

# RT2000

## Inertial and GPS Measurement Systems

### Features

- UrbanTrack GPS
- -155 dBm Tracking
- 0.2 km/h Velocity
- 10 mm/s<sup>2</sup> Acceleration
- Lateral Acceleration
- 0.25° Roll, Pitch
- 0.4° Slip Angle
- 0.02°/s Rates
- Other Measurements
- 100Hz Updates
- Real-Time
- Low Latency
- CAN Output Option
- 500MB Logging
- 5 min Installation
- Compact Size

### Applications

- Vehicle Testing
- AHRS
- Aerial Survey
- Agriculture
- Road Monitoring

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# RT2000 Low-Cost Inertial and GPS Navigation Systems



The RT2000 Inertial and GPS Navigation Systems are advanced six-axis inertial navigation systems that incorporate an UrbanTrack GPS receiver.

The RT2000 products show our commitment to bring customer value to users where a balance between price and performance is necessary or precision position accuracy is not a focus, but the coupling of INS and GPS systems is still desirable.

The RT2000 Inertial and GPS Navigation Systems include three angular rate sensors (gyros), three servo-grade accelerometers, the GPS receiver

and all the required processing in one very compact box.

The RT2000 products work as stand-alone, autonomous units and require no user input before they start operating.

The outputs from the RT2000 Inertial and GPS Navigation Systems are derived from the measurements of the accelerometers and gyros. Using the inertial sensors for the main outputs gives the RT2000 systems a fast update rate (100Hz) and a wide bandwidth. All the outputs are computed in real-time with a very low latency.

The RT2000 Inertial and GPS Navigation Systems output the real-time measurements over RS232, Ethernet and CANbus. Optional outputs can be made over Analogue.

The Analogue option includes 16 individually configurable channels of 16-bit resolution. Galvanic isolation on the analogue outputs ensures there are no ground loops.

The CAN bus output can be combined into a vehicle's

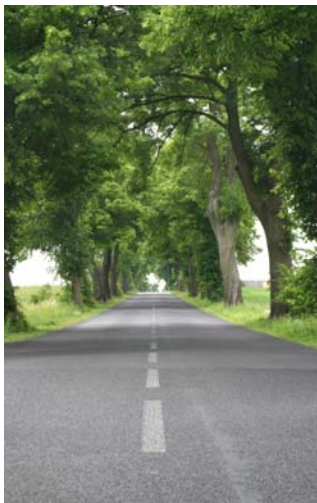
Parameter	RT2500	RT2502
Positioning	SPS / SBAS	SPS / SBAS
Position Accuracy	3.0mCEP SPS 2.0mCEP SBAS	3.0mCEP SPS 2.0mCEP SBAS
Velocity Accuracy	0.2 km/h RMS	0.2 km/h RMS
Acceleration		
– Bias	10 mm/s <sup>2</sup> 1 $\sigma$	10 mm/s <sup>2</sup> 1 $\sigma$
– Linearity	0.01%	0.01%
– Scale Factor	0.1% 1 $\sigma$	0.1% 1 $\sigma$
– Range	100 m/s <sup>2</sup> (Optional 30G)	100 m/s <sup>2</sup> (Optional 30G)
Roll/Pitch	0.25° 1 $\sigma$	0.25° 1 $\sigma$
Heading	0.3° 1 $\sigma$ <sup>1</sup>	0.2° 1 $\sigma$
Angular Rate		
– Bias	0.02°/s 1 $\sigma$	0.02°/s 1 $\sigma$
– Scale Factor	0.2% 1 $\sigma$	0.2% 1 $\sigma$
– Range	100°/s (Optional 300°/s)	100°/s (Optional 300°/s)
Track (at 50km/h)	0.25° RMS	0.25° RMS
Slip Angle (at 50km/h)	0.4° RMS	0.4° RMS
Lateral Velocity	0.4%	0.4%
Update Rate	100 Hz	100 Hz
Calculation Latency	3.9 ms	3.9 ms

Note 1: On land vehicles using Advanced Slip.

Parameter	RT2500/RT2502
Power	9-18 V d.c. 15W
Dimensions (mm)	234 x 120 x 80
Weight	2.2 kg
Operating Temperature	-10 to 50°C
Vibration	0.1 g <sup>2</sup> /Hz 5-500 Hz
Shock Survival	100G, 11ms
Internal Storage	500 MB



*Inertial Sensors in the RT2000 product family include servo-grade accelerometers and precision MEMS angular rate sensors. Powerful 40MHz floating point DSP takes care of coning, sculling and aliasing.*



*The RT2000 Inertial and GPS Navigation Systems are advanced six-axis inertial navigation systems that incorporate an UrbanTrack GPS receiver .*



CAN bus or captured using any CAN data acquisition system. The real-time nature allows the RT2000 family of products to be used for *hardware in the loop* and controller development. Connection to powerful tools like dSPACE is easy. CAN DBC files are provided.

The precision ADC in the RT2000 systems gives more than 20 bits of resolution. The resolution of the acceleration measurements is 0.12mm/s<sup>2</sup> (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. By using the measurements from GPS, the RT2000 systems are able to maintain highly accurate measurements and correct inertial sensor errors.

The RT2000 Inertial and GPS Systems come with acquisition software that collects the data on a PC or on Pocket PC de-

VICES. The software can be used to save tests in files, display real-time results and monitor the performance.

The internal logging enables the RT2000 range of products 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 user to change the mounting angle; displace the measurement point to a virtual location; change the differential GPS options and many more.

To obtain the best position accuracy, the RT2000 systems are able to use SBAS corrections such as WAAS and EGNOS.

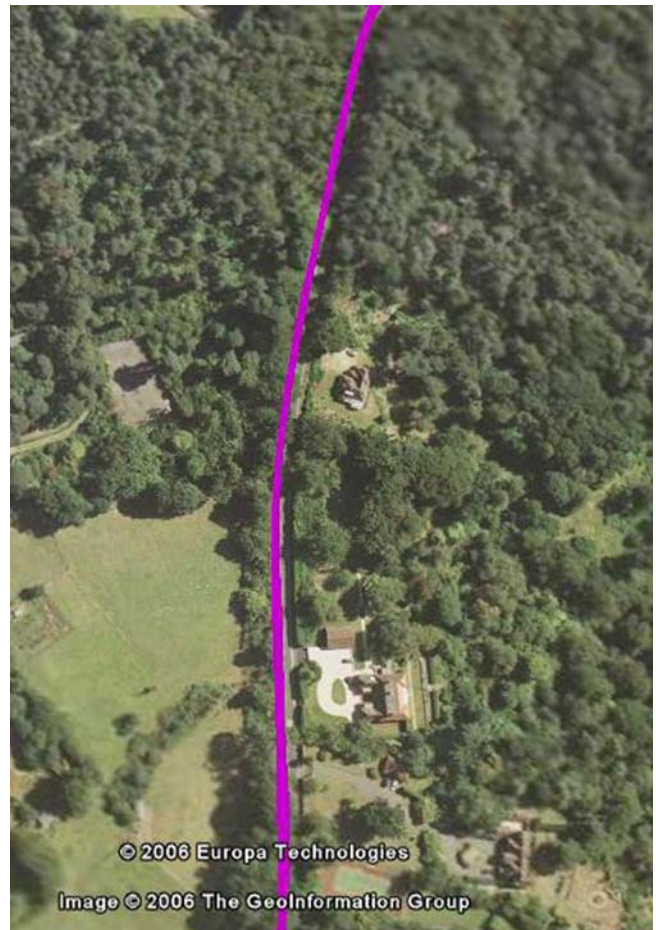
The RT2000 products are ideal for applications that do not require precise, sub-meter

positioning but need good velocity, orientation and inertial measurements.

For further information please contact Oxford Technical Solutions or your nearest local agent.

[Agent Details:](#)

*Combining Inertial Sensors and UrbanTrack GPS gives smooth trajectories, free from jump, even in difficult GPS environments.*



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