

**NavMonPc
User's Guide
Supplement**

Version 1.04 Update, May 16, 2010

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Contents

About This Document	3
Disclaimer and Warning	3
Changes Since Version 1.0	3
Menu Changes	4
NMEA Options.....	5
NMEA Header	5
Off / Auto / On	5
NMEA Monitor	6
General Options	7
(*) NMEA Checksums	8
Logging Options	9
NMEA Routing.....	10
Calculated Sources.....	11
Advanced Routing.....	12
Adding a Route-table entry.....	12
The MOB Option	14
Magnetic-only Operation.....	15
Debug.....	15
Debug1	16
Debug2	17
For More Information	17

About This Document

This document is a supplement to NavMonPc User's Guide Version 1. It covers the changes to NavMonPc introduced between Version 1.0, and Version 1.04

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 are agreeing to the above disclaimer and warnings.

Changes Since Version 1.0

- NavMonPc 1.04
 - Corrected MWV Generator to use "N" as "Knots" indication (was using "K", which is km/s).
 - Added full-window NMEA monitoring
 - Unformatted number option for spreadsheet log
 - Displays proper data when *only* magnetic information is available.

- NavMonPc 1.03
 - RapidAIS license no longer required.
 - Now saving AIS track options
 - Added "MOB" NMEA routing option for WPL and BWC (waypoint) messages (these also trigger AIS MOB target entry and display)
 - Added NMEA message generation for calculated values (TWS, TWA, TWD)
 - Added NMEA sentence decoding for XDR (transducer). Works with CruzPro VAH30 format, needs more work to generalize.
 - V, A, Ah optionally written To Log, no other display yet.

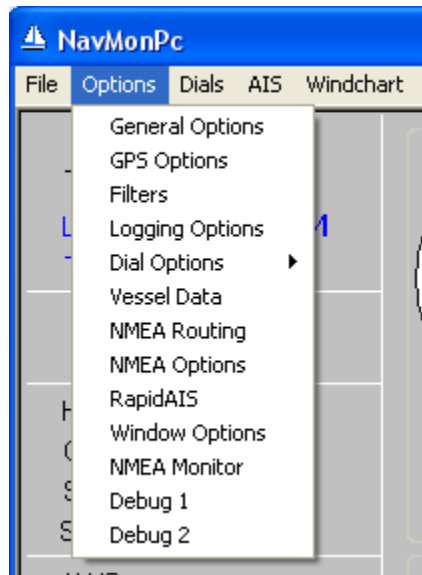
- NavMonPc 1.02

- Now saves entire RapidAIS database on program close when data file is manually loaded by user, otherwise only saves new records.
 - Using 2010 Geomag model (valid 2010 - 2014)
 - COG = HDG option
 - User-entered HDG option
 - Restored AIS "Decode VDO" debug option
 - Internationalization of text functions added
 - Fixed bug in AIS track display
 - more debug features
- NavMonPc 1.01
 - Fixed: Bug when saving RapidAIS data on program close (didn't save)

These new features are described below.

Menu Changes

There are changes to some of the NavMonPc menus and windows. In most cases these should be obvious, but some controls may have changed location.

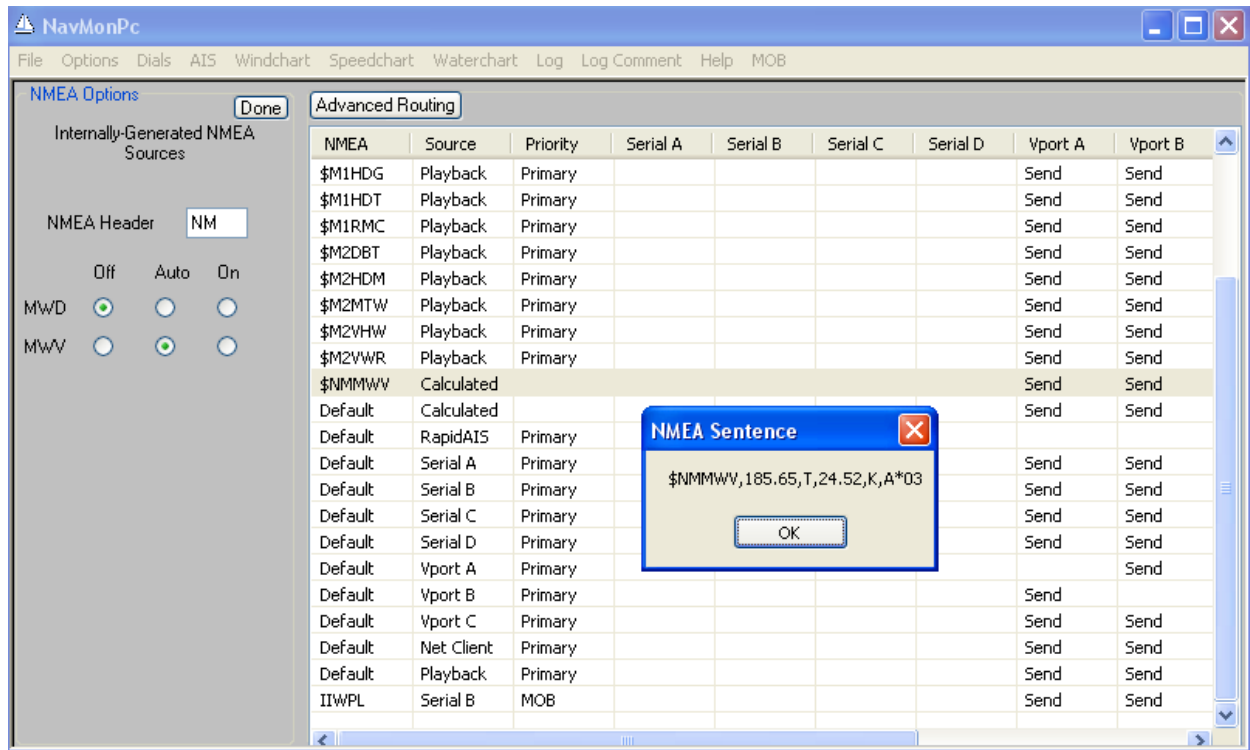


Options

There are three new entries on the Options menu:

- NMEA Options – controls the generation of “calculated” NMEA data
- NMEA Monitor – shows the NMEA input and output sentences
- Debug 1 – the original Debug window
- Debug2 – More Debug stuff

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:

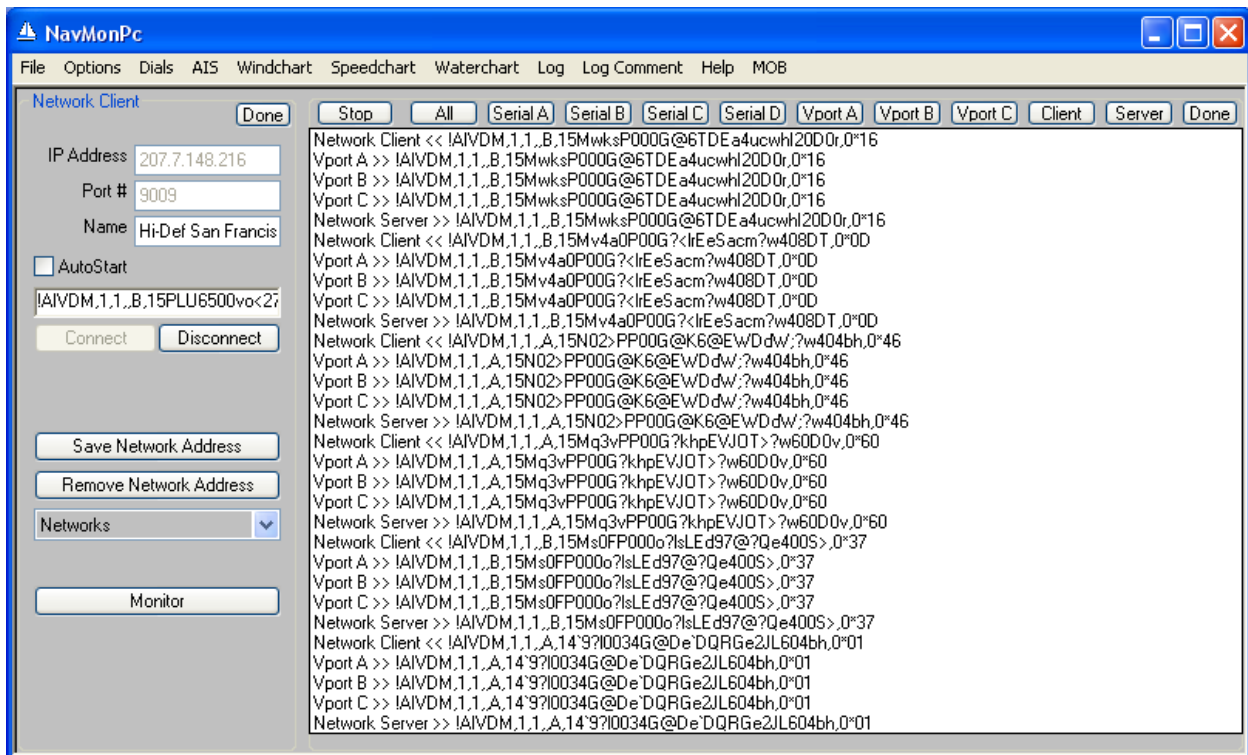
- Off – Do not generate the sentence
- Auto – Only generate the sentence if there is no similar sentence already being received

- 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 MWV sentence has been entered as an explicit route. By mouse-clicking on the “\$NMMWV” entry you can see the most-recently received sentence, as shown in the small “NMEA Sentence” information window.

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.)



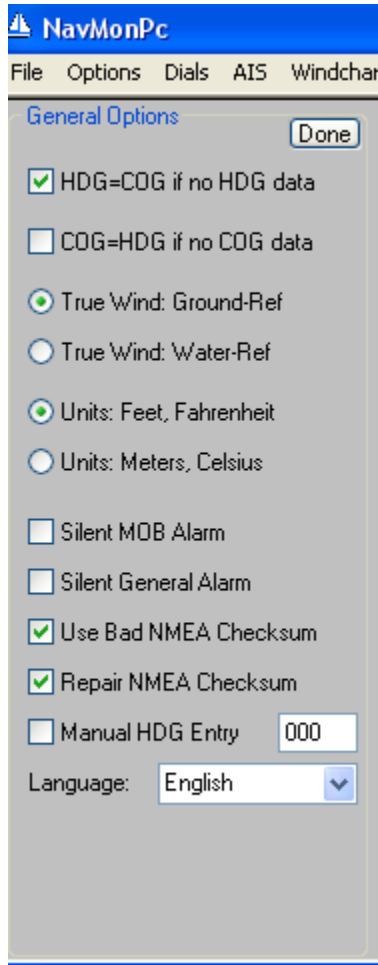
On the Monitor window there are several control buttons:

- 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 is not active or connected.

In the example above, AIS data is being received by the Network Client, and is sent (per the default NMEA routing) out the Network Client and the three Virtual Ports.

General Options



There are some new options:

- COG=HDG if no COG data – If, for example, you don't have a GPS, but only a fluxgate compass, this option will use the compass heading wherever COG is normally used. If both COG=HDG and HDG=COG are enabled, either one will be substituted for the other as needed. Obviously these features can affect the accuracy, so please use them with care.
- Use Bad NMEA Checksum – This option was previously called "Ignore NMEA Parity Errors". Normally, NavMonPc discards (does not use, does not forward) NMEA sentences with bad checksums. When enabled, NMEA sentences with bad checksums will be used and forwarded by NavMonPc.
- 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.
- 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!***

Logging Options

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
1	'Date	Time	'Latitude	'Longitude	'SOG	'COG	'Course Run	'Distance	'STW	'HDG	TWS	TWA	TWD	'AWS	'AWA
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:

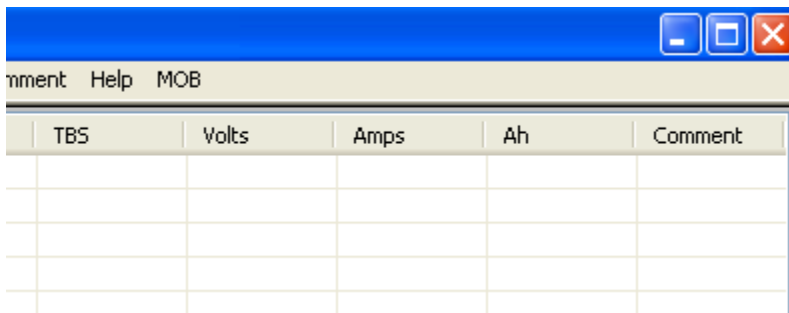
\$IIXDR,U,12.8,V,VAH30*04 (Voltage)

\$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:



The screenshot shows a software window with a blue title bar and a menu bar containing 'mment', 'Help', and 'MOB'. Below the menu bar is a table with five columns: 'TBS', 'Volts', 'Amps', 'Ah', and 'Comment'. The table has four empty rows below the header.

TBS	Volts	Amps	Ah	Comment

NMEA Routing

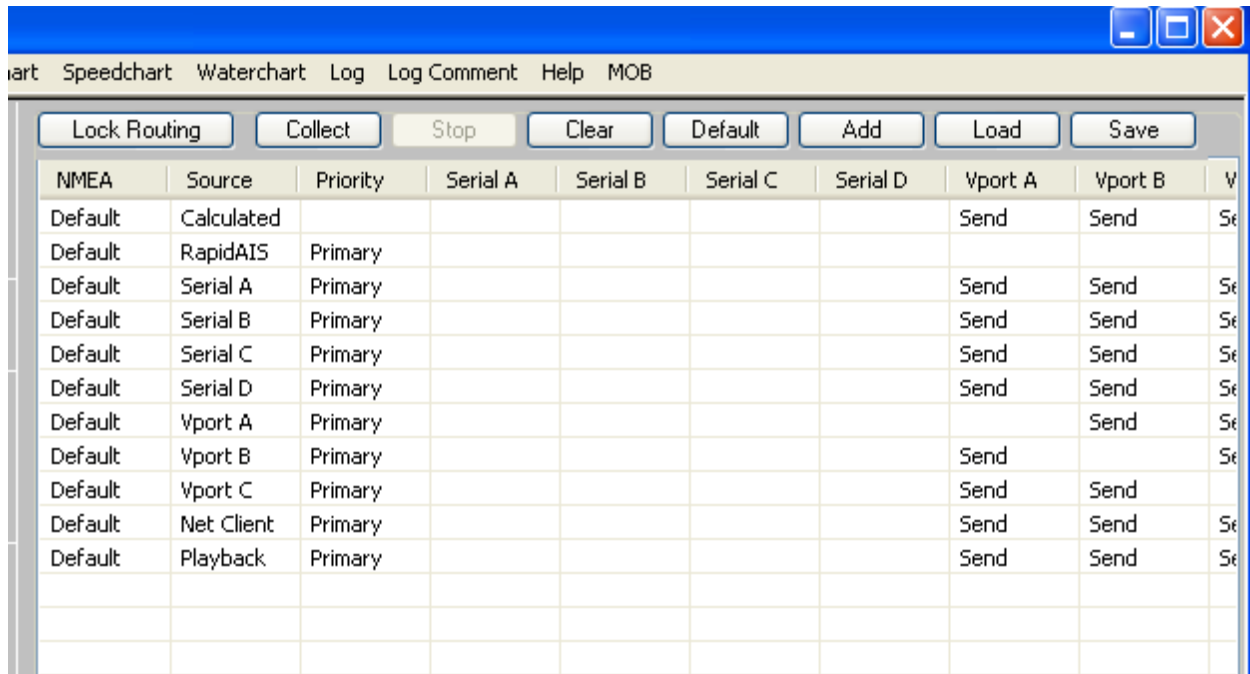
A new source category (Calculated) and a new priority (MOB) have been added, and the ability to hand-enter a route-table entry has been provided.

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.

Advanced Routing

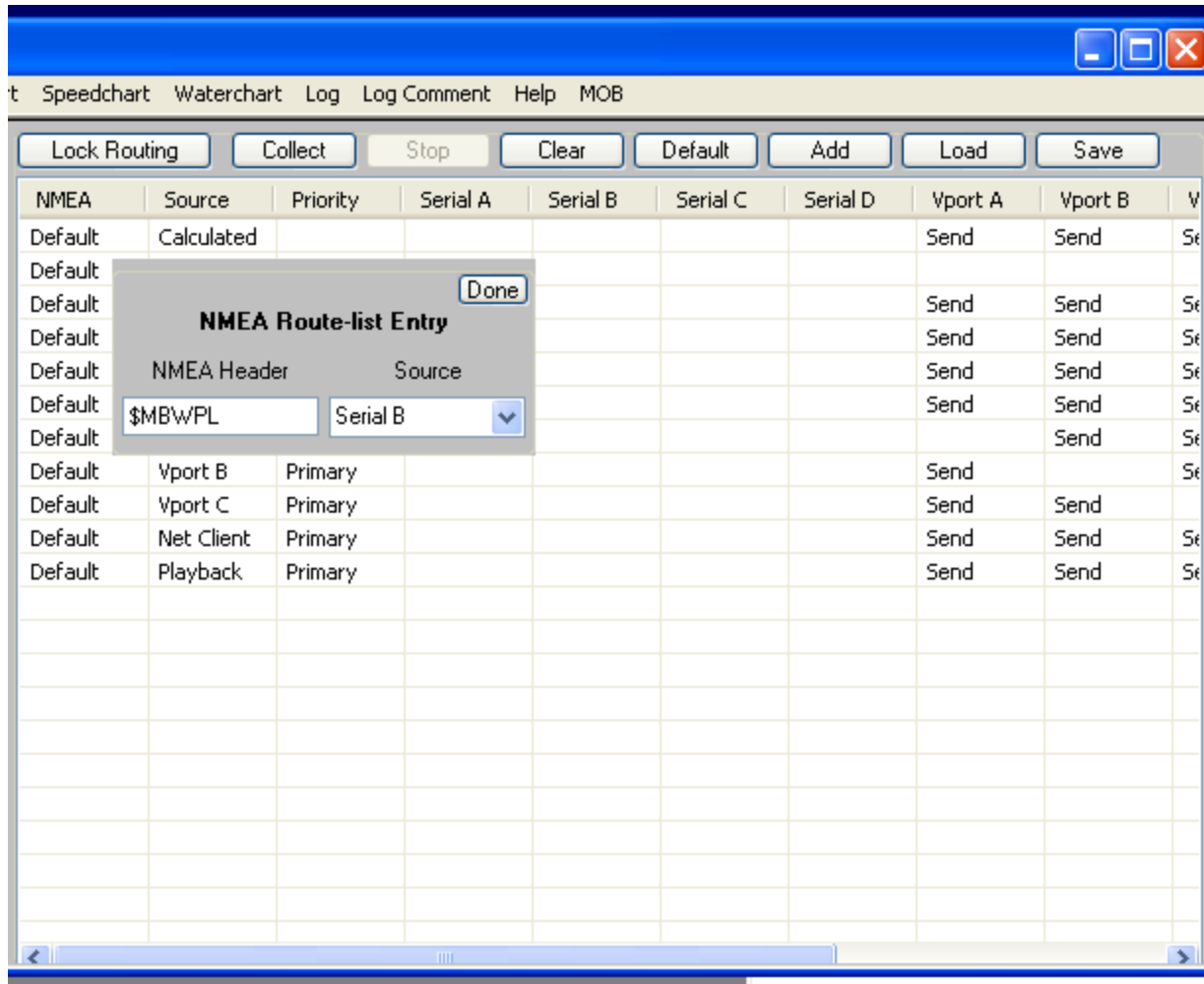


The screenshot shows a software window titled "Advanced Routing" with a menu bar (Start, Speedchart, Waterchart, Log, Log Comment, Help, MOB) and a toolbar (Lock Routing, Collect, Stop, Clear, Default, Add, Load, Save). Below the toolbar is a table with the following data:

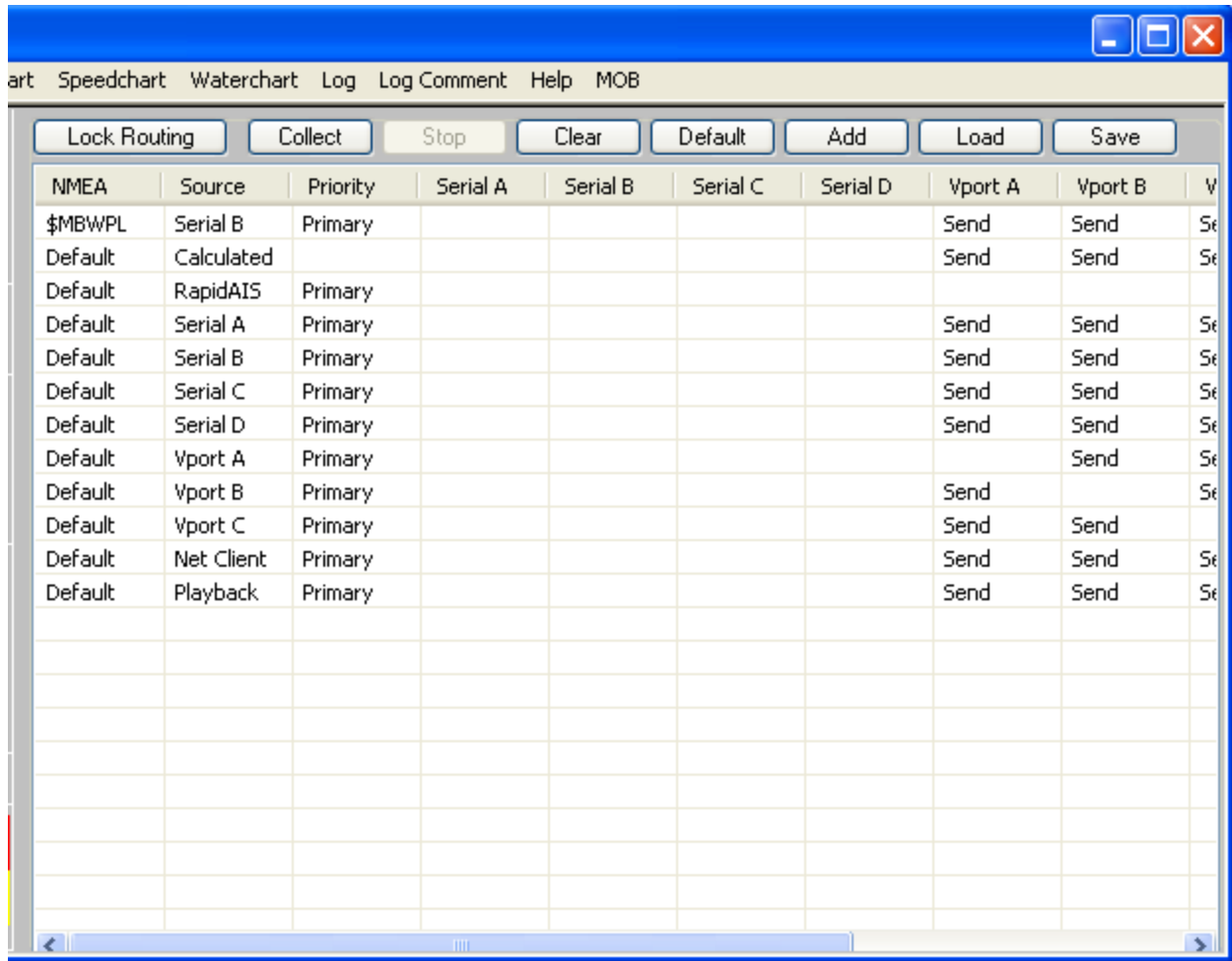
NMEA	Source	Priority	Serial A	Serial B	Serial C	Serial D	Vport A	Vport B	V
Default	Calculated						Send	Send	Se
Default	RapidAIS	Primary							
Default	Serial A	Primary					Send	Send	Se
Default	Serial B	Primary					Send	Send	Se
Default	Serial C	Primary					Send	Send	Se
Default	Serial D	Primary					Send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

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:

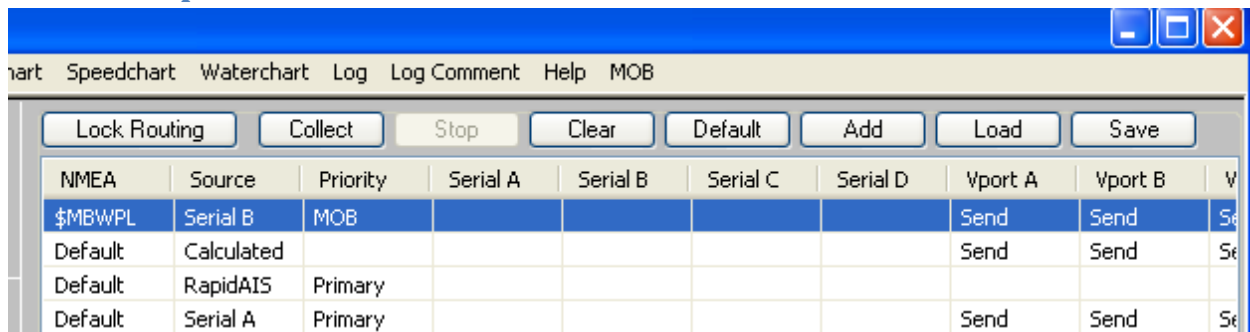


Here, you enter the NMEA sentence (including the leading "\$"), and select the input source. Click **Done**, and the entry will appear in the route-table, with the default routing options:



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.

Magnetic-only Operation

Previous versions of NavMonPc required certain valid GPS data before it would perform True Wind calculations and perform some other functions. In Version 1.04 the program now attempts to do as much as possible even if the GPS data is not available.

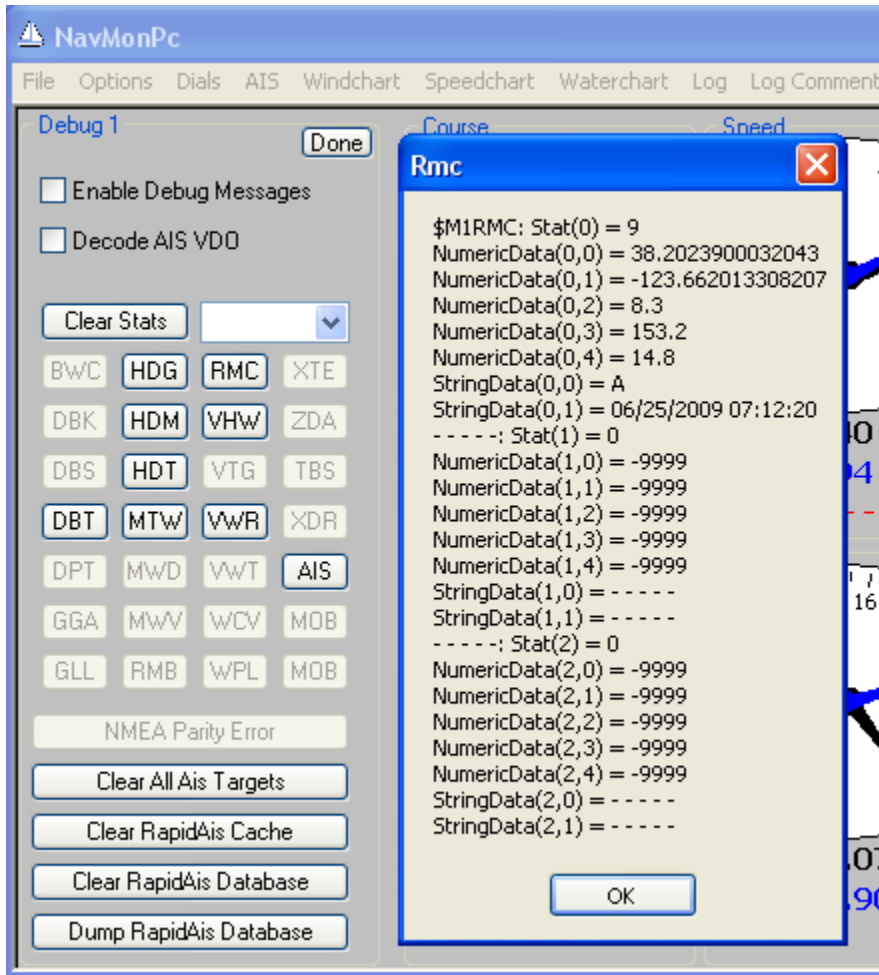
In particular, if COG and/or Magnetic Variation are not available, but Magnetic Heading is available, NavMonPc will display data in Magnetic mode (even if the **Use True Bearings** option is selected). If the **True Wind: Water-Ref** option is selected, NavMonPc will calculate True Wind (speed, angle, direction) using the magnetic heading.

GPS data is still required for the **True Wind: Ground-Ref** option.

Debug

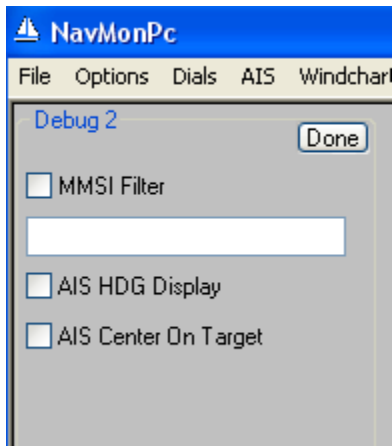
The Debug windows are where I put options and features under test, or features that are useful in my debugging. These are not guaranteed to work, or work in an obvious manner, and may be moved, deleted, added to, etc., without notice.

Debug1



- Enable Debug Messages – There may be debug messages, there may not be.
- Decode AIS VDO – The AIS “VDO” sentence is from your AIS transponder, and contains the data you transmit during a position report. When enabled, this is decoded and displayed on the NavMonPc AIS window as any other target.
- NMEA Sentence Status – These buttons become active when a particular NMEA sentence is received. Click the button to see the data inside the decoder (as seen above).
- NMEA Parity Error – This becomes active when a NMEA **Checksum** is in error. Click to see the offending sentence.
- Clear AIS Targets – Clears all active AIS targets.
- Clear RapidAIS Cache
- Clear RapidAIS Database
- Dump RapidAIS Database – Use with caution! This prints to an on-screen window, and with a big database it can take several minutes (during which nothing much else can happen).

Debug2



- MMSI Filter – When checked, only the ten-digit MMSI entered in the box will be decoded and displayed on the NavMonPc AIS window.
- AIS HDG Display – The Length field in the AIS target information window shows the target's heading. Debug only.
- AIS Center On Target – If checked, when an AIS target is selected from the target list the screen automatically centers on that target's current location. As the target moves, the screen does not re-center.

For More Information

See the NavMonPc website: www.NavMonPc.com

Email: info@NavMonPc.com

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