

EMBEDDED GNSS-INERTIAL SYSTEMS FOR CONTINUOUS MOBILE POSITIONING AND DIRECT GEOREFERENCING APPLICATIONS

KEY FEATURES

Proven GNSS-Aided Inertial technology from Trimble Applanix

Centimeter level mobile positioning accuracy

Industry leading continuous positioning performance in GNSS denied environments

Full position and orientation solution for direct georeferencing of remote sensing systems

Fully supported for all dynamic environments: terrestrial, airborne and marine

The Trimble AP20 GNSS-Inertial System is an embedded GNSS-Inertial OEM board set plus Inertial Measurement Unit (IMU) in a compact form factor. It is designed to give system integrators the ability to harness the best in GNSS multi-frequency positioning technology, with the superior capabilities of inertial data for continuous mobile positioning in poor signal environments, and for the orientation of imaging sensors.

The Trimble AP20 features a high-performance precision GNSS receiver and the industry leading Applanix IN-Fusion™ GNSS-Inertial integration technology running on a powerful, dedicated Inertial Engine (IE) board. This flexible, modular design ensures the ability to perform full high-powered GNSS-inertial processing without sacrificing performance, and an upgrade path to next generation GNSS boards as they become available.

PERFORMANCE YOU CAN TRUST

Whether it be guiding autonomous vehicles to winning finishes in the DARPA Urban challenge, motion compensating multibeam sonar to meet IHO standards, or georeferencing airborne laser scanners to centimetre level accuracy from high in the sky, Trimble GNSS with Applanix inertial technology has a proven track record of performance without compromise. With Trimble AP products you know exactly what positioning performance you will get for your mobile application.



*Trimble AP20 GNSS-Inertial
OEM System*

TRIMBLE AP20 GNSS-INERTIAL OEM SYSTEM

TECHNICAL SPECIFICATIONS

- Advanced Applanix IN-Fusion™ GNSS-Inertial integration technology
- Advanced Trimble Maxwell® 6 Custom GNSS survey technology (two chipsets)
- 220 Channels: (per chipset)
 - GPS: L1 C/A, L2C, L2E (Trimble method for tracking unencrypted) L5
 - GLONASS: L1 C/A and unencrypted P code, L2 C/A and unencrypted P code, L3 CDMA⁹
 - GALILEO¹⁰: L1 CBOC, E5A, E5B, E5AltBOC⁹
 - QZSS: L1 C/A, L1C, L1 SAIF, L2C, L5, LEX¹¹
 - SBAS: L1 C/A (EGNOS/MSAS), L1 C/A and L5 (WAAS)
 - L-Band: OmniSTAR VBS, HP, XP and G2
- High precision multiple correlator for GNSS pseudorange measurements
- Unfiltered, unsmoothed pseudorange measurements data for low noise, low multipath error, low time domain correlation and high dynamic response
- Very low noise GNSS carrier phase measurements with <1 mm precision in a 1 Hz bandwidth
- Proven Trimble low elevation tracking technology
- Support for optional Distance Measurement Indicator (DMI) input
- Support for optional GNSS Azimuth Measurement System (GAMSTM)
- Support for optional POSpac Mobile Mapping Suite post-processing software

INPUT/OUTPUT

LAN

Parameters	Time tag, status, position, attitude, velocity, track and speed, dynamics, performance metrics, raw IMU data (100 or 200 Hz, IMU dependent), raw GNSS data (5 Hz)
Display Port	Low rate UDP protocol output (1 Hz)
Control Port	TCP/IP input for system commands
Primary Port	Real-time TCP/IP protocol output (up to IMU data rate)
Secondary Port	Buffered TCP/IP protocol output for data logging to external device (up to IMU data rate)

Internal Logging, 4 GByte (up to IMU data rate)

Parameters	Time tag, status, position, attitude, velocity, track and speed, dynamics, performance metrics, raw IMU data (100 or 200 Hz, IMU dependent), raw GNSS data (5 Hz)
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RS232 Input

Parameter	AUX GPS Input (RTK, SBAS), CMR, CMR+, RTCM v2.x, RTCM v3.x
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RS232 NMEA Output (1 – 50 Hz)

Parameter	Position (\$INGGA), Heading (\$INHDT), Track and Speed (\$INVTG), Statistics (\$INGST), Attitude (\$PASHR), Time and Date (\$INZDA), Events (\$EVT1, \$EVT2)
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Other I/O

1 pulse-per-second	Time Sync output, normally high, active low pulse (configurable)
Event Input (2)	Two time mark of external events. TTL pulses > 1 msec width, max rate 100 Hz

PERFORMANCE SPECIFICATIONS¹ (RMS ERROR)

Airborne Applications

	SPS	DGPS	XP ³	Post-Processed ⁴
Position (m)	1.5 – 3.0	0.5 – 2.0	0.1 – 0.5	0.05 – 0.3
Velocity (m/s)	0.05	0.050	0.010	0.010
Roll & Pitch (deg)	0.03	0.020	0.020	0.015
True Heading ² (deg)	0.10	0.100	0.080	0.035

Marine Applications, No GNSS Outages

	SPS	DGPS	IARTK ⁶	Post-Processed ⁴
Position (m)	1.5 – 3.0	0.5 – 2.0	0.02 – 0.1	0.02 – 0.05
Velocity (m/s)	0.05	0.05	0.010	0.010
Roll & Pitch (deg)	0.03	0.03	0.020	0.015
True Heading ⁵ (deg)	0.05	0.05	0.050	0.025

Terrestrial Applications⁷, No GNSS Outages

	SPS	VBS ⁸	IARTK ⁶	Post-Processed ⁴
Position (m)	1.5 – 3.0	0.1 – 0.5	0.02 – 0.05	0.02 – 0.05
Velocity (m/s)	0.05	0.010	0.010	0.005
Roll & Pitch (deg)	0.03	0.020	0.020	0.015
True Heading ² (deg)	0.20	0.200	0.100	0.050
True Heading ⁵ (deg)	0.05	0.05	0.05	0.025

Terrestrial Applications⁷, 1 km or 1 minute GNSS Outage

	SPS	VBS ⁸	IARTK ⁶	Post-Processed ⁴
Position (m)	5.5	0.61 - 2.5	0.35 - 1.27	0.13 - 0.32
Position ⁵ (m)	4.5	0.61 - 0.88	0.35 - 0.69	0.13 - 0.24
Roll & Pitch (deg)	0.03	0.020	0.020	0.020
True Heading ² (deg)	0.20	0.200	0.100	0.060
True Heading ⁵ (deg)	0.07	0.070	0.070	0.030

PHYSICAL CHARACTERISTICS

Board Set

Size:	130 L x 100 W x 39 H mm (nominal)
Weight:	0.28 kg (nominal)
Power:	10 – 28 Volts DC, 20 Watts (max, with GAMS option)
Connectors:	I/O: Samtec QSH-060-01-L-D-DP-A-RT1 Power: Samtec TFM-105-12-S-D-LC Antenna: MMCX receptacle

ENVIRONMENTAL CHARACTERISTICS

Temperature:	-40 deg C to +75 deg C (Operational) -55 deg C to +85 deg C (Storage)
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Inertial Measurement Unit (IMU)

Type	Class	Temperature	Power	Size (L x W x H) mm	Weight	Data Rate
IMU-17	MIL	-40 deg C to +71 deg C	10 - 34 Vdc, 8 W (max)	158 x 158 x 124	2.5 kg	100 Hz
IMU-42	COM	-20 deg C to +55 deg C	+ 5 Vdc, 8 W (max)	85 x 85 x 66	0.68 kg	200 Hz

¹ Typical performance. Actual results are dependent upon satellite configuration, atmospheric conditions and other environmental effects

² Typical mission profile, max RMS error

³ OmniStar XP service, typical airborne results, subject to regional coverage. Subscription sold separately.

⁴ POSpac MMS

⁵ With GAMS option, 2 m baseline

⁶ Applanix IN-Fusion Inertially-Aided RTK, typical results

⁷ With DMI option

⁸ Virtual Base Station corrections

⁹ There is no public GLONASS L3 CDMA ICD. The current capability in the receivers is based on publicly available information. As such, Trimble cannot guarantee that these receivers will be fully compatible with a future generation of GLONASS satellites or signals.

¹⁰ Developed under a License of the European Union and the European Space Agency.

¹¹ Pilot observable.

Specifications subject to change without notice.