

IALA DOCUMENTS

SHIP INSTALLATIONS – RADIO - INTERFERENCES

Introduction

SOME IALA paper are dispatched since 2004. They consider usually shore installations, but they could be also appropriate for ship installations. Also, it is necessary to precise some informations, particularly about radio interferences on the ship.

IALA Recommendation V-128 Annex 4 Performance requirements for radiocommunications in VTS / 6 design and installation / Interference:

Radiocommunications equipment on the ship aren't able transmitting and receiving different communications VHF in the same time except in duplex mode. If one VHF transmitter in bord is in function, all the others VHF equipments (receivers and AIS) are desensitised whatever the channel utilised. The coverage in reception is absent or reduced at 1 or 2 nautical mile.

IALA Guidelines 1028 The automatic identification system (AIS)

- *9.1 end of article: “don't forget that reception coverage of AIS data is absent or reduced to 1 or 2 nautical mile on the ship if local VHF radio is in transmission mode, that is specially important in mode ship-to-ship for collision avoidance”*
- *12 caution when using AIS, add : “the mariner must always remember that AIS use a VHF carrier and the coverage in reception mode is absent or reduced at 1 to 2 nautical mile if their local radio VHF is in transmission.*
- *Annex 1 IMO Guidelines for installation of shipborne automatic identification system (AIS) / VHF ANTENNA INSTALLATION / 3.2.1 location :*
 - ➔ *the disposition (2 meters in vertical separation or 10 meters in distance) protect the receiver, but is not able to reduce the interference effects and the coverage of the reception (AIS or radio VHF) is absent or reduced at 1 or 2 nautical mile.*

IALA VTS MANUAL

1021 Coverage considerations

For up to date shore installations there should be no interference between AIS and local VHF equipments, but these requirements are not possible for ship station and the VTS operator should be inform that the coverage of the ship reception AIS equipment is absent or reduced to 1 or 2 nautical mile if there are in same time a VHF transmission, and should use short VHF message.

Technical explanation for ship installations

The standard radio transmitter-receiver equipment is not able to manage transmission in the same time as receive except in duplex mode.

In bord, there is no requirement for multiple receive and transmit functions in IEC or ETSI documents. If all the transmitter-receiver in bord are near each other, direct coupling generate local interferences in the equipments. If all the transmitter-receiver are enough separate in different cabinet, the isolation proceed of the antennae decoupling. A disposition of 2 meter in vertical separation or 10 meter in horizontal separation make an isolation of 30 dB, that reduce the interference with radio VHF.

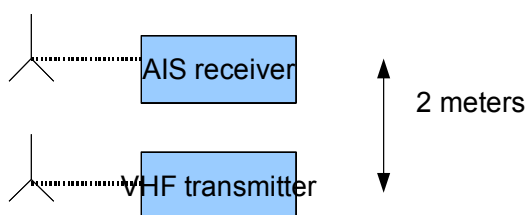


figure 1 isolation between antennae

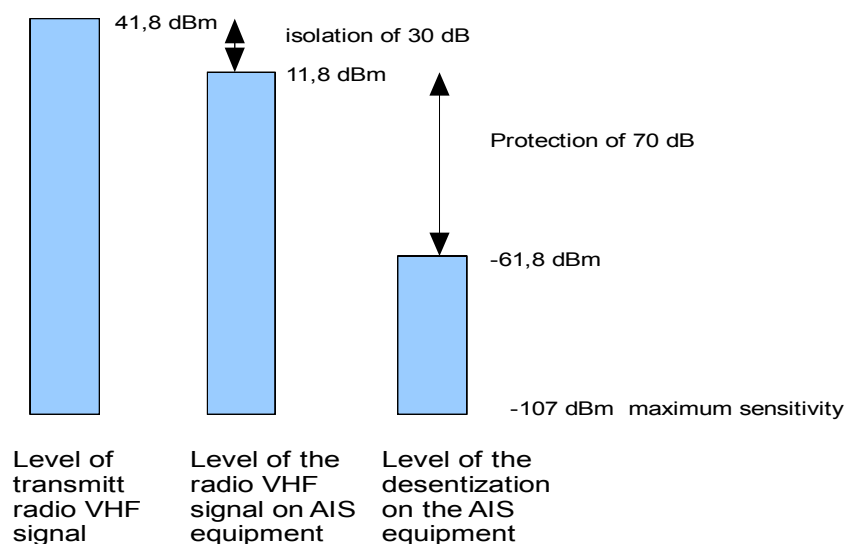


figure 2 statement of interferences

We have to consider 4 interference mode :

- 1. desensitization of VHF reception by AIS carrier transmission*
- 2. desensitization of VHF reception by AIS spurious transmission on VHF receive frequency*
- 3. desensitization of AIS reception by VHF carrier transmission*
- 4. desensitization of AIS reception by VHF spurious transmission on AIS frequency*

1 and 2 are very burst and inaudible.

3 and 4 are to evaluate

The technical characteristics of the transmitter and receiver are precise in IEC 60489-3 (61097-7), ETSI EN 300 086

The selectivity of the receiver for adjacent channel is specified at 70 dB. For channels away, we consider that the characteristics is a little better, but we may be careful and we propose the same protection.

The effective radiated power in adjacent channel is specified at 70 dB below the carrier power for adjacent channel. For channels more away, we consider for the same reason the same characteristic.

The appropriate protection of AIS for VHF radio equipment for selectivity or effective radiated power in the channel AIS is therefore 70 dB.

The figure 2 show that the level of AIS signal of another ship should be more than the level of desensitisation (– 61,8 dBm). The level of this AIS signal is therefore:

$$N = \text{level radiated (15 W)} = 41,8 \text{ dBm} - \text{level of desensitisation (61,8 dBm)} = 100 \text{ dB}$$

The distance between the two ships is calculate by the weakening of the wave by propagation over the sea.

$$\text{Weakening } [dB] \approx 32,5 + 20 \log [distance [km]] + 20 \log [Frequency [MHz]] + \text{diffraction}$$

we find a distance $d = 3,2 \text{ km}$ or $1,8 \text{ nautical mile}$

The AIS equipment of the ship that is transmitting with local radio VHF is able to receive an AIS message of another ship separate with a distance lower of 1,8 nautical mile.

If we want to increase this distance, we due add filters for improve the selectivity of the AIS receiver and reduce the spurious of the radiated VHF transmission of the local transmitter.

Evaluation

In progress