Calibration and Operation of the Dead Reckoning GPS Receiver

1. Power up the GPS receiver.

2. Ensure the system has obtained a valid GPS Nav status.

3. With the vehicle stationary and engine running, observe a DR Speed of zero. This ensures there is no noise on the wheeltick signal. The installation must have been previously verified for no noise on the wheeltick while stationary and when ignition is enabled. The wheeltick signal must meet the specifications and be discontinuous and linear.

4. Drive the vehicle at a speed of at least 8 km/h and observe a DR Speed matching this speed.

5. Drive the vehicle through a course that includes turns in both right and left directions of at least 90 degrees, with a straight run in between. These turns should be at a speed of at least 8 km/h. The course should also include some straight line travel as well and at least one full stop lasting five seconds or more. This should be done in an area with good satellite visibility and minimum obstructions for approximately 5 minutes of travel. The DR navigation status can be monitored using MID 41 Geodetic Nav message (but MID 41 is not intended for indicating the quality of prior DR calibration).

NOTE:
The system is designed to use minimum of 5 Satellite Validated 3D Kalman filter fixes for calibration to ensure the highest accuracy. This means that the GPS antenna system must be optimal to allow this level of fix to be always obtained and in the lowest time possible.

The time taken to calibrate is proportional to the quality of GPS fix and the quality of Gyro and wheeltick signals. In addition left and right hand turns are required at the minimum speed.

It is normal for the system to have relatively lower accuracy until the system has been running long enough to calibrate the system sufficiently.

Calibration parameters must be reset by performing a factory reset message, if a DR system is transferred to a different vehicle and/or a different gyroscope is connected.

The gyro should at least meet the requirements listed below:

Parameter Specification
Supply voltage: 5.0V ± 0.25V
Zero point: 2.5V ± 0.25V
Scale factor: 25mV/deg/s ± 1mV/deg/s
Dynamic range: ± 60 deg/s to ± 90 deg/s
Non-linearity: ± 0.5% (full scale)
Operating temperature range: -40 to +85 º C

The gyro should be mounted so its sensitive axis is as nearly vertical as practical. Deviations from the vertical reduce sensitivity for heading changes in the horizontal direction.