AIS Developer Studio

Release Version 1.0

ITU-R M.1371-5 Technology

STANDARD TEST SIGNALS

MODULE

NOTICE

This manual is for informational use only, and may be changed without notice. This manual should not be construed as a commitment of AISTE.ST. Under no circumstances does AISTE.ST assume any responsibility or liability for any errors or inaccuracies that may appear in this document or for the incorrect use of this information.

Unless expressly stated in this document, no condition, warranty or representation by AISTE.ST is given and shall not be implied in relation to this document, including any data, hardware or software descriptions, program listings or application information or other information included in this document.

In no event will AISTE.ST or any person or entity involved in creating, producing, distributing or contributing to this document be liable for any damages, including, without limitation, any direct, indirect, incidental, special, consequential or exemplary or punitive damages or any claim for economic loss or loss of profit arising out of the information or the use or the inability to use this information.

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.

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

Physical Address:
28 Mustang Ave
Pierre Van Ryneveld
Centurion
Gauteng
South Africa

Postal Address:
28 Mustang Ave
Pierre Van Ryneveld
Centurion
Gauteng
South Africa

Email: support@aiste.st
                info@sinequanonth.co.za

Website: www.aiste.st
                www.sinequanonth.co.za

Telephone: +27 0722253467

Thanking you,

AISTE.ST

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.

Standard Test Signals

The following M.1371 guideline is given.

10.6 Encoder for receiver measurements

Whenever needed and in order to facilitate measurements on the receiver, an encoder for the data system shall accompany the EUT, together with details of the normal modulation process. The encoder is used to modulate a signal generator for use as a test signal source.

Complete details of all codes and code format(s) used shall be given.

The Sine Qua Non legacy product PMG1 product packed the TDMA sequence for "IEC 61993 Standard Test Signal Number 2 & 3" into a message 8 frame and was used as part of receiver evaluations.

The AIS Developer studio has gone one step further and placed the value 3 in the repeat indicator.

This uniquely identifies this packet within the AIS Developer Studio Environment and produces its own message filter in the time lines display.

Parameter	Number of bits	Description
Message ID	6	Identifier for this Message : 8
Repeat indicator	2	Used by the repeater to indicate how many times a message has been repeated. See § 4.6.1, Annex 2; 0-3; 0 = default; 3 = do not repeat any more

As can be seen from the above M.1371, placing a value of 3 in the repeat indicator is well tolerated in the VDL.

The Standard Test Message Menu is found in the mouse (right click and
 hold) context menu of the Programmable Modulation Generator Time Line.
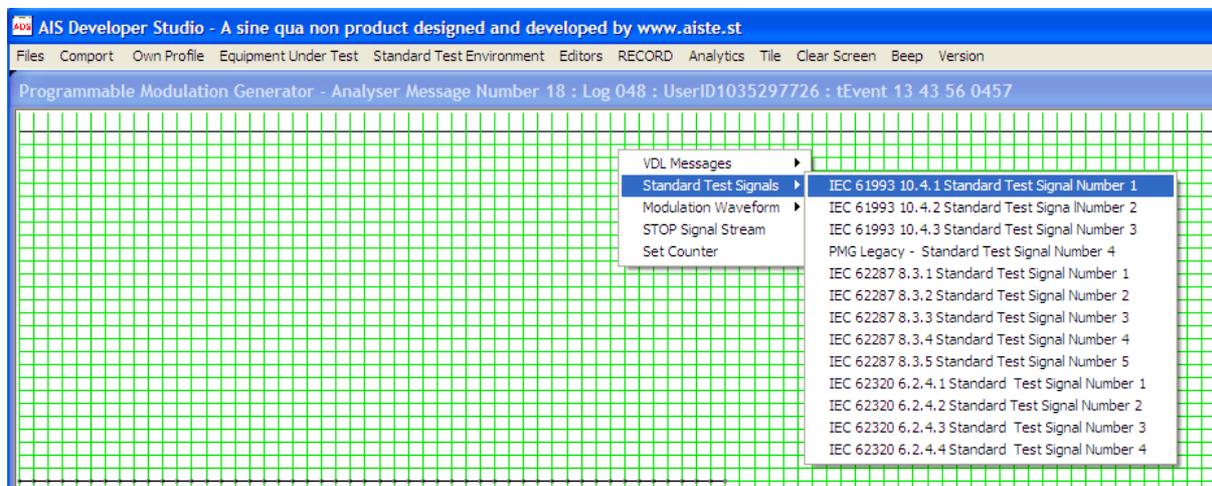
IEC 61993 10.4.1 Standard Test Signal Number 1

| A DSC call with an individual station address and with command sets 103 (report your position) and 111 (report ship name) unless otherwise stated (refer to ITU-R M.825)		
Protocol	V.23	
Baud Rate	1200bps	
FSK Signal Frequency	'0' Space	'1' Mark
	2100Hz	1300Hz

V.23 Waveform

IEC 61993 10.4.2 Standard Test Signal Number 2

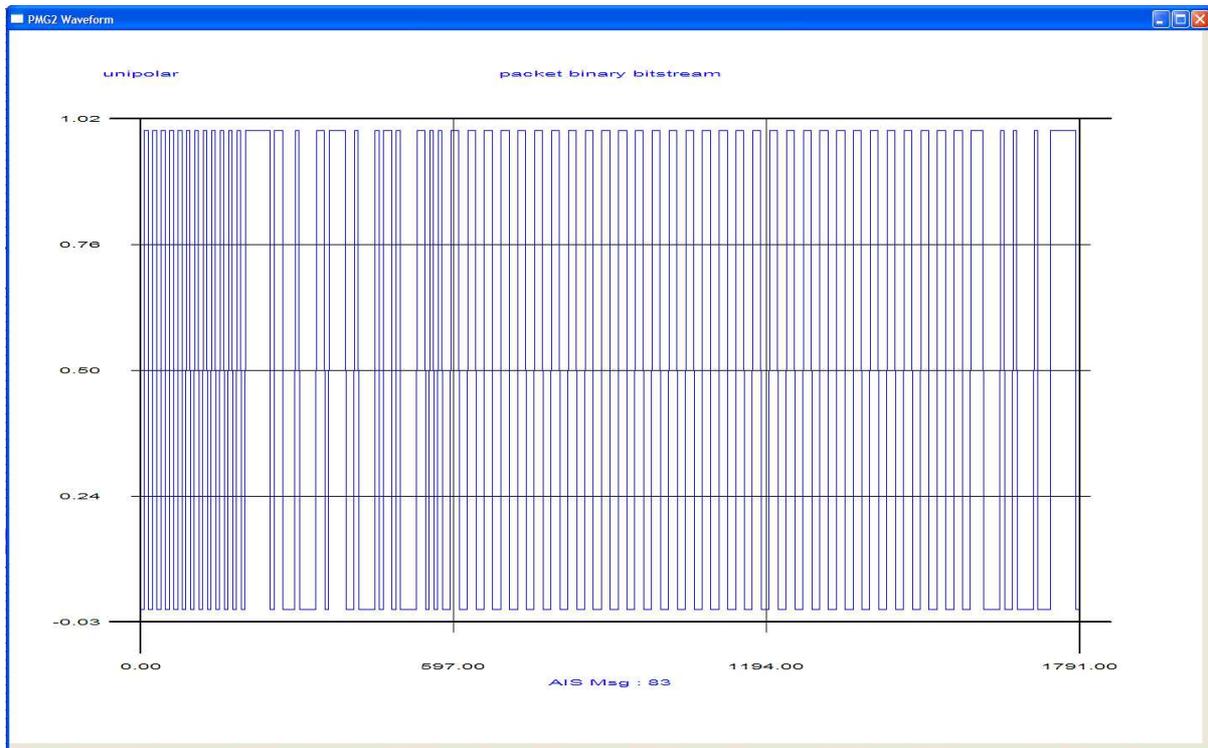| For TDMA Type 1: A test signal consisting of an infinite series of 010101		
Ramp up	8 bits	Hardware
Training sequence	24 bits	Necessary for synchronization
Start flag	8 bits	In accordance with HDLC (7E$_h$)
Message ID	6 bits	8
Repeat indicator	2 bits	(3) Used to ID test signal packet
User ID	30 bits	Unique identifier such as MMSI number (Own Profile)
Data	130 bits	010101…010101
CRC	16 bits	In accordance with HDLC
End flag	8 bits	In accordance with HDLC (7E$_h$)
Buffering	24 bits	Bit stuffing distance delays, repeater delay and jitter
Total	256 bits	

Binary bit stream before NRZI
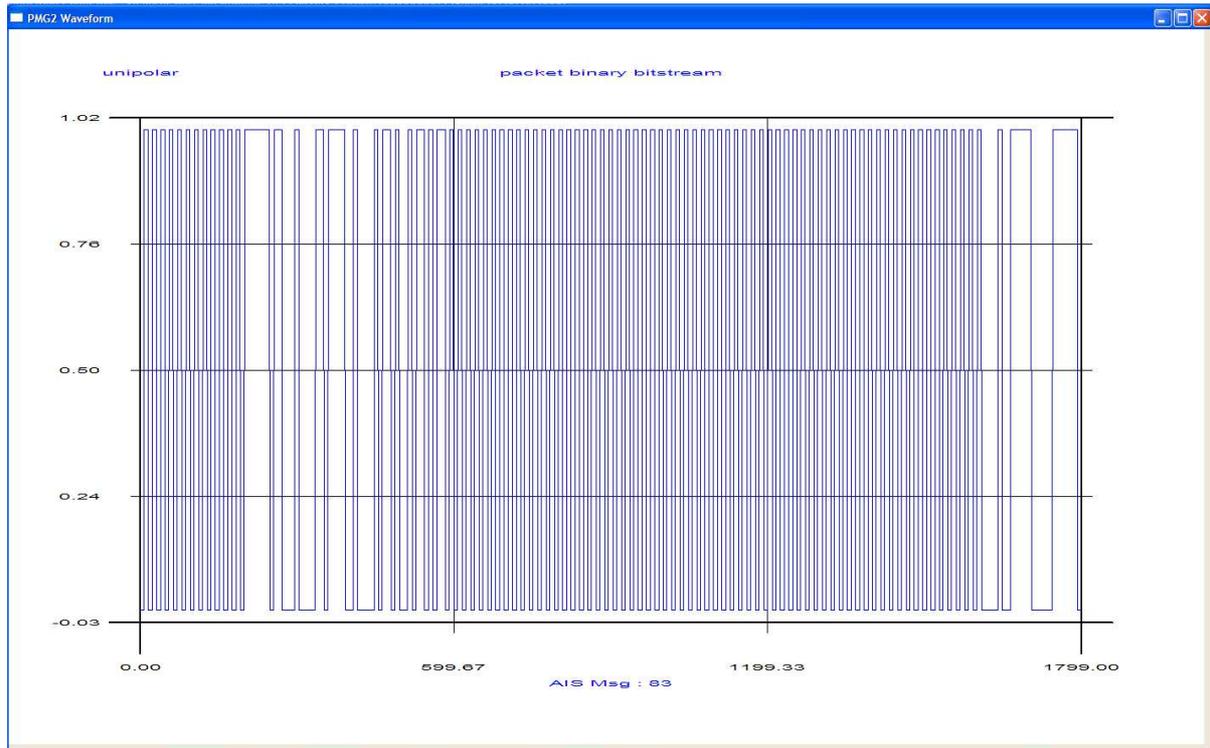
IEC 61993 10.4.3 Standard Test Signal Number 3

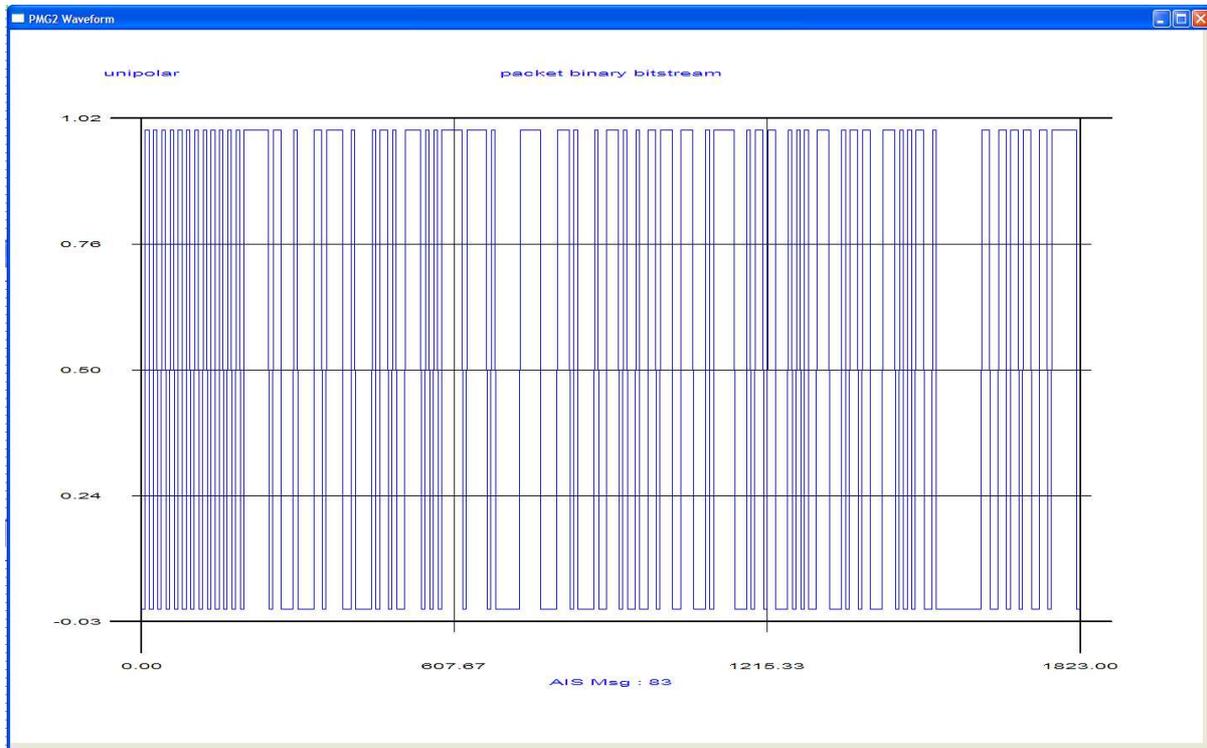| For TDMA Type 2: A test signal consisting of an infinite series of 00110011		
Ramp up	8 bits	Hardware
Training sequence	24 bits	Necessary for synchronization
Start flag	8 bits	In accordance with HDLC (7E$_h$)
Message ID	6 bits	8
Repeat indicator	2 bits	(3) Used to ID test signal packet
User ID	30 bits	Unique identifier such as MMSI number (Own Profile)
Data	130 bits	001100...110011
CRC	16 bits	In accordance with HDLC
End flag	8 bits	In accordance with HDLC (7E$_h$)
Buffering	24 bits	Bit stuffing distance delays, repeater delay and jitter
Total	256 bits	

Binary bit stream before NRZI

PMG Standard Test Signal Number 4

For TDMA Type 3: A test signal consisting of an infinite series of Pseudo Random Sequence (PRS) as specified in ITU-T 0.153 shall be used.		
Ramp up	8 bits	Hardware
Training sequence	24 bits	Necessary for synchronization
Start flag	8 bits	In accordance with HDLC (7E$_h$)
Message ID	6 bits	8
Repeat indicator	2 bits	(3) Used to ID test signal packet
User ID	30 bits	Unique identifier such as MMSI number (Own Profile)
Data	130 bits	*511-bit pseudorandom test pattern* CCITT Recommendation O.153 This pattern is primarily intended for error measurements at bit rates up to 14 400 bit/s The pattern may be generated in a nine-stage shift-register whose 5th and 9th stage outputs are added in a modulo-two addition stage, and the result is fed back to the input of the first stage. Length of the pseudorandom sequence = 511 bits
CRC	16 bits	In accordance with HDLC
End flag	8 bits	In accordance with HDLC (7E$_h$)
Buffering	24 bits	Bit stuffing distance delays, repeater delay and jitter
Total	256 bits	

PRS CCITT Recommendation O.153 binary bit stream before NRZI

IEC 62287 8.3.1 Standard Test Signal Number 1

A DSC modulated data signal comprising an infinite length of 01010101 (dotting pattern; refer to ITU-R M.825)		
Protocol	V.23	
Baud Rate	1200bps	
FSK Signal Frequency	'0' Space	'1' Mark
	2100Hz	1300Hz

V.23 dotting pattern

IEC 62287 8.3.1 Standard Test Signal Number 2

IEC 62320 6.2.4.1 Standard Test Signal Number 1

A series of 010101 as the data within an AIS message frame, with header, start flag, end flag and CRC. NRZI is not applied to the 010101 bit stream or CRC (i.e. unaltered "On Air" data)			
Ramp up	8 bits	Hardware	
Training sequence	22 bits	Preamble reduced by 2 bits because of ramp-up overlap	N R Z I
Start flag	8 bits	In accordance with HDLC (7E$_h$)	N R Z I
Data	168 bits	010101…010101	N O N R ZI
CRC	16 bits	In accordance with HDLC	N O N R ZI
End flag	8 bits	In accordance with HDLC (7E$_h$)	N O N R ZI
Buffering	24 bits	Hardware-Bit stuffing distance delays, repeater delay and jitter	N O N R ZI

NRZI is not applied to the 010101-bit stream or CRC (i.e. unaltered "On Air" data)
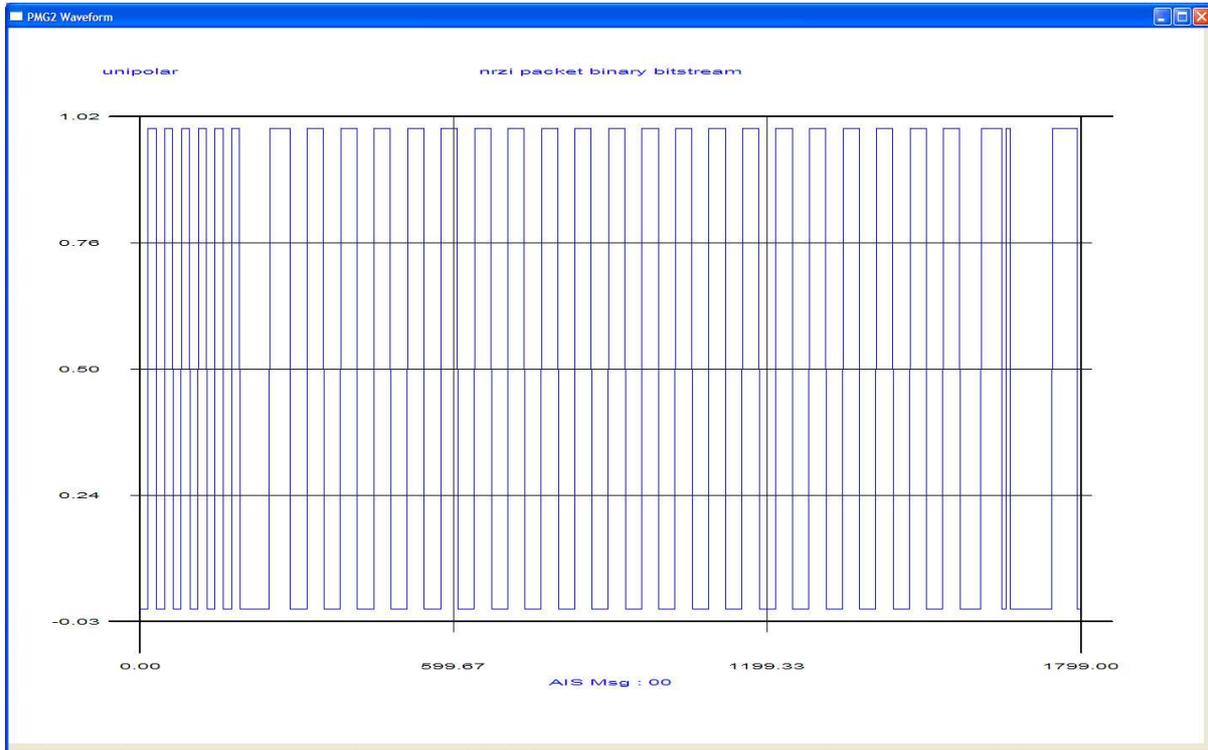
IEC 62287 8.3.1Standard Test Signal Number 3

IEC 62320 6.2.4.2 Standard Test Signal Number 2

A series of 00001111 as the data within an AIS message frame, with header, start flag, end flag and CRC. NRZI is not applied to the 00001111 bit stream or CRC (i.e. unaltered "On Air" data)

Ramp up	8 bits	Hardware	
Training sequence	22 bits	Preamble reduced by 2 bits because of ramp-up overlap	N R Z I
Start flag	8 bits	In accordance with HDLC (7E$_h$)	
Data	168 bits	00001111…00001111	N O N R ZI
CRC	16 bits	In accordance with HDLC	
End flag	8 bits	In accordance with HDLC (7E$_h$)	
Buffering	24 bits	Hardware-Bit stuffing distance delays, repeater delay and jitter	

NRZI is not applied to the 00001111-bit stream or CRC (i.e. unaltered "On Air" data)
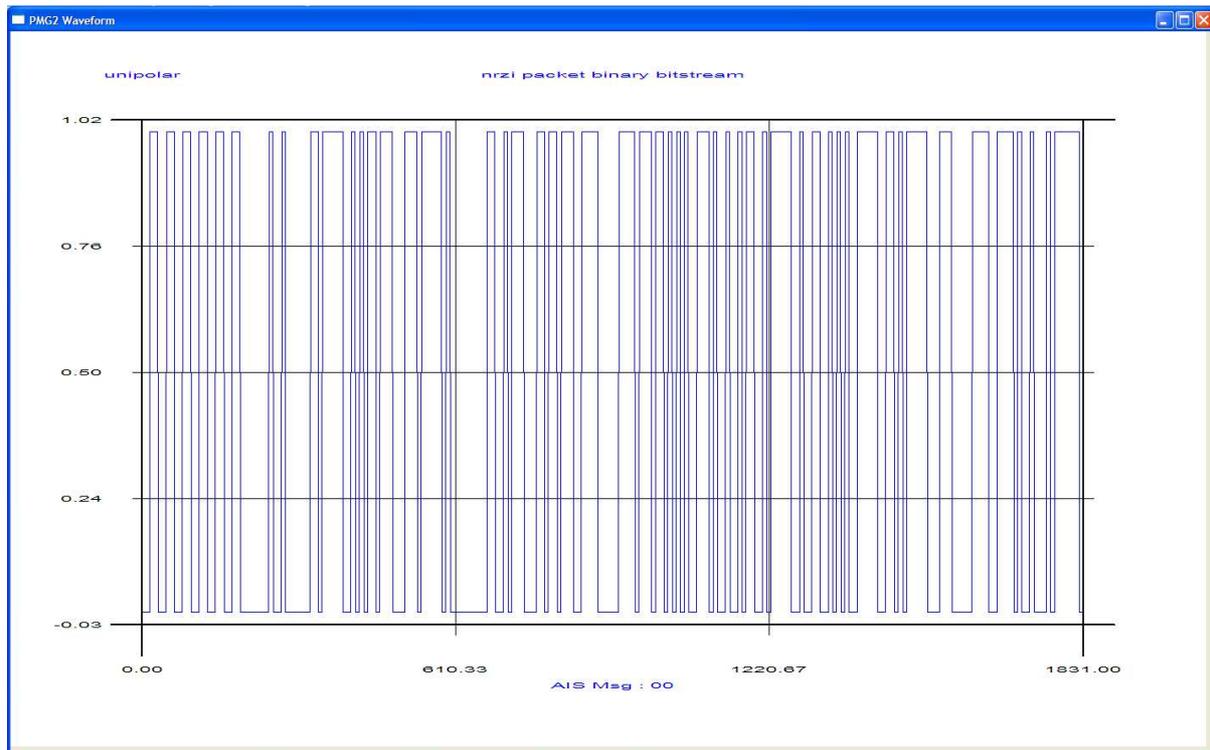
IEC 62287 8.3.1Standard Test Signal Number 4

IEC 62320 6.2.4.3 Standard Test Signal Number 3

A Pseudo Random Sequence (PRS) as specified in ITU/T Recommendation 0.153 as the data within an AIS message frame with header, start flag, end flag and CRC. NRZI is not applied to the PRS stream or CRC.

Ramp up	8 bits	Hardware	
Training sequence	22 bits	Preamble reduced by 2 bits because of ramp-up overlap	N R Z I
Start flag	8 bits	In accordance with HDLC (7E$_h$)	
Data	168 bits	Pseudo Random - As per PRS TABLE	N O N R ZI
CRC	16 bits	In accordance with HDLC	
End flag	8 bits	In accordance with HDLC (7E$_h$)	
Buffering	24 bits	Hardware-Bit stuffing distance delays, repeater delay and jitter	

NRZI is not applied to the PRS-bit stream or CRC (i.e. unaltered "On Air" data)

**IEC 62287 8.3.1Standard Test Signal Number 5**

IEC 62320 6.2.4.4 Standard Test Signal Number 4

This test signal consists of 200 packets grouped into clusters of 4. Each cluster consists of 2 consecutive transmissions. NRZI shall be applied to every packet. After sending packet 1 and 2 the notional initial state of the NRZI process shall be inverted and then packet 1 and 2 repeated. Between every transmitted packet there shall be at least 2 free time periods.

Ramp up	8 bits	Hardware	nrzi
Training sequence	22 bits	Preamble reduced by 2 bits because of ramp-up overlap	init
Start flag	8 bits	In accordance with HDLC (7E$_h$)	state
Data	168 bits	Pseudo Random - As per TABLE 20	=
CRC	16 bits	In accordance with HDLC	0
End flag	8 bits	In accordance with HDLC (7E$_h$)	
Buffering	24 bits	Hardware-Bit stuffing distance delays, repeater delay and jitter	
>= 4 Free Time Periods			
Ramp up	8 bits	Hardware	nrzi
Training sequence	22 bits	Preamble reduced by 2 bits because of ramp-up overlap	init
Start flag	8 bits	In accordance with HDLC (7E$_h$)	state
Data	168 bits	Pseudo Random - As per TABLE 20	=
CRC	16 bits	In accordance with HDLC	0
End flag	8 bits	In accordance with HDLC (7E$_h$)	
Buffering	24 bits		
>= 4 Free Time Periods			
Ramp up	8 bits	Hardware	nrzi
Training sequence	22 bits	Preamble reduced by 2 bits because of ramp-up overlap	init
Start flag	8 bits	In accordance with HDLC (7E$_h$)	state
Data	168 bits	Pseudo Random - As per TABLE 20	=
CRC	16 bits	In accordance with HDLC	1
End flag	8 bits	In accordance with HDLC (7E$_h$)	
Buffering	24 bits	Hardware-Bit stuffing distance delays, repeater delay and jitter	
>= 4 Free Time Periods			
Ramp up	8 bits	Hardware	nrzi
Training sequence	22 bits	Preamble reduced by 2 bits because of ramp-up overlap	init
Start flag	8 bits	In accordance with HDLC (7E$_h$)	state
Data	168 bits	Pseudo Random - As per TABLE 20	=
CRC	16 bits	In accordance with HDLC	1
End flag	8 bits	In accordance with HDLC (7E$_h$)	
Buffering	24 bits	Hardware-Bit stuffing distance delays, repeater delay and jitter	

NRZI initial state for packet 1, and packet 2 in sequence = 0
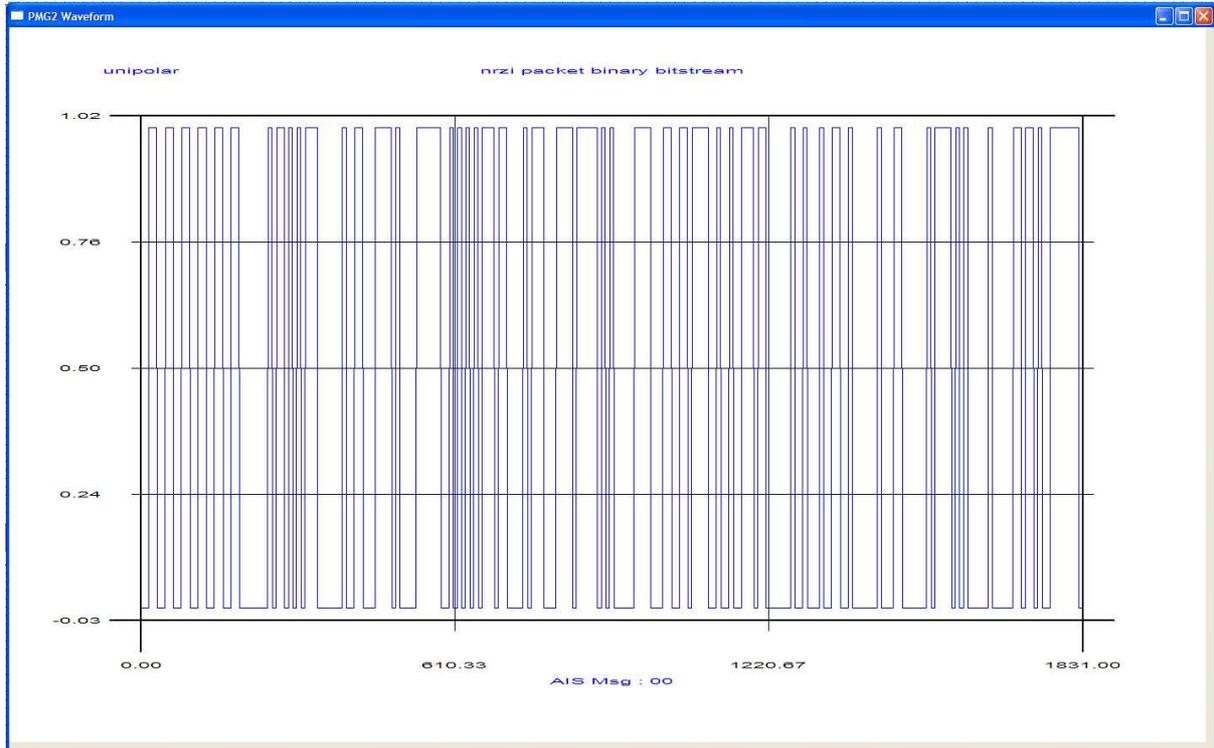
NRZI initial state for packet 3, and packet 4 in sequence = 1
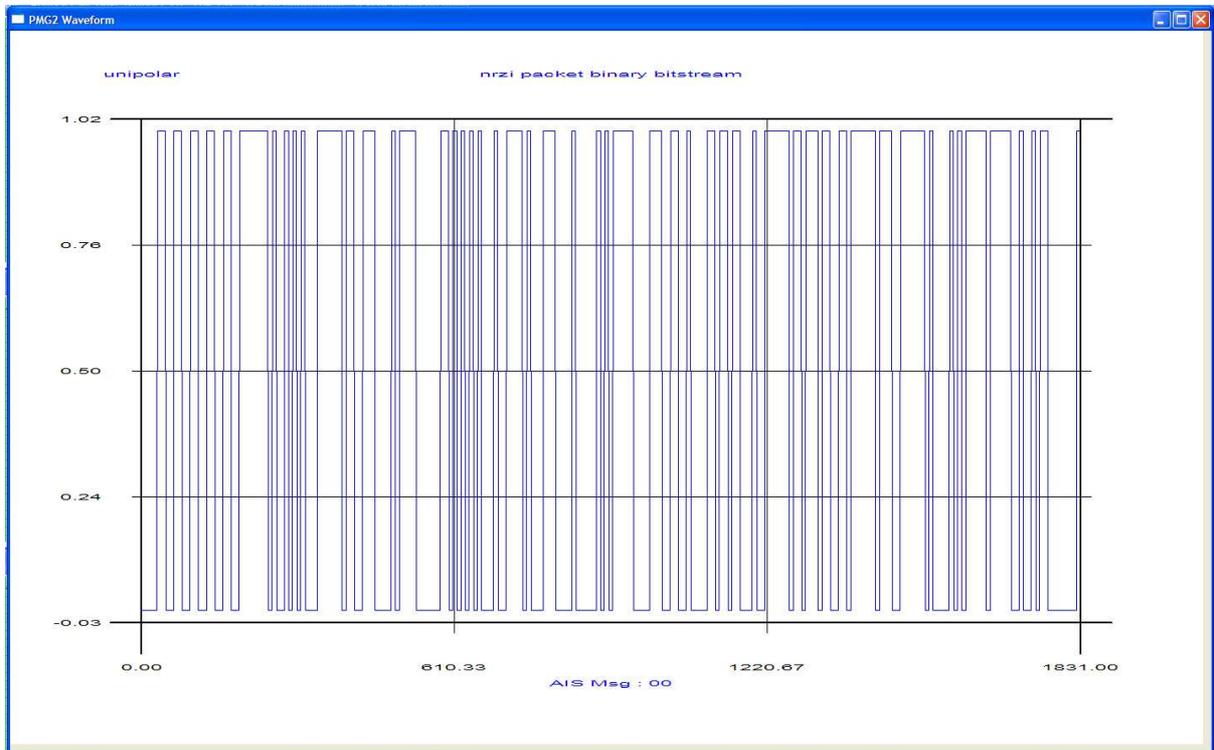
Abbreviations

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 Radio communication equipment and systems – General requirements-methods of testing and required results
NMEA 0183	

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

AIS

28 Mustang Ave
Pierre Van Ryneveld
Centurion
Gauteng
South Africa
Tel: +27 07222 53467
www.aiste.st
email: support@aiste.st