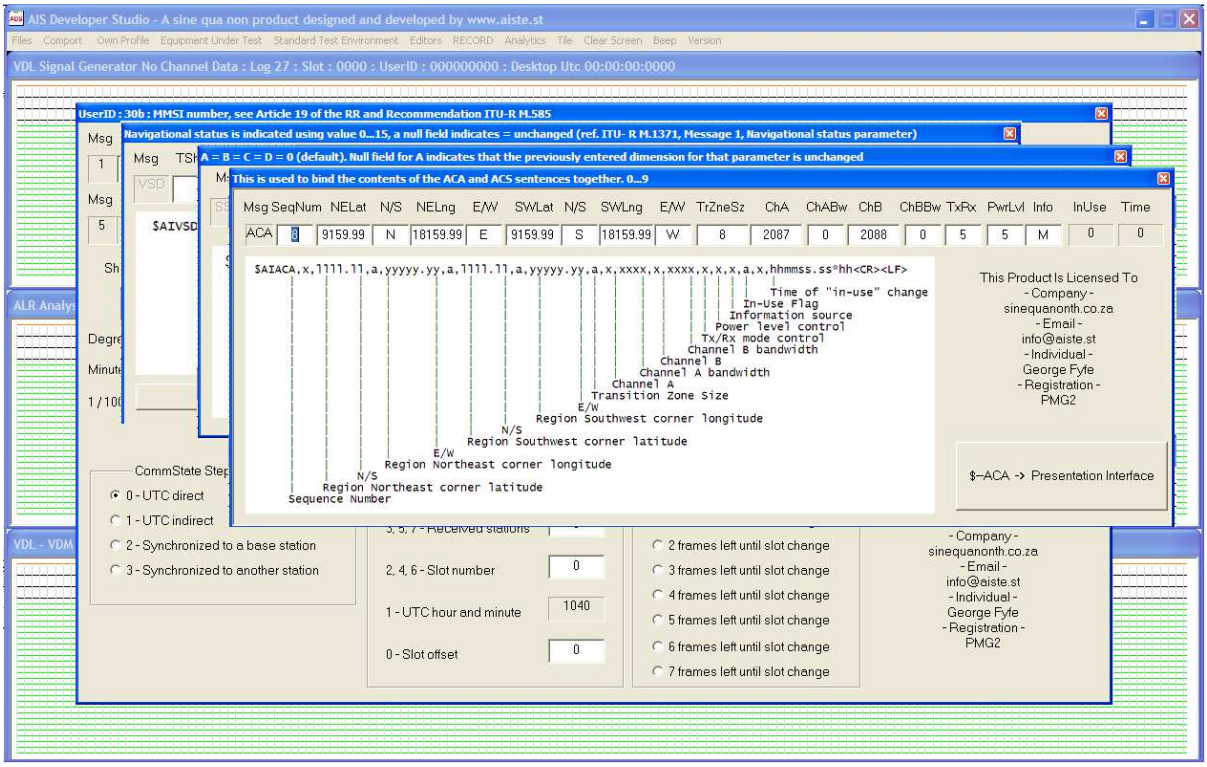

AIS Developer Studio

Release Version 1.0

ITU-R M.1371-5 Technology

TEST ENVIRONMENT
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.

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.

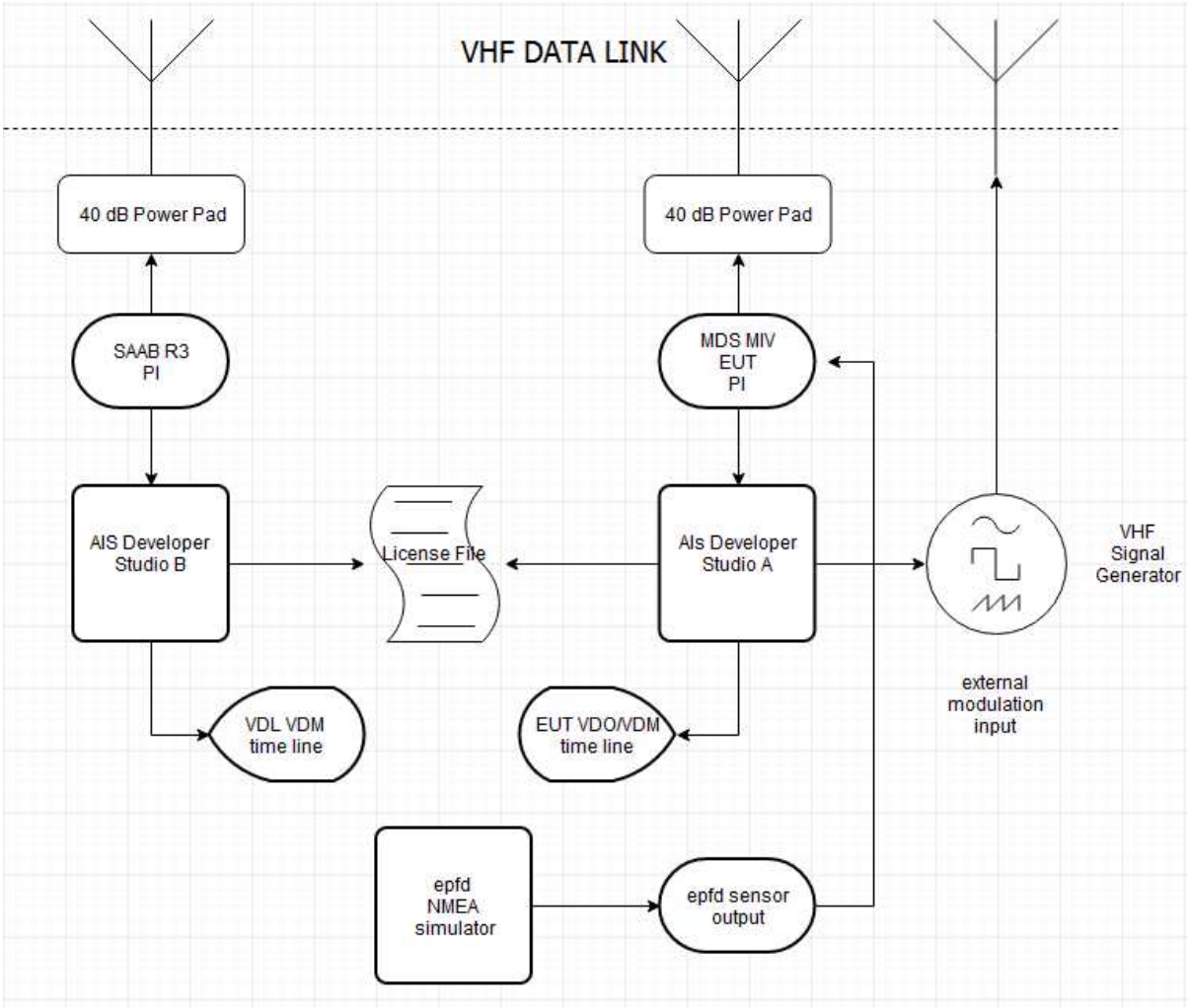
ALL requests for support should be addressed to support@aiste.st explaining any bug or discrepancy as well as a screenshot.

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.

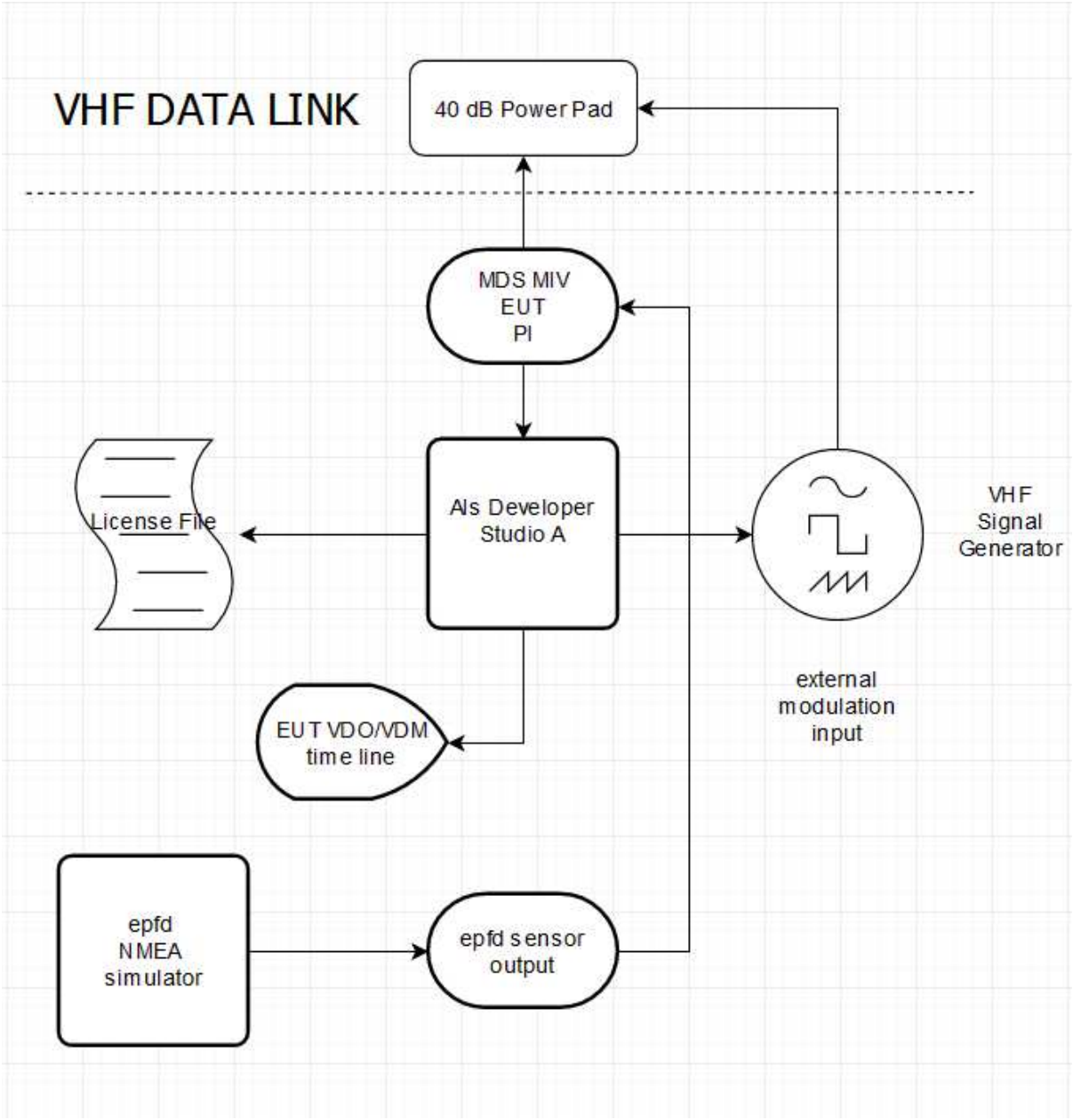
It is the intention of AISTE.ST to supply upgrades to the AIS Developer suite user group if and when they become available.

Users may subscribe to this upgrade service.

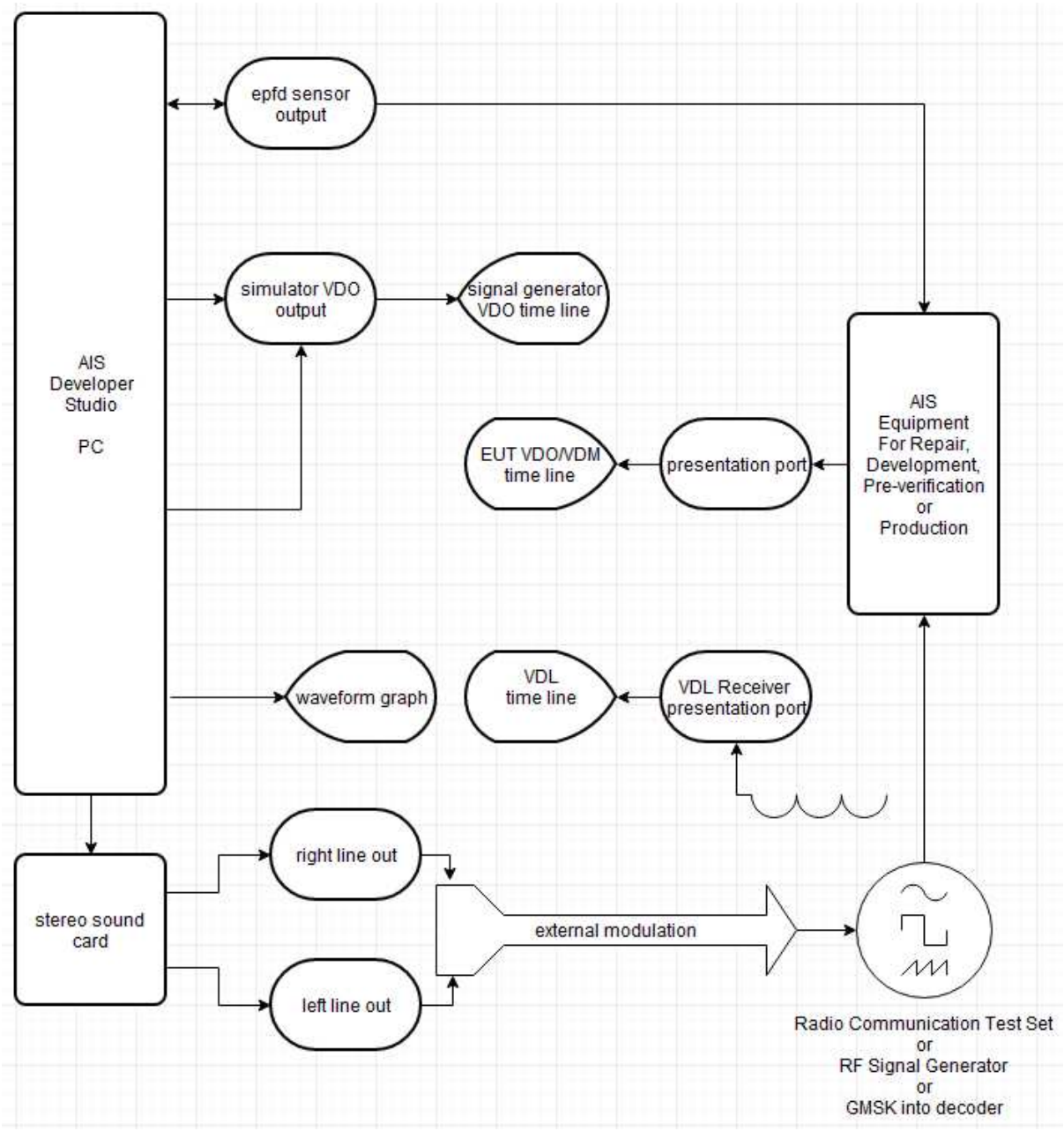
Verification set-up A



Verification set-up B



Verification set-up C



Method of measurement

Setup hardware as per Verification set-up A / B / C

Procedure

Initiate the following steps in order.

- Please follow order correctly.
- Once you have setup the signal generator modulation and created 5 separate identities you must save a system profile file.
- Save this file with a unique name so that you can re-use it and do not overwrite it.
- Step through all the following procedures.

WARNING

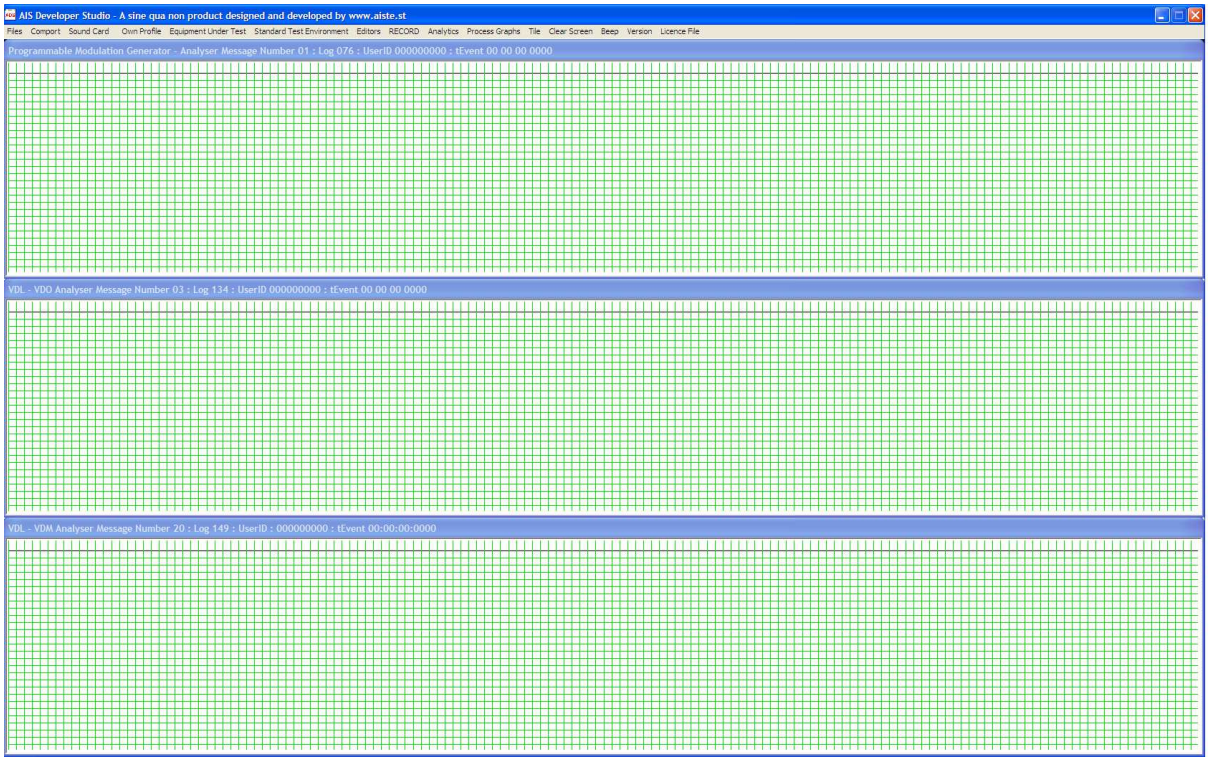
Many different signal generators and test sets are used to test radio communications transceivers. Some of these devices contain both signal generator and monitor receivers, which share a common output connector to the EUT path. If the signal generator is connected to the antenna connector to test the receiver, and the transmitter keys, then serious damage can result to the signal generator.

Higher quality instruments provide architectures with EUT reverse power protection. This circuitry will prevent damage to the signal source if a high RF power level is applied to its output connector from the EUT. Generally speaking…An AIS transmission may be to fast to correctly activate some of these protection circuit.

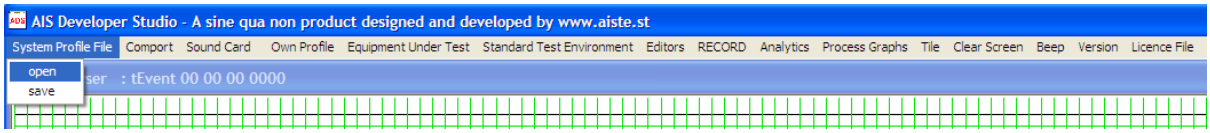
Make use of EXTERNAL RF POWER PADS.

Start AIS Developer Studio

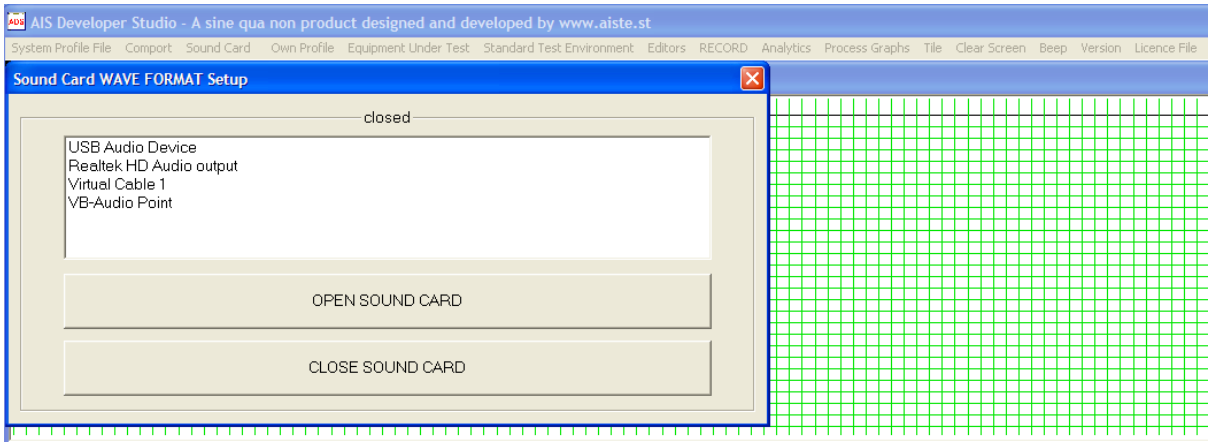
- Select and open license file
- AIS Developer Studio main time line window is displayed.



- If a “System Profile File” was previously created then select and open it.

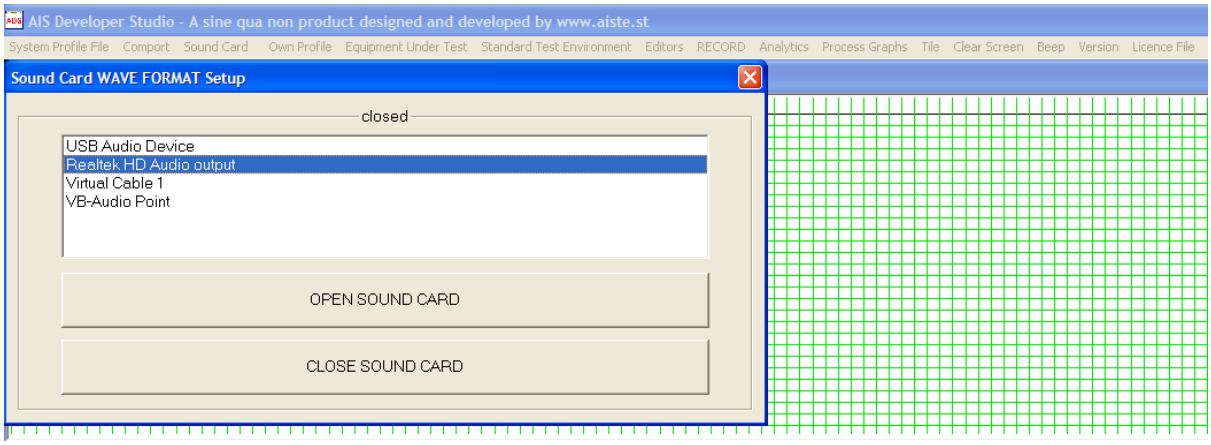


- Select Sound Card Menu Item



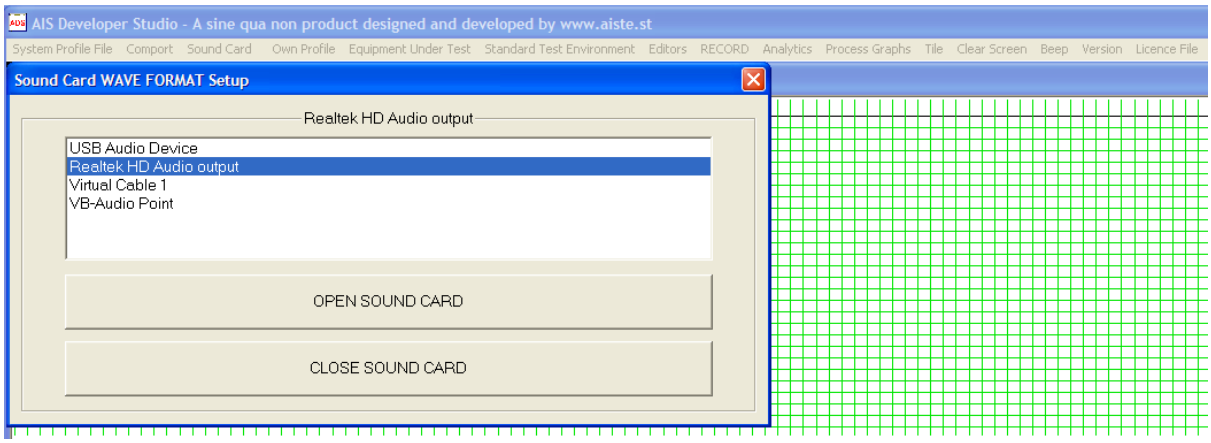
- A list of available devices will be shown.
- Dialogue device indication indicates, “closed”

- Select the “audio output device”. This will be different for every user and will depend on the internal / external soundcard/s in your system.



- Select your “Audio Output Device”
- Select “Open Sound Card”
- The dialogue will automatically close if the requested device could be opened.

If you want to view your selection re-select Sound Card Menu Item.



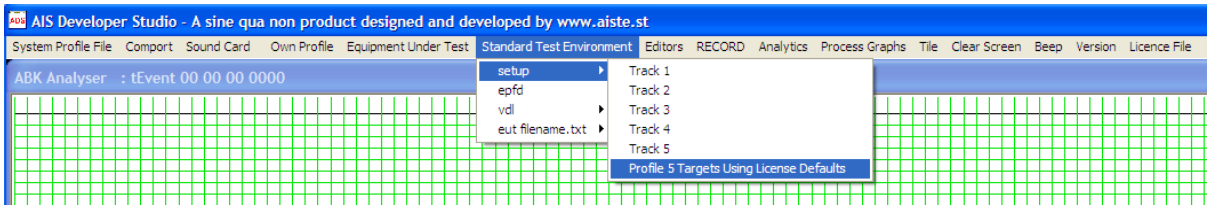
You can see that:

- Your previous selection is highlighted.
- If successfully opened the dialogue device string indicates the device you selected.

- Close the dialogue the conventional Windows way  or use the escape key.

Set up a test environment of at least 5 test targets as follows.

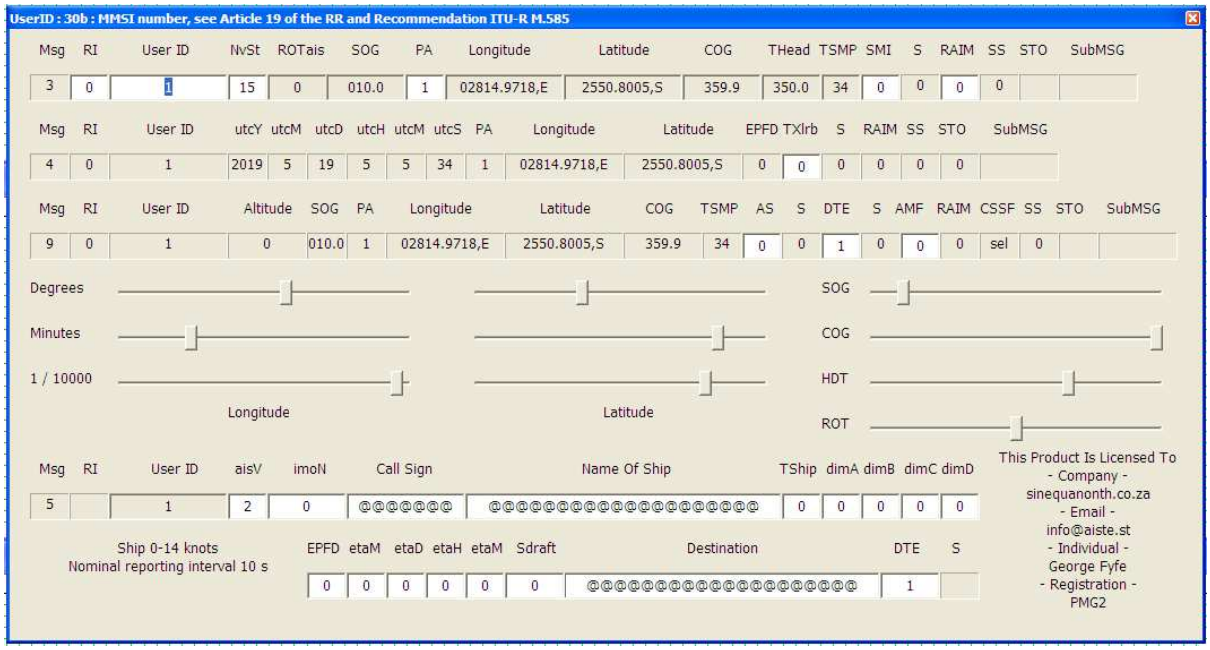
- Select Standard Test Environment Menu Item.



- Select setup-> Profile 5 Targets Using License Defaults
- This will automatically format the 5 virtual targets with the license defaults.
- The MMSI for each individual track will be equal to the (licence.txt)BaseMmsi + (1…5).

You need to individually select and format each virtual track.

- Select Standard Test Environment.
- Select setup-> Track 1
- Select Standard Test Environment.
- Select setup-> Track 2
- Select Standard Test Environment.
- Select setup-> Track 3
- Select Standard Test Environment.
- Select setup-> Track 4
- Select Standard Test Environment.
- Select setup-> Track 5



- Characterize each individual track. Dynamic update rate is supported.
- Close the dialogue the conventional Windows way  or use the escape key.

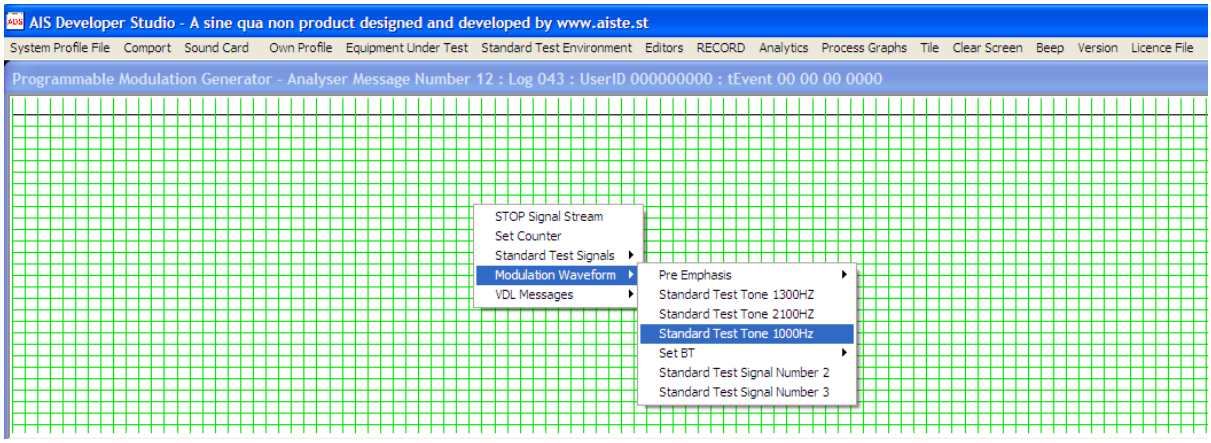
Set External Signal Generator Modulation / Deviation Level

Please read your Signal Generator Manual to find out the correct EXT modulation SETUP process for your instrument. It may be unique to your instrument.

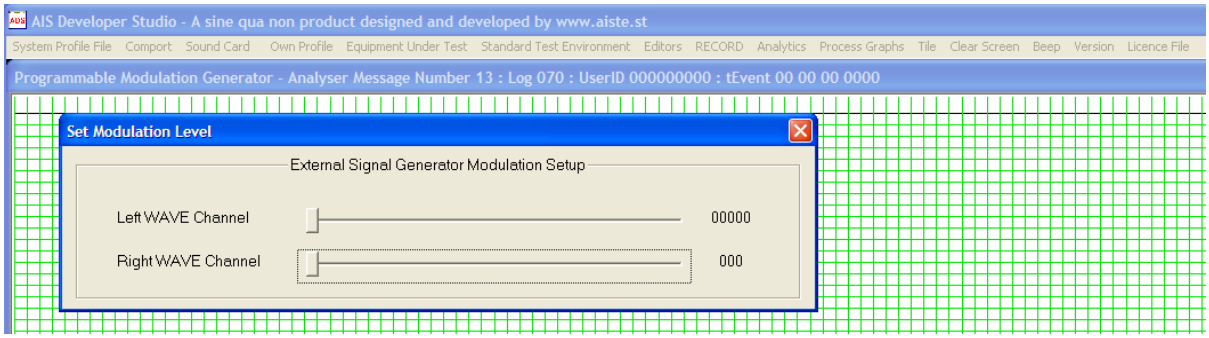
If you are unable to correctly setup your own instrument with the manufacturers manual then one of the following procedures may provide a nominally accurate 2.4KHZ deviation.

In FM, the depth of modulation is expressed as the modulation index (β), which is defined as the ratio of the deviation to the modulating frequency, or F_d/f_m. The FM process produces a large number of sidebands and, at certain values of β, the carrier will go to zero. The sidebands are described by mathematical entities called Bessel functions.

- Connect External Signal Generator Output to Spectrum Monitor.
- Setup Frequency = AIS1 / AIS2 / DSC; Span = 60 / 25Khz
- Select FM modulation as required.
- Right click mouse cursor in Programmable Modulation Time Line
- A context menu will be displayed.
- Select Modulation Waveform -> Standard Test Tone 1000HZ.



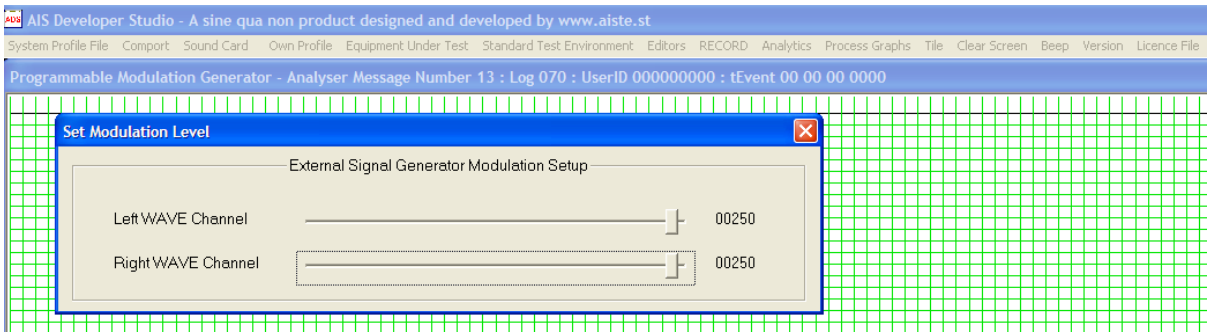
- Set the modulation frequency to 1KHz and zero level / deviation.



- Now slowly increase the level of the WAVE output channel / deviation that you connected to the Signal Generator EXT modulation in the “method” and you will see the carrier decrease to zero on the spectrum monitor. Leave the level at maximum null of the carrier.
- Reconnect Signal Generator to VDL “method”
- Save “System Profile File”

Alternatively if your Signal Generator has an automatic leveling EXT modulation setup, then set the Sound Card output level to just under maximum.

- This will allow the best signal to noise ratio from the sound card DAC.
- Adjust deviation on Signal Generator as required.

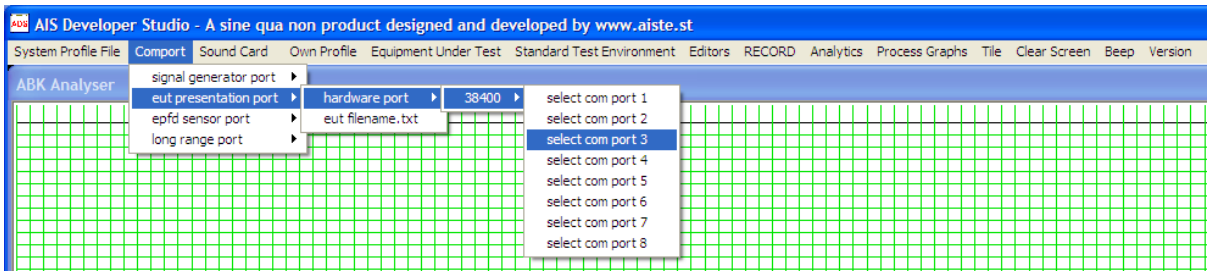


Alternatively make Use Of The IEC 61993 Transmission Mask for 25KHZ bandwidth as viewed on your Spectrum Monitor.

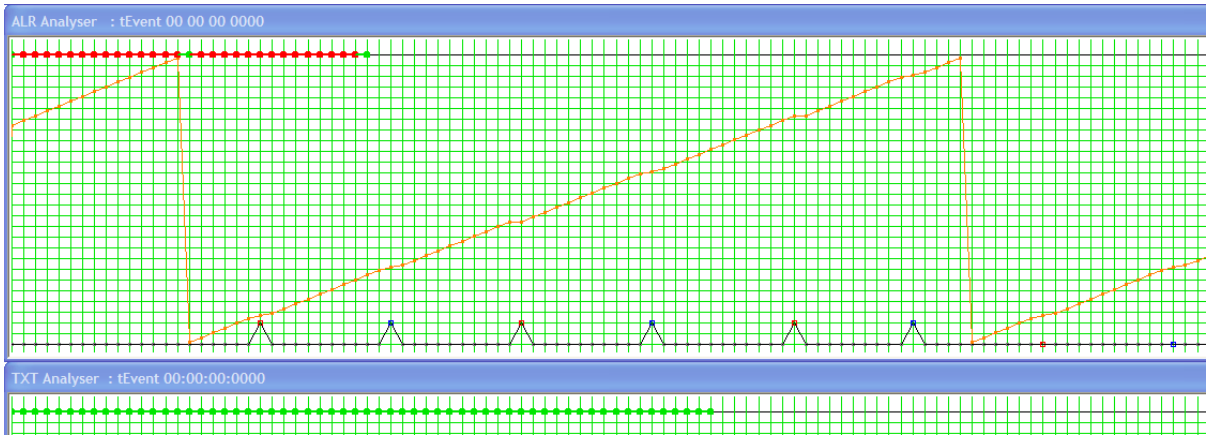
Starting the Standard Test Environment VDL

- Set Signal Generator Output to a nominal –nn.n dBm output level.
- As we are evaluating operational and not absolute EUT parameters, we create an average VDL level of –67 -> -87dBm) EUT received signal strength.

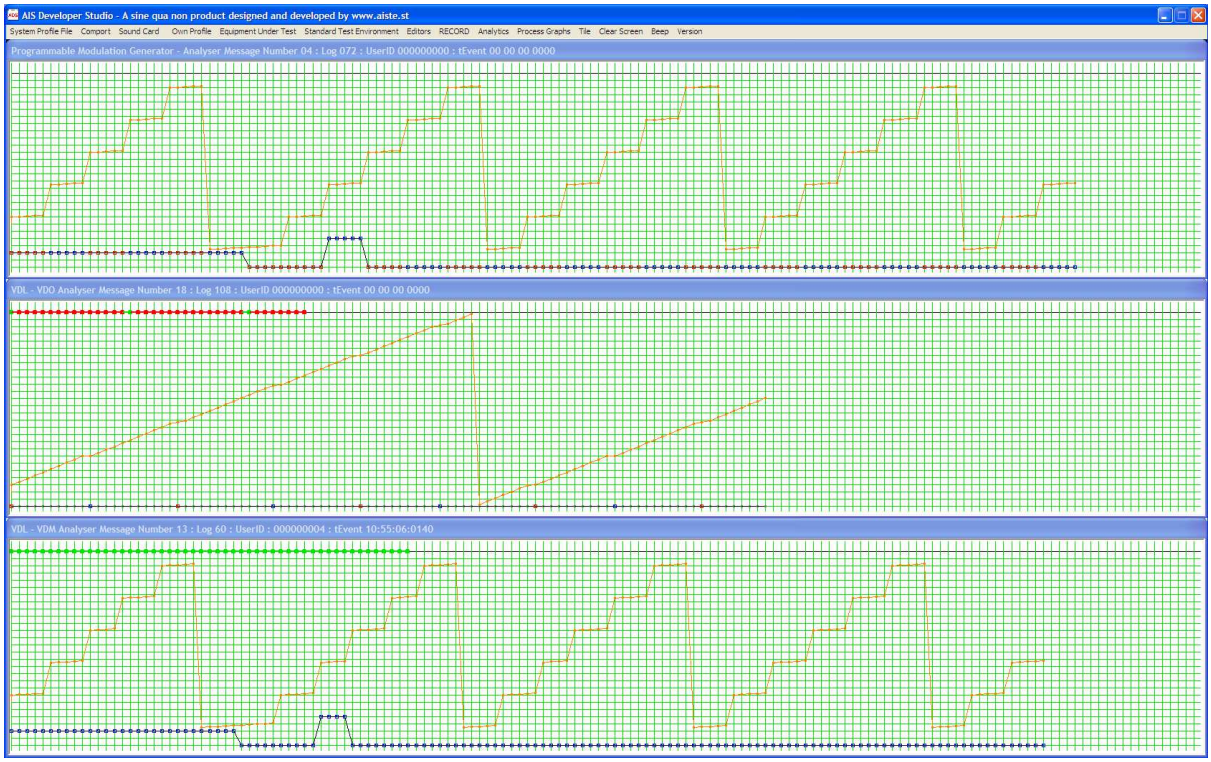
Open EUT COM Port



View EUT network entry – EUT VDO or ADS(B) VDL VDM



Start the Standard Test Environment VDL



View the ADS internal VDO communication – Programmable Modulation Generator - VDO.

- Network entry of 5 targets
- After network entry - Message 5 from 5 targets – repeats every 6 minutes
- Continuous operation phase 5 targets.
- Individual target dynamic update rate can be changed by effecting changes in static navigation state or respective sensor information.

View the ADS PMG->Soundcard->RF Signal Generator VDL communication – EUT Receiver VDM or VDL Receiver - VDO.

What can be seen in the PMG time line is that the color of each log point changes.
This is not the case for the VDL – VDM log point.

The reason is twofold:

- The PMG automatically creates and outputs VDO information on alternating AIS channels.
- The PMG Sound Card is connected to the external Signal Generator that is set to one AIS frequency manually.
- This correlates to single channel reception of the VDL. This is correct.

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
PMG	Programmable Modulation Generator
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
ADS	AIS Developer Studio

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

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

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