



The Cruising Club of America

USING THE

ICOM IC – M710 and 710RT

MARINE SSB RADIOS

Revised July 2006

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Note: Reference to a commercial product or service does not imply any endorsement by the Cruising Club of America as to function or suitability for any purpose or environment.

Foreword

Single Side Band (SSB) radios are sometimes called transceivers meaning a combination of both transmitter and receiver in one unit. Although these radios have many advanced features, the basic operation is direct and easy to use once you catch on to it.

This paper is intended to be a simple reference for the Icom M-710 and M710RT MF/HF Marine Transceivers and is not intended to be a replacement for the Instruction Manuals. Its purpose is to assist crewmembers unfamiliar with these SSB radios. It assumes the radio has been installed with a proper antenna connection, a good ground and has been determined to be operating satisfactorily by a qualified person or technician.

There are a few notes that apply to this paper:

1. All frequencies and SSB modes described are kHz (kilo Hertz) and USB (Upper Side Band) unless otherwise noted.
2. Although other equipment including Ham radios operate in single sideband mode, SSB throughout this paper refers to Marine Single Sideband Radios.
3. The International Telegraphic Union (ITU) is a UN body located at Geneva, Switzerland responsible for regulating radio usage including frequency and channel allocations. The US along with most maritime countries is party to treaties supporting these regulations. They are promulgated in the US by the Federal Communications Commission (FCC) and administered by various agencies. The US Coast Guard (USCG) has responsibility for maritime applications.
4. It has been suggested that an index be added. Actually, a facility in Acrobat Reader is available for this. Simply click on "Edit" on the Tool Bar, then "Find" and type in the reference word. The program will do the rest.
5. Downloading this paper to a computer running on Windows requires Acrobat Reader Version 5.0 or higher. Unfortunately, this version was released prior to Windows XP and while it will appear correct on computers running Windows XP, printing it out requires Acrobat Version 6.0 or higher for a legible printout. The latest Acrobat Reader version is available free at this website.
6. Margins, top and bottom, left and right have been set to:
 - a. Top and bottom – 1.0"
 - b. Left and right – 0.6"
 - c. Header and footer – 0.5"

7. Additional information about using a marine SSB, that is what to do with it once you know how to use it may be found in "Offshore Communications Memorandum" and the paper "Frequencies, Nets, WX Schedules and Tables", formerly titled the "Appendix" at this CCA website, www.cruisingclub.org under the sidebar "Offshore Communications and Electronics".

8. Information about "SSB Transmissions, Connections and Grounds" may also be found at that same sidebar.

My thanks to R. Steven Thing and Bill Cote who reviewed the original draft along with others who have written about the content since then.

Comments, corrections and suggestions are more than welcomed and I try to respond to each of these when received. Since we spend as much time as we can on our boat, please send them to me via email.

Have a good time with these great radios.

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Chair
Offshore Communications and Electronics
Cruising Club of America

July 2006

CHANGES AND CORRECTIONS

Major changes, additions and corrections in this version are highlighted in **YELLOW** where practical to assist in recognizing them. Where a new section or paragraph has been added, the title in the Table of Contents and the title (only) in the body of the paper are highlighted.

Version 5.01

Revised version numbering (year – issue)

Revised reference to the USCG Distress and Safety Watchkeeping Channels to reflect the change effective 1 Jan 05

Minor editorial corrections and reorganization

Version 6.01

Editorial clean-up and minor corrections

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1 INTRODUCTION

The M710 and M710RT are nearly identical in both operation and face appearance. The differences are, the M710RT face plate or Controller is separate from the main body of the radio; that is, the radio is in two boxes and one of them can be somewhat remote. The M710RT also has key buttons on the microphone for some channel and function selection while the M710 does not.

Aside from the added microphone controls, these radios operate the same and are treated as one in the following discussion.

2 THE ICOM DEALER

Continuing support is available from the Icom Dealer. This includes:

1. Correcting the emission mode for 2182 kHz in Channel 0 to USB if it is factory set to AM, DSB or H3E (all the same). This is not programmable by the user.
2. The radio can be adjusted for “Ham” operation for licensed Ham Operators. To do this, the operator must produce a “General” or above Ham License for the Dealer’s inspection. At the same time, the Dealer can also adjust the TX high frequency limitation to enable 10-meter operation.
3. The stored frequencies can be quickly modified by the dealer for the area you sail.

In the event an Icom dealer is not available, Icom America can be contacted at:

Main switchboard: Tel: 1 – 800 – 872 – 4266
1 – 425 – 454 – 7619
Fax: 1 – 425 – 454 – 1509

Technical Questions: marine@icomamerica.com

Information on parts: parts@icomamerica.com

Web Site: www.icomamerica.com

3 JUST A LITTLE TECHNICAL BACKGROUND FOR THE UNFAMILIAR

The Federal Communications Commission (FCC) regulates radio transmission on medium and high frequencies (MF & HF) under a treaty with the International Telegraphic Union (ITU), an agency of the UN. Certain specified frequencies have been allocated for marine SSB use in the 2,

4, 6, 8, 12, 16, 18, 22 and 25 mega Hertz (MHz) ranges or bands. These frequencies dovetail with some of the authorized Amateur Radio Operator ("Ham") frequency bands, but are not the same and do not overlap.

Transmit (TX) and Receive (RX) frequencies are sometimes thought of as "pairs" and are assigned together to a channel in the radio's memory. Each channel is numbered for easy identification. The more channels in a radio, the more pairs of frequencies can be stored and directly accessed rather than keying in or dialing new TX and RX frequencies each time there is a need to change frequencies.

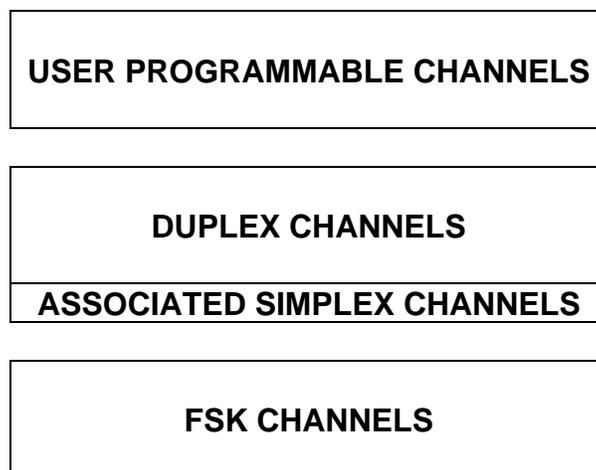
When a "pair" or both a TX and RX frequency in a channel are the same, the channel is called "a simplex channel". In this type of operation, a listener hears everything spoken by either party.

When the TX and RX frequencies are different, the channel is called "a duplex channel" and normally only one side of the conversation can be heard by a listener. Duplex channels are mainly used to communicate to shore side stations and provide a degree of confidentiality.

4 HOW THE RADIO IS ORGANIZED

The memory in this radio has been allocated into three separate groups. For want of better names, they are the "User Programmable Channels", the "ITU Duplex Channels" along with their "Associated Simplex Channels" and the "FSK Channels".

Memory Organization Concept:



As with many things in life, there are some exceptions and variations:

1. Channel 0 is unique and outside these three memory banks. Channel 0 is reserved for the Emergency Channel, 2182.0 kHz and is selected via the two or three buttons above the Volume knob. It is **not** user programmable.
2. User Programmable Channels: There are 160 programmable channels available which can be either simplex or duplex and can use any type emission (called mode) available to the radio.
3. Attached to each ITU Duplex Channel range are 9 "Associated Simplex Channels". These channels are programmable, but only in simplex in the same frequency band and are discussed later.
4. FSK Channels: The third section of the radio memory contains 662 channels for Frequency Shift Keying (FSK) operations. These channels are numbered from 4001 to 25040, stratified by frequency bands with a varying number of frequencies allocated to the bands. They are located between Channels 25 – 9 and Channel 1.

FSK Channels are required for some accessories and specialized equipment. Most yachts do not have a need or use for these channels and many dealers will disable this section to avoid operator confusion. For instructions on how to hide this section of the radio (recommended), see page 13 of the Instruction Manual under SET MODE (1).

We want to note the existence of the FSK Channels section, but will not discuss it on the assumption it has been disabled.

5 In Practice

Yachts with marine SSB radios talk to other yachts in simplex mode and always Upper Side Band (USB). Weather faxes, voice weather forecasts, news broadcasts from Voice Of America or BBC can all be received on USB although that may not be the primary emission mode. Although there could be, there is normally no transmit frequency for these channels.

Generally, yachts talk to each other in the 4 and 6 MHz frequency ranges and sometimes even as high as the 8 MHz frequencies depending on the distance. Some long-range SSB nets use one of the 12 MHz frequencies, but they are the exception. The higher frequencies usually mean greater range, but at a price; these signals normally "skip" over the top of yachts close in where your friends are who then can't receive the transmission. There is no such thing as a free lunch.

In the Caribbean, most SSB traffic and nets are on 4 or 6 MHz and the calling frequency is 6215 kHz, the calling and safety frequency. In the Mediterranean, most traffic is 8 MHz because of the added distance and many yachts use 8122 kHz for a calling frequency, particularly after the morning cruiser's net.

Some yachts use their SSB to make high seas telephone calls or send and receive e-mail via shore stations. Operations with shore stations normally involve duplex channels and are USB.

Doing email normally requires an accessory like a modem to manage the data. More details on this are covered in the primary paper in this series, "Offshore Communications Memorandum".

Local radio broadcast stations are normally AM as are WWV & WWVH.

Some foreign WX faxes are on Lower Side Band (LSB), but this is the rare exception.

Hams generally operate in simplex mode within the boundaries of their designated frequency bands. This is similar to SSB, but not the same because Hams may select any frequency within their authorized frequency bands while marine SSB has specific designated frequencies or channels in the marine SSB bands. Also, Hams use USB as well but switch to LSB below 7300 kHz.

The M710/M710RT is normally enabled to listen to the Ham bands but not transmit on them. As noted above, any Icom dealer can enable transmission on the Ham bands with the presentation of a "General" or better license.

6 THE INTERNATIONAL DISTRESS, SAFETY AND HAILING FREQUENCIES

Each of the lower SSB frequency bands of 2, 4, 6, 8, 12, and 16 MHz have a designated frequency for Safety and Hailing (The bands of 18, 22 and 25 MHz do not). These frequencies are all simplex (transmit and receive on the same frequency) and are all Upper Sideband (USB) including 2182 kHz. 2182 kHz in addition to being the Hailing Frequency for the 2 MHz band also serves as the International Emergency Frequency.

| ITU | Freq | Mode | Effective Range | |
|------|---------|---------|-----------------|------------|
| | | | Day | Night |
| | 2182 | Simplex | | |
| 450 | 4125 | Simplex | 300 | 800 |
| 650 | 6215 | Simplex | 400 | 1000 |
| 850 | 8291 | Simplex | 500 | 1200 |
| 1250 | 12290 | Simplex | 2000 | 800 |
| 1650 | 16420 * | Simplex | 4000 | Unreliable |

* Upon Request

Note: The USCG has announced they will use the International Safety and Hailing channels for their Distress and Safety Watchkeeping Channels. These are not the same as those used to broadcast voice Weather Forecasts (WX) as in the past. With this in mind, it is recommended that these frequencies if not already programmed on your radio, be added to allow direct access to the USCG if in distress.

12C SHP

Channel on top and a RX frequency below:

1801 USB
DUP
19.755.0

Note: The numbering is slightly staggered and slightly smaller on the lower line as it appears on the display. Also, simplex or duplex operations are indicated as SIMP or DUP.

On the lower right of the keypad is a button labeled CH/FREQ used to toggle between these presentations. Depress this button to get a channel number on the top line (a number without decimal points). If the number on top has a decimal point, it is a frequency. Nothing changes by depressing this button except what you see on the display.

7.1 The User Programmable Channels

The User Programmable Channels can be simplex, duplex or be programmed for a "receive only" frequency. The channels are numbered from 1 to 160 on the upper line of the display that uniquely identifies them. These are typically the channels most often used.

The easiest way to get into the User Programmable Channels memory is to press **1 RX** on the keyboard. Alternately, turn the large knob on the left labeled GROUP to find the User Programmable Channel Section. That is, a channel numbered from 1 to 160. You may have to toggle the CH/FREQ button to get channel numbers on the top line.

Once you find it, notice that each click of the GROUP knob on the left moves the pointer twenty channels per click. CHANNEL, the large knob on the right moves the pointer one channel per click. With 160 channels, eight clicks of the GROUP knob will take you through the entire range of these channels from the start.

It might help to think of the Group and Channel Knobs acting together as pointers to select a particular channel. The Group selects an area of the memory and the Channel Knob selects a specific channel in that area.

If the display happens to be at Channel 24, one click of the Group knob will select Channel 4 or 44 depending upon which way it is turned. In the same way from Channel 24, one click of the Channel knob on the right will select Channel 23 or 25. If the display is at Channel 160, one clockwise click of the knob will select Channel 1.

This section of the memory can be visualized as a pigeonhole mailbox of twenty pigeon holes high and eight across. Frequencies (RX & TX) are stuffed into the boxes along with a descriptive name.

A conceptual layout of the User Programmable Channels follows on the next page:

GROUP POSITIONS →

| | | | | | | | | |
|----------|----|----|----|----|-----|-----|-----|-----|
| CHANNELS | 1 | 21 | 41 | 61 | 81 | 101 | 121 | 141 |
| | 2 | 22 | 42 | 62 | 82 | 102 | 122 | 142 |
| | 3 | 23 | 43 | 63 | 83 | 103 | 123 | 143 |
| | 4 | 24 | 44 | 64 | 84 | 104 | 124 | 144 |
| | 5 | 25 | 45 | 65 | 85 | 105 | 125 | 145 |
| | 6 | 26 | 46 | 66 | 86 | 106 | 126 | 146 |
| | 7 | 27 | 47 | 67 | 87 | 107 | 127 | 147 |
| | 8 | 28 | 48 | 68 | 88 | 108 | 128 | 148 |
| | 9 | 29 | 49 | 69 | 89 | 109 | 129 | 149 |
| | 10 | 30 | 50 | 70 | 90 | 110 | 130 | 150 |
| | 11 | 31 | 51 | 71 | 91 | 111 | 131 | 151 |
| | 12 | 32 | 52 | 72 | 92 | 112 | 132 | 152 |
| | 13 | 33 | 53 | 73 | 93 | 113 | 133 | 153 |
| | 14 | 34 | 54 | 74 | 94 | 114 | 134 | 154 |
| | 15 | 35 | 55 | 75 | 95 | 115 | 135 | 155 |
| | 16 | 36 | 56 | 76 | 96 | 116 | 136 | 156 |
| | 17 | 37 | 57 | 77 | 97 | 117 | 137 | 157 |
| | 18 | 38 | 58 | 78 | 98 | 118 | 138 | 158 |
| | 19 | 39 | 59 | 79 | 99 | 119 | 139 | 159 |
| | 20 | 40 | 60 | 80 | 100 | 120 | 140 | 160 |

For example, to get the frequency that is in channel 45, turn the group knob to the group with 45 in it and then the channel knob.

7.2 The Duplex Channels

The second memory section of the radio is the duplex frequency section of the radio. It is composed of a series of duplex channels for each of the authorized frequency ranges or bands followed by nine simplex channels for each frequency band. The duplex channels and frequencies are fixed and cannot be revised.

Their associated simplex channels can be changed provided that they remain within the same frequency band. For example, the 4 MHz band will only accept 4 MHz frequencies but not 6, 8, etc. frequencies.

The following block diagram is a conceptual layout of the Duplex and their Associated Simplex Channels:

Turning the Group Knob clockwise will take the user from the User Programmable Channels to the ITU Duplex Channel ranges. Starting from 4 MHz duplex channels, continued turning will then progress to 4 MHz simplex, to 6 MHz duplex to 6 MHz simplex and in the same way, to 8, 12, 16, 18, 22 and finally 25 MHz duplex channels followed by the 25 MHz simplex section of the memory.

The channels are identified by channel numbers starting with 401 through to 2510 (discontinuous) on the upper line of the display. There are a total of 242 duplex channels allocated between the eight different frequency ranges or bands. The number of authorized channels in each band varies from eight channels in the 6 MHz band to fifty-six channels in the 16 MHz range.

The ITU duplex channels are also most easily identified when a channel number such as 602 or 1813 appears on the upper line. If it doesn't have a decimal point in the number, it is a channel number.

The organization of the memory for the fixed ITU Duplex Channels can be visualized as follows:

GROUP POSITIONS →

| | 4 MHz | 6 MHz | 8 MHz | 12 MHz | 16 MHz | 18 MHz | 22 MHz | 25 MHz |
|-----------------|--------------|--------------|--------------|---------------|---------------|---------------|---------------|---------------|
| | | | | | | | | |
| | 401 | 601 | 801 | 1201 | 1601 | 1801 | 2201 | 2501 |
| | 402 | 602 | 802 | 1202 | 1602 | 1802 | 2202 | 2502 |
| | . | . | 803 | 1203 | 1603 | . | 2203 | . |
| | . | . | . | . | 1604 | . | . | . |
| CHANNELS | . | . | . | . | . | . | . | . |
| | . | 606 | . | . | . | 1813 | . | 2508 |
| | . | 607 | 830 | . | . | 1814 | . | 2509 |
| | 425 | 608 | 831 | . | . | 1815 | . | 2510 |
| | 426 | | 832 | 1239 | . | | 2251 | |
| | 427 | | | 1240 | . | | 2252 | |
| | | | | 1241 | . | | 2253 | |
| | | | | | 1654 | | | |
| | | | | | 1655 | | | |
| | | | | | 1656 | | | |

7.3 Selecting A Duplex

The process of selecting a sector of the memory is a User Programmable



Channel

channel in the duplex little different from the Channels.

The Group Knob switches from the Duplex section to the associated Simplex section and then on to the next Duplex section and so on. For example, if at channel 601, one clockwise click of the Group Knob will take the user to 6 -1, the first simplex channel for the 6 MHz sector. Another click will take the user to 801, the first duplex channel in the 8 MHz range. Another click will lead to 8 - 1, the first simplex channel in the 8 MHz range and so on.

The Channel Knob operates somewhat differently. Where the Group Knob moves from one section of the radio to the next, the Channel Knob remains within that memory section. If at channel 601, one clockwise click of the Channel Knob will take the user to 602, then to 603 and so on through all the duplex channels to 608. The next click will enter the 6 MHz simplex channels starting at 6-1 and continue through to 6-9. One additional click will return to 601.

Finally and this is an exception, one click of the Channel Knob or microphone button past 25-9 will take the user into the FSK channel section unless it has been “locked out” by the dealer. When FSK has been inhibited, which should be the norm, one click of the Channel Knob past 25-9 will take the user back to the User Programmable Channels and Channel 1 bypassing this memory section.

7.4 The Associated Simplex Channels

There are nine simplex channels associated with and subset to each of the duplex frequency bands. These simplex frequencies are programmable and can be changed to other simplex frequencies, provided they are within the same band. For example, in the 6 MHz band, 6215.0 kHz can be entered in any of the simplex channels (from 6 – 1 to 6 – 9), but will not register in the 4, 8, 12 etc. MHz sectors.

Organization Concept of the Associated Simplex Channels:

BANDS →

| | 4 MHz | 6 MHz | 8 MHz | 12 MHz | 16 MHz | 18 MHz | 22 MHz | 25 MHz |
|-----------------|--------------|--------------|--------------|---------------|---------------|---------------|---------------|---------------|
| | 4 – 1 | 6 – 1 | 8 – 1 | 12 – 1 | 16 – 1 | 18 – 1 | 22 – 1 | 25 – 1 |
| | 4 – 2 | 6 – 2 | 8 – 2 | 12 – 2 | 16 – 2 | 18 – 2 | 22 – 2 | 22 – 2 |
| | 4 – 3 | 6 – 3 | 8 – 3 | 12 – 3 | 16 – 3 | 18 – 3 | 22 – 3 | 22 – 3 |
| | 4 – 4 | 6 – 4 | 8 – 4 | 12 – 4 | 16 – 4 | 18 – 4 | 22 – 4 | 22 – 4 |
| CHANNELS | 4 – 5 | 6 – 5 | 8 – 5 | 12 – 5 | 16 – 5 | 18 – 5 | 22 – 5 | 22 – 5 |
| | 4 – 6 | 6 – 6 | 8 – 6 | 12 – 6 | 16 – 6 | 18 – 6 | 22 – 6 | 22 – 6 |
| | 4 – 7 | 6 – 7 | 8 – 7 | 12 – 7 | 16 – 7 | 18 – 7 | 22 – 7 | 22 – 7 |
| | 4 – 8 | 6 – 8 | 8 – 8 | 12 – 8 | 16 – 8 | 18 – 8 | 22 – 8 | 22 – 8 |
| | 4 – 9 | 6 – 9 | 8 – 9 | 12 – 9 | 16 – 9 | 18 – 9 | 22 – 9 | 22 – 9 |

The Safety and Hailing frequencies along with authorized Ship-To-Ship and Ship-To-Shore frequencies should be programmed into these channels.

To assist in an emergency with a crew not familiar with the radio, the Safety and Hailing frequencies should be programmed into the first of the simplex channels for each band i.e., 4215 in 4 – 1, 6215 in 6 – 1, 8291 in 8 – 1 and so on. This should be followed by the other programmable simplex channels.

BANDS →

| | 4 - | 6 - | 8 - | 12 - | 16 - | 18 - | 22 - | 25 - |
|----------|------------|------------|------------|-------------|-------------|-------------|-------------|-------------|
| 1 | 4125 | 6215 | 8291 | 12290 | 16420 | 18825 | 22159 | 25100 |
| 2 | 4146 | 6224 | 8294 | 12353 | 16528 | 18828 | 22162 | 25103 |
| 3 | 4149 | 6227 | 8297 | 12356 | 16531 | 18831 | 22165 | 25106 |
| 4 | 4417 | 6230 | | 12359 | 16534 | 18834 | 22168 | 25109 |
| 5 | | 6516 | | | 16537 | 18837 | 22171 | 25112 |
| 6 | | | | | 16540 | 18840 | 22174 | 25115 |
| 7 | | | | | | 18843 | 22177 | 25118 |
| 8 | | | | | | | | |
| 9 | | | | | | | | |

Note 1: 16420 kHz is the highest frequency serving as a Safety and Hailing Channel.

Note 2: These frequencies may not be the same as those preprogrammed by the factory.

Not all of these eight simplex frequency groups will have frequencies programmed into them depending upon the area of radio use. However, these are all the frequencies authorized by the FCC with two exceptions.

The exceptions are special frequencies for use only in Alaska and on the Mississippi River. They are not authorized for use elsewhere and are omitted here. They are however included in the paper “Frequencies, Nets, WX Schedules and Tables”, previously titled the “Appendix to the Offshore Communications Memorandum”.

8 Operating The Radio and The Display

With the radio on, go to the User Programmable Channels section by pressing **1 RX** on the keyboard or turning the Group Knob. Select any channel.

8.1 Frequency / Channel Presentation

As noted above, the display will present either:

- Numbers on the upper line with one decimal point followed on the bottom by some letters with more numbers with two decimal points.
- Some numbers on the upper row with no decimal points followed by some letters and below that, a number or an alphanumeric (a word or a name given to that particular frequency) such as BBC or 4 Charlie.
- All channels can be displayed either way by depressing the CH/FREQ button on the keypad at the right. Nothing changes except what appears on the display.

8.2 The RX Icon

The **RX** symbol or icon appears on the left of the display indicating the radio is ready to RECEIVE.

8.3 Simplex, Duplex or Blank Display

Between the two rows, the words SIMP or DUP may appear or the line can be blank.

SIMP refers to SIMPLEX, meaning that transmit and receive frequencies are the same. It also means that anyone listening to that frequency hears both sides of the conversation.

DUP refers to DUPLEX, meaning that transmit and receive frequencies are different. Anyone listening to that frequency can hear one side of the conversation only, affording some privacy.

A blank line indicates there is no transmit frequency for this channel. This is normal for broadcast stations such as the Voice Of America and weather fax broadcast stations where transmitting on that frequency would create interference and is not looked at kindly by the authorities - or by anyone else.

On the right of the display are two or three letters indicating the emission mode. For SSB operations, it should be USB, Upper Sideband or J3E (the same) except when listening to a commercial radio broadcast station or WWV when the mode should be AM.

The DIMMER button for the LCD display is adjacent to the POWER button. The M710 radio has only two positions; on or off. However, contrast and brightness may also be controlled via "SET MODE" discussed on page 14 of the M710 Instruction Manual.

With the M710RT, depress the "Dimmer" button while rotating the Channel and Group Knobs (see page 2 in the M710RT Manual).

9 The Buttons Under The Display

9.1 The Mode Button (Emission Modes)

If the mode is anything other than USB (or J3E), depress the "MODE" button (just below the lower left corner of the display) as many times as it takes to change it back to USB. Then go to the keyboard and depress CE and then RX to save it. You should hear a "beep" indicating it has been saved.

Continued depressing the "MODE" button will change the display to AM, LSB, J2B, FSK, CW and then back to USB.

USB or Upper Sideband is the type of emission or operating mode used for most marine SSB transmissions. FSK is used for some Weather Facsimiles (WX Fax), but USB works well.

AM or Amplitude Modulation is the same type of transmission as you have on your home AM radio. This is sometimes called DSB for Double Sideband and was the standard transmission method in years gone by. It is no longer used except for some government operations and commercial broadcast radio.

LSB or Lower Sideband is used for some foreign weather facsimile broadcasts and by Hams at frequencies below 7.300 MHz. Ham operations at frequencies from 7.300 to 30.000 MHz are USB.

AFSK or Audio Frequency Shift Keying is an emission technique used in advanced applications involving accessories and is beyond the scope of this paper.

FSK or Frequency Shift Keying is another emission technique used in advanced applications involving accessories and also beyond the scope of this paper.

CW or Continuous Wave is the type of emission used for Morse code. It is sometimes called A1A.

The Emission Modes differ from the mode. Sometimes they are conversion table.

| M - 710 / 710RT MODE | EMISSION |
|---------------------------------|-----------------|
| AM | H3E |
| CW | A1A |
| FSK | F1B |
| ASFK | J2E |
| LSB | J3E |
| R3E | R3E |
| USB | J3E |

displayed on this radio may coding used by the FCC. used interchangeably. A follows to help clarify.

9.2 The Other Buttons

In addition to the MODE button, the remaining buttons under the display are AGC, NB, SQL and FUNC. TUNE is located between the knobs.

9.2.1 **AGC** or AUTOMATIC GAIN CONTROL - **Normally ON**

AGC adjusts the receiver's gain to ensure weak signals are received at the same volume as strong. If it is off, the letters AGC with lines through it will appear on the display. Depress the AGC button to turn it on (no symbol or indication). Without AGC on, some signals may be too loud.

With weak weather facsimile (WX Fax) signals however, some picture improvement may be achieved by turning the AGC off.

9.2.2 **NB** or NOISE BLANKER - **Normally OFF**

NB is used to eliminate repetitive noise interference from equipment close by such as fluorescent lights, motors, NMEA Data stream for electronic equipment on board and the like. It is on when the letters NB appear on the right side of the display.

9.2.3 **SQL** or Squelch - **Normally OFF**

SQL eliminates the hiss heard on SSB, but it can also reduce sensitivity to weak signals. When it is on, the letters SQL appear on the right side of the display.

You won't hurt anything by depressing these buttons, but it will help if you set them as suggested above. They are mainly to enhance how well you receive. NB on some other radios brands may create interference for neighboring vessels when transmitting.

9.2.4 **FUNC** or Function is something you could get into trouble with the first time around so leave it alone for now. Consult the ICOM Instruction Manual after you are comfortable with the radio. To minimize “follow on” grief, write down all settings before changing anything in FUNC.

9.2.5 **TUNE** - The TUNE button activates the Automatic Tuner. Depressing the TUNE button peaks the antenna system to the transmit frequency. There is normally no need to tune when receiving although it sometimes helps with weak signals. There is also no need to retune when making small TX frequency changes such from 4146.0 to 4149.0 kHz.

The AT-130 Automatic Tuner is standard with these radios and with it, the **TUNE** button can be ignored. The AT-130 will automatically tune when the channel is changed or the side microphone button is depressed to talk depending how the radio is setup.

Two tuning methods are available with the AT-130. With the first, the tuner will automatically retune every time a channel is changed with the knobs. With the second method, the tuner will automatically retune only when the microphone button is depressed. Microphone tuning is preferred because the antenna doesn't usually need to be retuned to listen.

Which one used is selected in the SET MODE (3) found on page 13 of the Instruction Manual.

If another model or brand tuner is being used, the TUNE button must be depressed before transmitting if the frequency has been changed. When the TUNE button is depressed, the word TUNE will appear on the left side of the display.

10 **The Keypad**

The keypad at the right side of the radio has two functions. They are, direct channel selection and inputting new frequencies.

In addition to the CH/FREQ already discussed, note the Keypad buttons labeled CE, -, RX and TX.

10.1 CE or Change Entry is used mainly to change a frequency. When it is depressed, a small triangle appears on the left of the display to indicate it is active and is accompanied with a beep. Depressing the CE button will also erase any erroneous entries.

10.2 The Dash Symbol “-” is used when direct dialing to the simplex channels associated with the duplex channel section of the memory such as 4-1, 12-3, etc.

10.3 RX or RECEIVE is used to change channels or enter a new receiving frequency. To change channels, simply key in the channel number followed by **RX**.

10.4 DIRECT DIALING: To direct dial a channel rather than turn knobs, enter the channel number on the keyboard and depress RX. For example, to direct dial:

| To Dial Channel | Key In |
|-----------------|-----------|
| 1 | 1 RX |
| 132 | 1 3 2 RX |
| 408 | 4 0 8 RX |
| 12 - 3 | 12 - 3 RX |

Since each channel already contains both the desired RX and TX frequencies, either simplex or duplex, everything is there to begin using that channel.

10.5 TX or TRANSMIT is used to change a transmit frequency.

11 Changing Programmable Frequencies

Changing a programmable frequency is the same for the User Programmable Channels and the Associated Simplex channels.

11.1 To change a RX (Receive frequency):

- 1 Go to the channel you want to place the new frequency by turning the knobs, direct dialing or through the buttons on the microphone on a M710RT.
- 2 Toggle the CH/FREQ button to display both the RX and TX frequencies.
- 3 Depress CE to make a change to the RX (receive) frequency. The CE icon (small triangle) will appear to the right of the RX icon.
- 4 Key in the new frequency with a trailing zero, depress RX and hold until you hear a “beep” sound followed by two more “beeps”. This signifies a new frequency has been entered.

Concurrently, the CE symbol will disappear. The line between the two frequencies may also change depending on whether the RX and TX frequencies are now the same or differ (Simplex or Duplex).

11.2 To change a TX (Transmit frequency):

- 1 Go to the channel you want to place the new frequency by turning the knobs, direct dialing or by using the buttons on the microphone on a M710RT.
- 2 Toggle the CH/FREQ button to display both the RX and TX frequencies.
- 3 Depress the TX button – The flashing TX icon appears on the left of the display with a “beep”.
- 4 Depress the CE button - The CE symbol (small triangle) appears next to the flashing TX with a beep.
- 5 Key in the new transmit frequency, remembering to add a trailing zero.
- 6 Depress the TX button and hold. You will hear three “beeps” and the CE symbol will disappear. Depress the TX button again. You will hear another “beep” and the flashing TX will disappear. The new transmit frequency is now ready for use.

NOTE: You can't just use any frequency you might want for Marine SSB. As noted before, frequencies and their use are specified under international agreements and controlled in the US by the FCC. This includes US flagged vessels wherever they might be as well unless there is a conflict with the local authorities.

The FCC takes a dim view of independent frequency determination and they back this up with fines that can be stiff. Selecting something other than designated listed frequencies can and does create interference with other radio transmissions as well. There are plenty of authorized frequencies available for maritime use.

One final note on programming: With 160 programmable channels available on this radio and an additional 72 simplex channels following the duplex channels, it is very easy to forget what is where. Placing a list of channels / frequencies in a loose-leaf binder or under a clear plastic sheet on the chart table helps. It facilitates knowing what channel to go to and in short order, becomes indispensable.

Cruiser Nets and their frequencies come and go, interests change, new Nets come on, the cruising area changes and so on. Putting your list of frequencies on a computer spread sheet may be a lot of work the first time, but it makes for easy change and good organization. With 160 channels available, leaving a blank channel every now and then helps to accommodate the changes.

12 The M - 710RT Microphone

Unique to the M710RT transceiver is a microphone with controls to change the channels and to activate a selected control such as squelch in addition to the usual Push-To-Talk button on the side for transmission. It is available only with the M710RT.

12.1 Channel Selection Buttons

Channel selection can be controlled from the microphone in the same way as the Channel Knob on the face of the radio. By pressing one of the two buttons with triangles, the channel can be changed one step at a time. Holding the button down will rapidly sequence through the channels.

Operating the same as the Channel Knob, the microphone Channel Selector will remain within whatever memory sector it started out. For example, in the User Programmable Memory and at some channel such as 146, depressing the "UP" button will run the channels up to 160 and then recycle starting at Channel 1. Doing the same at some duplex channel such as 403 will run the selection up to 427, then into the Associated Simplex Channels starting with 4 – 1, through them to 4 – 9 and recycle back to duplex Channel 401. The reverse is true with the holding the down button.

12.2 P SWITCH

The little button on the face of the microphone labeled "P" is used in place of any one of the function buttons under the display. These control functions, MODE, AGC, NB, SQL and TUNE are discussed above.

Only one function at a time can be controlled with the "P" switch although all can be activated. This is accomplished by holding down both the "P" switch and the desired function switch while turning the radio on. The "P" button is then used to toggle the selected function on or off. If the MODE function is selected, the "P" switch will cycle through all the Emission Modes.

To deactivate the "P" switch, turn the radio off. Holding the "P" switch down, turn the radio back on without depressing any of the function buttons.

12.3 PUSH TO TALK BUTTON (PTT)

The button on the side of the microphone is used to transmit in the conventional way. The operation is one way; depressed to transmit and released to receive.

This button will also active the AT-130 antenna tuner to tune to a new frequency (if selected in the set-up) when a change has been made. It is near instantaneous and draws very little current.

13 Transmitting

To transmit, hold the mike an inch or two away from your mouth, depress the button and speak in a normal voice. Shouting or holding the mike too close to your mouth doesn't help and can even make it difficult for you to be understood. Remember to depress the mike button before you start to speak and hold it down until you finish.

These radios work on the concept of either Receive or Transmit, one at a time, but not both at the same time. They are not like a telephone. This means, you won't be heard if you talk while someone else is talking to you. And they won't hear what you have to say either.

Remember to identify yourself with the name of the vessel and the Ship Radio Call Sign (top line - right on the Ship/Aircraft Radio Station License posted somewhere in the vicinity of the radio).

