



IEC TC 80 WG 15 MTG29
Liaison note to ETSI TG26 and RTCM SC119
14-September-2018

INTERNATIONAL ELECTROTECHNICAL COMMISSION

TECHNICAL COMMITTEE 80: Maritime navigation and radiocommunication equipment and systems. Working Group 15.

Liaison note to ETSI TG26 and RTCM committee SC119

On the development of Man Overboard Devices (MOB)

I. Discussion

During the IEC TC80 WG15 meeting held during September 2018 at BSI Headquarters in London, UK, preparing a new work item proposal document for Man Overboard (MOB) alerting and locating devices, the acceptable level of DSC receiver performance required for a MOB device to comply with ITU-R M.493-14 for a class M device was discussed. The paper 'Receiver Requirements for MSLD devices 20180509 oceansignal.pdf' and the currently published National/Regional standards, RTCM SC11901.1 (including amendments 1 and 2) and ETSI EN303 132 v1.1.1 (2017-03) were considered.

Both the RTCM and ETSI drafting committees have based the performance of the DSC receiver for the MOB/Maritime Survival Locating Devices (MSLD) on pre-existing standards for the VHF Class D DSC receiver specified in IEC62238 and EN302 025 (edition in force at the time of drafting).

The discussion in the IEC TC80 WG15 highlighted that this receiver performance may exceed the practical needs for a MOB device and may result in a larger than necessary product with increased battery consumption resulting in lower operational life. A number of MOB devices are fitted directly inside Personal Flotation Devices (PFDs) for activation at the time of the PFD inflation and the drive by PFD manufactures to make PFDs that are as small as possible.

Based on the predicted range on the maximum rated EIRP of a MOB of 1 Watt to a VHF DSC transceiver rated at 25 Watts transmit power, the workgroup discussed using the principle of reciprocity, the sensitivity of the receiver could be reduced by up to 12 dB compared to the normal DSC receiver.

It is proposed to reduce the receiver sensitivity by 12 dB.

II. Action requested by ETSI TG26 and RTCM committee SC119

IEC TC80 WG15 requests that ETSI TG26 and RTCM SC119 take note of the proposal above.

Receiver Requirements for MSLD devices

Introduction

The recently published amendments to the standard "SC119: Maritime Survivor Locating Devices" include receiver requirements for devices using open loop DSC techniques for transmitting MOB alerts and position. These requirements appear to have been taken from IEC62238 without modification. IEC62238 is the standard for 25Watt class D VHF radiotelephones. This paper seeks to question the need for such high level receiver standards and suggests an alternative proposal.

The situation

The MSLD is typically a small, body worn device with limited transmission power. By virtue of its low power, relatively small antenna and proximity to the water, the transmission range is likely to be much lower than from a traditional VHF DSC transceiver.

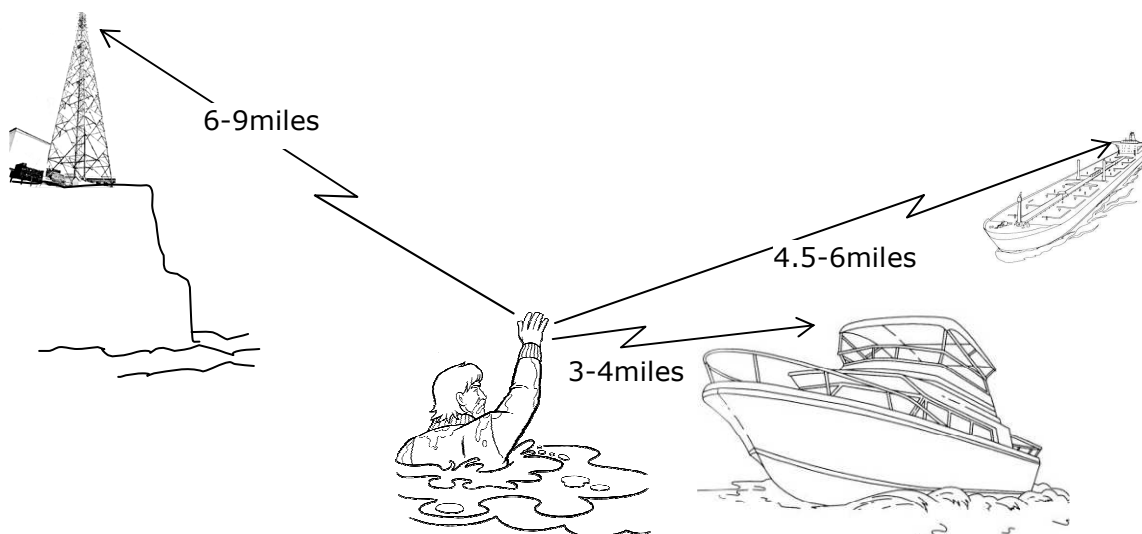


Figure 1: Diagram showing stations likely to be involved in MOB situation

The above assumes that the height of the MOB antenna is between 0.5 and 1metre above the sea level.

From Figure 1 above we can see that the range of a 500mW¹ MOB device on channel 70 will be limited. Unlike the 25Watt transmission of mobile

¹ The maximum power allowed in SC119 Annex D.

marine stations, the MOB has not only lower power, but significantly lower antenna height, which will significantly reduce the transmission range of the device.

Discussion

By simply taking the conducted power of a normal DSC mobile station of 25Watts (44dBm) and the maximum MOB device power of 0.5Watt (27dBm), we can see that the power has been reduced by a factor of 17dB. Assuming line of sight transmission, this will lead to a reduction in range² from 17miles to 6miles, assuming the height of the MSLD antenna is less than 0.5 metres and the receiver is a coast station with a 30 metre high antenna with a gain of 6dB.

An MSLD device is required to include a DSC receiver. *First, to ensure compliance with ITU-R M.541-9 it should be used to ensure that the transmitter is prevented from sending a DSC call until the channel is free.* Secondly the DSC receiver will be required for the reception of acknowledgment calls to stop the auto-repetition of DSC transmissions when the MOB is in an open loop situation. (receipt of other calls may also be beneficial, for instance for position reporting after the Distress transmissions are terminated).

The requirements in RTCM SC119 Annex A.5 for DSC receiver performance are as follows. These performance levels correspond to the requirements on both IEC62238 and ETS301 025 for 25Watt class D transceivers (Under normal environmental conditions)

Requirement	Wanted	Unwanted	Ratio	
MUS DSC	0dB μ V	-	-	
Co-Channel Rejection	+3dB μ V	-5dB μ v	-8dB	
Adjacent Channel Selectivity	+3dB μ V	+73dB μ	70dB	
Intermodulation Response	+3dB μ V	+68dB μ V	65dB	
Spurious Response Blocking Immunity	+3dB μ V	+73dB μ V +93dB μ V	70dB 90dB	
Dynamic range	0dB μ V	100dB μ V	100dB	

From the range discussion above we can see that the transmission range is reduced by a factor of [5/17], or in power terms 17dB. By reciprocity, the signal that the MSLD will receive from a 25Watt station transmitting the DSC acknowledgment at maximum range will be 17dB stronger than might be received by a 25Watt set working at maximum distance.

² Using the Egli model for path length calculation.

Therefore it makes sense that the receiver performance should be relaxed over that required for a 25Watt DSC transceiver. The following table of requirements suggest simply reducing the required receiver sensitivity by 17dB and adjusting the input level of the wanted signal accordingly. The absolute levels of the unwanted signals (except co-channel) remain the same. This is a valid assumption as the MOB device is likely to operate in the same or lower level RF environment than the receiver in a 25Watt radio will be exposed to in a similar location. If the unwanted input levels are acceptable to be used for normal DSC receivers, then there is no reason to suggest changing them for the MOB device.

This leads to the following conclusion on the required specification.

Requirement	Wanted	Unwanted	Ratio	
MUS DSC	+17dB μ V	-	-	
Co-Channel Rejection	+20dB μ V	+12dB μ v	-8dB	
Adjacent Channel Selectivity	+20dB μ V	+73dB μ	53dB	
Intermodulation Response	+20dB μ V	+68dB μ V	48dB	
Spurious Response Blocking Immunity	+20dB μ V	+73dB μ V +93dB μ V	53dB 73dB	
Dynamic range	+17dB μ V	100dB μ V	83dB	

Ocean Signal therefore propose that the above receiver sensitivity is used for MOB devices using DSC.

Alternative proposal

In Europe there is an ETSI standard for short range devices (EN300 220), which defines three categories of receiver performance. Category 1, applicable to MSLD devices, is defined as "Highly reliable SRD communication media; e.g. serving human life inherent systems (may result in physical risk to a person)." This recognises that the receiver for category 1 is to be of a higher standard than those categories where there is no risk to persons. The requirements for receiver performance in EN300 220 are as follows.

Requirement	Wanted	Unwanted	Ratio	
MUS	+6dB μ V	-	-	
Co-Channel Rejection				
Adjacent Channel Selectivity	+3dB		54dB	
Intermodulation Response				

Blocking Immunity	+3dB	+93dB μ V	84dB	
Spurious Response	+3dB		60dB	
Dynamic range				

Note: the wanted signal is adjusted to the MUS of the device, then increased by 3dB

Call channel loading

From ITU-R M.822, the call channel loading that VHF Channel 70 can be expected to handle is 500calls/hour. It is unlikely that MOB usage will have any real impact on this level, which was determined at a time when the uptake of DSC for public correspondence was assumed to be a significant factor on DSC calls made.