LandMark™ 30 INS/GPS *"LN Series"*

- **High Performance MEMS INS/GPS**
- ***Low Noise* Gyro Noise** *0.003º/sec/√Hz*
- ***Low Noise* Accel Noise** *0.035mg/√Hz*
- **In-Run Gyro Bias** *2°/hour 1σ*
- **Heading Angle** *0.5° typical*
- **Pitch & Roll Angles** *0.25° typical*
- **Redundant Altitude** *±3 meter typical*
- **Fully Compensated Bias, Scale Factor, Misalignment, g-Sensitivity, Heading & Altitude**
- ***Rugged* Environmentally Sealed Packaging & MILSPEC Connector**
- **Single RS485 Data Rate** *100Hz*
- **GPS Receiver – 50 Channel & 4 Hz Position Data Update Rate**
- **1 Pulse per Second Logic output**
- **GPS Accuracy** *±2.5m CEP Stationary*
- **Supports WAAS, EGNOS and MSAS** *User Selectable Option*
- **Low Voltage** *+6V to 36V (single sided power)*
- **Light Weight** *< 445 grams*
- **Small Size** *< 360cm³/21.8in³*

Low Noise MEMS Fixed Gain Kalman Filter GPS-Aided AHRS

Export Classification: Commerce ECCN7A994

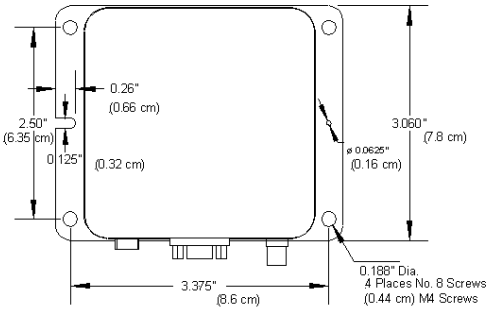
The new LandMark™ 30 INS/GPS *"LN Series* offers **Open Loop FOG performance** utilizing our own low noise *"LN Series"* MEMS gyros and accelerometers. This integrated GPS-Aided Inertial Navigation System (INS) employs a fixed gain Kalman filter and features 2°/hour in-run bias and excellent bias over temperature. An internal vibration isolation system enables temperature compensated RS485 output of delta velocity, delta theta, heading, pitch and roll angles and altitude information in a ruggedized package. The GPS is 50 channel C/A code receiver with 4Hz position update rate. GPS aiding is included in all units for turning error correction as well as for continued output during short-term GPS dropouts. The signature features are the low noise MEMS inertial sensors providing integrated and synchronized GPS and inertial data. This INS/GPS performance is optimized with **Fixed Gain Kalman Filter Aiding and fully compensated bias, scale factor, misalignment, g-sensitivity, heading, pitch and roll angles, altitude information integrated with a 4Hz GPS position data update rate GPS.** This is in a ruggedized environmentally sealed package that is EMI resistant and includes a MILSPEC connector. The unit is highly durable and can withstand environmental vibration, shock and EMI typically associated with commercial aircraft requirements. The LandMark™ 30 INS/GPS *"LN Series"* is well suited for commercial flight control, navigation, antenna stabilization and pointing, general aviation as well as laboratory use.

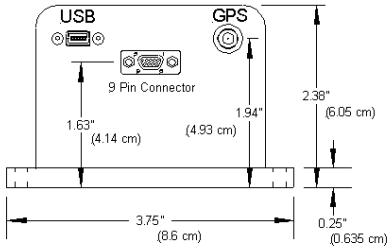
QMS
AS9100 Rev B &
ISO 9001:2000
Cert# FM 509639

Gladiator Technologies, Inc.

Rev. Jul2910
SN: 150

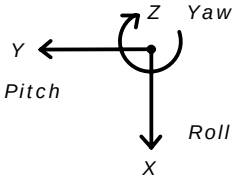
LandMark™ 30 INS/GPS *"LN Series"*





Mating Connector: M83513/01-AN

Axes (Top View) Right Hand Rule



Standard LandMark™ 30 INS/GPS
LMRK30INSGPS-025-**02**-100 or -**06** or -**10**
LMRK30INSGPS-100-**02**-100 or -**06** or -**10**
LMRK30INSGPS-175-**02**-100 or -**06** or -**10**
LMRK30INSGPS-350-**02**-100 or -**06** or -**10**

Pin No.	Assignment
1	RS-485 A (+) AHRS
2	RS-485 B (-) AHRS
3	Power Ground
4	RS-485 A (+) Combined GPS/AHRS
5	+6.0V to +36V Input Power
6	RS-485 B (-) Combined GPS/AHRS
7	1 Pulse Per Second Output
8	Signal Ground
9	Self Test

Outputs	Serial Sequence at 100Hz
1, 2, 3	Gyros: Roll (X), Pitch (Y), Yaw (Z)
4, 5, 6	Accelerometers: (X), (Y), (Z)
7	Temperature
8, 9, 10	Magnetometers: (X), (Y), (Z)
11, 12, 13	Angles: Roll (X), Pitch (Y), Yaw (Z)
14, 15, 16	Airspeed, Longitude, Latitude
17, 18	Time ms, Time Week
19, 20,21	GPS: Altitude, Velocity, Heading
22	No. of SV's
23, 24, 25	IMU Status, Status, Checksum

Specification

PARAMETER	LandMark™ 30 INS/GPS *"LN Series"*						
	RATE AXES				ACCEL AXES		
Power Requirements							
Input Voltage	+6.0V to +36V Max. Input (single sided)						
Power *Typical (Max)*	2.9W (3.05W)						
Inertial Performance							
Standard Full Scale Ranges	±25°/sec	±100°/sec	±175°/sec	±325°/sec	±2 g's	±6 g's	±10 g's
Scale Factor Error %	≤0.08% *(over temperature)*						
Bias In-Run Stability	2°/hour *1 σ*				0.01mg *typical*	0.015mg *typical*	0.02mg *typical*
Bias Over Temperature	<0.05°/sec 2σ				< 0.15mg *typical*	< 0.5mg *typical*	< 0.8mg *typical*
Resolution	0.002° /sec	0.002° /sec	0.0025° /sec	0.003° /sec	0.01mg	0.02mg	0.03mg
Angle Random Walk	0.003° /sec/√Hz	0.0035° /sec/√Hz	0.005° /sec/√Hz	0.006° /sec/√Hz	0.035mg/ √Hz	0.07mg/ √Hz	0.12mg/ √Hz
Alignment	1mrad *typical*						
G-Sensitivity	≤0.01°/sec/g *typical*						
INS/GPS Sensor Performance							
GPS Accuracy	2.5 m CEP						
Heading *(sole inertial)*	± 0.5° *typical*						
Pitch and Roll Angles	± 0.25° typical						
Altitude *(sole inertial)*	± 3m *typical*						
Start-Up Time (Inertial)	< 1.5 sec *AHRS 100 Hz Full Range*						
GPS Acquistion (Cold Start)	< 30 sec						
GPS Reacquisition (Warm Start)	< 1 sec						
Navigation Accuracy	50 NMPH						
Position Error w/o GPS 4 min.	1 Nautical Mile						
Update Rate (Inertial)	100 Hz						
Data Rate (GPS)	4 Hz Position Data *typical*						
Physical							
Weight	< 445 grams						
Size U.S.: / Metric:	3.0 X 3.06 X 2.38 = 21.8 in^3 7.62 X 7.8 X 6.05 = 360 cm^3						
Operating Life	10 Years *typical*						
Environments							
Operating Temperature	-40°C to +85°C						
Storage Temperature	-55°C to +100°C						
Vibration Operating	6gRMS *(20Hz to 2KHz ~ 10g accelerometers)*						
Shock	500g's ½ sine 30 msec powered, any axis						

Specification subject to change without notice

Gladiator Technologies, Inc.

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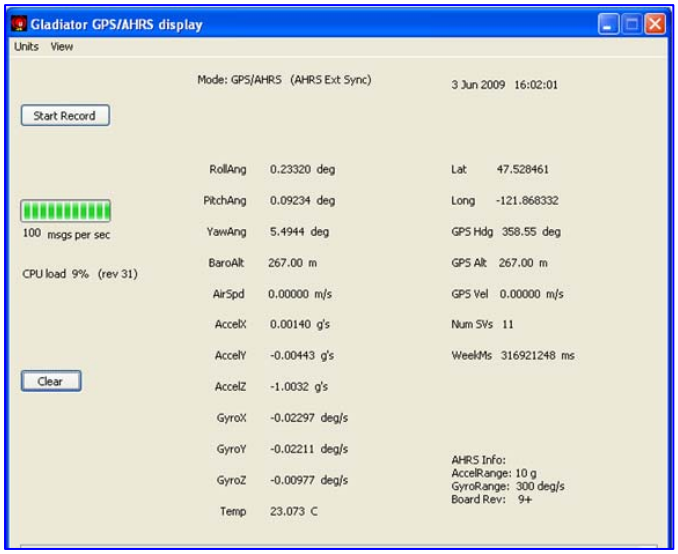
Message Protocol and GPS-GLAMR SDK Demo Kit

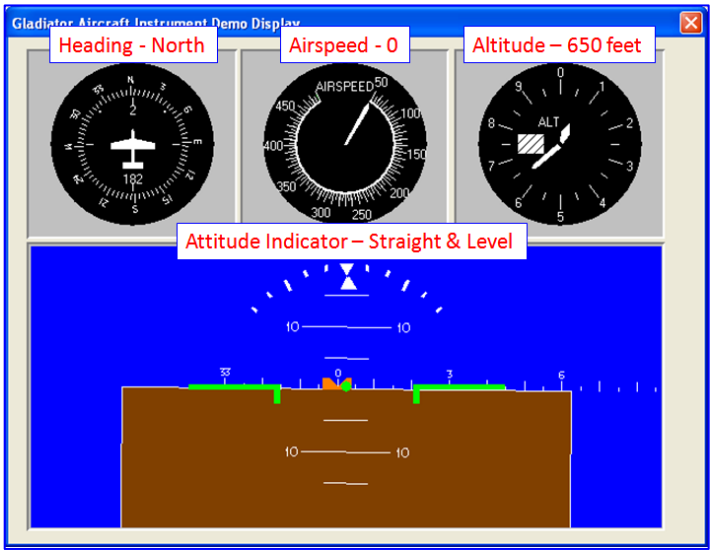
Description	Format	Source	LSB weight
Start of message	U8	Fixed: 0x51	N/A
Message counter	U8	Mod 256 counter	N/A
Gyro – X axis	I16	IMU	0.01 deg/sec
Gyro – Y axis	I16	IMU	0.01 deg/sec
Gyro – Z axis	I16	IMU	0.01 deg/sec
Accel – X axis	I16	IMU	0.001 g
Accel – Y axis	I16	IMU	0.001 g
Accel – Z axis	I16	IMU	0.001 g
Temp – X axis	I16	IMU	0.01 deg C
Roll Angle	I16	IMU	0.01 deg
Pitch Angle	I16	IMU	0.01 deg
Yaw Angle	U16	IMU	0.01 deg
Air Speed *	I16	IMU	meters/sec
Latitude	I32	POSLLH – Latitude	1e-7 degrees
Longitude	I32	POSLLH – Longitude	1e-7 degrees
TimeMs	U32	SOL – ms since start of week	1
TimeWeek	U16	SOL – week number	1
Altitude	I16	POSLLH – height above mean sea level / 1000	meters
Velocity	U16	VELNED – 2D ground speed / 100	meters/sec
Heading	U16	VELNED – 2D heading / 1000	0.01 deg
No. of SVs	U8	SOL – Number of SVs	1
IMU status	U8	IMU: See note 4.	n/a
Status	U8	See note 5 (in User Guide)	n/a
Checksum	U8	See note 1 (in User Guide)	n/a
Total size (bytes)	48		
Output Rate	100Hz		

*** Requires pitot tube of 1.45 differential pressure analog input 0-5V**

Messaging Protocol Notes:

1.The checksum byte is the two's complement of the sum of all bytes in the message excluding the checksum byte.
2.All 16-bit data are transferred in little-endian format (LSB first).
3.Total transport time per message packet is 4.4ms:
*Full: (46 bytes * 11 bits/byte) / 115200 bps = 4.4ms*
4.Status byte format: The status byte contains 5 error bits and 3 status bits *(see User Guide)*.





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