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**Maritime navigation and
radiocommunication equipment
and systems –
Radar –**

**Part 5:
Guidelines for the use and display
of AIS information on radar**

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PUBLICLY AVAILABLE SPECIFICATION



INTERNATIONAL
ELECTROTECHNICAL
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INTERNATIONAL ELECTROTECHNICAL COMMISSION

**MARITIME NAVIGATION AND RADIOCOMMUNICATION
EQUIPMENT AND SYSTEMS – RADAR –**
Part 5: Guidelines for the use and display of AIS information on radar

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IEC-PAS 60936-5 has been processed by IEC technical committee 80: Maritime navigation and radiocommunication equipment and systems.

The text of this PAS is based on the following document:

This PAS was approved for publication by the P-members of the committee concerned as indicated in the following document

Draft PAS	Report on voting
80/357/PAS	80/375/RVD

Following publication of this PAS, the technical committee or subcommittee concerned will investigate the possibility of transforming the PAS into an International Standard.

This PAS shall remain valid for no longer than 3 years starting from 2003-09. The validity may be extended for a single 3-year period, following which it shall be revised to become another type of normative document or shall be withdrawn.

This PAS document relates to International Standards of the IEC 60936 series and IEC 61993-2. The document has been co-ordinated with IMO Safety of Navigation circular No.217.

MARITIME NAVIGATION AND RADIOCOMMUNICATION EQUIPMENT AND SYSTEMS – RADAR –

Part 5: Guidelines for the use and display of AIS information on radar

1 Scope

This document specifies the minimum operational and performance requirements, methods of testing and required test results and the effect on extant standards, that are recommended to be complied with for optional equipment conforming to Interim Operational Guidelines not inferior to those adopted by the IMO in SN/Circ.217 (11 July 2001) – Interim guidelines for the presentation and display of AIS target information. The scope is further restricted to requirements for superimposition of **selected parts of AIS information** on radar systems. All text of this standard, which is identical to that in IMO SN/Circ.217 is printed in *italics* and the Circular and paragraph numbers are indicated in brackets, for example – (C.217/3.3).

The interim guidelines deal with the graphical presentation, alphanumeric information and the display of AIS target data in standalone or integrated navigational aids or systems and are considered as an interim performance guideline. They should be replaced by the appropriate performance standards after experience has been gained. (C.217/2)

The fusion of AIS and radar plotting (RP) data and information is not detailed in this guideline as it is only permitted when the functionality meets the requirements of an 'Integrated Navigation System', as specified in the relevant IMO Performance Standards.

2 Application

2.1 Intended use of these guidelines

These guidelines are intended to apply to all SOLAS ship's radar and radar plotting displays complying to IMO MSC.64(67) Annex 4¹⁾, IMO A.820(19)¹⁾ and IMO A.823(19)¹⁾.

2.2 Intended application of these guidelines

The application of these Guidelines is intended to reduce OoW workload, provide common training and enhance situation awareness for safety.

2.3 Effects of these guidelines on existing radar

The effect of these guidelines on the extant radar and radar plotting standards is given in Annex A.

3 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 60872-1:1998, *Maritime navigation and radiocommunication equipment and systems – Radar plotting aids – Part 1: Automatic radar plotting aids (ARPA) – Methods of testing and required test results*

¹⁾ As implemented in the IEC 60936 and IEC 60872 series of standards.

IEC 60872-2:1999, *Maritime navigation and radiocommunication equipment and systems – Radar plotting aids – Part 2: Automatic tracking aids (ATA) – Methods of testing and required test results*

IEC 60872-3:2000, *Maritime navigation and radiocommunication equipment and systems – Radar plotting aids – Part 3: Electronic plotting aids (EPA) – Methods of testing and required test results*

IEC 60936-1:2002, *Maritime navigation and radiocommunication equipment and systems – Radar – Part 1: Shipborne radar – Performance requirements – Methods of testing and required test results*

IEC 60936-2:1998, *Maritime navigation and radiocommunication equipment and systems – Radar – Part 2: Shipborne radar for high-speed craft (HSC) – Methods of testing and required test results*

IEC 60936-3:2002, *Maritime navigation and radiocommunication equipment and systems – Radar – Part 3: Radar with chart facilities – Performance requirements – Methods of testing and required test results*

IEC 60945:2002, *Maritime navigation and radiocommunication equipment and systems – General requirements – Methods of testing and required test results*

IEC 61162: *Maritime navigation and radiocommunication equipment and systems – Digital interfaces*

IEC 61993-2:2001, *Maritime navigation and radiocommunication equipment and systems – Universal shipborne automatic identification system (AIS) installation using VHF TDMA techniques*

IEC 62287 AIS class B²⁾

IMO MSC.982(73) *Guidelines on ergonomic criteria for bridge equipment and layout*

IMO SN/Circ.217 (11 July 2001) *Interim guidelines for the presentation and display of AIS target information*

4 Definitions and abbreviations

4.1 Definitions

4.1.1

AIS Symbol 1 – Sleeping target

target symbol indicating the presence and orientation of a vessel equipped with AIS in a certain location. No additional information is presented until AIS targets are activated, thus avoiding information overload. (C.217/1)

4.1.2

AIS Symbol 2a, b, c – Activated target

symbol representing the automatic or manual activation of a sleeping target for the display of additional graphically presented information, including:

- a vector (speed and course over ground or water) (2a);
- the heading (2a); and

2) To be published

- ROT or direction of turn indication (if available) to display the actually initiated course changes (2b) and/or path predictor (if available) (2c). (C.217/1)

4.1.3

AIS Symbol 3 – Selected target

symbol representing the manual or automatic selection of any AIS target for the display of detailed information in a separate data display area. In this area, received target data as well as the calculated CPA and TCPA values will be shown.(C.217/1)

4.1.4

AIS Symbol 4 – Dangerous target

symbol representing an AIS target (activated or not) which has data that contravenes pre-set CPA and TCPA limits. (C.217/1)

4.1.5

AIS Symbol 5 – Lost target

symbol representing the last valid predicted position of an AIS target before the reception of its data was lost. (C.217/1)

4.1.6

association

is a process by which data from AIS and radar plotting are assessed to represent the same physical target

4.2 Abbreviations

ACK	Acknowledge
AIS	Universal shipborne automatic identification system
ALR	Alarm
ARPA	Automatic Radar Plotting Aid
ATA	Automatic Tracking Aid
COG	Course over ground
CPA	Closest point of approach
CSE	Course
DR	Dead reckoning
EPA	Electronic Plotting Aid
EPFS	Electronic Position-Fixing System
EUT	Equipment Under Test
HSC	High Speed Craft
IEC	International Electrotechnical Committee
IMO	International Maritime Organization
MMSI	Maritime Mobile Service Identity
MSC	Maritime Safety Committee of the IMO
ROT	Rate Of Turn
RP	Radar Plotting
SENC	System electronic navigation chart
SOG	Speed over ground
SOLAS	Safety Of Life At Sea (IMO Convention for the Safety Of Life At Sea)
STW	Speed through water
TCPA	Time to closest point of approach
TDMA	Time division multiple access (system in the VHF maritime mobile band)

TTM	Serial output containing the TTM message (IEC 61162)
VDL	VHF data link
VDM	Serial output message containing VDL message (IEC 61162)
VDO	Serial output message containing VDO message (IEC 61162)

5 Functional requirements

5.1 General

5.1.1 Presentation and display of AIS information

In addition to the relevant performance standards, AIS information may be presented and displayed according to the following interim guidelines. (C.217/2)

5.1.2 Display and indication of AIS functions equivalency

As far as practical, the user interface for operating, displaying and indicating AIS functions shall be equivalent to the other relevant functions of the navigational aid. (C.217/2.3)

The AIS functionality, controls and display shall be similar to that provided for radar plotting as far as is practical.

5.1.3 Minimum required AIS information for collision avoidance

The equipment shall provide a facility to enable the user to select at least the minimum AIS information required for aiding collision avoidance and target identification.

The functionality shall aid collision avoidance by employing those selected parts of the AIS information necessary and sufficient for the task. (See Table 1)

5.1.4 Graphical display of AIS capability

The equipment shall have the capability to graphically display AIS targets as symbols.

5.1.5 Indication of AIS functionality

Clear and continuous indications shall be given of the status for AIS functionality and presentation.

5.2 Interfacing requirements

5.2.1 Minimum AIS information input

The minimum recommended selected parts of the AIS information – parts of messages 1, 2, (AIS class A) and optionally 18 and 19 (AIS class B) – that may be input to the own ship's radar for alpha-numeric or graphic display are given in table 1.

Table 1 – Relevant information content input from AIS

Relevant Information for 'Situation Awareness' (Collision Avoidance)			
Information provided by the AIS (data from IMO-AIS Spec.)	AIS-VDL message	AIS presentation interface IEC 61162 sentences	Minimum to be displayed if available by RADAR /RP
Static information			
MMSI	All	VDM	a
Dynamic information			
Target's position	1/2, 18/19	VDM	g
COG	1/2, 18/19	VDM	g, a
SOG	1/2, 18/19	VDM	g, a
Heading	1/2, 18/19	VDM	g
Turn Indicator or ROT	1/2	VDM	g
Where - g = graphic representation, and a = alphanumeric data.			
NOTE 1 Messages 18 and 19 are transmitted by Class B (SOLAS carriage exempt ships) transponders.			
NOTE 2 Incomplete AIS information shall be marked accordingly.			

5.2.2 Output of AIS information

The output from the AIS is specified by IEC 61162 messages (VDM/VDO). If AIS targets are transmitted from the radar using the TTM message, then the type of acquisition field shall be identified with the letter R.

5.3 Processing of information

5.3.1 Zones and limits

If zones or limits for automatic target acquisition are set, these shall be the same for automatically activating and presenting any targets regardless of their source. (C.217/2.2.1) Details shall be included in the manufacture's documentation.

5.3.2 Vector consistency

The vector time set shall be adjustable and valid for presentation of any target regardless of its source. (C.217/2.2.2) Vectors from radar plotting and AIS shall be of the same "time" length and shall all be consistent in presentation.

5.3.3 Equivalency of radar plotting and AIS plotting functions

If radar-plotting aids are used for the display of AIS information, these shall be capable of calculating and displaying collision parameters for AIS equivalent to the available radar plotting functions. (C.217/2.2.3)

5.3.4 (CPA/TCPA) Alarm

In all cases when the AIS functionality is enabled and *if the calculated CPA and TCPA values of an AIS target are less than the set limits,*

- an alarm shall be given; and
- a dangerous target symbol shall be displayed when the system is set to the appropriate range scale.

The pre-set CPA/TCPA limits applied to target data derived from different sensors shall be identical. (C.217/2.2.4)

It may be possible to enable/disable the AIS functionality. When disabled, the AIS CPA and TCPA activity shall also be disabled.

When calculating the CPA/TCPA value of an AIS target the system shall use the last COG/SOG and/or position values as received from AIS. There shall be no filtering or prediction based on the rate of turn.

If a failure of own ship or AIS target COG/SOG or other parameters causes the calculated CPA/TCPA value to be uncertain, a clear indication shall be given (for example AIS symbol triangle outline to be dashed.) Details of the clear indication method shall be provided in the manual.

The use of manual speed, set and drift and echo references shall be disabled when AIS functionality is enabled.

5.3.5 Processing or display overload

An indication shall be provided, when the maximum number of AIS targets that can be displayed has been reached.

The system shall continue to function normally when the maximum anticipated number (for example 500) AIS targets possible to be processed has been reached.

5.3.6 Lost target

If the signal of a dangerous AIS target is not received for a set time dependent on the reporting rates of the AIS target (see Table 2), then:

- a lost target symbol shall appear at the latest predicted position and an alarm be given;
- the lost target symbol shall disappear after the alarm has been acknowledged or after a pre-set time; and

Means to recover the data for a number of last acknowledged lost targets may be provided.

Preferably this function may also be applied to any AIS target within a certain range/distance. (C.217/2.2.5)

Table 2 – AIS Reporting Rates

Category of ship	Nominal reporting interval Class A	Lost target maximum interval Class A	Nominal reporting interval Class B	Lost target maximum interval Class B
Ship at anchor or moored and not moving faster than 3 knots (class B not moving faster than 2 knots)	3 min	18 min	3 min	18 min
Ship at anchor or moored and moving at more than 3 knots	10 s	60 s	N/A	N/A
Ship 0 – 14 knots (class B 2 – 14 knots)	10 s	60 s	30 s	180 s
Ship 0 – 14 knots and changing course	3 1/3 s	60 s		
Ship 14 – 23 knots	6 s	36 s	15 s	90 s
Ship 14 – 23 knots and changing course	2 s	36 s		
Ship > 23 knots	2 s	12 s	5 s	30 s
Ship > 23 knots and changing course	2 s	12 s		