Appendix B
Interoperability Test Procedures and Recorded Data

Bench Tests Procedures

The interoperability of 25 and 12.5 kHz channelized marine VHF radios was bench tested by measuring the sensitivity of 25 kHz receivers with a 12.5 transmitter and the sensitivity of 12.5 kHz receivers with a 25 kHz transmitter. The sensitivity of 25 kHz receivers to a 12.5 kHz transmitter was performed using the test set-up below in Figure B-1. The frequencies selected for these tests are described in Appendix F.

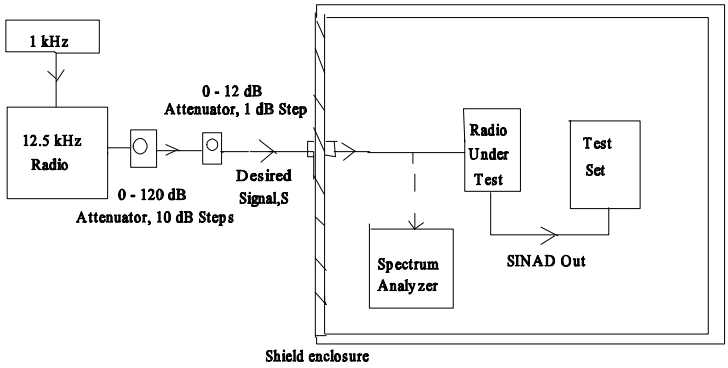

Figure B-1
25 kHz Receiver Interoperability Bench Test Set-up

The following steps were taken to perform the tests on the 25 kHz radio receivers:

1. The 12.5 kHz radio was set to the same channel as the 25 kHz radio being tested.

2. The 12.5 kHz radio was modulated by a 1 kHz tone adjusted in amplitude to produce a 2 kHz signal deviation.

3. The RF output of the 12.5 kHz radio, S, was fed through the step attenuators and then through the shielded enclosure. This signal was then connected to the RF input of the 25 kHz radio being tested.

4. The 12.5 kHz radio was keyed so that it would transmit. The step attenuators were set to their maximum values and then adjusted till the output power of the 12.5 kHz radio produced a 15 dB SINAD for the 25 kHz radio being tested.

5. The power of the desired signal, S, was measured in dBm with the spectrum analyzer and its value recorded.

For testing the interoperability of 12.5 kHz radio receivers with 25 kHz transmitters, the test set was used as the desired signal transmitter. The amplitude of the internal 1 kHz tone generator in the test set was set to a value that would produce a 3 kHz signal deviation. The RF power output of the test set was connected to the RF input of the 12.5 kHz radio and its level adjusted through a front panel control. The RF power of the test set was increased from -139 dBm to a value that would produce a 15 dB SINAD on the 12.5 kHz radio. A diagram of this test set-up is shown below in Figure B-2.

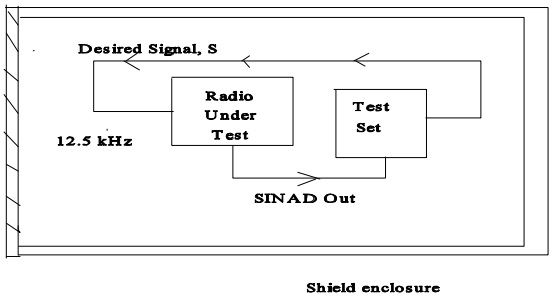

Figure B-2
12.5 kHz Receiver Interoperability Bench Test Set-up

The value of the RF power of the test set was recorded from the front panel in dBm when the SINAD measured 15 dB.

Bench Test Results

The results of the bench interoperability tests between a 12.5 kHz transmitter and the 25 kHz receivers are contained in the following paragraphs.

Simplex marine channel 22A was used as the desired signal channel for testing the interoperability of a 12.5 kHz transmitter with 25 kHz receivers. Column one in Table B-1 lists the receiver model and column two lists the amount of power in dBm for the 12.5 kHz transmitter to produce a 15 dB SINAD in the 25 kHz receiver. Column three lists the desired signal power in dBm from a 25 kHz transmitter required to produce the 15 dB SINAD.

Table B-1
25 kHz Receivers Interoperability Bench Data

Receiver	12.5 kHz Desired Signal, S (dBm)	25 kHz Desired Signal, S (dBm)
Receiver A	-111	-114
Receiver B	-117	-119
Receiver E	-114	-115
Receiver F	-116	-116
Receiver G	-110	-115
Receiver H	-111	-115
Receiver I	-113	-117
Receiver K	-118	-118

The results of the bench interoperability tests between a 25 kHz transmitter and the 12.5 kHz receivers are contained in the following paragraphs.

Simplex marine channel 22A and duplex marine channel 85 were used as the desired signal channels for testing the interoperability of a 12.5 kHz receiver with a 25 kHz transmitter. Column one in Table B-2 contains the receiver type or category and column two lists the amount of power in dBm required for the 25 kHz transmitter to produce a 15 dB SINAD in the 12.5 kHz receiver. Column three lists the desired signal power in dBm from a 12.5 kHz transmitter required to produce the 15 dB SINAD. Radio C was used as the 12.5 kHz receiver in both cases.

Table B-2
12.5 kHz Receiver Interoperability Bench Data

Receiver	25 kHz Desired Signal, S (dBm)	12.5 kHz Desired Signal, S (dBm)
Simplex	-119	-117
Duplex	-118	-117

Radiated Test Procedures

The interoperability of 25 and 12.5 kHz channelized marine VHF radios was tested in a maritime environment by measuring the sensitivity of 25 kHz receivers with a 12.5 transmitter. The sensitivity of the 25 kHz receivers with a 25 kHz transmitter was previously measured during the interference susceptibility tests described in section 4.0 of this report. The sensitivity of 25 kHz receivers to a 12.5 kHz transmitter was performed using the test set-up below in Figure B-3.

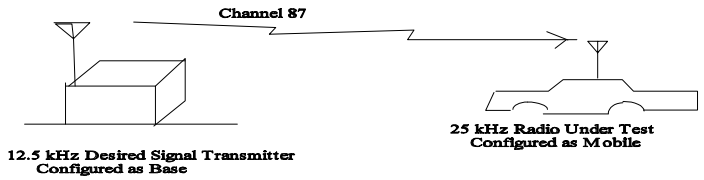

Figure B-3
25 kHz Receiver Interoperability Radiated Test Set-up

The following steps were taken to perform the tests on the 25 kHz radio receivers:

1. The 12.5 kHz radio and the 25 kHz radio being tested were both set to channel 87.

2. The 12.5 kHz radio was modulated by a 1 kHz tone adjusted in amplitude to produce a 2 kHz signal deviation.

3. The RF output of the 12.5 kHz radio was connected to an antenna located on the roof of the test facility.

4. The 25 kHz receiver was located in a car. The RF input to the radio was connected to adjustable RF attenuators and then to a whip antenna mounted on the roof of the car. The 12.5 kHz radio was keyed so that it would transmit.

5. The car then moved 2 miles north of the test facility and stopped. The level of the received desired signal power was then adjusted with the step attenuators till the SINAD of the radio being tested measured 15 dB with the communications test set. At that point the power of the desired signal at the receiver input was measured in dBm with the spectrum analyzer and its value recorded. The location of the car was determined in latitude and longitude with a GPS receiver.

6. Steps one through five were repeated for each radio being tested.

Radiated Test Results

The results of the interoperability tests with a 12.5 kHz transmitter and the 25 kHz receivers are contained below in Table B-3. Column one lists the 25 kHz receiver being tested, column two shows the desired signal power at the 25 kHz receiver input required to produce a 15 dB SINAD from a 12.5 kHz transmitter. Column three shows the desired signal power from a 25 kHz transmitter required to produce the 15 dB SINAD.

Table B-3
25 kHz Receivers Interoperability Radiated Data

25 kHz Radio	**12.5 kHz Desired Signal, S (dBm)**	**25 kHz Desired Signal, S (dBm)**
Receiver A	-115	-107
Receiver B	-119	-126
Receiver E	-113	-108
Receiver F	-115	-105
Receiver G	-116	-111
Receiver H	-115	-113
Receiver I	-116	-124
Receiver K	-116	-112

The locations of the desired signal transmitter and the radio under test are shown below in Table B-4.

Table B-4
Transmitter and Receiver Locations

	Latitude	Longitude
Desired Transmitter	27E 53.147' N	82E 45.679' W
Radio under test	27E 54.943' N	82E 45.976' W