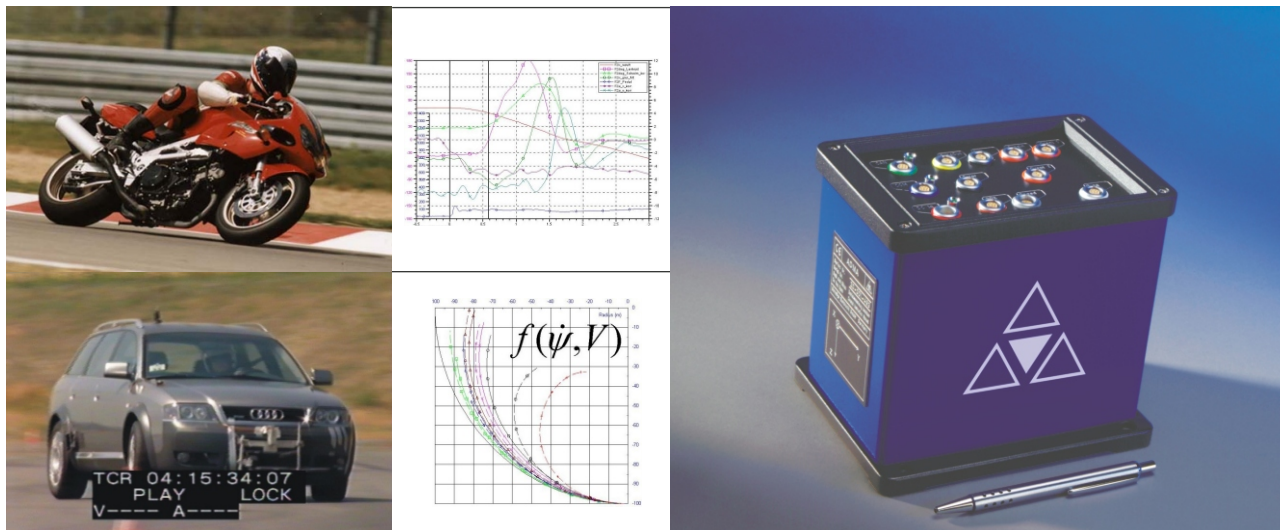




ADMA: Automotive Dynamic Motion Analyzer



Gyro system 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.

Special features

- Measurement of vehicle motion in three axes
- Dynamic attitude (pitch& roll) and heading determination
- Precise acceleration calculation due to extended Kalman filter
- Highly accurate position data with external GPS-receiver
- 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 testing |
| Adjustment of chassis systems | Tyres testing |
| Kinematic and elasto-kinematic analysis | Acceleration testing |
| Comfort analysis | Verification of simulation models |

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

Sensor technology for automotive testing and tunnelling
 Inclination-, gyro-, laser- metrology
 Industrial image processing



Description

The ADMA gyro system was especially developed for dynamic testing of vehicles. The ADMA continuously measures both the acceleration 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 and position.

The system comprises

- Three fibre optic gyros (unaffected by acceleration) for detecting rotational motion,
- three servo accelerometers for determining acceleration
- a 32 bit processor unit that continuously calculates the angular orientation and position from internal sensor signals and external information (e.g. GPS or velocity sensors).

The package is implemented in Strap-Down-Technology without moving parts and is therefore extremely robust and resistant against shocks and vibration.

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. To improve the accuracy of positional data and heading angle stability an external speed signal (odometer or Correvit) or an external GPS system can be connected. Alternatively the new ADMA is also available with an internal GPS receiver (ADMA-G version). The extended Kalman filter merges the internal with the external sensor data to achieve high frequency output as well as high accuracy. In this way positional accuracy in the centimetre range can be obtained while the vehicle is in motion.

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

Technical Data

Gyros:	Quantity / type: 3 closed-loop fiber optic gyros Measuring range heading / roll / pitch $\pm 320 / 100 / 100$ °/s Resolution heading / roll / pitch 0.00004 / 0.000012 / 0.000012 °/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:	Quantity / type: 3 Servo accelerometers Measuring range ± 5 g Measuring accuracy better than 1 mg Measuring resolution 300 μ g
Total system:	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 external GPS receiver or by manual input Interface: RS 232, 115200 Baud or CAN Data output rate: 50 - 400 Hz Sync input and output: TTL, optically isolated Event input (e.g. for lap index): TTL, optically isolated Input for external GPS or DGPS receiver 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 %, 12 Watt Dimensions (W x L x H): 110 x 170 x 160 mm (with intl. GPS Receiver H = 180 mm) Weight: 2.8 / 3.0 kg (without / with internal GPS-Receiver) Temperature range: -20 to +60 °C

Status: Mai 2004