

Combined Heading/Motion and Gyro Sensor Concerns

The IMCA DP Committee has been made aware of potential common-mode failures regarding Combined Gyro Compass and Motion Reference Sensors (MRU). These potential failures are discussed below and must be understood and considered while using/updating/purchasing combination MRU/Gyro, or gyro sensors that may rely on a GNSS signal to remain functional.

Since 2008, numerous DP-related issues have been noted as being caused by inaccurate Speed and/or Latitude data, resulting in heading measurement discrepancies at one or more gyro compasses and the subsequent loss of automatic DP heading control. As a result of these incidents and subsequent studies, it was recommended that the automated Speed and Latitude inputs to gyro compasses be disabled by setting them to "manual" during DP operations, with speed set to zero and latitude set to the operating region. Blocking input data from GNSS and/or speed log units is another way to prevent inaccurate data from influencing the heading calculation. See [IMCA Safety Flash 09/08](#).

Until now, it has been common practice to deactivate the automatic inputs from navigation GNSS and/or speed log whilst carrying out DP Operations, and many ASOGs include this barrier. The same practice could also be used for modern Combined Gyro Compass / Motion Reference Sensors or gyrocompasses recently introduced to the market, but users should be aware that this practice may be more problematic on such units. Problems may include the need for additional hardware or a return to normal operation if the signal input was removed.

The following concerns should be understood if the gyro compass continues to receive automatic GNSS and/or speed signal inputs:

- With the GNSS and/or speed log signal live, how does the sensor respond to:
 - GNSS position jump?
 - Slow drift of GNSS satellite signals?
 - GNSS Jamming and Spoofing?
 - Scintillation?
 - Interruption to GNSS satellite tracking/Signal drop out?
 - Erroneous speed input?
- Gyro compass performance may degrade without GNSS and/or speed log signals. When latitude and speed are manually modified by the operator, it is unlikely that large enough inaccuracies will be introduced to cause a major output heading inaccuracy.
- Have all the credible failure effects with the GNSS and/or speed log signal connected and disconnected, been Verified and Validated? Are these results available to the owner/operator/customer?
- Is additional hardware required to assist the operator in changing mode and functionality and, is this hardware outside the basic equipment scope package? (Owner's manual would state this).

The IMCA DP Committee will continue to monitor this issue and will provide updates when new information becomes available.

For more information, please contact Richard.Purser@imca-int.com

Related Guidance

- [IMCA M 220 – Guidance on Operational Activity Planning](#)
- [IMCA M 252 – Guidance on Position Reference Systems and Sensors for DP Operations](#)

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