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Maritime navigation and radiocommunication equipment and systems - Digital interfaces - Part 1: Single talker and multiple listeners

Navigations- und Funkkommunikationsgeräte und -systeme für die Seeschifffahrt - Digitale Schnittstellen - Teil 1: Ein Datensender und mehrere Datenempfänger

Matériels et systèmes de navigation et de radiocommunication maritimes - Interfaces numériques - Partie 1: Émetteur unique et récepteurs multiples

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TITLE:

Maritime navigation and radiocommunication equipment and systems – Digital interfaces – Part 1: Single talker and multiple listeners

PROPOSED STABILITY DATE: 2028

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

MARITIME NAVIGATION AND RADIOCOMMUNICATION EQUIPMENT AND SYSTEMS – DIGITAL INTERFACES –

Part 1: Single talker and multiple listeners

FOREWORD

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International Standard IEC 61162-1 has been prepared by IEC technical committee 80: Maritime navigation and radiocommunication equipment and systems.

This sixth edition cancels and replaces the fifth edition published in 2016, and constitutes a technical revision.

This edition includes the following significant technical changes with respect to the previous edition:

- alternative hardware is given in 5.1 which may now be as specified in this document or as specified in IEC 61162-2;
- the data transmission rate given in Clause 6 is now configurable. The default remains as 4 800 (bits/s) but higher rates may be provided;
- new identifiers have been added to Table 4;
- new sentences AGL, EPM, FSC, GDC, NLS, SEL, SLM, SMV and VBC have been added;

- revisions have been made to ABK, ABM, ACN, ALC, ALF, ARC, BBM, DDC, DTM, EPV, FIR, GBS, GFA, GLL, GNS, GRS, GSA, GST, GSV, HRM, NRX, POS, RLM, ROR, RSA, TLB, TTD, VSD and XDR;

The text of this standard is based on the following documents:

FDIS	Report on voting
80/XXXX/FDIS	80/XXXX/RVD

Full information on the voting for the approval of this standard can be found in the report on voting indicated in the above table.

A list of all parts in the IEC 61162 series, published under the general title *Maritime navigation and radiocommunication equipment and systems – Digital interface*, can be found on the IEC website.

This publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

The committee has decided that the contents of this publication will remain unchanged until the stability date indicated on the IEC website under "<http://webstore.iec.ch>" in the data related to the specific publication. At this date, the publication will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

A bilingual version of this publication may be issued at a later date.

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INTRODUCTION

IEC 61162 Maritime navigation and radiocommunication equipment and systems – Digital interfaces consists of 5 parts which specify digital interfaces for application in marine navigation, radiocommunication and system integration, as follows:

- Part 1: *Single talker and multiple listeners;*
- Part 2: *Single talker and multiple listeners, high speed transmission;*
- Part 3: *Multiple talkers and multiple listeners – Serial data instrument network;*
- Part 450: *Multiple talkers and multiple listeners – Ethernet interconnection;*
- Part 460: *Multiple talkers and multiple listeners – Ethernet interconnection – Safety and security*

IEC technical committee 80 interface standards are developed with input from manufacturers, private and government organisations and equipment operators. The information is intended to meet the needs of users at the time of publication, but users should recognise that as applications and technology change, interface standards should change as well. Users of this standard are advised to immediately inform the IEC of any perceived inadequacies therein.

The first edition of IEC 61162-1 was published in 1995. The second edition published in 2000 removed some sentences which were no longer in use, added some new sentences and included details of the ship equipment defined in IMO resolutions together with appropriate sentences for communication between them. This information was subsequently removed from the third edition when it became the practice to specify the sentence formatters in the individual standards for equipment.

The third edition published in 2007 introduced a re-arrangement of the text and new sentences particularly to support the Automatic Identification System and the Voyage Data Recorder. The third edition also introduced a further type of start of sentence delimiter. The conventional delimiter "\$" was retained for the conventional sentences which are now called parametric sentences. The new delimiter "!" identifies sentences that conform to special purpose encapsulation.

The fourth edition removed some sentences which were not in use, added some new sentences for new applications and made some corrections and additions. In particular the sentences of relevance to satellite navigation receivers were expanded to facilitate the description of new satellite systems.

The fifth edition also removed some sentences which were no longer in use, added some new sentences for new applications and made some corrections and additions.

This sixth edition adds some new sentences for new applications and makes some corrections and additions.

This edition has been aligned where appropriate and possible with NMEA 0183 version 4.10.

MARITIME NAVIGATION AND RADIOCOMMUNICATION EQUIPMENT AND SYSTEMS – DIGITAL INTERFACES –

Part 1: Single talker and multiple listeners

1 Scope

This part of IEC 61162 contains the requirements for data communication between maritime electronic instruments, navigation and radiocommunication equipment when interconnected via an appropriate system.

This part of IEC 61162 is intended to support one-way serial data transmission from a single talker to one or more listeners. These data are in printable ASCII form and may include information such as position, speed, depth, frequency allocation, etc. Typical messages may be from about 11 to a maximum of 82 characters in length and generally require transmission no more rapidly than one message per second.

The electrical definitions in this standard are not intended to accommodate high-bandwidth applications such as radar or video imagery, or intensive database or file transfer applications. Since there is no provision for guaranteed delivery of messages and only limited error checking capability, this standard should be used with caution in all safety applications.

For applications where a faster transmission rate is necessary, reference should be made to IEC 61162-2.

For applications to shore based equipment of the automatic identification system (AIS) reference should be made to the IEC 62320 series.

2 Normative references

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

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

ISO/IEC 8859-1:1998, *Information technology – 8-bit single-byte coded graphic character sets – Part 1: Latin alphabet No. 1*

ITU-T Recommendation X.27/V.11:1996, *Electrical characteristics for balanced double-current interchange circuits operating at data signalling rates up to 10 Mbit/s*

3 Terms and definitions

3.1 General

Common terms are defined in the glossary of Annex A. Where there is a conflict, terms are interpreted, wherever possible, in accordance with the references in Clause 2.

78 3.2 Terms and definitions

79 For the purposes of this document, the following terms and definitions apply.

80 3.2.1

81 **CCRP**

82 Consistent Common Reference Point

83 3.2.2

84 **CCRS**

85 Consistent Common Reference System

86 3.2.3

87 **GNSS**

88 Global Navigation Satellite System

89 3.2.4

90 **listener**

91 any device which receives data from another device

92 3.2.5

93 **talker**

94 any device which sends data to other devices

95 Note 1 to entry: The type of talker is identified by a 2-character mnemonic as listed in 8.2 (see Table 4).

96 4 Manufacturer's documentation

97 Installation manuals provided for equipment that is intended to meet the requirements of this
98 standard shall contain the following information:

- 99 a) identification of the A and B signal lines (see Figure 1);
- 100 b) the output drive capability as a talker;
- 101 c) a list of approved sentences, noting unused fields, proprietary sentences transmitted as a
102 talker and transmission interval for each sentence;
- 103 d) the load requirements as a listener;
- 104 e) a list of sentences and associated data fields that are required as a listener;
- 105 f) the current software and hardware revision if this is relevant to the interface;
- 106 g) an electrical description or schematic of the listener/talker input/output circuits citing actual
107 components and devices used, including connector type and part number;
- 108 h) the version number and date of update of the standard for which compliance is sought;
- 109 i) list of supported baud rates (bits/s) including any limitations per each baud rate supported.

110 5 Hardware specification

111 5.1 General

112 NOTE Guidelines on methods of testing are given in Annex B.

113 One talker and multiple listeners may be connected in parallel over an interconnecting wire.
114 The number of listeners depends on the output capability and input drive requirements of
115 individual devices.

116 There are two alternatives for the hardware:

- 117 1) method based on subclauses 5.2 to 5.6;
118 2) method based on IEC 61162-2.

119 **5.2 Interconnecting wire**

120 Interconnection between devices may be by means of a two-conductor, shielded, twisted-pair
121 wire.

122 **5.3 Conductor definitions**

123 The conductors referred to in this document are the signal lines A and B, and shield (see
124 Figure 1).

125 **5.4 Electrical connections/shield requirements**

126 All signal line A connections are connected in parallel with all device A connections and all
127 signal line B connections are connected in parallel with all device B connections. The shields
128 of all listener cables should be connected to the talker chassis only and should not be connected
129 at each listener.

130 **5.5 Connector**

131 No standard connector is specified. Wherever possible readily available commercial connectors
132 shall be used. Manufacturers shall provide means for user identification of the connections
133 used.

134 **5.6 Electrical signal characteristics**

135 **5.6.1 General**

136 This subclause describes the electrical characteristics of transmitters and receivers.

137 **5.6.2 Signal state definitions**

138 The idle, marking, logical 1, OFF or stop bit states are defined by a negative voltage on line A
139 with respect to line B, see Figure 2 for the stop bit.

140 The active, spacing, logical 0, ON or start bit states are defined by a positive voltage on line A
141 with respect to line B, see Figure 2 for the start bit.

142 NOTE The polarity of an output can be easily checked with a multi-meter. If there is no output message (idle state)
143 or only a short message each second, where most of the time the output is in idle state, it can be measured about 2
144 to 5 V at the output with positive polarity at line B.

145 It should be noted that the above A with respect to B levels are inverted from the voltage
146 input/output requirements of standard UARTs and that many line drivers and receivers provide
147 a logic inversion.

148 **5.6.3 Talker drive circuits**

149 No provision is made for more than a single talker to be connected to the bus. The drive circuit
150 used to provide the signal A and the return B shall meet, as a minimum, the requirements of
151 ITU-T Recommendation X.27/V.11.

152 **5.6.4 Listener receive circuits**

153 Multiple listeners may be connected to a single talker. The listener receive circuit shall consist
154 of an opto-isolator and shall have protective circuits to limit current, reverse bias and power
155 dissipation at the opto-diode as shown in Figure 1. Reference to example circuits is made in 9.3.