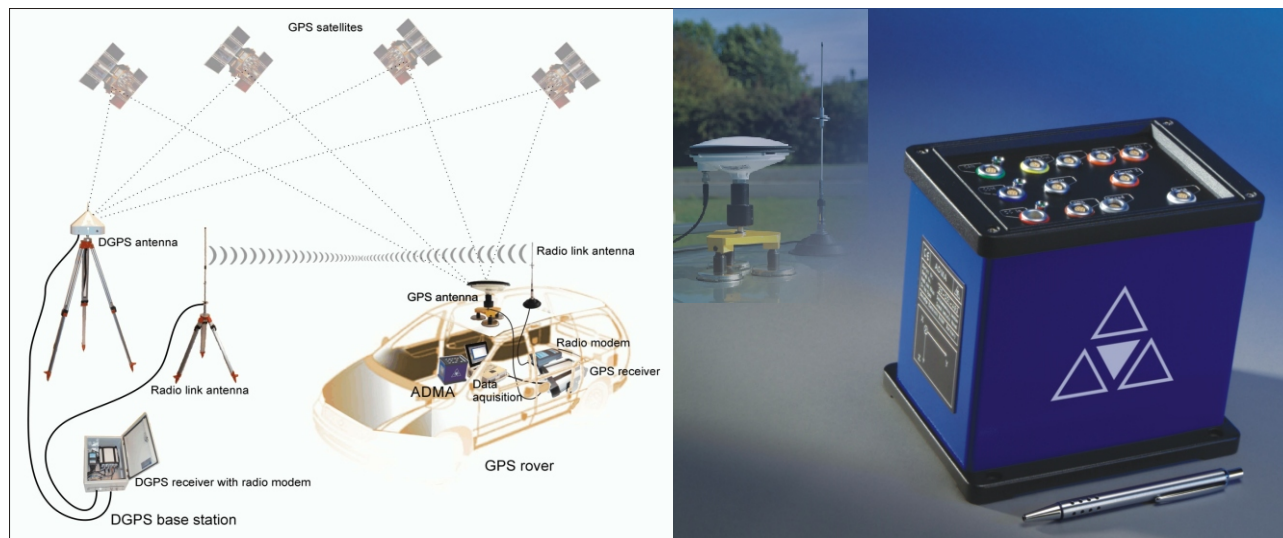




ADMA-G: Automotive Dynamic Motion Analyzer with DGPS



Gyro System and Precision GPS for Automotive Testing

The ADMA (Automotive Dynamic Motion Analyzer) gyro system was developed especially for the dynamic testing of automobiles. Using the ADMA all dynamic movements of a vehicle such as acceleration, speed, position, turning speed and angle of the vehicle can be tracked with a high degree of accuracy.

Special features

- △ Measurement of vehicle motion in three axes
- △ Dynamic attitude (pitch and roll) and heading determination
- △ Precise acceleration and position calculation thanks to extended Kalman filter
- △ Accurate position data with internal WAAS/EGNOS DGPS receiver (< 1 m)
- △ Highly accurate position data with internal RT2 DGPS receiver and DGPS-base station (2 cm)
- △ Robust inertial strap-down measurement technology without moving parts
- △ CAN-Bus data interface compatible with DIAdem® (NI) software

Range of applications

- | | |
|---|---|
| △ Vehicle driving dynamics analysis | △ Deceleration/acceleration testing |
| △ Adjustment of chassis systems | △ Tyre testing |
| △ Road holding test | △ Road survey |
| △ Kinematic and elasto-kinematic analysis | △ Track analysis |
| △ Verification of simulation models | △ GIS data acquisition |
| △ Steering robot navigation | △ Verification of driver assistance systems |

Improved design: smaller, lower weight, GPS inside, Kalman filter, software upgradable



Description

The ADMA gyro system was especially developed for dynamic testing of vehicles. The ADMA-G continuously measures both the acceleration and position in all three axes and the pitch, roll and heading angle of a moving vehicle. The system can also be used for the dynamic calculation of speed. The ADMA-G is the sophisticated ADMA version with an integrated GPS receiver for highly accurate measurements.

The system comprises:

- △ three fibre-optic gyros (unaffected by acceleration) for detecting rotational motion;
- △ three servo accelerometers for determining acceleration;
- △ an internal GPS receiver for accurate position update with WAAS- or RTK-DGPS corrections;
- △ a 32-bit processor unit that continuously calculates the angular orientation and position from internal sensor signals and external information (e.g. velocity sensors).

The package is implemented in strap-down-technology without moving parts and is therefore extremely robust and resistant to shock and vibration. Additionally, all components for DGPS data generation (antennas, radio link ...) are provided.

The calculation algorithms are optimised for dynamic vehicle tests such as slalom and circular movement and take account of the gravitational acceleration and rotation of the earth. In addition to the integrated DGPS receiver, an external speed signal (odometer or Correvit) can be connected in order to improve the accuracy of positional data and heading angle stability. The extended Kalman filter merges the internal with the external sensor data to achieve high-frequency output as well as great accuracy. In this way, positional accuracy in the centimetre range can be obtained while the vehicle is in motion.

Data output is transmitted via a CAN bus. This way, data exchange with "off-the-shelf" data acquisition systems (e.g. DIAdem) can easily be performed. In addition to simple operation, synchronisation with other measuring signals is ensured.

Technical Data

Gyros:	<ul style="list-style-type: none"> △ Quantity / Type: 3 closed-loop fibre optic gyros △ Measuring range heading / roll / pitch: ± 320 °/s △ Resolution heading / roll / pitch: 0.00004 °/s △ Zero stability better than 6 °/h, optional 1 °/h △ Gyro noise better than 0.6 %/ h, typ. 0.2 %/ h △ Scale factor accuracy better than 0.1 %, typ. 0.06 %
Accelerometers:	<ul style="list-style-type: none"> △ Quantity / type: 3 servo accelerometers △ Measuring range: ± 5 g △ Measuring accuracy better than 1 mg △ Measuring resolution: 300 μg
GPS:	<ul style="list-style-type: none"> △ Measuring accuracy: 0.01 / 0.2 / 0.45 / 0.8 / 1.2 / 1.5 / 1.8 m (GPS receiver dependent) △ Measuring precision: 0.075 / 0.2 / 6 / 25 cm (GPS receiver dependent) △ Data update rate: up to 50 msec (internally interpolated from 20 to 2.5 msec) △ WAAS/EGNOS-DGPS corrections or RT2-DGPS corrections (via radio link)
Complete system:	<ul style="list-style-type: none"> △ Angle measuring range heading / roll / pitch: $\pm 180 / 60 / 60$ ° △ Angle measuring accuracy static / dynamic: better than 0.05 ° / typical 0.1 ° △ Angle resolution: 0.005 ° △ Measuring axis misalignment < 1 mrad △ Initial alignment with internal GPS receiver or by manual input △ Interface: RS 232, 115200 baud or CAN △ Data update rate: 50 - 400 Hz △ Sync input and output: TTL, optically isolated △ Event input (e.g. for lap index): TTL, optically isolated △ Input for GPS antenna and radio link for DGPS corrections △ Speed input: 2 x (Vx, Vy), analogue 14 bit or TTL pulse △ Interface for internal software upgrade △ Power supply: selectable 12 / 24 / 48 VDC, ± 10 %, 15 Watt △ Dimensions (W x L x H): 110 x 170 x 180 mm △ Weight: 3.0 kg △ Temperature range: -20 to +60 °C

Released: August 09