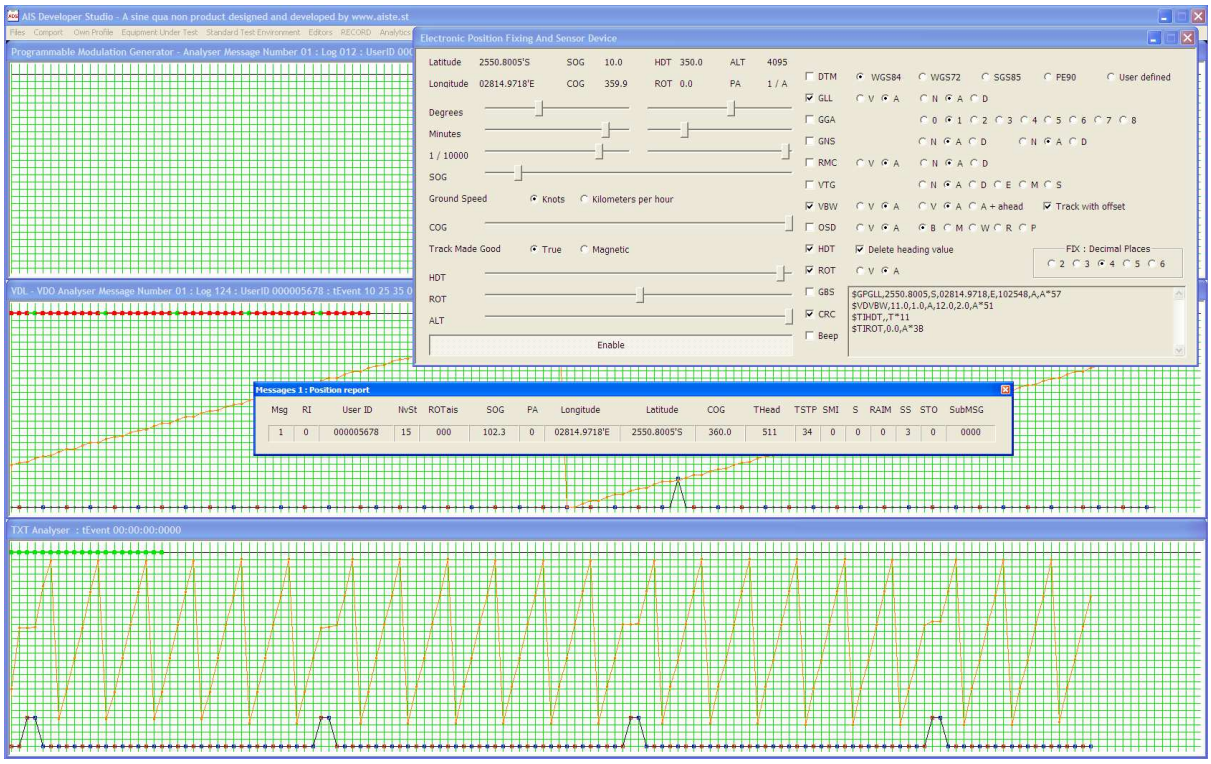

AIS Developer Studio

Release Version 1.0

ITU-R M.1371-5 Technology
IEC 61993-2 19.5 Test Procedure

ELECTRONIC POSITION FIXING DEVICE

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.

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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(RX) / 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:

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

EPFD SIMULATOR 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.

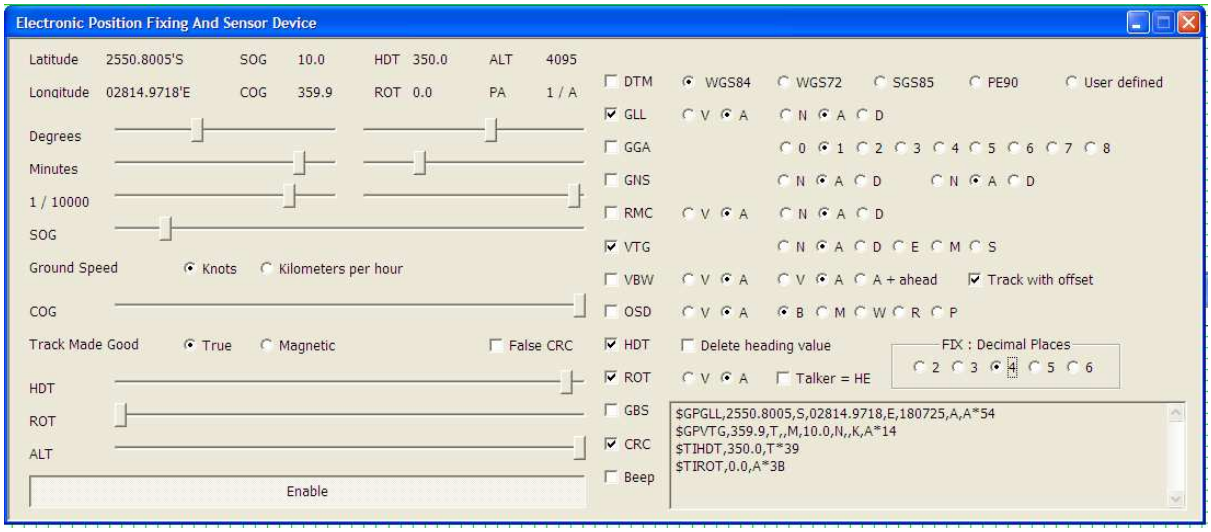
Registered users will receive support if any problems with AIS Developer Studio arise.

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.

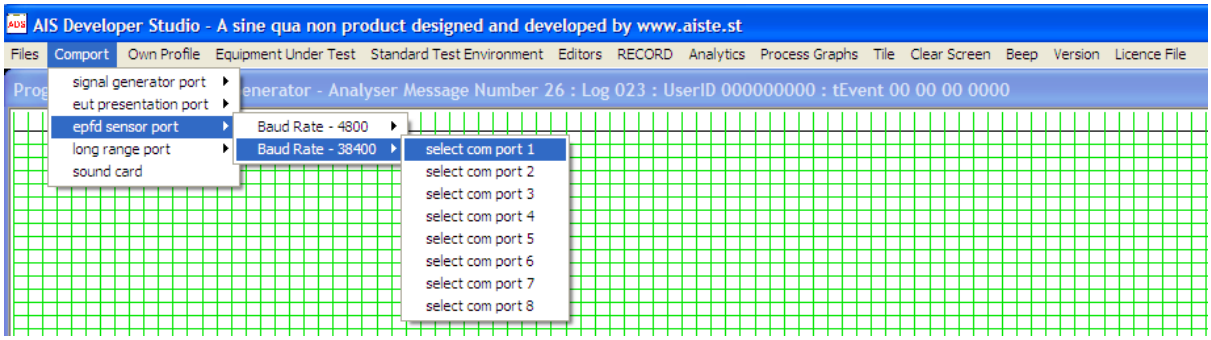


WARNING:

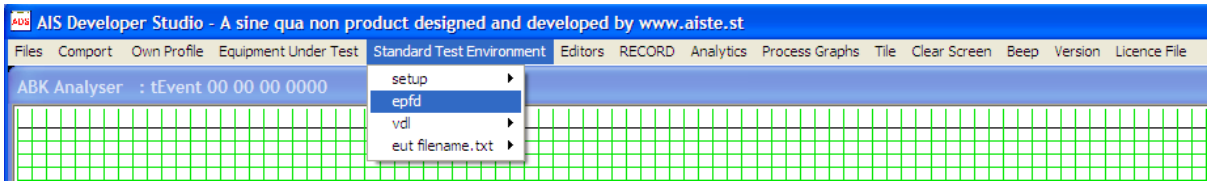
This is simulated NMEA data!

Although the GP talker ID is used, this module should in no way be used outside the scope of the AIS Developer Studio Suite.

EPFD Comport is found in the Comport Menu



EPFD is found in the Standard Test Environment Menu



EPFD Module

Global Setting

- Applied to all EPFD strings
- CRC (Enable / Disable/False)
- Enable NMEA
- Disable NMEA

Individual Setting

- Enable / Disable and string modifiers applied to individual string
- GNS
- GLL
- GGA
- RMC
- VBW
- VTG
- HDT
- GBS
- ROT
- OSD
- BEEP – 1PPS requires main menu “Beep” = ON

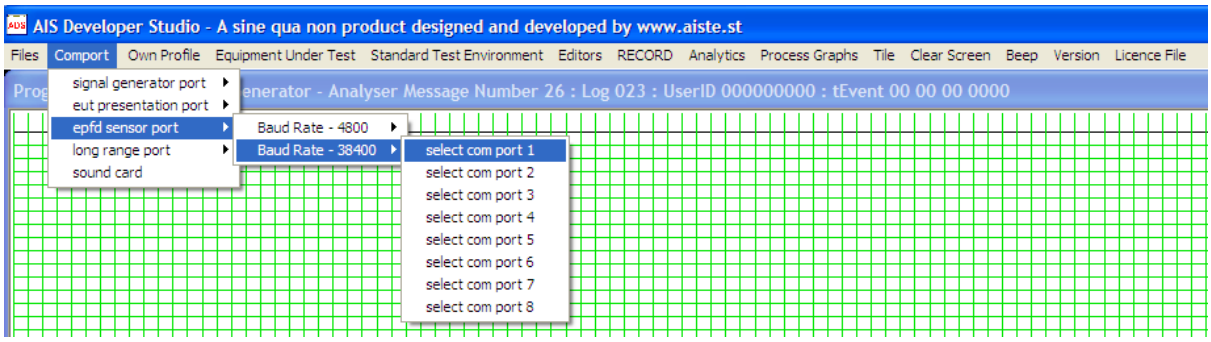
Operating Method

Windows

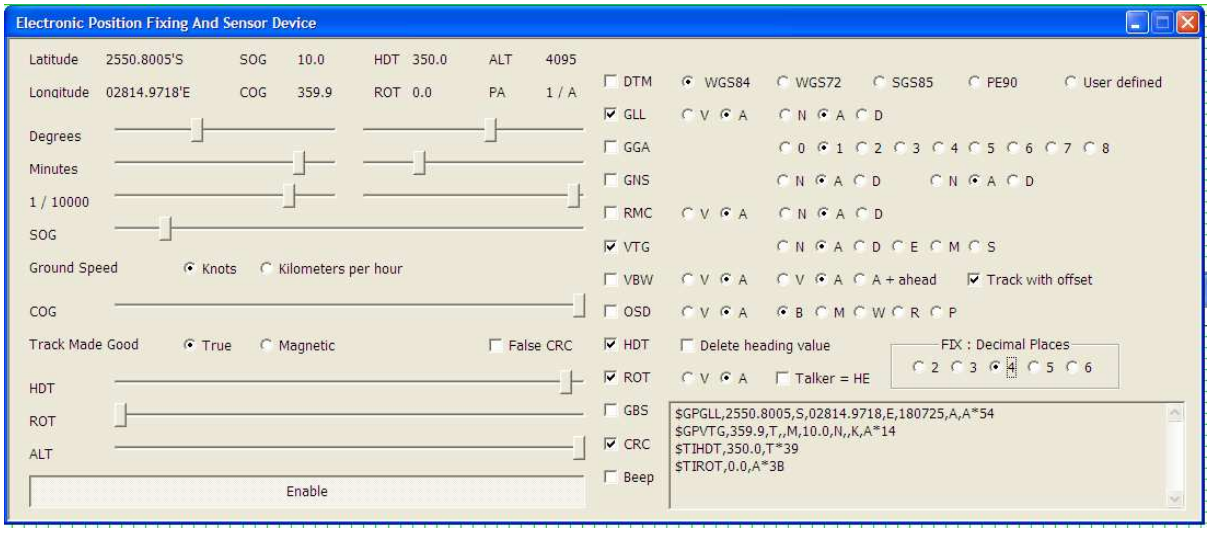
- Determine from your Windows device manager which COM PORT your USB RS422 bridge is installed.
- Determine from your Windows device manager which COM PORT your RS232 bridge is installed.
- If you are using hardware PCI or other RS422 cards make sure that the OS enumerator’s it as a COM port within the range 1 -> 8.
- Change if required.
- If you are using Windows 10 make very certain that your RS422 driver is installed correctly. The biggest support problem we experience with WIN10 OS is that the drivers indicate that they have loaded but when you dig a bit deeper you will see that it states 'requires further installation.' Make sure that your USB to RS422 bridge device is correctly installed and you know which comport it is using.
- All our development and test’s are tested with FTDI Windows 10 compatible USB to RS232/422 bridges.

AIS Developer Studio

- Select -> Comport -> EPFD Sensor Port -> Baud Rate and COM PORT
-



- Open EPFD dialog
- Select NMEA strings
- Select NMEA *individual* string modifiers found to the right of each talker ID
- Enable *global* NMEA



- Minimize EPFD.
- Strings will be generated at the SENSOR port at 1-second update rate whilst the EPFD dialogue is in the maximized or minimized state on screen.
- Strings will be terminated if the EPFD dialogue is closed

Sensor ports

The AIS unit is equipped with sensor inputs for position, speed, and heading and rate-of-turn. These ports are input ports only. They should be RS 422 IEC 61162-2 protocol.

The AIS Unit Under Test must be able to accept various NMEA type sentences from a number of sensors onboard the vessel. The following sentences are supported.

These are ported on the EPFD SENSOR COM PORT. (see block diagram).

They will generally be RS422 and will require a USB to (RS232/RS422) bridge (converter).

The ship's GPS/DGPS NMEA sensor will normally be connected to any of the three sensor input ports (Sensor 1, Sensor 2 or Sensor 3).

The EUT internal GPS is always present but is generally used for acquiring position data when it is differentially corrected and an external differentially corrected GPS is not available.

Sensor Communications Port					
Message Content					
Position	SOG	COG	Heading	Rate of Turn	RAIM Indicator
GNS					
GLL					
GGA					
RMC	RMC	RMC			
	VTG	VTG			
DTM					GBS
			HDT		
				ROT	
	OSD	OSD	OSD		
	VBW				

When any of the above messages are used, it must be input to the AIS unit at intervals of 1 second.

Position and Time

For position and time information, the GNS and GLL sentences should be used. Optionally GGA and RMC may be used. All four of these sentences are implemented.

The priority for these sensors is tabulated below:

Priority	Position Sensor Status		Affected data in message 1,2 and 3			
			Position accuracy flag	Time stamp	RAIM-flag	Position Longitude/Latitude
1	external DGNSS in use (corrected)		1	UTC-sec	1/0	Lat/Lon (external)
2	internal DGNSS in use (corrected over air: msg 17)		1	UTC-sec	1/0	Lat/Lon (internal)
3	internal DGNSS in use (corrected; beacon)		1	UTC-sec	1/0	Lat/Lon (internal)
4a	external GPS in use (uncorrected)		0	UTC-sec	1/0	Lat/Lon (external)
4b	external non-GPS EPFS in use					
5	internal GNSS in use (uncorrected)		0	UTC-sec	1/0	Lat/Lon (internal)
6	no sensor position in use	manual pos. input	0	61	0	Lat/Lon (manual)
		dead reckoning pos.		62		Lat/Lon (dead-reckoning)
		no position		63		not available=181/91

Speed over ground

The VBW, VTG, OSD or RMC NMEA sentences are implemented. The Sensor precedence will give priority to the external sensor for SOG information. Thereafter it will use the active GPS as source.

Course over ground

For COG the RMC, VTG or OSD NMEA sentences are implemented.

Heading

The HDT and OSD NMEA sentences are implemented. A gyrocompass providing heading information is a mandatory sensor input to the AIS. Only 1 source for heading (HDT) information may be connected to the AIS unit. If more than one source is connected it may supply different information, which will cause the heading information to seem erratic.

RAIM indicator

The GBS NMEA sentence is implemented for this.

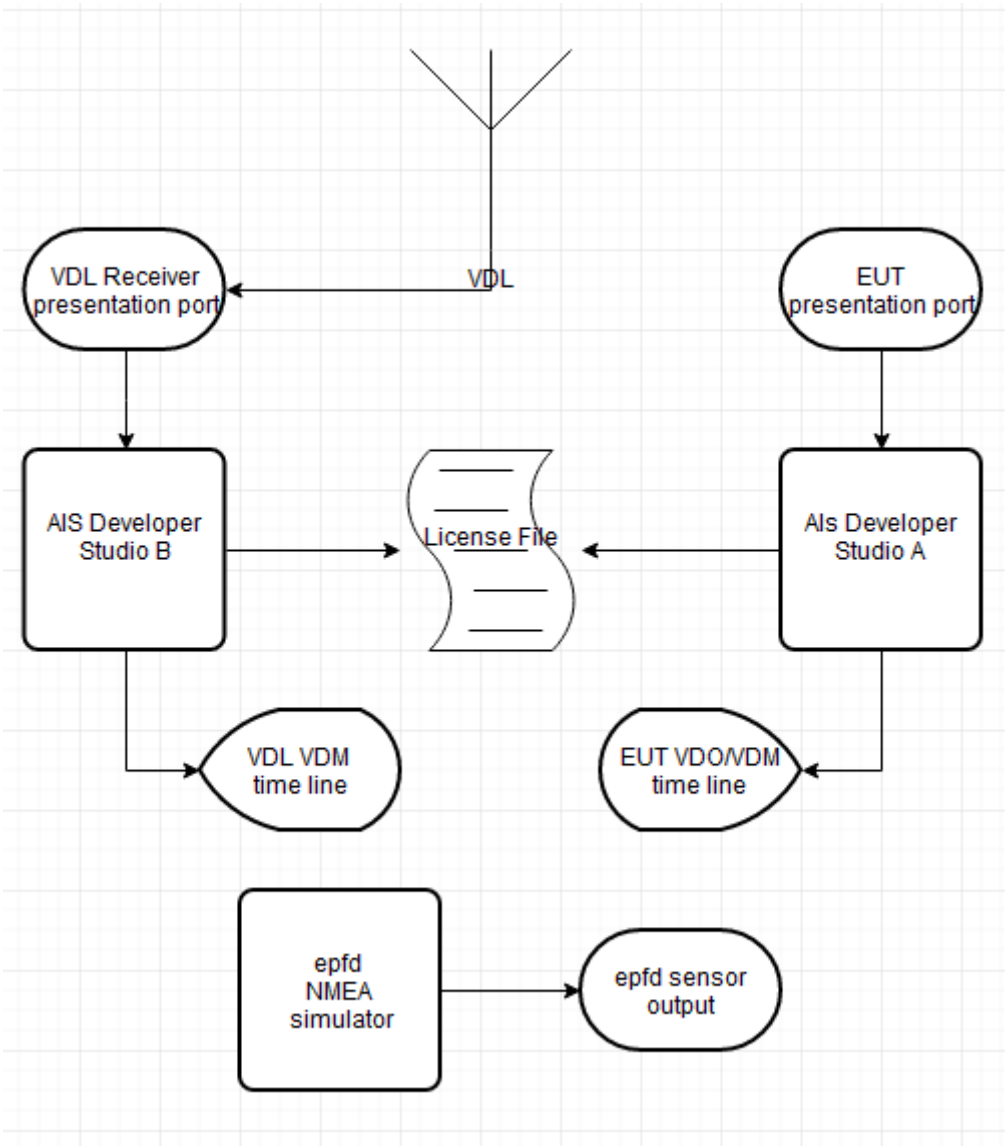
ROT indicator

Some ships do not carry a Rate-Of-Turn (ROT) Indicator according to IMO A.526. However, if a rate-of-turn indicator is available and it includes an IEC 61162 interface, it shall be connected to the AIS.

The ROT sentence is implemented for this. ROT is also calculated from heading when ROT is not available. The following precedence is used.

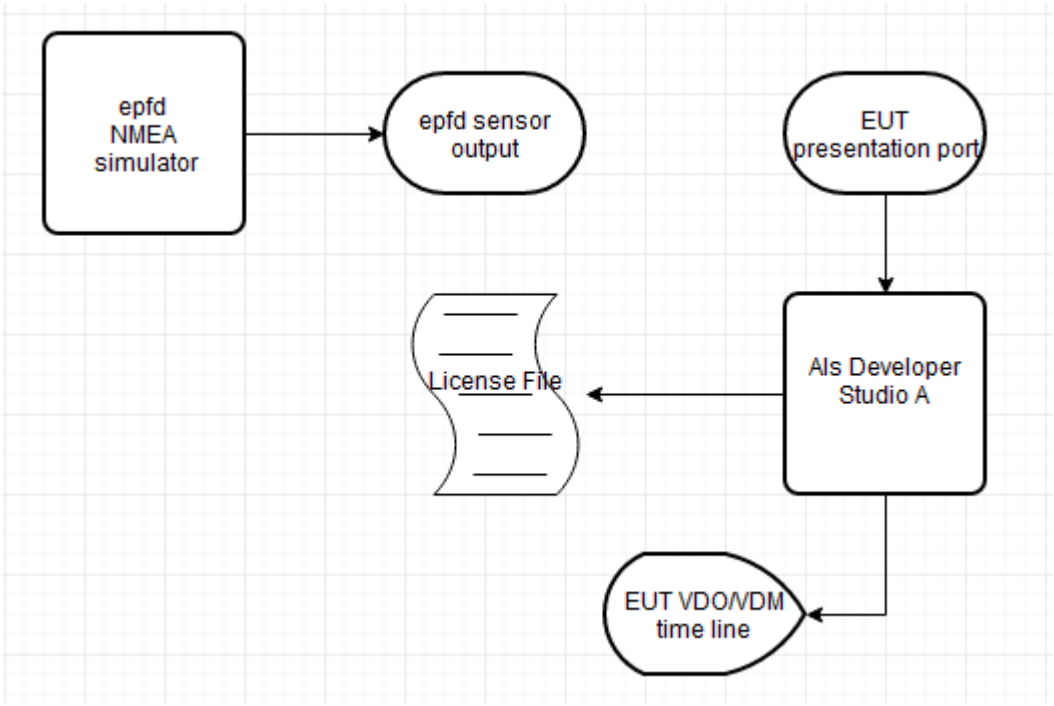
Priority	Affected data in msg 1, 2, 3 ⇒ Position Sensor status	Contents of ROT field
1	Rate of Turn Indicator in use	0...+ 126 = turning right at up to 708 degrees per minute or higher; 0...- 126 = turning left at up to 708 degrees per minute or higher Values between 0 and 708 degrees/min shall be coded by $ROT_{AIS}=4.733\ SQRT(ROT_{sensor})$ degrees/min where ROT_{sensor} is the Rate of Turn as input by the external Rate of Turn Indicator (TI). Values of 709 degrees per minute and above shall be cut to 708 degrees per minute.
2	other ROT source in use	+ 127 = turning right at more than 5^0/30s (No TI available) 0 = no turn - 127 = turning Left at more than 5^0/30s (No TI available)
3.	no valid ROT information available	–128 (80 hex) indicates no turn information available (default)

Verification set - up A



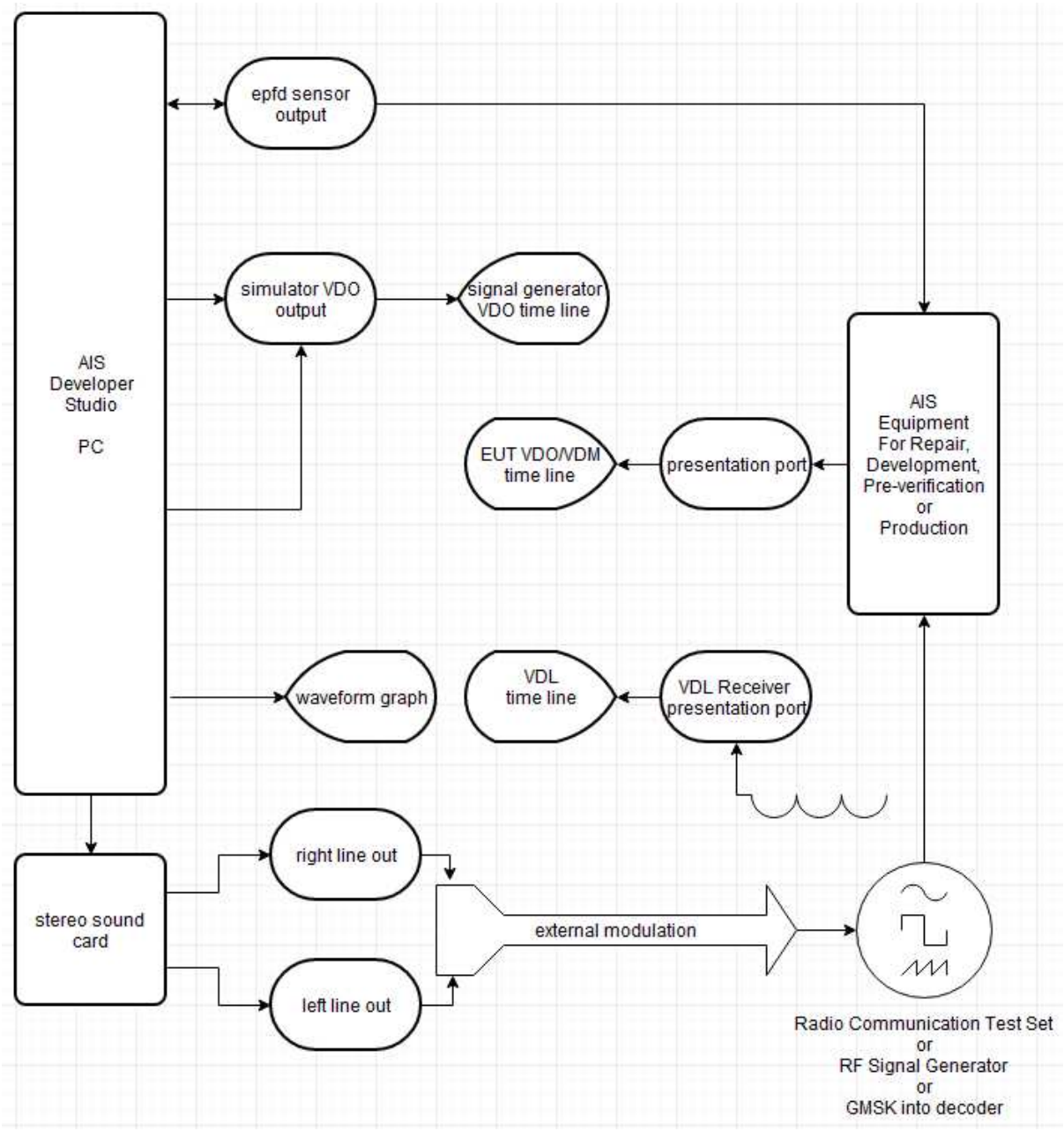
Verification of VDL “ONAIR” received VDM message and EUT VDO messages can take place with set-up A.

Verification set - up B



Verification of EUT VDO messages can take place with set-up B.

Verification set - up C



IEC 61993-2 19.5 Test Procedure

19.5 Test of sensor input

Method of measurement

Set-up standard test environment and operate inputs with simulated sensor data. Record VDL output.

a) simulate sensor information for position, speed, heading, ROT

b) simulate invalid and unavailable data

Required results

a) Verify that the recorded VDL message contents agree with the simulated sensor information.

b) Verify that affected data is set to default values.

The intention of this evaluation is to check the conversion of external sensor input data, to the VDL and equipment under test VDO messages.

Method:

- The equipment shall be connected as illustrated in set-up A or set-up B or C
- Place RF shroud over GPS antenna to get default values as internal sensor data.

Hardware Setup:
Verification set - up A

Equipment Under Test:
Marine Data Systems MIV Type approved AIS Class A Unit.

VDL Receiver:
SAAB R3 Type approved AIS Class A Unit

Procedure:

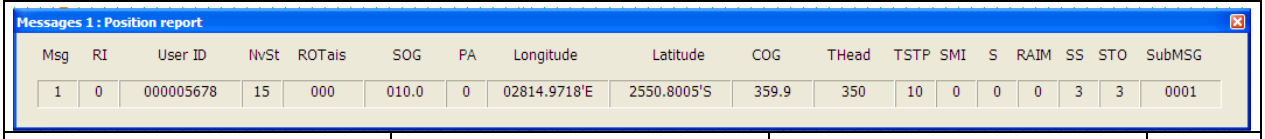
- Use one or more of the following procedures.

GLL sentence

<table>
<tr><th colspan="4">Procedure : GLL position input</th></tr>
<tr><th>Test item</th><th>Check</th><th>Remark</th><th>Result</th></tr>
<tr><td colspan="3">Apply simulated GLL sentence to the sensor input
$GPGLL,2550.8005,S,02814.9718,E,112137,A,A*5A
$GPVTG,359.9,T,,M,10.0,N,,K,A*14
$TIHDT,350.0,T*39
$TIROT,0.0,A*3B</td><td></td></tr>
<tr><td colspan="3">Check (VDL, VDO) = setupA or Check (VDO) = setupB</td><td></td></tr>
<tr><td rowspan="3"><u>Set status/mode to A,A</u></td><td>Check latitude</td><td></td><td>Ok</td></tr>
<tr><td>Check longitude</td><td></td><td>Ok</td></tr>
<tr><td>Check PA-Flag = 0</td><td></td><td>Ok</td></tr>
<tr><td colspan="4">Messages 1 : Position report
Msg RI User ID NvSt ROTais SOG PA Longitude Latitude COG THead TSTP SMI S RAIM SS STO SubMSG
1 0 000005678 15 000 010.0 0 02814.9718'E 2550.8005'S 359.9 350 24 0 0 0 3 6 1518</td></tr>
<tr><td rowspan="2"><u>Set status/mode to A,D</u>
(differential mode)</td><td>Check PA-Flag = 1</td><td></td><td>Ok</td></tr>
<tr><td>Check PA-Flag = 1</td><td></td><td>Ok</td></tr>
<tr><td colspan="4">Messages 1 : Position report
Msg RI User ID NvSt ROTais SOG PA Longitude Latitude COG THead TSTP SMI S RAIM SS STO SubMSG
1 0 000005678 15 000 010.0 1 02814.9718'E 2550.8005'S 359.9 350 32 0 0 0 3 0 2243</td></tr>
<tr><td rowspan="3"><u>Set status/mode to V,N</u>
(invalid data)</td><td>Check latitude = 91º</td><td></td><td>Ok</td></tr>
<tr><td>Check longitude = 181º</td><td></td><td>Ok</td></tr>
<tr><td>Check PA-Flag = 0</td><td></td><td>Ok</td></tr>
<tr><td colspan="4">Messages 1 : Position report
Msg RI User ID NvSt ROTais SOG PA Longitude Latitude COG THead TSTP SMI S RAIM SS STO SubMSG
1 0 000005678 15 000 010.0 0 18100.0000'E 9100.0000'N 359.9 350 31 0 0 0 3 0 0000</td></tr>
<tr><td><u>Set status/mode to A,A</u>
Change the number of digits for latitude & longitude after the decimal point from 2 to 6</td><td>Check that latitude and longitude are correct for all numbers</td><td></td><td>Ok</td></tr>
<tr><td colspan="4">$GPGLL,2550.800500,S,02814.971800,E,173109,A,A*50</td></tr>
<tr><td colspan="4">Messages 1 : Position report
Msg RI User ID NvSt ROTais SOG PA Longitude Latitude COG THead TSTP SMI S RAIM SS STO SubMSG
1 0 000005678 15 000 010.0 0 02814.9718'E 2550.8005'S 359.9 350 57 0 0 0 3 2 0543</td></tr>
<tr><td>No GBS sentence has been applied</td><td>Check that RAIM-Flag = 0</td><td></td><td>Ok</td></tr>
</table>

GGA sentence

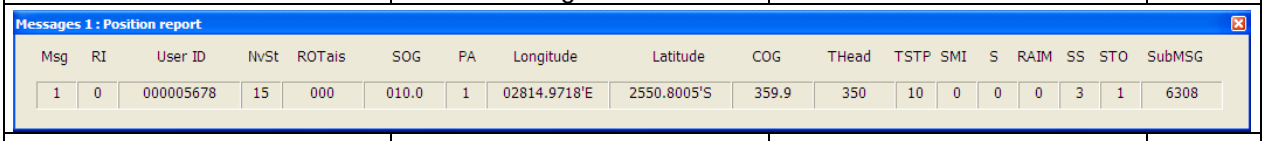
Procedure : GGA GPS position input			
Test item	**Check**	**Remark**	**Result**
Apply simulated GGA sentence to the sensor input $GPGGA,124559,2550.8005,S,02814.9718,E,2,,,4095,M,,,,*0E $GPVTG,359.9,T,,M,10.0,N,,K,A*14 $TIHDT,350.0,T*39 $TIROT,0.0,A*3B			
Check (VDL, VDO) = setupA or Check (VDO) = setupB			
Set Mode = **1** (autonomous)	Check latitude		Ok
	Check longitude		Ok
	Check PA-Flag = 0		Ok



Messages 1 : Position report

Msg	RI	User ID	NvSt	ROTais	SOG	PA	Longitude	Latitude	COG	THead	TSTP	SMI	S	RAIM	SS	STO	SubMSG
1	0	000005678	15	000	010.0	0	02814.9718'E	2550.8005'S	359.9	350	10	0	0	0	3	3	0001

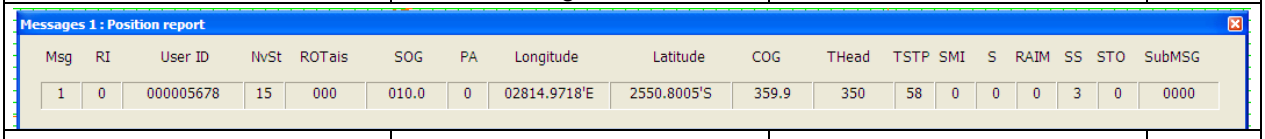
Set mode = **2** (differential)	Check data		Ok
	Check PA-Flag = 1		Ok



Messages 1 : Position report

Msg	RI	User ID	NvSt	ROTais	SOG	PA	Longitude	Latitude	COG	THead	TSTP	SMI	S	RAIM	SS	STO	SubMSG
1	0	000005678	15	000	010.0	1	02814.9718'E	2550.8005'S	359.9	350	10	0	0	0	3	1	6308

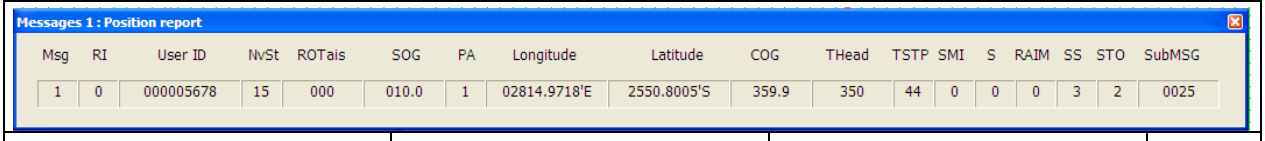
Set mode = **3** (GPS-PPS)	Check data		Ok
	Check PA-Flag = 0		Ok



Messages 1 : Position report

Msg	RI	User ID	NvSt	ROTais	SOG	PA	Longitude	Latitude	COG	THead	TSTP	SMI	S	RAIM	SS	STO	SubMSG
1	0	000005678	15	000	010.0	0	02814.9718'E	2550.8005'S	359.9	350	58	0	0	0	3	0	0000

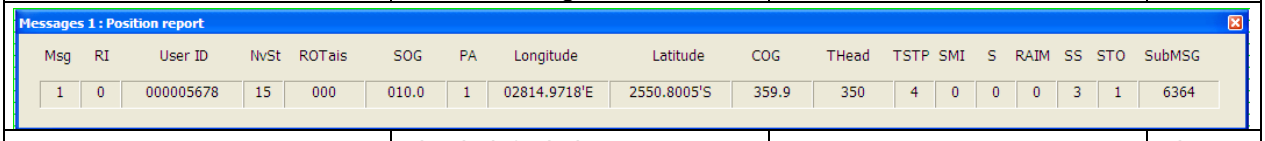
Set mode =**4** (RTK fixed)	Check data		Ok
	Check PA-Flag = 1		Ok



Messages 1 : Position report

Msg	RI	User ID	NvSt	ROTais	SOG	PA	Longitude	Latitude	COG	THead	TSTP	SMI	S	RAIM	SS	STO	SubMSG
1	0	000005678	15	000	010.0	1	02814.9718'E	2550.8005'S	359.9	350	44	0	0	0	3	2	0025

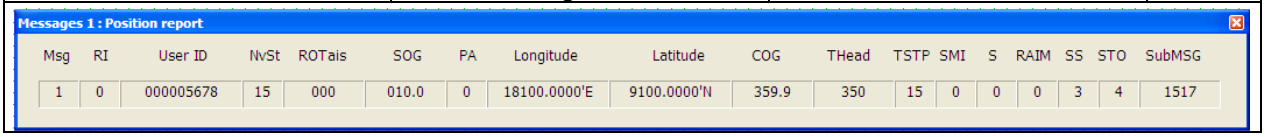
Set mode =**5** (RTK float	Check data		Ok
	Check PA-Flag = 1		Ok



Messages 1 : Position report

Msg	RI	User ID	NvSt	ROTais	SOG	PA	Longitude	Latitude	COG	THead	TSTP	SMI	S	RAIM	SS	STO	SubMSG
1	0	000005678	15	000	010.0	1	02814.9718'E	2550.8005'S	359.9	350	4	0	0	0	3	1	6364

Set mode = **6** (dead reck.)	Check default data		Ok
	Check PA-Flag = 0		Ok



Messages 1 : Position report

Msg	RI	User ID	NvSt	ROTais	SOG	PA	Longitude	Latitude	COG	THead	TSTP	SMI	S	RAIM	SS	STO	SubMSG
1	0	000005678	15	000	010.0	0	18100.0000'E	9100.0000'N	359.9	350	15	0	0	0	3	4	1517

Procedure : GGA GPS position input			
Set mode = **7** (manual)	Check default data Check PA-Flag = 0		Ok

Messages 1 : Position report

Msg	RI	User ID	NvSt	ROTais	SOG	PA	Longitude	Latitude	COG	THead	TSTP	SMI	S	RAIM	SS	STO	SubMSG
1	0	000005678	15	000	010.0	0	18100.0000'E	9100.0000'N	359.9	350	15	0	0	0	3	0	2247

Set mode = **8** (simulated)	Check default data Check PA-Flag = 0		Ok

Messages 1 : Position report

Msg	RI	User ID	NvSt	ROTais	SOG	PA	Longitude	Latitude	COG	THead	TSTP	SMI	S	RAIM	SS	STO	SubMSG
1	0	000005678	15	000	010.0	0	18100.0000'E	9100.0000'N	359.9	350	15	0	0	0	3	0	2256

Set mode = **0** (**no fix**)	Check default data Check PA-Flag = 0		Ok

GNS sentence

Procedure : GNS satellite position input			
Test item	**Check**	**Remark**	**Result**
Apply simulated GNS sentence to the sensor input $GPGNS,165730,2550.8005,S,02814.9718,E,AA,,,,,,*6A $GPVTG,359.9,T,,M,10.0,N,,K,A*14 $TIHDT,350.0,T*39 $TIROT,0.0,A*3B			
Check (VDL, VDO) = set-up A or Check (VDO) = set-up B			
Set Mode = **AA** (autonomous GPS/GLONASS)	Check latitude		Ok
	Check longitude		Ok
	Check PA-Flag = 0		Ok
	Check RAIM-Flag = 0		Ok

Messages 1 : Position report

Msg	RI	User ID	NvSt	ROTais	SOG	PA	Longitude	Latitude	COG	THead	TSTP	SMI	S	RAIM	SS	STO	SubMSG
1	0	000005678	15	000	010.0	0	02814.9718'E	2550.8005'S	359.9	350	0	0	0	0	3	1	0000

Set Mode = **AN** (autonomous GPS/no GLONASS)	Check data		Ok
	Check PA-Flag = 0		Ok

Messages 1 : Position report

Msg	RI	User ID	NvSt	ROTais	SOG	PA	Longitude	Latitude	COG	THead	TSTP	SMI	S	RAIM	SS	STO	SubMSG
1	0	000005678	15	000	010.0	0	02814.9718'E	2550.8005'S	359.9	350	0	0	0	0	3	5	0001

Set Mode = **NA** (no GPS/ autonomous GLONASS)	Check data		Ok
	Check PA-Flag = 0		Ok

Messages 1 : Position report

Msg	RI	User ID	NvSt	ROTais	SOG	PA	Longitude	Latitude	COG	THead	TSTP	SMI	S	RAIM	SS	STO	SubMSG
1	0	000005678	15	000	010.0	0	02814.9718'E	2550.8005'S	359.9	350	0	0	0	0	3	2	1801

Set Mode = **DA** (differential GPS/ autonomous GLONASS)	Check data		Ok
	Check **PA-Flag = 1**		Ok

Messages 1 : Position report

Msg	RI	User ID	NvSt	ROTais	SOG	PA	Longitude	Latitude	COG	THead	TSTP	SMI	S	RAIM	SS	STO	SubMSG
1	0	000005678	15	000	010.0	1	02814.9718'E	2550.8005'S	359.9	350	0	0	0	0	3	1	0000

Set Mode = **DD** (differential GPS/ differential GLONASS)	Check data ok		Ok
	Check PA-Flag = 1		Ok

Messages 1 : Position report

Msg	RI	User ID	NvSt	ROTais	SOG	PA	Longitude	Latitude	COG	THead	TSTP	SMI	S	RAIM	SS	STO	SubMSG
1	0	000005678	15	000	010.0	1	02814.9718'E	2550.8005'S	359.9	350	0	0	0	0	3	4	0227

Procedure : GNS satellite position input			
Set Mode = **DN** (differential GPS/ no GLONASS)	Check data		Ok
	Check PA-Flag = 1		Ok

Messages 1 : Position report

Msg	RI	User ID	NvSt	ROTais	SOG	PA	Longitude	Latitude	COG	THead	TSTP	SMI	S	RAIM	SS	STO	SubMSG
1	0	000005678	15	000	010.0	1	02814.9718'E	2550.8005'S	359.9	350	0	0	0	0	3	3	0001

Set Mode = **AD** (autonomous GPS/ differential GLONASS)	Check data ok		Ok
	Check PA-Flag = 1		Ok

Messages 1 : Position report

Msg	RI	User ID	NvSt	ROTais	SOG	PA	Longitude	Latitude	COG	THead	TSTP	SMI	S	RAIM	SS	STO	SubMSG
1	0	000005678	15	000	010.0	1	02814.9718'E	2550.8005'S	359.9	350	0	0	0	0	3	2	1727

Set Mode = **ND** (no GPS/ differential GLONASS)	Check data ok		Ok
	Check PA-Flag = 1		Ok

Messages 1 : Position report

Msg	RI	User ID	NvSt	ROTais	SOG	PA	Longitude	Latitude	COG	THead	TSTP	SMI	S	RAIM	SS	STO	SubMSG
1	0	000005678	15	000	010.0	1	02814.9718'E	2550.8005'S	359.9	350	0	0	0	0	3	5	0001

Set Mode = **NN** (no GPS/ no GLONASS)	Check latitude = 91º		Ok
	Check longitude = 181º		Ok
	Check PA-Flag = 0		Ok

Messages 1 : Position report

Msg	RI	User ID	NvSt	ROTais	SOG	PA	Longitude	Latitude	COG	THead	TSTP	SMI	S	RAIM	SS	STO	SubMSG
1	0	000005678	15	000	010.0	0	18100.0000'E	9100.0000'N	359.9	350	0	0	0	0	3	2	1127

RMC sentence

Procedure : RMC position input			
Test item	**Check**	**Remark**	**Result**
Apply simulated RMC sentence to the sensor input $GPRMC,174441,A,2550.8005,S,02814.9718,E,10.0,359.9,140519,,,A*56 $TIHDT,350.0,T*39 $TIROT,0.0,A*3B			
Check (VDL, VDO) = set-up A or Check (VDO) = set-up B			
Set status/mode to **A,A**	Check latitude		Ok
	Check longitude		Ok
	Check PA-Flag = 0		Ok

Messages 1 : Position report

Msg	RI	User ID	NvSt	ROTais	SOG	PA	Longitude	Latitude	COG	THead	TSTP	SMI	S	RAIM	SS	STO	SubMSG
1	0	000005678	15	000	010.0	0	02814.9718'E	2550.8005'S	359.9	350	24	0	0	0	3	0	0000

Set status/mode to **A,D** (differential mode)	Check of valid data		Ok
	Check PA-Flag = 1		Ok

Messages 1 : Position report

Msg	RI	User ID	NvSt	ROTais	SOG	PA	Longitude	Latitude	COG	THead	TSTP	SMI	S	RAIM	SS	STO	SubMSG
1	0	000005678	15	000	010.0	1	02814.9718'E	2550.8005'S	359.9	350	8	0	0	0	3	2	1579

Set status/mode to **V,N** (invalid data)	Check latitude = 91º		Ok
	Check longitude = 181º		Ok
	Check PA-Flag = 0		Ok

Messages 1 : Position report

Msg	RI	User ID	NvSt	ROTais	SOG	PA	Longitude	Latitude	COG	THead	TSTP	SMI	S	RAIM	SS	STO	SubMSG
1	0	000005678	15	000	102.3	0	18100.0000'E	9100.0000'N	360.0	350	4	0	0	0	3	4	1647

Set status/mode to **V,A** Status test for invalid data	Check latitude = 91º		Ok
	Check longitude = 181º		Ok
	Check PA-Flag = 0		Ok
	Check SOG = 102.3		Ok
	Check COG = 360°		Ok

Messages 1 : Position report

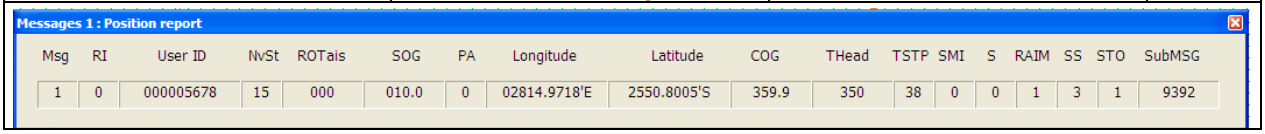
Msg	RI	User ID	NvSt	ROTais	SOG	PA	Longitude	Latitude	COG	THead	TSTP	SMI	S	RAIM	SS	STO	SubMSG
1	0	000005678	15	000	102.3	0	18100.0000'E	9100.0000'N	360.0	350	4	0	0	0	3	4	0296

DTM sentence

<table>
<tr><th colspan="4">Procedure : DTM reference datum</th></tr>
<tr><th>Test item</th><th>Check</th><th>Remark</th><th>Result</th></tr>
<tr><td colspan="3">Apply simulated position sentences with DTM - Start with datum not WGS 84
$GPGLL,2550.8005,S,02814.9718,E,180157,A,A*57
$GPVTG,359.9,T,,M,10.0,N,,K,A*14
$GPDTM,W72,,,,,,W72*4A
$TIHDT,350.0,T*39
$TIROT,0.0,A*3B</td><td></td></tr>
<tr><td colspan="3">Check (VDL, VDO) = set-up A or Check (VDO) = set-up B</td><td></td></tr>
<tr><td>Apply <u>GLL</u> sentence with DTM
Datum = WGS 72</td><td>Check default data</td><td></td><td>Ok</td></tr>
<tr><td colspan="4">Messages 1 : Position report
Msg RI User ID NvSt ROTais SOG PA Longitude Latitude COG THead TSTP SMI S RAIM SS STO SubMSG
1 0 000005678 15 000 010.0 0 18100.0000'E 9100.0000'N 359.9 350 44 0 0 0 3 0 2256</td></tr>
<tr><td colspan="4">$GPDTM,W84,,,,,,W84*4A</td></tr>
<tr><td>Set Datum = WGS 84</td><td>Check data valid</td><td></td><td>Ok</td></tr>
<tr><td colspan="4">Messages 1 : Position report
Msg RI User ID NvSt ROTais SOG PA Longitude Latitude COG THead TSTP SMI S RAIM SS STO SubMSG
1 0 000005678 15 000 010.0 0 02814.9718'E 2550.8005'S 359.9 350 20 0 0 0 3 0 0000</td></tr>
<tr><td colspan="4">$GPDTM,P90,,,,,,P90*4A</td></tr>
<tr><td>Set Datum = PE90</td><td>Check default data</td><td></td><td>Ok</td></tr>
<tr><td colspan="4">Messages 1 : Position report
Msg RI User ID NvSt ROTais SOG PA Longitude Latitude COG THead TSTP SMI S RAIM SS STO SubMSG
1 0 000005678 15 000 010.0 0 18100.0000'E 9100.0000'N 359.9 350 17 0 0 0 3 2 0081</td></tr>
<tr><td colspan="4">$GPGGA,181846,2550.8005,S,02814.9718,E,1,,,4095,M,,,*01
$GPDTM,W72,,,,,,W72*4A</td></tr>
<tr><td>Apply <u>GGA</u> sentence with DTM
Datum = WGS 72</td><td>Check default data</td><td></td><td>Ok</td></tr>
<tr><td colspan="4">Messages 1 : Position report
Msg RI User ID NvSt ROTais SOG PA Longitude Latitude COG THead TSTP SMI S RAIM SS STO SubMSG
1 0 000005678 15 000 010.0 0 18100.0000'E 9100.0000'N 359.9 350 17 0 0 0 3 4 1657</td></tr>
<tr><td colspan="4">$GPDTM,P90,,,,,,P90*4A</td></tr>
<tr><td>Set Datum = PE90</td><td>Check default data</td><td></td><td>Ok</td></tr>
<tr><td colspan="4">Messages 1 : Position report
Msg RI User ID NvSt ROTais SOG PA Longitude Latitude COG THead TSTP SMI S RAIM SS STO SubMSG
1 0 000005678 15 000 010.0 0 18100.0000'E 9100.0000'N 359.9 350 0 0 0 0 3 2 2106</td></tr>
<tr><td colspan="4">$GPDTM,W84,,,,,,W84*4A</td></tr>
<tr><td>Set Datum = WGS 84</td><td>Check data valid</td><td></td><td>Ok</td></tr>
<tr><td colspan="4">Messages 1 : Position report
Msg RI User ID NvSt ROTais SOG PA Longitude Latitude COG THead TSTP SMI S RAIM SS STO SubMSG
1 0 000005678 15 000 010.0 0 02814.9718'E 2550.8005'S 359.9 350 40 0 0 0 3 0 0000</td></tr>
</table>

GBS sentence

Procedure : GBS input			
Test item	**Check**	**Remark**	**Result**
Apply simulated gll sentence with GBS sentence to the sensor input $GPGLL,2550.8005,S,02814.9718,E,184357,A,A*51 $GPGBS,184357,0.1,0.1,0.1,,0,0.1,5.0*56 $GPVTG,359.9,T,,M,10.0,N,,K,A*14 $TIHDT,350.0,T*39 $TIROT,0.0,A*3B			
Check (VDL, VDO) = set-up A or Check (VDO) = set-up B			
	Check that RAIM-Flag = 1		Ok

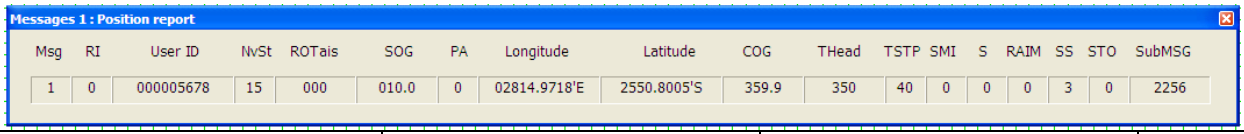


Messages 1 : Position report

Msg	RI	User ID	NvSt	ROTais	SOG	PA	Longitude	Latitude	COG	THead	TSTP	SMI	S	RAIM	SS	STO	SubMSG
1	0	000005678	15	000	010.0	0	02814.9718'E	2550.8005'S	359.9	350	38	0	0	1	3	1	9392

HDT sentence

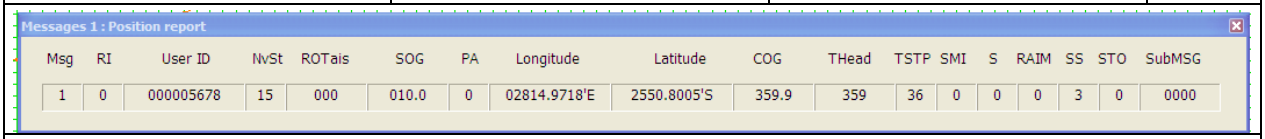
Procedure : HDT heading input			
Test item	**Check**	**Remark**	**Result**
Apply simulated HDT sentence to the sensor input $GPGLL,2550.8005,S,02814.9718,E,191148,A,A*59 $GPVTG,359.9,T,,M,10.0,N,,K,A*14 $TIHDT,350.0,T*39 $TIROT,0.0,A*3B			
Check (VDL, VDO) = set-up A or Check (VDO) = set-up B			
Heading value = 350.0	Check heading valid		Ok



Messages 1 : Position report

Msg	RI	User ID	NvSt	ROTais	SOG	PA	Longitude	Latitude	COG	THead	TSTP	SMI	S	RAIM	SS	STO	SubMSG
1	0	000005678	15	000	010.0	0	02814.9718'E	2550.8005'S	359.9	350	40	0	0	0	3	0	2256

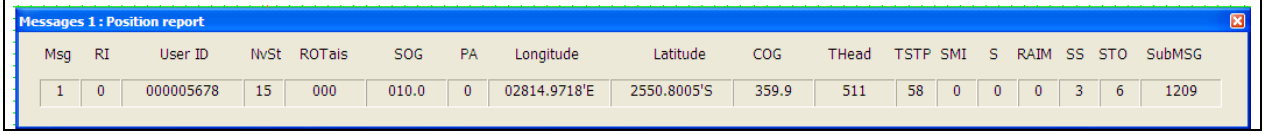
Change value to 359.9	Check that heading = 359 or 0, **not 360**		Ok



Messages 1 : Position report

Msg	RI	User ID	NvSt	ROTais	SOG	PA	Longitude	Latitude	COG	THead	TSTP	SMI	S	RAIM	SS	STO	SubMSG
1	0	000005678	15	000	010.0	0	02814.9718'E	2550.8005'S	359.9	359	36	0	0	0	3	0	0000

$TIHDT,,T*11			
Delete heading value (empty field)	Check that heading = default		Ok



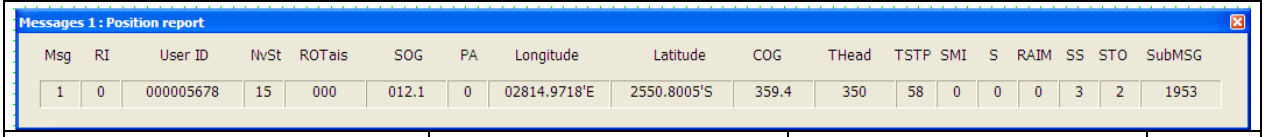
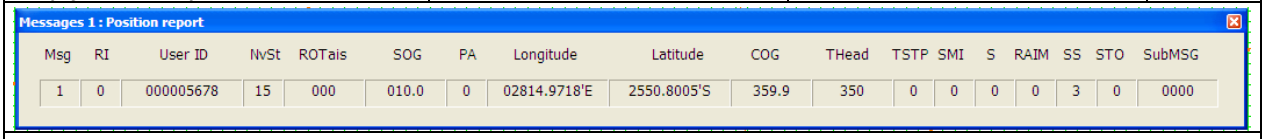
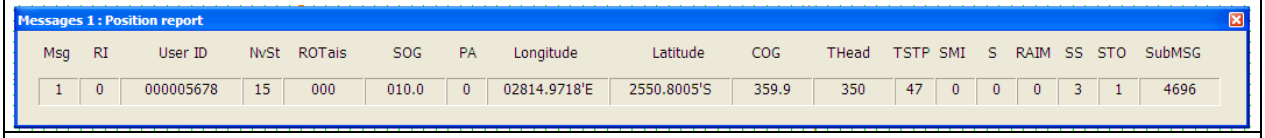
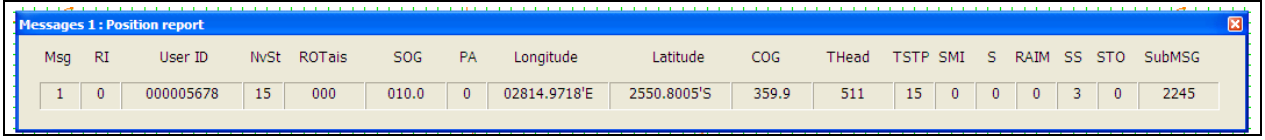
Messages 1 : Position report

Msg	RI	User ID	NvSt	ROTais	SOG	PA	Longitude	Latitude	COG	THead	TSTP	SMI	S	RAIM	SS	STO	SubMSG
1	0	000005678	15	000	010.0	0	02814.9718'E	2550.8005'S	359.9	511	58	0	0	0	3	6	1209

VTG sentence

<table>
<tr><th colspan="4">Procedure : VTG speed input</th></tr>
<tr><th>Test item</th><th>Check</th><th>Remark</th><th>Result</th></tr>
<tr><td colspan="3">Apply simulated VTG sentence to the sensor input
$GPGLL,2550.8005,S,02814.9718,E,192847,A,A*5C
$GPVTG,359.9,T,,M,10.0,N,,K,A*14
$TIHDT,350.0,T*39
$TIROT,0.0,A*3B</td><td></td></tr>
<tr><td colspan="3">Check (VDL, VDO) = set-up A or Check (VDO) = set-up B</td><td></td></tr>
<tr><td rowspan="2">Set mode to A (autonomous)</td><td>Check SOG valid</td><td></td><td>Ok</td></tr>
<tr><td>Check COG valid</td><td></td><td>Ok</td></tr>
<tr><td colspan="4">Messages 1 : Position report
Msg RI User ID NvSt ROTais SOG PA Longitude Latitude COG THead TSTP SMI S RAIM SS STO SubMSG
1 0 000005678 15 000 010.0 0 02814.9718'E 2550.8005'S 359.9 350 12 0 0 0 3 4 1722</td></tr>
<tr><td rowspan="2">Set mode to D (differential)</td><td>Check SOG valid</td><td></td><td>Ok</td></tr>
<tr><td>Check COG valid</td><td></td><td>Ok</td></tr>
<tr><td colspan="4">Messages 1 : Position report
Msg RI User ID NvSt ROTais SOG PA Longitude Latitude COG THead TSTP SMI S RAIM SS STO SubMSG
1 0 000005678 15 000 010.0 0 02814.9718'E 2550.8005'S 359.9 350 38 0 0 0 3 1 9856</td></tr>
<tr><td rowspan="2">Set mode to N (invalid)</td><td>Check SOG = 102.3 (default)</td><td></td><td>Ok</td></tr>
<tr><td>Check COG = 360 (default)</td><td></td><td>Ok</td></tr>
<tr><td colspan="4">Messages 1 : Position report
Msg RI User ID NvSt ROTais SOG PA Longitude Latitude COG THead TSTP SMI S RAIM SS STO SubMSG
1 0 000005678 15 000 102.3 0 02814.9718'E 2550.8005'S 360.0 350 10 0 0 0 3 0 2251</td></tr>
<tr><td colspan="4">Set Simulation(Ground Speed , Kilometers per hour)</td></tr>
<tr><td colspan="4">$GPVTG,359.9,T,,M,,N,18.5,K,N*16</td></tr>
<tr><td>Set mode to A (autonomous)
Set SOG Simulator to KPH
This changes the SOG-N field to SOG K-Field (speed in km/h)</td><td>Check SOG value.
It has to be converted into knots or set to default</td><td></td><td>Ok</td></tr>
<tr><td colspan="4">Messages 1 : Position report
Msg RI User ID NvSt ROTais SOG PA Longitude Latitude COG THead TSTP SMI S RAIM SS STO SubMSG
1 0 000005678 15 000 009.9 0 02814.9718'E 2550.8005'S 359.9 350 22 0 0 0 3 5 0001</td></tr>
</table>

VBW sentence

	Procedure : VBW input with VTG sentence valid		
Test item	**Check**	**Remark**	**Result**
Apply simulated VBW sentence to the sensor input Set Simulation(VBW, Track with offset) $GPGLL,2550.8005,S,02814.9718,E,090911,A,A*5D $GPVTG,359.9,T,,M,10.0,N,,K,A*14 $VDVBW,11.0,1.0,A,12.0,2.0,A*51 $TIHDT,350.0,T*39 $TIROT,0.0,A*3B			
Check (VDL, VDO) = set-up A or Check (VDO) = set-up B			
Status of bottom track: **A,A** (valid) Ahead and across speed available.	Check that SOG = resultant of ahead and across speed		Ok
	COG = calculated from SOG vector and heading		Ok
			
Status of bottom track: **A,V** (invalid) Ahead and across speed not empty. Water speed valid !	SOG from VTG		Ok
	COG from VTG		Ok
			
Set Simulation(VBW, **A, A + ahead**, Track with offset) = single axis log			
$VDVBW,11.0,1.0,A,12.0,,A*7D			
Status of bottom track: **A,A…**(valid) Ahead available, **across speed empty (**e.g. single axis log)	SOG from VTG		Ok
	COG from VTG		Ok
			
Set Simulation(VBW, A, Track with offset) Set Simulation(HDT, Delete heading value)			
$VDVBW,11.0,1.0,A,12.0,2.0,A*51 $TIHDT,,T*11			
Status of bottom track: **A,A** (valid) Ahead and across speed available, **Heading invalid**	SOG from VTG		Ok
	COG from VTG		Ok
			

Procedure : VBW input, no VTG sentence			
Test item	**Check**	**Remark**	**Result**
Apply simulated VBW sentence to the sensor input, No VTG speed available $GPGLL,2550.8005,S,02814.9718,E,094338,A,A*58 $VDVBW,11.0,1.0,A,12.0,2.0,A*51 $TIHDT,350.0,T*39 $TIROT,0.0,A*3B			
Check (VDL, VDO) = set-up A or Check (VDO) = set-up B			
Status of bottom track: **A**,**A** (valid) Ahead and across speed available.	Check that SOG = resultant of ahead and across speed		Ok
	COG = calculated from SOG vector and heading	See above	Ok

Messages 1 : Position report

Msg	RI	User ID	NvSt	ROTais	SOG	PA	Longitude	Latitude	COG	THead	TSTP	SMI	S	RAIM	SS	STO	SubMSG
1	0	000005678	15	000	012.1	0	02814.9718'E	2550.8005'S	359.4	350	55	0	0	0	3	2	1807

Status of bottom track: **A,V** (invalid) Ahead and across speed not empty. Water speed valid !	SOG = default		Ok
	COG = default		Ok

Messages 1 : Position report

Msg	RI	User ID	NvSt	ROTais	SOG	PA	Longitude	Latitude	COG	THead	TSTP	SMI	S	RAIM	SS	STO	SubMSG
1	0	000005678	15	000	102.3	0	02814.9718'E	2550.8005'S	360.0	350	27	0	0	0	3	3	0001

Set Simulation(VBW, **A, A + ahead**, Track with offset) = single axis log			
$VDVBW,11.0,1.0,A,12.0,,A*7D			
Status of bottom track: **A…** (valid) Ahead available, **across speed empty (**e.g. single axis log)	SOG = default		Ok
	COG = default		Ok

Messages 1 : Position report

Msg	RI	User ID	NvSt	ROTais	SOG	PA	Longitude	Latitude	COG	THead	TSTP	SMI	S	RAIM	SS	STO	SubMSG
1	0	000005678	15	000	102.3	0	02814.9718'E	2550.8005'S	360.0	350	33	0	0	0	3	0	2247

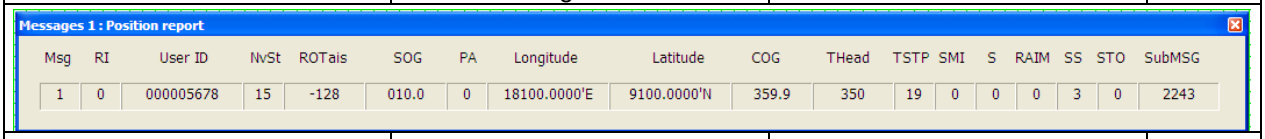
Set Simulation(VBW, A, Track with offset) Set Simulation(HDT, Delete heading value)			
$VDVBW,11.0,1.0,A,12.0,2.0,A*51 $TIHDT,,T*11			
Status of bottom track: **A,A** (valid) Ahead and across speed available, **Heading invalid**	SOG from VBW or default		Ok
	COG = default		Ok

Messages 1 : Position report

Msg	RI	User ID	NvSt	ROTais	SOG	PA	Longitude	Latitude	COG	THead	TSTP	SMI	S	RAIM	SS	STO	SubMSG
1	0	000005678	15	000	102.3	0	02814.9718'E	2550.8005'S	360.0	511	9	0	0	0	3	4	0069

OSD sentence

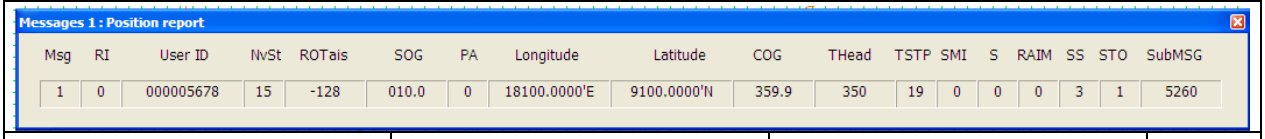
Procedure : OSD own ship data input			
Test item	**Check**	**Remark**	**Result**
Apply simulated OSD sentence to the sensor input $INOSD,350.0,A,359.9,B,10.0,B,,,N*63			
Check (VDL, VDO) = set-up A or Check (VDO) = set-up B			
Heading status = **A** (valid) Speed reference = **B** (bottom)	Check SOG from OSD		Ok
	Check COG from OSD		Ok
	Check heading from OSD		Ok



Messages 1 : Position report

Msg	RI	User ID	NvSt	ROTais	SOG	PA	Longitude	Latitude	COG	THead	TSTP	SMI	S	RAIM	SS	STO	SubMSG
1	0	000005678	15	-128	010.0	0	18100.0000'E	9100.0000'N	359.9	350	19	0	0	0	3	0	2243

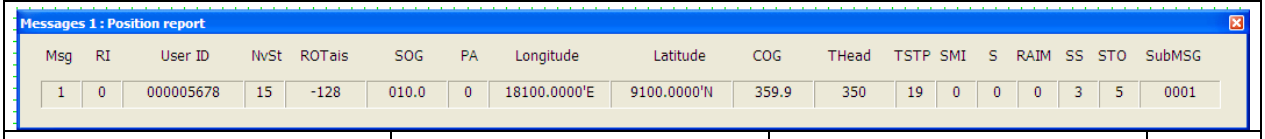
Set speed reference to **P** (Positioning system)	Check SOG and COG from OSD		Ok



Messages 1 : Position report

Msg	RI	User ID	NvSt	ROTais	SOG	PA	Longitude	Latitude	COG	THead	TSTP	SMI	S	RAIM	SS	STO	SubMSG
1	0	000005678	15	-128	010.0	0	18100.0000'E	9100.0000'N	359.9	350	19	0	0	0	3	1	5260

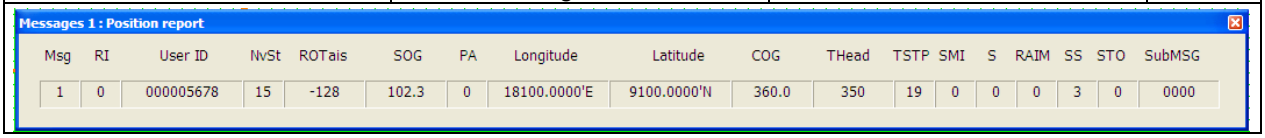
Set speed reference to **R** Radar tracking	Check SOG and COG from OSD		Ok



Messages 1 : Position report

Msg	RI	User ID	NvSt	ROTais	SOG	PA	Longitude	Latitude	COG	THead	TSTP	SMI	S	RAIM	SS	STO	SubMSG
1	0	000005678	15	-128	010.0	0	18100.0000'E	9100.0000'N	359.9	350	19	0	0	0	3	5	0001

Set speed reference to **W** (Water speed)	Check SOG = default		Ok
	Check COG = default		Ok
	Check heading from OSD		Ok



Messages 1 : Position report

Msg	RI	User ID	NvSt	ROTais	SOG	PA	Longitude	Latitude	COG	THead	TSTP	SMI	S	RAIM	SS	STO	SubMSG
1	0	000005678	15	-128	102.3	0	18100.0000'E	9100.0000'N	360.0	350	19	0	0	0	3	0	0000

Procedure : OSD own ship data input			
Set speed reference to **M** (Manual)	Check SOG = default		Ok
	Check COG = default		Ok
	Check heading from OSD		Ok

Messages 1 : Position report

Msg	RI	User ID	NvSt	ROTais	SOG	PA	Longitude	Latitude	COG	THead	TSTP	SMI	S	RAIM	SS	STO	SubMSG
1	0	000005678	15	-128	102.3	0	18100.0000'E	9100.0000'N	360.0	350	19	0	0	0	3	1	5260

$INOSD,350.0,V,359.9,P,10.0,P,,,N*74

Set speed reference to **P** (Positioning system)	Check SOG from OSD		Ok
	Check COG from OSD		Ok
Set **heading status = V** (invalid)	Check heading = default		Ok

Messages 1 : Position report

Msg	RI	User ID	NvSt	ROTais	SOG	PA	Longitude	Latitude	COG	THead	TSTP	SMI	S	RAIM	SS	STO	SubMSG
1	0	000005678	15	-128	010.0	0	18100.0000'E	9100.0000'N	359.9	511	19	0	0	0	3	1	5260

Set Simulation(Ground Speed , Kilometers per hour)

$INOSD,350.0,V,359.9,P,18.5,P,,,K*7C

Change speed reference from N (kn) to K (km/h)	Check SOG is converted into knots		Ok

Messages 1 : Position report

Msg	RI	User ID	NvSt	ROTais	SOG	PA	Longitude	Latitude	COG	THead	TSTP	SMI	S	RAIM	SS	STO	SubMSG
1	0	000005678	15	-128	009.9	0	18100.0000'E	9100.0000'N	359.9	511	19	0	0	0	3	1	5260

Set Simulation(Ground Speed , Knots)

Apply simulated OSD,GLL,ROT sentence's to the sensor input

$GPGLL,2550.8005,S,02814.9718,E,112215,A,A*59

$INOSD,350.0,A,359.9,B,10.0,B,,,N*63

$TIROT,0.0,A*3B

Messages 1 : Position report

Msg	RI	User ID	NvSt	ROTais	SOG	PA	Longitude	Latitude	COG	THead	TSTP	SMI	S	RAIM	SS	STO	SubMSG
1	0	000005678	15	000	010.0	0	02814.9718'E	2550.8005'S	359.9	350	23	0	0	0	3	6	0605

ROT sentence

Procedure : ROT Rate of Turn input			
Test item	**Check**	**Remark**	**Result**
Apply simulated ROT sentence to the sensor input, Talker = TI $GPGLL,2550.8005,S,02814.9718,E,120011,A,A*5E $GPVTG,359.9,T,,M,10.0,N,,K,A*14 $TIHDT,350.0,T*39 $TIROT,0.0,A*3B			
Check (VDL, VDO) = set-up A or Check (VDO) = set-up B			
ROT status = **A** (valid) ROT value = 0.0 degr./min	Check ROT value		Ok

Messages 1 : Position report

Msg	RI	User ID	NvSt	ROTais	SOG	PA	Longitude	Latitude	COG	THead	TSTP	SMI	S	RAIM	SS	STO	SubMSG
1	0	000005678	15	000	010.0	0	02814.9718'E	2550.8005'S	359.9	350	13	0	0	0	3	0	0000

	$TIROT	ROTais		
Change rate of turn to different values according to the check column. The ROT value has to be the nearest value according the conversion formula (see conversion table)	10	15		Ok
	20	21		Ok
	60	37		Ok
	180	63/64		Ok
	360	90		Ok
	720	126		Ok
	-20	–21		Ok
	-720	-126		Ok

$TIROT,10.0,A*0A

Messages 1 : Position report

Msg	RI	User ID	NvSt	ROTais	SOG	PA	Longitude	Latitude	COG	THead	TSTP	SMI	S	RAIM	SS	STO	SubMSG
1	0	000005678	15	015	010.0	0	02814.9718'E	2550.8005'S	359.9	350	5	0	0	0	3	2	2172

$TIROT,20.0,A*09

Messages 1 : Position report

Msg	RI	User ID	NvSt	ROTais	SOG	PA	Longitude	Latitude	COG	THead	TSTP	SMI	S	RAIM	SS	STO	SubMSG
1	0	000005678	15	021	010.0	0	02814.9718'E	2550.8005'S	359.9	350	32	0	0	0	3	0	0000

TIROT,60.0,A*0D

Messages 1 : Position report

Msg	RI	User ID	NvSt	ROTais	SOG	PA	Longitude	Latitude	COG	THead	TSTP	SMI	S	RAIM	SS	STO	SubMSG
1	0	000005678	15	037	010.0	0	02814.9718'E	2550.8005'S	359.9	350	51	0	0	0	3	3	0001

$TIROT,180.0,A*32

Messages 1 : Position report

Msg	RI	User ID	NvSt	ROTais	SOG	PA	Longitude	Latitude	COG	THead	TSTP	SMI	S	RAIM	SS	STO	SubMSG
1	0	000005678	15	063	010.0	0	02814.9718'E	2550.8005'S	359.9	350	17	0	0	0	3	0	0000

Procedure : ROT Rate of Turn input

$TIROT,360.0,A*3E

Messages 1 : Position report

Msg	RI	User ID	NvSt	ROTais	SOG	PA	Longitude	Latitude	COG	THead	TSTP	SMI	S	RAIM	SS	STO	SubMSG
1	0	000005678	15	090	010.0	0	02814.9718'E	2550.8005'S	359.9	350	41	0	0	0	3	3	0001

$TIROT,720.0,A*3E

Messages 1 : Position report

Msg	RI	User ID	NvSt	ROTais	SOG	PA	Longitude	Latitude	COG	THead	TSTP	SMI	S	RAIM	SS	STO	SubMSG
1	0	000005678	15	126	010.0	0	02814.9718'E	2550.8005'S	359.9	350	53	0	0	0	3	0	0000

$TIROT,-20.0,A*24

Messages 1 : Position report

Msg	RI	User ID	NvSt	ROTais	SOG	PA	Longitude	Latitude	COG	THead	TSTP	SMI	S	RAIM	SS	STO	SubMSG
1	0	000005678	15	-21	010.0	0	02814.9718'E	2550.8005'S	359.9	350	11	0	0	0	3	0	2248

$TIROT,-720.0,A*13

Messages 1 : Position report

Msg	RI	User ID	NvSt	ROTais	SOG	PA	Longitude	Latitude	COG	THead	TSTP	SMI	S	RAIM	SS	STO	SubMSG
1	0	000005678	15	-126	010.0	0	02814.9718'E	2550.8005'S	359.9	350	49	0	0	0	3	7	0001

Set ROT <u>status =</u> **V** (invalid)	Check that ROT = default (default = -731.4 = -128)		Ok

$TIROT,-720.0,V*04

Messages 1 : Position report

Msg	RI	User ID	NvSt	ROTais	SOG	PA	Longitude	Latitude	COG	THead	TSTP	SMI	S	RAIM	SS	STO	SubMSG
1	0	000005678	15	-128	010.0	0	02814.9718'E	2550.8005'S	359.9	350	57	0	0	0	3	0	2254

Procedure : ROT Rate of Turn input				
Set Simulation(ROT , **A, Talker = HE**)				
$HEROT,0.0,A*2B				
ROT status = **A** (valid) ROT value = 0.0 degr./min Set **Talker = HE**	Check ROT = 0.0			Ok

Messages 1 : Position report

Msg	RI	User ID	NvSt	ROTais	SOG	PA	Longitude	Latitude	COG	THead	TSTP	SMI	S	RAIM	SS	STO	SubMSG
1	0	000005678	15	000	010.0	0	02814.9718'E	2550.8005'S	359.9	350	0	0	0	0	3	0	0000

	$HEROT	$TIROT	AISrot		
Change rate of turn to different values according to the check column. Converted values are shown.	9	0	0		Ok
	11	720	127		Ok
	- 9	0	0		Ok
	-11	-720	-127		Ok

$HEROT,9.0,A*22

Messages 1 : Position report

Msg	RI	User ID	NvSt	ROTais	SOG	PA	Longitude	Latitude	COG	THead	TSTP	SMI	S	RAIM	SS	STO	SubMSG
1	0	000005678	15	000	010.0	0	02814.9718'E	2550.8005'S	359.9	350	5	0	0	0	3	4	2177

$HEROT,11.0,A*1B

Messages 1 : Position report

Msg	RI	User ID	NvSt	ROTais	SOG	PA	Longitude	Latitude	COG	THead	TSTP	SMI	S	RAIM	SS	STO	SubMSG
1	0	000005678	15	127	010.0	0	02814.9718'E	2550.8005'S	359.9	350	51	0	0	0	3	6	1645

$HEROT,-9.0,A*0F

Messages 1 : Position report

Msg	RI	User ID	NvSt	ROTais	SOG	PA	Longitude	Latitude	COG	THead	TSTP	SMI	S	RAIM	SS	STO	SubMSG
1	0	000005678	15	000	010.0	0	02814.9718'E	2550.8005'S	359.9	350	39	0	0	0	3	3	0001

$HEROT,-11.0,A*36

Messages 1 : Position report

Msg	RI	User ID	NvSt	ROTais	SOG	PA	Longitude	Latitude	COG	THead	TSTP	SMI	S	RAIM	SS	STO	SubMSG
1	0	000005678	15	-127	010.0	0	02814.9718'E	2550.8005'S	359.9	350	17	0	0	0	3	6	0371

Additional Tests

	Procedure : Additional Tests		
Test item	**Check**	**Remark**	**Result**
Apply simulated GLL,VTG,HDT and ROT sentences to the sensor input NO CRC $GPGLL,2550.8005,S,02814.9718,E,171318,A,A $GPVTG,359.9,T,,M,10.0,N,,K,A $TIHDT,350.0,T $TIROT,0.0,A Initial baud rate = 38 400 Set Simulation(CRC un-ticked)			
Check (VDL, VDO) = set-up A or Check (VDO) = set-up B			
Send sentences without checksum	Check position = default		Ok
	Check SOG/COG = default		Ok
	Check heading = default		Ok
	Check ROT = default		Ok

Messages 1 : Position report

Msg	RI	User ID	NvSt	ROTais	SOG	PA	Longitude	Latitude	COG	THead	TSTP	SMI	S	RAIM	SS	STO	SubMSG
1	0	000005678	15	-128	102.3	0	18100.0000'E	9100.0000'N	360.0	511	13	0	0	0	3	6	1803

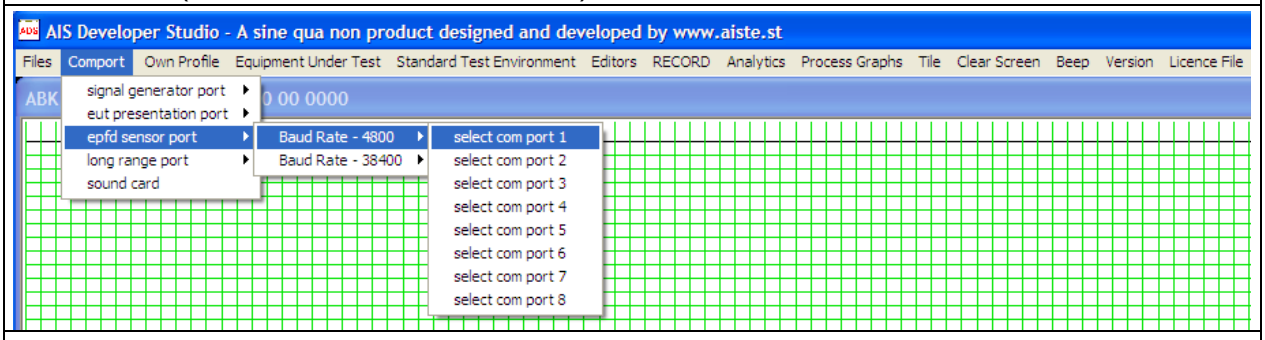
Set Simulation(CRC ticked, False CRC ticked) $GPGLL,2550.8005,S,02814.9718,E,171736,A,A*27 $GPVTG,359.9,T,,M,10.0,N,,K,A*6B $TIHDT,350.0,T*46 $TIROT,0.0,A*44			
Send sentences with false checksum	Check position = default		Ok
	Check SOG/COG = default		Ok
	Check heading = default		Ok
	Check ROT = default		Ok

Messages 1 : Position report

Msg	RI	User ID	NvSt	ROTais	SOG	PA	Longitude	Latitude	COG	THead	TSTP	SMI	S	RAIM	SS	STO	SubMSG
1	0	000005678	15	-128	102.3	0	18100.0000'E	9100.0000'N	360.0	511	13	0	0	0	3	1	8756

Procedure : Additional Tests

Set Simulation(CRC ticked, False CRC un-ticked)



Change baud rate to 4800

$GPGLL,2550.8005,S,02814.9718,E,171841,A,A*57

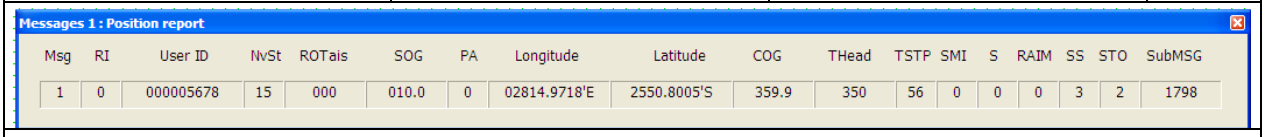
$GPVTG,359.9,T,,M,10.0,N,,K,A*14

$TIHDT,350.0,T*39

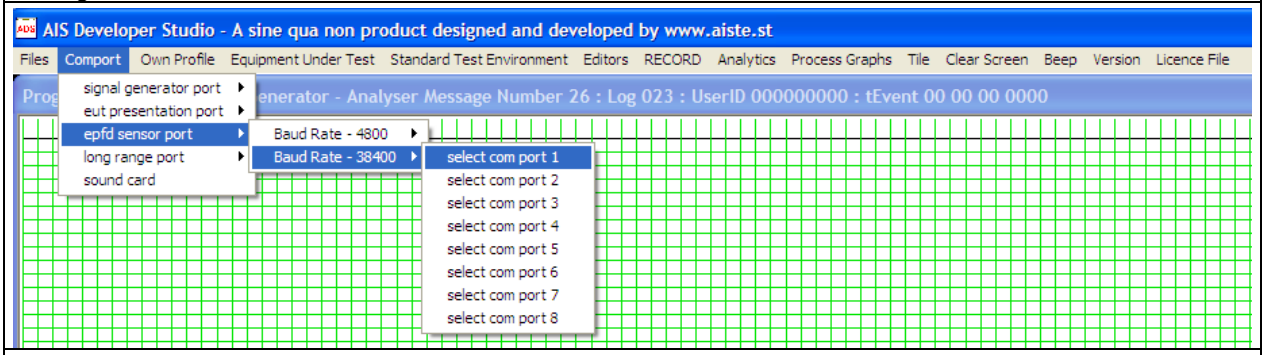
$TIROT,0.0,A*3B

Wait short period

Back to valid checksum Set baud rate of simulator to 4800 Baud.	Check position	System detects new baud rate automatically	Ok
	Check SOG/COG	See above	Ok
	Check heading	See above	Ok
	Check ROT	See above	Ok

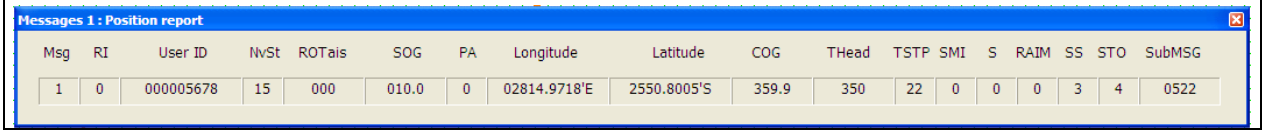


Change baud rate to 38 400



Wait short period

Set baud rate of simulator to 38 400 Baud.	Check position	System detects new baud rate automatically	Ok
	Check SOG/COG	See above	Ok
	Check heading	See above	Ok
	Check ROT	See above	Ok



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
OS	PC Operating System

List of reference 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	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
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

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