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Software Release Notes

H5000 RTM

2018 SOFTWARE RELEASE

JULY 2018

Photo: Rich Edwards/Volvo Ocean Race

H5000 | INSTRUMENTS | AUTOPILOT

Overview

The latest H5000 developments provide a system-wide package of upgrades with a wide range of new features, enhancements and fixes based on installer and user feedback.

- New Features, including: User renaming of "Aft Depth"; improved wind algorithm; expanded True Wind correction tables; enhanced interpolation of correction table data; added Pilot commissioning ability to Graphic display; additional websocket support; enhanced boat speed selection logic

- Minor improvements and fixes, including: improved data formatting; wider range of damping control; extended compatibility with new and 3rd party sensors; minor tweaks to wind calculations

- Updated documentation

- Connected Vulcan & Zeus MFDs require NOS 18.2 release for full compatibility.

Software updates cover:

H5000 Graphic; H5000 CPU (inc. webserver); H5000 Pilot CPU; H5000 Pilot Keypad; HV mast displays (all models); H5000 Race Display; H5000 Analogue Expansion; H5000 Serial Expansion; H5000 Sensor Modules (3D Motion, Alarm and Barometer), Triton²

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Detailed overview of all updates

FEATURE SUMMARIES

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New/Enhanced Feature Summary

A number of significant changes have been made to the H5000 feature set, based on feedback from installers and users. These include:

- Added ability to rename "Aft Depth" function to remove confusion when used as a multihull dual-depth system i.e. port/starboard vs. fore/aft

- Introduced expanded True Wind Correction tables to allow correction of TWS across a wider range (including upwind) and more resolution to TWA correction. The new tables use cubic spline interpolation within the CPU calculations and webserver to provide a smoother correction

- Improved heel / boat speed linearity correction tables, allowing adjustment to boat speed range

- Opened up advanced Pilot variables (e.g. TWS Response) for view in Graphic display and webserver, this also adds ability to pull/log the Pilot variables via the websockets interface

- Added Pilot commissioning ability to Graphic display. Allowing greater flexibility in choice of Pilot controller, including the Triton2 Pilot Controller.

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Wind: True Wind algorithm enhancement

The true wind solution has been further enhanced to match our WTP3 grand prix system, providing increased data stability (smoother numbers during manoeuvres), while still remaining responsive to changes, to give the best information available.

Any system with an autopilot will benefit from these changes with the additional change to "leeway corrected wind" being disabled by default, which will improve overall pilot performance from first power up. Non-autopilot users may re-enable this feature if desired.

In addition to these enhancements, greater resolution on wind offsets have been introduced, allowing corrections to be entered to a tenth of a degree (0.1).
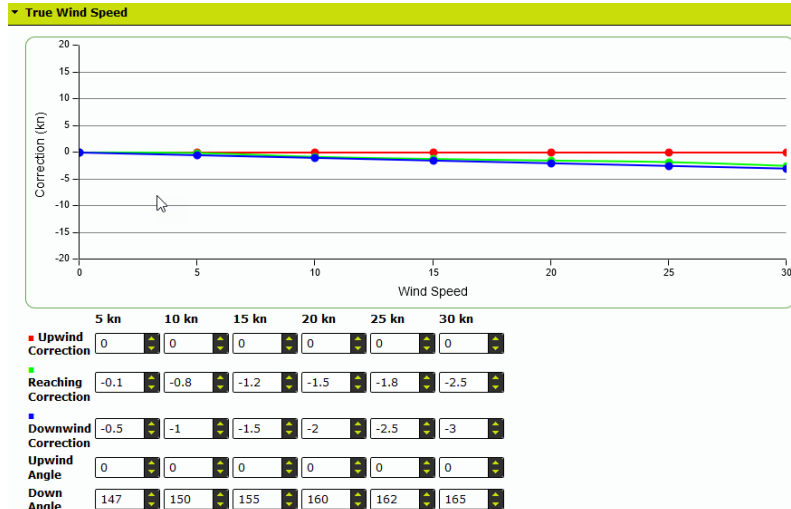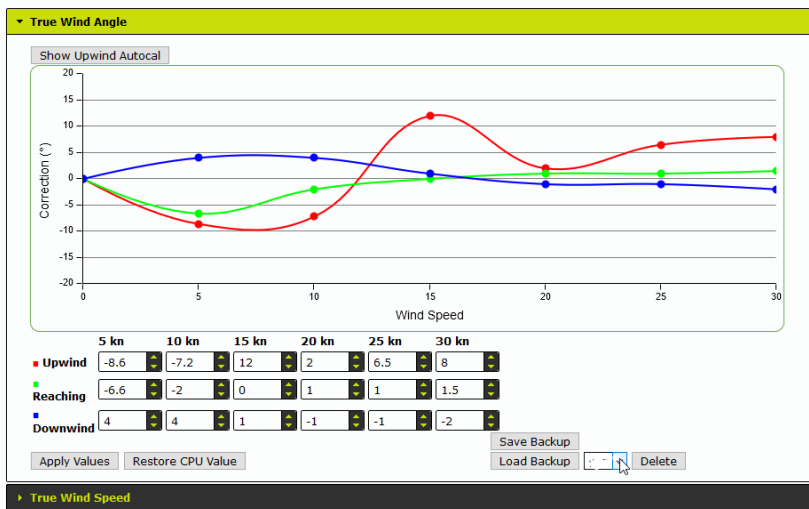
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Wind Enhancement: calibration/correction

The addition of expanded True Wind tables allows correction of True Wind Speed (TWS) across a wider range, including upwind, along with more control of TWA correction. New cubic spline interpolations within the CPU calculations and webserver to provide a smoother correction to calculated wind data.

- True Wind Speed table is now configurable upwind, reaching (fixed at 90) and downwind (Target TWA), to provide increased accuracy over the previous corrections – this change is critical for yachts sailing at high boat speeds in relation to wind speed
- Cubic Spline interpolation of the True Wind Speed and True Wind Angle tables is now (optionally) available, providing a smoother transition – especially useful when sailing slightly higher than target angle upwind [default = on]
- Webserver will display splined interpolation of tables in chart if enabled.

Limitations
- Due to graphic library limitations the H5000 Graphic display and any navigation displays (Vulcan or Zeus) will show linear interpolation on displayed charts, however the data they use from H5000 will be subject to the interpolation selected by the user. i.e. the data is the same throughout the system, but non-webserver user interfaces will show a simplified (but still 100% functional) graphical representation.

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Wind Enhancement: calibration/correction

True Wind Angle

Show Upwind Autocal

	5 kn	10 kn	15 kn	20 kn	25 kn	30 kn
▪ Upwind	-8.6	-7.2	12	2	6.5	8
▪ Reaching	-6.6	-2	0	1	1	1.5
▪ Downwind	4	4	1	-1	-1	-2

Apply Values   Restore CPU Value   Save Backup   Load Backup   Delete

True Wind Speed

	5 kn	10 kn	15 kn	20 kn	25 kn	30 kn
▪ Upwind Correction	0	0	0	0	0	0
▪ Reaching Correction	-0.1	-0.8	-1.2	-1.5	-1.8	-2.5
▪ Downwind Correction	-0.5	-1	-1.5	-2	-2.5	-3
Upwind Angle	0	0	0	0	0	0
Down Angle	147	150	155	160	162	165

The above images show the smoother cubic spline interpolation for TWA and TWS in the webserver.

Note: TWA page no longer shows an "old" correction table, old values are still displayed on the chart for comparison.

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Depth: Auxiliary Depth function naming

Customers requiring an auxiliary depth sensor for applications other than Aft Depth may now rename the second depth function to meet their requirements

- Naming is controlled by H5000 Webserver (under System > Settings > Depth)
- Naming options:
  - Aft Depth (default)
  - Forward Depth
  - Mid Depth
  - Port Depth
  - Starboard Depth
  - Depth 2
- Auxiliary Depth function also has a shallow water alarm, as per the primary depth
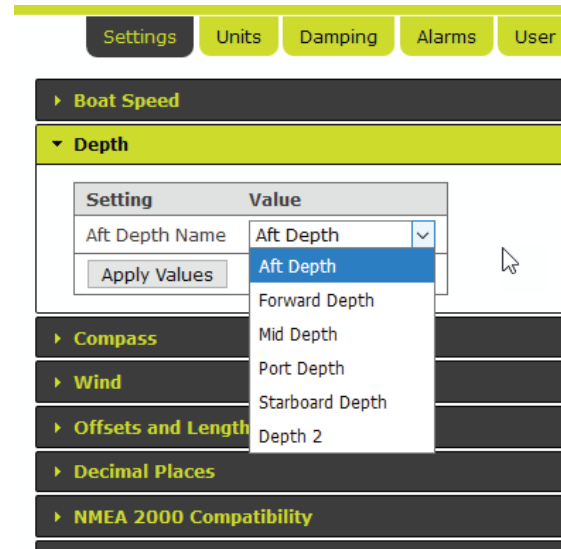
Limitations
- When installing multiple depth sensors ensure that the sensors used will not conflict – you should use different frequency transducers to avoid cross-sensor interference.

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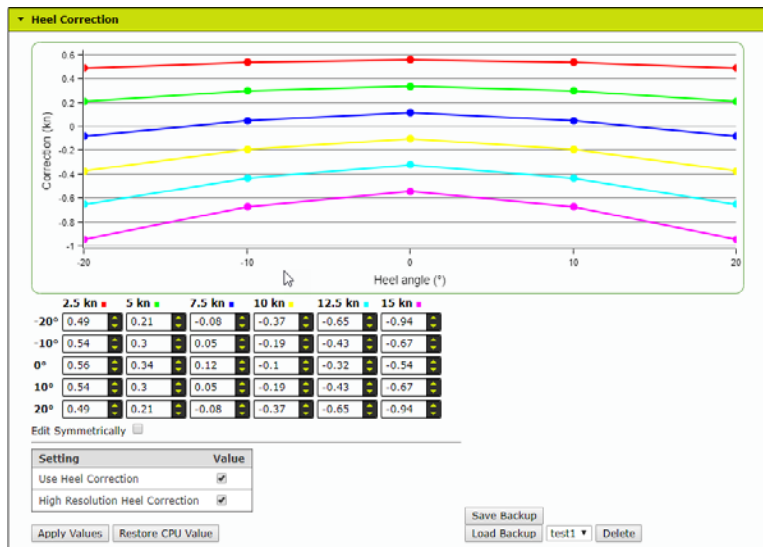# Boat Speed: Speed linearity / Heel correction enhancement

The ability to select the range of boat speeds used for the linearity correction of boat speed is added to allow more precise correction of moderate performance yachts

- Correction table can now be set to use 2.5, 5.0, 7.5, 10.0, 12.5, 15.0 knot reference speeds rather than the existing 5, 10, 15, 20, 25, 30 to allow inshore race boats to have a higher resolution correction table
- Cubic spline interpolation is now used, providing a smoother transition between reference points [default = on]
- Webserver will display splined interpolation of tables
- Correction values for speeds over the maximum speed value used (15 or 30) are corrected to the same correction value as the final column. Correction values below the minimum speed value used (2.5 or 5.0) are interpolated to zero.
- In addition SOG is now displayed alongside any boat speed calibration within the webserver, to provide a visual reference

Limitations
- Due to graphic library limitations the H5000 Graphic display and any navigation displays (Vulcan or Zeus) will show linear interpolation on displayed charts, however the data they use and is displayed from H5000 will be treated to the interpolation selected by the user. i.e. the data is the same throughout, but non-webserver interfaces will show a simplified (but still 100% functional) graphical representation.

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Boat Speed: Heel Correction Tables
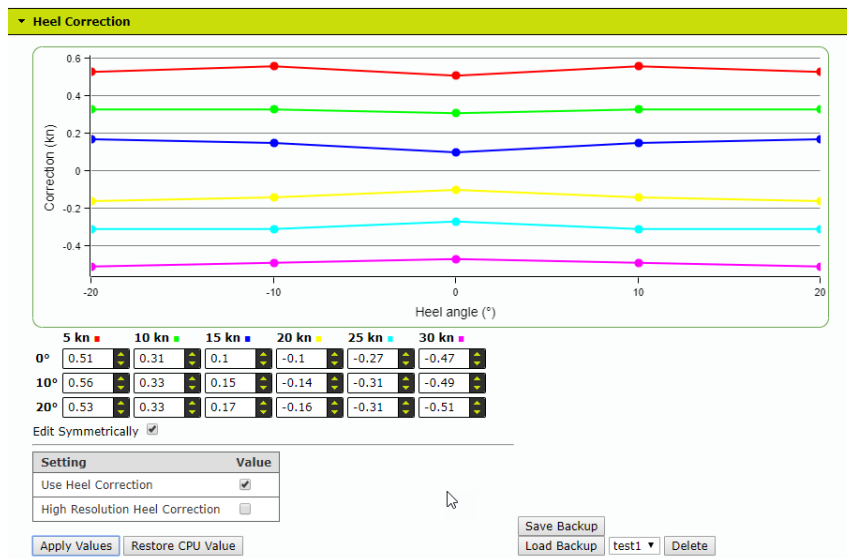
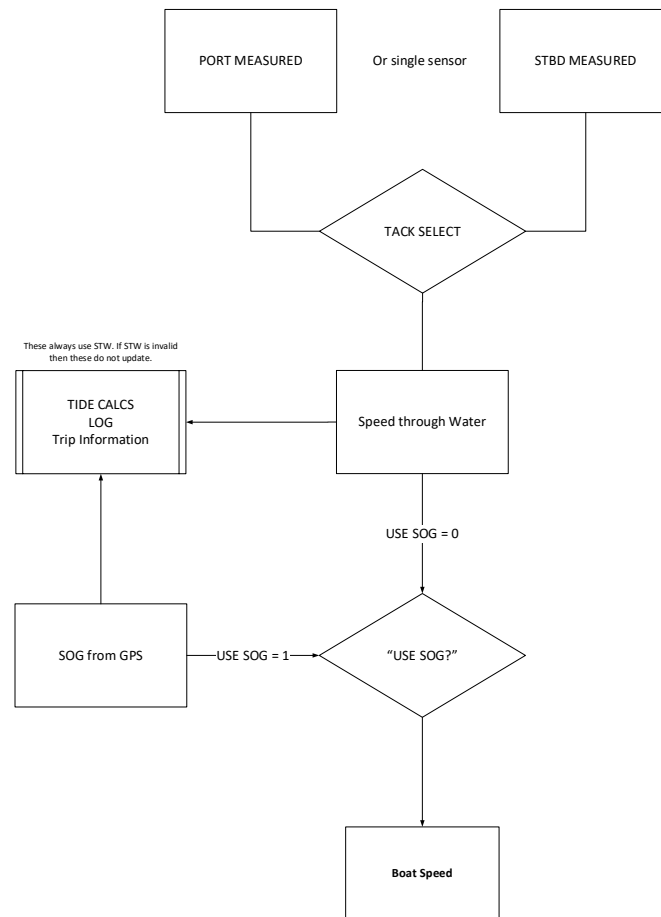The above images show the webserver Heel Correction tables, (High Resolution and Normal).

Boat Speed: Selected Speed Logic

The ability to monitor both water-speed, SOG and selected boat-speed in an external application allows advanced users to better analyse data

- Boat Speed, SOG and Water Speed are now completely independent variables that can be communicated via Websockets / H-Link protocols to an external system, regardless of the selected speed

Limitations

- H5000 Graphic, Vulcan and Zeus series SailSteer tide elements currently do not operate if speed selection is SOG

PORT MEASURED   Or single sensor   STBD MEASURED

TACK SELECT

These always use STW. If STW is invalid then these do not update.

TIDE CALCS
LOG
Trip Information

Speed through Water

USE SOG = 0

SOG from GPS   USE SOG = 1   "USE SOG?"

Boat Speed

Compatibility: Sensor support

Extended network support for Diverse Yacht Services Hybrid Loadcell Amplifier (HLA) systems

The following new loadcell functions have been added to the system:

Reacher	Deflector - Lower
Blade	Winch - Port
Staysail	Winch - Starboard
Tack	Spin Halyard - Port
J4	Spin Halyard - Stbd
Solent	Main Halyard
Tack - Port	Load 1
Tack - Starboard	Load 2
Deflector - Upper	Mast Base 2

- All loadcell data is now shown to 2 decimal places

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Data: Damping and presentation changes

To allow better control of the displayed wind data, independent damping for True Wind Speed has been added. This allows greater control of the displayed data by allowing TWD and TWS to damped independently.

In addition, additional control for damping functions of displayed data has been added along with enhancements with displayed data maximising control of displayed data.

- Added the ability to damp Heel and Trim data
- Added the ability to damp Speed over Ground (SOG) and Course over Ground (COG)
- Performance target data uses the relevant damped data for a smoother change
- Added a decimal place to the velocity performance target data (i.e. Target Boat Speed)
- Removed the decimal place for performance percentage data (i.e. Polar Performance)

Limitations
- Damped Heel data is used for internal calculations such as Heel Correction. Care must be taken not to increase this damping value too high to cause instability / delay in calculated functions.

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Interfaces: Websocket expansion

To further enhance the Websocket functionality for third party connections, the H5000 CPU can now act as the system Navigation Source allowing waypoint information (such as Range and Bearing to a mark) be sent into the CPU and then sent out to the displays.

Along with the navigational information, various new functions have been added to the Websocket which include:

• H5000 Pilot Variables – allowing logging of internal variables to aid with pilot setup

Note: MFDs will NOT show this navigation data

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Tide: Low/zero speed validity alteration

Improvements have been made to the tide calculation at low speed when COG becomes unstable or invalid.

At speeds below 0.2 knots, COG data is overwritten with Heading data so that the system can continue to calculate tide.

This applies to all displays (Graphic, Triton², HV, Race and MFDs)

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Feature Summary: Pilot data available for display and logging

The following variables are now sent across the NMEA 2000 network and stored in the CPU datastore. They are available to external devices via the websockets interface for logging and display in the webserver:

Pilot Variable	Abbreviation	Note
Active Perf Mode	ACTIVE PERF	The performance mode (PERF 1, 2, 3, 4 or 5) set by the Pilot's internal algorithm. Depending on settings in use this may not match the user setting
Gust Bear Away	GUST BA	The calculated angle to be applied to the Target Wind Angle
TWS Bear Away	TWS BA	The calculated angle to be applied to the Target Wind Angle
Heel Compensation	HEEL COMP	The amount of applied Rudder Angle to counteract any heel induced broach
Pilot Net Course	NET CRSE	The magnetic course that the pilot is steering to
Pilot Target Wind Angle	PLT TARG WA	The calculated wind angle the pilot is steering to which is adjusted for Gust and TWS if enabled
Pilot Weather Helm	PLT WHELM	The applied rudder angle to keep pilot on a straight course
Pilot Mean Heel	PLT AVG HEEL	Average heel angle recorded by Pilot
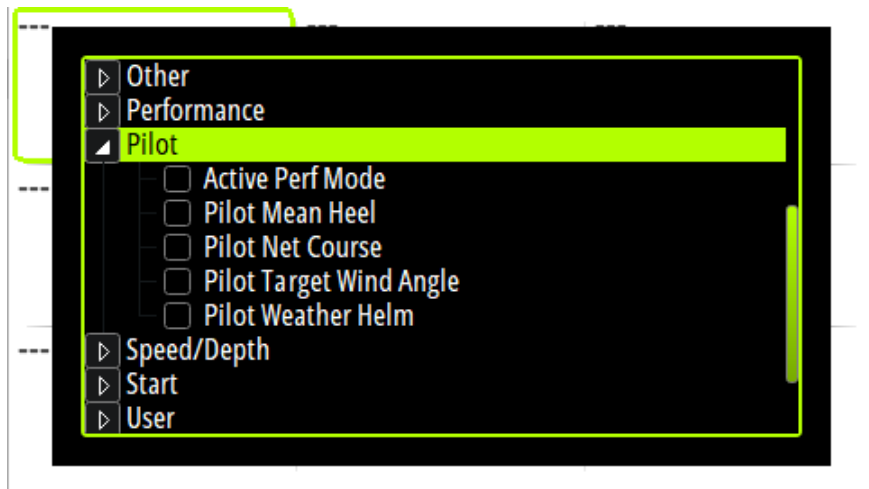
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Feature Summary: Pilot data available for display and logging


Example screens showing the pilot variables for display

Feature Summary: Pilot commissioning available via Graphic display

It is now possible to fully commission the autopilot via the H5000 Graphic display and any compatible Pilot controller, this allows greater choice in the selection of Pilot controller, e.g. allowing Triton2 Pilot controllers to be used with H5000:
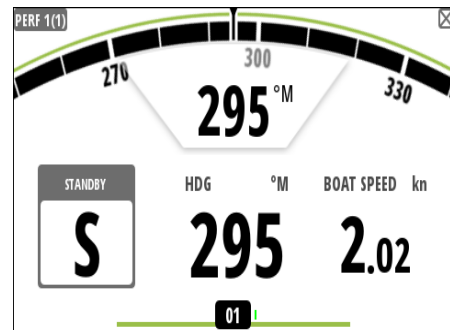
Autopilot: Commissioning

In addition to the H5000 Pilot Controller, the H5000 Graphic can be used to commission the autopilot giving full access to the Dockside wizard and Sea Trail options, giving greater flexibility in choice of displays / controllers.

Simple wizard style dialogues are used to allow all key controls to be set quickly and easily.

Autopilot: Failsafe Modes

The H5000 autopilot can now monitor the primary inputs (Boat Speed, Heading and GPS) and should any of these sources fail, the pilot can automatically change over to a backup source which is configured to suit the suit the system.

The sources are controlled from the standard SETTINGS > SOURCES > option where the following new sources have been added:

- Monitor Compass
- Position Backup
- Boat Speed Backup

Limitations
- These failsafe sources are only available from the H5000 Graphic, not available in webserver.

Autopilot: Advanced Mode

In addition to being able to commission the pilot from the H5000 Graphic display, the advanced pilot settings can be enabled to be controlled from the Graphic display Autopilot menu

Under Display mode, the option for "Show autopilot advanced settings" can be enabled which will then allow access to the following advanced features for configuration:

- Gust Response

- TWS Response

- Heel Compensation

Limitations

- By default, the advanced settings are turned off and need to be enabled first before they can be used.

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HV Display: Port/Starboard context switching

To maximise display use, Port / Starboard switching for HV displays has been added. This allows the H5000 CPU (Hercules or Performance level) to send a particular data type to each side of the boat on each tack to show specific data.

The above image shows a 20/20 configured for Port and Starboard switching.

Graphic Display: AIS Screen

The Graphic Display now has a built in simple to use AIS Display, when connected to a compatible AIS system, AIS Targets will now appear on the screen giving a simple and easy view of the situation around you.

Transmission Mode
Shows if the AIS is transmitting or receiving only.

AIS — Transmitting mode
Silent or receive only mode

Own Vessel
Own vessel indicated at centre of display to assist in understanding the relative positions of other targets.

Range Ring
Distance between range rings

Number of Targets
Number of targets visible vs. number of targets being tracked.

Other Vessels
Other vessels' relative position. Smart filtering allows user to only show significant vessels - not just the "closest targets" but the ones that are relevant.

Range Scale
Selected range. Targets outside this range are not shown on screen - but are included in the displayed number of targets tracked.

AIS   3 / 8   1.00 NM   2.00 NM

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Graphic Display: AIS-Additional Functionality

Target List
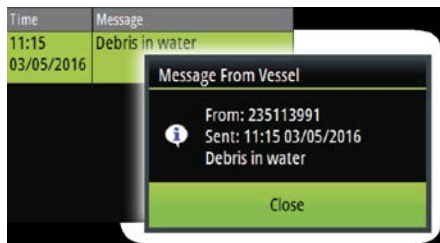
Ability to receive AIS Messages
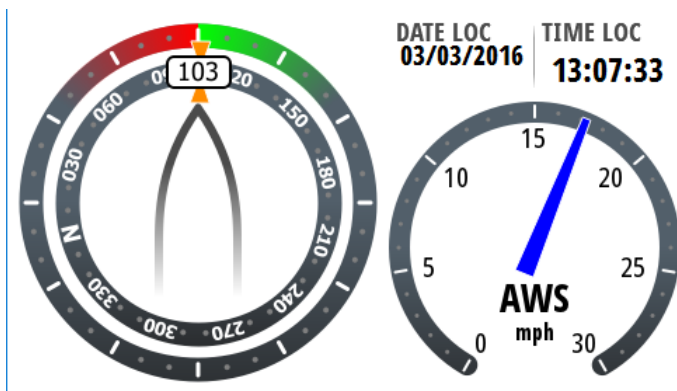

Initiate a DSC call to an AIS Target via a B&G VHF

PLUS:

- CPA/TCPA Dangerous Target Alarm
- Lost vessel alarms
- Display of AIS SARTS
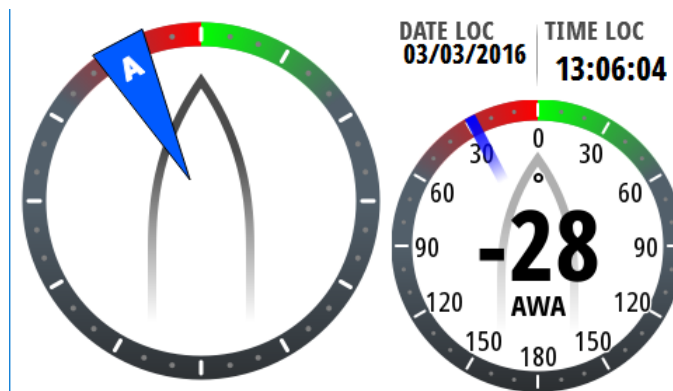- Relative and true course indication
- HDG or COG orientation

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Graphic Display: New Templates

A selection of new template pages have been added to the Graphic display.

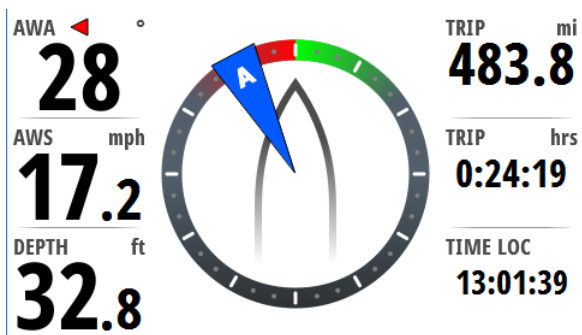New Templates based on the Dual Analog screen
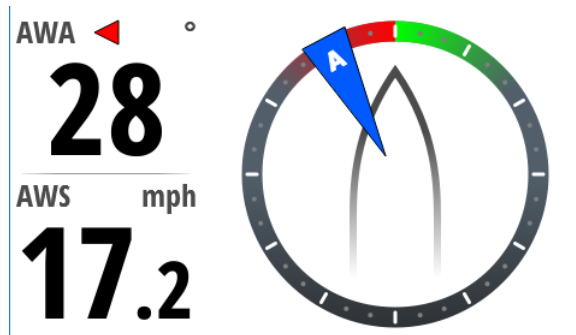

SailSteer with customizable gauges

Composite Wind with customizable gauges
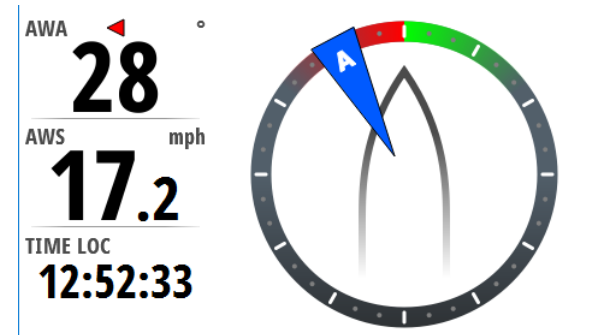
Graphic Display: New Templates

New Templates based on the Composite Wind screen

Centre Composite Wind with customisable gauges
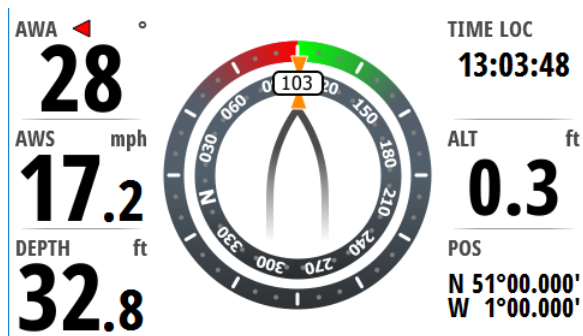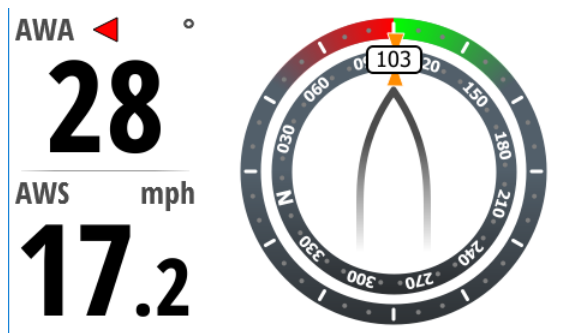

Composite Wind with 2 fields

Composite Wind with 3 fields

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Graphic Display: New Templates

New Templates based on the SailSteer screen

Centre SailSteer with customisable gauges

SailSteer with 2 fields
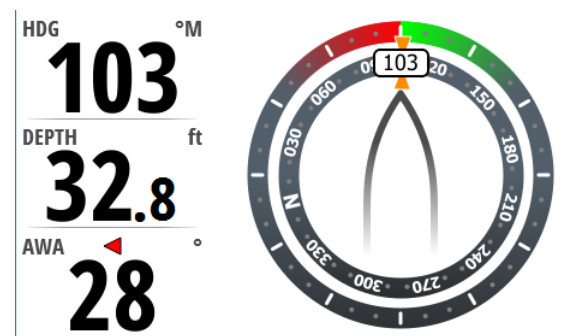
SailSteer with 3 fields

Service support

Various minor changes have been made to ensure that H5000 components are aligned with B&G's NASA online support service

- Factory process and software changes to ensure the software serial number and the external (label) serial number are of identical format and content to allow clear traceability through the dealer .nif file analyser tool.

Limitations
- Analogue Gauges are not fully NASA / NIF compliant

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Minor improvements, changes and fixes

The following issues are resolved

Serial module not transmitting valid MTW (sea temperature) sentence

CPU Analogue channel 3 dropping calibration settings if set to certain modes

Erroneous "configuration unsuccessful" message from serial module

Calibration of RF25 Rudder Angle sensor from webserver only allowed starboard to be –ve value

Cosmetic issue with time/date display in webserver Alarm History

Rudder calibration via H5000 Graphic

Serial module not transmitting valid VLW sentence

Added in a default set of NMEA0183 sentences to be transmitted from the Serial Module to match the H5000 CPU

Disabled start / reset commands for Race Timer while timer is running on H5000 CPU Webserver.

Leeway Angle sent as a signed value over H-Link and Websockets

Linear channels (0-10, 0-100 and 0-1000) can now be configured to show negative values

Added the ability to display Water Tank information from a relevant sensor

Corrected misleading text in Drive Engage setting

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Version list, bug fixes and known issues

RELEASE SUMMARY

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Software version by product

Product	Version	Notes
H5000 CPU	2.0-45.0.29	All CPU variants (Hydra, Hercules, Performance)
H5000 Graphic Display	2.0-57.3.83	
H5000 Race Display	1.52	
H5000 Analogue Expansion	1.8.03	
H5000 Serial Expansion	1.2.35	
HV Displays	1.45	10/10, 20/20, 30/30, 40/40 variants
H5000 3D Motion Sensor	1.2.4	
H5000 Alarm Module	1.2.4	
H5000 Barometer	1.2.4	
H5000 Pilot CPU	1.2.5.8	
H5000 Pilot Controller	1.1.0.21	
H5000 Analogue Displays	1.15	All variants – Unchanged from current production
Triton² Display	2.0-57.3.83	

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Known Issues Summary

Product	Known Issue	Notes
H5000 CPU	USB Stick size	The H5000 CPU can only support USB sticks for software updates 4GB or less.
Vulcan/Zeus	Representation of Display Charts	Due to graphic library limitations, Vulcan / Zeus displays will show linear interpolation on displayed charts, however the data they use and is displayed from H5000 will be treated to the interpolation selected by the user. i.e. the data is the same throughout
H5000 Graphic Display	Representation of Display Charts	Due to graphic library limitations, Vulcan / Zeus displays will show linear interpolation on displayed charts, however the data they use and is displayed from H5000 will be treated to the interpolation selected by the user. i.e. the data is the same throughout
H5000 CPU	Source of Motion Correction	There is no source selection for Motion Correction, so the first available source is used. For systems running both a 3D Motion sensor and the INDYN protocol, unplug the 3D Motion sensor when not being used.
System	Multiple Depth Sensors	When installing multiple depth sensors ensure that the sensors used will not conflict – you should use different frequency transducers to avoid cross-sensor interference.
H5000 Graphic Display	Analogue Gauge showing Heel and Trim data	When an Analogue Gauge is configured to show Heel / Trim, Negative Numbers (heeled to port) are not shown correctly.
Triton² Display	Analogue Gauge showing Heel and Trim data	When an Analogue Gauge is configured to show Heel / Trim, Negative Numbers (heeled to port) are not shown correctly.
Vulcan / Zeus	Analogue Gauge showing Heel and Trim data	When an Analogue Gauge is configured to show Heel / Trim, Negative Numbers (heeled to port) are not shown correctly.

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Document revision history

DOCUMENT REVISION

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Document Revisions

Revision	Date	Notes
1.0	10th July 2018	Published document for customer release
0.3	3rd April 2018	Working draft for beta testers
0.2	27th March 2018	Working draft for internal review and amendments
0.1	11th August 2017	Initial Draft. Not for release

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