

NAVICOM DYNAMICS PRODUCTS FOR HARBOUR AND CHANNEL PILOTS

October 2007

This document gives a general description of the products and services that Navicom Dynamics offers for harbour and channel pilots. It is forwarded to provide the background for the choices and recommendations made in our separate proposal document, customised to your specific port.

It does not cover all of the products or services that Navicom Dynamics can offer, such as **ShuttlePilot** for offshore relative positioning (primarily for the oil and gas industry), and specialist position and heading devices for racing super-yachts.

Navicom Dynamics has a range of products for harbour and channel pilots, including:

HarbourPilot. Full-function PPU for harbour navigation and docking assistance.

ChannelPilot. As above but providing navigation assistance only – no docking.

LightPilot. GPS position only data, no DGPS.

AISPilot. Wireless connectivity to AIS Pilot Plug. Corrects for all known wiring errors in pilot plugs

AIS cable. Cable connectivity to AIS Pilot Plug. Manual correction for Tx/Rx wiring error

Qastor display software. Used with all of the above, or can be sold separately

ENC production. We have sub-contractors available who can create or amend S-57 ENCs to user specifications.



HarbourPilot Ruggedised

HarbourPilot & ChannelPilot

HarbourPilot is a precise navigation and docking system, using a dual-antenna GPS, together with an integrated rate-gyro to calculate accurate position, heading and rate of turn of the vessel. When combined with the world's leading pilotage software – Qastor by QPS – the resultant image on screen shows an accurate outline of the whole of the vessel, to scale, against the background of a chart.

HarbourPilot and **ChannelPilot** are essentially the same product, the difference being that **ChannelPilot** works only with the navigation mode of the Qastor software, while **HarbourPilot** has the full range of software modes available – including Docking mode. It is very easy to upgrade from **ChannelPilot** to **HarbourPilot**, simply by enabling the extra software modes. See below for detailed specification.

Options for **HarbourPilot** and **ChannelPilot** include:

1. Source of DGPS corrections
2. Battery duration – 8 hours or 16 hours
3. Choice of laptop
4. Ruggedised form or new lightweight form
5. Addition of AIS data
6. Display of docking data on a PDA
7. Lock-Approach Mode (HP only)

The image on the first page and at right shows **HarbourPilot/ChannelPilot** in its ruggedised form.

Supplied in a rugged case weighing <8.kg including laptop, it has two antennas that are placed on the bridge wing or roof. The sensor system incorporates GPS position (DGPS where available), independent heading, and rate of turn from an integrated rate gyro.



The sensor sends its data wirelessly to the display laptop, running Qastor ECDIS software.

Using the data from the sensor, as well as advanced fast-setup options with the software, the pilot is presented with an accurate real-time image of where all parts of the vessel are, set against the background of a electronic chart

Lightweight version of **HarbourPilot/ChannelPilot**

Navicom Dynamics is currently finalising a new lightweight version – see image at right. This is designed to be stowed in a small backpack. All electronics and one antenna and gyro are in one unit, with a second antenna providing the heading input and beacon DGPS correction signals (where applicable).

All other aspects of the equipment are otherwise identical to the ruggedised version, including performance characteristics. It weighs under 6kg incl laptop and high-quality backpack.



HarbourPilot Lightweight

PDA

We also offer the ability to view Qastor's "docking data" on a PDA. When enabled, the PDA will show an image of the data area of the Qastor screen when in docking mode.

These can also be supplied in Intrinsically Safe form if required.

Note that the PDA application gets its data over a WLAN connection from a laptop running the full Qastor application, so will not operate by itself without the laptop.



Laptop options

The end user can choose from a range of display laptops, from the fully rugged waterproof tablet in the image on page one, to lightweight laptops from Panasonic's ToughBook range, or others if preferred.

For an ultra-lightweight display, and for good performance inside the bridge where sunlight viewability is not at a premium, the Panasonic CF-W5 is hard to beat. It weighs just 1.2kg, but is not waterproof and does not have a touch screen.

For overall performance, ruggedness, excellent water protection, an outstandingly bright touchscreen, and the ability to convert between laptop and tablet format, we strongly recommend the Panasonic CF19.



Panasonic CF-W5



Panasonic CF-19

LightPilot

LightPilot is a small Bluetooth GPS that feeds position-only data to Qastor. Since it is not providing heading, the alignment of the ship-shape on screen is the same as COG. If the vessel is subject to any set, is going astern or being pushed by tugs, this image will be completely erroneous.

LightPilot has value in areas where wide fairways are prevalent, and accurate heading/rate-of-turn information is not required.

LightPilot is supplied in a small rugged case for security on the bridge wing.



AISPilot

AISPilot provides wireless connectivity to a vessel's AIS pilot plug.

It corrects for all known errors in wiring of pilot plugs, as well as errors in data rates.

Battery life is in the order of 8-12 hours, with rechargeable batteries capable of being recharged in use.

Wireless operating system is ad-hoc WLAN, with a range of approximately 50 metres.

AISPilot can be used in conjunction with HarbourPilot, where the AISPilot just provides the 'other-ship' data.

Alternatively it can be used by itself (feeding both 'other-ship' and 'own-ship' data into Qastor). Note that the quality of the 'own-ship' data will never be the same as HarbourPilot or ChannelPilot, and is often erroneous, hence AISPilot should not be considered as a replacement for either of these if high accuracy is required.



AIS Cable

As an alternative to AISPilot, we can supply a cable at 5m length, ready to plug directly into an AIS pilot plug. The other end is fitted with a standard DB9 9-pin serial plug, suitable for plugging into a laptop's COM1 port.

A converter plug is also supplied that will swap the Transmit and Receive pins for those pilot plugs that have been wired up 'the wrong way round'.

For those laptops which do not have a DB9 COM1 port, a USB-serial converter cable can also be supplied (see image at right).



Qastor software

The Qastor ECDIS software, by QPS of the Netherlands, is available in two primary versions:

Navigation Mode

Navigation Mode and Docking Mode (incorporating Lock Approach Mode and FPSO Modes)

In terms of the hardware products above, HarbourPilot would be supplied with Qastor Navigation Mode and Docking Mode, whereas ChannelPilot, LightPilot and AISPilot would normally be supplied with Qastor Navigation Mode only.

All Qastor licences are soft-locked to the computer on which they are installed. Normally the licences are not transferable.

The minimum specification for computer is Windows XP Pro, XGA screen with minimum resolution – 1024 x 768. 32bit true colour. We recommend a minimum of 512B of RAM.

Qastor has not been fully tested for operation with Windows Vista, though we know of instances where it is working with this operating system.

Qastor Navigation Mode offers the following functionality (list not complete):

- Display of scaled ship-shape against chart
- Digital display of Heading, ROT, COG, SOG
- Graphical/digital display of XTE/DTW
- Swept path predictor with user-selectable intervals
- Curved EBL
- Interactive HOT
- AIS target display / AIS vessel database
- User selectable alarms
- User selectable information windows
- Second chart display window
- Vessel store for later retrieval
- Voyage replay



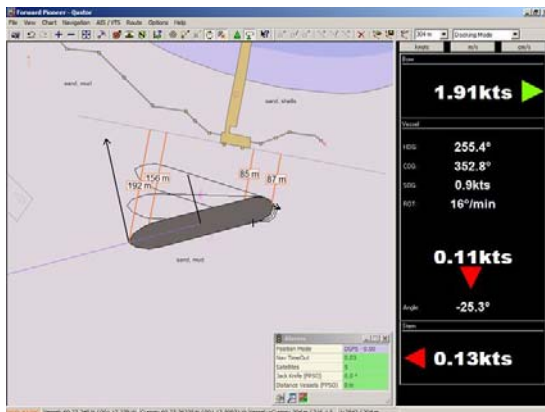
Qastor Docking Mode adds the following functions:

Digital display of athwartships component of velocity of the bow and stern

Ahead/astern component of speed

Graphical display of movement of bow and stern, with length of vector proportional to speed

Clearance distance ahead and astern to wharves or other pre-defined shallow areas



Distance of shoulder and quarter (1/6th LOA) to wharf

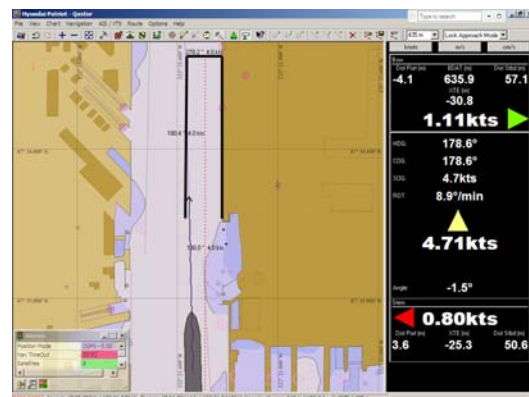
Optional adjustable manifold position for aligning vessel with specific position on wharf

Angle to wharf

Qastor Lock Approach Mode is an extension of docking mode, adding further functionality in relation to locks.

In particular it gives distance to both sides of the lock, both at the bow and at the stern.

It can also give distance to the end of the lock and cross-track error in relation to the centreline of the lock.



Charts

Qastor can work with either S-57 ENC's or with C-MAP 93v3 Professional charts. In all cases, S-57 is the preferred option where these are available, with C-MAP used as the fall-back option.

In many parts of the world, national hydrographic offices have produced S-57 ENC's. Many of these have been licenced for distribution through the UKHO, with the updated list of availability on their website www.ukho.gov.uk. In the USA, ENC's of the US coastline are available for free download from the NOAA website <http://nauticalcharts.noaa.gov/mcd/enc/index.htm>

Where official S-57 ENC's are not available, there are two alternatives:

Create a new S-57 chart from local data. This would incur a one-off cost, with the port then owning the chart. This makes subsequent update very much easier. Note that there are minimum requirements for the quality for the data needed to create an S-57 chart. Further details can be provided if required.

Use C-MAP. These will always be subject to C-MAP update and licencing conditions. Note that C-MAP is charged per licence key (ie per computer).

Navicom Dynamics has considerable experience in the production of S-57 charts from local data, and offers high quality QA services to ensure a high standard. Charts have been produced for the following ports:

Napier, Lyttelton, South Port in New Zealand

Dampier, Port Kembla, Geraldton in Australia

Ravenna in Italy

Hazira and Mundra in India

All charts that we have produced meet the requirements of the local pilots. Please discuss your requirements with us.

DGPS

It is important to understand that **HarbourPilot** and **ChannelPilot** technology do not require the addition of DGPS corrections to make them work. The accuracy of the heading and the rate-of-turn output is completely independent of whether DGPS corrections are available or not.

Nevertheless, the accuracy of the GPS position can be improved by the use of DGPS corrections. The other advantage of incorporating DGPS corrections is to provide a measure of integrity monitoring to the basic GPS signal.

Many countries have free-to-air DGPS corrections available, either in the form of satellite-based systems (WAAS or EGNOS over the north American continent and Europe respectively), or from the large number of marine beacons working in the 300kHz band that have been set up by many national authorities. **HarbourPilot** and **ChannelPilot** are fully able to work with either of the above options, where available.

For those ports which are not covered by either of these, Navicom Dynamics can supply and install suitable equipment to set up a local DGPS base station for the port. The station transmits suitable corrections on a UHF frequency, so a licensed frequency would need to be allocated. This option is not available with **HarbourPilot/ChannelPilot** lightweight versions.

It should be noted that the high quality receivers and antennas that are employed in **HarbourPilot** and **ChannelPilot** are able to offer 2.5m accuracy (95%) even in raw GPS. With DGPS corrections, this is improved to sub-metre.

Where a free differential correction signal from any of WAAS, EGNOS or a coastal MF beacon is available, then this should be used to give DGPS level accuracy and integrity. Where no such free signal is available, we recommend trying the system using raw GPS, as it has proved to be remarkably stable in this mode, and those ports that are using **HarbourPilot** with raw GPS have reported very good results.

Additional Information

Use for training

In addition to its operational use, **HarbourPilot** and **ChannelPilot** are outstanding tools for training new pilots, and for re-validation training of experienced pilots. The automatic recording facility in the software allows easy play-back and review of a complete event, at increased playback speed if required, with the ability to fast-forward to the area of interest.

Pilots have often commented how the equipment gives them a greatly enhanced visualisation of what is really happening to their vessel, particularly during complicated turns - invaluable for self-improvement.

Supply of equipment

Our preferred option is to supply Turnkey systems. Although we are able to supply systems ready to work with a customer's own laptop, we cannot guarantee the full system from end to end in these circumstances. When we supply a complete system including display, we conduct a significant amount of customisation of the laptop to make it simple for the user to become familiar with the equipment. This customisation includes:

- Adding a range of setup and diagnostic files for ease of support

- Customising both the hardware and Qastor specifically for the port, with optimum display settings, template vessels, navlines and routes, all setup and ready-to-go for the port.

- Conducting full end-to-end testing, to ensure everything works to specification.

Commissioning and Training

We very strongly recommend attendance by one of our staff for training, as the pilots will find they can make much more effective use of the system after having received training. We recently received the following comment from a port in the UK concerning training:

"Having used this equipment a number of times, I would like to mention the importance of appropriate training. It is clear to me that the importance of training for potential users is vital. The functionality of this equipment, whilst easy to set up, is complex to fully utilise and operate to its full capacity and capability. Experience has shown that by giving each pilot the correct training, even those individuals who are not inclined to embrace this technology, do so with success and vigour."

Depending on the number of pilots needing to be trained, we often propose a 'train-the-trainer' regime, whereby everyone available gets basic training and the port nominates a small number of pilots to be trained to a higher standard. The 'trainers' will themselves then be responsible for continuation training of others. We anticipate that this can be achieved in three to five working days in most ports.

Timing

We expect to be able to fulfil orders within 6-8 weeks, depending on product ordered, quantity, and on prior orders.

Performance Specification for HarbourPilot/ChannelPilot

HarbourPilot consists of a specially adapted GPS compass, integrated with a radio link to provide wireless communication to Pilot display unit running QPS Qastor software. An integrated Differential GPS radio receiver is included where requested. The system comes complete with a rechargeable Lithium-Ion battery. A PDA is also available, with a further wireless connection, to display the docking data remote from the laptop display.

System Accuracy: (2σ RMS Values)

Heading:	$\pm 0.25^\circ$ (1.5m baseline)
ROT:	$\pm 1.0^\circ/\text{min}$ (steady turn)
Position:	$\pm 0.6\text{m}$ (DGPS), 2.5m (GPS)
Velocity:	$\pm 0.02\text{m/sec}$ (0.05 Kn) (DGPS)

Battery Life: 8 hours nominal (16-hours option available)

Wireless operating range: > 50m – across the full beam of a Cape-Size Bulk Carrier

Rugged system weight ~8kg (including display unit)

Lightweight system weight <6kg (including display unit)

Display units

Our preferred option is the Panasonic Toughbook CF-19 convertible laptop/tablet computer, with probably the brightest screen in its class

(see http://toughbook.co.nz/main/mobile-computing_cf19.asp for details)

Screen size:	10.4" Transmissive (sunlight viewable) touchscreen
Resolution:	XGA (1024 x 768)
Op system:	Windows XP Pro
Software:	Qastor by QPS
Dimensions:	271 x 216 x 48 mm
Weight:	2.1 kg
Battery life:	>5 Hrs (approx)

A variety of alternative laptops are available.

