AIS sim 2.50

High Speed NMEA and AIS Simulator

COLLINS Software Services 2006

CONTENTS

1. Getting Started

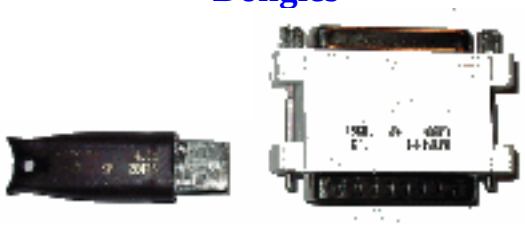
Installation

Insert the CD into the drive - the setup program should start automatically. If not, *explore* the CD and double click on **Setup.exe**. Follow the instructions on the screen.

AISsim Demo Version

If you start the AISsim program **without** plugging the hardware key (dongle) into your PC, then AISsim will only run in **demo mode.** This allows the simulator to generate sentences in the Output Monitor but no COM port output is generated or received. Also in demo mode playback of log files is disabled so the demo version cannot be used as a live AIS RADAR display. AIS sentences can be interpreted by double clicking on them in the output monitor with the simulator stopped. Most of the other features can be used including the RADAR display. It will be automatically updated with the simulated AIS data if **Virtual Loop Back** mode is selected in the main menu.

Dongles



USB **Parallel**

Running AISsim

Plug the dongle into the appropriate port i.e. USB or Parallel. The driver will have been installed with the software. This driver checks all USB ports and all Parallel ports for the presence of a dongle when AISsim is started, and from time to time during operation.

AISsim starts maximised with two monitor windows open for **Input** and **Output.** These windows cannot be closed. Simulated NMEA/AIS sentences appear in the Output monitor and on the COM port. To interpret the sentences and to display them in the RADAR display use a **loop back connector** in the serial port. Alternatively you can select **Virtual Loop Back** mode in the main menu Or record an **Output Log** file and then play it back. Log files are played back to the input and output monitors simultaneously unless you select **Playback to NMEA** in the config menu when they will be played back to the output monitor and the serial port.

Two pre-recorded Log files are supplied with AISsim:

Input Log 13-11-05.txt This was recorded on the authors boat in Lorient harbour, France, using a NASA Marine Electronics AIS Engine receiver. It

shows up to four different targets and demonstrates most of the features when played back. It contains own boat GPS data as well so the Lorient chart will autoload.
While its running, if you turn off "Show Own GPS Track", the display will follow the nearest target, the SAINT TUDY, out of the harbour. When the third target, the ANDRE L, appears double click on it and the display will follow it all the way into the harbour and on to its berth.While this is in progress turn on chart detail and waypoints for a more interesting display. Zoom in to see the vessel plan.
Hong-Kong-AIS.txt This small file taken from actual voyage data on a vessel in Hong Kong contains 46 targets some with ship's static (message 5) data. There is no GPS data so chart autoload won't work. Proceed as follows: Launch the RADAR display and open the World chart, if its not already open. Place the graphic cursor somewhere near Hong Kong and click on the Auto-Load chart button. Now playback the Hong-Kong-AIS.txt file. The targets will appear one by one, about one a second at slow playback speed. If you turn off "Show Own GPS Track", select "Show Name / MMSI - On All" and double click on a target with a name, e.g. MACAU SUCCESS, so it becomes the selected target, i.e. it is highlighted in yellow. Then when you zoom in, you will see the vessel plan displayed relative to the GPS antenna position from its mesage 5 data.

Simulating your own data

On installation, the default output consists of a mix of AIS and GPS sentences. You will get a target at 00.000N 000.000W heading SE at 10 Knots if you just click the start button. However you need to configure the AIS Sentence 5 to add a ship's name and dimensions etc. Also you can set the MMSI number in AIS message 1-3 config. Remember it's the MMSI number that differentiates the targets. You can use the charts by right clicking to create a new starting position for simulation. Having configured everything you need for a specific simulation you can save the config as a named file for quick loading in future. Also when you quit AISsim the current configuration is automatically saved and will be reloaded on starting AISsim again.

It is recommended that you read the NMEA AIS specification to obtain full details of the NMEA sentence structure with encapsulated AIS data. (NMEA 0183 version 3.00 and NMEA 0183-HS ver 1 also AIS Spec. ITU-R M. 1371-1 / IEC 61993-2).

Loop Back

Loop Back Connector

This is serial female connector with pins 2 and 3 connected together. See also Virtual Loop Back Mode

Loop Back Mode

Click and **check** this menu item to enable the **Virtual Loopback Mode**. This simulates a connection between pins 2 and 3 on the com port connector. It enables the simulated data appearing in the output monitor to be analysed in the input monitor as if a loop back connection had been made. When in loopback mode an indicator next to the com status appears:

Warning do not select loopback mode when an actual loopback connector is in place or if actual live data is being received since unpredictable results will occur.
Note Loopback mode works in **Demo Mode** so you can analyse the simulated data without a **Dongle.**

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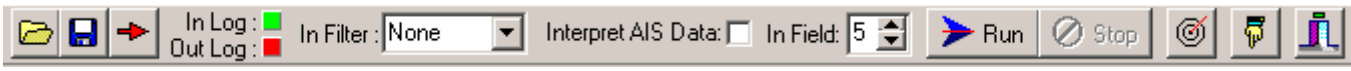
2. Main Toolbar



This toolbar is found at the top of the main window. It provides quick access to the frequently used functions of the program. Most of its actions are duplicated in the main menu. Also note that on extreme right hand end, beyond the exit button, there is a com port indicator e.g. **COM 1 38400**. If you are running AISsim without a hardware key (dongle) it displays **DEMO MODE**.

Open

This enables you to open the following types of file :

- Text files (*.txt)
- Log Files (*.log)

Text files are usually those generated by the **AISsim** program. There are two pre-named text log files **Input Log.txt** and **Output Log.txt**. The *.log file extension option is provided for opening log files generated by **RECSIM** - ESL's previous NMEA simulator. Files are opened with MS NotePad or WordPad depending on the size of file.

Save As...

Enables you to save the contents of a monitor or track file window e.g. after interpreting an AIS sentence in text form or modifying a track file.

Playback Logfile

This button / menu item enables you to open a pre-recorded log file of NMEA and AIS data for **Playback.** The following file extensions are provided:

- *.txt AISsim log files
- *.log RECSIM log files
- *.vdr AMI Voyage Data Recorder files

The data will always appear in the Output Monitor and, depending on settings in the config menu, it will be output to the COM port or played back directly to the input monitor where it can be interpreted and / or sent to the RADAR display. Playback can occur at various speeds: **Slow** - 1 line per second, **Medium** - 10 lines/sec, **Fast** - 100 lines/sec and Single Shot

Log File Status

These two "lamps" indicate the status of the Input and Output Monitor text log files. If you right click in either monitor window and click on the **Log File** item in the pop-up menu, a text log will be opened and the appropriate status lamp will go **green.** Then data received in the monitor window is also written to the log file for that monitor . If you right click in the monitor window again the Log File item in the popup menu will have a ✓against it also showing that the log file is open for that monitor. Click it again to close the log file. The status "lamp" for that log file will then go **red** to indicate that the file is closed. If you want to keep a log file you must use MS Explorer to **rename** it since it will be overwritten by the next log file, **Input Log.txt** or **Output Log.txt.**

Input Filter

This Editable Picklist enables you to select an input filter string. If the beginning of the incoming sentence matches the string the sentence is accepted, if not it is ignored. If the desired string is not in the pull-down list you can type your own string. The default setting of "None" means "accept all sentences". (See also **Advanced Filter** in the **Config** menu).

Interpret AIS

This Checkbox and field position selector enables you to request text interpretation of AIS strings embedded in incoming NMEA sentences. The default field position is field 5. **Note** that this setting applies to both automatic interpretation in the Input Monitor and double clicking on AIS sentences in either monitor.

Run / Stop

These two buttons start and stop the simulator. The simulated position is updated every second when the simulator is running regardless of the update rate of each group of sentences. When the simulator is running the **Playback Log** and the **COM port Config** functions are disabled.

Single Shot

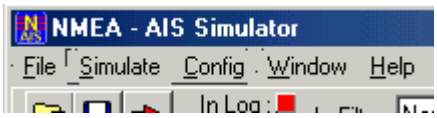
The Single Shot button on the main toolbar enables you to step through a log

file one line at a time if you are in **playback mode** and **Single Shot** is selected in the Playback Speed Config sub menu. If **not** in **playback mode** then pressing this button sends a single NMEA sentence group to the output monitor and COM port as specified in the NMEA 1 parser string. This is true whether or not the simulator is running and also if **playing a track file**.

Exit Program

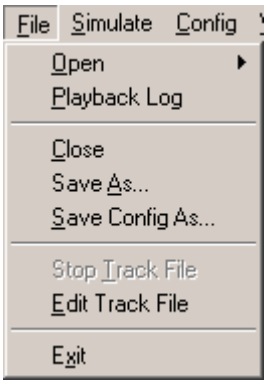
Clicking this button will end the program after a warning and continue option. Normally this is safe to do with log files open for writing. **However it is recommended that any important log files are closed before quitting.**

3. Main Menu



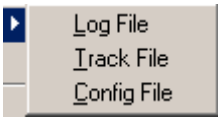
Main menu items:

File Menu



Open

The Open File menu item has cascading sub menu items for file types:



This enables you to open the following types of file :

- Text files (*.txt)
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Text files are usually those generated by the **AISsim** program. There are two

pre-named text log files **Input Log.txt** and **Output Log.txt**. The *.log file extension option is provided for opening log files generated by **RECSIM** - ESL's previous NMEA simulator. Files are opened with MS NotePad or WordPad depending on the size of file.

- Config files (*.sfg)

Open a previously saved configuration file which sets up most of the AISsim dialog values that existed when the configuration was saved. This is useful for returning to a particular starting position, speed, heading and set of NMEA sentences from a previous session. Note - on quitting AISsim the current settings are saved in the default config file - Nsim.sfg (see also Save Config As...)

Close

Close the currently selected window - (note **Monitors** cannot be closed). This command only really applies to **Track Files**, which can be closed by clicking on the windows close icon X. The close command is only included in the file menu for completeness.

Closing a Track File window does not stop the execution of a running track file

Save As...

Enables you to save the contents of a monitor or track file window e.g. after interpreting an AIS sentence in text form or modifying a track file.

Save Config As...

Save the current settings of AISsim as a config file with the extension ".sfg " (see also Open Config File).

Stop Current Track

Stop running the current track file. After a confirmation message / response the simulation is stopped. The Window listing the track file is left open and must be closed manually.- (note this menu item is only enabled if a track file is currently running)

Edit Track File

This command opens a track file in a new window but doesn't start executing it, so that you can start **editing** it without the simulator starting. Note that it leaves the program in the same state as **stopping** an open track file or a track file reaching its natural end.

Simulate Menu

Run / Stop

Start / Stop the simulator. These items duplicate the buttons in the main toolbar

Autopilot

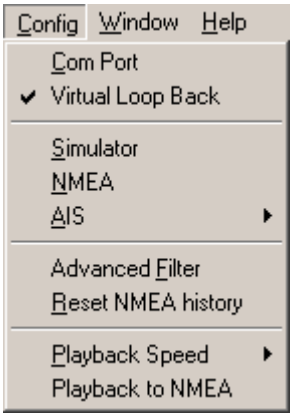
Setting the autopilot mode to ON by checking this item enables a simulated autopilot response, which monitors the received NMEA sentences and interprets $--XTE, $--APA and $--APB autopilot cross track error sentences as follows:

- If the XTE reduced since the last time or is inside the dead band then **Hold Course**
- If the XTE is outside the dead band and it stayed constant or increased then **steer R or L** accordingly. Using XTE x Max Change as the course change, with at least Min Change and at most, Max Change, alteration.
- If the sentence signaled invalid data or cycle lock failure then **Hold Course**.

The Autopilot also responds to $--HSC (heading steering command) sentences. In this case the course steered is the true heading contained in the HSC sentence.

Connecting AISsim to a ECDIS or Chart plotter system that outputs autopilot sentences enables AISsim to follow a route like a vessel on autopilot. Note the autopilot characteristics depend on the settings in the Simulator Configuration Dialogue (see page 10).

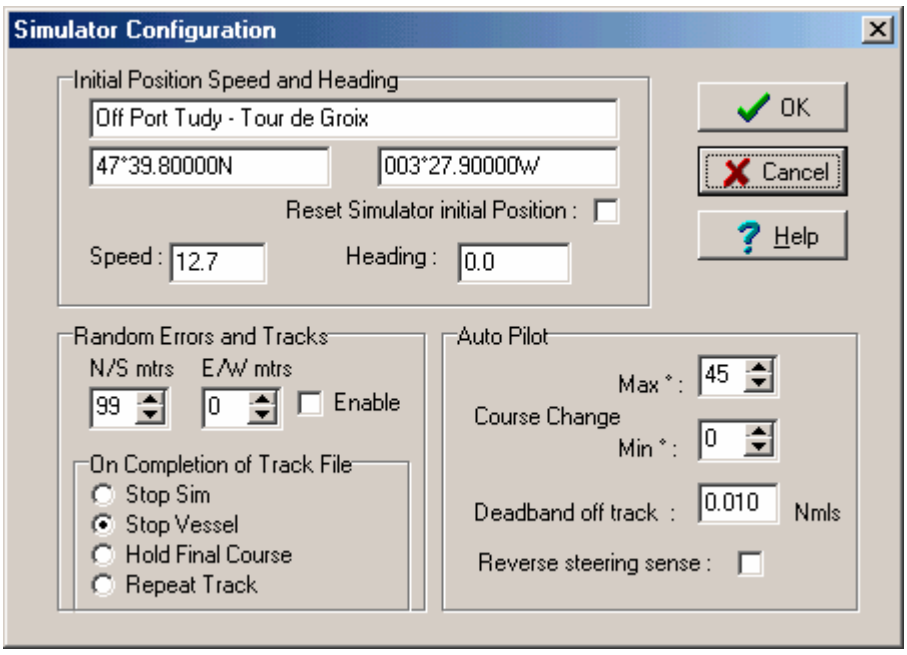
Config Menu



Com Port Configuration

Use this dialog to set up the com port. The settings are **saved** in the config file and are reloaded on starting **AISsim**. The default settings on **first starting** AISsim are HS NMEA **38400** baud and Com **1**. The com port configuration is displayed at the right hand end of the main toolbar.

Simulator



Simulator configuration dialog.

Initial Position

This enables you to set, or reset the initial position of the simulated vessel. The current position is saved in the default config file or can be saved in a named config file as the **startup** position, when that config file is loaded.

Enter positions without spaces or the decimal point. The format is semi-automatic, what you are aiming at is like the example shown. e.g. 47°39.80000N - Just type 47398n - **the ° and .** are added automatically as you type.

Reset Position

Check this box to cause the initial position to be changed to that contained in this dialogue on **OK** exit. The default is **not checked**, so that you don't accidentally reset the position when just changing the speed or heading

Speed and Heading

This lets you set the vessel's speed and heading, either initially or while the simulator is running, giving you the ability to "drive" the simulated vessel. On closing the dialog with **OK** the new speed and heading is applied, however the current position of the vessel is not reset to the initial position unless the "**Reset Simulator initial position**" checkbox is ticked. Also note that the **heading** is not reset if a **trackfile** is playing.

Random Errors

To simulate the errors associated with various sources of position data e.g. GPS, Differential GPS, etc. random error generation is provided. The max error ranges can be specified in meters from the nominal position, separately for the North/South and East/West directions. In the UK at Lat 51Deg approx, the East/West error for GPS is usually worse than the North/South and scatter plots have a characteristic elliptical shape, which can be simulated.

The normal error ranges could be both set to +/-15 mtrs. (i.e. the theoretical performance of GPS on a good day!) The errors can be set between 0 and +/-99 mtrs in each direction. there is an enable checkbox to turn the errors on and off. The range settings are saved in config files but note that, on start-up, errors are always **off** !

On Completion of Track File (See Track Files - chapter 8, page 31).

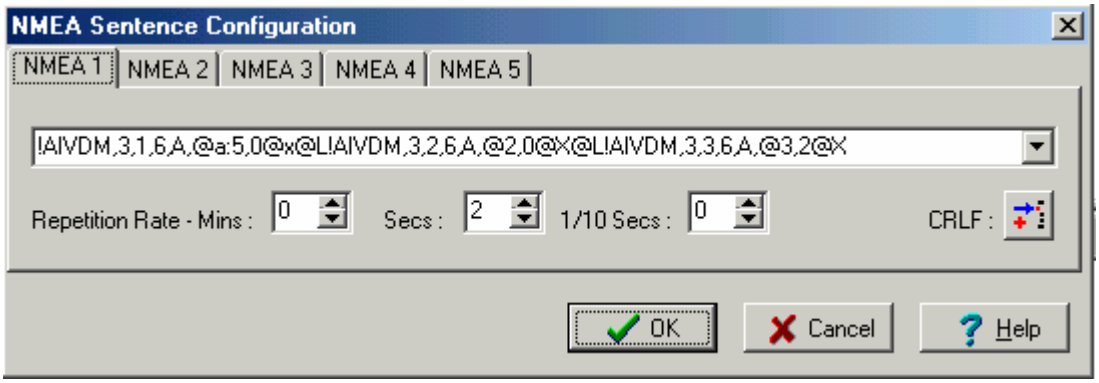
Auto Pilot

If the Auto Pilot item in the Simulate Menu is checked then alter course as described:

- If the XTE reduced since the last time or is inside the dead band then **Hold Course**
- If the XTE is outside the dead band and it stayed constant or increased then **steer R or L** accordingly. Using XTE x Max Change as the course change, with at least Min Change and at most, Max Change, alteration.
- If the sentence signalled invalid data or cycle lock failure then **Hold Course.**.

(Also see page 9),

NMEA Configuration Dialogue



NMEA parser string

Enter the required sentence or group of sentences here. For details see NMEA parser (chapter 5, page 20). These strings are passed to the NMEA parser for conversion into the actual NMEA output sentences. (Note the parser string entry history is stored in drop down history lists, for quick reloading.

CR LF Button

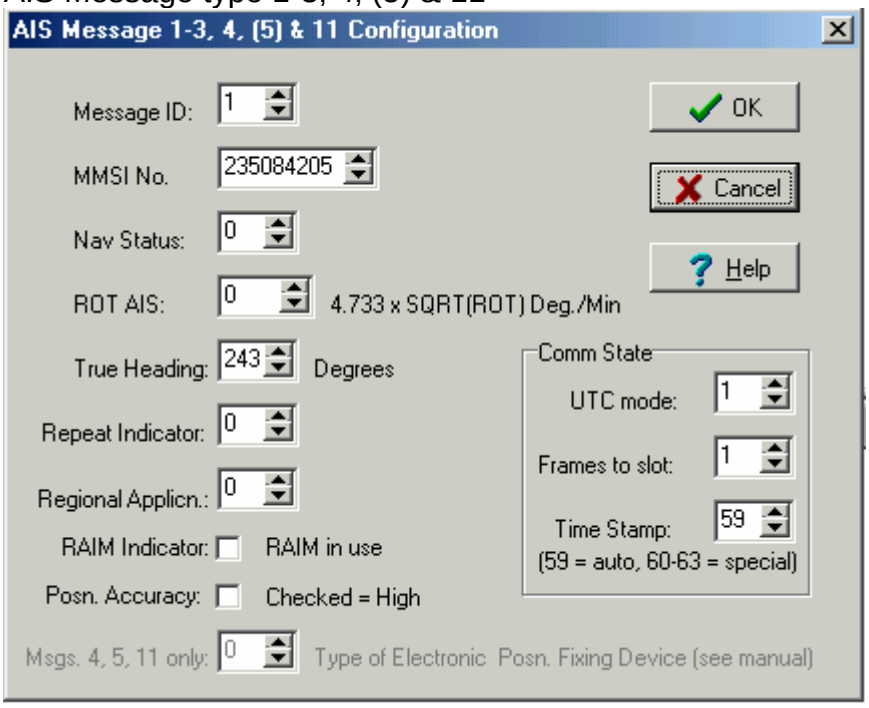
Click this button to insert an @L into the parser string which inserts a new line into the simulated data.

Repetition Rate

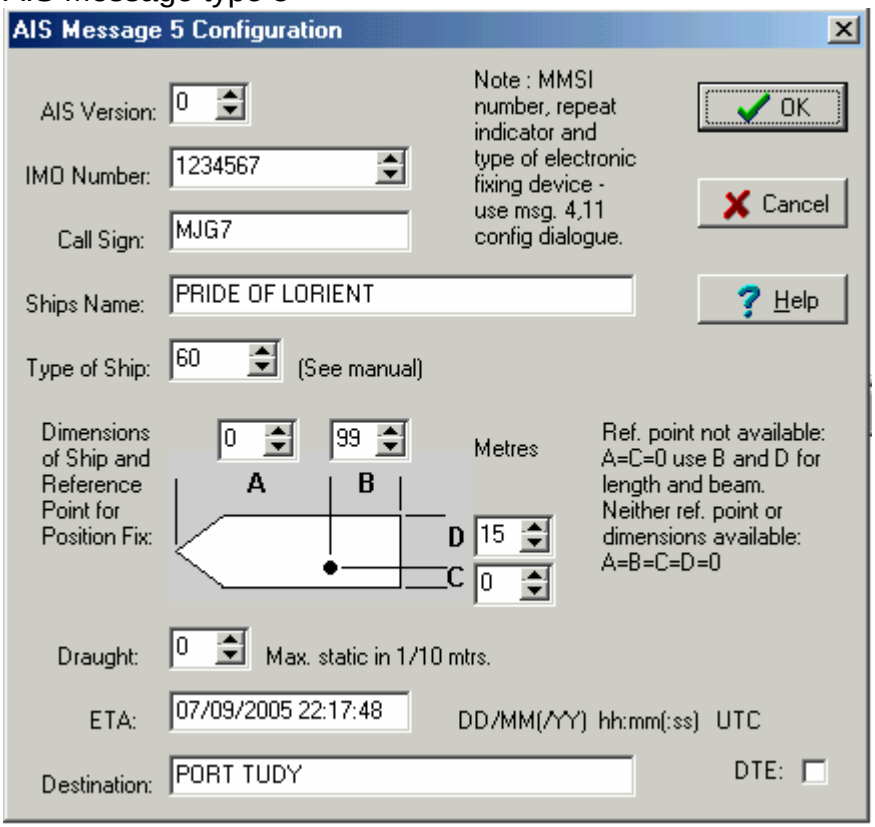
Use these spin edit boxes to set up the **repetition** rate of the selected NMEA group. Minimum value is 0.1, **Maximum** value is 60 mins 59.9 secs, (default is 1.0 sec). The values are saved in config files.

AIS Config Dialogues

AIS Message type 1-3, 4, (5) & 11



AIS Message type 5



(Details - see next page)

Message ID

This can be set to 1 - 3, 4, 11 or 5 for the simple case of the parser term @A as described in the Parser, (Chapter 5 page 20).

MMSI Number

This is the unique 9 digit DSC Radio ID number issued for the vessel. Also referred to as the User ID in the AIS specification.

IMO Number

The Ships International Maritime Organization number.
0 = Not available.

Ships Name and Call Sign

Name of vessel - max 20 characters. Note restricted character set 6 bit ASCII automatically converts to upper case. **Call sign** is the normal non DSC radio call sign e.g. MKKN6.

Dimensions of Ship

These parameters can be entered to indicate the position of the GPS antenna relative to the plan view of the ship. The use of them is given in the dialogue.

Draught

Enter the maximum draft of the vessel in decimetres (1/10ths of a metre) Note this is not saved in the config file.

ETA and Destination

The default value of **ETA** is the date and time that AISsim was started. If you enter another value you must take care to use exactly the same format, as shown in the dialogue. **Destination** - max 20 characters. Note restricted character set 6 bit ASCII automatically converts to upper case.

Navigation Status

0	Under way using engine
1	At Anchor
2	Not under command
3	Restricted Maneuverability
4	Constrained by her draught
5	Moored
6	Aground
7	Engaged in fishing
8	Under way sailing
9-15	Reserved

Type of Ship

Extract from NMEA / AIS Standard Document : -

3.3.8.2.3.2 Type of ship

TABLE 18

Identifiers to be used by ships to report their type			
Identifier No.	Special craft		
50	Pilot vessel		
51	Search and rescue vessels		
52	Tugs		
53	Port tenders		
54	Vessels with anti-pollution facilities or equipment		
55	Law enforcement vessels		
56	Spare – for assignments to local vessels		
57	Spare – for assignments to local vessels		
58	Medical transports (as defined in the 1949 Geneva Conventions and Additional Protocols)		
59	Ships according to Resolution No 18 (Mob-83)		
Other ships			
First digit (*)	Second digit (*)	First digit (*)	Second digit (*)
1 - reserved for future use	0 – All ships of this type	-	0 – Fishing
2 – WIG	1 – Carrying DG, HS, or MP IMO hazard or pollutant category A	-	1 – Towing
3 - see right column	2 – Carrying DG, HS, or MP IMO hazard or pollutant category B	3 – Vessel	2 – Towing and length of the tow exceeds 200 m or breadth exceeds 25 m
4 – HSC	3 – Carrying DG, HS, or MP IMO hazard or pollutant category C	-	3 – Engaged in dredging or underwater operations
5 – see above	4 – Carrying DG, HS, or MP IMO hazard or pollutant category D	-	4 – Engaged in diving operations
	5 – reserved for future use	-	5 – Engaged in military operations
6 – Passenger ships	6 – reserved for future use	-	6 – Sailing
7 – Cargo ships	7 –reserved for future use	-	7 – Pleasure Craft
8 – Tanker(s)	8 – reserved for future use	-	8 – reserved for future use
9 – Other types of ship	9 – No additional information	-	9 – reserved for future use

DG: Dangerous Goods.
HS: Harmful Substances.
MP: Marine Pollutants.

(*) NOTE – The identifier should be constructed by selecting the appropriate first and second digits.

Type of Position Fixing Device

0 Position Fixing Device - Undefined
1 GPS
2 GLONASS
3 Combined GPS/GLONASS
4 Loran-C
5 Chayka
6 Integrated Navigation System
7 Surveyed
8-15 Position Fixing Device Not Used

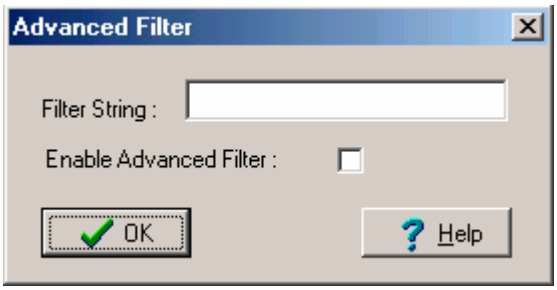
Rate Of Turn AIS

This AIS parameter has a range of +/ - 127, these limits representing turning right (starboard) at 720 deg/min or higher and turning left (port) at 720 deg/min or higher. The AIS ROT value is = 4.733 x SQRT(ROT indicated in degrees per minute).

Other AIS Parameters

You need a knowledge of the NMEA / AIS specification to input them. Those shown are the default values and can be left.

Advanced Filter Menu Item



Enable Filter

Use this checkbox to turn the advanced filter on and off.

Advanced Filter String

Type a unique string here to identify the sentence you wish to select from the incoming data. The string can occur **anywhere** in the sentence so for example you could search for a sentence containing a certain value or position. You can also set the standard filter for the start of the sentence (Also see main tool bar). In which case the filters are used in series and the data is accepted only if both criteria are met.

Reset NMEA History

Clicking this item will **clear** all the sentences you added to the NMEA sentence groups and set them back to the installation **default** settings. You receive a confirmation dialog before the action is performed. This command is provided to enable you to tidy up your sentence library if it gets too big and cumbersome.

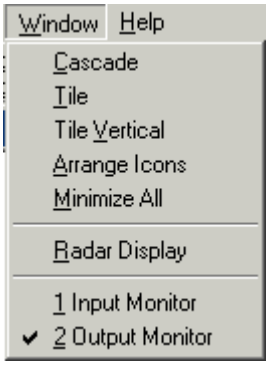
Playback Speed

Playback of log files can be at various speeds: **Slow** - 1 line per second, **Medium** - 10 lines/sec, **Fast** - 100 lines/sec and Single Shot Use the cascading submenu to set the required speed. Default on startup is **slow.**

Playback to NMEA

This checkable menu item determines the output path for data from logfiles during playback. If **checked** the data appears in the **Output Monitor** and is sent to the **com port**. If **not checked** (default) the data appears in the **Output Monitor** and is sent directly to the **Input Monitor** as if it was being received on the com port.

Window Menu



Window menu item,

Window Commands
Standard Window operations. (Tile = Tile Horizontally)

Show Radar Display
Launch the RADAR display window.

Window List
List of all open Windows, the currently selected one having a tick against it.

Help Menu

Help menu item

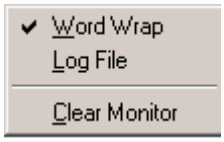
About
Display revision details of this issue of AISsim

Help Contents
Launch the help system contents page for AISsim. There is also a short cut key CTRL F1 and direct **Help** buttons in some of the dialogues.

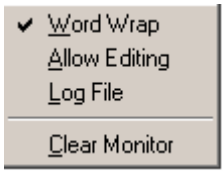
4. Monitors

The two windows that appear on starting AISsim are an **input monitor** and an **output monitor**. The Input monitor produces a list of all sentences that arrive on the COM port (after filtering, if the filters are set). The output monitor lists all simulator output data. *Note that these two MDI windows cannot be closed.* The monitor windows are limited to 300 lines after which they clear and start again. This is to avoid them becoming unmanageably large, however they can be saved continuously in a file by right-clicking in them and selecting "Log File" in the monitor's pop up menu.

Input Popup



Output Popup



If "Log File" is selected the appropriate Log File status "lamp" is lit (see Main Toolbar) and all data appearing in the monitor is recorded in a file named **Input Log.txt** or **Output Log.txt**

Note that you can select "Allow Editing" in the output monitor - this is to allow you to edit track files

AIS Data

If there is a NMEA AIS sentence (or group of up to 3 sentences in the case of Message type 5) **double clicking** on it (or on each one of the group in the correct order), will result in the full text interpretation of the encapsulated AIS data being displayed at the bottom of the window. This applies to both input and output monitors. In addition in the case of the input monitor, if the **Interpret AIS Data** checkbox is checked in the toolbar, then every incoming AIS sentence will be interpreted.

5. NMEA Parser

AISsim uses extended NMEA parser technology first introduced in 1990 with **RECSIM,** ESL's original NMEA simulator. The NMEA parser provides a very flexible way of generating almost any NMEA sentence. There are 5 custom parser strings, each representing a different group of NMEA / AIS sentences, with a programmable repetition rate. Before they are sent they are converted to the actual NMEA/AIS sentences, with the variable field "@" terms replaced by the values of the simulated data terms, specified as follows :

Variable terms

Variable terms are preceded by the character @. (You can copy and paste some of these examples of AIS parser strings into the NMEA config dialog).

AIS encapsulation

@A AIS encapsulated string for messages type 1 - 3, 4, 11 and 5 as specified in the AIS config dialog

e.g. **!AIVDM,1,1,,1,@a,0@x** (complete position report sentence, message type 1)

e.g. **!AIVDM,3,1,6,A,@a,0@X** (first part of a 3 sentence message 5 group, message ID =6, assumes message type 5 selected in dialogue)

@A:n

AIS encapsulated string for messages type n where n is 1, 2, 3, 4 or 5

e,g, **!AIVDM,1,1,,1,@a:4,0@x** (complete repeat position report sentence, message type 4)

(Note: to form a message type 11 which is the same format as type 4, use **@A** and select message type 11 in the AIS config dialog).

@2 Second part of a multi sentence encapsulated string for message type 5.

e.g. **!AIVDM,3,2,6,A,@2,0@X**

@3 Third part of a multi sentence encapsulated string for message type 5.

e.g. **!AIVDM,3,3,6,A,@3,2@X**

(Note that if message 5 is specified in the AIS message config dialog or as the n parameter you must also include sentences structured for the second and third parts of the message as follows :

!AIVDM,3,2,6,A,@2,0@X@L!AIVDM,3,3,6,A,@3,2@X

(Note all the NMEA fields must be correct. In this case after the **!AIVDM,** we have **3** sentences required, sentence **2 of 3** and sentence **3 of 3**, group ID in each case=**6**, channel **A,** **@a** for sentence 1, **@2** for sentence 2 and **@3** for sentence 3. Then **2** for the 2 packing bits required to complete the frame. *It is recommended that you read the NMEA AIS specification to obtain full details of the NMEA sentence structure with encapsulated AIS data. (NMEA 0183*

version 3.00 and NMEA 0183-HS ver 1 also AIS Spec. ITU-R M. 1371-1 / IEC 61993-2)

@**A:5** This is a simpler way of forming a message type 5 which doesn't rely on setting the message type in the AIS config dialog. The whole message 5, consisting of 3 sentences, can be placed in a single NMEA group as follows:
!AIVDM,3,1,6,A,@a:5,0@X@L!AIVDM,3,2,6,A,@2,0@X@L!AIVDM,3,3,6,A,@3,2@X
Also you can add a position report as well (assumes that the message type is set to 1, 2 or 3 in the AIS config dialog) :
!AIVDM,1,1,,1,@a,0@x@L!AIVDM,3,1,6,A,@a:5,0@X@L!AIVDM,3,2,6,A,@2,0@X@L!AIVDM,3,3,6,A,@3,2@X
(Note the @L between the sentences to generate the CR/LFs).

Standard NMEA fields

@**T** Time in the format:
HHMMSS
(Note decimal secs can be added if required as a literal or random digits e.g. @t.00 or @t.@r@r)

@**D** Date in the format:
DDMMYY

@**D:** Date in the long format:
DD,MM,YYYY (for ZDA sentence)

@**P** Position in Lat/Long e.g.
50.35.23,N,001.56.45,W
(default is 2 decimal places of mins)

@**P:n** e.g. @P:3 sets the output format to three decimal places of minutes.
(Max range of n is 0-9. Standard NMEA uses 2-4)

@**K** Speed over the ground in Kilometres / Hour e.g.
7.60

@**S** Speed over the ground in knots e.g.
5.00

@**C** Course over the ground in deg. T eg.
315.0

@**M** Course over the ground in deg. M eg.
319.8
(Note this adds a fixed variation of 4.75 deg W)

@R Random digit in the range 0-9 e.g. 7
Use to create variable speed, heading
etc. Adds realism! See also Random Errors.

@N Value of a programmable counter. This is useful for simulating continuously changing quantities e.g. range or bearing. For realism use **@N.@R** - this will generate the value with a random decimal place e.g. 25.9.

@N:< Set Counter to 0

@N:> Set counter to 360

@N:+ Increment counter

@N:- Decrement counter
By calling increment every second as part of a suitable NMEA group you can simulate value which increases by one unit per second.

@L Insert a CR/LF pair into the string.
This enables multiple sentences to
be created within one custom string.

@@ Insert an @ character into the output
(if this reserved character required)

@X Checksum - format *hh e.g. *5F
This inserts *hh (where hh are the hex values of the MS and LS 4 bits of the XOR of all characters between the $ and the *) It must only be placed at the end of the sentence!
Terms which have commas and letters within them, e.g. position then the commas are supplied, all external commas and letters are left to the user to supply as literals.

The best illustration of the structure of a sentence is to make one. In this example we want to make a cross track error sentence with a random error.

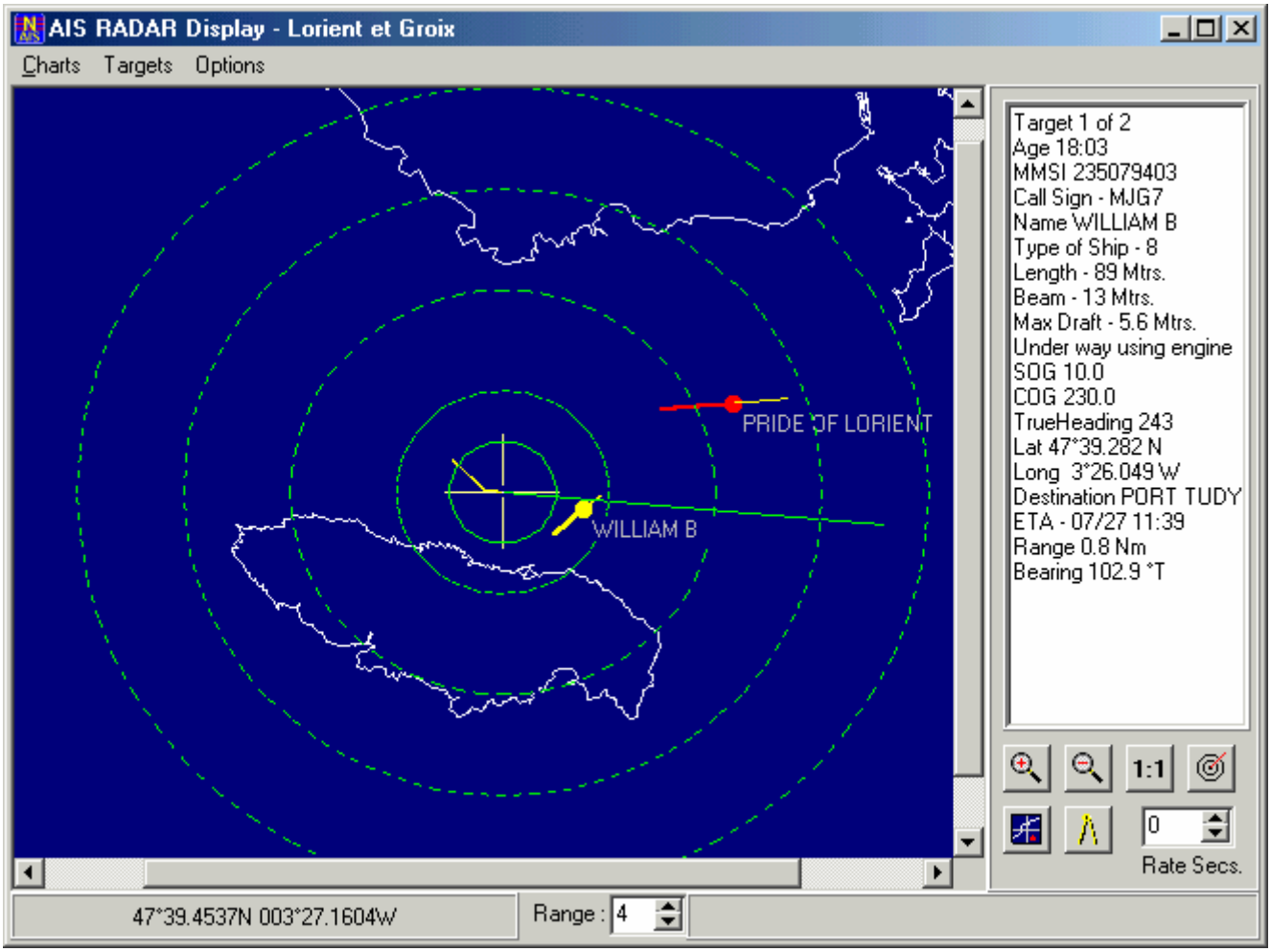
$GPXTE,A,A,0.@R,L,N

If you set this up as say, NMEA 1 and give it a repetition rate of say, 2 secs. you can start the simulator and watch the effect in the output monitor. If you use the link-back connector to feed the output back into the input of the com port and turn the **autopilot** on you can see the effect on the simulator steering. To make it more interesting also insert the following sentence as NMEA 2, also with a 2 sec rep rate:

$GPGGA,@t,@p:3,2,07,1.2,10.7,M,48.8,M,7,0001@x

If you launch the RADAR display this will now show you the course the simulator is steering as well as showing how easy it is to make NMEA sentences.

6. Radar Display



Radar Window Display Features

Own Ship

Normally at the center of the screen and the Range Rings. The track and position of your vessel shown with a large upright yellow cross (the graphics cursor), a green heading line.

Nearest Target

This is shown as a yellow "lollipop" if **Highlight Nearest** is selected in the **Targets** menu. The position is shown by the disc and the "stick" shows the direction of travel. with the length of the stick representing the speed. The range and bearing from your position is displayed at the bottom of the Target Information panel.

Targets

If not selected i.e. **highlighted,** targets are shown as **red** "lollipops" The position is shown by the disc and the "stick" shows the direction of travel. with the length of the stick representing the speed. Targets can be selected by

double clicking on them. They are then displayed highlighted in **yellow** and the range and bearing from your position is displayed at the bottom of the Target Information panel. However if **Highlight Nearest** is set in the **Targets** menu then the highlighting will return to the nearest target when the RADAR display is updated.

Panels and Buttons

Target Information

This panel, to the right of the chart, displays the detailed AIS data for the selected target. The information is a combination of Position Report and Ship Data if available. The panel has a popup menu to set word wrap if required to show longer names and destinations.

Your Position

This panel, below the chart, normally displays the position of your vessel in Lat / Long. This is at the centre of the screen and the range rings. Also it is used to display the position of the graphics cursor when you click elsewhere in the RADAR display e.g. when using the Measure Mode. If you move the graphics cursor it always returns to "Your Position" when the RADAR display updates again if plotting your track.

Range Rings

This box enables you to select the range rings to display as follows:

- 2 / 4 Rings at 0.5, 1, 2, 3 and 4 Nm
- 6 / 8 Rings at 1, 2, 4, 6 and 8 Nm
- 10 / 12 Rings at 2, 4, 6, 8, 10 and 12 Nm
- 14 / 16 Rings at 4, 8, 12, 16 and 20 Nm

Select 0 to turn the rings off completely.

Auto Load Chart

Pressing this button will automatically load the nearest chart to the current cursor position. The existing chart will be replaced, (regardless of the **Chart Append Mode** setting in the **Charts** menu). This provides a simple way of loading charts in conjunction with the **Available Charts** command in the **Charts** menu. Click inside the required chart outline, near the centre and press the Auto Load button. The selected chart will be loaded. Note that if the Auto-load Charts option is set in the charts menu The nearest chart to your ships position will automatically be loaded when the RADAR display updates.

Note that **AISsim** uses the same vector chart files as **Portable Navigator** so, if you also have Portable Navigator, it is possible to copy charts from PNAV to the local AISsim\Charts directory.

Measure Mode

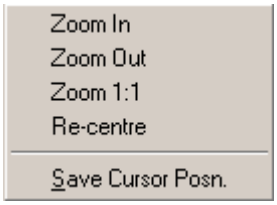
Press this button to select Measure Mode, it stays in to indicate that Measure Mode is on. The position of the cursor at the time the button was pressed is the target point for measurement. Now when the cursor is dragged or placed somewhere else the status line at the bottom of the window shows the distance in the selected units and the bearing to and from the target point Release the mouse, if dragging and a construction line will be drawn from the target point to the cursor position. To check a clearance, for example, place the target point on the feature of interest. As fixes are taken the display will show the range and bearing of the selected feature.

Refresh Rate

This enables you to change the update rate of the RADAR display between 1 sec and 60 secs. The default rate on starting **AISsim** is 5 secs.

Radar Display Popup Menu

Right Click anywhere in the chart area to launch the popup menu:



Zoom in/out :

These two items zoom the RADAR display in (+) or out (-) by 2x / 0.5x when clicked. These functions are duplicated by buttons in the RADAR window.

Zoom 1:1

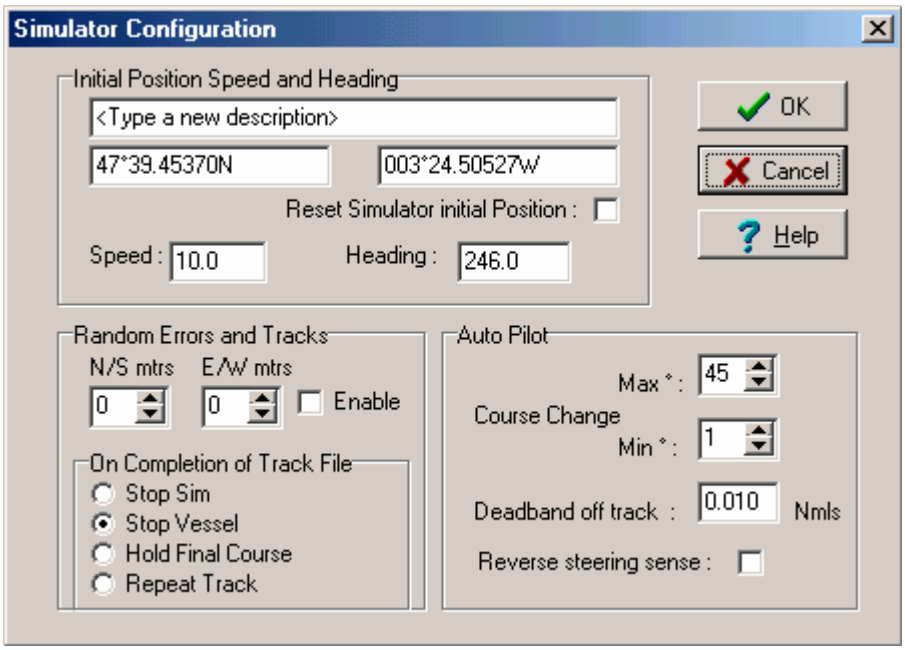
This item restores the display to the full chart. This function is duplicated by a button in the RADAR window.

ReCentre

This item redraws the RADAR display at the present zoom factor, centered at the current cursor position. This function is also duplicated in the RADAR window.

Graphical Save Position

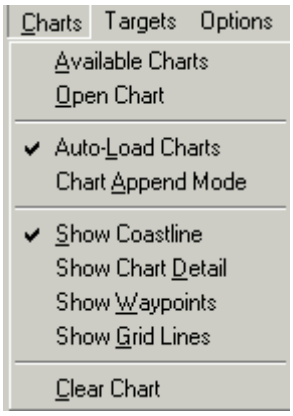
Clicking this popup menu item automatically transfers the current graphic cursor position to, and launches the **Simulator Configuration Dialogue** e.g.:



Type a new description, if required, and check the reset simulator initial position box to move the starting point of the simulator. This is useful for setting up simulation scenarios before saving a complete named config file with NMEA and AIS sentences already configured.

7. Radar Display Menu items

Charts Menu



Available Charts

Draw the boundaries of all the available charts in the current display if they are visible in the context of the current chart. (*You may need to zoom out first*).

Open Chart

Open a Portable Navigator chart file in the .\Charts directory. Note that if you open an additional chart file depending on the setting of the chart append mode in this menu, it will either replace the existing chart or be appended to the one already open, up to the memory limit of the "Chart Store" (5400 points), also the waypoint file associated with the chart will be appended to the "Waypoint Store" up to a maximum of 300 waypoints.

Auto Load Charts Mode

When this item is checked "Auto Load" the chart nearest to the current position when plotting **Own Position** or **Nearest Target** in the RADAR Display (see also Main Toolbar Autoload button). Note that if a detailed chart is open and the position plotted is a long way off e.g. the other side of the world, then it is necessary to manually load the world chart before the autoload function will operate correctly.

Chart Append Mode

Enable / Disable "Chart Append Mode" Default is disabled i.e. replace existing chart when loading a new chart. If this item is **checked** then the selected chart will be **appended** to the current chart, up the the limit of 5400 chart points and 300 waypoints

Show Chart Items

This group of check items turn chart features On or Off The Default is "Off" except the for the Coastline. When "Graticule" is checked the view is overlayed with an automatic measurement grid in the selected units. It's size depends on the zoom factor. To find out what this is, "hover" the mouse over

the side menu panel. The Grid size will be displayed as a floating hint at the bottom of the side bar panel..

Clear Chart

Click to delete the current chart data from the radar display.

Targets Menu

Highlight Nearest

When this item is checked the nearest **Target** to your own position is displayed highlighted (**yellow** lollipop) and the Target Information is displayed in the side panel. **Note** that this menu item is disabled until there is at least one target available and is always checked when disabled.

Show Name / MMSI

This checkable menu item causes the **name** of the target vessel, (if available), and the **MMSI** number to be displayed on the RADAR display next to the **Target.** The MMSI number is only shown if the **Show MMSI** item is also checked in the menu. This menu item has a checkable cascading sub menu to select:

- On All
- On Selected
- On None

The default is "**On Selected**".

Auto Remove

Targets are timed from when the first appear and the timer is reset if they are subsequently updated. They can be automatically removed if they are not updated within a certain time. This menu item has a cascading submenu to select this removal time limit:

- Never
- After 15 Mins
- After 10 Mins
- After 5 Mins

The default setting on starting AISsim is 15 Mins.

Lollipop Size

Check this item to display the targets with larger icons.

Vessel Plan

This feature allows the plan profile of the selected vessel, from the data in message 5, to be displayed on the chart. Note this is only true if you have zoomed in far enough for the size of the vessel to be significant. The orientation of the vessel plan is, by default, the AIS - **True Heading**. However there is a cascading sub-menu to enable the selection of AIS - **COG** as an altenative. **Note** if the value of True Heading is 511 i.e. not available, AIS-COG is selected automatically when displaying the target.

Clear All Targets

Click this item to remove all the existing Targets from the RADAR display.

Show Own Track / Track disposal method

When **Show own GPS Track** is checked, this causes the position of your vessel and its recent track to be displayed and the display to be centred on your position. The last **98** track points are shown. When **Show own GPS Track** is unchecked the display is centred on the selected target.
Check **Intelligent Log Disposal** in this menu (the default), to skeletonise the oldest part of the track by progressively overwriting every alternate fix when the track log is full. Detail is maintained for the most recent part of the log, while the earlier fixes become more widely spaced. Un-Check **Intelligent Log Disposal** to run the track log / display in **FIFO** mode.

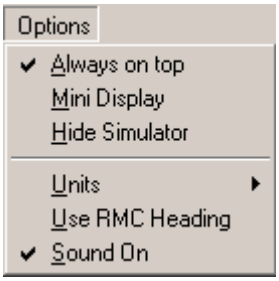
Show Own Heading

Check this item to draw the **heading line** of your own vessel on the screen. Default is **checked.**

Clear Own Track

Delete all stored track points in your own vessel's track log.

Options Menu



Always On Top

When Checked (default), ensures that the **RADAR** display window is on top of the **Simulator** window.

Mini Display

Shrink **RADAR** display and omit tools side and bottom panels. Useful when using in conjunction with **Portable Navigator** to provide a simultaneous RADAR window.

Hide Simulator

Check to render the simulator window **invisible.** When checked, opening and closing the **RADAR** window in effect toggles between the **Simulator** and **RADAR** window. The simulator still runs however **note** that if you close the RADAR window, targets are no longer added to it. **If you want the RADAR window to continue running, minimise it, don't close it !**

Units

Cascading sub-menu to select **Nm** or **Km.** (Default on starting AISsim Nm **Nautical Miles**)

Use RMC Heading

This item, when checked, causes the **heading line** to be drawn with the heading (true) from the GPS **RMC** sentence (if available). Default is "not checked" which means - work out heading from **subsequent** GPS positions.

Sound On/Off

Check to sound a "Ping" when a **new target** is added to the **RADAR** screen. Default is checked

8. Track Files

Use the **File Open** cascading menu to select a Track file. The format of these files can be seen in the examples provided. Track files are simple text files with the extension **.TRK**, containing a series of distances in Nm and headings in deg T, one pair per line. They can use either absolute or relative headings. If a line starts with the character R, the heading is taken as relative to the current heading, otherwise it is taken as absolute.

Track files can contain, remarks which are ignored, to remind you of their function If a line starts with * (asterisk) it is regarded as a remark. Some examples are provided. Track files can be any length. To **STOP** a track file executing, click on **Stop Track File** in the File menu.

Selecting a track disables the normal Run/Stop commands and the Autopilot. Execution, the track then starts immediately from the current position, at the current speed (and heading if a relative track). When the track is complete, i.e the end of the track file is reached, the next action depends on the setting in the **Simulator** Config dialog, (see page 10). Note that you can also use Random Errors with track files!

On Completion of Track File

This section of the Simulator Config Dialog enables you to select the action required when the end of the track file has been reached:

- Stop Simulator - Stop generating Sentences
- Stop Vessel - Set speed to zero
- Hold Final Course - Hold final track file heading
- Repeat Track - Start the track from beginning

The setting is not saved. The default on start-up is "**Stop Vessel**".

Tracks are relative to the current position and can be started at any time so, for example, if you set the Simulator Mode to "Repeat Track" and select CIRCLE1R.TRK, the simulator will immediately start "steaming" in a circle to port.

It is recommended that you use the AISsim built in editor to prepare track files. But you can use any text editor e.g. NotePad

Track File Format

Rules for track files are very simple. Each data line in the file must contains one data pair consisting of a distance (Nm), and heading (DegT) , separated by spaces and ending with CR LF. This represents one leg of the track. On reading each line, the simulator continues in the direction specified, at its current speed until it has covered the distance specified. It then reads the next line and so on.

Lines starting with the letter R (upper or lower case) before the distance (no space), are treated as containing a relative heading. Lines starting with just the distance are treated as containing absolute headings. Relative and absolute headings can be mixed in a file, but take care, as this can be confusing!

Lines starting with * ,(asterisk), are ignored, so you can use * to denote a remark. Remarks are useful to remind yourself what a track file does! All other lines containing text and numeric data that does not meet these simple format rules are generally ignored and should not cause any errors.

If not using the built in track file editor, it is recommended that you use a simple text editor e.g. WINDOWS **Notepad** to create and modify track files. A few examples of both absolute and relative tracks are included on the CD.

Examples

1. BOX1REL.TRK
* Box to port with Side of 1 nm relative to present course
* The present course is treated as if it is 000deg
r1 0
r1 270
r1 270
r1 270
* i.e just keep turning 90deg to port
* Set mode to "hold final course" to resume previous course.

2. CIRCLE1R.TRK
* See how simple a circle is in relative notation !
r0.1 350
* Set mode to repeat and the simulator will steer
* a continuous series of tracks 0.1 Nm long and
* at 10 degree increments turning to port

9. NMEA DDE Server

AISsim is also a **DDE** server for use with other applications that require position information such as **Portable Navigator**. The properties of the server are as follows:

- Application Name AISsim
- Application File aissim.exe
- Topic RADAR
- Item POSITION

To use AISsim as an NMEA server set the DDE client properties in the receiving application as shown above. The NMEA GGA and RMC sentences that are being received on the COM port by AISsim are then served to DDE clients as they become available. This enables AISsim to be used instead of NMEApro with Portable Navigator to provide a simultaneous AIS Radar display.