Firmware SPAN® Land Vehicle

OPTIMIZES SPAN PERFORMANCE IN FIXED WHEEL LAND VEHICLE APPLICATIONS

SPAN TECHNOLOGY

SPAN (Synchronous Position, Attitude and Navigation) technology brings together two complementary technologies: Global Navigation Satellite System (GNSS) positioning and inertial navigation. The absolute accuracy of GNSS positioning and the stability of Inertial Measurement Unit (IMU) gyro and accelerometer measurements, combine to provide an exceptional 3D navigation solution delivering full attitude and orientation.

SPAN LAND VEHICLE OVERVIEW

NovAtel's SPAN Land Vehicle technology optimizes the integrated GNSS+INS performance for fixed wheel land vehicles under low dynamics, in urban canyons, or during extended GNSS outages. Accurate position, velocity and attitude are maintained in these challenging environments through our intelligent vehicle dynamics modeling and the use of NovAtel's patented Antenna Phase Windup technology.

EXTENDED GNSS OUTAGE

During periods of extended GNSS outage, the INS solution can drift significantly without the GNSS position to correct for the accumulation of IMU errors. The intelligent vehicle modeling in SPAN Land Vehicle technology identifies IMU errors and reduces the impact of those errors on the SPAN solution.

TABLE 1: AVERAGE SPAN LAND VEHICLE PERFORMANCE AT 1 HOUR COMPLETE GNSS OUTAGE[1]

IMU Grade	Average Error Over Distance Traveled (%) Over 1 Hour		Azimuth Error (degrees) 1 Sigma Standard Deviation	
	Land Profile	Land Profile with DMI	Land Profile	Land Profile with DMI
Entry Level–S1	0.28%	0.15%	1.76	1.59
Mid-Range—S2	0.10%	0.05%	0.18	0.17
High Performance–S3	0.08%	0.05%	0.12	0.10

1. Typical driving conditions at an average speed of 65 km/hr.

BENEFITS AND FEATURES

+ Continuous position, velocity and attitude output through extended GNSS outage
+ Enhanced navigation performance in low dynamic applications
+ SPAN intelligent vehicle dynamics modeling
+ Patented Antenna Phase Windup Technology
+ Available for all SPAN supported IMUs

If you require more information about firmware, visit www.novatel.com/products/firmware-options

SPAN® Land Vehicle

LOW DYNAMICS APPLICATIONS

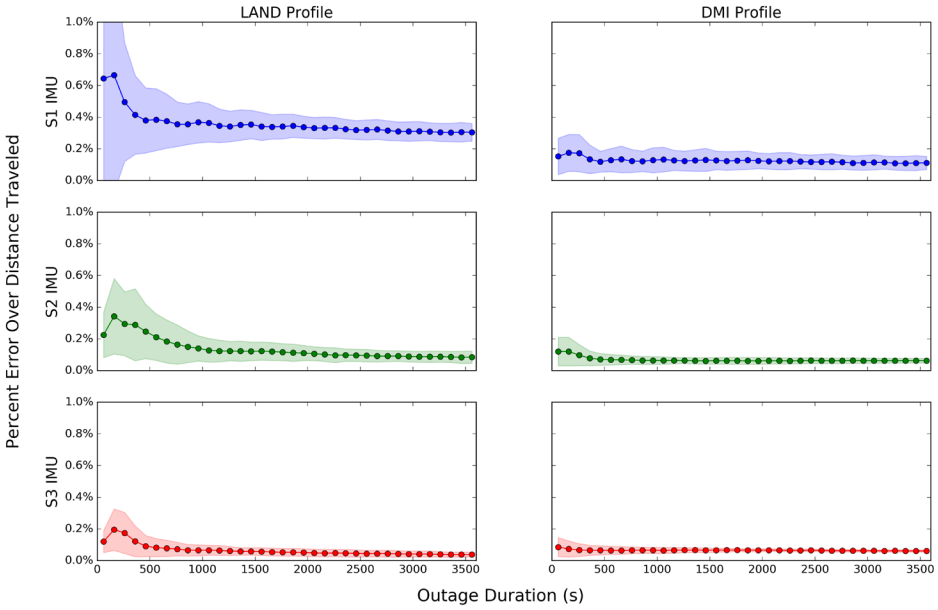
INS systems rely on changes in accelerations and rotations to determine velocity and heading. In applications with a constant direction and speed, such as those commonly found in agriculture, mining and machine control, it is difficult for an INS system to differentiate IMU errors from actual measurements. In a GNSS+INS system, GNSS positioning can constrain position and velocity errors, but cannot correct errors in attitude measurements.

SPAN Land Vehicle technology uses NovAtel's patented Antenna Phase Windup technology to sense changes in direction and, when combined with intelligent vehicle modeling, can correct for IMU errors in attitude.

ADDING EXTERNAL SENSORS

By adding external sensors to the system, such as a Distance Measurement Instrument (DMI), dual antennas or any other external position, velocity or attitude input, SPAN Land Vehicle technology can be further improved. The plots below show the performance for each grade of IMU over a 1 hour period.

FIGURE 1: ERROR OVER DISTANCE TRAVELED OVER 1 HOUR OF COMPLETE GNSS OUTAGE



To obtain the latest data regarding this product, visit www.novatel.com/products/firmware-options/span-land-profile/

novatel.com

sales@novatel.com

1-800-NOVATEL (U.S. and Canada)
or 403-295-4900

China 0086-21-68882300

Europe 44-1993-848-736

SE Asia and Australia 61-400-883-601

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