GNSS/IMU 5000 Integrated Dual GNSS and Inertial Navigation System

THE GNSS/IMU 5000 SYSTEM IS A 'CLOSE COUPLED' GPS/GLONASS AND INERTIAL MEASUREMENT 'PACKAGE' IDEALLY SUITED FOR USE IN MOBILE MAPPING OPERATIONS.

Features

- 2 cm positioning
- 0.05 km/h velocity
- 10 mm/s2 acceleration
- Dual antenna GPS
- 0.1° heading
- 0.03° roll, pitch
- 0.15° slip angle
- 0.01°/s angular rates
- Real-time
- Low latency
- Ethernet
- Wheel speed input
- 2 GB logging
- 5 minute installation
- Compact size
- Lightweight
- Camera trigger output

Applications

- Photogrammetry
- Autonomous vehicles
- AHRS
- Video correction
- Road survey
- Aerial survey
- LIDAR correction
- Swath sonar connection
- Dynamic ship positioning

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Position Accuracy	11.5mCEP SPS
	0.6mCEP SBAS
	0.4mCEP DGPS
	0.5mCEP VBS2[2]
	0.15MCEP XP[2]
	0.1MCEP HP[2]
	0.2m 1σ L1
	0.02m 1σ L1/L2
Velocity Accuracy	0.05 km/h RMS
Acceleration	
–Bias	$10mm/s^2$ Iσ
–Linearity	0.01%
–Scale Factor	0.1% 1σ
–Range[1]	$100 m/s^2$
Roll Pitch	0.03˚ 1σ
Heading	0.1˚ 1σ
Angular Rate	
–In-run Bias	2 deg/hr
–ARW	0.2 deg/√hr
–Range[1]	$100˚/s$
Track 9at 50km/h)	0.07˚ RMS
Slip Angle (at 50km/h)	0.15˚ RMS
Lateral Velocity	0.2%
Power:	9-18 V d.c. 20 W
Dimensions:	234mm x 120mm x 80mm
Weight:	2.4 Kg & continous cable
Operating temperature:	-10˚ C to 50˚ C
Shock survival	100 G, 11 ms
Update rate	100 Hz
Calculation latency	3.5 ms
Internal storage	2 GB

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General

The GNSS/IMU5000 Inertial and Dual-GPS/GNSS Navigation system is an advanced six-axis inertial navigation system, blended with precision GPS, to give robust outputs of position, orientation and velocity. The second GPS improves heading accuracy. The dual GNSS package provides instant true heading information when initialised and removes the need for vehicles to perform complex heading calibration runs at high dynamic speeds. This is particularly important where operations are carried out in restricted areas, such as mine sites, ports and harbours. Equally the system is suitable for high dynamic operations, such as Highway surveying and airborne Lidar operations.The Compact and Lightweight package requires no user input to initialise it and out puts data over RS232, CANBus or Ethernet.

Description

The GNSS/IMU5000 Inertial and GNSS Navigation System includes three angular rate sensors (gyros), three survey-grade accelerometers, two GPS receivers and all the required processing in one very compact box. The GNSS/IMU5000 can work as a stand alone, autonomous unit and requires no user input before it starts operating.

The outputs from the GNSS/IMU5000 Inertial and GNSS Navigation System are derived from the measurements of the accelerometers and gyros. Using the inertial sensors for the main outputs gives the GNSS/IMU5000 a high update rate (100Hz) and a wide bandwidth. All the outputs are computed in real-time with a very low latency.

The two GPS receivers work together to measure true heading. Unlike other inertial navigation systems corrected by a single antenna system, the heading accuracy is constant and not dependent on having high dynamics. It is possible for the GNSS/IMU5000 to initialise without motion.

The GNSS/IMU5000 Inertial and GNSS Navigation System outputs its real-time measurements over RS232, Ethernet and CAN bus.

The precision ADC in the GNSS/IMU5000 gives more than 20 bits of resolution. The resolution of the acceleration measurements is 0.12 mm/s2 (12μg). The ADC oversamples the analogue sensors and uses coning / sculling motion compensation algorithms to avoid aliasing of the signals.

The internal processing includes the strapdown algorithms (using a WGS-84 earth model). Kalman filtering and in-flight alignment algorithms. The internal Pentium-class processor runs QNX real-time operating system to ensure that the outputs are always delivered on time.

The Kalman filter monitors the performance of the system and updates the measurements using GPS and wheel speed. By using the measurements from GPS, the GNSS/IMU5000 system is able to maintain highly accurate measurements and correct its inertial sensor errors.

The GNSS/IMU5000 comes with acquisition software that displays the data on a PC or Pocket PC devices. The PC software can be used to save tests in files, display real-time results and monitor the performance.

The internal logging enables the GNSS/IMU5000 to work stand-alone. Post-mission, data can be output in ASCII text format and loaded in to the software of your choice.

Simple configuration software allows the use to change the mounting angle; displace the measurement point to a virtual location; change the differential GPS options, etc.

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