From: Marine Radio and Electronics - by Allan Lytel - 1960

Chapter 7.11 RADIOTELEPHONE SERVICE ON THE GREAT LAKES

According to the RTCM (Radio Technical Commission for Marine services) the maritime mobile radiotelephone system for the Great Lakes of North America was developed through the coordinated efforts of United States and Canadian shipping interests, shore station operating companies, and the government agencies of both nations. The system is so integrated that any vessel may establish contact with any other vessel within range at any time vessels are under way. Also, any vessel may contact or be contacted by any shore station at any time.

An "Agreement between the United States and Canada for Promotion of Safety on the Great Lakes by Means of Radio" requires that all vessels of 500 tons or more, together with certain other categories of smaller vessels, be equipped for and use radiotelephony for safety purposes while navigating the Great Lakes. This agreement establishes 2182 Kc as the safety, distress, and calling channel and requires that all compulsorily equipped vessels be equipped for monitoring and operating on 2182 Kc and for intercommunication on the ship-to-ship channel 2003 Kc.

Typical Great Lakes bulk freighters of recent construction are from 600 to 700 feet long with a beam width of 60 to 75 feet and are capable of carrying from 18,000 to 22,000 tons of bulk cargo at normal loading. The aggregate single trip loading capacity of the entire United States-Canadian fleet is 5,039,547 gross tons.

The large number of vessels creates problems in the use of radiotelephone because of the traffic density.

While there are many yachts, fishing craft, and smaller vessels on the Great Lakes, there are also a large number of vessels of substantial size. The major function of the Great Lakes radiotelephone system is to serve the safety, distress, navigational, and operational requirements of large vessels. However, the requirements of small vessels have not been neglected.

BACKGROUND

The Great Lakes area is defined in the Agreement as follows: "Great Lakes means all of the Great Lakes, their connecting and tributary waters, and the River St. Lawrence as far east as the lower exit of the Lachine Canal and the Victoria Bridge at Montreal, but shall not include tributary rivers which are ot also connecting rivers, and shall not include the Niagara River (including the Black Rock Canal)."

This area is exempt from the provisions of the Safety of Life at Sea Convention for vessels that operate solely within the area. Being territorial waters of the United States and Canada and having maritime activities of a special nature, they have lent themselves to the development and use of radiotelephony to a high degree.

The history of radiotelephony for Great Lakes operations dates back to the early 1930's. At that time some vessels were equipped with multichannel medium frequency, high frequency sets primarily for the

purpose of maintaining contact between vessels and through public correspondence shore stations and the land telephone system through their home offices.

In 1937 studies were made to increase the usefulness of radio-telephone for safety and navigation. Basic safety, distress, and operational requirements were determined from these studies.

The navigating officers of every radiotelephone-equipped ship should be able to contact and intercommunicate with the officers of every other radiotelephone-equipped ship distant not more than about 50 miles. Similar contact and intercommunication should be possible between radiotelephone-equipped vessels and a sufficiently large number of shore points to take care of ship-shore distress, safety, and navigational traffic.

There should be provision for the transmission and reception of weather forecasts, other weather information, notices to mariners from the Coast Guard, etc.

The means for meeting these requirements are:

(1) Provide a sufficient number of radio channels to handle required traffic, and equip vessels with multichannel sets.

(2) Designate one of these channels as the safety calling channel, and,where practicable, provide for monitoring this channel with a loud-speaker on the bridge on every radiotelephone-equipped vessel.

(3) Provide controls for rapid switching from the safety calling channel to the appropriate working channel, once contact has been established.

The present integrated safety, navigational commercial ship-shore system utilizing 2182 Kc as a common meeting ground for all types of communication is a result of the 1937 studies and of integrating safety provisions into the previously existing radiotelephone system. In addition to making provision for the use of 2182 Kc, this program also brought into the system the participation of approximately 80 United States Coast Guard stations, all of which were equipped for loud-speaker monitoring on 2182 Kc and for operation on this channel.

The system established in the late 1930's has continued in use with only minor changes since that time. One significant improvement occurred several years ago when the ship-to-ship working channel frequency was changed from 2738 Kc to 2003 Kc. This was done because of a serious interference problem on 2738 Kc.

The traffic load on the Great Lakes radiotelephone system has increased very greatly over the years. However/it has not been possible to add channels to the system because of the large demand by all services for channels in the 2000 Kc portion of the spectrum.

The use of VHF radiotelephone to supplement the 2000 Kc band for short-range applications has improved the system.

These studies commenced in 1945, when operational tests were conducted into the feasibility of using VHF aboard Great Lakes vessels. Since that time, allocations have been provided and equipments built to satisfy the needs of the Great Lakes in this respect.

AVAILABLE CHANNELS

Radiotelephone channels in use on the Great Lakes lie in three frequency bands. These are: medium frequency (MF) band between 2000 and 3000 Kc; high frequency (HF) 4000 to 5000 and 8000 to 9000 Kc bands; and very high frequency (VHF) band between 156 and 162 Mc.

The medium frequency radiotelephone stations that constitute the elements of the system are:

2638 Kc	Ship-to-ship working	Available to all vessels; used pri-
marily by yachts		
2158 Kc ship	Ship-shore public	Available to all U.S. vessels; used
2550 Kc shore		primarily by large U.S. vessels;
Shore Stations of both nations*		
2206 Kc ship	Ship-shore public	Canadian large vessels; shore sta-
2582 Kc shore	correspondence traffic	tions of both nations*
2118 Kc ship	Ship-shore public	Available vessels of both nations;
2514 Kc shore	correspondence traffic	shore stations of both nations*

* These three channels are also used for intercommunication between stations at locks and vessels for the control of traffic through locks.

The following HF channels are available, for use on the Great Lakes for public correspondence ship-shore radiotelephony:

Ship (Kc)		Shore (Kc)	
4108.4	4129.1	4413.8	4434.1
4115.2	8248.1	4420.7	8797.3

A typical large United States vessel on the Great Lakes is equipped with either a six- or an eight-channel MV, HF set, including the calling channel, the intership channel (2003 Kc), and at least one ship-shore channel in the 2000, the 4000, and the 8000 Kc bands respectively. Smaller vessels may be equipped with fewer channels, but in every case a vessel equipped with any 2000' Kc channel under United States rules must also be equipped with the safety calling channel, 2182 Kc, and one MF working channel. Large Great Lakes vessels are being equipped with eight-channel VHF sets. A large number of tugs are

already equipped with four-channel or six-channel VHF sets.

The following types of communications take place on 2182 Kc:

(1) Distress calls and distress communication.

(2) Security calls. A security call is an announcement broadcast on the safety calling channel when the captain of a vessel is about to make a maneuver of which captains of nearby vessels should be informed, as, for instance, entering or leaving a restricted harbor channel.

(3) Contact with any other ship or shore station in the Great Lakes system before handling traffic on the appropriate working channel.

(4) Announcement by shore stations of weather broadcasts and notices to mariners to be made on working channels.

VHF RADIOTELEPHONE

The Great Lakes VHF-FM supplemental radiotelephone system, for which a substantial number of vessels and shore stations of various types, including United States Coast Guard stations, are already equipped, has a total of 11 channels. One of these is designated as the safety calling channel. The other 10 are working channels provided for the performance of various communication functions.

Of the 10 working channels provided in the VHP system, 8 are designated for navigational and operational functions and 2 are for public correspondence.The performance of all of the communication functions of concern in connection with the operation of large Great Lakes vessels requires that they be equipped with 8-channel sets.

The VHF safety calling channel 156.8 Mc serves the same function in the VHP system as is served by 2182 Kc in the medium frequency system. Each VHF equipped vessel should carry a loud-speaker in the pilothouse for the purpose of continuously monitoring 156.8 Mc while under way. Once contact between two stations has been established on this channel, the shift is to the appropriate working channel provided for the specific communication function to be performed.

Federal Communications Commission rules require that every vessel and every shore station equipped for the VHF system be equipped to monitor and communicate on 156.8 Mc.

In the medium frequency system there is available only one ship-to-ship channel. The VHF system provides three. These are the General Intership (156.3 Mc), required by the rules of the Federal Communications Commission on all VHF equipped vessels; a Second Intership (157.0 Mc), available only to large vessels; and a Third Intership (156,7 Mc), available only to small vessels.

The navigating officers of large vessels, when meeting and passing in confined waters and particularly when within radar range of one another, have ship-to-ship communication problems peculiar to themselves and of little concern to those operating small vessels. Therefore, it is recommended that 157.0 Mc be the first choice for ship-to-ship intercommunication between large vessels. If at any time there is need for communication between a large vessel and a small vessel, then 156.3 Mc is used; 156.3 Mc is also available for ship-to-ship traffic between large vessels as required.

In the medium frequency system there is no working channel for use between vessels and Coast Guard shore stations. Therefore, it is

permissible to use 2182 Kc, not only for contacting Coast Guard stations but also for Coast Guard traffic. The use of 2182 Kc for traffic is unfortunate but necessary in the medium frequency system.

In the VHF system a specific Coast Guard working channel (157.2 Mc) is provided so that after contact has been made with a Coast Guard station traffic can be handled on 157.2 Mc.

On the Great Lakes, 156.6 Mc serves two navigational functions. It is available as a working channel between vessels and locks masters' offices at St. Marys Falls and in the Welland Canal area. It is also available for direct communication between vessels and tugs during maneuvering operations.

The 156.5 Mc band is available for communication between commercial vessels and shore operational stations such as those being established at tug dispatch stations, coal docks, ore docks, and similar points. Therefore, it is recommended that all VHP sets secured for vessels belonging to members of The Lake Carriers' Association be capable of operation on 156.5 Mc, according to the RTCM.

The VHF system provides two duplex public correspondence working channels for use in communication with public correspondence shore stations where interconnection with the land telephone system is desired. Here the same procedure is applicable in establishing contact between stations. These are 157.3-162.0 Mc and 157.4-161.9 Mc. Where vessels are equipped with selective ringers, they may be contacted from shore directly on the appropriate working channel. Selective ringers on ship-borne public correspondence receivers are desirable.

The VHF system provides for new functions of concern in connection with operation of large vessels that have not been provided for in the past. In time, all harbor tugs and tug dispatch offices will be equipped for VHF. There is provided a channel (156.9 Mc) for communication between tugs and tug dispatch offices. This is not available to large vessels. However, there is also a channel that may be used by the navigating officers of large vessels for communicating directly with tug dispatch offices. This is 156.5 Mc.

The 156.6 Mc band is available for direct communication between tug and large vessels during maneuvering operations. The value of this type of inter-communication has already been demonstrated many times.

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Appendix C VHF-FM INSTALLATIONS

Within the past three or four years, the Coast Guard has been installing VHF-FM 150 Mc/s band radiotelephone equipment in the major port areas of the United States. A compilation of facilities, completion dates, and number of various units employing VHF-FM is attached hereto. Base stations maintain a guard on 156. 8 Mc/s and have available another transmitter/receiver capable of operation on one of four channels - 156.8, 156.6, 157.1, and 157.2 Mc/s. Some base station installations have remote transmitters and receivers designed to give maximum coverage of the water area. Vessels are also equipped with four channel equipment and are capable of operation on 156.8, 156.3, 157.1, and 157.2 Mc/s.

Also in operation are stations located in the Saint Mary's River area of the Great Lakes centered upon Sault Ste. Marie, Michigan. At present there are six base stations in this area with a central control station located at Sault Ste. Marie, locally known as the SOO. The movement and anchorage of vessels transiting the St. Mary's River and the approaches to the SOO locks between Lake Superior and Lake Huron are controlled by these stations. A continuous guard is maintained by these stations on the safety and calling frequency 156. 8 Mc/s. Working with non-government vessels is done on 157.2 Mc/s. Additionally, these stations are equipped to operate on 156. 3 Mc/s, and on an exclusive government channel 157.1 Mc/s.

The following frequencies will be used in all the below listed port areas. The first three frequencies are standard and recommended by the International Maritime VHF Radiotelephone Conference (The Hague, 1957). The other two frequencies are made available to the Coast Guard for port operations by a national allocation agreement.

156. 3 Mc/s. - Intership
156. 6 Mc/s - Ship-shore
156. 8 Mc/s - Calling and Safety
157.1 Mc/s - Coast Guard Liaison with non-government vessels
157. 2 Mc/s - Coast Guard - Port Working frequency

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Appendix D *(Partial)*

LIST OF MARINE FREQUENCIES

	Ship TX	Ship RX
Mississippi River, Channel 5	**2782**	**2782 3)**
Mississippi River, Channel 1	**4067**	**4067**
Mississippi River (alt. Ch. 1)	**4372.4**	**4372. 4**
U. 8. Great Lakes:		
Calling & Coast Guard, Ch. 51	**2182**	**2182**
Telephone, Channel 39	**2118**	**2514**
Telephone, Channel 30	**2158**	**2550**
Ship to Ship, Channel 40	**2003**	**2003**
Telephone, Channel 60	**4115.3**	**4420.7**
Telephone, Channel 38	**2206**	**2582**
Telephone, Channel 20	**4129. 1**	**4434. 5**
Canadian Great Lakes:		
Ship to Ship	**2003 Kc**	**2003 Kc**
Calling and Distress	**2182**	**2182**
Telephone	**2118**	**2514**
Telephone	**2206**	**2558**
Telephone	**4108.4**	**4413.8**
Ship to Ship East of Montreal	**2738**	**2738**