DATA ACQUISITION SYSTEM

General-Purpose –

- Comprehensive, flexible data acquisition
- Embedded GPS receiver option (single-, dual- or triple-frequency)
- Eight isolated RS232 serial ports (115.2 kbps), two Ethernet (10/100/1000 Mbps)
- Flexible ASCII, binary and raw-data protocols, with large buffers
- 16 differential/32 single-ended analog inputs, 16-bit resolution
- Fully compatible with all leading sensors and instrumentation in airborne geophysics: spectrometers (RSI), navigation systems, etc.
- All data synchronized to magnetics and GPS, with time & event tags
- Flexible and simple user interface via built-in TFT LCD and external display
- Full monitoring/control from any Windows device (via Ethernet, or through the Internet)
- Real-time graphical output to built-in display, external display and chart recorder
- Rugged and reliable embedded storage: on-board Flash (≥ 16 GB), and hard-disk / solid-state drive (≥ 160 GB)

Magnetics –

- Magnetometer interface for up to 8 high-sensitivity sensors (Cs, He or K)
- Front-end sampling rates up to 1280 Hz
- Magnetometer processor: 0.32 pT resolution, < 0.1 pT system noise, ±10 ppb temperature stability
- User may customize Front End processing to specific installation requirements
- Real-time data recording & output: up to 160 Hz
- Gating of magnetometer readings for concurrent use with EM systems
- Optional fluxgate (vector) magnetometer and interface for post-flight compensation

System –

- Real-time operating system (RTOS): QNX 6.5
- State-of-the-art HW & FW architecture based on advanced 64/32-bit processors
- Compact and light: 19”-rack mountable, 5.25” height, 19 lb.
The RMS Instruments’ DAS500 offers outstanding performance in aeromagnetic data acquisition and recording. Powerful, versatile and rugged, yet compact and light, the DAS500 is ideally suited to airborne and mobile geophysical and environmental survey/monitoring applications.

The system is built on the foundation of state-of-the-art hardware and firmware architectures, using a deterministic, real-time operating system. The proprietary magnetometer counter technology, highly-advanced and robust, has been proven in a multitude of installations. Consistent with the magnetics, data from practically any sensor/device used in airborne geophysical applications, are delivered with unparalleled performance, accuracy and reliability.

**Magnetics**

The Front End in the system handles all magnetics data acquisition and processing, and provides accurate synchronization to GPS. The magnetometer interface, most critical for high performance and data quality, uses the latest in analog and digital electronics to achieve excellent accuracy and synchronization for up to eight high-sensitivity magnetometer sensors.

In its standard form the DAS500 accepts decoupled Larmor signals from the magnetometers. An optional embedded power/decoupler module is available for four or eight inputs. The decoupler separates the Larmor outputs of the magnetometers from 28-Volt power, and monitors the quality of magnetometer input signals.

The magnetometer interface uses a highly stable and reliable time base (OCXO). The proprietary counter and synchronization hardware deliver outstanding performance with negligible noise and temperature drift.

Front End sampling rates are user-selectable, up to 1280 Hz. Finely tuned, user-selectable transfer functions deliver outstanding anti-aliasing characteristics. The user may also customize Front End processing to the specific requirements of an installation (e.g., minimize effects from the rotor system in a helicopter).

For concurrent use with EM systems a gating signal may be used to qualify magnetometer readings.

**Optional fluxgate magnetometer and interface**

A three-axis fluxgate (vector) magnetometer and interface are available as an option. The data is perfectly synchronized to all total-field data, thus allowing optimum post-flight compensation of aircraft interference.

**General-Purpose Data Acquisition**

The DAS500 offers comprehensive and flexible general-purpose data acquisition and recording capabilities. External devices with digital (serial) and analog outputs can be connected directly to the DAS500. The system provides 8 high-speed, isolated, serial (RS232) inputs and outputs, 16 differential (or 32 single-ended) analog inputs, and two 10/100/1000Base-TX Ethernet interfaces (one dedicated to data acquisition).

Flexible serial protocols and practically unlimited buffering space, allow easy interfacing to most devices. All data sampling is at rates based on the same time base (up to 160 Hz). All data streams are perfectly synchronized and are recorded with time and event tags that allow accurate reference to GPS time and position.

The application software and real-time operating system (RTOS) reside in (solid-state) Flash memory. The RTOS is QNX 6.5 (or later). This is a deterministic and extremely reliable operating system tailored to mission-critical applications, that guarantees compliance with the strict timing constraints of all critical tasks.
The system includes extensive software utilities, including spectral analysis, graphical and/or numerical real-time monitoring of input signals, file management, and many others. Configuration and control is through an easy-to-use graphical user interface.

Embedded recording options include on-board Flash (≥ 16 GB), and a mass-storage device (HDD or SSD, ≥ 160 GB). Direct recording on a Flash disk connected to one of the USB ports is also available.

The integrated graphics controller allows simultaneous output to the built-in display and to any external display (via a standard VGA port). Other functionality includes remote control via a serial (COM) port, and extensive general-purpose I/O (one 1-Gbps Ethernet interface, independent of the one used for data acquisition, and five USB 2.0 ports).

**Remote control from Windows**

A remote connectivity tool for the DAS500 allows users full control and operation of the unit from a remote Windows-based system, across an IP network.

The user interface of the DAS500 is seamlessly replicated in the Windows-based computer. The mouse and keyboard attached to the computer have the same effect as if they were connected to the DAS500. The figure below shows typical connections and data flow.

This technology facilitates flexible architectures for complex systems that incorporate the DAS500. A single computer/laptop can be used to control and operate the DAS500 and other instruments (e.g., gamma-ray spectrometer, gravity system, etc.). Naturally, any other Windows applications can also be running simultaneously (e.g., navigation software). This remote connectivity is also very useful for training and remote support (from any location, via Internet).

**GPS receiver**

The system is available with an embedded (typically dual-frequency) GPS receiver. All magnetics and ancillary data are referenced to GPS time and position. A variety of receivers are available to satisfy different requirements in accuracy. The DAS500 gives users direct access to two ports on the receiver. This provides, for example, the interface to a navigation system. The system can also be used with an external (user-supplied) receiver.

**Data exporting software**

The data files recorded by the DAS500 have a structure optimized for efficiency and performance. ExportDaarc is a comprehensive support software package included with the DAS500 which allows exporting data files to industry-standard formats (e.g., flat-ASCII, 'XYZ', Geosoft 'GBN').

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**ORDERING INFORMATION**

- **DAS500-x**: Data Acquisition System. [x = # of magnetometer inputs: 2 ... 8]
  Includes: — License/Key for QNX (RTOS) & Phindows (remote control from any Windows computer via IP network over Ethernet).
- **Advanced Functions**: Multiple FE ampl. rates & transf. funcs., raw FE logging, in-field FW updating, mag. gating for concurrent use with EM.
- **RMS4880A Magnetometer Power/Decoupler Module**: RMS4880A-1 (up to 4 inputs), RMS4880A-2 (up to 8 inputs).
- **RMS2938-1**: 32 single-ended analog channels (instead of the standard 16 differential channels).
- **GPS Receiver Option**: Internal (consult RMS Instruments for list of receivers available) or External.
- **RMS4915 Fluxgate Magnetometer I/F Module, and 3-Axis Vector (Fluxgate) Magnetometer.**
**DAS500 SPECIFICATIONS**

**Magnetometer Inputs:**
Up to 8 high-sensitivity magnetometers; any combination of:
- Cs: Typ. 70 kHz to 350 kHz
- K-41, K-39: Typ. 140 kHz to 700 kHz
- He: Typ. 560 kHz to 2.8 MHz

**Magnetic Field Range:**
Per the magnetometer’s range; e.g.:
- G-822A, G-823A: 20,000 to 100,000 nT
- CS-3, CS-L, CS-VL: 15,000 to 105,000 nT
- GSMP-30A: 20,000 to 100,000 nT

**Front End (FE):**
- Time base: > 100 MHz, OCXO
- Resolution: 0.32 pT
- System noise: \( \sigma < 0.1 \) pT
- Temperature stability: \( \pm 10 \) ppb
- Sampling rate: 160, 640, 800 or 1280 Hz
- Transfer function (bandwidth): 1.6 Hz, 3.25 Hz, 6.4 Hz, 9.8 Hz, 20 Hz, 0.16F\(_{SH}\)
- or Custom Transf. Fonct.–user-select.

**Optional Filter (Host):**
- User-selectable, 0.4 to 3.0 Hz BW

**Vector Magnetometer:**
- Optional, with RMS4915 Fluxgate Magnetometer I/F Module
- 3-axis fluxgate
- Oversampling, 16-bit, self-calibrating ADC

**Data Output & Recording:**
- \( F_{SH} \): 10, 20, 40, 80, 160 Hz (GPS-PPS or internal synch.); external-trigger
- Serial port: to 115.2 kbps, ASCII/Binary
- Recording media: internal Flash (\( \geq 16 \) GB), internal HDD or SSD (\( \geq 160 \) GB), USB-Flash disk
- Chart recorder
- Display (built-in and external)

**Event Inputs/GPS Synch.:**
- Four latched event inputs
- LS-TTL levels, edge-sensitive
- Event tags included with output data
- Accuracy: per Front End sampling rate

**Raw Data Logging:**
- At Front End sampling rate
- 1-MB buffer
- Ex.: 41666 records for 4 mag. inputs

**Display:**
- 6.5" colour TFT digital LCD
- VGA resolution (640 x 480)
- Antiglare surface treatment
- Backlight: LED (white)
- Luminance: 1000 nits

**Mouse:**
- Silicone-rubber actuators
- Pressure-controlled operation
- No moving parts

**Remote Control:**
- From any Windows-based computer, via IP ntwk. over Ethernet – replica of DAS500’s user I/F on computer.
- Via serial (RS232) port – ASCII cmdns.

**Data Acquisition – Analog:**
- 16-bit, self-calibrating A/D converter
- RMS2938: (standard)
- 16 differential, 20-Hz AA
- RMS2938-1: (optional)
- 32 single-ended, 20-Hz AA
- Input range: \( \pm 10 \) Volts (standard), \( \pm 5 \) Volts
- Input over-voltage protection: –20 Volts to +52 Volts, power ON
- –35 Volts to +55 Volts, power OFF
- Sampling & recording: \( F_{SH} \) or submult.

**Data Acquisition – Serial:**
- 8 isolated RS232 channels
- Up to 115.2 kbps, HW handshaking
- Input: ASCII, Binary and Raw protocols
- Sampling & recording: \( F_{SH} \) or submult.

**Output:**
- User-defined packets synch. to \( F_{SH} \)

**Data Acquisition – Ethernet:**
- 10/100/1000Base-TX
- TCP/IP
- Sampling & recording: \( F_{SH} \) or submult.

**Synch. to External Devices:**
- Two independent pulse outputs
  - Rate: \( F_{SW} \) x, with \( 1 \leq x \leq 255 \)
  - Low-going pulses, \( > 10\text{-usec width} \)

**Indicators, General-Purpose I/O:**
- 8 LEDs for mag. input status
- 2 LEDs for Front End status
- Five USB 2.0
- Data output (RS232, 9-pin D-sub)
- Remote control (RS232, 9-pin D-sub)
- Two 10/100/1000Base-TX Ethernet, one
- for data acquisition (RJ45)
- Analog RGB (15-pin D-sub)
- Chart recorder I/F (9-pin D-sub)

**GPS Receiver Option:**
- Magnetics data tagged with GPS time, lat., long., altitude and auxiliary data
- Up to 10 Hz
- Internal (embedded) configuration – Single-, dual- or triple-frequency receiver from Novatek’s OEMV-1, OEMV-2, OEM6 or OEM7 series
- External configuration – Any GPS receiver with standard NMEA GGA output via serial (RS232) port (up to 10 Hz), and PPS trigger

**Power:**
- +28 VDC \( (\pm 6 \text{ VDC}) \), 3.75 A
- For each mag. input connected through the RMS4880A Magnetometer Power/Decoupler Module: 0.5 A typical
- up to 1.0 A at turn-on

**Environmental:**
- Operating Temperature: 0 to +50°C
- Storage Temperature: –20 to +55°C
- Relative Humidity: 0 to 99%, non-cond.
- Altitude: 0 to 3,000 m (0–10,000 ft); HDD
  0 to 6,000 m (0–20,000 ft); SSD
- Size \( (W \times H \times D) \): 483 x 133 x 381 mm
  \( (19 \times 5.25 \times 15 \text{ in}) \)
- Weight: 8.6Kg (19lb)

**Notes:**
1. Per manufacturer’s specs. at print time: G-822A, G-823A (Geometrics), CS-3, CS-L, CS-VL (Scintrex), GSMP-30A (GEM Sys.).
2. 1.6-Hz BW, 625-sms integr.
3. Typical; 1.6-Hz BW, 625-sms integr., 10 Hz.
4. Within operating temp. range. Over –20 to +70°C, \( < \pm 35 \) ppb.
5. With DAS500 Advanced Functions Option.
6. Specifications subject to change without notice
7. Per Geometrics G822A-type sensors. May vary for other sensors.

For additional information on these and other products, contact: Distributed By:

Distributed By:

For Geophysical Exploration

687-1 Gowery Drive
Mississauga, Ontario
Canada L4V 1L9
Tel: (905) 677-5533
Fax: (905) 677-9530
Web: http://www.rmsinst.com
E-mail: rms@rmsinst.com

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