GESELLSCHAFT FUER INERTIALE MESS-,
AUTOMATISIERUNGS- UND REGELSYSTEME MBH
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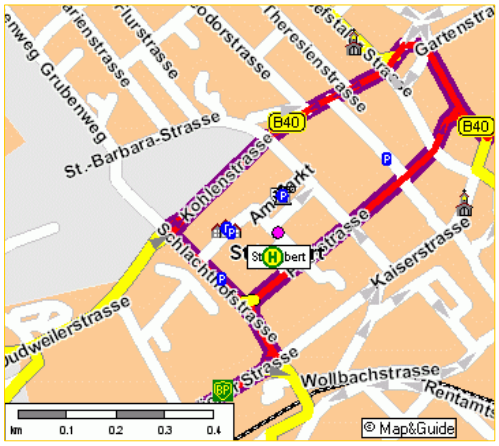
iDRPOS.32

Dead Reckoning System for Precision Position Determination
Präzise Ortung von Gabelstaplern und Vermessungs-Fahrzeugen

Dead Reckoning is the way to make (D)GPS more accurate and reliable when tracking or steering vehicles or when surveying their trajectories, e.g. for GIS data acquisition applications. It uses extra sensors (in addition to GPS) installed in the vehicle to measure the speed and the direction, i.e. heading. Therefore a full dead reckoning system

- provides NMEA position and heading also during GPS outages
- position accuracy with DGPS about 1 m (Omnistar)
- data rate up to 200 Hz
- fiber optic gyro technology (FOG) or MEMS gyros
- interfaces: RS232 / Ethernet
- used for mapping and navigation applications
- used for road surveying, autonomous truck guidance, fork-lifters

consists of a (D)GPS receiver, one or three gyroscope (to detect heading and if necessary roll and pitch), an odometer (to measure the vehicle's velocity) and (only for usage in difficult environment) three accelerometers. By combining the information of all these sensors the current vehicle's position can be calculated with higher accuracy, even when GPS or DGPS signals are blocked for a certain time. This means that iDRPOS continues to report positions with high data rate also when GPS signals are blocked or disturbed, such as in tunnels or when surrounded by tall buildings like in urban canyons or container terminals.



iMAR's Dead Reckoning System for accurate Positioning iDRPOS is realized in an open architecture. In dependence on users requirements iDRPOS can be equipped with gyroscopes of different classes of accuracy, e.g. fiber-optic gyros, vibrating gyros or laser gyros (main differences are e.g. in drift and scale factor accuracy). If the operational area of the vehicle is not a flat plain, then a solution using only one gyro may be not sufficient. Therefore iDRPOS.32 contains two additional accelerometers provided to correct influences due to roll and pitch angles.

hardware vs. feature	**iDRPOS.32**	**iNAV-FMS-DRPOS**
gyro performance	FOG, 3 deg/hr 0.2 deg/sqrt(hr)	FOG, 1 deg/hr 0.15 deg/sqrt(hr)
gyro scale factor accuracy	0.03 %	0.03 %
roll/pitch compensation	yes	yes
no. of accel + gyro axes	2 + 1	3 + 3 (full strapdown)
output data rate	1...200 Hz	1...400 Hz
data output	pos., vel., heading, roll, std.dev.	pos., vel., heading, roll, pitch, angular rate, accel., std.dev.
Stored heading feature	yes	yes
application	roads, standard dynamics, heavy vehicles, container vehicles, surveying cars.	highest precis., offroad, demanding applications together with stabilisation requirements for cameras...
typical performance (condition: system is aided by GPS over at least 2 km before benchmarking with loss of GPS is started). Odometer / iMWS shall be installed on a non-driven wheel.	0.2 % of distance travelled (roll < 20 °, pitch < 12° [< 20 %]). Error increases slightly for larger roll/pitch.	0.2 % of distance travelled (roll < 35 °, pitch < 35° [< 70 %]). Error increases slightly for larger roll/pitch.

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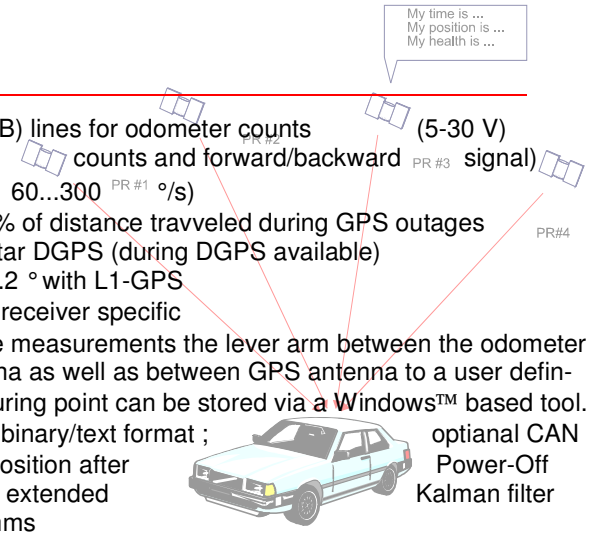
If also strong coning motion excitation of the vehicle is expected or highest accuracy is required also in off-road applications, instead of iDRPOS.32 the iNAV-FMS can be delivered containing three gyroscopes and accelerometers (processing of so-called strap-down algorithms). iDRPOS can be used with nearly all common available (D)GPS receivers like Javad, NovAtel, Trimble, Ashtec, Rockwell, Garmin, NavStar etc. Using differential GPS (DGPS) like Omnistar, the accuracy of iDRPOS is much better than using standard GPS of course. The Kalman filter processed inside of the iDRPOS performs an automatically and continuously operating and estimation of the odometer scale factor, so no initialisation or fine calibration by the user is required. As an option it is also possible to store all the data of inertial sensors like gyroscopes and accelerometers, odometer and mobile GPS on an internal 4 GByte flashdrive.

The "stored heading" feature is standard equipment in the iDRPOS.32 and allows a fast start-up even if GPS is not available so far at power-on.

Technical Data:

Odometer Interface:	one (A) or two (A/B) lines for odometer counts (5-30 V) (option: Tacho counts and forward/backward signal)
Vehicle's Max. Rotation Rate:	±200 °/s (optional 60...300 °/s)
Typical system performance:	Position error 0.2% of distance travveled during GPS outages < 1 m with Omnistar DGPS (during DGPS available) Heading error < 0.2 ° with L1-GPS
GPS Interface:	RS232: NMEA or receiver specific
Parameter Setup:	For most accurate measurements the lever arm between the odometer to the GPS antenna as well as between GPS antenna to a user definable virtual measuring point can be stored via a Windows™ based tool.
Data Output:	RS232: NMEA or binary/text format ; optianal CAN
Additional Options:	Stored Heading/Position after Power-Off
Signal Processing:	iMAR's Advanced extended Kalman filter based SD-algorithms
Size, Weight:	230 x 229 x 98 mm (WxDxH) ; 2,550 grams
Power Supply:	10...34 V DC



Please do not hesitate to contact us should you have any further questions or need further information on our family of Dead Reckoning or other Inertial Measurement Systems.

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