LN-251 Inertial Navigation System/ Global Positioning System (INS/GPS)

Designed to provide customers maximum flexibility, the LN-251 Inertial Navigation System/Global Positioning System (INS/GPS) meets the most challenging military requirements along with civil interoperability capabilities—delivering results, reliability and unprecedented performance. Resilient implementation for the most demanding navigation, pointing, stabilization and flight control applications.

Description and Advantages

The LN-251 is a fully integrated, non-dithered navigation system with options for an embedded 12/24 channel, All-In-View, Selective Availability/Anti-Spoofing Module (SAASM), P(Y) code or Standard Positioning Service (SPS), and future M-Code GPS. The LN-251 has a fully integrated, tightly coupled GPS inertial design that provides superior navigation performance relative to other embedded INS/GPS units. The non-dithered inertial sensor achieves the lowest measurement error for both gyro and accel in its class for increased sensor accuracy. Its modular open system architecture provides for easy adaptation to other applications and evolving requirements.

Northrop Grumman's highly reliable LN-251 INS/GPS has various advantages, including light weight, low cost and high performance.

The LN-251 fiber-optic gyro (FOG) employs one of our most modern technologies and includes three independent navigation solutions: blended INS/GPS, INS-only, and GPS-only. The non-dithered, low noise FOG technology eliminates self-induced acceleration and decreases velocity noise as observed in Ring Laser Gyro technologies. Additionally, Standard Positioning Service GPS (coarse/acquisition code) is available. Our LN-251 has independent and programmable inputs and outputs for flight controls and avionics. The LN-251 is available in discrete performance categories from 0.2 to 2.0 nmi/hr (free inertial) performance.

Applications

The LN-251 is a tightly coupled, integrated digital INS/GPS that provides superior performance for navigation, geo-location of sensor targeting, and transfer align of remote sensors. The lowest Angle Random Walk (ARW) in its performance class achieves unequaled stabilization performance for use in SAR (Synthetic Aperture Radar), AESA (Actively Electronically Scanned Array) Radar and EOIR (Electro-Optical Infrared) applications, as well as the most accurate target location. The system is used in a wide variety of shipboard and under-sea applications and is capable of AR-57 shipboard alignment.

The LN-251 has been integrated with several different Differential GPS (DGPS) applications, including: Starfire™, OmniStar™, Novatel™ LAAS and RTCM-104 format.

Interface Options

The LN-251 is currently equipped with RS-422, ARINC-429, MIL-STD-1553B, and Ethernet (10/100T) interfaces. Additionally, future growth of the interface will allow for gigabit Ethernet and Firewire.

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Growth

The LN-251 is available with an integrated high, anti-jam GPS subsystem and is upgradeable to M-Code GPS. The LN-251 is currently capable of supporting a Joint Precision Approach and Landing System solution and will continue to integrate with other DGPS solutions, including ZNAV™. The LN-251 possesses the ability to provide a self-contained Real Time Kinematic solution for refueling or precision landing.

Performance			
	Free Inertial	**GPS-Aided (Spec)**	**GPS-Aided (Measured)**
Position	<0.8 nm/hr CEP	<5m SEP (16.4 ft)	<4m SEP (13.1 ft)
Velocity (rms)	<0.8 m/sec (2.5 ft/sec)	<0.015 m/sec (0.05 ft/sec)	<0.008 m/sec (0.025 ft/sec)
Heading (rms)	<0.05°	<0.015°	<0.01°
Pitch and Roll (rms)	<0.05°	<0.01°	<0.005°
Operating Modes	Gyrocompass, stored heading, manual at sea; GPS		
Acquisition Time		<2 min Time To First Fix	

Characteristics	
Power	MIL-STD-704E and 1275 25W (typical), 30W (max)
Size	327 cu in. (5,358.6 cu cm)
Dimensions (max)	Length: 10.19 in. (25.88 cm), Width: 7.64 in. (19.41 cm), Height: 5.49 in. (13.94 cm)
Weight	12.7 lb (5.8 kg) with GPS
Temperature	-54°C (-65.2°F), +71°C (159.8°F)
Cooling	Passive (MIL-E-5400, Class 1)
Vibration	7.8g rms
Velocity	12,000 m/sec (39,370 ft/sec)
Angular Rate	1,000°/sec
Linear Acceleration, Jerk	28g, 13g/sec
Angular Acceleration	1,500°/sec^2
MTBF	>22,000 hours 49°C AUC
Mounting	Bolt-down
Maintainability	Full Built In Test; no intermediate maintenance required; no special tooling or test equipment required

Features	
Position	Latitude, longitude, altitude
Heading	True, magnetic (no external reference required)
Velocity	3-axis
Acceleration	3-axis
Attitude	Roll, pitch, yaw; unlimited mounting
Angular Rates and Accelerations	3-axis linear and angular output
ARINC-429, MIL-STD-1553B, RS-422, RS-485, Ethernet (10/100T)	Standard (multiple digital formats)
HAVE QUICK, Precise Time and Time Interval (PTTI)	Standard
Independent Inertial and GPS Data Interfaces	Standard; GPS MIL-STD-1553B data per SS-US-200, GRAM
Key Loading	Standard GPS loaders DS-101 & DS-102

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