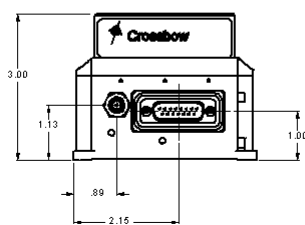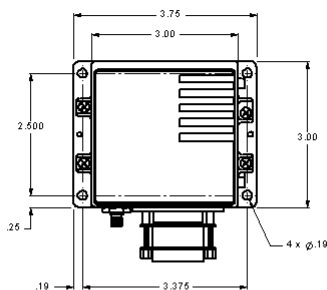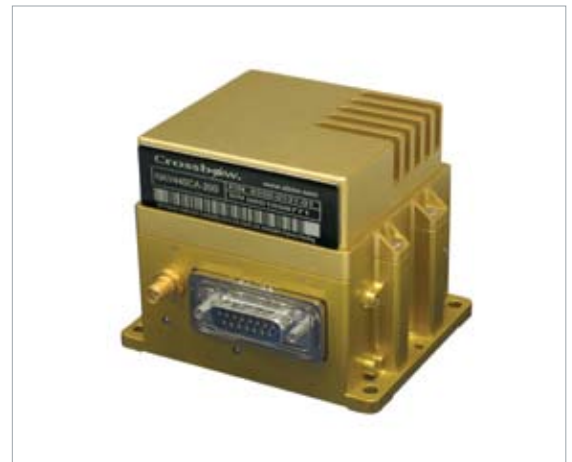# NAV440

GPS-AIDED MEMS INERTIAL SYSTEM

- AHRS Pitch, Roll, and Heading Output at 100Hz

- GPS X, Y, Z Position and Velocity Outputs

- Built-In GPS Receiver with RTCM and WAAS Compatibility

- High Stability MEMS Sensors

- Enhanced Performance Kalman Filter Algorithm

- EMI & Vibration Resistant

- Environmentally Sealed

Applications

- Unmanned Vehicle Control

- Land Vehicle Guidance

- Avionics Systems

- Platform Stabilization

Package Dimensions

NAV440CA

The Crossbow NAV440 is a combined GPS Navigation and GPS-Aided Attitude & Heading Reference system (AHRS) that utilizes both MEMS-based inertial sensors and GPS technology to provide an unmatched value in terms of both price and performance. Developed in response to over a decade of experience in a wide variety of airborne applications including thousands of deployed units and millions of operational hours.

- Built-in GPS receiver for position and velocity measurement

- GPS data synchronization clock

- Configurable high-performance Extended Kalman Filter (EKF) algorithms tunable to a wide range of applications

- Water resistant, vibration resistant, light-weight design

- EMI protection for trouble-free operation

- Continuous Built-in-Test

The NAV440 provides consistent performance over a wide temperature range in challenging EMI environments across a broad range of input power conditions. It is designed and configurable for use in a number of different applications including unmanned vehicle control, land vehicle guidance, uncertified avionics, and platform stabilization.

With GPS integration, the NAV440 system also provides GPS-Aided velocity data at up to 100 Hz. Velocity data derived from the inertial systems improves stability and reduces the latency associated with stand-alone GPS measurements.

Each NAV440 system comes with a GPS antenna, Crossbow's User's Manual and NAV-VIEW 2.0 software to assist with system development, evaluation, and data acquisition. A High-Gain, Aircraft Quality GPS Antenna option is also available.
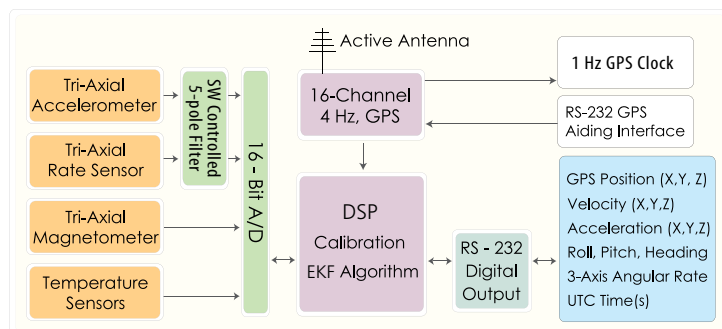
NAV440 Block Diagram

Specifications	NAV440CA-200	Remarks
Performance		
Update Rate[1] (Hz)	2-100	Programmable
Start-up Time Valid Data (sec)	< 1	
Fully Stabilized Data (sec)	< 60	Under static conditions
Position/Velocity		
Position Accuracy[2] (m CEP)	2.5	Internal GPS
X,Y Velocity Accuracy (m/s rms)	< 0.4	With GPS aiding
Z Velocity Accuracy (m/s rms)	< 0.5	With GPS aiding
1PPS Accuracy (ns)	± 50	Internal GPS
Heading		
Range (°)	± 180	
Accuracy[3] (° rms)	< 2.0	With GPS aiding
Accuracy[3] (° rms)	< 3.0	Without GPS aiding
Resolution (°)	< 0.1	
Attitude		
Range: Roll, Pitch (°)	± 180, ± 90	
Accuracy[3] (° rms)	< 0.5	With GPS aiding
Accuracy[3] (° rms)	< 1.5	Without GPS aiding
Resolution (°)	< 0.1	
Angular Rate		
Range: Roll, Pitch, Yaw (°/sec)	± 200	
Bias: Roll, Pitch, Yaw (°/sec)	< ± 0.1	Kalman filter stabilized
Scale Factor Accuracy (%)	< 1	
Non-Linearity (% FS)	< 0.5	
Resolution (°/sec)	< 0.06	
Bandwidth (Hz)	25	-3 dB point nominal
Random Walk (°/hr$^{1/2}$)	< 4.5	
Acceleration		
Input Range: X/Y/Z (g)	± 4	
Bias: X/Y/Z (mg)	< ± 15	Full temperature range
Scale Factor Accuracy (%)	< 1	
Non-Linearity (% FS)	< 1	
Resolution (mg)	< 0.6	
Bandwidth (Hz)	25	-3 dB point nominal
Random Walk (m/s/hr$^{1/2}$)	< 1.0	
Environment		
Operating Temperature (°C)	-40 to +71	
Non-Operating Temperature (°C)	-55 to +85	
Enclosure [4]	IP66 compliant	
Electrical		
Input Voltage (VDC)	9 to 42	
Input Current (mA)	< 350	At 12 VDC nominal
Power Consumption (W)	< 5	
Digital Output Format	RS-232	
Physical		
Size (in)	3.0 x 3.75 x 3.0	Including mounting flanges
(cm)	7.62 x 9.53 x 7.62	Including mounting flanges
Weight (lbs)	< 1.3	
(kg)	< 0.58	
Connector	15 pin "D" male	
GPS Antenna Connector	SMA Jack	

15 Pin "D" Connector Male Pinout

Pin	Signal
1	RS-232 Transmit Data
2	RS-232 Receive Data
3	Positive Power Input (+Vcc)
4	Power Ground
5	Chassis Ground
6	NC – Factory use only
7	RS-232 GPS Tx
8	RS-232 GPS Rx
9	Signal Ground
10	1PPS OUT
11	NC – Factory use only
12	NC – Factory use only
13	BIT Out
14	NC – Factory use only
15	NC – Factory use only

NAV440 Pin Diagram

Specifications subject to change without notice.

Notes:

[1] See User's Manual for additional information

[2] Internal GPS accuracy can be further improved with Radio Technical Commission for Maritime (RTCM) or Satellite Based Augmentation System (SBAS) messages such as the Wide Area Augmentation System (WAAS).

[3] Dynamic conditions, aggressive Crossbow flight profile.

[4] IP66 Compliant without EMI filter attached.
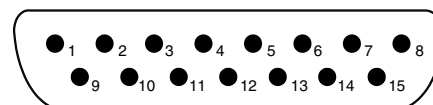
Ordering Information

Model	Description	Gyro (°/sec)	Accel (g)
NAV440CA-200-1	GPS-Aided MEMS Inertial System - includes: CD ROM, User's Manual, Quick Start Guide, GPS Antenna, and cable	± 200	± 4
NAV440CA-200-2	GPS-Aided MEMS Inertial System - includes: CD ROM, User's Manual, Quick Start Guide, High-Gain GPS Antenna and cable	± 200	± 4

CALL FACTORY FOR OTHER CONFIGURATIONS

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