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NavMonPc

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User's Guide

Version 1.10, September 12, 2011

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About NavMonPc

NavMonPc is a Windows program for the capture, display, and playback of NMEA-0183 data. The user interface is optimized to run on a low-power, small-format "netbook" style of computer, but it will operate on any Windows-compatible machine. It is not intended to replace a chartplotter -- NavMonPc does not display standard navigational charts -- but instead this program is designed to supplement your chartplotter and provides additional features and convenient access to important navsystem data. NavMonPc features include:

- Dial display of critical parameters and conditions
- AIS (Automatic Identification System) decoding and target display, including flexible proximity and approach alarms
- Enhanced AIS performance using *Rapid*AIS
- Anchor-watch alarm
- Depth Alarms
- Course, Heading, Speed, Wind alarms
- Man Overboard alarm
- Strip-chart style displays of course and speed, windspeed and direction, water depth and temperature
- Concise on-screen log display
- Logging to file
- Flexible filtering and routing of input data
- Multiple RS-232 serial interfaces, and TCP/IP network interface
- Multiple "Virtual serial port" outputs of bridged / routed data for use by other programs.

NavMonPc has been tested with the Windows-XP, Vista, and Windows 7 operating systems.

Disclaimer and Warning

NavMonPc is a work in progress, and almost certainly contains bugs, errors, and omissions. It may or may not be useful to you. I make no promises that it will not cause your computer to explode, but if it does, be assured that it was accidental and I am very sorry. However, I won't be sorry enough to pay for any damages: direct, incidental, or imaginary.

NavMonPc is the sole property of Paul M. Elliott, and is offered on a limited basis free of charge for non-commercial use.

I reserve the right to change the terms of this offer at any time.

NavMonPc is not a substitute for proper navigation and seamanship. I am not responsible for any damages caused by the use (or mis-use) of NavMonPc.

By installing and/or running NavMonPc you understand and agree to the above disclaimer and warnings.

Installing the Program
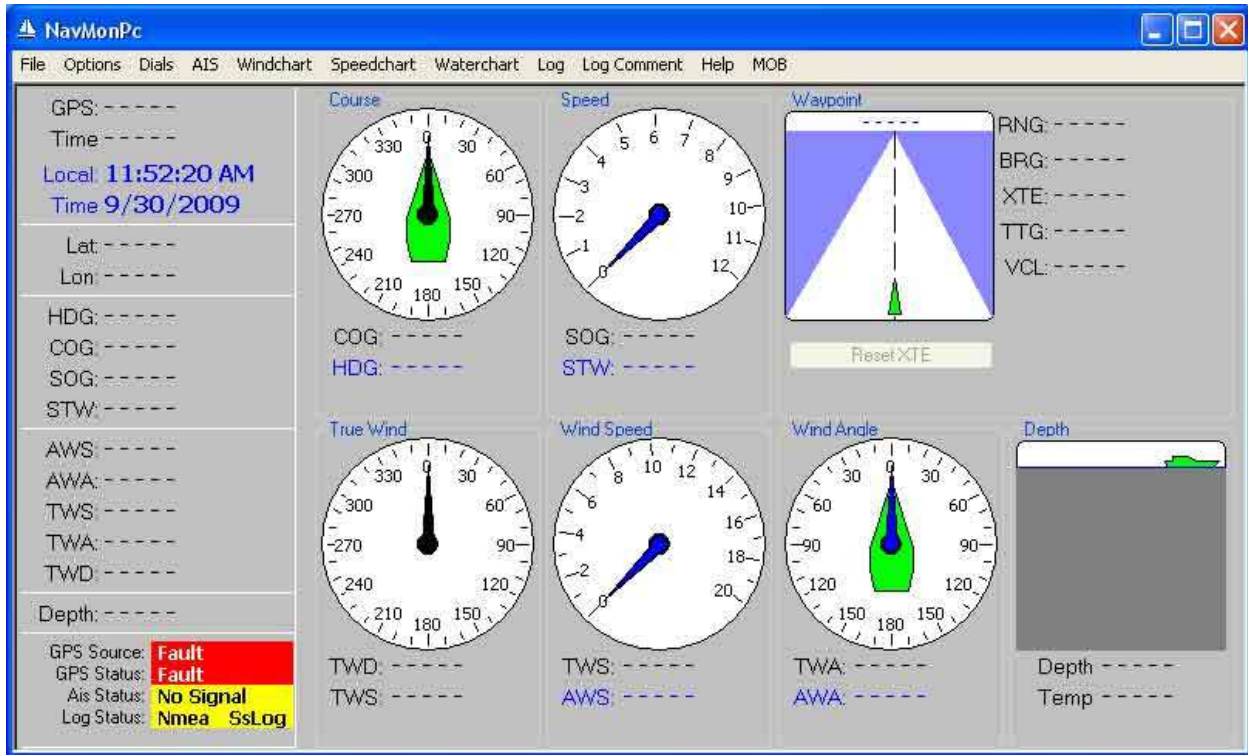
The NavMonPc installation file can be found here: http://www.navmonpc.com/downloads.html. Download and run the latest version (unless you specifically want to use a previous version). The install program will load several programs and files. For a full list of these files, see the **Technical Details** section of this document.

The installation starts with a typical setup screen:

Proceed with the installation as usual.

Before the installer finishes, you will be asked if you want to want to run `SerialToolsXPRunTime`, which installs drivers for the serial port interfaces:
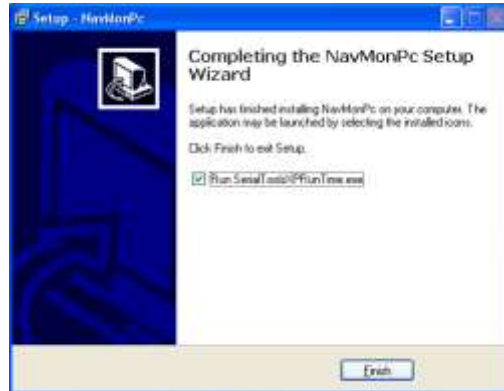
If this is the first time NavMonPc has been installed on this computer, continue and run the program. If NavMonPc has been previously installed you may opt to "un-check" the box and not run `SerialToolsXPRunTime` (it only needs to be run once).

Configuration

When NavMonPc first runs, you will see the following screen:
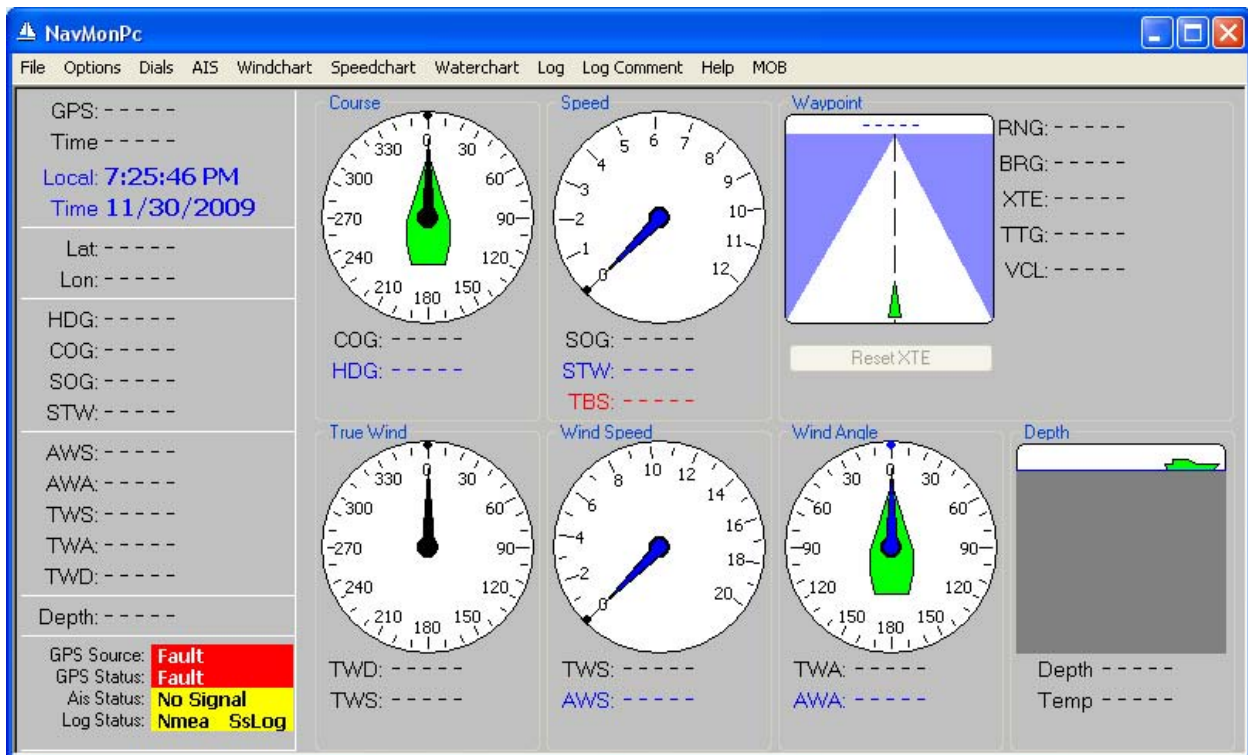
Initial NavMonPc Screen

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Note that with the exception of the "Local Time" field (which actually displays the computer time), all fields contain "- - - - -". This indicates that there is no valid data available for these fields. Great pains have been taken in NavMonPc to indicate when there is valid data and when there is not. All data sources are constantly tested for "freshness", and if any data becomes more than ten seconds old it is declared to be invalid. This is done because old data can be more dangerous than no data at all.

By default, NavMonPc displays all direction and heading information in True (not magnetic), and all units in English (feet, nautical miles, fathoms). These settings can be changed in the **General Options** window.

The next step is to set up your data sources.   This is done through the "File / Connections" screens:

Connections
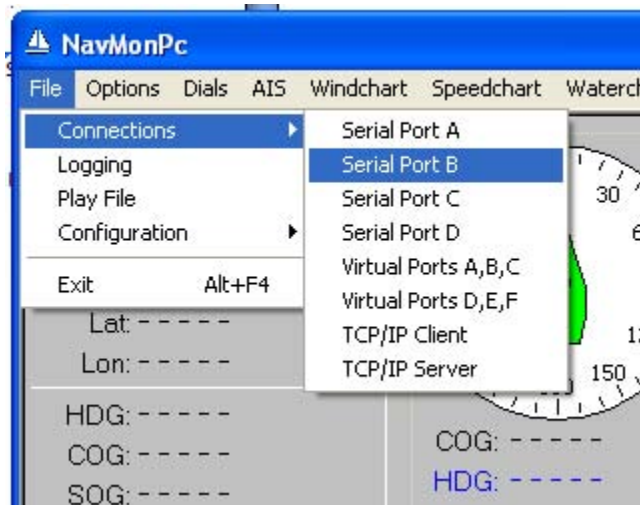
These screens let you configure the serial ports, the virtual serial ports, the TCP/IP (network) client, and the TCP/IP server.

In most cases, the NMEA data used by NavMonPc will be received over a physical RS232 or RS422 (NMEA standard) serial port.

Serial Ports
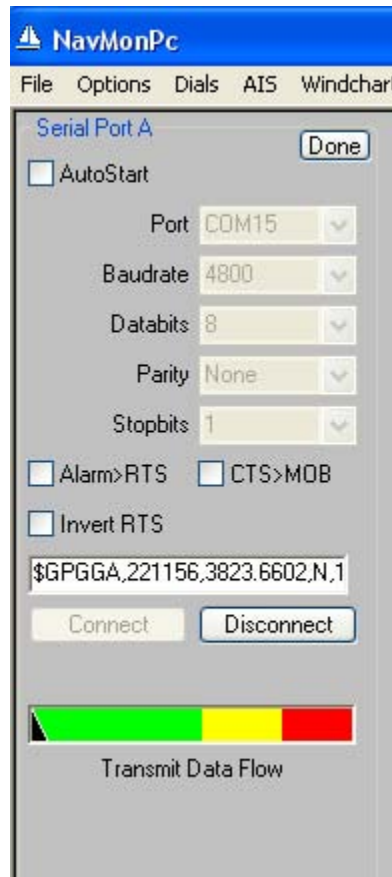
NavMonPc provides interfaces to up to four serial ports. Here you can configure the port number, the baud rate, the number of data bits, the parity, and the number of stop bits. The typical settings are:

- Port – COM1 through Com15 (will be determined by the computer or adaptor)
- Baud Rate – 4800 for most NMEA connections, or 38400 for AIS and/or multiplexed connections.
- Data Bits – 8
- Parity – None
- Stop Bits – 1

An **Autostart** checkbox is provided, which when checked will cause the serial port to automatically connect when the program starts, using the current settings. If the specified port does not exist (due to a hardware change, for example), the connection will not be made.

The **Connect** and **Disconnect** buttons start and stop the serial connection.

Just above these buttons there is a text window that shows the received data. This is an easy way to see if the serial port is operating properly.

At the bottom of the Serial Port window is a **Transmit Data Flow** indicator. In addition to receiving serial data, it is possible to configure NavMonPc to send NMEA data out over a serial port (see the NMEA Routing section of this document for more on this). This indicator shows the average amount of data being sent to the serial port, relative to the selected Baud Rate. If the pointer moves into the red zone, the data is being queued up for transmit faster than the serial port can send it. Occasional visits to the red zone will merely cause data to be buffered, but too much data will eventually overflow and be lost.
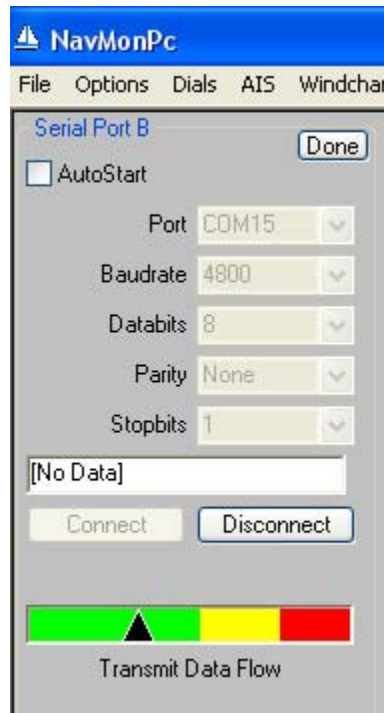
The **Transmit Data Flow** indicator operates whether the Serial Port is connected or not. Note that it is quite easy to send too much data to a port, especially if there are multiple input ports all configured to echo data out a single serial port. **NMEA Routing** can be used to reduce the transmit data flow by allowing you to select which specific NMEA sentences will be sent.

Port A Alarms

For Serial Port A only, there are three options used for alarm inputs and outputs, which can be connected to this port's "handshake" pins:

- Alarm > RTS – When a MOB or General Alarm occurs, NavMonPc can drive the RTS pin high. This signal can be used to drive an external alarm buzzer (or similar annunciator).
- Invert RTS – This causes the alarm to drive the RTS pin low.
- CTS > MOB – A high level on the CTS pin will trigger NavMOnPc's MOB alarm. This pin can be connected to a pushbutton in the cockpit, wired to put +12V on this pin when the button is pressed.

By default, the Serial Ports are configured to receive, and not send NMEA. This can be changed with **NMEA Routing.**

Virtual Serial Ports
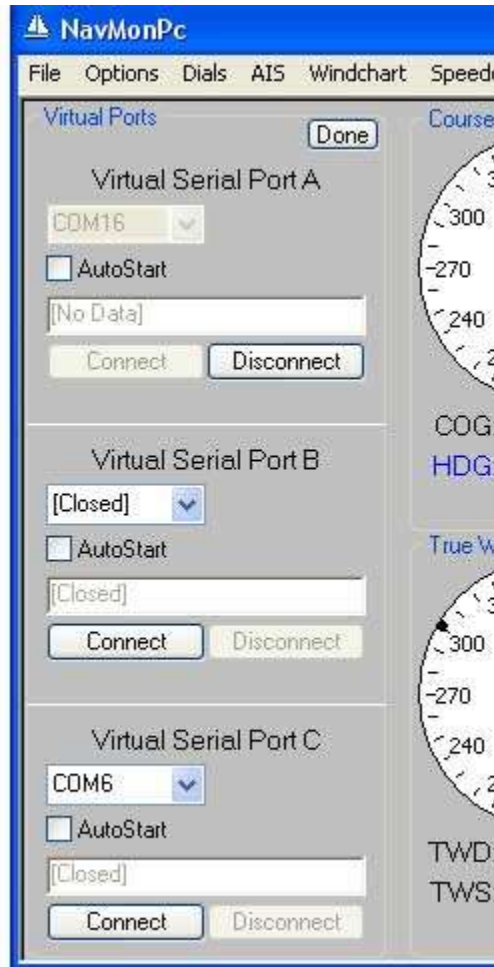
Virtual Serial Ports are used to send and receive data between NavMonPc and other programs. Many programs are designed to accept NMEA data from a serial port, but provide no method of sharing this data with other programs. One solution is to connect multiple serial ports to a single data source, but this method is hardly elegant. NavMonPc can perform this NMEA data distribution by creating up to three "virtual" serial ports. These are not physical ports, but programs can connect to them just as they would a physical serial port.

To configure the Virtual serial Ports, it is only necessary to choose an unused port number. NavMonPc provides a list of these unused port numbers which can be selected. There is no need to program baud rate, etc. The Virtual Serial Port will interface to other programs regardless of their port settings.

There is an **AutoStart** option for each Virtual Serial Port.

By default, the Virtual Serial Ports are configured to send all NMEA data received by NavMonPc. This can be changed with **NMEA Routing.**

TCP/IP (Network) Client
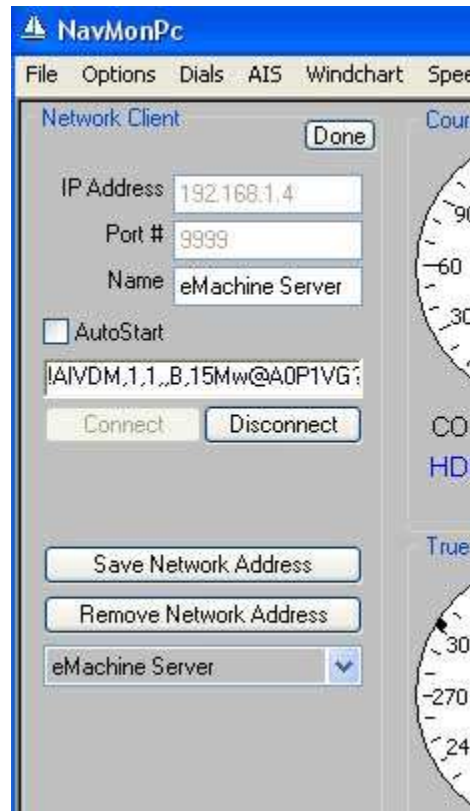
The TCP/IP Client provides a *receive-only* data connection to a TCP/IP server. This server can be a remote internet NMEA server, or a server provided by another program.

Required fields are the **IP Address** (using dot-notation), and **Port #**. The **Name** field is optional, but is useful when saving the network address. To connect to the server, click the **Connect** button.

It is possible to save a network address/port/name to the NavMonPc configuration file. These saved addresses are available for later use through the drop-down selector at the bottom of this screen. If a new address is entered or selected, it will not be used until any current connection is disconnected.

There is an **AutoStart** option for the TCP/IP Client.

The TCP/IP client is configured to receive, and not send NMEA messages. This cannot be changed.

TCP/IP (Network) Server
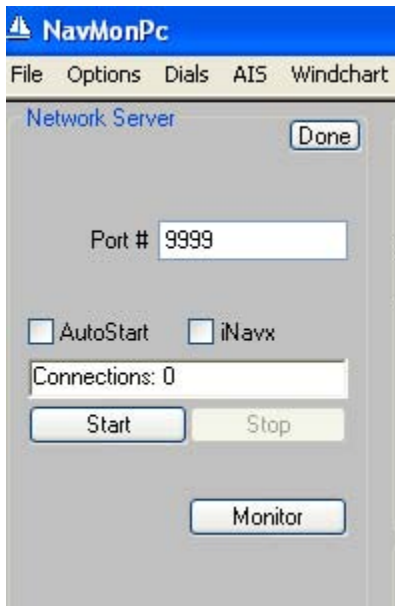
The TCP/IP Server provides up to ten *transmit-only* data connections to external clients. These clients can be remote, or clients provided by other programs.

The only required field is **Port #**. With certain exceptions, this can be most any arbitrary number. When in doubt, just use the default "9999". To start to the server, click the **Start** button.

There is an **AutoStart** option for the TCP/IP Server.

The **iNavx** checkbox is a work-around for a flaw in the server where it thinks that an iPhone / iPad / iPod TCP/IP connection is being continuously dropped (iNavx is an navigation app for the iPhamily). When checked, NavMonPc will not test for disconnected server connections. This isn't a great solution, but it does work.

The TCP/IP Server is configured to send, and not receive NMEA messages. This cannot be changed.

In order for other programs to connect to the TCP/IP server, they must have the IP address of the server. This will be the IP address of the computer running NavMonPc. You can find this by opening the Windows "Command Prompt" and running the "ipconfig" program:

You can also find your computer's IP address on the status window for your Local Area Connection (start with "My Network Places"):
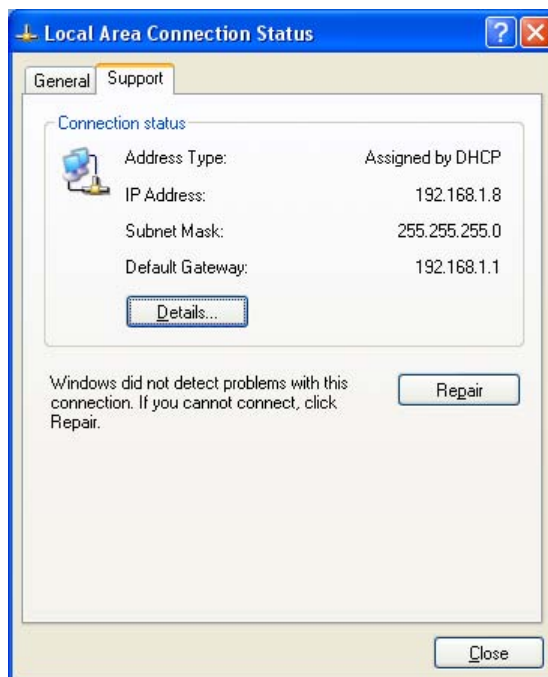
In the above examples, the IP address is 192.168.1.8

If you are connecting to the TCP/IP server from another program on the same computer, you can use the "Localhost" address: **127.0.0.1**

Dials
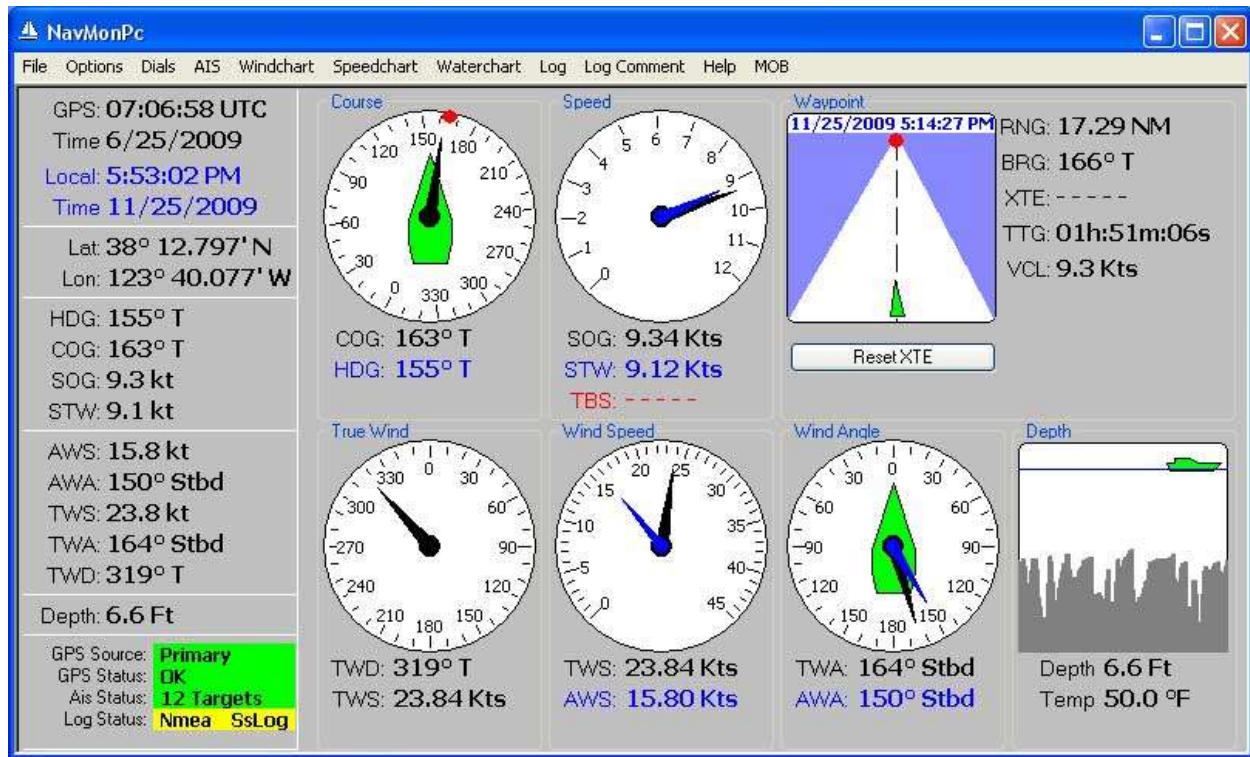
NavMonPc 's main "dashboard" is the **Dials** screen. These dials are quite flexible, having options for scaling, min/max history, and alarms. The dials are:

- **Course**: Shows Course Over Ground, Heading, and bearing to Waypoint (the red dot)
- **Speed**: Speed Over Ground, Speed Through the Water, and if available,Target Boat Speed.
- **True Wind**: True Wind Direction and True Wind Speed
- **Wind Speed**: True Wind Speed and Apparent Wind Speed
- **Wind Angle**: True Wind Angle and Apparent Wind Angle
- **Waypoint**: Range, Bearing, Crosstrack Error, Time To Go, Closing Velocity
- **Depth**: Water depth and temperature

Dial Options
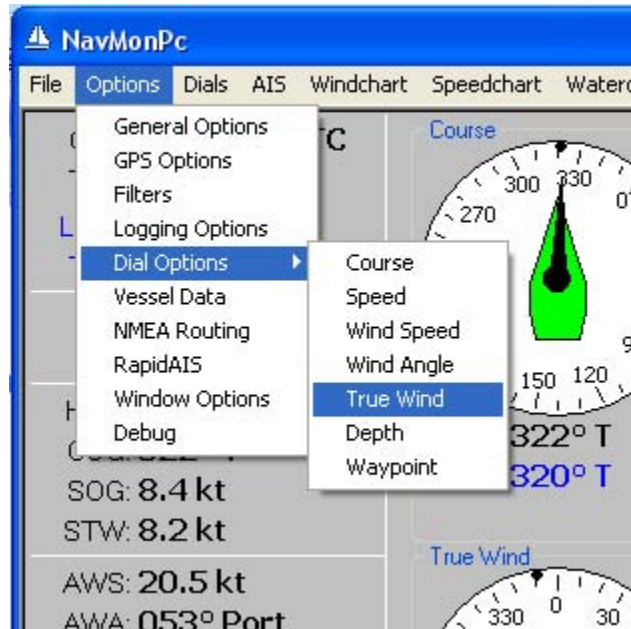
A dial configuration window can be accessed through the "Options / Dial Options / [Dial]" menu, or by just clicking on the dial face. The screen below shows the configuration screens for all dials:
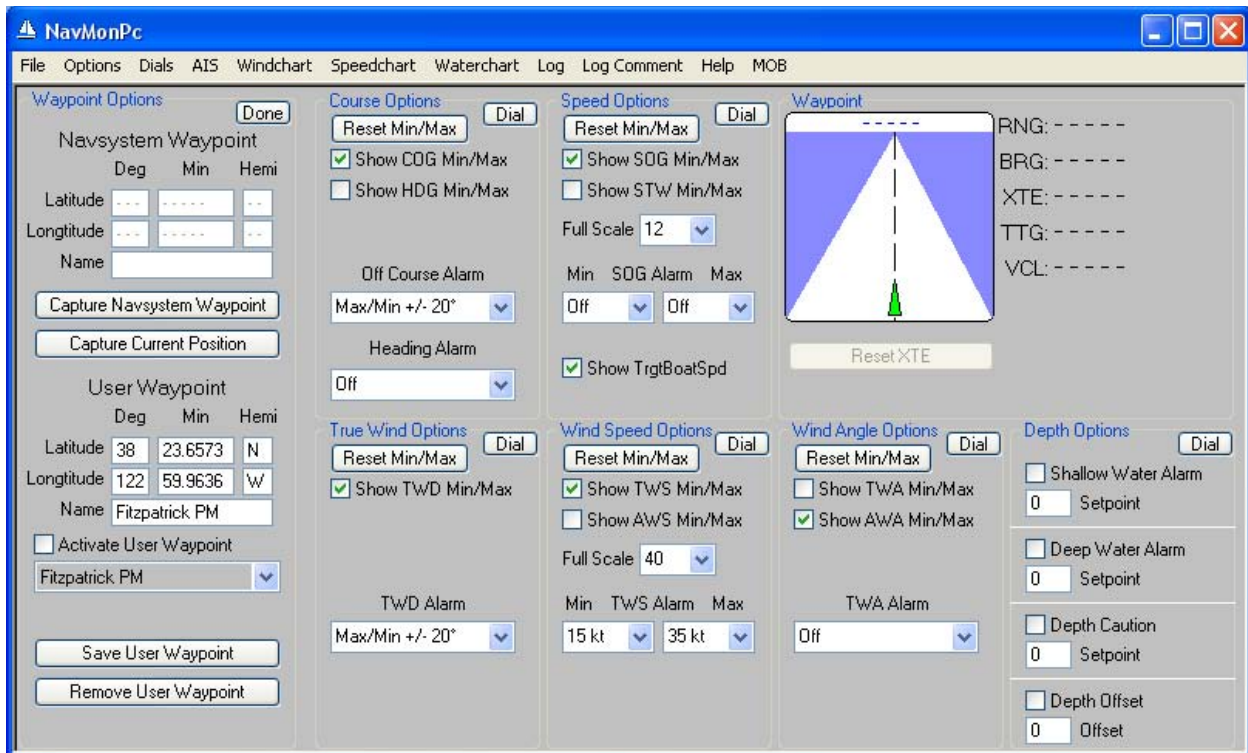
Here you can choose to display Min/Max indicators for various parameters, change the scale of the wind and boat speed dials, and select various alarms. Note that the Waypoint settings are on the leftmost portion of the NavMonPc screen.

Once you are finished configuring a dial's options, click on the **Dial** button to exit the configuration window. The settings above result in the dials below:.
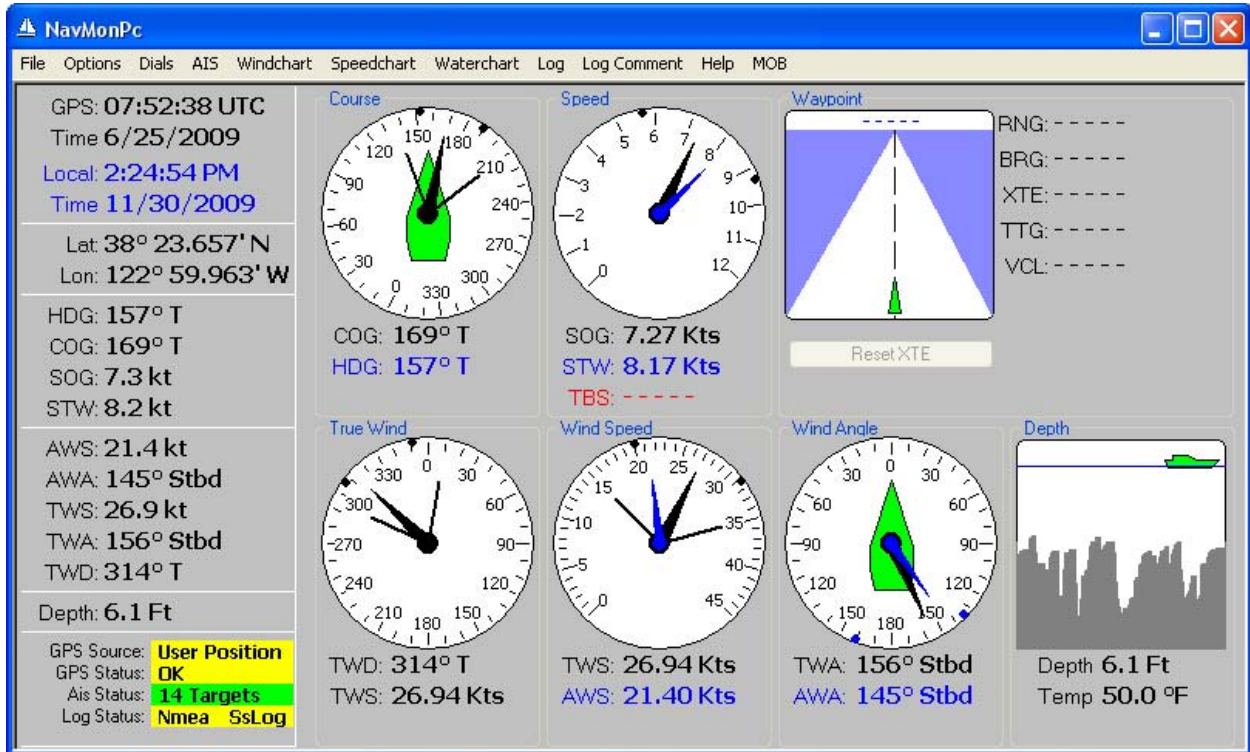
Min/Max Indicators

Most dials have one or two Min/Max indicators available. These show pairs of dots on the dial edge that indicate the minimum and maximum values of the selected parameter(s). Note that the dot color matched the needle/value color.

The Min/Max values are saved when NavMonPc exits and are remembered when NavMonPc starts. You can reset the Min/Max indicators on the Dial configuration window, or simply by positioning the cursor over the dial face and doing a "Control-Click".

Min/Max Alarms
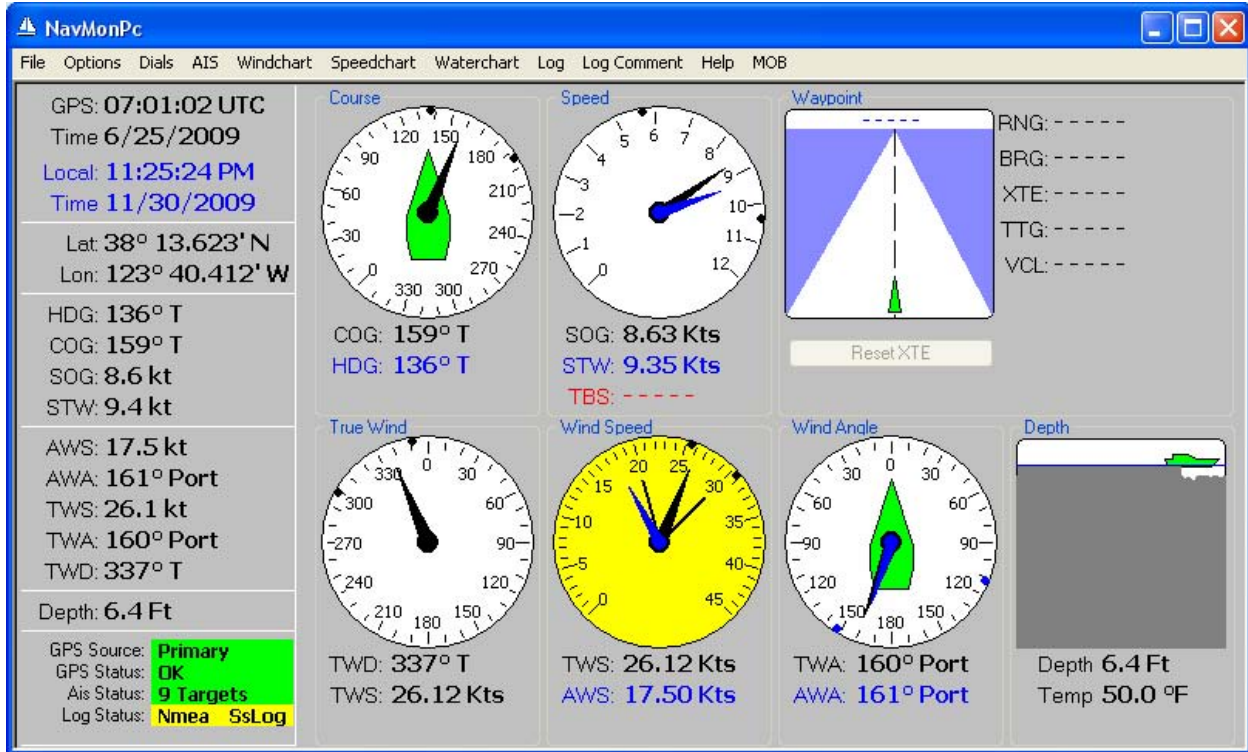
Most dials have settable Min/Max alarms, to alert you when conditions have changed significantly:

- Course
- Boat speed
- Wind direction
- Wind angle
- Wind speed

When an alarm is triggered, NavMonPc will pop up if (it has been hidden), set the Serial Port A alarm output (if enabled), and play an alarm sound over the computer's audio output (if General Alarm sounds are enabled). The appropriate dial face will be painted yellow to help you determine the source of the alarm. To disable the alarm, click on the yellow dial face. If the alarm condition no longer exists the alarm will clear. Otherwise you should reset the alarm controls as appropriate (or put your boat back on course!)

Waypoint

NavMonPc can display waypoint data that comes from your chartplotter (the **Navsystem Waypoint**), or you can create a waypoint with NavMonPc (the **User Waypoint**). To create a User Waypoint, you can capture the current Navsystem Waypoint, or the current Position, or hand-enter the position and name. The User Waypoint can be saved to a list for future use.

By default, the Navsystem Waypoint is displayed, along with any other available waypoint information. To display the User Waypoint, check the **Activate User Waypoint** box. NavMonPc will calculate and display the Great-Circle Range, Bearing, Cross-Track Error, Time To Go, and CLosing Velocity from your current position to the waypoint.

NavMonPc can send this calculated waypoint data to an external autopilot. By enabling the RMB option found on the **NMEA Options** window, NavMonPc will generate the NMEA RMB sentence and send it to the ports specified on the **NMEA Routing** window.

True Wind

This dial shows the direction that the wind is actually coming from, and it's true speed, not the Apparent wind as felt from the deck of your boat.

NavMonPc will display True Wind data as received from the NMEA inputs. If True Wind data is not available, NavMonPc will attempt to calculate True Wind values from available Apparent Wind data. See the Technical Details section of this document for more about True Wind Calculations.

Wind Speed

This dial shows TWS (True Wind Speed) and AWS (Apparent Wind Speed).

Wind Angle

This dial shows TWA (True Wind Angle) and AWA (Apparent Wind Angle).

Depth

The Depth dial has options for:

- Shallow Water alarm: Triggers a General Alarm when the water is too shallow
- Deep Water alarm: Triggers a General Alarm when the water is too deep
- Depth Caution alarm: This causes the Depth Dial to turn yellow when the water is shallower than the Caution setting, but no alarm will be generated.
- Depth Offset field: The Depth Offset is set to zero unless you wish to display something other than depth from the surface (assuming that your depthsounder is calibrated to read depth from the surface).

AIS
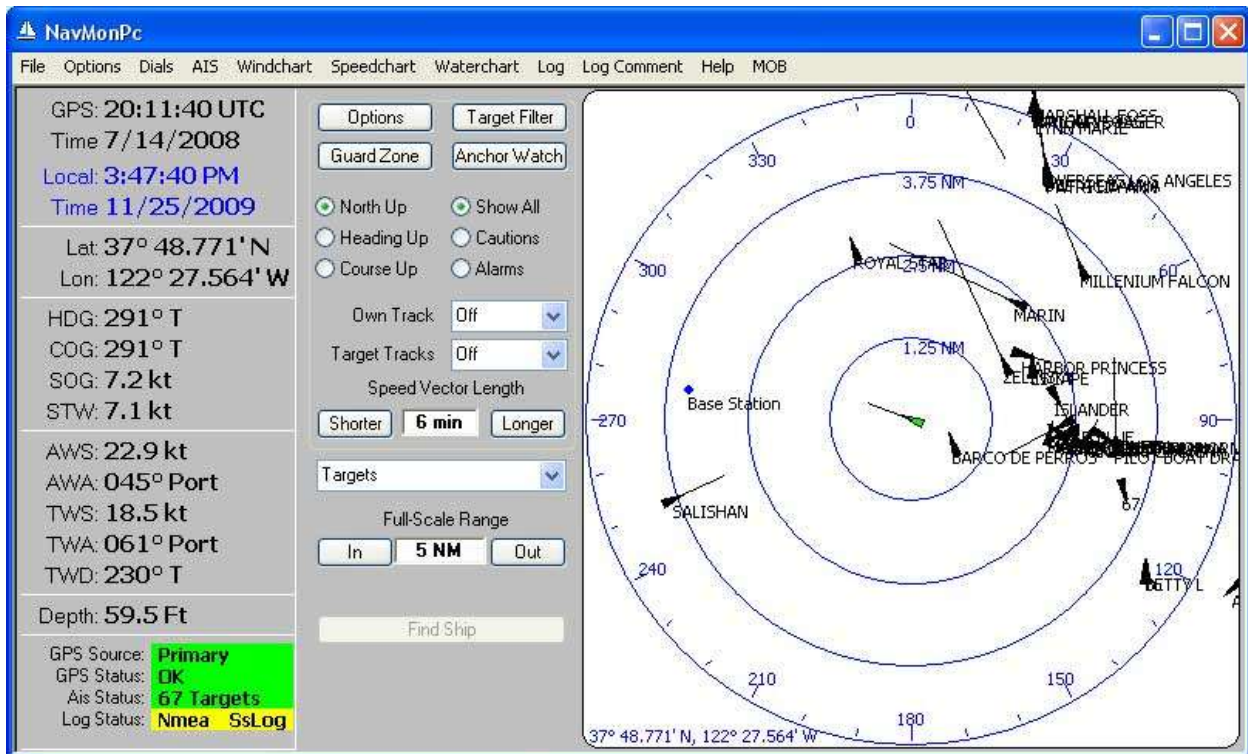
AIS (Automatic Identification System) is a powerful system that is used to show the position, course, speed, and other information about surrounding vessels *that are equipped with an AIS transponder*. To use the AIS display, you must have an AIS receiver or transponder providing NMEA data to NavMonPc. Most large ships are required to have AIS transponders, and some smaller vessels are AIS-equipped as well. However, most small craft, and most military vessels do not have transponders.

Do not assume that all nearby vessels will appear as "targets" on the NavMonPc AIS display, or that AIS data sent by other vessels is 100% accurate. AIS does not replace your traditional methods for safe navigation.

Disclaimers aside, the NavMonPc capabilities give you a very useful tool, increasing your "situational awareness" and providing you with valuable information.

The NavMonPc AIS display is a "radar-like" screen, usually showing your vessel in green at the screen-center, and the surrounding AIS "Targets", overlaid on a set of "range/bearing" circles. There are many ways you can customize this display.

At the lower-left corner of the AIS display is the latitude and longitude of the screen-center. As you move the mouse across the display, the range and bearing of the cursor location (relative to the screen-center) will be displayed in the lower-right corner.

A valuable feature of NavMonPc AIS is the ability to define **Guard Zones**, in which an approaching vessel will trigger an alarm when it gets too close, or meets other conditions.

When a target (vessel) first appears on the AIS screen, due to the nature of the AIS message protocol, it will not yet have sent its name. The name will be during the next six or twelve minutes (if you have a single-channel receiver it may take twelve minutes or more for the name to appear). While waiting for the name to be received, instead the MMSI (an identification number) will be displayed next to the vessel icon.

NavMonPc does provide a neat solution to the "waiting for the name" problem: *Rapid*AIS (patent pending). See the *Rapid*AIS section of this document for more information.

AIS Settings

The most commonly-used settings are available on the main AIS screen. These are:

- Screen Orientation
  - North Up
  - Heading Up
  - Course Up

The standard radar display uses a **Heading-Up** orientation, and all targets are displayed relative to your vessel. This orientation has its merits, but the targets are constantly moving on the screen as your vessel's heading changes. On a small boat in heavy seas, it can be quite difficult to work with a **Heading-Up** display. If you choose to work in this orientation, you may want to experiment with the filtering that NavMonPc provides for heading (and other parameters). Look at the "**Options / Filters**" screen to configure these filters. **Course-Up** is a slightly more stable mode, but I find that I prefer the **North-Up** mode for general use.

- Target Selection
  - Show All
  - Cautions
  - Alarms

When using **Guard Zones**, targets may be assigned a Caution or Alarm status. It may be helpful to display only those targets with Alarm, or Caution and Alarm status. This will clear the screen of all other targets, letting you quickly find the target in question. *Please use this feature with care, as it can hide potentially dangerous targets*.

- Own Track
  - Off
  - 1 Hour
  - 24 Hour

The **Own Track** option displays the one-hour or 24-hour track of your vessel. The one-hour track saves your vessel's position every ten seconds. The 24-hour track positions are saved every five minutes.

- Target Tracks

- o Off
- o All
- o Selected

The **Target Tracks** option shows the track of AIS targets. Either **all** vessels, or the **selected** target, or none (**Off**) can be displayed. The track buffers are fixed-size and they store the most recent AIS dynamic position reports. These dynamic reports are sent at varying rates, depending on the target's speed and rate of turn, so the track time will vary as well. Note that if there are a lot of targets being received, enabling Target Tracks for all of them may create a heavy processing burden and may noticeably slow down your computer.

- Speed Vector Length

All targets display a Speed Vector, indicating the target's course and speed. With this control, you can choose the length of the vector; for example, with a setting of "10 minutes", the vector will extend the distance that the target will travel in ten minutes.

- Full-Scale Range

This control sets the distance scale of the AIS display. With it, you can zoom in to a 100 foot range, and out to a 10,000 mile range (the extremely long ranges are obviously useless when your AIS data source is a receiver on your vessel, but can be handy if you are receiving AIS data over the internet).

You can also press the "+" and "-" keys to zoom in and out.

- Target List

This is a drop-down list of AIS targets. The list is ordered alphabetically, and will reflect the **Target Selection** and **Target Filter** settings, so the list can be de-cluttered with these options.

If you click on one of the listed targets, the **Target Detail** window for that vessel will be displayed.

It is also possible to select a target by clicking on it.

- Find Ship

In normal use, your own vessel will be at the center of the screen. However, it is possible to center the screen elsewhere, by double-clicking on the screen at the desired center-location. The **Find Ship** button will re-center and keep the screen at your vessel's current position.

Pressing the "Home" key serves the same function as clicking the **Find Ship** button.

You can also press the Left/Right/Up/Down arrow keys to center the AIS display at a new location.

Options
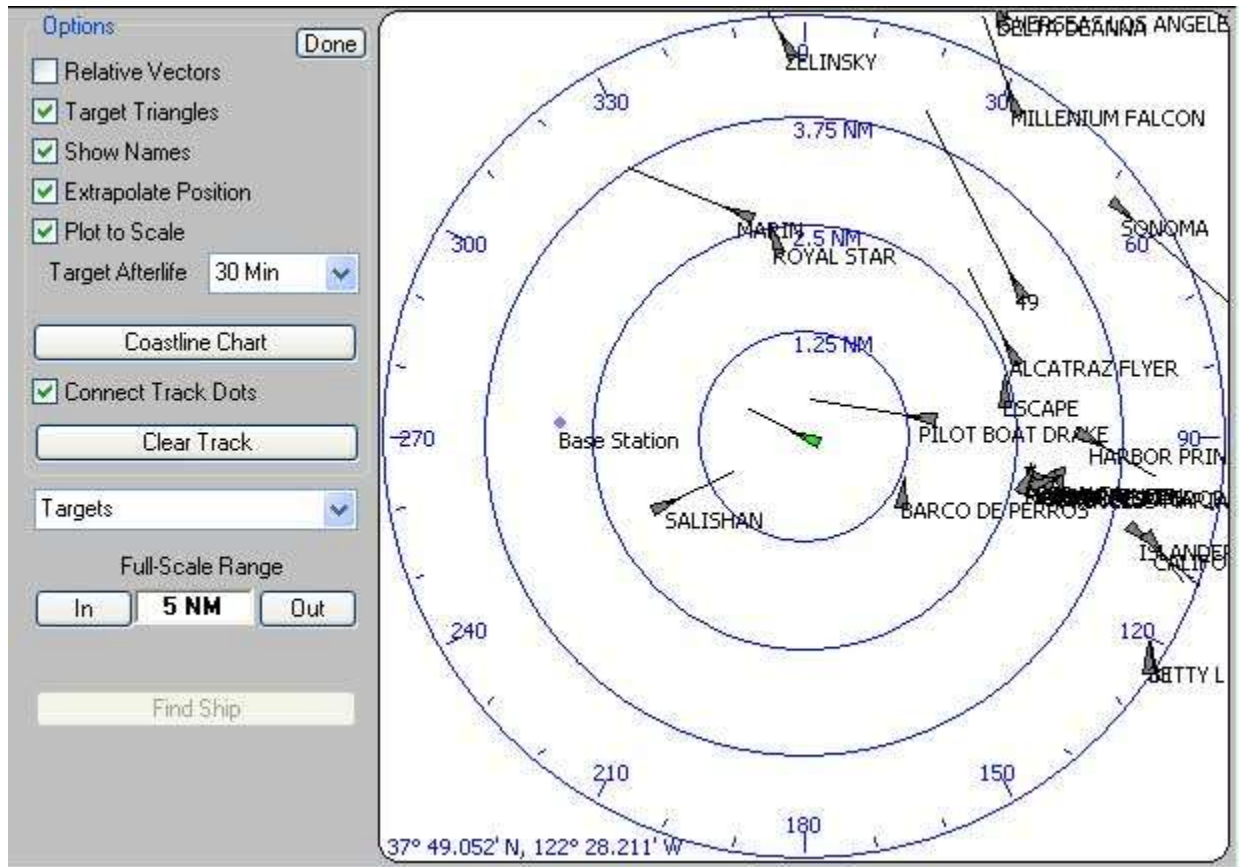
By clicking the **Options** button, you bring up the Options window. These are seldom needed, but may be useful:

- Relative Vectors – when enabled, all target vectors are plotted relative to your own vessel's course and speed. This gives a display more like a traditional radar screen.
- Target Triangles – Instead of triangles showing target heading, only small dots are plotted. This can un-clutter a busy screen.
- Show Names – Target names can be omitted to un-clutter a busy screen.
- Extrapolate Position – Position updates arrive irregularly with AIS. When extrapolation (ded reckoning) is selected, target positions will be calculated from their last-known position, course and speed. This may not accurately reflect the target's actual position, but neither does freezing the previous position on the screen. Take your pick, but I prefer extrapolation.
- Plot to Scale – AIS targets send their dimensions and GPS location. With this option, when the scale permits, targets will be displayed with their proper dimensions.
- Target Afterlife – If no AIS signal is received from a target for seven minutes or more, it is considered to be a dead target. It will continue to be displayed on the screen as a "grey-ghost" symbol for the selected **Afterlife** time. Note that the targets in the above screen are dead, as I had disconnected the AIS input. ***Please be aware that the displayed position accuracy is a ghost target is highly questionable.***

- Coastline Chart – While NavMonPc is definitely *not* a charting program, it can display rudimentary "coastline charts", available free of charge from the NOAA. The Coastline Chart button will call up the Charting window, where you can select a coastline chart to use
- Connect Track Dots – The track for your own vessel, and other AIS targets can be displayed as a string of dots, or as a chain of line segments.
- Clear Track – this will clear your own vessel's track history, and might be used if you are playing back NMEA files, and your vessel's position is jumping around from file to file. Normally not too useful though.

Target Filter Options
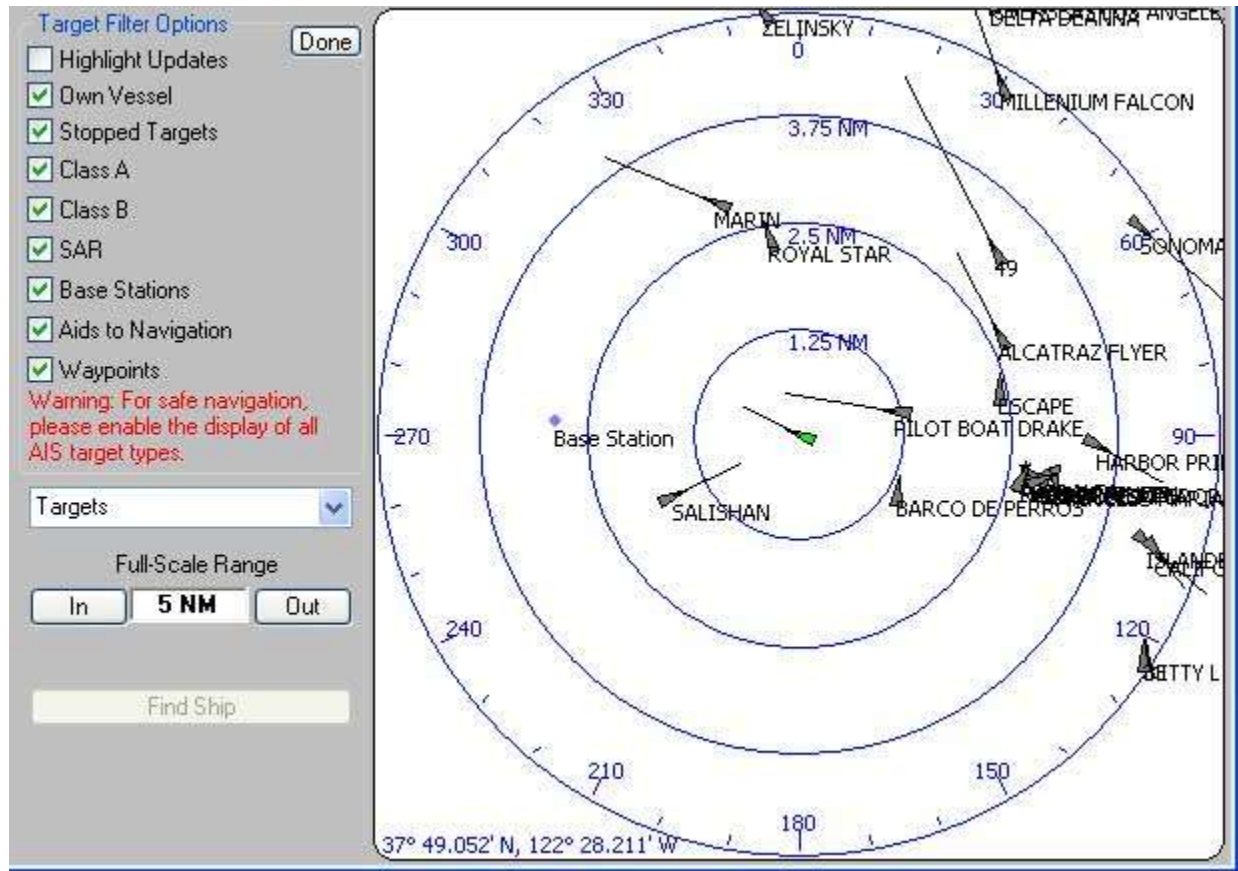
The **Target Filter Options** are used to select which types of targets to display (or not display). This can be valuable if you are using NavMonPc to study AIS traffic, but can be dangerous if you are using it when sailing. As the window warning states:

For safe navigation, please enable the display of all AIS target types.

The upper checkbox controls a slightly different option. When **Highlight Updates** is selected, an AIS target will be displayed in yellow briefly after it sends an AIS message. This feature can be used to study the behavior of the AIS system, but it can also be quite distracting. I recommend that you leave this option disabled when underway with NavMonPc.

Coastline Charts
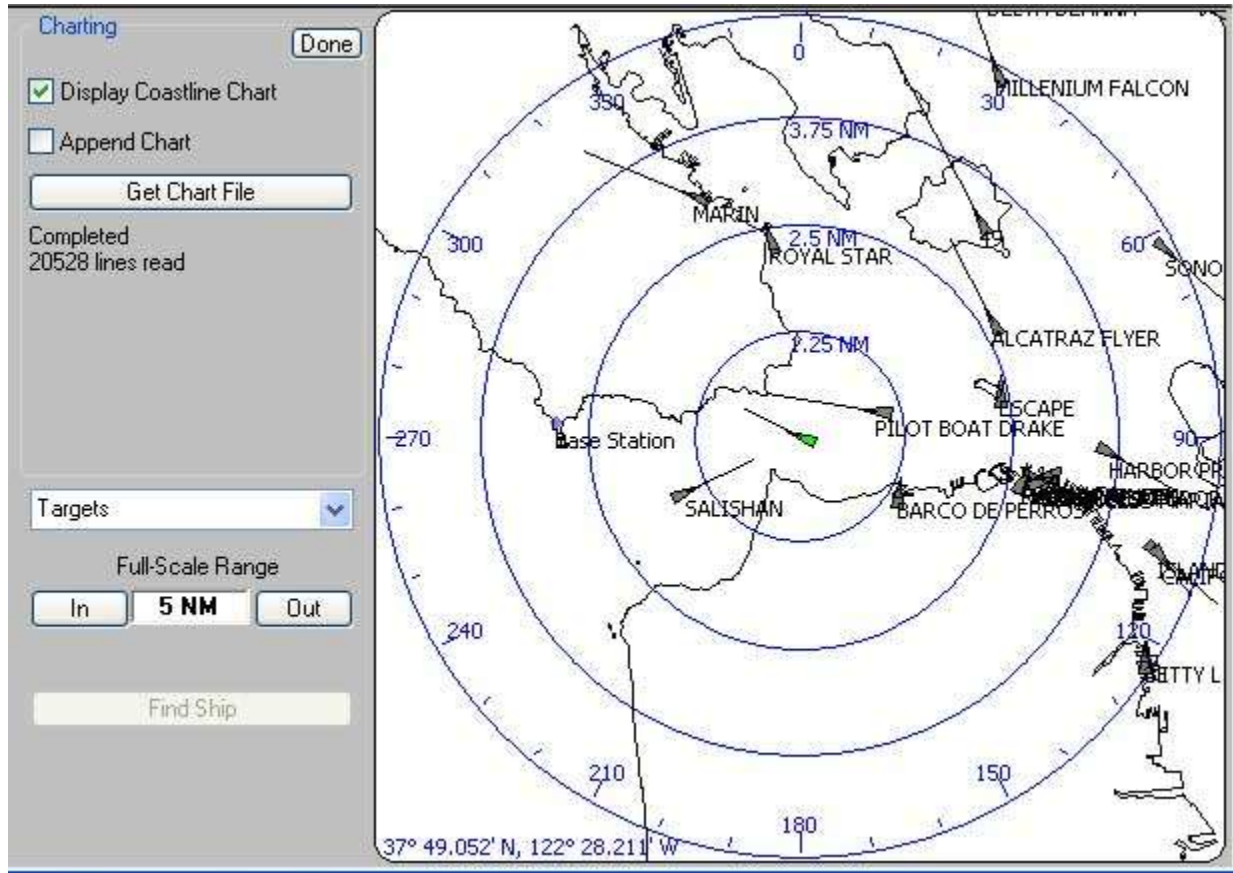
Displaying large coastline charts may place a heavy load on your computer.

See the Technical Details section of this document for more details about coastline charts.

Guard Zones
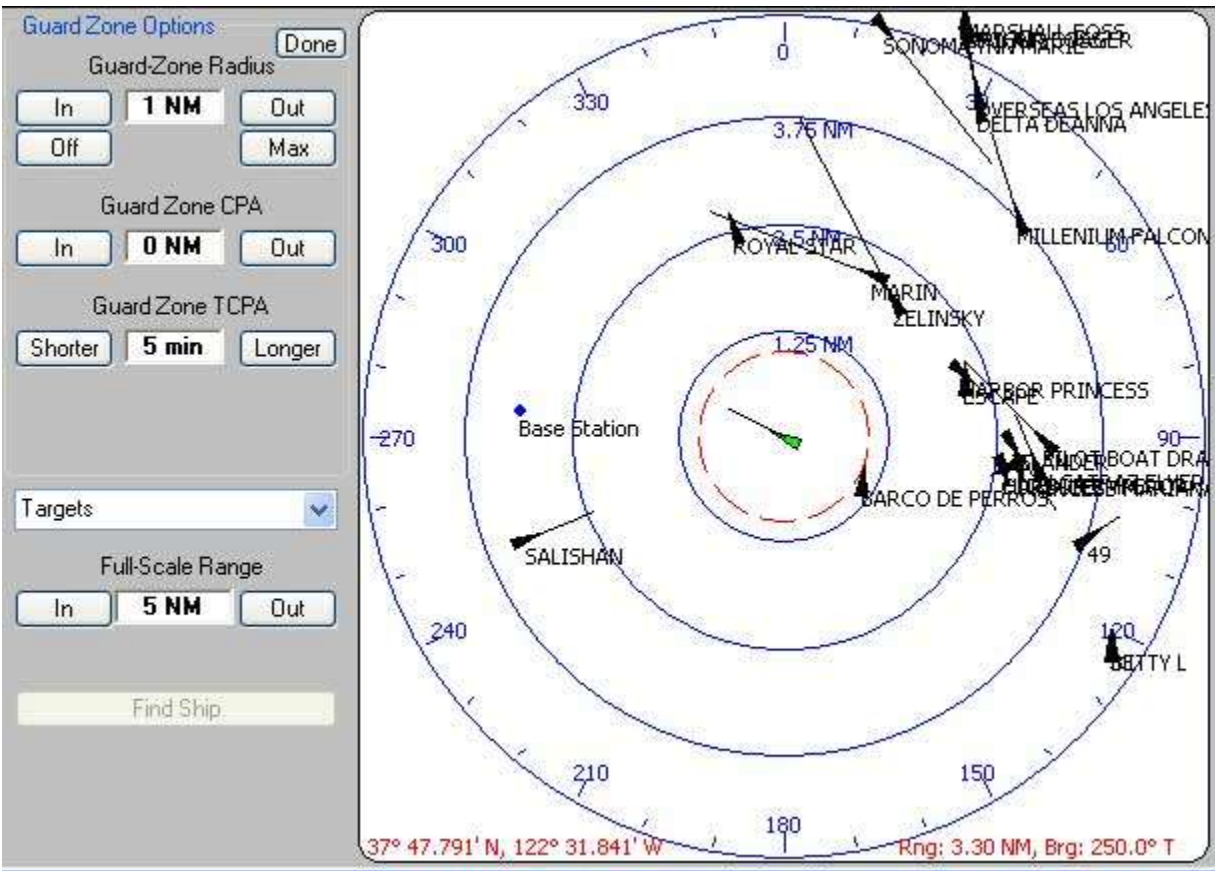
Standard Guard Zone

If you wish to be notified when an AIS target vessel is getting close enough to be a concern, you can use Guard Zones to trigger a NavMonPc General Alarm. There are two types of Guard Zones provided:

- Standard Guard Zone – this is controlled with the upper group of buttons. With these you can specify a radius around your vessel. If a target is inside of this radius *and you are approaching each other*, the General Alarm will be triggered. If you are moving away from each other, the alarm will not be triggered. The **Off** button will set the radius to zero, disabling the Guard Zone, and the **Max** button will extend the zone to 100 miles, allowing you to be notified whenever a target is approaching.
- CPA/TCPA Guard Zone – this is a more flexible Guard Zone, allowing you to specify a target's minimum allowable CPA (Closest Point of Approach), and a minimum TCPA (Time to Closest Point of Approach). If a target has a calculated CPA that is equal to or less than the selected CPA, and it has a calculated TCPA that is equal to or less than the selected TCPA, the General Alarm will be triggered.
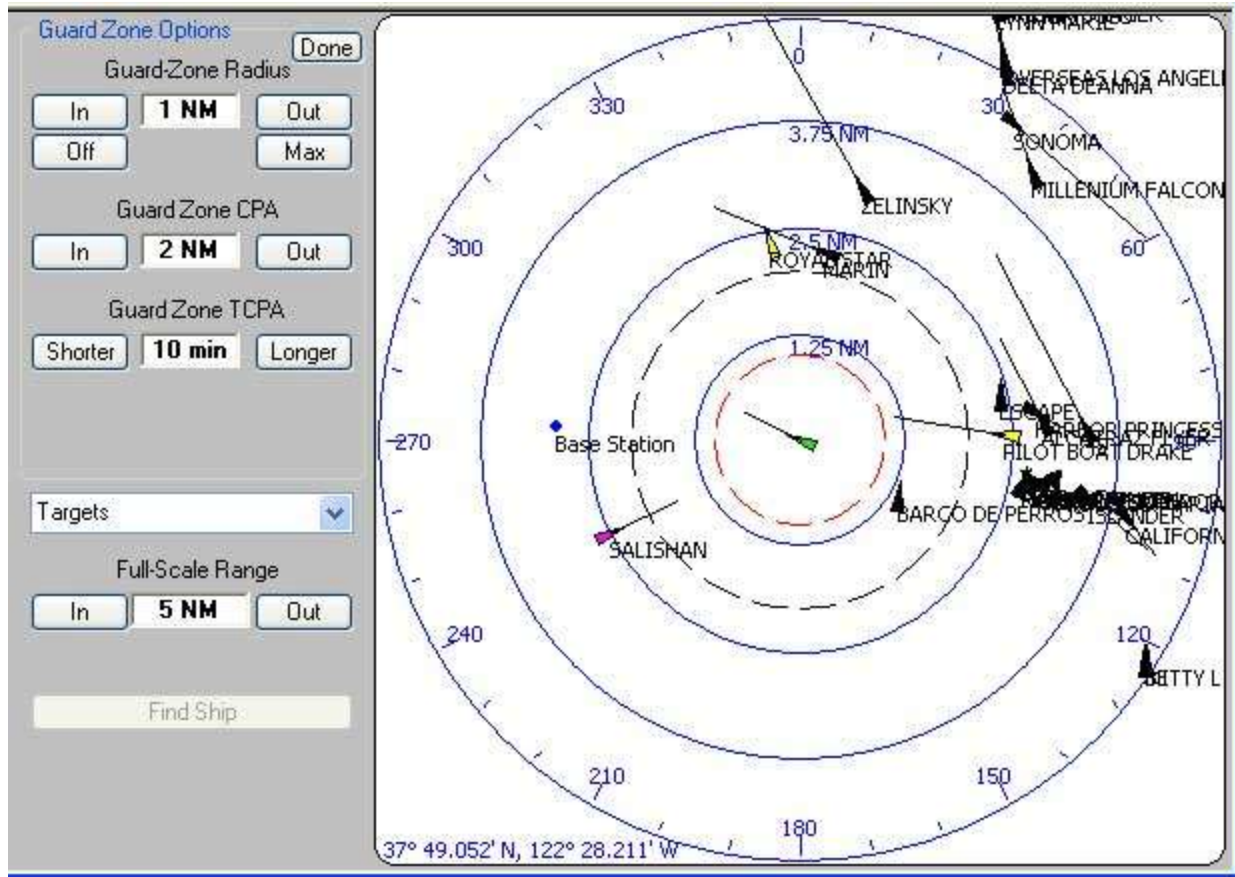
Standard Guard Zone and CPA/TCPA Guard Zone

The window above shows a Standard Guard Zone of 1 nautical mile, and a CPA/TCPA Guard Zone of 2 NM / 10 Minutes.

These different types of Guard Zones are both useful, but the CPA/TCPA mode allows you to reduce the nuisance alarms caused by setting a large-radius zone, but still notifying well in advance of a quickly-approaching target.

Neither of these Guard Zone types will substitute for keeping a proper lookout!
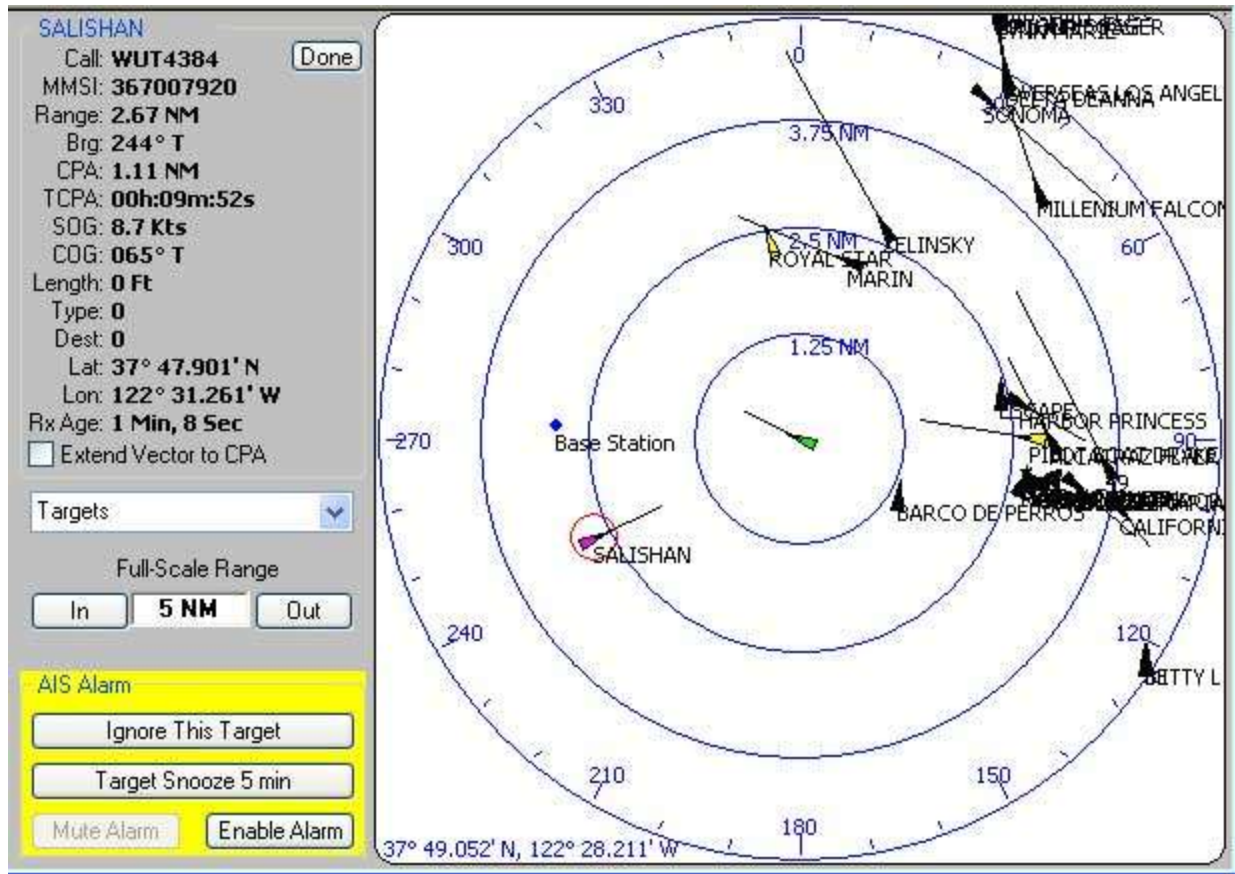
In the above window, the target "SALISHAN" has triggered the CPA/TCPA Guard Zone Alarm. Note that the CPA/TCPA Guard Zone has been set to two nautical miles / ten minutes, and the Target Information Window shows a calculated CPA of 1.11 NM in under ten minutes.

When a Guard Zone alarm is triggered, NavMonPc will pop up un screen if it was minimized, the General Alarm soundfile will be played, and the Serial Port A alarm output pin will be set (if these options are enabled). The AIS window, the Target Information Window, and the AIS Alarm will be displayed.

In the AIS Alarm window you have these options:

- Muting or enabling the AIS General Alarm (this does not affect other General Alarm sources)
- Permanently ignoring this target (if the target ages and dies, this option is reset)
- Put this target on a five minute "snooze". If the target still meets the alarm criteria after the snooze period the alarm will be re-triggered.

Vessel Details
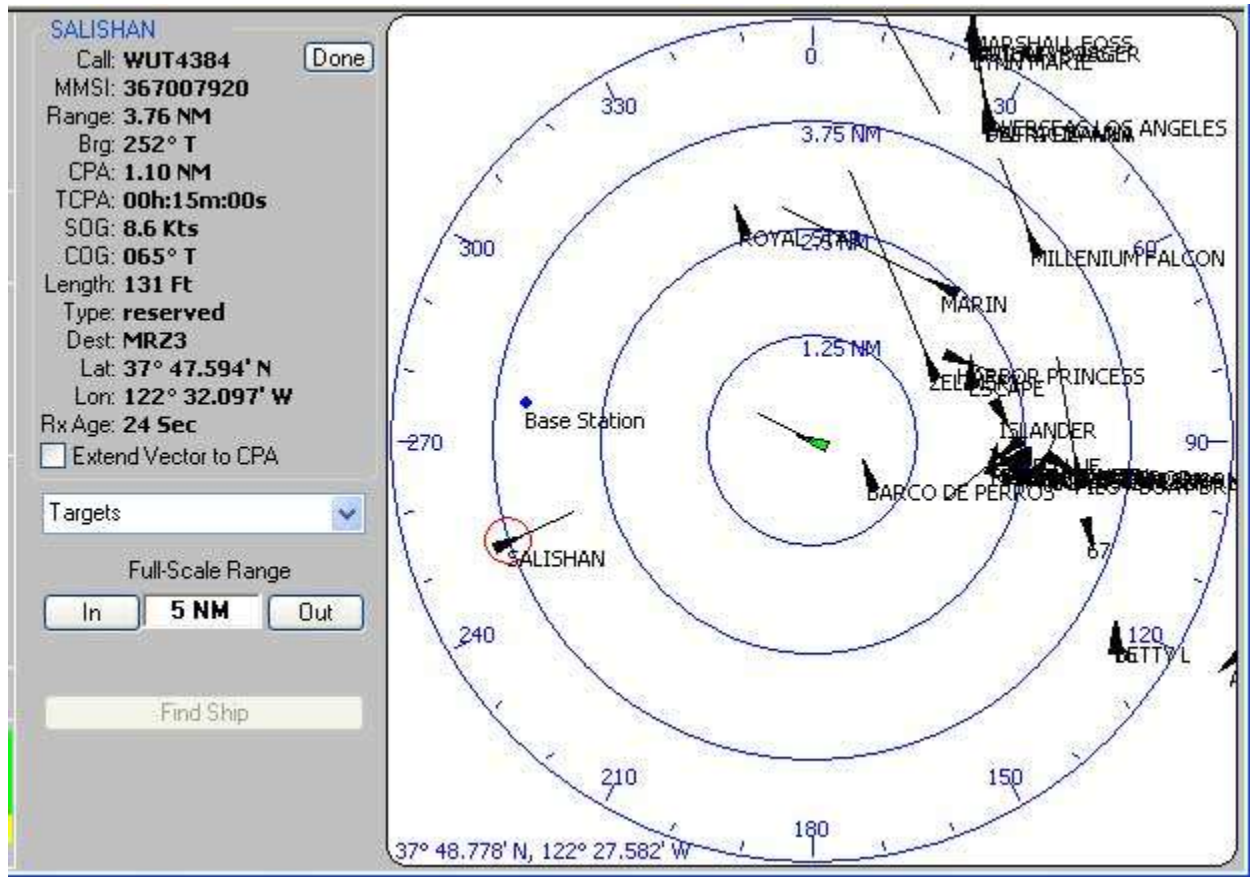
You can display the Target Information Window for any of the AIS targets, by clicking on the target itself, or by selecting it from the drop-down "Targets" list.
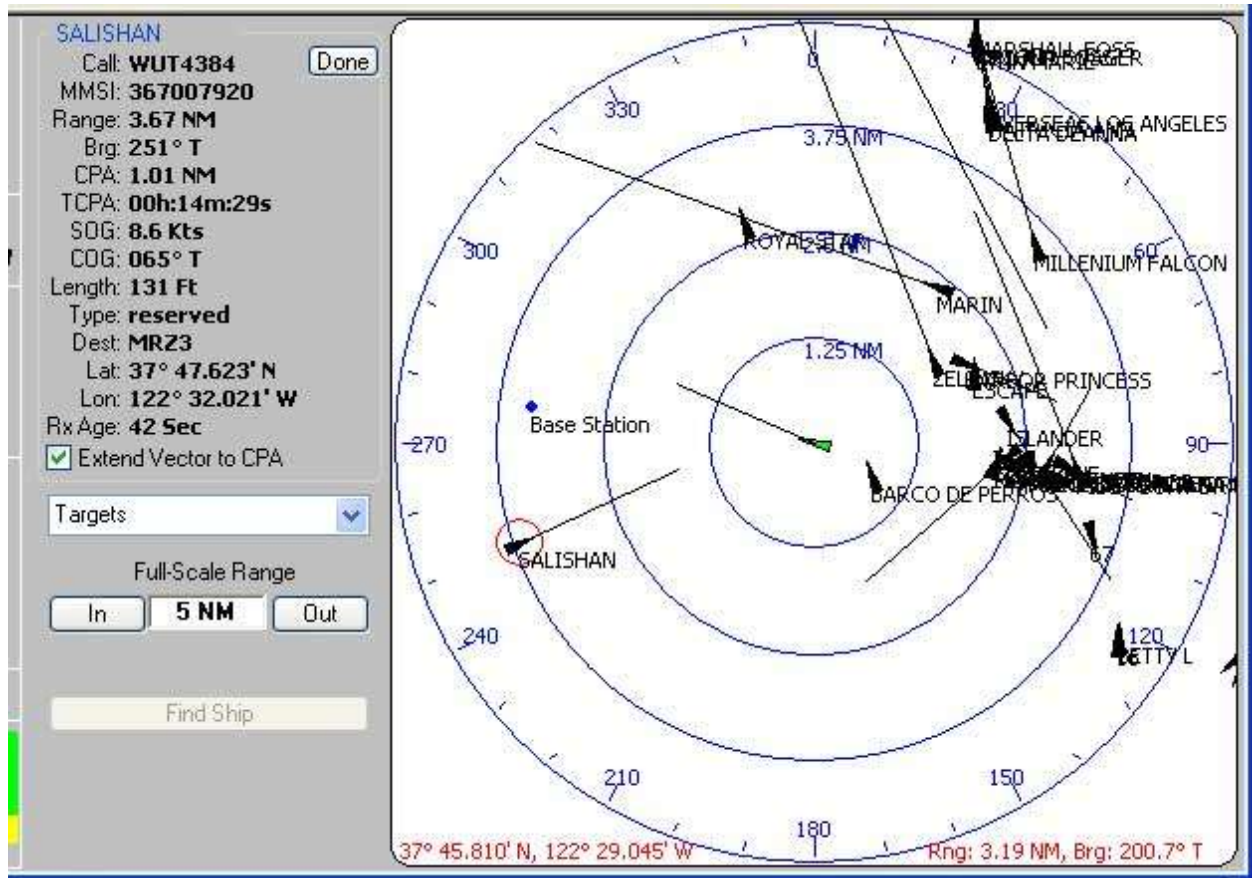
If you select **Extend Vector to CPA** the vector timescale will be adjusted to the TCPA of the selected target. For example, note the vector for "Salishan"
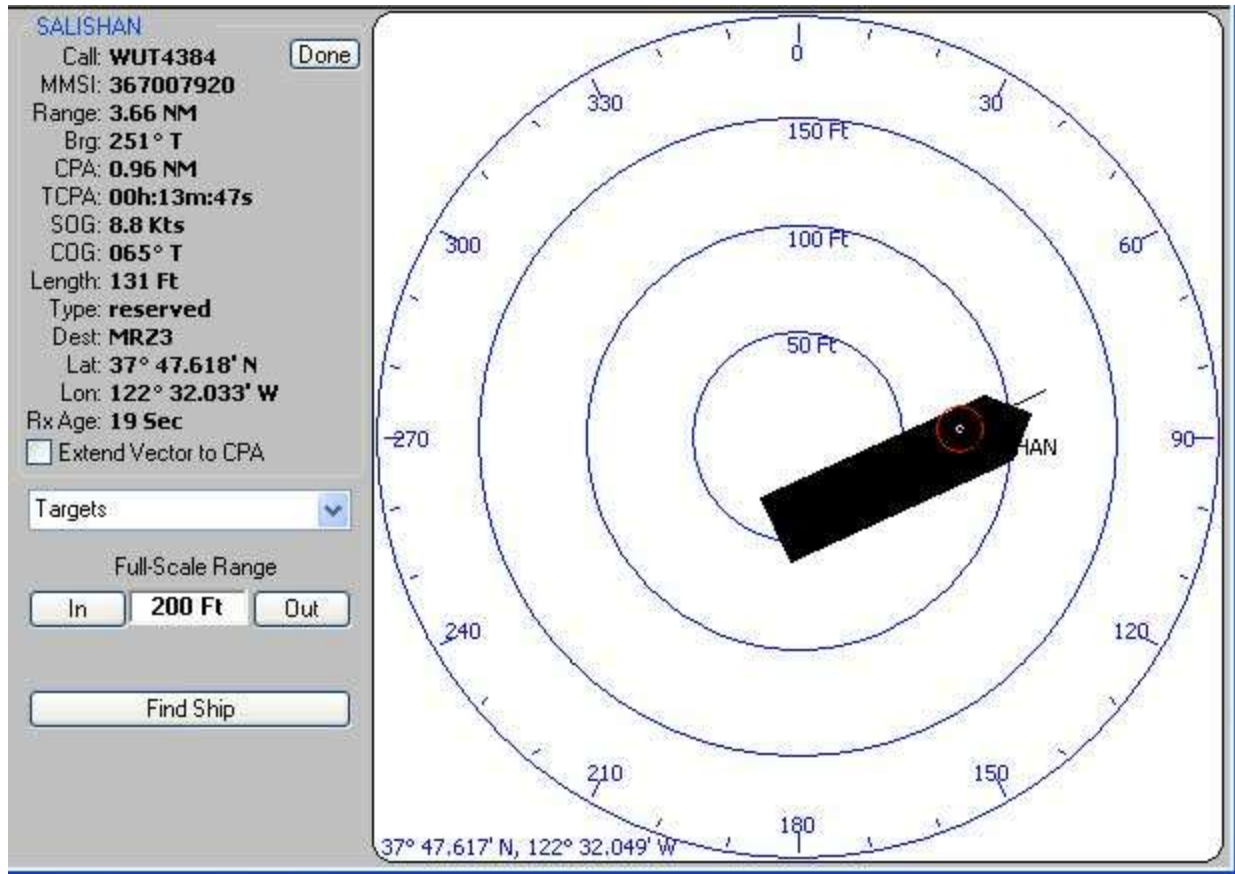
When zoomed in on a target, the length, width, and the location of the GPS receiver will be shown. Be aware that the vessel dimensions are sometimes incorrectly entered, which can lead to inaccurate (and unusual) vessel shapes. ***As always, use caution with AIS data***.

Anchor Watch

Preconditions
To show the own ship geometry, including the location of the GPS sensor, the correct vessel data needs to be entered in "Option/Vessel Data"

Steps for setting the anchor watch
After having set the anchor, note the length of you rode plus the distance from the bow to the GPS sensor.

On the AIS screen, set "Own Track" to 1 hr

Select a Full Scale Range of 2-3 times the length of the anchor rode

Let the boat swing at anchor for a while. NavMonPC will draw a part of a circle

Double click on the AIS screen, where you think the anchor is set, probably the center of the circle, this can be corrected later, when the boat has swung a little further.

Click the button "Anchor Watch"

In the field anchor watch select the radius for your anchor alarm circle. In this example it is set to 110ft: The anchor rode was 50ft, the boat is 44ft long and has the GPS sensor mounted in the back: 94ft swing radius. Select a 10-20% larger number to allow for GPS errors as well as not having set the center of the circle .

Hit the button "Set". A green circle should be drawn just outside of the swing-circle of the boat. An alarm will sound if the boat drags beyond the circle. (Test the alarm to make sure, use a smaller radius)

On the AIS screen, set "Own Track" to 24 hr, to see how the circle drawn by NavMonPc develops over the longer term, during tide swings.

Example screen shot:
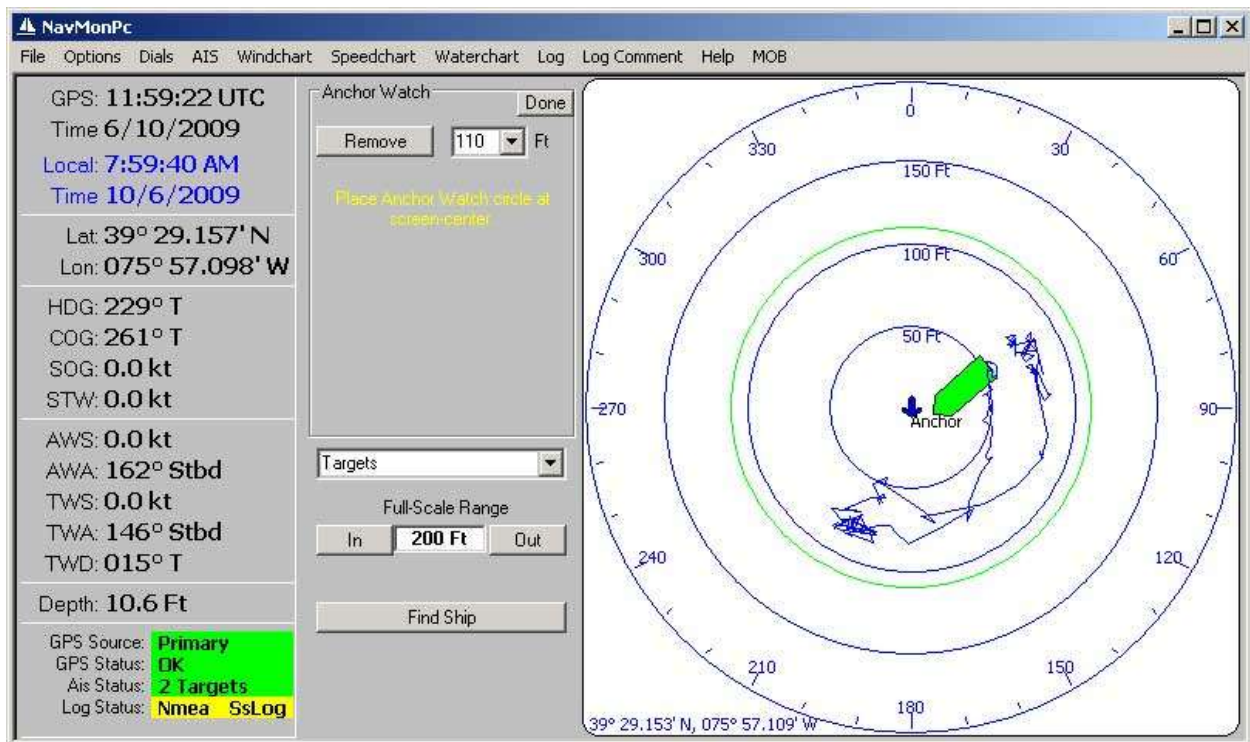
This shows a boat that has swung with the tide, twice, over a period of about 12h. One could suspect the anchor had to re-set after the first tide swing.

Alarm
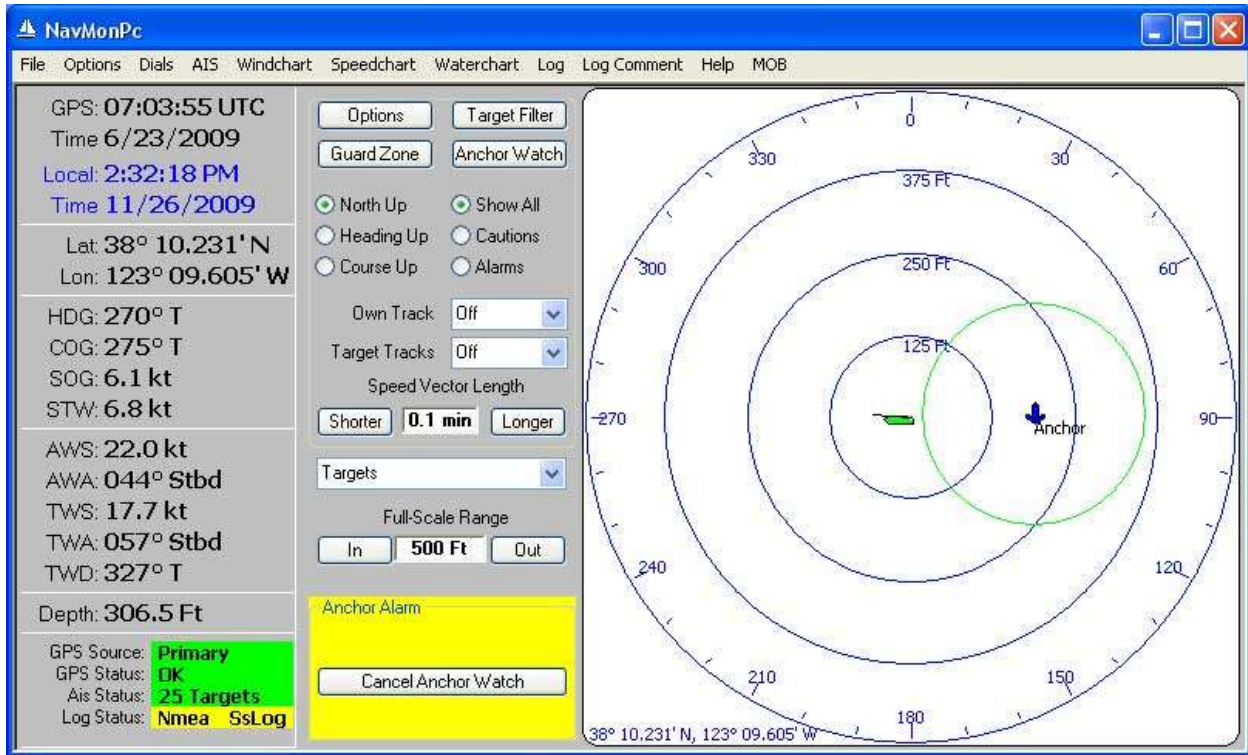
Serious Disclaimer:

Having NavMonPc doing the anchor watch does not excuse for bad anchoring practice and if there is any doubt about the anchor holding then a human anchor watch is the prudent thing to have.

Man Over Board
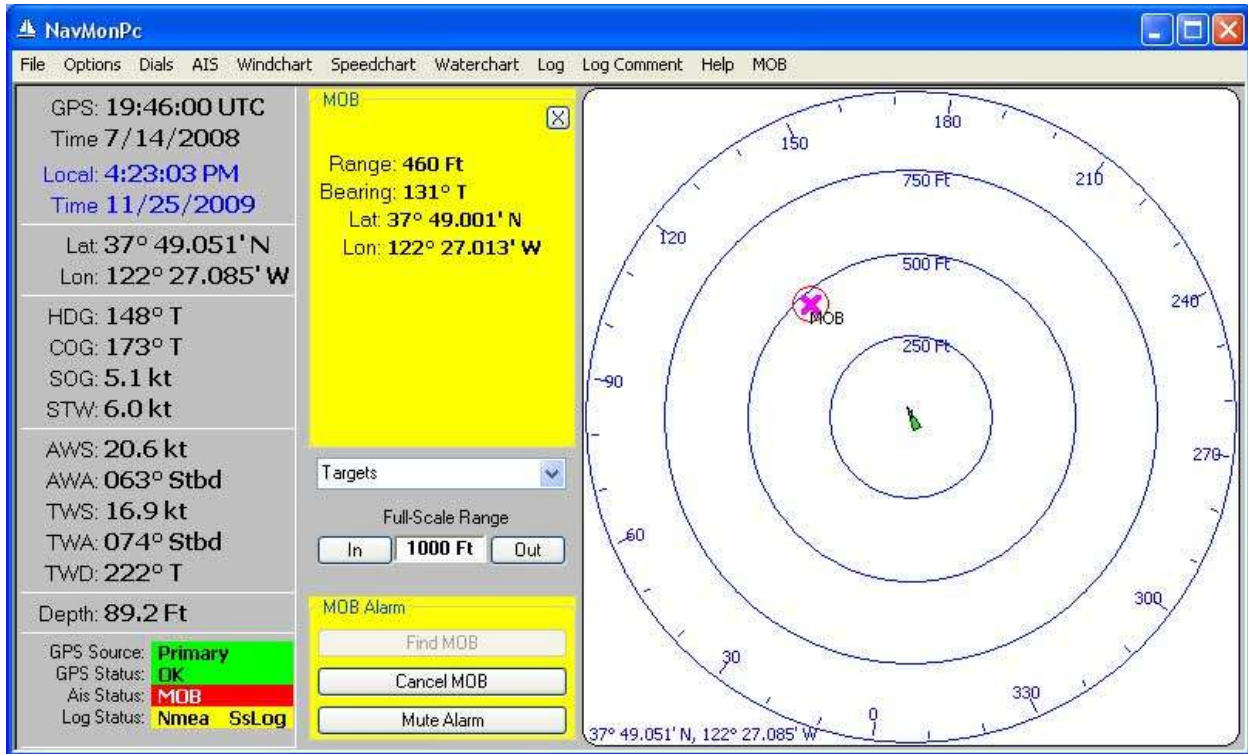
If the MOB menu item is clicked, or the hardware MOB input is triggered, the NavMonPc AIS screen will be displayed, and placed into the "Heading-Up" mode. The screen will auto-scale to keep the MOB location on-screen.

Note that the MOB location displayed is the GPS location of your vessel at the time of the MOB trigger. The person in the water may be elsewhere, depending on current, and how quickly the MOB trigger occurred.

Strip Charts

NavMonPc has three strip chart display screens: Wind, Speed, and Water. The strip charts display data over the previous ten minutes, 100 minutes, twelve hours, or 24 hours.

Wind
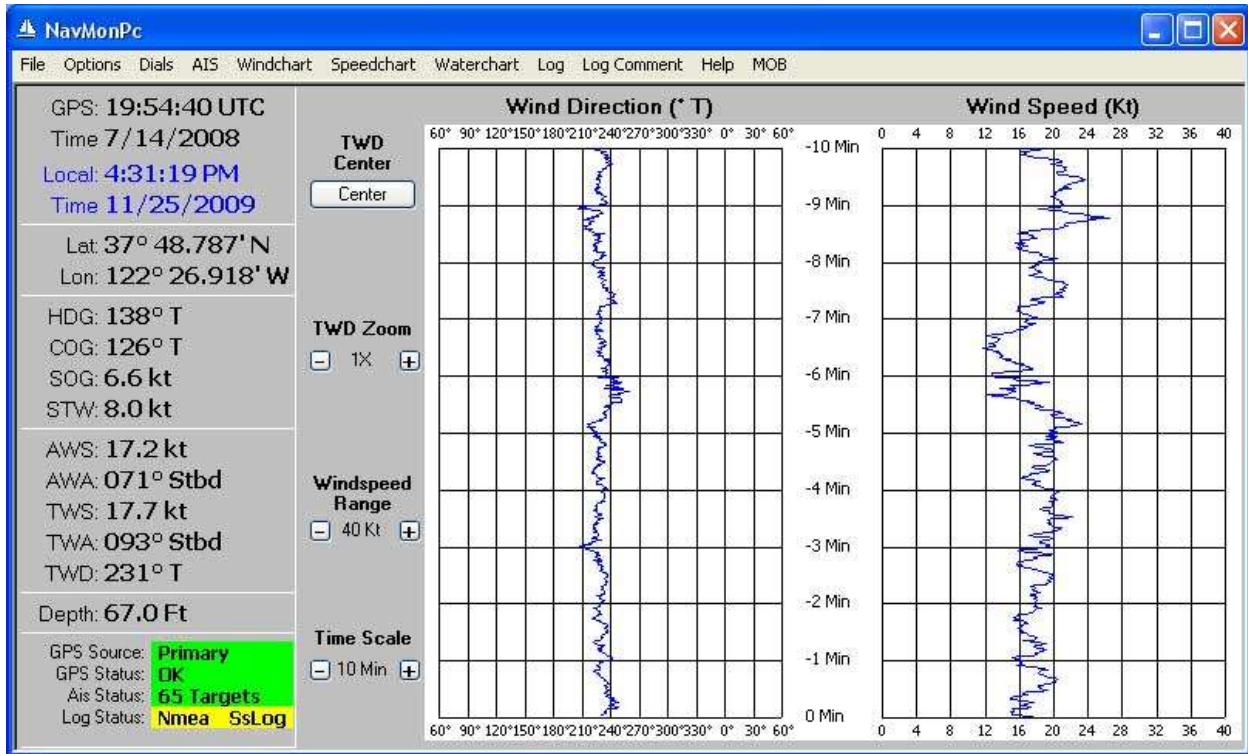
The Wind chart displays True Wind Direction, and True Wind Speed. The TWD can be centered and the degrees scale zoomed.

The TWS range can be set from 5 knots to 100 knots full-scale.

With the 100 minute, 12 and 24 hour charts, in addition to the instantaneous windspeed (shown in blue), the display indicates the minimum and maximum measured values (shown in grey).

Speed
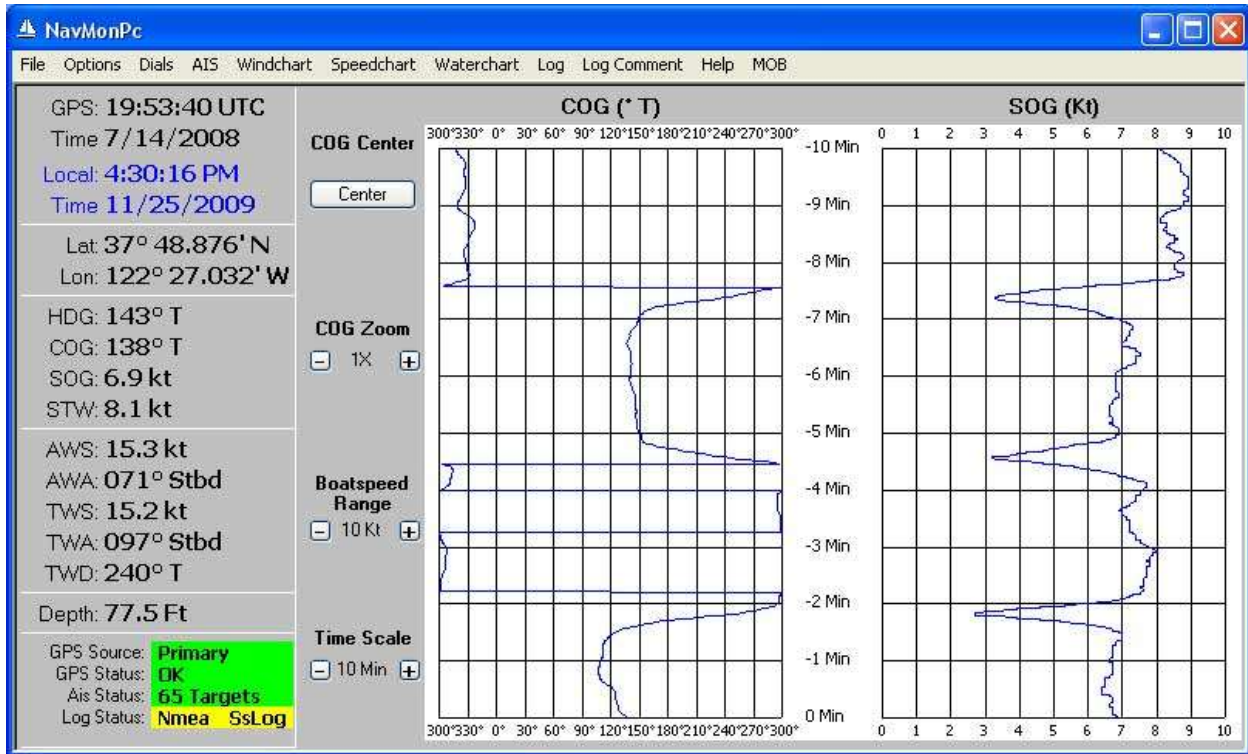
The Speed chart shows Course and Speed Over Ground.

Water

The Water chart shows water temperature and depth.

Logging

NavMonPc provides powerful logging options. There is an on-screen log, and an optional logfile that is saved in comma-delimited format for spreadsheet compatibility.

Logging Comments

The **Log Comment** menu item will bring up a comment window. Any commas in the log comment will be included verbatim in the comma-delimited spreadsheet log (with predictable results!).

The log comment will be displayed on the on-screen log.

Logging Options

There are numerous optional log fields which can be selected on the **Logging Options** screen. By default, the log time and date are taken from the computer's time and date, but instead the GPS time and date bay be used.

After making a change to the logged information, please click the **Rebuild Log Fields** button to allow these choices to be reflected in the log.

Various logging intervals are available, ranging from one second to one hour.

The **Autolog** option automatically starts saving the logfile using a name derived from the current date (computer or GPS, as selected). At midnight a new logfile will be started.

The Spreadsheet Log File now has an **Unformatted** option, which causes the data to be saved without any special formatting, no "degree" symbols, etc. This option makes the spreadsheet logs slightly less easy to read, but much easier to manipulate the data.

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	
	'Date	'Time	'Latitude	'Longitude	'SOG	'COG	'Course Run	'Distance	'STW	'HDG	'TWS	'TWA	'TWD	'AWS	'AWA	'D
2	6/25/2009	07:00:30 UTC	38° 13.702' N	123° 40.435' W	10.7	155° T	177° T	0.0262	9.3	172° T	25.9	150° Stbd	321° T	18.4	135° Stbd	
3	6/25/2009	6/25/2009 07:00:30	38.22837	-123.67391	10.7	155.2	176.6	0.0262	9.3	171.6	25.9	149.8	321.4	18.4	135	

The spreadsheet shown above illustrates the two different formatting options. Row 2 uses the standard format, and row 3 uses the **Unformatted** option. Note that the Unformatted differences are:

- Time -- contains both the date and time
- Latitude, Longitude – Use decimal degree formatting. Negative latitude = South, negative longitude = West.
- COG, Course Run, TWD – decimal degrees, no indication of True or Magnetic
- TWA, AWA – decimal degrees, 0-180 = starboard, 180-360 = port

An optional Battery Monitor field has been added to the NavMonPc log. This data comes from the NMEA "XDR" (Transducer Measurement) sentence, and at the moment NavMonPc only supports the particular format used by the CruzPro VAH60 battery monitor. Here are the three messages sent by this instrument:

`$IIXDR,U,12.8,V,VAH30*04` (Voltage)

`$IIXDR,G,0299,,VAH30*57` (Remaining Amp Hours)

`$IIXDR,I,-002,A,VAH30*05` (Current)

The XDR sentence is far more flexible than this, and I will attempt to expand the decoding to cover more options and formats.

This data is displayed in the log as shown below:

NMEA Logging

In addition to the standard log capabilities, NavMonPc allows you to log the raw NMEA messages being received.

There is an Add Port # option available, which prepends a unique input port number to each logged NMEA message. This option can be useful when debugging the navsystem.

There is an **Autolog** option for the NMEA log.

It is possible to select or filter which messages are logged by using the **NMEA Routing** options. It is possible for the NMEA logfiles to become quite large, so this filtering may be desirable. On the other hand, it is better to have a particular piece of data and not need it, than to need it and not have it.

NMEA Routing

NMEA Routing is a powerful feature that you will most likely never need to use. It gives you the option of choosing how NMEA message are used within the program, and are sent ("bridged" or "echoed") to the various output ports.

You can bring up the NMEA Routing screen through the top-line menu, under "Options / NMEA Routing"

In NavMonPc, the sources for NMEA messages are:

- The four serial ports (A,B,C,D)
- The three Virtual Serial Ports (A,B,C)
- The TCP/IP Network Client
- Logfile Playback
- The NavMonPc RapidAIS engine

The message destinations are:

- Internal processing and display
- The four serial ports (A,B,C,D)
- The three Virtual Serial Ports (A,B,C)

- The TCP/IP Network Server
- NMEA Logfile capture
- The NavMonPc RapidAIS engine

The Default Routes

NMEA	Source	Priority	Serial A	Serial B	Serial C	Serial D	Vport A	Vport B	Vport C	Vport D	Vport E	Vport F	Net Server	NMEA Log	RapidAIS
Default	Calculated						Send	Send	Send	Send	Send	Send	Send		
Default	RapidAIS	Primary													
Default	Serial A	Primary					Send	Send	Send	Send	Send	Send	Send	Send	Send
Default	Serial B	Primary					Send	Send	Send	Send	Send	Send	Send	Send	Send
Default	Serial C	Primary					Send	Send	Send	Send	Send	Send	Send	Send	Send
Default	Serial D	Primary					Send	Send	Send	Send	Send	Send	Send	Send	Send
Default	Vport A	Primary						Send	Send	Send	Send	Send	Send	Send	Send
Default	Vport B	Primary					Send		Send	Send	Send	Send	Send	Send	Send
Default	Vport C	Primary					Send	Send		Send	Send	Send	Send	Send	Send
Default	Vport D	Primary					Send	Send	Send		Send	Send	Send	Send	Send
Default	Vport E	Primary					Send	Send	Send	Send		Send	Send	Send	Send
Default	Vport F	Primary					Send	Send	Send	Send	Send		Send	Send	Send
Default	Net Client	Primary					Send	Send	Send	Send	Send	Send	Send	Send	Send
Default	Playback	Primary					Send	Send	Send	Send	Send	Send	Send		Send

Default Routes

When NavMonPc is first run, it creates a "default" Routefile and saves it (typically as "C:\Documents and Settings\[user name]\Application Data\NavMonPc\NavMonPcRouting3.txt"). The default routes are usually appropriate for a typical navigation system, and will at least get you up and running.

The default routes work like this:

- Any NMEA message received on one of the input ports will be assigned a **Primary** priority and *will* be used for internal processing and display.
- It *will not* be echoed (sent) out on any of the four serial ports.
- It *will not* be echoed out the same port from which it was received.
- It *will* be echoed out on all other output ports.
- *Rapid*AIS is used by the NavMonPc NMEA decider (but *Rapid*AIS must still be activated).

In a typical application, the serial ports are used as inputs, and the virtual ports and network server are used to send data to other applications running on your computer. The default route is designed for these cases.

The **Priority** entry is used to select among several sources of the same NMEA message (for example, you may have GPS information from both your chartplotter and an AIS transponder). There are four levels of priority:

- **Primary** – This is the highest priority. Data from this message will be used by NavMonPc.
- **Secondary** – Data from this message will be used only if there is no active Primary data source.

- **Backup** – Only used if there are no active Primary or Secondary data sources.
- **Ignore** – This data is never used. It may still be bridged to the output ports.

Priority only works among identical NMEA message types. Keep reading for more details on the Priority function, and see the Technical Details section of this document.

To edit the Priority and other options you must enable Advanced NMEA Routing.

Advanced NMEA Routing

Sometimes, the default routes just won't do. For example, you may wish to take NMEA data received from your GPS and send it out a serial port to your VHF transceiver. Or, you may wish to save a log of only certain NMEA messages. Fortunately, you can change the routing rules to suit your application.

Note: I recommend that wherever possible, you use direct physical connections for your critical navigation data. I have tried to make NavMonPc as reliable and bullet-proof as possible, but on my boat I use hard-wired connections and NMEA multiplexers for the important stuff. Sometimes, computers crash! Reliability and ease-of-use should be your goals when designing your navigation system.

To enable Advanced NMEA Routing, click on the NMEA Routing screen's "Advanced Routing" button. There will be an "Are You Sure?" popup window, since it is possible to really mess things up with NMEA Routing! Fortunately, you can always restore the default routes by clicking "Clear", then "Default".

NMEA	Source	Priority	Serial A	Serial B	Serial C	Serial D	Vport A	Vport B	Vport C	Net Server	NMEA Log
Default	Serial A	Primary		Send	Priority		Send	Send	Send	Send	Priority
Default	Serial B	Secondary					Send	Send	Send	Send	Priority
Default	Serial C	Backup					Send	Send	Send	Send	
Default	Serial D	Ignore					Send	Send	Send	Send	
Default	Vport A	Primary						Send	Send	Send	
Default	Vport B	Primary					Send		Send	Send	
Default	Vport C	Primary					Send	Send		Send	
Default	Net Client	Primary					Send	Send	Send	Send	Send
Default	Playback	Primary					Send	Send	Send	Send	

Customized Route

You will notice that in the routing screen above, some entries have been changed from their defaults. These options will be covered in the following paragraphs. Some of these screen-captures are from a previous version of NavMonPc, where there are only three Virtual Ports. Version 1.10 provides six.

The control buttons on the Advanced Routing screen are:

- Lock Routing – Exits Advanced Routing; the current route table will be used

- Collect – Monitors all NavMonPc inputs, and enters each NMEA message/source into the route table, creating a default route for each entry. When Collecting, all internal processing and bridging is suspended.
- Stop – Stops NMEA message capture. Internal processing and bridging resumes.
- Clear – Removes all entries from the route table. With an empty table, all incoming NMEA data will be ignored: no internal decoding, processing, or bridging will be done.
- Default – This adds a default routing list, and sets the default routing options for any message-specific table entries. This will overwrite any previously-entered routing options.
- Load – You will be prompted to select a Routefile, which will be added to the existing route table. If you wish to use only the routes in the Routefile, click "Clear" before clicking "Load".
- Save – You will be prompted for a filename, and the current route table will be saved.

Setting Priorities

NMEA	Source	Priority
Default	Serial A	Primary
Default	Serial B	Secondary
Default	Serial C	Backup
Default	Serial D	Ignore
Default	Vport A	Primary

In the above screenshot, you will see that the Priority settings for the "Default" entries have been changed from the original (Primary). These "Default" entries apply to any NMEA messages received on the specified source port, unless there is a specific routing rule defined for a particular message/port (more on this later).

In the above case, if, for example "RMC" messages (GPS data) are being received on all four serial ports, only the message from Port A will be used (that is, used by NavMonPc – it may still be echoed to one or more of the output ports). If Port A stops receiving "RMC" messages, after a ten-second timeout data from the next-highest priority RMC message will be used.

To change the Priorities, simply click on the desired Priority field. The value will cycle through all available options.

Note that Priorities are not applied to AIS data, which will be processed and bridged unless the "Ignore" setting is selected.

Message Bridging Options

NMEA	Source	Priority	Serial A	Serial B	Serial C
Default	Serial A	Primary		Send	Priority
Default	Serial B	Secondary			
Default	Serial C	Backup			
Default	Serial D	Ignore			
Default	Vport A	Primary			
Default	Vport B	Primary			
Default	Vport C	Primary			
Default	Net Client	Primary			
Default	Playback	Primary			

The screen above illustrates the three NMEA message bridging options: **Send** (always), **Priority** (sometimes), and **blank** (never).

To change the bridging options, click on the option. It will cycle through the available choices.

Note the setting of **Priority** for the "Serial C" output. In this case, it will function the same as a **Send** setting, since there is only one source (Serial A), and all messages received on Serial A are assigned **Primary** status. You must have multiple sources selected in order for **Priority** to be useful.

In addition to Source-based routing, for even more flexibility you also have the ability to specify Message/Port-based routing. Message/Port routes take precedence over Port-only routes. When an NMEA message is received, NavMonPc first tests it to see if there is a matching Message/Port routing rule. If not, the routes are searched for a Port-only rule. If no matching rule is found, the message is ignored.

The easiest way to configure Message/Port routes is by first collecting the NMEA data being received by NavMonPc. Enter **Advanced Routing**, **Clear** the current routes if you wish, then click **Collect**. All processing will stop, and as NMEA messages are received they will be displayed along with their default route on the route table. It will take several seconds for all messages to show up, and perhaps much longer for certain message types (you can use Port-only routes to cover any messages you missed during collection). When it looks like all messages have been accounted for, click **Stop**. Processing will resume, using the displayed route table:

NMEA	Source	Priority	Serial A	Serial B	Serial C	Serial D	Vport A	Vport B	Vport C	Net Server	NMEA Log
!AIVDM	Serial A	Primary						Send	Send	Send	Send
!AIVDO	Serial A	Primary						Send	Send	Send	Send
$AIALR	Serial A	Primary						Send	Send	Send	Send
$AITXT	Serial A	Primary						Send	Send	Send	Send
$GPGBS	Serial A	Primary						Send	Send	Send	Send
$GPRMC	Serial A	Primary						Send	Send	Send	Send
$M1DTM	Serial A	Primary						Send	Send	Send	Send
$M1EC	Serial A	Primary						Send	Send	Send	Send
$M1HDG	Serial A	Primary						Send	Send	Send	Send
$M1HDT	Serial A	Primary						Send	Send	Send	Send
$M1RMC	Serial A	Primary						Send	Send	Send	Send
$M2DBT	Serial A	Primary						Send	Send	Send	Send
$M2HDM	Serial A	Primary						Send	Send	Send	Send
$M2MTW	Serial A	Primary						Send	Send	Send	Send
$M2VHW	Serial A	Primary						Send	Send	Send	Send
$M2VWR	Serial A	Primary						Send	Send	Send	Send

Collected NMEA Messages

In the above example, you will see that all data is arriving on the **Serial A** port (this is from my boat, where I have an NMEA multiplexer combining various sources into one serial stream.) The routing rules above are functionally identical to the original default routes. They must be edited if you desire other behavior:

NMEA	Source	Priority	Serial A	Serial B	Serial C	Serial D	Vport A	Vport B	Vport C	Net Server	NMEA Log
!AIVDM	Serial A	Primary						Send	Send	Send	Send
!AIVDO	Serial A	Primary						Send	Send	Send	Send
$AIALR	Serial A	Primary						Send	Send	Send	Send
$AITXT	Serial A	Primary						Send	Send	Send	Send
$GPGBS	Serial A	Primary						Send	Send	Send	Send
$GPRMC	Serial A	Primary					Priority	Send	Send	Send	Send
$M1DTM	Serial A	Primary						Send	Send	Send	Send
$M1EC	Serial A	Primary						Send	Send	Send	Send
$M1HDG	Serial A	Primary						Send	Send	Send	Send
$M1HDT	Serial A	Primary						Send	Send	Send	Send
$M1RMC	Serial A	Secondary					Priority	Send	Send	Send	Send
$M2DBT	Serial A	Primary						Send	Send	Send	Send
$M2HDM	Serial A	Primary						Send	Send	Send	Send
$M2MTW	Serial A	Primary						Send	Send	Send	Send
$M2VHW	Serial A	Primary						Send	Send	Send	Send
$M2VWR	Serial A	Primary						Send	Send	Send	Send

Note that in the above table, there are two sources for the NMEA "RMC" message: "$GPRMC", which is coming from my Class-B AIS transponder, and "$M1RMC", which comes from my chartplotter. While it

probably wouldn't be cause any problems if these sources were used interchangeably (under the default rules, NavMonPc will use the most-recently received RMC message), I prefer to use the data from the AIS transponder. This is because I often turn off the chartplotter to save power, and I would prefer to not have my sources switch unless necessary. To accomplish this, I have set the Priority for the chartplotter's RMC message to **Secondary**

Note that VportA (Virtual Serial Port A) has all messages disabled, except for these two RMC messages, which have been set to **Priority**. In this case, VportA is feeding GPS position data to a radio Email program, and I have decided to send only the GPS RMC data. With the **Priority** setting , only the highest active priority RMC message will be sent to the Email application.

NMEA	Source	Priority	Serial A	Serial B	Serial C	Serial D	Vport A	Vport B	Vport C	Network	NMEA Log
Default	Serial A	Primary					Send	Send	Send	Send	Send
Default	Serial B	Primary					Send	Send	Send	Send	Send
Default	Serial C	Primary					Send	Send	Send	Send	Send
Default	Serial D	Primary					Send	Send	Send	Send	Send
Default	Vport A	Primary						Send	Send	Send	Send
Default	Vport B	Primary					Send		Send	Send	Send
Default	Vport C	Primary					Send	Send		Send	Send
Default	Network	Primary					Send	Send	Send		Send
Default	Playback	Primary					Send	Send	Send	Send	
!AIVDM	Serial A	Primary					Send	Send	Send	Send	Send
!AIVDO	Serial A	Primary					Send	Send	Send	Send	Send
$AIALR	Serial A	Primary					Send	Send	Send	Send	Send
$GPGBS	Serial A	Primary					Send	Send	Send	Send	Send
$GPRMC	Serial A	Primary					Send	Send	Send	Send	Send
$M1DTM	Serial A	Primary					Send	Send	Send	Send	Send
$M1EC	Serial A	Primary					Send	Send	Send	Send	Send
$M1HDG	Serial A	Primary					Send	Send	Send	Send	Send
$M1HDT	Serial A	Primary					Send	Send	Send	Send	Send
$M1RMC	Serial A	Primary					Send	Send	Send	Send	Send
$M2DBT	Serial A	Primary					Send	Send	Send	Send	Send
$M2HDM	Serial A	Primary					Send	Send	Send	Send	Send
$M2MTW	Serial A	Primary					Send	Send	Send	Send	Send
$M2VHW	Serial A	Primary					Send	Send	Send	Send	Send
$M2VWR	Serial A	Primary					Send	Send	Send	Send	Send

The above route-table shows collected data, with the default routes added (either before or after collection). Note that the order of route-table entries makes no difference.

There are a few editing aids available with a mouse-click:

- Sorting – Click on the NMEA or Source column-headings to forward/reverse sort the table.
- Deleting Entries – Right-click on the NMEA message to delete the entry
- Seeing NMEA message data – Click on the NMEA message to see the most-recently received message.

When you are finished editing the route-table, click Lock Routing. This will prevent inadvertent changes to the routes. The new route-list will be saved when NavMonPc exits, and will be reloaded at program-start. It is possible to load the route-list file into a spreadsheet or text editor, and hand-edit it there. See the Technical Details section of this document for information on the file format.

Calculated Sources

NMEA	Source	Priority	Serial A	Serial B	Serial C	Serial D	Vport A	Vport B	Vport C	Net Server	NMEA Log	RapidAIS
Default	Calculated						Send	Send	Send	Send		
Default	RapidAIS	Primary										
Default	Serial A	Primary					Send	Send	Send	Send	Send	Send
Default	Serial B	Primary					Send	Send	Send	Send	Send	Send
Default	Serial C	Primary					Send	Send	Send	Send	Send	Send
Default	Serial D	Primary					Send	Send	Send	Send	Send	Send
Default	Vport A	Primary						Send	Send	Send	Send	Send
Default	Vport B	Primary					Send		Send	Send	Send	Send
Default	Vport C	Primary					Send	Send		Send	Send	Send
Default	Net Client	Primary					Send	Send	Send	Send	Send	Send
Default	Playback	Primary					Send	Send	Send	Send		Send

As discussed in the **NMEA Options** section, NavMonPc optionally generates several NMEA sentences that can be sent to connected equipment or programs. While the source data for these messages is used internally, the messages themselves are not decoded by NavMonPc, so the associated **Priority** routing field is always empty. These messages can be forwarded to the various output ports, under control of the route-table.

Adding a Route-table entry

Advanced Routing now provides the ability to hand-enter a NMEA message into the route-table. To do this, click the **Add** button. The **NMEA Route-list Entry** window will appear:
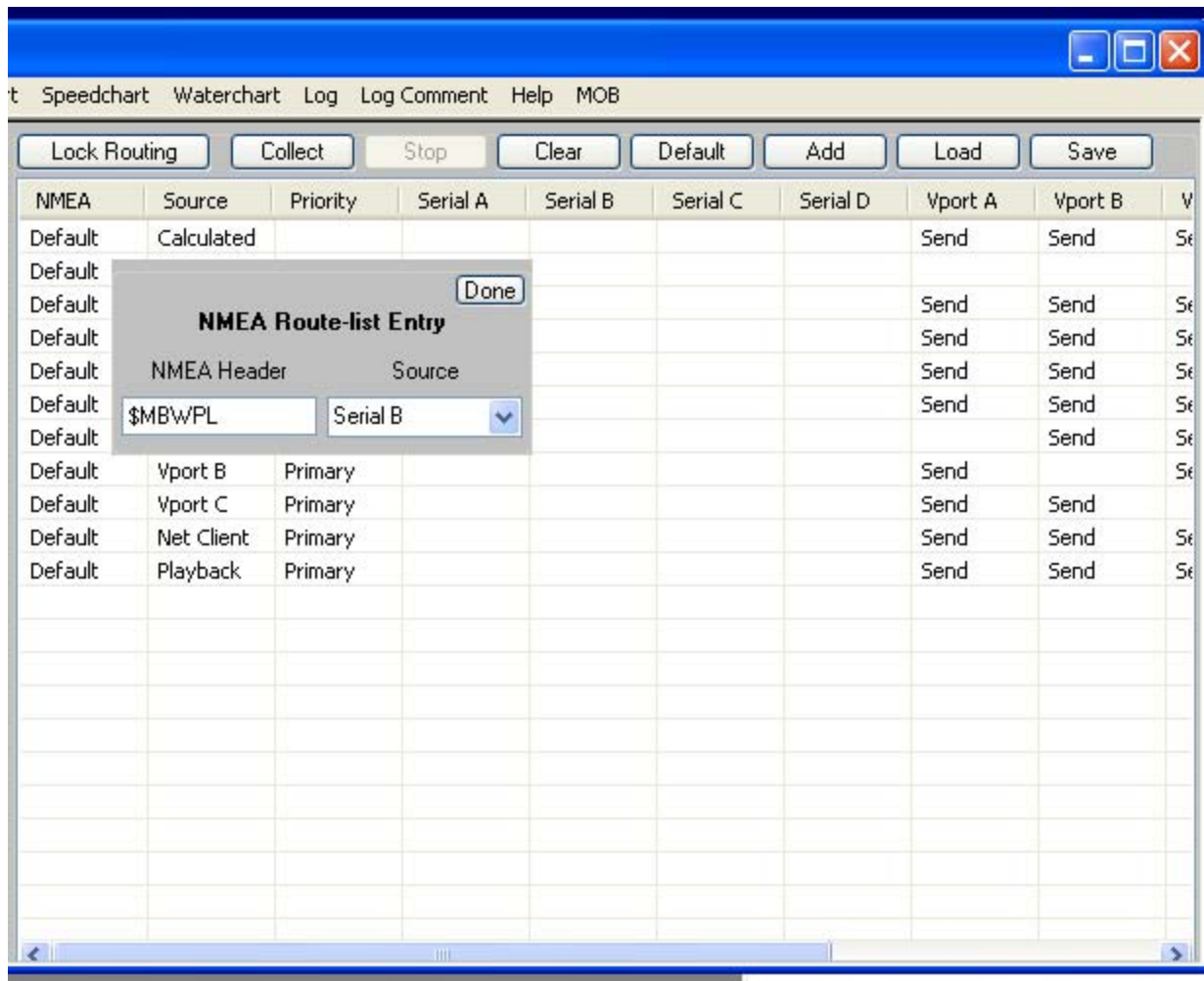
Here, you enter the NMEA sentence (including the leading "$"), and select the input source. Click **Done**, and the entry will appear in the route-table, with the default routing options:
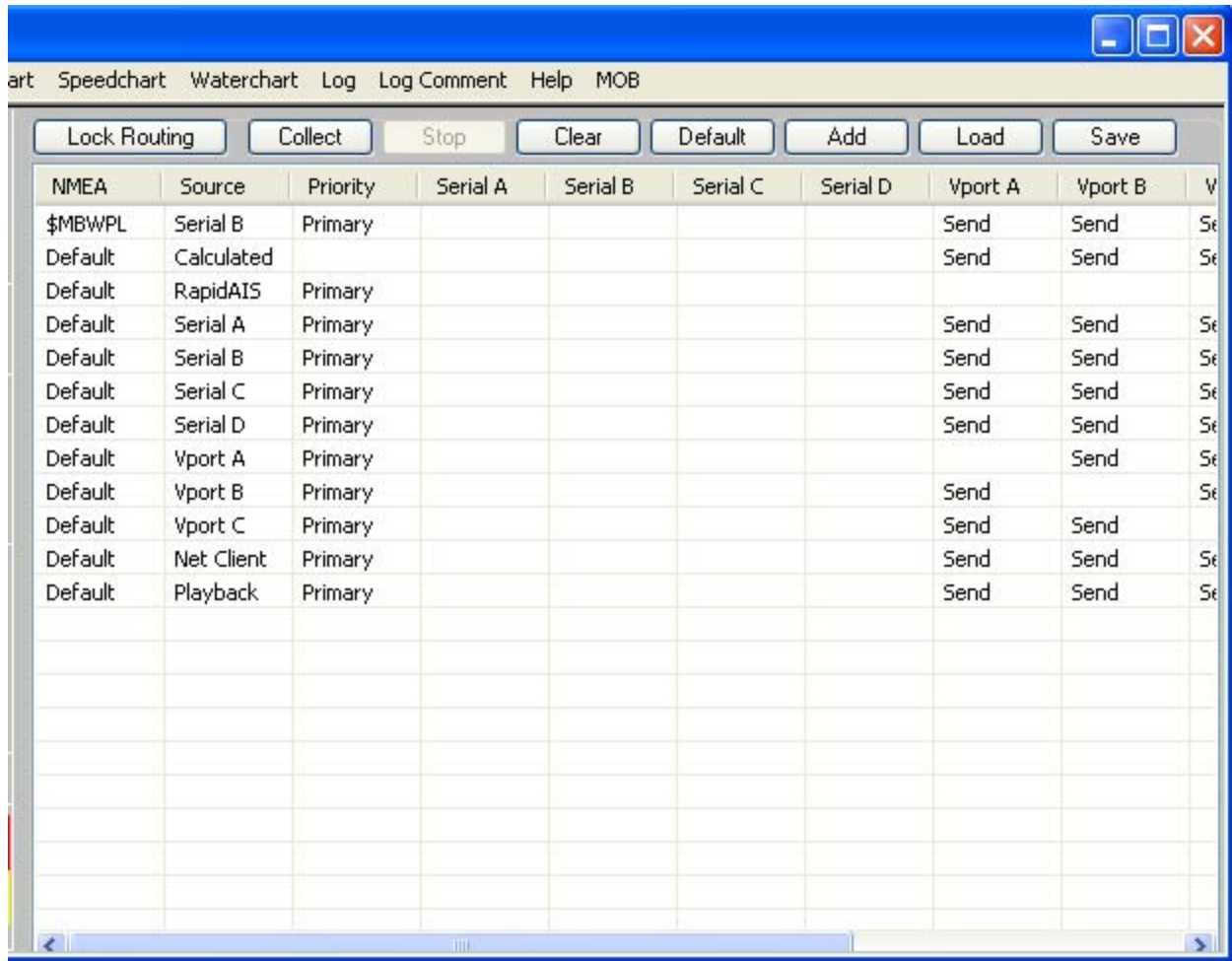
You can now edit the routing options as desired.

The MOB Option
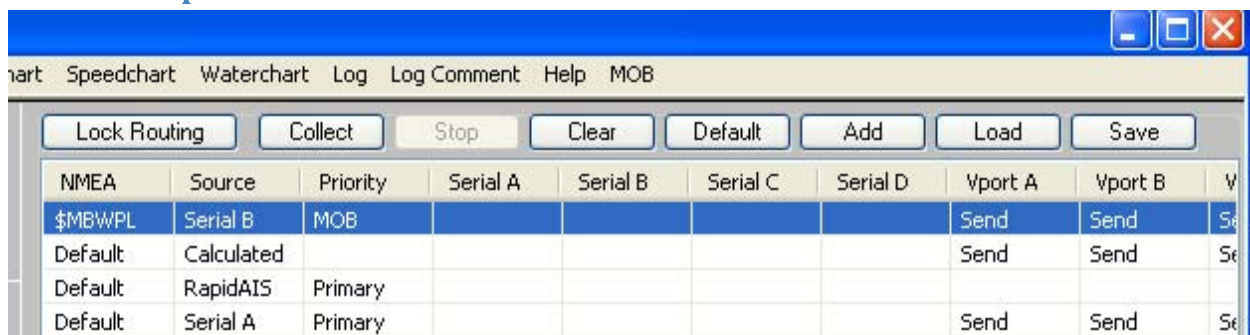
There are some MOB (Man Over Board) alarm systems that generate NMEA sentences which can be used to trigger alarms, and place a MOB waypoint on the chartplotter. NavMonPc will detect these messages and use them to initiate the MOB alarm (see **Man Over Board** in the NavMonPc User's Guide). If a latitude/longitude position is provided by the MOB message, NavMonPc will use this position. If no position is provided, NavMonPc will use the current position of the boat for the MOB location.

I am currently aware of two systems that generate the MOB message: NKE, and MOBILert. These systems use the NMEA "WPL" (Waypoint Location) message.

To enable detection of these MOB messages, there is now a "MOB" Priority option. When the MOB option is selected, the associated message is not decoded as a normal WPL message, but is instead processed as a MOB message. The MOB priority is only available for the "WPL" and "BWC" NMEA sentence types. I don't know of any MOB systems using the BWC sentence, but have been using it for testing.

NMEA Monitor

The NMEA Monitor can be opened from the **Options** menu, or by clicking the **Monitor** button on the various input/output configuration screens (**File / Connections / Serial Port A**, etc.)
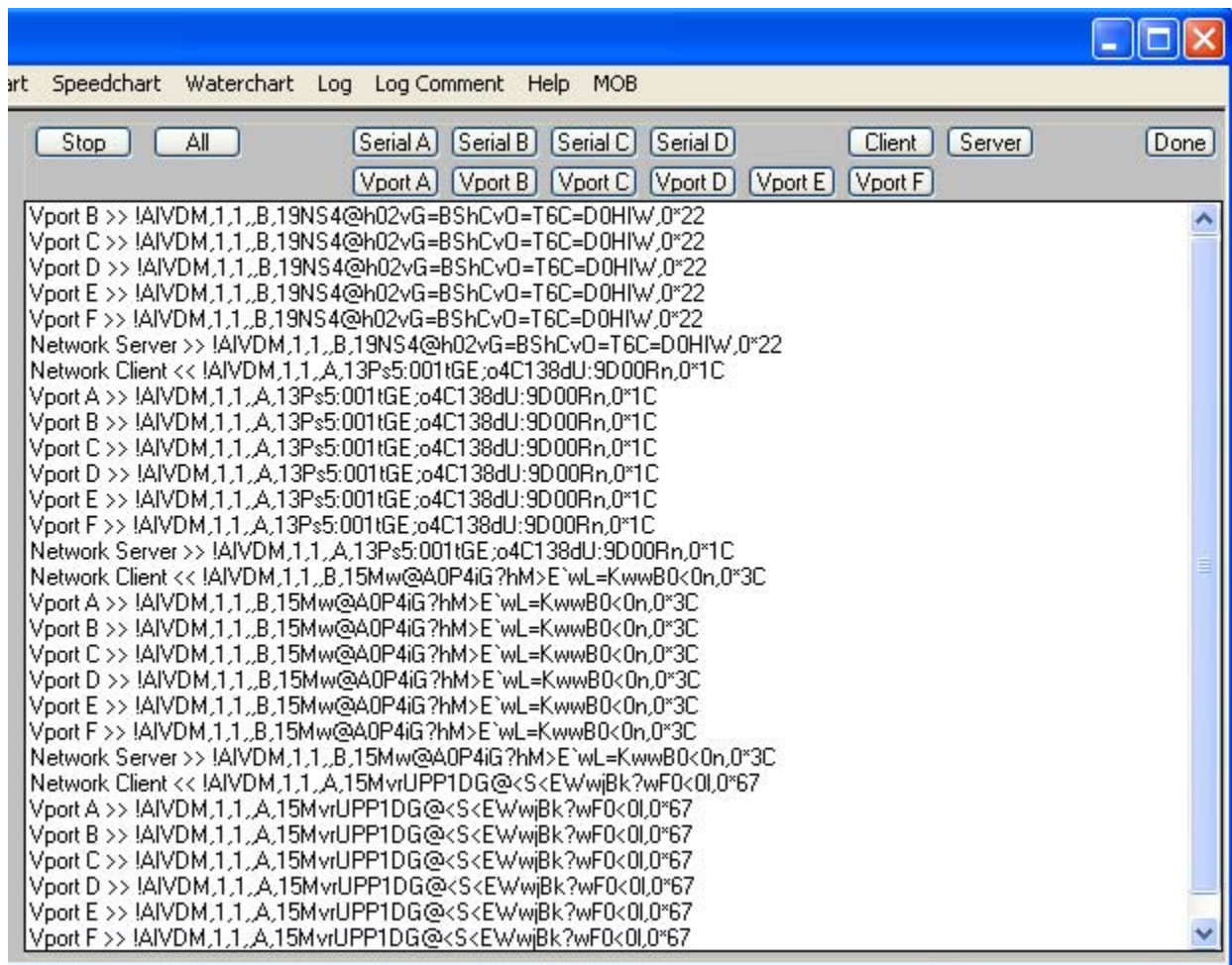
On the Monitor window there are several control buttons:

- Stop – Freezes the Monitor screen
- All – Shows data from all ports

- Serial A, SerialB … Server – Shows only data to/from the selected port
- Done – Closes the Monitor window

Data being received by a port is designated by a **<<**, and data being sent from a port by a **>>**. Note that data being queued for transmission from a port will be displayed even if the port if not active or connected.

NavMonPc Options
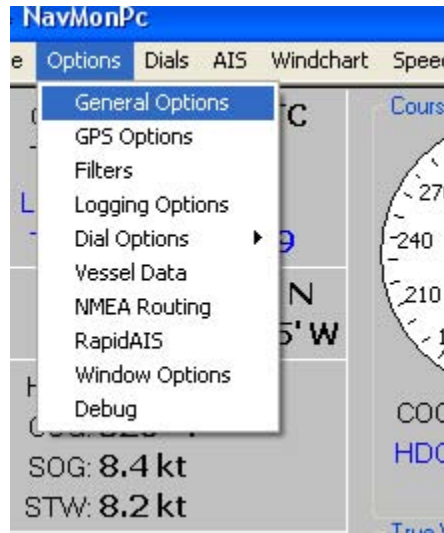
Most NavMonPc options can be accessed through the **Options** menu.

General Options
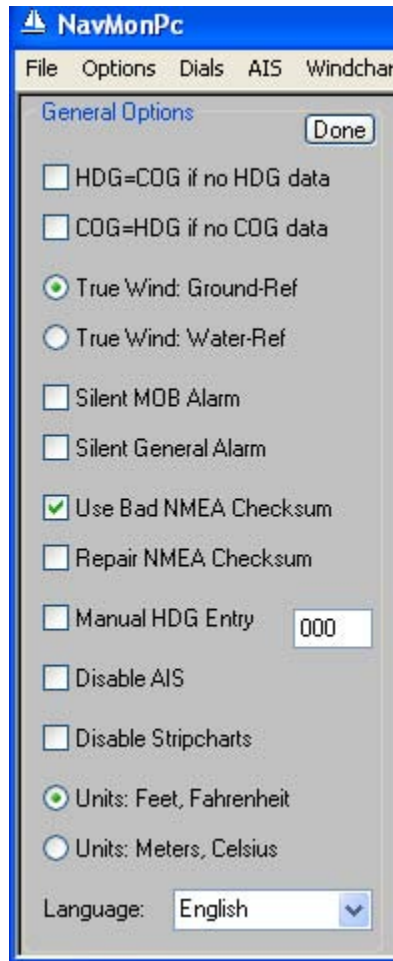
- HDG=COG – This option uses Course Over Ground (COG) in place of Heading (HDG) if no heading data is available. COG is typically provided by a GPS, and HDG by a fluxgate compass.
- COG=HDG – This option uses HDG in place of COG if no COG data is available.
- True Wind – This option selects either ground-referenced, or water-referenced True Wind calculations. See the FAQ for more information on True Wind calculations.
- Alarms – Mutes the Man Over Board and General alarms
- NMEA Parity Errors – Some NMEA equipment does not generate a proper message parity field (also called a checksum). Normally NavMonPc will discard NMEA messages with invalid parity. This option causes the parity to be ignored.
- Repair NMEA Checksum – When enabled, all NMEA messages will have their checksums regenerated. This can be useful when you need to have another piece of NMEA gear process data with bad checksums (*see note below).
- Manual HDG Entry – In some cases (a stored boat, for example) most of the navigation equipment has been turned off and only wind data is available. This option lets you hand-enter a True heading (000.0 – 359.9) so the wind direction can be displayed.

- Disable AIS – AIS processing can use a significant amount of computer power. If you do not need NavMonPc's AIS feature, you can disable it.
- Disable Stripcharts – again, you can reduce the processor loading with this option.
- Units – Selects English or Metric units
- Language – NavMonPc now supports multiple languages! There is a translation file that NavMonPc reads at start-up – *translations gratefully accepted* – and this option lets you select the language to use. The selected language will be loaded the next time the program is started.

(*) NMEA Checksums

In navsystems using the NMEA-0183 protocol, there are two forms of error detection: parity and checksum. These terms are occasionally interchanged, and I have been guilty of this. To clarify:

Parity is the per-character check performed by the serial port hardware. This is a single bit, applied to the end of the character, that indicates whether there are an even or odd number of "one" bits in the character. ***The parity bit is usually omitted in NMEA connections (the serial port setting "N, 8, 1" indicates "No parity, 8 data bits, 1 stop bit").***

The **Checksum** is a two-character field (hexadecimal, "00" to "FF"), applied at the end of an NMEA sentence. For example, here is an "RMC" sentence:
`$ECRMC,202830,A,3711.152,N,12341.411,W,4.8,229.0,150708,015.0,E,A*1A`
Note the "`*1A`" at the end. The "`1A`" is the checksum, preceded by the "`*`" parity flag. The checksum is the eight-bit exclusive or of all the characters in the sentence between, but not including, the leading "$" (or "!" in the case of AIS messages) and the trailing "*".

A bad checksum usually indicates that the sentence was corrupted in some manner, either by noise in the interconnections, or by overflow, etc., in some piece of equipment. In these cases, it is best to discard the damaged messages. In some cases however, a bad checksum is provided by equipment that is otherwise delivering good data. For example, some (but not all) multiplexers will modify a sentence header but not recalculate the checksum. While this is not desirable, NavMonPc provides the ability to ignore and repair these bad checksums. ***Please use these features with care! Using bad data can ruin your whole day!***

GPS Options

- User Position --You will typically use the position delivered by a connected GPS. In some cases you may instead choose to manually enter the latitude/longitude of a fixed location.
- Magnetic Variation Source -- In most cases the Magnetic Variation is provided by the GPS. In some cases it is not, and you can either enter a fixed magnetic variation, or let NavMonPc perform the calculation. Note that the GPS-provided and NavMonPc-calculated variations may not agree exactly. The difference is usually minor and can be safely ignored (and the NavMonPc calculation is probably the more accurate of the two).
- Use True Bearings – Magnetic bearings will be displayed if this box is un-checked.

NMEA Options
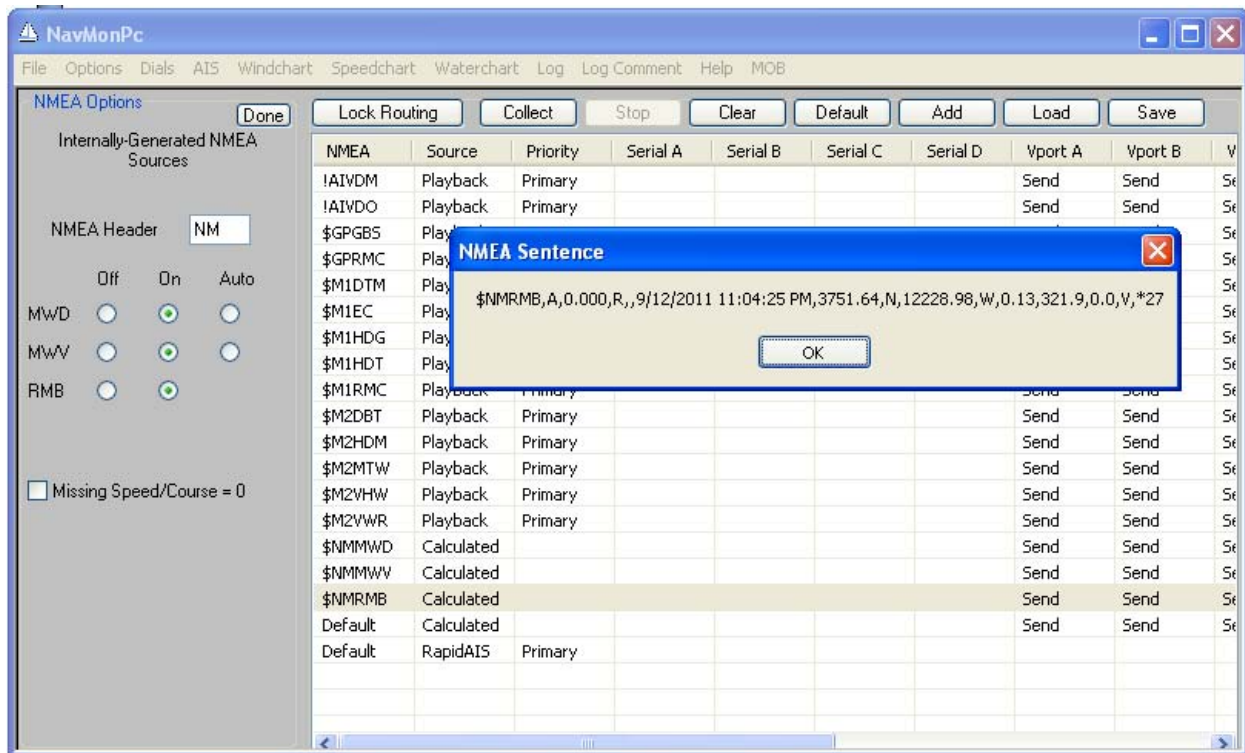
The NMEA Options screen (on the left) is where you control the generation of "calculated" true wind NMEA data.

NavMonPc will display true wind data whenever possible (it also displays apparent wind data). If true wind data (MWD, MWV, VWT) is received from the attached navsystem gear, NavMonPc displays this data. If true wind information is not available, NavMonPc attempts to calculate it from the available apparent wind data (and from vessel speed and heading).

"MWD" and "MWV" NMEA sentences that contain this true wind data can be generated and sent to other programs and systems, under the control of the options on the NMEA Options, and the NMEA Routing windows.

NMEA Header

The header is used to identify the source of the NMEA sentence. For compatibility, the header should be in upper case, and have exactly two characters. There are many pre-defined header values, but any arbitrary header is acceptable (unless the equipment that is receiving this data requires something specific).

Off / Auto / On

These option buttons control the NMEA sentence generation:

- Off – Do not generate the sentence
- Auto – Only generate the sentence if there is no similar sentence already being received
- On – Always generate the sentence

The NMEA Routing feature can be used to control where the generated messages are sent. If you are upgrading from a previous version of NavMonPc, you will need to add these messages to the route-table (see **NMEA Routing** in the NavMonPc User's Guide).   This can be done in the Advanced Routing window by clicking either the **Collect** or **Default** buttons. In the screen-shot above, the generated MWV, MWD, and RMB sentences have been captured as explicit routes. By mouse-clicking on the "$NMRMB" entry you can see the most-recently received sentence, as shown in the small "NMEA Sentence" information window.

Filters
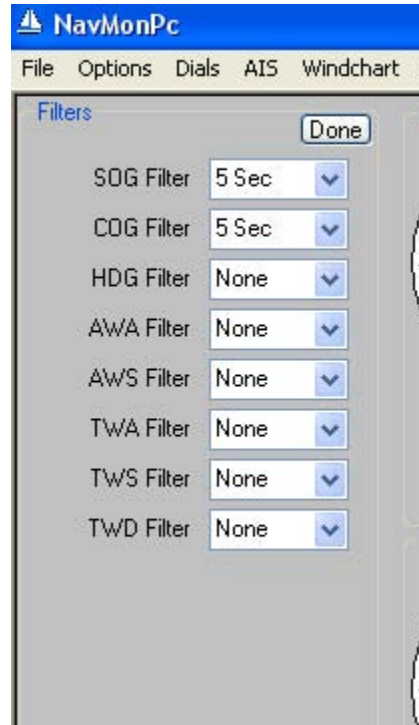
It may be useful to filter, or smooth, the various data sources. For example, some GPS-delivered speed and course data can be pretty noisy, and this can affect the AIS proximity alarm calculations, or make the dials and stripcharts difficult to interpret.

The filters are very simple, and provide a wide range of "time-constant" settings. Longer settings will cause the displayed values to respond very slowly, so the filter settings will always be a compromise. Start with a low filter setting and gradually increase it until you achieve the desired effect.

Vessel Data
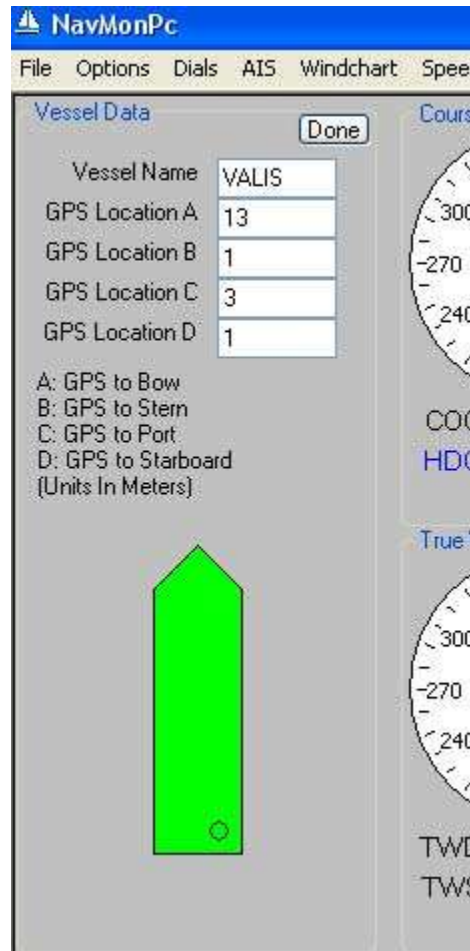
The Vessel Data is provided so your vessel appears on the AIS screen in its proper size, relative to the other ships. It serves no other purpose.

Note that the AIS Closest Point of Approach (CPA) calculations use the locations of the GPS antennas on each vessel, and do not take into account the vessel dimensions.

Features

NavMonPc provides several additional features:

NMEA File Playback

NavMonPc can replay NMEA logfiles, which allows you to review previous conditions, your boat's performance, etc. The playback speed is only approximate, with the options for 1x (real-time), 10x, and 100x speeds.

*Rapid*AIS
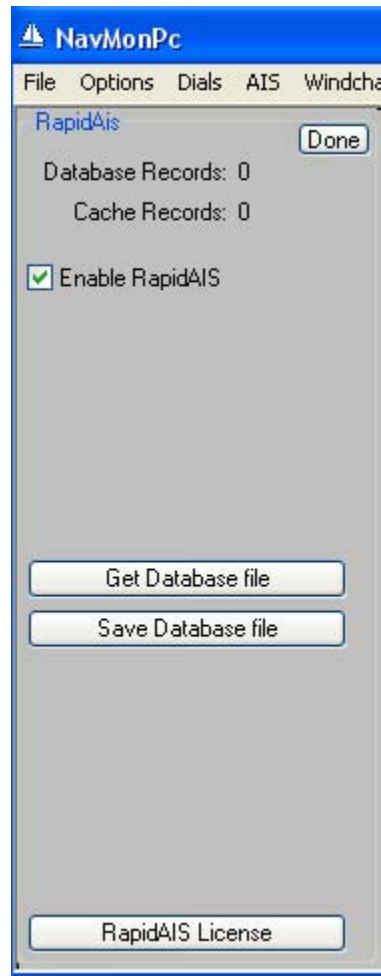
If you have spent much time using AIS, you have no doubt experienced painfully long delays while waiting for an approaching vessel's name to appear on the screen. While AIS transponders transmit a vessel's position, course, and speed fairly frequently, a vessel's name, callsign, and other "static" information is only sent every six minutes. If you have a single-channel AIS receiver you may have to wait twice as long for this valuable information, and if the signals are weak or noisy a vessel may be dangerously close by the time the name appears. Calling "the ship off my port bow" is often fruitless, while a "Hailing Vessel Andromeda!" will usually get a quick response.

*Rapid*AIS is a powerful feature that will remember the name, callsign, and other static information for AIS-equipped vessels you encounter, and save it to a database on your computer. This won't help the first time you meet, but as we often see the same vessels again and again in our cruising grounds, over time *Rapid*AIS "learns" the names of many of the vessels you encounter.

It is also possible to use a "pre-collected" database, with data collected from the internet and other sources of AIS data. I am looking into this and other options, so stay tuned.

A license is no longer required to activate *Rapid*AIS. You do have to enable it by checking the **Enable RapidAIS** box.

Window Options
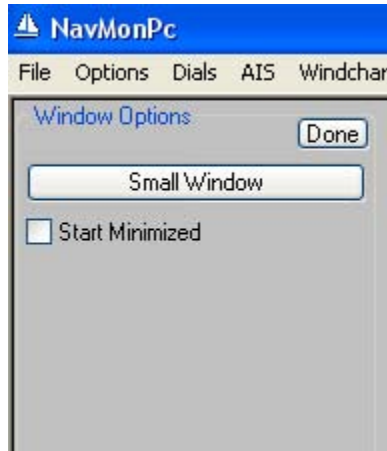
The normal NavMonPc tray icon   The "Loss of GPS" NavMonPc tray icon

If the GPS input to NavMonPc is lost, the tray icon will flash once every second, alternating between the normal and the alarm icons.

The **Small Window** button restores the NavMonPc window to the default minimum size. This feature is included because the normal Windows "drag window edge" operation is rather difficult to use in NavMonPc. It works, but the expected cursor icons do not appear.

Frequently Asked Questions

Calculating and displaying True Wind

(working on this)

Why can't I send data out the Network Client port?

Because I can't make the networking library I am using properly support this. I'm working on it.

All the dials are blank!

The reason for this is that your computer's "Color Quality" is set to 16-bits. Due to a "feature" of the programming libraries used in NavMonPc, certain objects require a Color Quality setting of 24 or 32-bits. You can set the quality in the Windows "Display Properties" screen:
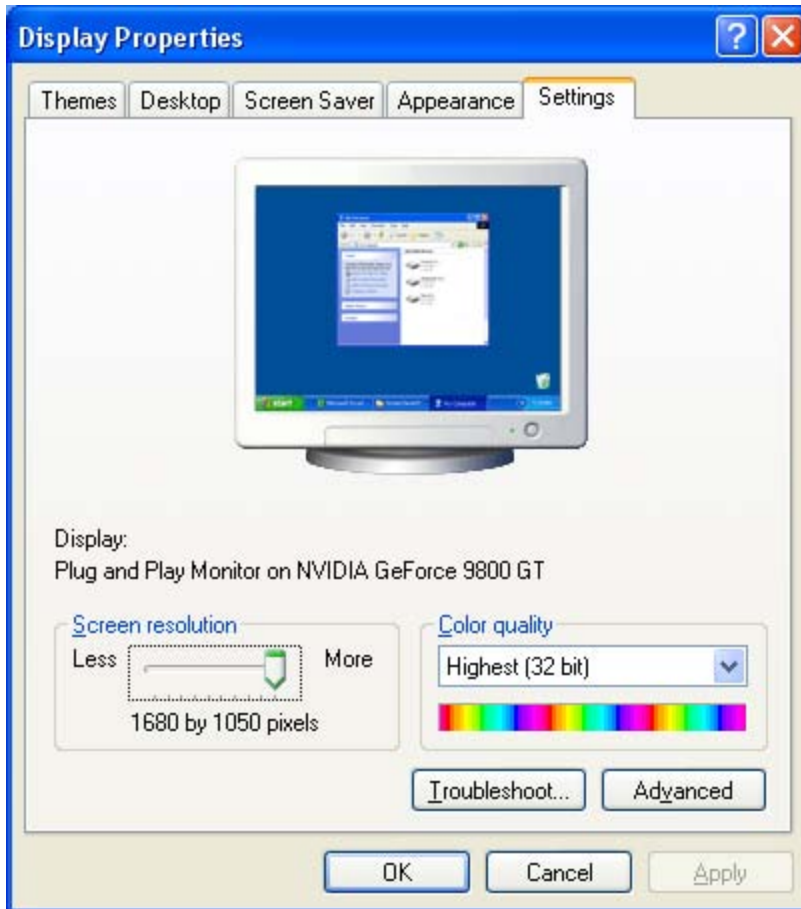
The above screen is from a WindowXP system, and it may have a different appearance in other versions of Windows.

My Serial Port connections freeze when the computer wakes up from hibernation

Sometimes the serial ports do not resume operation when the computer comes out of hibernation. In my experience this depends on the Serial/USB adaptor, not the computer, its OS, or the NavMonPc version. On my testbench, the Belkin FSU409 behaves well, but the no-name (Prolific) adaptor always hangs up during hibernation. Strangely though, one NavMonPc user is seeing the same adaptor work fine with NavMonPc ver 0.67, but hang up (after hibernation) with ver 0.70. Any other reports would be appreciated.

How can I reduce the size of the NMEA Logfiles?

Just to clarify, the NMEA logging is by default all or nothing. The 1 minute interval (and others) is for the spreadsheet log only. If you want to reduce the size of the NMEA log, you can use the advanced NMEA routing function to select which NMEA sentences/input ports will be sent to the log. This is obviously only an option if there is data you don't care to save.

I connect NavMonPc to the serial output of my B&G "Performance Processor", and I'm not getting any data.

As an option, the B&G Performance Processor puts out data in a proprietary "H-Link" format. NavMonPc cannot decode this format, it only understands NMEA-0183.

What about NMEA-2000?

NavMonPc does not understand NMEA-2000. There are adaptors available that can translate a limited subset of NMEA-2000 data into NMEA-0183.

What about SeaTalk?

NavMonPc does not understand SeaTalk, and the SeaTalk data format is not compatible with standard serial ports. There are adaptors available that can interface to and translate SeaTalk data into NMEA-0183.

The NMEA inputs are connected and running, but I'm not seeing all the data.

Did you mess with the NMEA Routing? I told you this might happen! Try going to the **Advanced Routing** screen, click **Clear**, then **Default**.

If this doesn't fix it, check the Serial Port connections. Is the baud rate set correctly? What about Databits, Parity, and Stopbits? You should be seeing the NMEA data flash by on the data window. If it looks like a bunch of funny symbols, the Port settings may be wrong. The usual setting is:

Databits: 8
Parity: None
Stopbits: 1
Baud Rate: 4800 (or 38400 when AIS is being carried)

You may be getting NMEA Parity errors. Some equipment omits the NMEA Parity (also called checksum). See if setting the NavMonPc "Ignore NMEA Parity Errors" option fixes the problem. ("Options / General Options")

How can I display "Target Boat Speed"?

TBS (Target Boat Speed) is provided by your sailing instruments, not NavMonPc. These instruments calculate TBS from the wind conditions, your boat's polars, and often other parameters such as heel, etc.

I am working on an option to read a Polar table, perform a simple TBS calculation, and display it. This will most likely not be as accurate as the high-end systems, but may prove useful.

How do I set the Baud Rate for the Virtual Serial Ports?

The virtual serial ports completely ignore baud rate (and parity, stop bit) settings. You can select *any* baud rate in a connected application and it will work fine.

What is NMEA-0183?

(info about NMEA-0183, some sample messages)

My computer doesn't have a serial port.

(info about USB multiplexers, network interfaces)

Technical Details

NavMonPc Installation

Here is the installer control file for NavMonPc version 0.76:

```
; -- NavMonPc.iss --
[Setup]
OutputBaseFilename=NavMonPc-0.76-Setup
AppName=NavMonPc
AppVerName=NavMonPc Prototype Dials
DefaultDirName={pf}\NavMonPc
DefaultGroupName=NavMonPc
UninstallDisplayIcon={app}\navmonpc.exe
Compression=lzma
SolidCompression=yes

[Files]
Source: "navmonpc.exe"; DestDir: "{app}"; Flags: replacesameversion

Source: "NSBComDlg.dll"; DestDir: "{sys}"; Flags: restartreplace sharedfile regserver
Source: "NSCEPictureBox.ocx"; DestDir: "{sys}"; Flags: restartreplace sharedfile regserver
Source: "NSBControls.dll"; DestDir: "{sys}"; Flags: restartreplace sharedfile regserver
Source: "MSCEFILE.DLL"; DestDir: "{sys}"; Flags: restartreplace sharedfile regserver
Source: "NSBWin32.dll"; DestDir: "{sys}"; Flags: restartreplace sharedfile regserver


; Franson serialtools
Source: "SerialXP.dll"; DestDir: "{sys}"; Flags: restartreplace sharedfile regserver
Source: "SerialToolsXPRunTime.exe";   DestDir: "{app}"; Flags: replacesameversion

; Catalyst SocketWrench, for network client
Source: "cswskax5.ocx"; DestDir: "{sys}"; Flags: restartreplace sharedfile regserver

; NETStreams.dll, Newobjects, contains network server tools
Source: "newobjectspack1.dll"; DestDir: "{sys}"; Flags: restartreplace sharedfile regserver
Source: "NETStreams.dll"; DestDir: "{sys}"; Flags: restartreplace sharedfile regserver


Source: "NavMonPcConfig.txt"; DestDir: "{%appdata}\NavMonPc"; Flags: onlyifdoesntexist
Source: "NavMonPcRouting2.txt"; DestDir: "{%appdata}\NavMonPc"
Source: "Alarm1.wav"; DestDir: "{%appdata}\NavMonPc"; Flags: onlyifdoesntexist
Source: "Alarm2.wav"; DestDir: "{%appdata}\NavMonPc"; Flags: onlyifdoesntexist
Source: "navmontray.bmp"; DestDir: "{%appdata}\NavMonPc"
Source: "navmontrayAlarm2.bmp"; DestDir: "{%appdata}\NavMonPc"
Source: "NavMonPcSplash.jpg"; DestDir: "{%appdata}\NavMonPc"

[Icons]
Name: "{group}\NavMonPc"; Filename: "{app}\navmonpc.exe"

[Run]
Filename: "{app}\SerialToolsXPRunTime.exe"; Flags: postinstall
```

The installer will create the NavMonPc folder in your computers application folder (usually `C:\Program Files\NavMonPc`).
Into this folder goes

- `NavMonPc.exe`
- `SerialToolsXPRunTime.exe`

It will also create a folder for NavMonPc's data (usually `C:\Documents and Settings\[user]\Application Data\NavMonPc`)

Into the data folder go these files:

- `NavMonPcConfig.txt`
- `Alarm1.wav` – the general alarm soundfile
- `Alarm2.wav` – the MOB alarm soundfile
- `navmontray.bmp` – the regular system tray icon
- `navmontrayAlarm2.bmp` – the "loss of GPS" system tray icon
- `NavMonPcSplash.jpg` – the program-start screen

The installer also installs numerous support files into the system folder (usually `C:\WINDOWS\system32`):

- `NSBComDlg.dll`
- `NSCEPictureBox.ocx`
- `NSBControls.dll`
- `MSCEFILE.DLL`
- `NSBWin32.dll`
- `SerialXP.dll`
- `cswskax5.ocx`
- `newobjectspack1.dll`
- `NETstreams.dll`

When all these files are installed, the installer asks if you want to want to run `SerialToolsXPRunTime.`, which installs drivers for the serial port interfaces. If this is the first time NavMonPc has been installed on this computer, continue and run the program. If NavMonPc has been previously installed you may opt to not run `SerialToolsXPRunTime.`

A Sample NavMonPcConfig.txt file

```
' NavMonPc Version 0.72 Configuration File: C:\Documents and Settings\Elliott\Application Data\NavMonPc\NavMonPcConfig.txt
' Save Date: 11/30/2009 11:27:28 PM
'InitialConfig$ Ignore Parity Errors$ Use True Bearings$ SilentMobAlarm$ SilentGeneralAlarm$ obTwsUseStw$ Spare
InitialConfig$ 1$ 1$ 0$ 0$ 0$ Spare
'UserPosition$ Lat (+/-DD.ddddd)$ Lon (+/-DDD.ddddd)$ Use
UserPosition$ 38.39428$ -122.9994$ 0
'SerialConfig$ portA$ BaudA$ AutoStart$ cbAlarmA$ cbMobA$ cbInvertRts$ portB$ BaudB$ AutoInitB$ VPortA$ AutoInitVPortA$ VPortB$ AutoInitVPortB$ VPortC$
AutoInitVPortC
SerialConfig$ [Closed]$ 38400$ 0$ 0$ 0$ [Closed]$ 38400$ 0$ [Closed]$ 0$ [Closed]$ 0$ [Closed]$ 0$
'PortA$ AutoStart$ ComPort$ BaudRate$ DataBits$ Parity$ StopBits$ Alarm>RTS$ CTS>MOB$ Invert RTS
PortA$ 0$ [Closed]$ 38400$ 1$ 0$ 0$ 0$ 0$ 0
```

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```
'PortB$ AutoStart$ ComPort$ BaudRate$ DataBits$ Parity$ StopBits
PortB$ 0$ [Closed]$ 38400$ 1$ 0$ 0
'PortC$ AutoStart$ ComPort$ BaudRate$ DataBits$ Parity$ StopBits
PortC$ 0$ [Closed]$ 38400$ 1$ 0$ 0
'PortD$ AutoStart$ ComPort$ BaudRate$ DataBits$ Parity$ StopBits
PortD$ 0$ [Closed]$ 38400$ 1$ 0$ 0
'NetworkConfig$ Name$ address port$ AutoStart
NetworkConfig$ Ais-Hub$ 87.121.76.11$ 4033$ 0
'AisConfig$ North Up$ Heading Up$ Course Up$ Show All$ Show Cautions$ Show Alarms$ Relative Vectors$ Target Triangles$ Show Names$ Plot to Scale$ Auto-TCPA
Vector$ GZ Radius$ GZ CPA$ GZ TCPA$ Range$ Vector$ ExtrapolatePosition$ cbGhostLife$ obDisplayChart$ CoastlineFileName$ ShowOwnVessel$ ShowClassA$
ShowClassB$ ShowSAR$ ShowBaseStations$ ShowWaypoints$ ShowNavAids$ ShowStoppedShips$ FreshTargets$ MmsiCaching$ Spare$ Spare
AisConfig$ 1$ 0$ 0$ 1$ 0$ 0$ 0$ 1$ 1$ 0$ 0$ 2$ 11$ 13$ 1$ 0$ C:\Documents and Settings\Elliott\My Documents\_NavMonPc\Coastline\California.dat$ 1$
1$ 1$ 1$ 1$ 1$ 1$ 1$ 1$ False$ False
'Waypoint$ LatDeg$ LatMin$ LatNS$ LonDeg$ LonMin$ LonEW$ WpName$ WpActive
Waypoint$ 38$ 23.6573$ N$ 122$ 59.9636$ W$ Fitzpatrick PM$ 0
'Stripchart$ TimeScaleIndex(0)$ TimeScaleIndex(1)$ TimeScaleIndex(2)$ RightScaleIndex(0)$ RightScaleIndex(1)$ RightScaleIndex(2)$ ZoomArrayIndex(0)$
ZoomArrayIndex(1)$ ZoomArrayIndex(2)$ LeftChartCenter(0)$ LeftChartCenter(1)$ LeftChartCenter(2)
Stripchart$ 0$ 0$ 0$ 0$ 0$ 0$ 0$ 0$ 0$ 0$ 0$ 60
'IpList$ [Name$ IP$ Port]
IpList$ Hi-Def San Francisco$ 207.7.148.216$ 9009
IpList$ Ais-Hub$ 87.121.76.11$ 4033
IpList$ Siitech$ 174.1.59.216$ 9019
IpList$ Barn AIS Server$ 192.168.1.5$ 4005
IpList$ Barn GPS Server$ 192.168.1.230$ 14001

'OwnShipData$ OwnShipName$ OwnShipGpsLocA$ OwnShipGpsLocB$ OwnShipGpsLocC$ OwnShipGpsLocD$ Spare
OwnShipData$ Own Ship$ 13$ 1$ 3$ 1$ Spare
'InternationalOptions$ obUnitsMetric.value
InternationalOptions$ 0
'WaypointList$ [Name$ Lat$ Lon]
WaypointList$ Fitzpatrick PM$ 38.39429$ -122.9994

'Filters$ cbSogFilter.ListIndex$ cbCogFilter.ListIndex$ cbAwaFilter.ListIndex$ cbAwsFilter.ListIndex$ cbTwaFilter.ListIndex$ cbTwsFilter.ListIndex$
cbTwdFilter.ListIndex$ cbCogToHdg.value
Filters$ 2$ 2$ 0$ 0$ 0$ 0$ 0
'MagVar$ AutoMagVar$ CalcMagVar$ UserMagVar$ UsrMvDeg$ UsrMvMin$ UsrMvEW
MagVar$ 1$ 0$ 0$ 00$ 00$ W
'Dial$ InstanceName$ Row$ Column$ cbShowMinMax.value$ cbShowMinMax2.value$ Max$ Min$ Max2$ Min2
Dial$ Compass$ 1$ 1$ 1$ 0$ 194.5764$ 138.0013$ 198.4$ 131
'Dial$ InstanceName$ Row$ Column$ cbShowMinMax.value$ cbShowMinMax2.value$ cbScale.ListIndex$ cbTbsEnable.value$ Max$ Min$ Max2$ Min2
Dial$ Speedo$ 1$ 2$ 1$ 0$ 3$ 1$ 10.39341$ 5.698496$ 10.77$ 6.5
'Dial$ InstanceName$ Row$ Column$ cbShowMinMax.value$ cbShowMinMax2.value$ cbScale.ListIndex$ Max$ Min$ Max2$ Min2
Dial$ WindSpeed$ 2$ 2$ 1$ 0$ 8$ 24.4$ 13.1$ 31.0901860887877$ 20.5194659661044
'Dial$ InstanceName$ Row$ Column$ cbShowMinMax.value$ cbShowMinMax2.value$ Max$ Min$ Max2$ Min2
Dial$ WindAngle$ 2$ 3$ 1$ 0$ 212$ 112$ 209.02$ 125.188
Dial$ InstanceName$ Row$ Column$ cbShowMinMax.value$ Max$ Min
Dial$ TrueWind$ 2$ 1$ 1$ 351.296$ 298.841
'Dial$ InstanceName$ Row$ Column$ cbEnaShallowAlarm.value$ tbShallowSetpoint.text$ cbEnaDeepAlarm.value$ tbDeepSetpoint.text$ cbEnaDepthCaution.value$
tbDepthCaution.text$ cbEnaDepthOffset.value$ tbDepthOffset.text
Dial$ DepthDial$ 2$ 4$ 0$ 0$ 0$ 0$ 0$ 0$ 0$ 0
'Dial$ InstanceName$ Row$ Column
Dial$ Waypoint$ 1$ 3
'Dial$ InstanceName$ Row$ Column$ Height$ Width$ SsLogFileName$ SsLogFileRoot$ NmeaLogFileName$ NmeaLogFileRoot$ cbLogGpsTime$ cbLogRun$ cbLogTrueWind$
cbLogAppWind$ cbLogWater$ cbLogStw$ cbLogHdg$ cbLogTbs$ cbSsAutoLog$ cbNmeaAutoLog$ cbAlog2Interval$ cbNmeaLogSourceId$ Columns(1).width$ Columns(2).width$
Columns(3).width$ Columns(4).width$ Columns(5).width$ Columns(6).width$ Columns(7).width$ Columns(8).width$ Columns(9).width$ Columns(10).width$
Columns(11).width$ Columns(12).width$ Columns(13).width$ Columns(14).width$ Columns(15).width$ Columns(16).width$ Columns(17).width$ Columns(18).width$
Columns(19).width$ Columns(20).width
Dial$ LogList$ 0$ 0$ 424$ 603$ C:\SsLog.csv$ C:\$ C:\NmeaLog.txt$ C:\$ 0$ 1$ 1$ 1$ 1$ 1$ 1$ 0$ 0$ 9$ 0$ 75$ 75$ 75$ 75$ 75$ 75$ 75$ 75$ 75$ 75$
75$ 75$ 75$ 75$ 75$ 75$ 10
'Dial$ NmeaRouteList$ Row (unused)$ Column (unused)$ Height$ Width
Dial$ NmeaRouteList$ 0$ 0$ 408$ 603
'NetworkServer$ AutoStart$ Port$ Spare$ Spare$ Spare$ Spare
NetworkServer$ 0$ 9999$ Spare$ Spare$ Spare$ Spare
'NavMonScreen$ Top$ Left$ Width$ Height$ StartMinimized
NavMonScreen$ 0$ 0$ 800$ 434$ 0
```

The NavMonPcRoute2.csv file format

(To be added)

Coastline Charts

While NavMonPc is definitely *not* a charting program, it can display rudimentary "coastline charts",
available free of charge from the NOAA: http://rimmer.ngdc.noaa.gov/mgg/coast/getcoast.html .

The easiest way to get these charts is to download them in "Mapgen" format, using zip compression.
Extract the ".dat" file and save it to a convenient location where you will be able to find it later.

The coastline chart file is a simple tab-delimited textfile, made up of coast sections. Each section starts
with a delimiter ("-b"), followed by a batch of line segments (longitude, latitude points):

```
# -b
-158.115670        21.379668
-158.115670        21.452420
-158.038224        21.494663
-157.906802        21.421911
-157.773032        21.309263
-157.683852        21.227124
-157.728442        21.206002
```

```
-157.829356      21.194268
-157.949045      21.175493
-158.059346      21.236511
-158.160260      21.379668
-158.148526      21.421911
-158.115670      21.379668
# -b
-157.242647      21.081620
-157.275503      20.987747
-157.242647      21.029990
-157.155814      21.051111
```

For More Information

See the NavMonPc website: www.NavMonPc.com

Join the Yahoo NavMonPc discussion group: http://tech.groups.yahoo.com/group/NavMonPc/