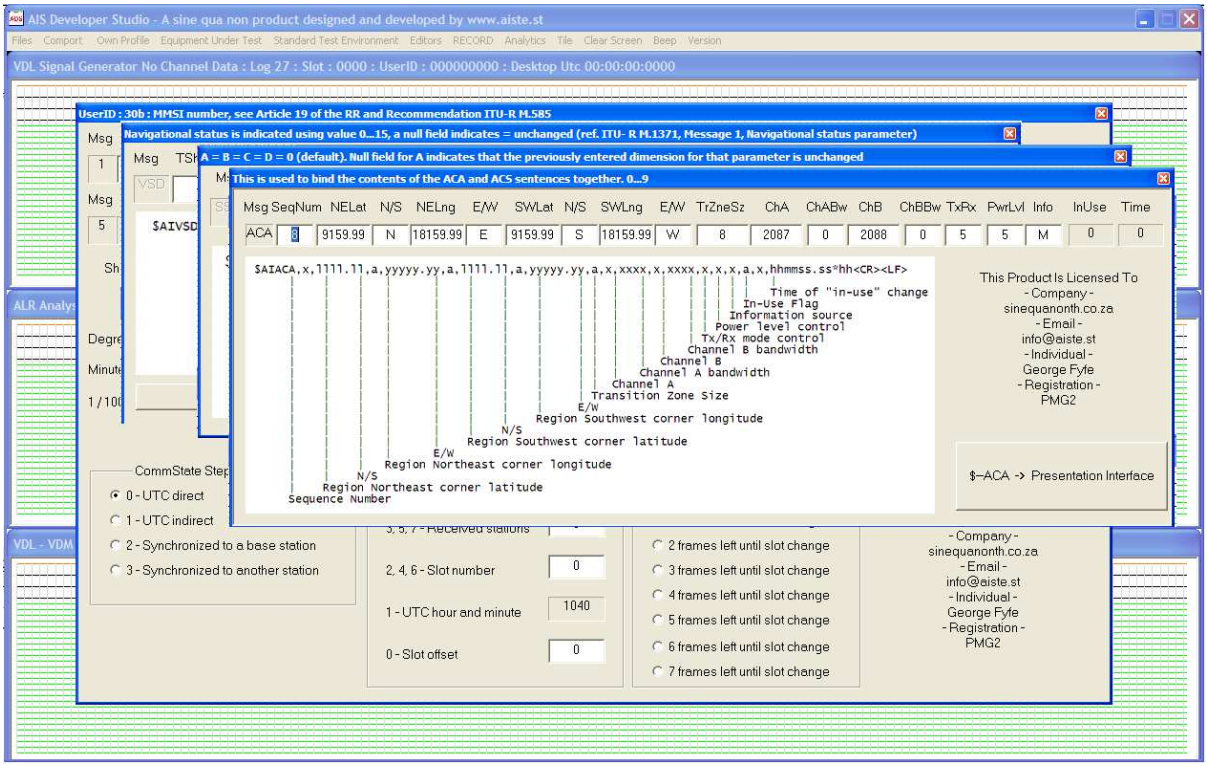

AIS Developer Studio

Release Version 1.0

ITU-R M.1371-5 Technology

TECHNICAL INTERFACE MODULE

NOTICE

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Objective

The objective for the use of the AIS Developer Studio is to create a general VDL environment using a PC and optional external RF signal generator / power pad. Where the choice of the base-band VDL / VDO and VDM data is easily analyzed and defined. As an AID to AIS.

This product should only be used for the purposes intended by its developers and then only according to acceptable reference standards and operating procedures.

Any deviation from this may well be in conflict with competent regional authorities in your area.

The AIS Developer Studio and or Interface/s should not be used to alter the operational status of any AIS unit unless authorized by a competent authority.

Under no circumstances should the AIS Developer Studio and or Interface/s be used to create any signal content outside the scope of this document using any procedure or method offered by the AIS Developer Studio Interface.

AISTE.ST formerly Sine Qua Non would like to take this opportunity to congratulate you on the purchase of one of the AIS Developer Studio suite of products. We want to assure you that this product range is designed using over 22 Years of AIS experience and thoroughly tested to ensure your complete satisfaction.

A demonstration program is provided free of charge. AISTE.ST requires that the user download the demo program and documentation from www.aiste.st and validate it for their respective use prior to placing an order for the un-encumbered licensed version.

Limited Warranty.

Where software discrepancies are identified and or module operational bugs are found. These should immediately be brought to the attention of AISTE.ST. The warranty is limited to the rectification of the discrepancy or bug by software upgrade, and should not exceed the original operational and technical specification as defined by AISTE.ST in the respective AIS Developer Studio module manual.

If you have any questions, queries or customisation requests related to this product, please do not hesitate to contact us by email:

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Thanking you,

AISTE.ST

INTRODUCTION

AIS Developer Studio Overview

The AIS Developer Studio is a synergistic merger of software and hardware modules to create a general AIS development, production, integration and verification environment. It provides a value added service to all users of AIS equipment.

The main objective of the system is to assist in providing different test and monitoring scenarios using the PC workstation as the main control object. It does this by providing interactive modules, which have been streamlined to produce verifiable outcomes.

The Automatic Identification System (AIS Class A) is defined by the IMO and has been made a carriage requirement by the latest revision of SOLAS Chapter V. This does not only require the AIS to be installed, but also to provide information used for ship navigation.

The AIS has been standardised by the ITU and IEC and is subject to type approval. In order to fulfil the reliability requirements of information exchange, product verification must be done at all levels of development to ensure correct AIS inter operability.

Modulation Waveform Generator

The Modulation Waveform Generator module that is embedded in the simulator creates all the required modulation waveforms as set out in IEC61993-2 paragraph 10.4 and IEC 62287 paragraph 8.4 as well as IEC 62320 6.2.4.

It can perform the encoder requirement as set out in these documents. All original PMG1 legacy waveforms are supported.

Data Interfaces

The AIS Developer studio uses the PC workstation hardware equipped with USB to serial com bridges that allow connection to:

VDL Analyser connects to VDO / VDM EUT /RX Presentation Interface (RS232 / RS422)
EUT Ship's Sensors connects to typically GYRO, GPS, COG and ROT Sensor (RS422)
Other NMEA-compliant ship's navigation equipment (RS232 RS422)

Sound Card Interfaces

The stereo line out socket from the internal or external PC sound card supplies base–band or IQ modulation audio for connection to external RF signal generator.

This interface must be set-up for flat (NO EQ) response.

Technical interface requirements

Classification	Operational Verification of the Universal Automatic Identification system (AIS). Reference documentation used in development, recommendation ITU.R M.1371-5, IEC 61993-2, IEC61993-2 paragraph 10.4 and IEC 62287 paragraph 8.4 as well as IEC 62320 6.2.4. IEC 61162-2, IEC 60945 and IMO resolution MSC.74 (69) Annex 3.
AIS Unit Equipment Under Test Presentation Interface	IEC 61993-2, IEC 62287, IEC 62320, M.1371-5 IEC 61162-1, IEC 61162-2.
Requires WINXP / WIN10 compatible USB COM to RS422 bridge interface.	1 Port Required EPFD SENSOR NMEA OUTPUT (EUT RS422)
Requires WINXP / WIN10 compatible USB COM to RS232 bridge interface.	1 Port Required EUT PRESENTATION INTERFACE VDO OUT / VDM IN
Requires WINXP / WIN10 compatible USB COM to RS232 / RS422 bridge interface.	1 Port Required SIMULATOR STANDARD TEST ENVIRONMENT OWN PROFILE VDO OUT Other NMEA-compliant ship's navigation equipment (RS232 RS422)
AIS Modulation	Base band or IQ 9.6kbits/s GMSK(licensed)
AIS Coding	HDLC with bit stuffing
WINXP / WIN10 PC Workstation Sound Card - Line Out	1 Sound Card - Stereo Line Output Socket. Required conversion of digital sources at up to 96 kHz
PC Network Time Synchronization	Network Time Protocol or Simple Network Time Protocol (SNTP) client for Windows XP / 10

Installation

The installation of AIS Developer Studio is as follows. Obtain the latest version of ADSV2.exe and license.txt from www.aiste.st. Create a new folder. Save the downloaded files in the folder. Run the application. This will allow the unit to run in demo mode.

Certain modulation formats will not run in demo mode.

AIS Developer Studio is not freeware.

Once you have evaluated it for your purpose please purchase your license file from www.aiste.st. Save your purchased license.txt file in the above-mentioned folder. This will allow the application to run in full un-unencumbered mode.

The license file will provide full user registration details.

Registered users will receive support if any problems with AIS Developer Studio arise.

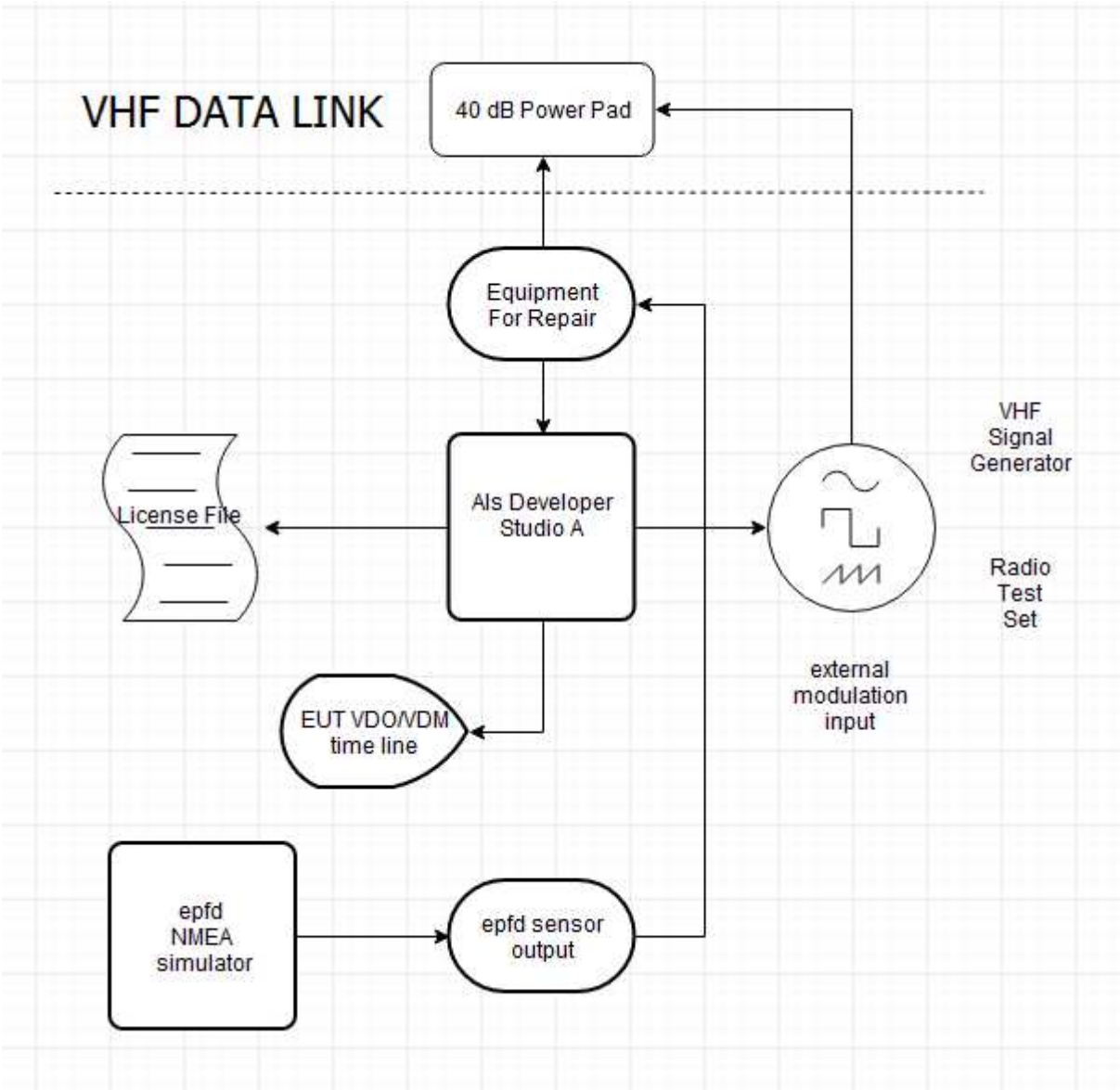
ALL requests for support should be addressed to support@aiste.st explaining any bug or discrepancy as well as a screenshot.

It is the intention of AISTE.ST through the current and further development of the AIS Developer Studio suite of components to continue to supply a cost effective method for development, production, integration and verification of protocols as used by AIS, ASM and VDE.

It is the intention of AISTE.ST to supply upgrades to the AIS Developer suite user group if and when they become available.

Users may subscribe to this upgrade service.

BLOCK DIAGRAM A



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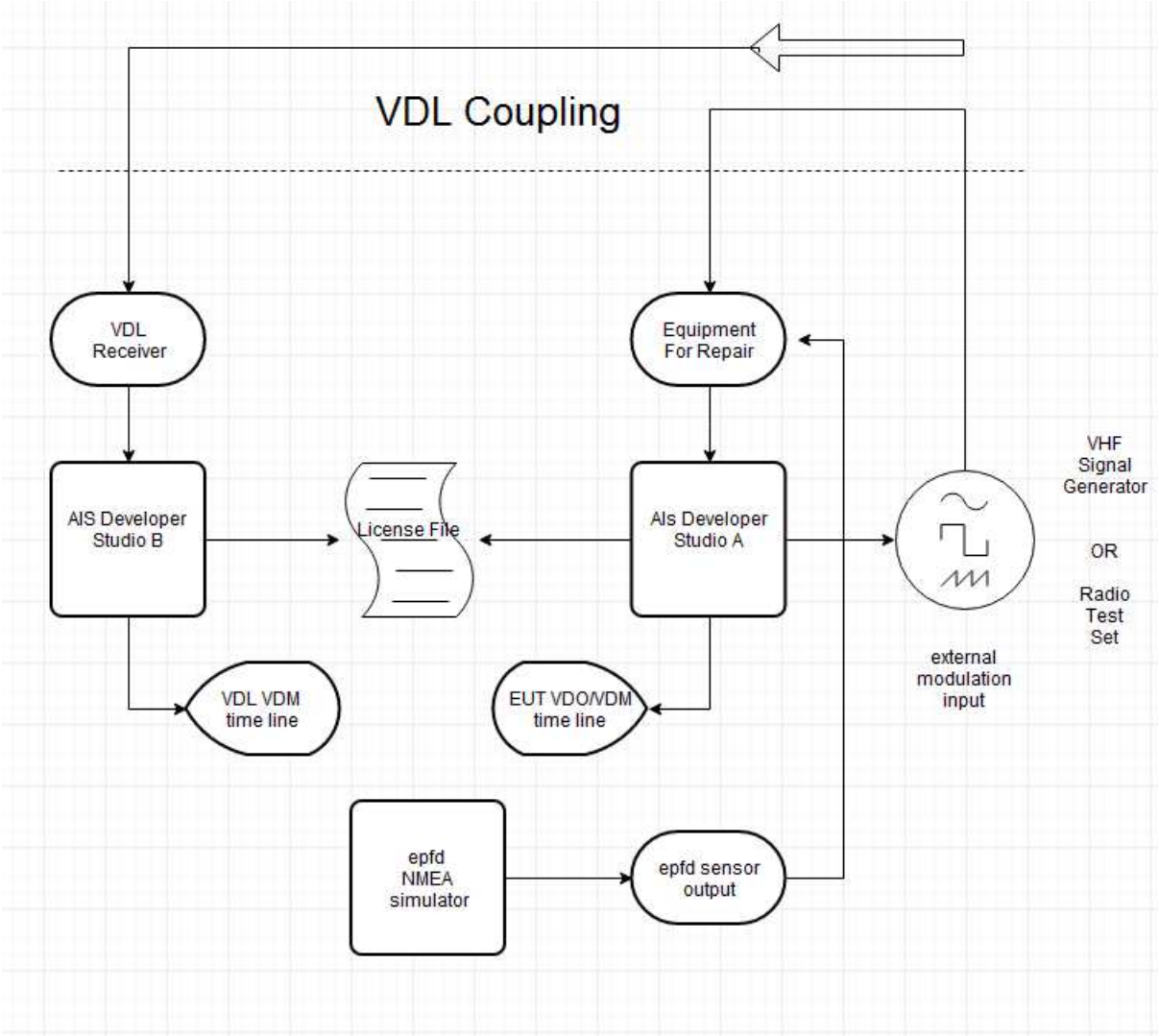

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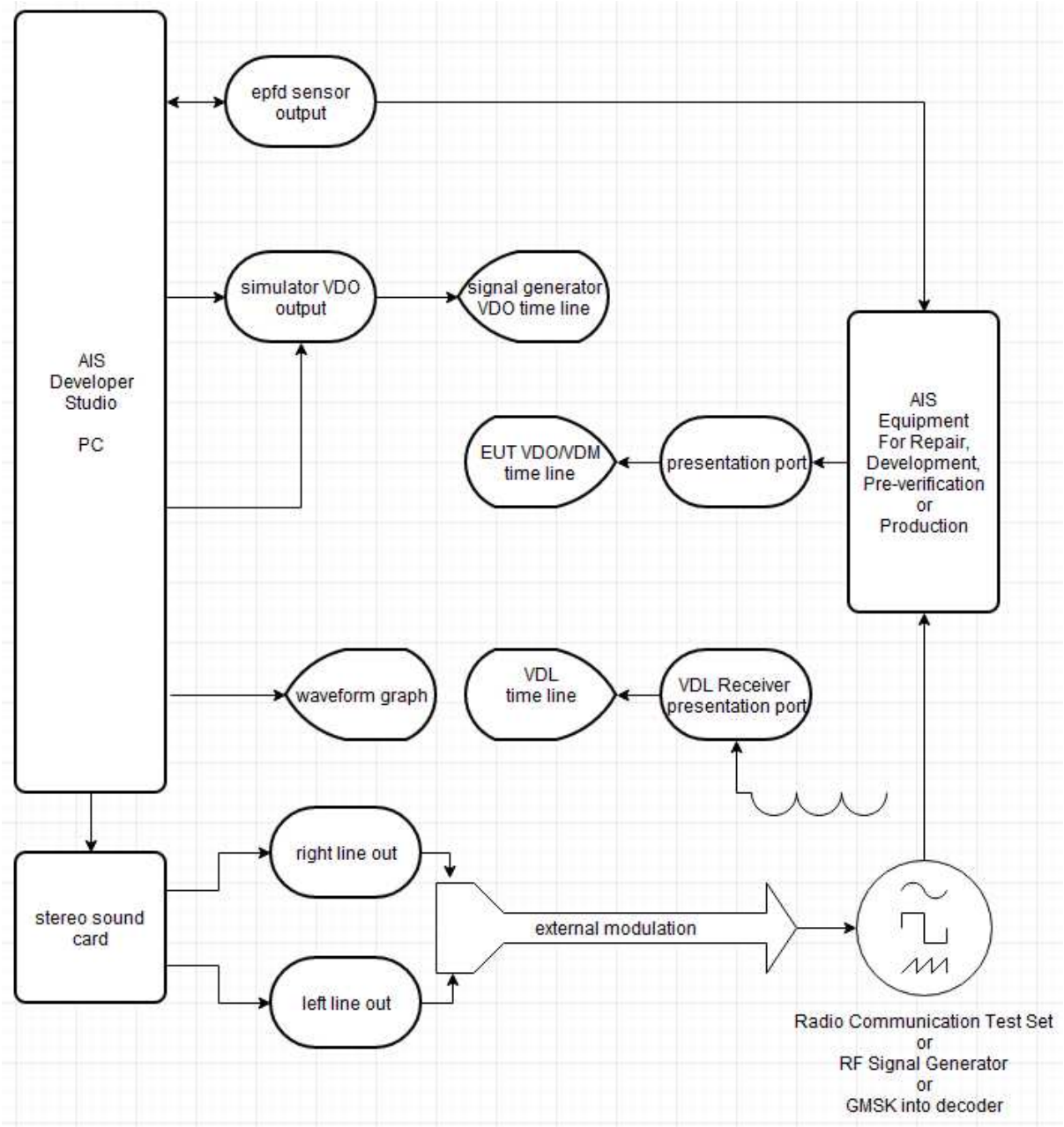

NTP / SNTP

The AIS Developer Studio uses NTP/SNTP network lock to obtain a relative UTC time base. All events are time stamped with the NTP/SNTP network lock.

NTP

The Network Time Protocol (NTP) is a networking protocol for clock synchronization between computer systems over packet-switched, variable-latency data networks. In operation since before 1985, NTP is one of the oldest Internet protocols in current use. NTP was designed by David L. Mills of the University of Delaware.

SNTP

Simple Network Time Protocol (SNTP) is a simplified version of Network Time Protocol (NTP) that is used to synchronize computer clocks on a network. This simplified version of NTP is generally used when full implementation of NTP is not needed.

The accuracy of the UTC time stamp is dependent on your network lock of choice.

EUT Receive process synchronization

Many years ago AIS developers locked there RECEIVE process synchronous to 1PPS.
This was in error as the AIS unit should be able to decode any received RF stream regardless of SLOT SYNCRONIZATION or GPS 1PPS lock.

The following M.1371 guideline is given

3.1.1 TDMA synchronization

TDMA synchronization is achieved using an algorithm based on a synchronization state as described below. The sync state flag within SOTDMA communication state (see § 3.3.7.2.1) and within ITDMA communication state (see § 3.3.7.3.2), indicates the synchronization state of a station (see Figs 3 and 4).

The TDMA receiving process should not be synchronized to slot boundaries.

3.1.1 TDMA Synchronization

"The TDMA receiving process should not be synchronized to slot boundaries."

1. For multiple packet receiver testing in development, the EUT transmitter should be disabled.

2. On an operational unit the EUT's dynamic state should be placed in "Ship at anchor or moored and not moving faster than 3 knots" or 3min nominal reporting interval.

This allows none(1) or minimal clash(2) of VDL packets.

Class A ship borne mobile equipment reporting intervals

Ship's dynamic conditions	Nominal reporting interval
Ship at anchor or moored and not moving faster than 3 knots	3 min
Ship at anchor or moored and moving faster than 3 knots	10 s
Ship 0-14 knots	10 s
Ship 0-14 knots and changing course	3 1/3 s
Ship 14-23 knots	6 s
Ship 14-23 knots and changing course	2 s
Ship 23 knots	2 s
Ship 23 knots and changing course	2 s

Abbreviations

The following is a list of abbreviations used in the AIS Developer Studio Suite

1pps	1 pulse per second
ACK	Acknowledge
AIS	Automatic Identification System
AIS1	Automatic Identification System channel 1 (161.975 MHz)
AIS2	Automatic Identification System channel 2 (162.025 MHz)
ANT	Antenna
BER	Bit Error Rate
BIT	Built In Self Test
BS	Base Station
BT	Bandwidth Time product
COG	Course over Ground
DBR	Differential Beacon Receiver
DSC	Digital Selective-Calling
DTE	Data Terminal Equipment
ECDIS	Electronic Chart Display and Information System
ECS	Electronic Chart System
EPFS/D	Electronic Position Fixing System/Device
ETA	Estimated Time of Arrival
GPS	Global Positioning System
HDLC	High-level Data Link Control
IEC	International Electro-technical Commission
IO	Input-Output
ITU	International Telecommunication Union
KDU	Keyboard Display Unit
LR	Long Range
MMSI	Maritime Mobile Service Identities
NU	Not Used
PA	Power Amplifier
PC	Personal Computer
PER	Packet Error Rate
PI	Presentation Interface
RF	Radio Frequency
ROT	Rate of Turn
RX	Receive
SOG	Speed over Ground
TDMA	Time Division Multiple Access
TX	Transmit
UTC	Coordinated Universal Time
VDL	VHF Data Link
VHF	Very High Frequency
VSWR	Voltage Standing Wave Ratio
ADS	AIS Developer Studio V2
NTP	Network Time Protocol
SNTP	Simple Network Time Protocol

Reference Documents

List of standards and specifications

Document Number	Title
IEC 61162-1	Maritime Navigation and Radio Communication Equipment and Systems - Digital Interfaces: Part 1 - Single Talker and Multiple Listeners.
IEC 61162-2	Maritime Navigation and Radio Communication Equipment and Systems - Digital Interfaces: Part 2 - Single Talker and Multiple Listeners High Speed Transmission.
IEC 61993-2 IEC 62287 IEC 62320	Universal Shipborne Automatic Identification System (AIS).
ITU-R M.1084-2	Interim solutions for improved efficiency in the use of Band 156-174Mhz by stations in the Maritime Mobile Service.
ITU-R M.1371-5	Technical characteristics for a universal ship-borne automatic identification system using time division multiple access in the maritime mobile band.
ITU-R M.493	Digital Selective Calling (DSC) system for use in the Maritime Mobile Service.
ITU-R M.823-2	Technical characteristics of differential transmissions for global navigation satellite systems from maritime radio beacons in the frequency band 283.5 - 315 kHz in region 1 and 285-325 kHz in regions 2 and 3.
ITU-R M.825-3	Characteristics of a transponder system using DSC techniques for use with vessel traffic services and ship-to-ship identification.
ITU Manual	ITU Manual for use by the Maritime mobile and Maritime Mobile-Satellite Services.
IEC 61108-1	Global navigation satellite systems (GNSS) - Part 1: Global positioning system (GPS) - Receiver equipment - Performance standards, methods of testing and required test results.
IEC/EN 60945	Maritime Navigation and Radiocommunication equipment and systems – General requirements-methods of testing and required results

List of Related Software and Manuals

Module	Description	Part number
AIS Developer Studio Software for Windows. Verified to run on WINXP and WIN10	A Windows based application for configuring and testing various AIS products. Various levels of user access available dependent on licence.	ADSV2.exe

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