62	156.125	160.725	Canadian Coast Guard	✓
63	156.175	160.775	Canadian Coast Guard	✓
64	156.225	160.825	Port Operations	✓
65	156.275	160.875	Port Operations	✓
66	156.325	160.925	Port Operations	✓
67	156.375	156.375	Commercial	✓
68	156.425	156.425	Boat Operations, Recreational	✓
69	156.475	156.475	Boat Operations, Recreational	✓
70	—	156.525	Digital Selective Calling Only	—
71	156.575	156.575	Boat Operations, Recreational	✓
72	156.625	156.625	Boat Operations, Recreational	✓
73	156.675	156.675	Port Operations	✓
74	156.725	156.725	Port Operations	✓
75	—	156.775	CH16 Guard Band	—
76	—	156.825	CH16 Guard Band	—
77	156.875	156.875	Port Operations	✓
78	156.925	161.525	Boat Operations, Recreational	✓
79	156.975	161.575	Commercial	✓
80	157.025	161.625	Commercial	✓
81	157.075	161.675	Coast Guard	✓
82	157.125	161.725	Coast Guard	✓
83	157.175	161.775	Coast Guard	✓
84	157.225	161.825	Marine Operator	✓
85	157.275	161.875	Marine Operator	✓
86	157.325	161.925	Marine Operator	✓
87	157.375	161.975	Marine Operator	✓
88	157.425	162.025	Commercial	✓

telephone.

Notes:

- Transmitter is automatically disabled on channels 15, 75, and 71 in INT mode.
- 1 Watt initially. User can override to high power setting via front panel controls.
- 1 Watt only.
- Channel 70 is now used for Digital Selective Calling only, therefore transmission is disabled on channel 70 in this radio.

****IMPORTANT NOTICE****

The INT mode is not legal for use while operating in U.S. waters. The TX/RX frequencies available in the INT mode were agreed upon by the attending countries at the 1966 ITU International Telecommunication Union meeting in Geneva, and are legal for use in international waters only.

Canada Mode Frequency Table for the RAY 100 VHF Radiotelephone

Canada Mode			Function	
TX	RX	Type of Traffic	Ship to Ship	Ship to Shore
156.050	156.050	VTS, Port Operations	✓	
156.100	156.100	Port Operations	✓	
156.150	156.150	Port Operations	✓	
156.200	156.200	Canadian Coast Guard, SAR	✓	
156.250	156.250	Port Operations	✓	
156.300	156.300	Intership Safety	✓	
156.350	156.350	Commercial	✓	
156.400	156.400	Commercial	✓	
156.450	156.450	Calling	✓	
156.500	156.500	Commercial	✓	
156.550	156.550	Commercial	✓	
156.600	156.600	Port Operations	✓	
156.650	156.650	Navigation, Bridge to Bridge	✓	
156.700	156.700	Environmental	✓	
156.800	156.800	Emergency, Calling	✓	
156.850	156.850	State Controlled	✓	
156.900	156.900	Commercial	✓	
156.950	156.950	Commercial	✓	
157.000	157.000	Port Operations	✓	
157.050	157.050	Coast Guard	✓	
157.100	157.100	Coast Guard	✓	
157.150	157.150	Coast Guard	✓	
157.200	161.800	Marine Operator		✓
157.250	161.850	Marine Operator		✓
157.300	161.900	Marine Operator		✓
157.350	161.950	Marine Operator		✓
157.400	162.000	Marine Operator		✓
156.025	156.025	Canadian Coast Guard	✓	
156.075	156.075	Canadian Coast Guard	✓	
156.125	156.125	Canadian Coast Guard	✓	
156.175	156.175	Canadian Coast Guard	✓	
156.225	156.225	Canadian Coast Guard	✓	
156.275	156.275	Port Operations	✓	
156.325	156.325	Port Operations	✓	
156.375	156.375	Commercial	✓	
156.425	156.425	Boat Operations, Recreational	✓	
156.475	156.475	Boat Operations, Recreational	✓	
—	156.525	Digital Selective Calling Only	—	—
156.575	156.575	Boat Operations, Recreational	✓	
156.625	156.625	Boat Operations, Recreational	✓	
156.675	156.675	Port Operations	✓	
156.725	156.725	Port Operations	✓	
—	156.775	CH16 Guard Band	—	—
—	156.825	CH16 Guard Band	—	—
156.875	156.875	Port Operations	✓	
156.925	156.925	Boat Operations, Recreational	✓	
156.975	156.975	Commercial	✓	
157.025	157.025	Commercial	✓	
157.075	157.075	Coast Guard	✓	
157.125	157.125	Coast Guard	✓	
157.175	157.175	Coast Guard	✓	
157.225	161.825	Marine Operator		✓
157.275	161.875	Marine Operator		✓
157.325	161.925	Marine Operator		✓
157.375	161.975	Marine Operator		✓
157.425	157.425	Commercial	✓	

Notes:

- 1: Transmitter is automatically disabled on channels 15, 75, and 76 in Canada mode.
- 2: 1 Watt initially. User can override to high power setting via front panel controls.
- 3: 1 Watt only.
- 4: Not for use by general public. Requires special authorization from the Canadian Coast Guard, or under private land mobile license.
- 5: Channel 70 is now used for Digital Selective Calling only, therefore transmission is disabled on channel 70 in this radio.

IMPORTANT NOTICE

Canada mode is not legal for use in U.S. waters.

SECTION 4

SPECIFICATIONS

4.1 SPECIFICATIONS

4.1.1 Transmitter

Channels	All available US,INT, Canada VHF Marine band
Frequency Stability	±10 PPM (0.001%) from -20°C to +50°C
Frequency Range	156.025 to 157.425 MHz
Channel Spacing	25 KHz increments
Power Output	Switchable 5W, 1 W into 50 Ohms at 6.0 VDC
Modulation	Frequency Modulated (16K0G3E)
Modulation Audio	Shall not vary +1/-3 dB from true 6 dB/Oct pre-emphasis response from 300 to 2500 Hz, reference 1000 Hz. Audio frequencies 3-20 KHz shall be attenuated (at 1 KHz by 60 log 1/3 dB. Above 20 KHz by 50 dB)
FM Hum & Noise	Level greater than 40 dB below audio
Audio Distortion	Less than 10% at 1 KHz for 3 KHz deviation
Spurious & Harmonic	Attenuated at least 43+10 log Po (below rated radiated carrier power) per FCC, Rules Parts 2 & 60
Antenna Impedance	50 Ohms
Transmitter Protection	Shall survive open or short circuit of antenna system without damage (10 min. test)

4.1.2 Receiver

Channels	All available US,INT, Canada VHF Marine band
Frequency Range	156.025 to 163.275 MHz in 25 KHz increments
Frequency Stability	±10 PPM (0.001%) from -20°C to +50°C
Usable Sensitivity	0.3 uV for 12 dB (SINAD); 0.5 uV for 20 dB quieting
Squelch Sensitivity threshold	0.3 uV or better
Tight squelch sensitivity	0.5uV to 1.0uV
Modulation Acceptance	Less than ±7.0 KHz
Adjacent Channel Rejection	Greater than 65 dB
Spurious Image Rejection	Greater than 65 dB
Intermodulation Rejection	Greater than 60 dB
Audio Output	0.4 Watt or more at 10% or less distortion into 4 Ohm load
Hum & Noise in Audio	Less than -40 dB

1.3 Operating Requirements

Input Voltage	6.0 VDC NiCad rechargeable battery
Battery Capacity	600mA/H
Current Required	Less than 2.0 amps at 5 W; and 1 .0 amp at 1 W
Transmit	Less than 40mA; 150mA at 0.3 Watt audio output (1 KHz)
Receiving (squelched)	
Operating Temperature	-20°C to +50°C
Duty Cycle	Continuous, 60% receive, 20% transmit (max. 10 min. @25)
Humidity	100% at +50°C for 6 hours

1.4 Radio Dimensions

Height (radio body w/batt.)	149.2 mm
Width	63.3 mm
Depth	36.0 mm
Weight	Approx. 0.5kg. (1 lb)

NOTE:

The RAY1 00 VHF FM Radiotelephone meets all applicable sections of FCC Rules Parts **2, 15** and **80.**

SECTION 5

APPENDIX

5.1 VHF MARINE CHANNEL USAGE GUIDE AND LICENSING REQUIREMENTS

Most of the information found in this section is reprinted in whole or in part from FCC Information Bulletin No. 2 REVISED EDITION February 1991 and FCC Fact Sheet PR-5000 March 1990.

REMEMBER:

- Maintain a radio **watch** on Channel 16. Channel 16 is used for distress and safety purposes **only**.
- Use VHF Channel 70 only for Digital Selective Calling (DSC). It may be used for general-purpose calling using DSC. Your cooperation in not using Channel 70 for general intership communications is necessary to prevent interference.
- Your VHF transceiver has a high-low power switch. Use low power whenever feasible. Unnecessary high-power operations can interfere with other important communications.
- Always use your radio call sign at the beginning and end of each transmission.
- Be sure only qualified persons operate your radio. You are responsible for control of your radio. Know the rules.
- Limit calls to other vessels to 30 seconds. If you receive no reply, wait 2 minutes; then-try again. Keep communications brief and avoid chit-chat.
- Never transmit false distress messages, and never use profanity on the air.

OTHER REMINDERS:

You need a radio operator license to operate VHF Marine Radio only if you plan to dock in a foreign port or leave a foreign port to dock in a U.S. port.

- Your radio license is **not** transferable. If you sell your boat, request the FCC to cancel your station license.