

Release Version 1.0

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

ELECTRONIC POSITION FIXING DEVICE

MODULE

## <u>NOTICE</u>

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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.

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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 <u>www.aiste.st</u> 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: <u>support@aiste.st</u> info@sinequanonth.co.za

Website: <u>www.aiste.st</u> <u>www.sinequanonth.co.za</u>

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 <u>www.aiste.st</u>. 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 <u>www.aiste.st</u>. 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 <u>support@aiste.st</u> 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.



Electronic Position Fixing And Sensor Device	
Latitude 2550.8005'S SOG 10.0 HDT 350.0 ALT 4095 Longitude 02814.9718'E COG 359.9 ROT 0.0 PA 1/A Degrees	Image: DTM       Image: WGS84       C WGS72       C SGS85       C PE90       C User defined         Image: GGA       C N Image: A C D       Image: GGA       C O Image: A C D       Image: GGA       C O Image: A C D       Image: GGA       C O Image: GGA       C O Image: GGA       Image: GGA       C O Image: GGA       Image: GGA       C O Image: GGA       C O Image: GGA       Image: GGA       C O Image: GGA       Image: G
COG	□ OSD       □ V ○ A       ○ B ○ M ○ W ○ R ○ P         □ HDT       □ Delete heading value       FIX : Decimal Places         □ ROT       □ V ○ A       □ Talker = HE       □ 2 ○ 3 ○ □       ○ 5 ○ 6         □ GBS       \$GCPGLL,2550.8005,S,02814.9718,E,180725,A,A*54       ○       ○         □ CRC       \$GCPVTG,359.97.1,M,10.0,N,K,A*14       ○         □ F Beep       \$TIROT,0.0,A*38       ♥

#### 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

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#### EPFD is found in the Standard Test Environment Menu

ADS	AIS	S Devel	op	er S	itua	lio	- 🏾	\ si	ne	q	ua	n	on	pr	oduct	designed	and	de	vel	ope	ed l	by '	ww	w.,	aist	e.s	t																				
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#### **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

AIS Developer Studio - A sine qua non product designed and developed by www.aiste.st												
Files Comport Own Profile Equi	ipment Under Test Standard Test Environment	Editors RECORD Ar	nalytics Process Graphs Tile	Clear Screen Beep	Version Licence File							
Prog signal generator port	enerator - Analyser Message Number 20	6 : Log 023 : User	ID 000000000 : tEvent 0	0 00 00 00 00 00 00 00 00 00 00 00 00 0								
epfd sensor port	Baud Rate - 4800 🕨											
long range port 🕨	Baud Rate - 38400 ▶ select com port 1											
sound card	select com port 2	╶		++++++++++	+++++++++++++++++++++++++++++++++++++++							
	select com port 3											
	select com port 4											
	select com port 5											
	select com port 6				+++++++++++++++++++++++++++++++++++++++							
	select com port 7											
	select com port 8											

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

Electronic Position Fixing And Sensor Device	
Latitude 2550.8005'S SOG 10.0 HDT 350.0 ALT 4095 Longitude 02814.9718'E COG 359.9 ROT 0.0 PA 1/A Degrees	Image: DTM         Image: WGS84         C WGS72         C SGS85         C PE90         C User defined           Image: GGA         C N Image: A C D           Image: GGA         C N Image: A C D           Image: GNS         C N Image: A C D           Image: GNS         C N Image: A C D         C N Image: A C D         C N Image: A C D         C N Image: A C D
SOG Ground Speed © Knots © Kilometers per hour COG	マ VTG C N で A C D C E C M C S 「 VBW C V で A C V で A C A + ahead マ Track with offset 「 OSD C V で A で B C M C W C R C P
Track Made Good © True © Magnetic Palse CRC	IF HDT       Delete heading value       FIX : Decimal Places         IF ROT       C V C A       Talker = HE       C 2 C 3 C 4 C 5 C 6         GBS       SCPCUL,2550.8005,S,02814.9718,E,180725,A,A*54         IF CRC       SCPVTG,359.9,T,,M,10.0,N,K,A*14         IF Beep       STIROT,0.0,A*3B

- 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-ofturn. 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.

	Sens	sor Co	ommunica	ations 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:

			Affe	ected data	in me	essage 1,2 and 3
Priority	Position Sen	sor Status	Position accuracy flag	Time stamp	RAIM-flag	Position Longitude/Latitude
1	external DGNSS in ι	use (corrected)	1	UTC-sec	1/0	Lat/Lon (external)
2	internal DGNSS in us (corrected over air: n	se nsg 17)	1	UTC-sec	1/0	Lat/Lon (internal)
3	internal DGNSS in us (corrected; beacon)	se	1	UTC-sec	1/0	Lat/Lon (internal)
4a	external GPS in use	(uncorrected)	0	UTC-sec	1/0	l at/l on (external)
4b	external non-GPS El	PFS in use	0		.,	
5	internal GNSS in use	e (uncorrected)	0	UTC-sec	1/0	Lat/Lon (internal)
		manual pos. input		61		Lat/Lon (manual)
6	no sensor position	dead reckoning	0	62	0	Lat/Lon
	in use	pos.		62		(dead-reckoning)
				03		not available=101/91

#### 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 <sub>AIS</sub> =4.733 SQRT(ROT <sub>sensor</sub> ) degrees/min where ROT <sub>sensor</sub> 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	<ul> <li>+ 127 = turning right at more than 5<sup>0</sup>/30s (No TI available)</li> <li>0 = no turn</li> <li>- 127 = turning Left at more than 5<sup>0</sup>/30s (No TI available)</li> </ul>
3.	no valid ROT information available	-128 (80 hex) indicates no turn information available (default)



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





#### 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**

	Procedure : GLL position	input	
Test item	Check	Remark	Result
Apply simulated GLL sentence to	the sensor input		
\$GPGLL,2550.8005,S,02814.97	18,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			
Check (VDL, VDO) = setupA or	Check (VDO) = setupB	1	
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 CO	DG THead TSTP SMI S RAIM SS STO	SubMSG
1 0 000005678 15 000	010.0 0 02814.9718'E 2550.8005'S 3	59.9 350 24 0 0 0 3 6	1518
Set status/mode to A,D	Check PA-Flag = 1		Ok
(differential mode)	Check PA-Flag = 1		Ok
Messages 1 : Position report		·	X
Msg RI User ID NvSt ROTais	SOG PA Longitude Latitude Cu	OG THead TSTP SMI S RAIM SS STO	SubMSG
1 0 000005678 15 000	010.0 1 02814.9718'E 2550.8005'S 3	59.9 350 32 0 0 0 3 0	2243
Set status/mode to V,N	Check latitude = 91°		Ok
(invalid data)	Check longitude = 181°		Ok
	Check PA-Flag = 0		Ok
Messages 1 : Position report			X
Msg RI User ID NvSt ROTais	SOG PA Longitude Latitude C	OG THead TSTP SMI S RAIM SS STO	SubMSG
1 0 000005678 15 000	010.0 0 18100.0000'E 9100.0000'N 3	59.9 350 31 0 0 0 3 0	0000
Set status/mode to A,A	Check that latitude and		Ok
Change the number of digits	longitude are correct for all		
for latitude & longitude after the	numbers		
decimal point from 2 to 6			
\$GPGLL,2550.800500,S,02814.	971800,E,173109,A,A*50		
Messages 1 : Position report			×
Msg RI User ID NvSt ROTais	SOG PA Longitude Latitude CO	OG THead TSTP SMI S RAIM SS STO	SubMSG
1 0 000005678 15 000	010.0 0 02814.9718'E 2550.8005'S 3	59.9 350 57 0 0 0 3 2	0543
No GBS sentence has been	Check that RAIM-Flag = 0		Ok
applied			



#### **GGA** sentence

	Procedure : GGA GPS positio	on input	
Test item	Check	Remark	Result
Apply simulated GGA sentence t \$GPGGA,124559,2550.8005,S,0 \$GPVTG,359.9,T,,M,10.0,N,,K,A \$TIHDT,350.0,T*39 \$TIROT.0.0.A*3B	to the sensor input 02814.9718,E,2,,,4095,M,,,,*0E \*14		
Check (VDL, VDO) = setupA or	Check (VDO) = setupB		
<u>Set Mode = 1 (autonomous)</u>	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 CC	DG THead TSTP SMI S RAIM SS STO	SubMSG
1 0 000005678 15 000	010.0 0 02814.9718'E 2550.8005'S 35	59.9 350 10 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 CC	DG THead TSTP SMI S RAIM SS STO	SubMSG
1 0 000005678 15 000	010.0 1 02814.9718'E 2550.8005'S 35	59.9 350 10 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 CC	DG THead TSTP SMI S RAIM SS STO	SubMSG
1 0 000005678 15 000	010.0 0 02814.9718'E 2550.8005'S 35	59.9 350 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 CO	DG THead TSTP SMI S RAIM SS STO	SubMSG
1 0 000005678 15 000	010.0 1 02814.9718'E 2550.8005'S 35	i9.9 350 44 0 0 0 3 2	0025
Set mode =5 (RTK float	Check data		Ok
	Check PA-Flag = 1		Ok
Messages 1 : Position report			X
Msg RI User ID NvSt ROTais	SOG PA Longitude Latitude CC	DG THead TSTP SMI S RAIM SS STO	SubMSG
1 0 000005678 15 000	010.0 1 02814.9718'E 2550.8005'S 35	59.9 350 4 0 0 0 3 1	6364
Set mode = 6 (dead reck.)	Check default data		Ok
	Check PA-Flag = 0	<u> </u>	Ok
Messages 1 : Position report			×
Msg RI User ID NvSt ROTais	SOG PA Longitude Latitude CC	DG THead TSTP SMI S RAIM SS STO	SubMSG
1 0 00005678 15 000	010.0 0 18100.0000'E 9100.0000'N 35	99.9 350 15 0 0 0 3 4	151/



	Procedure : GGA GPS position input	
Set mode = 7 (manual)	Check default data	Ok
	Check PA-Flag = 0	
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	Ok
	Check PA-Flag = 0	
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
<u>Set mode = 0 (no fix)</u>	Check default data	Ok
	Check PA-Flag = 0	



#### **GNS** sentence

	Procedure : GNS satellite posit	ion input	
Test item	Check	Remark	Result
Apply simulated GNS sentence t	o the sensor input		
\$GPGNS,165730,2550.8005,S,0	)2814.9718,E,AA,,,,,,*6A		
\$GPVTG,359.9,T,,M,10.0,N,,K,A	<b>\*14</b>		
\$TIHDT,350.0,T*39			
\$TIROT,0.0,A*3B			
Check (VDL, VDO) = set-up A	or Check ( VDO ) = set-up B		
Set <u>Mode = <b>AA</b></u>	Check latitude		Ok
(autonomous GPS/GLONASS)	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 CC	DG THead TSTP SMI S RAIM SS STO	SubMSG
1 0 000005678 15 000	010.0 0 02814.9718'E 2550.8005'S 35	59.9 350 0 0 0 0 3 1	0000
<u>Set Mode = AN (</u> autonomous	Check data		Ok
GPS/no GLONASS)	Check PA-Flag = 0		Ok
Messages 1 : Position report			×
Msg RI User ID NvSt ROTais	SOG PA Longitude Latitude CO	DG THead TSTP SMI S RAIM SS STO	SubMSG
1 0 000005678 15 000	010.0 0 02814.9718'E 2550.8005'S 35	59.9 350 0 0 0 0 3 5	0001
Set Mode = <b>NA</b> (no GPS/	Check data		Ok
autonomous GLONASS)	Check PA-Flag = 0		Ok
Messages 1 : Position report			
Msg RI User ID NvSt ROTais	SOG PA Longitude Latitude CC	DG THead TSTP SMI S RAIM SS STO	SubMSG
1 0 000005678 15 000	010.0 0 02814.9718'E 2550.8005'S 35	59.9 350 0 0 0 0 3 2	1801
<u>Set Mode = <b>DA</b></u> (differential	Check data		Ok
GPS/ autonomous GLONASS)	Check <b>PA-Flag = 1</b>		Ok
Messages 1 : Position report	• • • • • • • • • • • • • • • • • • • •		X
Msg RI User ID NvSt ROTais	SOG PA Longitude Latitude CC	DG THead TSTP SMI S RAIM SS STO	SubMSG
1 0 000005678 15 000	010.0 1 02814.9718'E 2550.8005'S 3	59.9 350 0 0 0 3 1	0000
<u>Set Mode = DD (</u> differential	Check data ok		Ok
GPS/ differential GLONASS)	Check PA-Flag = 1		Ok
Messages 1 : Position report			×
Msg RI User ID NvSt ROTais	SOG PA Longitude Latitude CO	DG THead TSTP SMI S RAIM SS STO	SubMSG
1 0 000005678 15 000	010.0 1 02814.9718'E 2550.8005'S 3	59.9 350 0 0 0 0 3 4	0227



Procedure : GNS satellite position input									
Set Mode = <b>DN</b> (differential	Check data	Ok							
GPS/ no GLONASS)	Check PA-Flag = 1	Ok							
Messages 1 : Position report		X							
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 3 3	0001							
Set Mode = AD (autonomous	Check data ok	Ok							
GPS/ differential GLONASS)	Check PA-Flag = 1	Ok							
Messages 1 : Position report	······································	X							
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 3 2	1727							
Set Mode = ND (no GPS/	Check data ok	Ok							
<u>Set Mode = ND (no GPS/</u> differential GLONASS)	Check data ok       Check PA-Flag = 1	Ok Ok							
Set Mode = ND (no GPS/ differential GLONASS)	Check data ok       Check PA-Flag = 1	Ok Ok							
Set Mode = ND (no GPS/ differential GLONASS)         Messages 1 : Position report         Msg RI       User ID       NvSt       ROTais	Check data ok       Check PA-Flag = 1       SOG     PA       Longitude     Latitude       COG     THead       TSTP SMI     S	Ok Ok SubMSG							
Set Mode = ND (no GPS/ differential GLONASS)         Messages 1 : Position report         Msg RI       User ID       NvSt       ROTais         1       0       000005678       15       000	Check data ok         Check PA-Flag = 1           SOG         PA         Longitude         Latitude         COG         THead         TSTP         SMI         S         RAIM         SS         STO           010.0         1         02814.9718'E         2550.8005'S         359.9         350         0         0         0         3         5	Ok Ok SubMSG 0001							
Set Mode = ND (no GPS/ differential GLONASS)         Messages 1 : Position report         Msg RI       User ID         1       0         000005678       15         Set Mode = NN (no GPS/ no	Check data ok         Check PA-Flag = 1           SOG         PA         Longitude         Latitude         COG         THead         TSTP         SMI         S         RAIM         SS         STO           010.0         1         02814.9718'E         2550.8005'S         359.9         350         0         0         0         3         5           Check latitude = 91°	Ok Ok SubMSG 0001							
Set Mode = ND (no GPS/ differential GLONASS)         Messages 1: Position report         Msg RI       User ID         1       0         0       000005678         15       000         Set Mode = NN (no GPS/ no GLONASS)	Check data ok         Check PA-Flag = 1           SOG         PA         Longitude         Latitude         COG         THead         TSTP         SMI         S         RAIM         SS         STO           010.0         1         02814.9718'E         2550.8005'S         359.9         350         0         0         0         3         5           Check latitude = 91°           Check longitude = 181°	Ok Ok SubMSG 0001 Ok Ok							
Set Mode = ND (no GPS/ differential GLONASS)         Messages 1 : Position report         Msg RI       User ID         NvSt       ROTais         1       0         Set Mode = NN (no GPS/ no GLONASS)	Check data ok         Check PA-Flag = 1           SOG         PA         Longitude         Latitude         COG         THead         TSTP         SMI         S         RAIM         SS         STO           010.0         1         02814.9718'E         2550.8005'S         359.9         350         0         0         0         3         5           Check latitude = 91°           Check longitude = 181°         Check PA-Flag = 0	Ok Ok SubMSG 0001 Ok Ok Ok Ok							
Set Mode = ND (no GPS/ differential GLONASS)         Messages 1 : Position report         Msg RI       User ID         1       0         000005678       15         Set Mode = NN (no GPS/ no GLONASS)	Check data ok         Check PA-Flag = 1           SOG         PA         Longitude         Latitude         COG         THead         TSTP         SMI         S         RAIM         SS         STO           010.0         1         02814.9718'E         2550.8005'S         359.9         350         0         0         0         3         5           Check latitude = 91°           Check longitude = 181°         Check PA-Flag = 0	Ok Ok SubMSG 0001 Ok Ok Ok Ok							
Set Mode = ND (no GPS/ differential GLONASS)         Messages 1: Position report         Msg       RI         User ID       NvSt         ROTais         1       0         000005678       15         000         Set Mode = NN (no GPS/ no GLONASS)	Check data ok	Ok Ok SubMSG 0001 Ok Ok Ok SubMSG							



#### **RMC** sentence

Procedure : RMC position input										
Test item	Check	Remark	Result							
Apply simulated RMC sentence t	o the sensor input									
\$GPRMC,174441,A,2550.8005,\$	S,02814.9718,E,10.0,359.9,14051	19,,,A*56								
\$TIHDT,350.0,T*39	\$TIHDT,350.0,T*39									
\$TIROT,0.0,A*3B										
Check (VDL, VDO) = set-up A c	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	500 DA Longitude Latitude 00	C THERE TOTO ONL & DATA OF STO	Cul-MCC							
Misg RI USETID INVSL ROTAIS		50 0 250 24 0 0 0 2 0								
	010.0 0 02014.9718 2550.0005 5 5.	3.9 330 24 0 0 0 3 0	0000							
Set status/mode to A,D	Check of valid data		Ok							
(differential mode)	Check PA-Flag = 1		Ok							
Messages 1 : Position report			×							
Msg RI User ID NvSt ROTais	SOG PA Longitude Latitude CO	DG THead TSTP SMI S RAIM SS STO	SubMSG							
1 0 000005678 15 000	010.0 1 02814.9718'E 2550.8005'S 3	59.9 350 8 0 0 0 3 2	1579							
Set status/mode to V,N	Check latitude = 91°		Ok							
(invalid data)	Check longitude = 181°		Ok							
	Check PA-Flag = 0		Ok							
Messages 1 : Position report			×							
Msg RI User ID NvSt ROTais	SOG PA Longitude Latitude CO	DG THead TSTP SMI S RAIM SS STO	SubMSG							
1 0 000005678 15 000	102.3 0 18100.0000'E 9100.0000'N 3	60.0 350 4 0 0 0 3 4	1647							
Set status/mode to V,A	Check latitude = 91°		Ok							
Status test for invalid data	Check longitude = 181°		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 CC	DG THead TSTP SMI S RAIM SS STO	SubMSG							
1 0 000005678 15 000	102.3 0 18100.0000'E 9100.0000'N 36	50.0 350 4 0 0 0 3 4	0296							



#### **DTM sentence**

	Procedure : DTM reference	datum								
Test item	Check	Remark	Result							
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										
Check (VDL, VDO) = set-up A or Check (VDO) = set-up B										
Apply <u>GLL</u> sentence with DTM Datum = WGS 72	Check default data		Ok							
Messages 1 : Position report	SOG På Longitude Latitude CO	G THead TSTP SMI S RAIM SS STO	SubMSG							
Image         Image <th< td=""><td>010.0 0 18100.0000'E 9100.0000'N 35</td><td>9.9 350 44 0 0 0 3 0</td><td>2256</td></th<>	010.0 0 18100.0000'E 9100.0000'N 35	9.9 350 44 0 0 0 3 0	2256							
\$GPDTM,W84,,,,,,W84*4A										
Set Datum = WGS 84	Check data valid		Ok							
Messages 1 : Position report Msg RI User ID NvSt ROTais	SOG PA Longitude Latitude CO	G THead TSTP SMI S RAIM SS STO	SubMSG							
1 0 000005678 15 000	010.0 0 02814.9718'E 2550.8005'S 35	9.9 350 20 0 0 3 0	0000							
\$GPDTM,P90,,,,,,P90*4A										
Set Datum = PE90	Check default data		Ok							
Messages 1 : Position report           Msg         RI         User ID         NvSt         ROTais           1         0         000005678         15         000	SOG         PA         Longitude         Latitude         CO           010.0         0         18100.0000'E         9100.0000'N         35	G THead TSTP SMI S RAIM SS STO 9.9 350 17 0 0 0 3 2	SubMSG 0081							
\$GPGGA,181846,2550.8005,S,0 \$GPDTM,W72,,,,,,W72*4A	02814.9718,E,1,,,4095,M,,,,*01									
Apply <u>GGA</u> sentence with DTM Datum = WGS 72	Check default data		Ok							
Messages 1 : Position report										
Msg RI User ID NvSt ROTais	SOG         PA         Longitude         Latitude         CO           010.0         0         18100.0000'E         9100.0000'N         35	G THead TSTP SMI S RAIM SS STO 9.9 350 17 0 0 0 3 4	SubMSG 1657							
Set Datum = PE90	Check default data		Ok							
Messages 1 : Position report										
Msg RI User ID NvSt ROTais	SOG PA Longitude CO	G THead TSTP SMI S RAIM SS STO	SubMSG							
1 0 000005678 15 000	010.0 0 18100.0000'E 9100.0000'N 35	9.9 350 0 0 0 0 3 2	2106							
\$GPDTM,W84,,,,,,W84*4A										
Set Datum = WGS 84	Check data valid		Ok							
Messages 1 : Position report	SOG PA Longitude Latitude CO	C THead TSTP SMT & PATM CC CTO	SubMSG							
1 0 000005678 15 000	010.0 0 02814.9718'E 2550.8005'S 35	9.9 350 40 0 0 0 3 0	0000							



#### **GBS** sentence

Procedure : GBS input													
Test item Check Remark I													
Apply simulated gll sentence with	GBS sentence to the sensor input	ut											
\$GPGLL,2550.8005,S,02814.971	18,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 c	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 CO	G THead TSTP SMI S RAIM SS STO	SubMSG										
1 0 000005678 15 000 0	010.0 0 02814.9718'E 2550.8005'S 35	9.9 350 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,02814.971	18,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 o	or Check (VDO) = set-up B		<b>.</b>					
Heading value = 350.0	Check heading valid		Ok					
Messages 1 : Position report								
Msg RI User ID NvSt ROTais	SOG PA Longitude Latitude CO	G THead TSTP SMI S RAIM SS STO	SubMSG					
1 0 000005678 15 000 0	010.0 0 02814.9718'E 2550.8005'S 359	9.9 350 40 0 0 3 0	2256					
Change value to 359.9	Check that heading = 359 or 0, <b>not 360</b>		Ok					
Messages 1 : Position report			×					
Msg RI User ID NvSt ROTais	SOG PA Longitude Latitude CO	G THead TSTP SMI S RAIM SS STO	SubMSG					
1 0 000005678 15 000	010.0 0 02814.9718'E 2550.8005'S 35	9.9 359 36 0 0 0 3 0	0000					
\$TIHDT,,T*11								
Delete heading value	Check that heading = default		Ok					
(empty field)								
Messages 1 : Position report			×					
Msg RI User ID NvSt ROTais	SOG PA Longitude Latitude CO	G THead TSTP SMI S RAIM SS STO	SubMSG					
1 0 000005678 15 000 0	010.0 0 02814.9718'E 2550.8005'S 35	9.9 511 58 0 0 0 3 6	1209					



#### **VTG** sentence

Procedure : VTG speed input										
Test item	Check	Remark	Result							
Apply simulated VTG sentence to	o the sensor input									
\$GPGLL,2550.8005,S,02814.97	18,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										
Check (VDL, VDO) = set-up A c	or Check ( VDO ) = set-up B									
Set mode to A (autonomous)	Check SOG valid		Ok							
	Check COG 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							
	010.0 0 02814.9718'E 2550.8005'S 359.9	9 350 12 0 0 0 3 4	1722							
Set mode to <b>D</b> (differential)	Check SOG valid		Ok							
	Check COG 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 38 0 0 0 3 1	9856							
Set mode to <b>N (</b> invalid)	Check SOG = 102.3 (default)		Ok							
	Check COG = 360 (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	0 350 10 0 0 0 3 0	2251							
Set Simulation(Ground Speed, k	(ilometers per hour)									
\$GPVTG,359.9,T,,M,,N,18.5,K,N	*16									
Set mode to A (autonomous)	Check SOG value.		Ok							
Set SOG Simulator to KPH	It has to be converted into knots									
This changes the SOG-N field	or set to default									
to SOG K-Field (speed in km/h)	L									
Messages 1 : Position report	COC DA Longitudo Latitudo COC	Tuesd TOTO CMT & DATA OF STO	SubMCC							
Misy KL USERID INVSt KUTAIS		1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	0001							
1 0 00003678 13 000	005.5 0 02014.9/10 E 2000.8000 5 309.	5 550 22 0 0 0 3 5	0001							



#### **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 \$TIPOT 0.0 A*3B									
Check (VDL, VDO) = set-up A or C	heck (VDO) = set-up B								
Status of bottom track: <b>A,A</b> (valid) Ahead and across speed available.	Check that SOG = resultant of ahead and across speed		Ok Ok						
	vector and heading		<u>O</u> K						
Messages 1 : Position report           Msg         RI         User ID         NvSt         ROTais         SOG           1         0         000005678         15         000         012.1	PA Longitude Latitude COG 0 02814.9718'E 2550.8005'S 359.	THead TSTP SMI S RAIM SS STO .4 350 58 0 0 0 3 2	SubMSG 1953						
Status of bottom track: <b>A,V</b> (invalid) Ahead and across speed not empty. Water speed valid !	SOG from VTG COG from VTG		Ok Ok						
Messages 1 : Position report           Msg         RI         User ID         NvSt         ROTais         SOG           1         0         000005678         15         000         010.0	PA Longitude Latitude COG 0 02814.9718'E 2550.8005'S 359.	THead TSTP SMI S RAIM SS STO 9 350 0 0 0 0 3 0	SubMSG 0000						
Set Simulation(VBW, A, A + ahead,	Track with offset) = single axis	log							
\$VDVBW,11.0,1.0,A,12.0,,A*7D		1	<b>a</b> :						
Status of bottom track: <b>A,A</b> (valid) Ahead available, <b>across speed</b> <b>empty</b> (e.g. single axis log)	COG from VTG		Ok Ok						
Messages 1 : Position report           Msg         RI         User ID         NvSt         ROTais         SOG           1         0         000005678         15         000         010.0	PA Longitude Latitude COG 0 02814.9718'E 2550.8005'S 359.	THead         TSTP SMI         S         RAIM         SS         STO           9         350         47         0         0         3         1	SubMSG 4696						
Set Simulation(VBW, A, Track with or Set Simulation(HDT, Delete heading	offset) y value)								
\$νΟνΒνν,11.0,1.0,Α,12.0,2.0,Α*51  \$TIHDT,,T*11									
Status of bottom track: <b>A</b> , <b>A</b> (valid) Ahead and across speed available, <b>Heading invalid</b>	SOG from VTG COG from VTG		Ok Ok						
Messages 1 : Position report           Msg         RI         User ID         NvSt         ROTais         SOG           1         0         000005678         15         000         010.0	PA Longitude Latitude COG 0 02814.9718'E 2550.8005'S 359.	THead TSTP SMI S RAIM SS STO 9 511 15 0 0 0 3 0	SubMSG 2245						



Test item         Check         Remark         Result           Apply simulated VBW sentence to the sensor input, No VTG speed available SGPGLL.2550.8005, S.02814.9718, E.094338, A.A*58         Subscription         <	Procedure : VBW input, no VTG sentence									
Apply simulated VBW sentence to the sensor input, No VTG speed available \$CPGLL 2508.005, \$(2814.9718, E,094338, A,*58 \$VDVBW,11.0,1.0,A,12.0,2.0,A*51 \$THHDT,350.0,T*39 \$TIROT,0.0,A*3B <ul> <li>Check (VDL,VDO) = set-up A or Check (VDO) = set-up B</li> <li>Status of bottom track: AA (valid) Ahead and across speed available.</li> <li>Check (VDL, VDD) = set-up A or Check (VDO) = set-up CB</li> <li>Check (VDL, VDD) = set-up A or Check (VDO) = set-up B</li> <li>Check (VDL, VDD) = set-up A or Check (VDO) = set-up CB</li> <li>Check (VDL, VDD) = set-up A or Check (VDO) = set-up B</li> <li>Check (VDL, VDD) = set-up A or Check (VDO) = set-up CB</li> <li>Check (VDL, VDD) = set-up A or Check (VDO) = set-up B</li> <li>Check (VDL, VDD) = set-up A or Check (VDO) = set-up B</li> <li>Check (VDL, VDD) = set-up A or Check (VDO) = set-up B</li> <li>Check (VDL, VDD) = set-up A or Check (VDO) = set-up B</li> <li>Check (VDL, VDD) = set-up A or Check (VDO) = set-up B</li> <li>Check (VDL, VDD) = set-up A or Check (VDO) = set-up B</li> <li>Status of bottom track: A,V (invalid)</li> <li>SOG = clefault</li> <li>Ok</li> <li>COG = default</li> <li>Ok</li> <li>COG = default</li> <li>Ok</li> <li>Soute Speed valid !</li> <li>Soute Speed valid !</li> <li>SOG = default</li> <li>Ok</li> <li>Soute Speed valid !</li> <li>SOG = default</li> <li>Ok</li> <li>SOG = default</li> <li>Ok</li> <li>Soute Speed valid :</li> <li>SOG = default</li> <li>Ok</li> <li>SOG = default</li> <li>Ok</li> <li>Soute Speed valid :</li> <li>SOG = default</li> <li>Ok</li>             &lt;</ul>	Test item	Check	Remark	Result						
No VTG speed available         SGPGL_2550.8005,S02814.9718,E,094338,A,A*58           \$VDVBW,11.0,1.0,A,12.0,2.0,A*51         \$TIHDT,350.0,T*38           Check (VDL, VDO) = set-up A or Check (VDO) = set-up B	Apply simulated VBW sentence to the	ne sensor input,								
SGPGLL,2550.8005.8,02814.9718.E,094338,A,A*58           SVDVBW,11.0,1.0,A,12.0,2.0,A*51           STIROT,0.0,A*38           Check (VDL, VDO) = set-up A or Check (VDO) = set-up B           Status of bottom track: A.4 (valid)           Ahead and across speed available,           of ahead and across speed           Mg         RL           Mg         RL           Mg         RL           Mg         RL           Mg         RL           Mada and across speed available,         COG = calculated from SOG           See above         Ok           Vector and heading         OK           Mg         RL         Wer D           Status of bottom track: A.Y (invalid)         SOG = default         Ok           COG = default         Ok         Ok           Mg         RL         Wer D         Not ROTes           Status of bottom track: A.Y (invalid)         SOG = default         Ok           Mg         RL         Wer D         Not ROTes         SOG PA           Status of bottom track: A (valid)         Nog RL default         Ok         Ok           Mg         RL user D         Not ROTes         SOG PA         Longtude         Latude COG         THead TSTP SML S R	No VTG speed available									
\$VDVBW,11.0,1.0,A,12.0,2.0,A*51           \$TIROT,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.           Image: 1 humber track: A.A (valid)           Ahead and across speed available.           Image: 1 humber track: A.Y (invalid)           Status of bottom track: A.Y (invalid)           Ahead and across speed not emptude           Image: 1 humber track: A.Y (invalid)           Status of bottom track: A.Y (invalid)           Ahead and across speed not emptude           COG = calculated from SOG           Status of bottom track: A.Y (invalid)           SOG = default           COG = default           I = 0 00005678           1 = 0 00005678           1 = 0 00005678           1 = 0 00005678           1 = 0 00005678           1 = 0 00005678           1 = 0 00005678           1 = 0 00005678           1 = 0 00005678           1 = 0 00005678           1 = 0 00005678           1 = 0 0000578	\$GPGLL,2550.8005,S,02814.9718,E	E,094338,A,A*58								
\$THOT,350.0,T*39           Check (VDL, VDO) = set-up A or Check (VDO) = set-up B           Status of bottom track: <b>A.Q</b> (valid)           Ahead and across speed available.         Check that SOG = resultant of ahead and across speed         Ok           Mg         Rt         User B         Status of bottom track: <b>A.Y</b> (valid)         Check that SOG = resultant of ahead and across speed         Ok           Mg         Rt         User B         Notit R07ais         SOG         PA         Longitude         Lattude         CO         Timed TSTF 5ML         SRAM 55         STO         SUMM55           Status of bottom track: <b>A.Y</b> (invalid)         SOG = default         Ok           COG = claculated from SOG           Valuer B         Status of bottom track: <b>A.Y</b> (invalid)           COG = default         Ok           Ok         Ok           Mg         R1 user B         Not R07as         SUG         Numer Bottom track: <b>A.W</b> (invalid)           SUMON         SUMON         SUMON         SUMON           SUMON         Colspan="2">SUMON           SUMON         SUMON	\$VDVBW,11.0,1.0,A,12.0,2.0,A*51									
\$TIROT.0.0.A*3B       Check (VDL, VDO) = set-up A       Check (VDL, VDO) = set-up A         Status of bottom track: A.A (valid)       Check that SOG = resultant       Ok         Ahead and across speed available.       Check that SOG = resultant       Ok         Mead and across speed available.       CoG = calculated from SOG       See above       Ok         Mead and across speed available.       CoG = calculated from SOG       See above       Ok         Status of bottom track: A.V (invalid)       SOG = default       Ok         Ahead and across speed not empty. Water speed valid !       SOG = default       Ok         Mag R1 userb INSt ROTas SOG PA Longtude Lattude COG Thead TSTP SML S RAM SS STO SuMMSG       SOG = default       Ok         Status of bottom track: A.V (invalid)       SOG = default       Ok       Ok         Mag R1 userb INSt ROTas SOG PA Longtude Lattude COG Thead TSTP SML S RAM SS STO SuMMSG       SOG = default       Ok         SyDVDW, 11.0, 1.0, A, 12.0, A*7D       Status of bottom track: A.L. (valid)       SOG = default       Ok         Set Simulation (VBW, A, Track with offset)       Soc PA Longtude Lattude COG Thead TSTP SML S RAM SS STO SuMMSG       SOG = default       Ok         Image 1: Postore Table are speed available, across speed       Ok       Ok       Ok       Ok         Status of bottom track: A.A (valid)       SOG Fon VB	\$TIHDT,350.0,T*39									
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           Image: International sequence         Ok         COG = calculated from SOG vector and heading         See above         Ok           Image: International sequence         Image: International sequence         Ok         Ok         Ok           Image: International sequence         Image: International sequence         Ok         Ok         Ok           Image: International sequence         Image: International sequence         Ok         Ok         Ok           Image: International sequence         Image: International sequence         Ok         Ok         Ok           Image: International sequence         Image: International sequence         Ok         Ok         Ok           Image: International sequence         Image: International sequence         Ok         Ok         Ok           Image: International sequence         Image: International sequence         Image: International sequence         Ok           Image: International sequence         Image: International sequence         Image: International sequence         Ok           Image: Internationalintion         Image: Internation         Imag	\$TIROT,0.0,A*3B									
Status of bottom track: A,A (valid)         Check that SOG = resultant         Ok           Ahead and across speed available.         COG = calculated from SOG vector and heading         See above         Ok           Msg R1 User ID         INSE ROTes         SOG PA Longtude         Lattude         COG = talculated from SOG vector and heading         Ok           Status of bottom track: A,V (invalid)         SOG = default         Ok         Ok         Ok           Ahead and across speed valid !         COG = default         Ok         Ok           Msg R1 User ID         INSE ROTes         SOG PA Longtude         Lattude         COG         Thead TSTP SML S RAIM SS STO SubMSG           Status of bottom track: A,V (invalid)         SOG = default         Ok         Ok         Ok           Set Simulation(VBW, A, A + ahead, Track with offset) = single axis log         SVDVBW,11.0,1.0,A,12.0,A*7D         Status of bottom track: A (valid)         SOG = default         Ok           Ahead available, across speed         COG = default         Ok         Ok         Ok           Set Simulation(VBW, A, Track with offset)         SoG = default         Ok         Ok           COG = default         Ok         Ok         Ok         Ok           Msg R1         User ID         Not1 ROTEs         SoG PA Longtude         Lattude	Check (VDL, VDO) = set-up A or C	heck(VDO)= set-up B	1							
Ahead and across speed         Or ahead and across speed         Ok           COG = calculated from SOG         See above         Ok           Msg R1         User ID         NSI ROTES         SOG PA         Longtude         Lattude         COG THEED TST SMI S RAM SS STO SubMSG           Status of bottom track:         A.V (invalid)         SOG = default         Ok         Ok           Status of bottom track:         A.V (invalid)         SOG = default         Ok         Ok           Mag R1         User ID         NSI ROTES         SOG G = default         Ok           COG = default         Ok         Ok         Ok           Ahead and across speed valid !         OK         Ok         Ok           Msg R1         User ID         NSI ROTES         SOG PA         Longtude         Lattude         COG THEED TSTP SMI S RAM SS STO SubMSG           Set Simulation(VBW, A, A + ahead, Track with offset) = single axis log         SVDVBW,11.0,1.0,A,12.0,A*7D         Status of bottom track: A (valid)         SOG = default         Ok           Mead available, across speed         OG         PA         Longtude         Lettude         COG THEED TSTP SMI S RAM SS STO SubMSG           1         0000005678         SOG PA         Longtude         Lattude         Ok           CO	Status of bottom track: A,A (valid)	Check that SOG = resultant		Ok						
COG = calculated from SOG         See above         Ok           Mag R1         User ID         Ivist R0Tais         SOG         PA         Langtude         Lattude         COG         THead         TSTP SMI         S         RAIM         SS         STO         0         3         2         1807           Status of bottom track:         A.V         (Invalid)         SOG = default         Ok         Ok           Ahead and across speed valid !         OCG = default         Ok         Ok         Ok           Mag R1         User ID         Invit R0Tais         SOG = default         Ok           OCG = default         Ok         Ok         Ok         Ok           Mag R1         User ID         Invit R0Tais         SOG = default         Ok           VDVBW, Water speed valid !         Oi         Oi </td <td>Ahead and across speed available.</td> <td>of ahead and across speed</td> <td></td> <td></td>	Ahead and across speed available.	of ahead and across speed								
Intervalue         Intervalue <thintervalue< th="">         Intervalue         Interval</thintervalue<>		COG = calculated from SOG	See above	Ok						
Mag         R1         User ID         INST         ROTALS         SOG         PA         Longitude         Latitude         COG         THead         TSTP         SNI         S         RAM         SS         STO         Submit           Status of bottom track:         A,V         (invalid)         SOG = default         Ok         Ok           Ahead and across speed not empty.         Water speed valid !         Ok         Ok         Ok           Mag         R1         User ID         NST         ROTals         SOG         PA         Longitude         Latitude         COG         Thead         TSTP         SNI         S         RAM         SS         TO         0         3         2         1607           Mag         R1         User ID         NST         ROTals         SOG         PA         Longitude         Latitude         COG         THead         TSTP         SNI         S         RAM         SS         STO         SubMSG         Ok           Status of bottom track:         A         (Valid)         A         A + ahead, Track with offset) = single axis log         Ok         Ok           Mag         R1         user ID         NvSt         ROTals         SOG	Messanes 1 · Docition report		l							
1         0         000005678         15         000         012.1         0         02814.9718FE         2550,800375         359.4         350         0         0         3         2         1807           Status of bottom track:         A,V         (invalid)         SOG = default         Ok         Ok           Ahead and across speed valid !         OG         GG = default         Ok         Ok           Msg R1         User ID         NSE ROTes         SOG PA         Longtude         Lattude         COG         THead         TSTP SMI S         RAIM SS STO SubMSG           1         0         00005578         15         000         102.3         0         02814.5718FE         2550,80055         360.0         350         27         0         0         3         0001           Set Simulation(VBW, A, A + ahead, Track with offset) = single axis log         SVDVBW,11.0,1.0,A,12.0,A*7D         Status of bottom track: A (valid)         SOG = default         Ok         Ok           Msg R1         user ID         NSE ROTes         SOG PA         Longtude         Lattude         COG         Thead         TSTP SMI S RAIM SS STO SubMSG           1         0         00005578         15         000         102.3         0	Msg RI User ID NvSt ROTais SOG	PA Longitude Latitude COG	THead TSTP SMI S RAIM SS STO	SubMSG						
Status of bottom track: A,V (invalid) Ahead and across speed not empty. Water speed valid !         SOG = default         Ok           Verages 1 stolene report         Ok         Ok         Ok           Meg Rt         User ID         NSE ROTals         SOG PA         Longtude         Lattude         COG         TSTP SML S         RAIM SS         STO         O         3         0001           Set Simulation(VBW, A, A + ahead, Track with offset)         = single axis log         SVDVBW,11.0,1.0,A,12.0,A*7D         Status of bottom track: A (valid)         Ahead available, across speed         Ok         Ok           Meg Rt         User ID         NSE ROTals         SOG PA         Longtude         Lattude         Ok           Status of bottom track: A (valid)         Ahead available, across speed         OK         Ok         Ok           Meg Rt         User ID         NSE ROTals         SOG PA         Longtude         Lattude         COG         THead TSTP SML S RAIM SS STO SubMSG           1         0         000005678         15         000         102.3         0         0         3         0         0         3         0         0         3         2247           Set Simulation(VBW, A, Track with offset)         Set Simulation(HDT, Delete heading value)         SVDVBW or de	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)         SOG = default         Ok           Ahead and across speed not empty. Water speed valid !         Ok         Ok           Messages 1: Notion report         Ok         Ok           Msg RL User ID         NSt ROTais         SOG F A Longitude         Latitude         COG THead         TSTP SML S RAIM SS STO SubMSG           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)         SOG = default         Ok           Ahead available, across speed         COG = default         Ok         Ok           Msg RL User ID         NSt ROTais         SOG P Longitude         Latitude COG THead         TSTP SML S RAIM SS STO SubMSG           Status of bottom track: A (valid)         Ahead available, across speed         Ok         Ok           Msg RL User ID         NSt ROTais         SOG P Longitude         Latitude         COG THead         TSTP SML S RAIM SS STO SubMSG           Set Simulation(VBW, A, Track with offset)         Set Simulation(VBW, A, Track with offset)         Set Simulation(HDT, Delete heading value)         SVDVBW,11.0,1.0,A,12.0,2.0,A*51         STHDT,T*11           Status of bottom track: A.A (valid)         SOG from VBW or default         Ok         Ok           Msead and across speed available, Heading invalid <t< td=""><td></td><td></td><td>1 1 1 1 1 1 1</td><td></td></t<>			1 1 1 1 1 1 1							
Ahead and across speed not empty. Water speed valid !         COG = default         Ok           Mescaues 1 Position report         Msg RL User ID         Nvst ROTels         SOG         PA         Longtude         Latitude         COG         THead         TSTP SML S         RAIM SS STO         SubMSG           1         0         00000578         15         000         102.3         0         2814.9718*E         2550.8005*S         360.0         350         27         0         0         3         0001           Set Simulation(VBW, A, A + ahead, Track with offset)         = single axis log         \$         \$         \$         \$         \$         OK           Status of bottom track: A (valid)         Ahead available, across speed         SOG = default         Ok         Ok           Meg RL         User ID         Nst ROTels         SOG         PA         Longtude         Latitude         COG         THead         TSTP SML S         AAIM SS STO         SubMSG           1         0         00000578         15         000         102.3         0         02814.9718*E         2550.8005*S         360.0         350         33         0         0         2         2247         Set Simulation(HDT, Delete heading value)         \$         \$<	Status of bottom track: A,V (invalid)	SOG = default		Ok						
empty. Water speed valid !	Ahead and across speed not	COG = default		Ok						
Mag 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       2814.9718'E       2550.8005'S       360.0       350       27       0       0       3       3       0001         Set Simulation(VBW, <b>A</b> , <b>A</b> + ahead, Track with offset) = single axis log         VDVBW,11.0,1.0,A,12.0,,A*TD         Status of bottom track: <b>A</b> (valid)       SOG = default       Ok         Ahead available, across speed         empty (e.g. single axis log)         Mag RI       User ID       NSt ROTais       SOG PA       Longitude       Latitude       OK       THEAD NSt ROTais       SOG PA       Longitude       Latitude       OK         Mag RI       User ID       NSt ROTais       SOG PA       Longitude       Latitude       COG       THead TSTP SMI S RAIM SS STO SubMSG         1       0       000005678       15	empty. Water speed valid !		<u> </u>							
Image       No.       No. <th< td=""><td>Messages 1: Position report</td><td>PA Longitudo Latitudo COC</td><td></td><td>SubMSC</td></th<>	Messages 1: Position report	PA Longitudo Latitudo COC		SubMSC						
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)         SOG = default         Ok           Ahead available, across speed empty (e.g. single axis log)         SOG = default         Ok           Mg RI         User ID         Nxt ROTais         SOG PA         Longitude         Latitude         COG         THead         TSTP SMI S         RAIM SS         STO         SubMSG           Set Simulation(VBW, A, Track with offset)         Set Simulation(VBW, A, Track with offset)         Set Simulation(VBW, A, Track with offset)         Set Simulation(HDT, Delete heading value)         SVDVBW,11.0,1.0,A,12.0,2.0,A*51         STIHDT,,T*11         SOG from VBW or default         Ok           Meading invalid         COG = default         Ok         Ok         Ok           Meading invalid         Nxt ROTais         SOG from VBW or default         Ok	1 0 000005678 15 000 102.3	0 02814 9718'E 2550 8005'S 360		0001						
Set Simulation(VBW, A, A + ahead, Track with offset) = single axis log           \$VDVBW,11.0,1.0,A,12.0,A*7D         SOG = default         Ok           Status of bottom track: A (valid)         SOG = default         Ok           Ahead available, across speed empty (e.g. single axis log)         COG = default         Ok           I         0         000005678         15         000         102.3         0         02814.9718*         2550.8005*5         360.0         350         30         0         3         2247           Set Simulation(VBW, A, Track with offset)         Set Simulation(VBW, A, Track with offset)         Set Simulation(HDT, Delete heading value)         SVDVBW,11.0,1.0,A,12.0,2.0,A*51         STIHDT, T*11         SOG from VBW or default         Ok           Status of bottom track: A,A (valid)         Ahead and across speed available,         COG = default         Ok           Heading invalid         COG = default         Ok         Ok         Image: Som VBW or default         Ok										
\$VDVBW,11.0,1.0,A,12.0,A*7D       Status of bottom track: A (valid)       SOG = default       Ok         Ahead available, across speed empty (e.g. single axis log)       SOG = default       Ok	Set Simulation(VBW, A, A + ahead,	Track with offset) = single axis	log							
Status of bottom track: A (valid)         SOG = default         Ok           Ahead available, across speed empty (e.g. single axis log)         COG = default         Ok           Msg RI         User ID         NVSt ROTais         SOG PA         Longitude         Lattude         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         30         0         0         2247           Set Simulation(VBW, A, Track with offset)         Set Simulation(HDT, Delete heading value)         SVDVBW,11.0,1.0,A,12.0,2.0,A*51         \$	\$VDVBW,11.0,1.0,A,12.0,,A*7D									
Ahead available, across speed empty (e.g. single axis log)       COG = default       Ok         Messages 1: Position report       Image: Cog Thead TSTP SMI S RAIM SS STO SubMSG       Image: Cog Thead TSTP SMI S RAIM SS STO SubMSG       Image: 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       30       0       3       0       2247         Set Simulation(VBW, A, Track with offset)       Set Simulation(HDT, Delete heading value)       SVDVBW,11.0,1.0,A,12.0,2.0,A*51       Strinubation(HDT, T*11       Status of bottom track: A,A (valid)       Ahead and across speed available,       Ok         Heading invalid       COG = default       Ok       Ok       Ok         Msg RI User ID NvSt ROTais SOG PA Longitude Latitude COG Thead TSTP SMI S RAIM SS STO SubMSG       Image: Cog Thead TSTP SMI S RAIM SS STO SubMSG       Image: Cog Thead TSTP SMI S RAIM SS STO SubMSG         Msg RI User ID NvSt ROTais SOG PA Longitude Latitude COG Thead TSTP SMI S RAIM SS STO SubMSG       Image: Cog Thead TSTP SMI S RAIM SS STO SubMSG       Image: Cog Thead TSTP SMI S RAIM SS STO SubMSG         1       0       000005678       15       000       102.3       0       2814.9718/E       250.8005/S 360.0       511       9       0       3       0069	Status of bottom track: A (valid)	SOG = default		Ok						
empty (e.g. single axis log)         Image: single axis log         Set Simulation(VBW, A, Track with offset)           Set Simulation(VBW, A, Track with offset)         330 0 0 0 3 0 2247           Set Simulation(VBW, A, Track with offset)         550 000 000000000000000000000000000000	Ahead available, across speed	COG = default		Ok						
Messages 1 : Position report         X           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         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         \$THENDT,,T*11         \$Sog from VBW or default         Ok           Status of bottom track: A,A (valid)           Ahead and across speed available,         COG = default         Ok           Heading invalid         OK         Ok         \$COG = default         Ok	empty (e.g. single axis log)									
Msg         RI         User ID         NvSt         ROTais         SOG         PA         Longitude         Latitude         COG         THead         TSTP         SMI         S         RAIM         SS         STO         SubMSG           1         0         0000005678         15         000         102.3         0         02814.9718'E         2550.8005'S         360.0         350         33         0         0         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         \$ <td< td=""><td>Messages 1 : Position report</td><td></td><td></td><td></td></td<>	Messages 1 : Position report									
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         Sold from VBW or default         Ahead and across speed available,         Heading invalid       COG = default       Ok         Msg RI User ID NvSt ROTais         1       0       000005678       15       000       102.3       0       02814.9718'E       2550.8005'S       360.0       511       9       0       0       3       4       0069	Msg RI User ID NvSt ROTais SOG	PA Longitude Latitude COG	THead TSTP SMI S RAIM SS STO	SubMSG						
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         Ok         Msg RI User ID NVSt ROTais         1       0         0       10         1       0         1       0         1       0         1       0         1       0         1       0         1       0         0       12.3         0       02814.9718'E         2550.8005'S       360.0       511       9       0       0       3       4       0069	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 (VDW, 74, Healt with onsol)         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         OK         Msg RI       User ID         NvSt ROTais       SOG         PA       Longitude         Lattude       COG         Thead       TSTP SMI         S RAIM SS STO       SubMSG         1       0         1       0         1       0         1       0         1       0         1       0         0       12.3         0       02814.9718'E         2550.8005'S       360.0       511         9       0       0         3       4         0       10         0       10         0       10         0       10         0       10         0       10         0       10         0       10         0       10          <	Set Simulation(VBW_A_Track with (	offset)								
SvDvBW,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         COG = default           Msg RI         User ID         NvSt R0Tais         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         3         4         0069	Set Simulation (HDT, Delete heading	value)								
\$TIHDT,,T*11         Status of bottom track: A,A (valid)         Ahead and across speed available,         Heading invalid         COG = default         Msg RI       User ID         NvSt ROTais       SOG         PA       Longitude         Latitude       COG         THead       TSTP SMI         S RAIM       SS STO         Submission       Submission         User ID       NvSt         ROTAL       COG         T       0         0       10         10       000005678         15       000         10       102.3         0       02814.9718'E         2550.8005'S       360.0       511         9       0       0         34       0069	\$VDVBW.11.0.1.0.A.12.0.2.0.A*51									
Status of bottom track: A,A (valid)         Ahead and across speed available,       SOG from VBW or default       Ok         Heading invalid       COG = default       Ok         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       3       4       0069	\$TIHDTT*11									
Ahead and across speed available, Heading invalid       COG = default       Ok         Messages 1 : Position report       Image: Cog in the imag	Status of bottom track: <b>A.A</b> (valid)	SOG from VBW or default		Ok						
Heading invalid         COG = default         Ok           Messages 1: Position report         Image: COG         Thead         TSTP         SNI         S         RAIM         SS         STO         SubMSG         SubMSG         Image: COG         THead         TSTP         SNI         S         RAIM         SS         STO         SubMSG         Image: COG         THead         TSTP         SNI         S         RAIM         SS         STO         SubMSG         Image: COG         THead         TSTP         SNI         S         RAIM         SS         STO         SubMSG         Image: COG         THead         TSTP         SNI         S         RAIM         SS         STO         SubMSG         Image: COG         THead         TSTP         SNI         S         RAIM         SS         STO         SubMSG         Image: COG         Image: COG         SI         Image: COG         Image: COG         SI         Image: COG         Image: COG         Image: COG         Image: COG         SI         Image: COG         Ima	Ahead and across speed available,									
Messages 1 : Position report         X           Msg         RI         User ID         NvSt         ROTais         SOG         PA         Longitude         Latitude         COG         THead         TSTP         SMI         S         STO         SubMSG           1         0         000005678         15         000         102.3         0         02814.9718'E         2550.8005'S         360.0         511         9         0         0         3         4         0069         1000         102.3         0         02814.9718'E         2550.8005'S         360.0         511         9         0         0         3         4         0069         1000         1000         1000         1000         1000         1000         1000         1000         1000         1000         1000         1000         1000         1000         1000         1000         1000         1000         100000         10000         100000 </td <td colspan="9">Heading invalid COG = default</td>	Heading invalid COG = default									
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         3         4         0069	Messages 1 : Position report		•	×						
1 0 000005678 15 000 102.3 0 02814.9718'E 2550.8005'S 360.0 511 9 0 0 0 3 4 0069	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 3 4	0069						



#### **OSD** sentence

Procedure : OSD own ship data input											
Test item	Check	Remark	Result								
Apply simulated OSD sentence t	o 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 = <b>A</b> (valid)	Check SOG from OSD		Ok								
Speed reference = <b>B</b> (bottom)	Check COG from OSD		Ok								
	Check heading from OSD		Ok								
Messages 1 : Position report			×								
Msg RI User ID NvSt ROTais	SOG PA Longitude Latitude CC	OG THead TSTP SMI S RAIM SS STO	SubMSG								
1 0 000005678 15 -128	010.0 0 18100.0000'E 9100.0000'N 35	i9.9 350 19 0 0 0 3 0	2243								
Set speed reference to P	Check SOG and COG from		Ok								
(Positioning system)	OSD										
Messages 1 : Position report			×								
Msg RI User ID NvSt ROTais	SOG PA Longitude Latitude CC	OG THead TSTP SMI S RAIM SS STO	SubMSG								
1 0 000005678 15 -128	010.0 0 18100.0000'E 9100.0000'N 35	59.9 350 19 0 0 0 3 1	5260								
Set speed reference to R	Check SOG and COG from		Ok								
Radar tracking	OSD										
Messages 1 : Position report			×								
Msg RI User ID NvSt ROTais	SOG PA Longitude Latitude CC	OG THead TSTP SMI S RAIM SS STO	SubMSG								
1 0 000005678 15 -128	010.0 0 18100.0000'E 9100.0000'N 35	59.9 350 19 0 0 0 3 5	0001								
Set speed reference to W	Check SOG = default		Ok								
(Water speed)	Check COG = default		Ok								
	Check heading from OSD										
Messages 1 : Position report			×								
Msg RI User ID NvSt ROTais	SOG PA Longitude Latitude CC	OG THead TSTP SMI S RAIM SS STO	SubMSG								
1 0 000005678 15 -128	102.3 0 18100.0000'E 9100.0000'N 36	io.0 350 19 0 0 0 3 0	0000								



	Procedure : OSD own ship data input							
Set speed reference to M	Check SOG = default							
(Manual)	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 3 1	5260						
\$INOSD,350.0,V,359.9,P,10.0,P	,,,N*74	1						
Set speed reference to P	Check SOG from OSD	Ok						
(Positioning system)	Check COG from OSD	Ok						
Set heading status = V	Check heading = default	Ok						
(invalid)								
Messages 1 : Position report	COC DA Langituda Latituda COC TURAN TETR SMI S DATM SS STO	SubMSC						
		5260						
1 0 0000000 13 120	01010 0 10100.0000E 9100.0000 N 555.5 511 15 0 0 0 5 1	3200						
Set Simulation(Ground Speed, I	Kilometers per hour)							
\$INOSD,350.0,V,359.9,P,18.5,P	,,,K*7C							
Change speed reference from	Check SOG is converted into	Ok						
N (kn) to K (km/h)	knots							
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, H	(nots)							
Apply simulated OSD,GLL,ROT	sentence's to the sensor input							
\$GPGLL,2550.8005,S,02814.97	18,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						
		0.005						



#### **ROT sentence**

Procedure : ROT Rate of Turn input												
Test item	Check	Result										
Apply simulated ROT sentence to	o the sensor input, T	alker = TI										
\$GPGLL,2550.8005,S,02814.97	18,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 c	pr Check ( VDO ) = s	set-up B										
$ROT \underline{status} = \mathbf{A} (valid) \qquad Check ROT value \qquad Ok$												
ROT value = 0.0 degr./min												
Messages 1 : Position report				×								
Msg RI User ID NvSt ROTais	SOG PA Longitude	Latitude COG	G THead TSTP SMI S RAIM SS STO	SubMSG								
1 0 000005678 15 000	010.0 0 02814.9718'E	2550.8005'S 359	0.9 350 13 0 0 0 3 0	0000								
	\$TIROT	ROTais		<b>_</b>								
Change rate of turn to different	10	15		Ok								
values according to the check	20	21		Ok								
column.	60	37		Ok								
The DOT value has to be the	180	63/64		Ok								
nearest value according the	360	90		Ok								
conversion formula (see	720	126		Ok								
conversion table)	-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 3 2	2172								
\$TIROT,20.0,A*09												
Messages 1 : Position report				X								
Msg RI User ID NvSt ROTais	SOG PA Longitude	Latitude COG	G THead TSTP SMI S RAIM SS STO	SubMSG								
1 0 000005678 15 021	010.0 0 02814.9718'E	2550.8005'S 359	0.9 350 32 0 0 0 3 0	0000								
TIROT.60.0,A*0D												
Messages 1 : Position report				X								
Msg RI User ID NvSt ROTais	SOG PA Longitude	Latitude COG	G 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 3 3	0001								
\$TIROT.180.0.A*32												
Messages 1 : Position report				X								
Msg RI User ID NvSt ROTais	SOG PA Longitude	Latitude COG	S THead TSTP SMI S RAIM SS STO	SubMSG								
1 0 000005678 15 063	010.0 0 02814.9718'E	2550.8005'S 359	0.9 350 17 0 0 0 3 0	0000								



	Procedure : ROT Rate of Turn input																
\$	\$TIROT,360.0,A*3E																
P	lessage	s 1 : Po	sition report														×
H	Msg	RI	User ID	NvSt	ROTais	SOG	PA	Longitude	Latitude	COG	THead	TSTP S	4I S	RAIM	I 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																	
	1essage	s 1 : Po	sition report														×
H	Msg	RI	User ID	NvSt	ROTais	SOG	PA	Longitude	Latitude	COG	THead	TSTP S	۹I S	RAIM	SS	STO	SubMSG
	1	0	000005678	15	126	010.0	0	02814.9718'E	2550.8005'S	359.	9 350	53	D (	0 0	3	0	0000
\$	TIRC	DТ,-	20.0,A*24														
P	lessage	s 1 : Po	sition report														×
H	Msg	RI	User ID	NvSt	ROTais	SOG	PA	Longitude	Latitude	COG	THead	TSTP SM	1I S	RAIM	SS	STO	SubMSG
	1	0	000005678	15	-21	010.0	0	02814.9718'E	2550.8005'S	359.	9 350	11	) (	) 0	3	0	2248
\$	TIR	ЭΤ,-	720.0,A*1	3													
	lessage	s 1 : Po	sition report														
	Msg	RI	User ID	NvSt	ROTais	SOG	PA	Longitude	Latitude	COG	THead	TSTP SM	II S	RAIM	SS	STO	SubMSG
	1	0	000005678	15	-126	010.0	0	02814.9718'E	2550.8005'S	359.	9 350	49 1	) (	) 0	3	7	0001
Set ROT $\underline{status} = \mathbf{V}$ (invalid)Check that ROT = default (default = -731.4 = -128)Ok																	
\$	TIRC	<mark>ЭТ,-</mark>	720.0,V*0	4													
	1essage	s 1 : Po	sition report														×
H	Msg	RI	User ID	NvSt	ROTais	SOG	PA	Longitude	Latitude	COG	THead	TSTP SM	1I S	RAIM	SS	STO	SubMSG
	1	0	000005678	15	-128	010.0	0	02814.9718'E	2550.8005'S	359.	9 350	57	) (	) 0	3	0	2254



Procedure : ROT Rate of Turn input				
Set Simulation(ROT , A, Talker =	Set Simulation(ROT , <b>A, Talker = HE</b> )			
\$HEROT,0.0,A*2B				
ROT status = <b>A</b> (valid)	Check ROT = 0.0			Ok
ROT value = 0.0 degr./min				
Set Talker = HE				
Messages 1 : Position report				
Msg RI User ID NvSt ROTais	SOG PA Longitude	Latitude COG T	Head TSTP SMI S RAIM SS STO S	ubMSG
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	9 0	0		Ok
values according to the check	11 720	127		Ok
Converted values are shown	-90	0		Ok
Converted values are shown.	-11 -720	-127		Ok
\$HEROT,9.0,A*22				
Messages 1 : Position report				
Msg RI User ID NvSt ROTais	SOG PA Longitude	Latitude COG T	Head TSTP SMI S RAIM SS STO S	ubMSG
	010.0 0 02814.9718'E	2550.8005'5 359.9	350 5 0 0 0 3 4	21//
\$HEROT,11.0,A*1B				
Messages 1 : Position report				×
Msg RI User ID NvSt ROTais	SOG PA Longitude	Latitude COG T	Head TSTP SMI S RAIM SS STO S	ubMSG
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	<del>_ , , , , , , , , , , , , , , , , , , ,</del>		······································	
Messages 1 : Position report				X
Msg RI User ID NvSt ROTais	SOG PA Longitude	Latitude COG T	Head TSTP SMI S RAIM SS STO S	ubMSG
1 0 000005678 15 000	010.0 0 02814.9718'E	2550.8005'S 359.9	350 39 0 0 3 3	0001
1				
Messages 1 : Position report		· · · · · · · · · · · · · · · · · · ·	· · · · · · · · · · · · · · · · · · ·	
Msg RI User ID NvSt ROTais	SOG PA Longitude	Latitude COG T	Head TSTP SMI S RAIM SS STO S	ubMSG
1 0 000005678 15 -127	010.0 0 02814.9718'E	2550.8005'S 359.9	350 17 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	9.9,T,,M,10.0,N,,K,A			
\$TIHDT,350.0,T				
\$TIROT,0.0,4	4			
Initial baud rate = 38 400				
Set Simulatio	n(CRC un-ticked)			
Check (VDL	, VDO ) = set-up A c	or Check ( VDO ) = set-up B		
Send sentend	ces without	Check position = default		Ok
cnecksum		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 Co	DG THead TSTP SMI S RAIM SS STO	SubMSG
	0005678 15 -128	102.3 0 18100.000 E 9100.000 N 30	50.0 511 13 0 0 0 3 6	1803
Set Simulatio	n(CRC ticked, False	e CRC ticked )		
\$GPGLL,255	0.8005,S,02814.97	18,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	A*44	1	1	-
Send sentend	ces with false	Check position = default		Ok
checksum		Check SOG/COG = default		Ok
		Check heading = default		Ok
		Check ROT = default		Ok
Messages 1 : Position	report			×
Msg RI I	Jser ID NvSt ROTais	SOG PA Longitude Latitude CC	DG THead TSTP SMI S RAIM SS STO	SubMSG
1 0 00	0005678 15 -128	102.3 0 18100.0000'E 9100.0000'N 36	50.0 511 13 0 0 0 3 1	8756



Procedure : Additional Tests			
Set Simulation(CRC ticked, False CRC un-ticked )			
Als Developer Studio A cipe gue per product decigned and developed by youry sinte st			
Files Comport Own Profile Equipment Under Test	Standard Test Environment Editors RECORD Analy	tics Process Graphs Tile Clear Screen Beep Versio	n Licence File
ABK signal generator port > 0 00 0000			
eut presentation port   eut presentation port  Baud Rate - 480	0 ▶ select com port 1		
long range port  Baud Rate - 384	00  select com port 2		
	select com port 3		
	select com port 5		
	select com port 7		
	select com port 8		
Change baud rate to 4800			
\$GPGLL,2550.8005,S,02814.97	18,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	Check position	System detects new baud rate	Ok
Set baud rate of simulator to	Check SOG/COG	See above	Ok
	Check heading	See above	Ok
	Check ROT	See above	Ok
Messages 1: Position report			
Messages 1 : Position report			X
Messages 1 : Position report Msg RI User ID NvSt ROTais	SOG PA Longitude Latitude Co	DG THead TSTP SMI S RAIM SS STO	X SubMSG
Messages 1 : Position report           Msg         RI         User ID         NvSt         ROTais           1         0         000005678         15         000	SOG PA Longitude Latitude Co 010.0 0 02814.9718'E 2550.8005'S 3	DG THead TSTP SMI S RAIM SS STO 59.9 350 56 0 0 0 3 2	SubMSG 1798
Messages 1 : Position report           Msg         RI         User ID         NvSt         ROTais           1         0         000005678         15         000	SOG PA Longitude Latitude CI 010.0 0 02814.9718'E 2550.8005'S 3	DG THead TSTP SMI S RAIM SS STO 59.9 350 56 0 0 0 3 2	SubMSG 1798
Messages 1 : Position report       Msg     RI     User ID     NvSt     ROTais       1     0     000005678     15     000	SOG PA Longitude Latitude Co 010.0 0 02814.9718'E 2550.8005'S 3	DG THead TSTP SMI S RAIM SS STO 59.9 350 56 0 0 0 3 2	SubMSG 1798
Hessages 1 : Position report         Msg       RI       User ID       NvSt       ROTais         1       0       000005678       15       000         Change baud rate to 38 400         Mail       AlS Developer Studio - A sine qua non profile         Files       Comport       Own Profile       Environment Under Test	SOG PA Longitude Latitude CO 010.0 0 02814.9718'E 2550.8005'S 3 duct designed and developed by www.aiste.s	DG THead TSTP SMI S RAIM SS STO 59.9 350 56 0 0 0 3 2 t	SubMSG 1798
Messages 1 : Position report         Msg       RI       User ID       NvSt       ROTais         1       0       000005678       15       000         Change baud rate to 38 400         Mail       Developer Studio - A sine qua non proprietation         Files       Comport       Own Profile       Equipment Under Test         proc       signal generator port       Image: partor - Apple	SOG PA Longitude Latitude Co 010.0 0 02814.9718'E 2550.8005'S 3 duct designed and developed by www.aiste.s Standard Test Environment Editors RECORD Analytic vser Message Number 26 : Log 023 : UserID 00	DG THead TSTP SMI S RAIM SS STO 59.9 350 56 0 0 0 3 2 t t S Process Graphs Tile Clear Screen Beep Version 00000000 : tEvent 00 00 00 0000	SubMSG 1798
Messages 1 : Position report         Msg       RI       User ID       NvSt       ROTais         1       0       000005678       15       000         Change baud rate to 38 400         Als Developer Studio - A sine qua non prot         Files       Comport Own Profile Equipment Under Test         Prog       signal generator port       ent presentation port       ent presentation port         Baud Rate - 4800	SOG PA Longitude Latitude CO 010.0 0 02814.9718'E 2550.8005'S 3 duct designed and developed by www.aiste.s Standard Test Environment Editors RECORD Analyti yser Message Number 26 : Log 023 : UserID 00	DG         THead         TSTP         SMI         S         RAIM         SS         STO           59.9         350         56         0         0         0         3         2           t         cs         Process Graphs         Tile         Clear Screen         Beep         Version           00000000 : tEvent         00         00         00000000         1	SubMSG 1798
Messages 1 : Position report         Msg       RI       User ID       NvSt       ROTais         1       0       000005678       15       000         Change baud rate to 38 400         Image: Source of the second	SOG       PA       Longitude       Latitude       Cl         010.0       0       02814.9718'E       2550.8005'S       3         duct designed and developed by www.aiste.s         Standard Test Environment       Editors       RECORD       Analytic         yser       Message       Number 26 : Log 023 : UserID 0       0         select com port 1       0       0       0       0	DG THead TSTP SMI S RAIM SS STO 59.9 350 56 0 0 0 3 2 t ts Process Graphs Tile Clear Screen Beep Version 00000000 : tEvent 00 00 00000	SubMSG 1798
Messages 1 : Position report         Msg       RI       User ID       NvSt       ROTais         1       0       000005678       15       000         Change baud rate to 38 400         Change baud rate to 38 400         Msg AIS Developer Studio - A sine qua non propriet         Files       Comport       Own Profile       Equipment Under Test         Prog       signal generator port         epfd sensor port       Baud Rate - 4800         Baud Rate - 3840       Baud Rate - 3840	SOG       PA       Longitude       Latitude       Cr         010.0       0       02814.9718'E       2550.8005'S       3         vduct designed and developed by www.aiste.s       Standard Test Environment       Editors       RECORD       Analytic         yser Message Number 26 : Log 023 : UserID 00       •<	DG         THead         TSTP         SMI         S         RAIM         SS         STO           59.9         350         56         0         0         3         2           t         Image: S         S         Clear Screen         Beep         Version           000000000 : tEvent         00         00         000000000000000000000000000000000000	SubMSG           1798
Messages 1 : Position report         Msg       RI       User ID       NvSt       ROTais         1       0       000005678       15       000         Change baud rate to 38 400         Als Developer Studio - A sine qua non procession         Files       Comport Own Profile Equipment Under Test         Prog       signal generator port       eut presentation port       enerator - Analy         Baud Rate - 4800       Baud Rate - 4800       Baud Rate - 4800	SOG       PA       Longitude       Latitude       Co         010.0       0       02814.9718'E       2550.8005'S       3         oduct designed and developed by www.aiste.s       Standard Test Environment       Editors       RECORD       Analytic         yser       Message Number 26 : Log 023 : UserID 00       Select com port 1       Select com port 2       Select com port 3         select com port 4	DG         THead         TSTP         SMI         S         RAIM         SS         STO           59.9         350         56         0         0         0         3         2           t         cs         Process Graphs         Tile         Clear Screen         Beep         Version           00000000 : tEvent         00         00         00000000         1	SubMSG 1798
Messages 1 : Position report         Msg       RI       User ID       NvSt       ROTais         1       0       000005678       15       000         Change baud rate to 38 400         Change baud rate to 38 400         Msg RI       User ID       NvSt       ROTais         Change baud rate to 38 400         Msg RI       000         Files Comport       Own Profile       Equipment Under Test         enerator - Analy         enerator port       enerator - Analy         Baud Rate - 4800         Baud Rate - 3840	SOG       PA       Longitude       Latitude       Cl         010.0       0       02814.9718'E       2550.8005'S       3         duct designed and developed by www.aiste.s       Standard Test Environment       Editors       RECORD       Analytic         yser       Message       Number       26 : Log       023 : UserID       0         select com port 1       select com port 2       1       1       1       1         select com port 3       select com port 4       select com port 5       1       1       1       1         select com port 5       select com port 6       1 <t< td=""><td>DG         THead         TSTP         SMI         S         RAIM         SS         STO           59.9         350         56         0         0         0         3         2           t         <tht< th="">         t         t         <tht< th=""></tht<></tht<></td><td>SubMSG           1798           Licence File</td></t<>	DG         THead         TSTP         SMI         S         RAIM         SS         STO           59.9         350         56         0         0         0         3         2           t <tht< th="">         t         t         <tht< th=""></tht<></tht<>	SubMSG           1798           Licence File
Messages 1 : Position report         Msg       RI       User ID       NvSt       ROTais         1       0       000005678       15       000         Change baud rate to 38 400         Image baud rate to 38 4	SOG       PA       Longitude       Latitude       CI         010.0       0       02814.9718'E       2550.8005'S       3         duct designed and developed by www.aiste.s       Standard Test Environment       Editors       RECORD       Analytic         yser       Message       Number       26 : Log       023 : UserID       0         select com port 1       select com port 2       1       1       1       1         select com port 3       select com port 4       1       1       1       1       1         select com port 4       select com port 5       1       <	DG         THead         TSTP         SMI         S         RAIM         SS         STO           59.9         350         56         0         0         3         2           t         Image: S         S         Clear Screen         Beep         Version           00000000 : tEvent         00         00         00000000         00         00000         00         000000000         00         000000000000000000000000000000000000	Licence File
Messages 1 : Position report         Msg       RI       User ID       NvSt       ROTais         1       0       000005678       15       000         Change baud rate to 38 400         Als Developer Studio - A sine qua non pro         Files       Comport Own Profile Equipment Under Test         Prog       signal generator port       entrator - Analy         end fidsensor port       Baud Rate - 4800         Baud Rate - 3840       Baud Rate - 3840	SOG       PA       Longitude       Latitude       Co         010.0       0       02814.9718'E       2550.8005'S       3         Ducct designed and developed by www.aiste.s       Standard Test Environment       Editors       RECORD       Analyti         yser       Message Number 26 : Log 023 : UserID 0       Image: Select com port 1       Select com port 2       Image: Select com port 3       Image: Select com port 4       Image: Select com port 5       Image: Select com port 7       Image: Select com port 8       Image: Select com port 8       Image: Select com port 7	DG         THead         TSTP         SMI         S         RAIM         SS         STO           59.9         350         56         0         0         0         3         2           t         cs         Process Graphs         Tile         Clear Screen         Beep         Version           00000000         : Event         00         00         00         0	SubMSG 1798  Licence File
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#### 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
10	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
ТХ	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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