

LandMark™ 20 AHRS



- **Rugged Environmentally Sealed Packaging & MILSPEC Connector**
- **Low Noise Silicon MEMS AHRS**
- **Low Gyro Noise**  $0.01^\circ/\text{sec}/\sqrt{\text{Hz}}$   $1\sigma$
- **Low Accel Noise**  $0.05\text{mg}/\sqrt{\text{Hz}}$  ( $2g$ )
- **In-Run Gyro Bias**  $15^\circ/\text{hour}$   $1\sigma$
- **Heading (Yaw) Angles**  $0.5^\circ$  stationary
- **Pitch & Roll Angles**  $0.25^\circ$  stationary
- **Altitude**  $\pm 3$  meter  $1\sigma$
- **Fully Temperature Compensated Bias and Scale Factor**
- **Compensated Misalignment**  $1\text{mrad}$   $1\sigma$  and **g-Sensitivity**  $< 0.02^\circ/\text{sec}/g$   $1\sigma$
- **External Sync Input** ( $1\text{kHz}$  or  $1\text{pps}$ )
- **Low Power**  $< 600$  mWatt typical
- **Low Voltage**  $+3.3\text{V}$  (single sided power)
- **Light Weight**  $110$  grams
- **Small Size**  $< 72\text{cm}^3/4.4\text{in}^3$
- **Bandwidth Filtering Capability**
- **RS485 Data Rate**  $100$  Hz (user selectable)
- **Internal Vibration Isolation**
- **Internal Temperature Sensors**

**Rugged, Low Power, Low Noise  
and Accurate MEMS AHRS**

Export Classification: Commerce ECCN7A994

The new LandMark™ 20 AHRS features very low noise gyros and accelerometers with excellent in-run bias as well as over temperature bias performance with ruggedized environmentally sealed packaging enclosure and a MILSPEC connector. The unit is form, fit and function interchangeable with both the LMRK10 & 40 AHRS. The unit is ideal for applications demanding excellent performance coupled with challenging environmental requirements at low cost. Other features include: low power consumption, small size, light weight, long life MTBF and enhanced packaging



with environmental sealing and EMI protection. The signature feature of this AHRS is the **low noise gyros and accelerometers**, which enable precision measurement and improved in-run and bias over temperature as well as reduced jitter on an attitude indicator display. This is combined with an accurate magnetometer for heading, that is calibrated over temperature, as well as pitch and roll angle outputs. The AHRS's performance is optimized with **fully temperature compensated bias and scale factor and compensated misalignment and g-sensitivity**. The unit is well suited for the harsh environments of commercial automotive and motorcycle testing, motorsports racing, commercial aircraft and sea applications that require both low cost and high performance as well as rugged durability.



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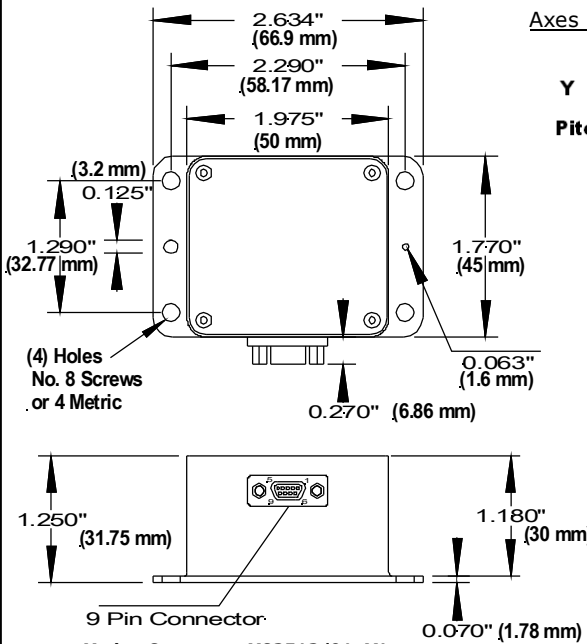
High Performance Inertial MEMS

**Gladiator Technologies, Inc.**

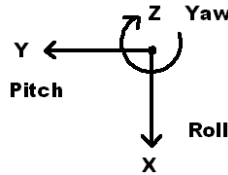
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SN: 150

## LandMark™ 20 AHRS



Axes (Top View) Right Hand Rule



### LandMark™ 20 AHRS

LMRK20AHRS-075-02-300 or -10  
LMRK20AHRS-150-02-300 or -10  
LMRK20AHRS-300-02-300 or -10

## Specification

Pin No.	Assignment
1	RS-485 A (+)
2	RS-485 B (-)
3	Power Ground
4	Analog/Digital Input (0V to 5V)
5	<b>+3.1V to +5.5V Input Power</b>
6	External Sync Input (1kHz or 1pps)
7	+5V Regulator Out
8	Signal Ground
9	Self Test

Note: Any unused inputs (Pins 4, 6, 9) must be connected to signal ground (Pin 8).

Outputs	Serial Sequence at 100Hz
1, 2, 3	Gyros: Roll (X), Pitch (Y), Yaw (Z)
4, 5, 6	Accelerometers: (X), (Y), (Z)
7	IMU Temperature
8, 9, 10	Magnetometers: (X), (Y), (Z)
11	Pressure
12, 13, 14	Angles: Roll, Pitch, Yaw
15, 16, 17	AC Velocities: (X), (Y) & Vertical Velocity: (Z)
18, 19, 20	Altitude, Temp, Forward Velocity

User to provide either analog or external velocity for velocity functions to be enabled (pin 4).

PARAMETER	RATE AXES			ACCEL AXES	
Range	±75°/sec	±150°/sec	±300°/sec	±2 g's	±10 g's
Bias (Over Temp.)	<0.05°/sec 1 σ			< 1.0mg 1 σ	< 1.5mg 1 σ
Bias (In Run Stability)	15°/hour 1 σ			0.02mg 1 σ	0.1mg 1 σ
Scale Factor Error %	≤0.1% (over temperature) 1 σ				
Sensor Resolution	0.005°/sec			0.025mg	0.08mg
Angle Random Walk	0.01° /sec/√Hz 1 σ			0.05mg /√Hz 1 σ	0.16mg /√Hz 1 σ
Alignment	1mrad 1 σ				
G-Sensitivity	<0.02°/sec/g 1 σ				
Self Test On	Δ 50 ± 25°/sec			Δ 1.5 ±0.5g	Δ 0.3 ±0.2g
	Logic 1 = 3V to 5V at Pin 9 (open = off)				
Temp Range	Operating: -40°C to +85°C Non-Operating: -55°C to +85°C				
Heading	± 0.5° stationary				
Pitch & Roll	± 0.25° stationary				
Altitude	± 3m 1 σ				
Update Rate	100 Hz or 10 Hz (user selectable)				
Temp Sensors	Internal Temperature Sensors				
Start-up Time	< 0.65 sec AHRS 200 Hz Spec Mode				
Input Power	<b>+3.1V to 5.5V Max. Input (single sided)</b>				
Power Consumption	600 mW at 3.3V typical 750 mW at 3.3V maximum				
Size	U.S.:	1.97 x 1.77 x 1.25 = 4.4 in <sup>3</sup>			
	Metric:	5 x 4.5 x 3.2 = 72 cm <sup>3</sup>			
Weight	110 grams				
Mounting	4ea No.8 or M4 Screws				
Shock	500g's ½ sine 30 msec powered				
Vibration	6gRMS (20Hz to 2KHz ~ 10g accelerometers)				
MTBF	31,428 hrs (per MIL-STD-217F, Notice 2 based on AIC environment with ambient temperature at 40°C)				

Specification subject to change without notice



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