

Data Acquisition Station

KMS-850



The KMS-850 Data Acquisition Station (DAS) is developed for EM (ElectroMagnetic) and seismic applications to obtain subsurface resistivity and velocity structure for oil and gas exploration. It also can be used in general purpose acquisition and long term monitoring services.

The acquisition station has up to six channels of 24-bit low noise, low drifting input. These channels are sampled simultaneously and synchronized with GPS. In addition, KMS-850 has expandable GPS synchronized digital interface for additional customized timing requirements. The data is saved on a SD card and can be streamed via USB or a wireless network for real-time quality check purpose. The windows based software is provided for real-time status monitoring. The long range wireless networking, up to 5 miles depending on terrain or unlimited in relaying mode, gives the ease and flexibility for field operation.

The format of the data is standard SEG formats but can also be customized. The station provides up to weeks of monitoring operation without changing battery due to its low power design and flexible working scheme. All acquiring procedures, such as sampling frequencies, acquisition time duration sequence, gain, filter setting, etc., are downloaded through local wireless network, USB, or pre-saved into the SD card eliminating manual setting changes during the entire survey.

The station architecture design utilizes modular concept with motherboard and expandable, function specific, acquisition channels. The motherboard handles large amount of data with a dedicated 32-bit floating point DSP processor for fast and sophisticated data processing. A microcontroller handles USB, wireless networking, GPS, SD card, and system management. Each function specific acquisition channel is an independent module which is designed for its specific use, such as E field or H field measurement, or seismic measurement with its specific bandwidth, filters, offset, gain and sampling rate or other signal conditioning requirements. The output from the channel module is digitized data stream and the FPGA on the module handles commands and synchronization with the motherboard. Each channel module has its own power supply and communicates to the motherboard through a isolated interface. As a result, all the channel modules are completely isolated, minimizing ground loops and cross-talk between channels for critical applications. In this architecture, customer can easily target their specific requirements and configure the station with great flexibility. The expandability will significantly reduce customer cost and time to market for new application because they do not need to buy a new acquisition station later. They only need to simply add/swap a new application channel module into the existing station and ready to operate.

The KMS-850 is cost effective and delivers high quality EM or seismic data and can easily and seamlessly be operated with existing seismic systems or even as seismic recorders with the installation of a seismic channel module. The Data Acquisition Station reduces maintenance and deployment cost with high reliability.

Innovating Solutions

Product Applications

Land EM applications:

- EM transmitter synchronization and monitoring
- System response recording (time domain and induced polarization)
- EM survey in array configuration

Marine EM applications:

- Transition zone transmitter and monitor
- Source controller and environmental monitor (current and one field component)

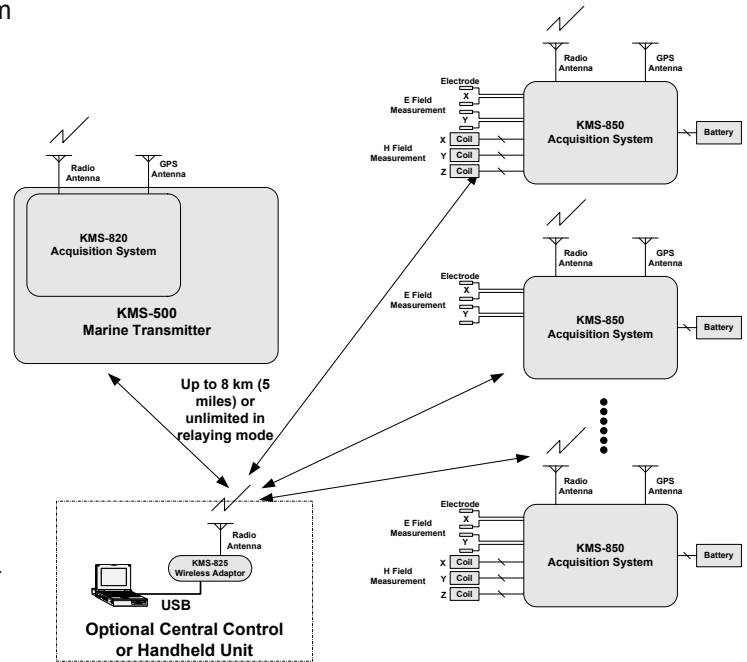
Land seismic applications:

- Seismic survey of subsurface structure for hydrocarbon, minerals and geothermal energy exploration
- Passive microseismic monitoring for regional and local seismic activities

General lab measurement applications:

- Coil calibrations
- Electrode long term stability study

In example 1, KMS-820 is included inside transmitter KMS-500 to provide GPS synchronized signals and record the current in time domain. Multiple KMS-850 DASs are placed at different survey sites to record the E (electrical) field and H (magnetic) field using six low noise, low drifting 24-bit channels. These DASs can work standalone up to weeks without changing the battery and the data are stored on a SD card. The real-time data can also be streamed to an optional handheld monitoring unit via USB cable or through long range wireless network for status monitoring and quality checks. An optional central control unit may also be added.



Example 1. Controlled source EM measurements with marine transmitter

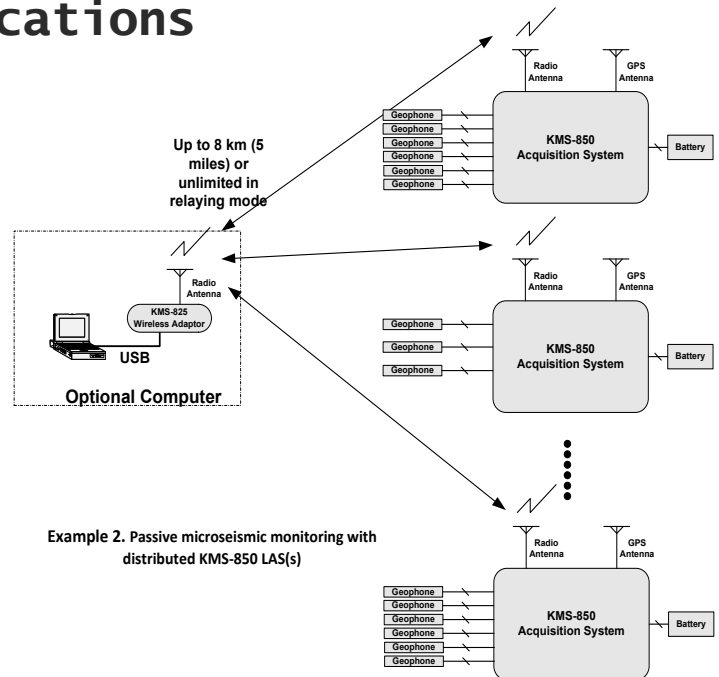
Innovating Solutions

Product Applications

In example 2, multiple KMS-850 DAUs are distributed around the survey sites, such as mountain, hydrocarbon or geothermal reservoir. Each DAU is connected to either geophones or accelerometers with its six low noise, low drifting 24-bit channels.

These DAUs can work stand-alone and data are saved to a SD card. At the same time, the real time data can be streamed to an optional central computer or handheld monitoring unit via

USB cable or through long range wireless network for status monitoring and quality check. These DAUs can work up to weeks without battery change and the acquiring procedures can be in-situ downloaded through long range wireless network or pre-saved to the SD card. The node can be configured to record microseismic data including all customary event detection and triggering. KMS-820 utilizes low noise, zero-drifting circuits for all input channels. This is very beneficial for microseismic monitoring because it eliminates the low frequency DC drifting due to the amplifier flicker noise, which may falsely indicate low frequency passive seismic activities.



Acquisition and Monitoring Software

The acquisition software is windows based. It is used to send commands to control the acquisition parameters, display the real time waveforms and save the data onto hard drive. Figures 1 and 2 show the PC software working with the acquisition system to acquire signals and monitor the real time waveforms and system behavior. The interface and saved data format can be customized according to customer needs.

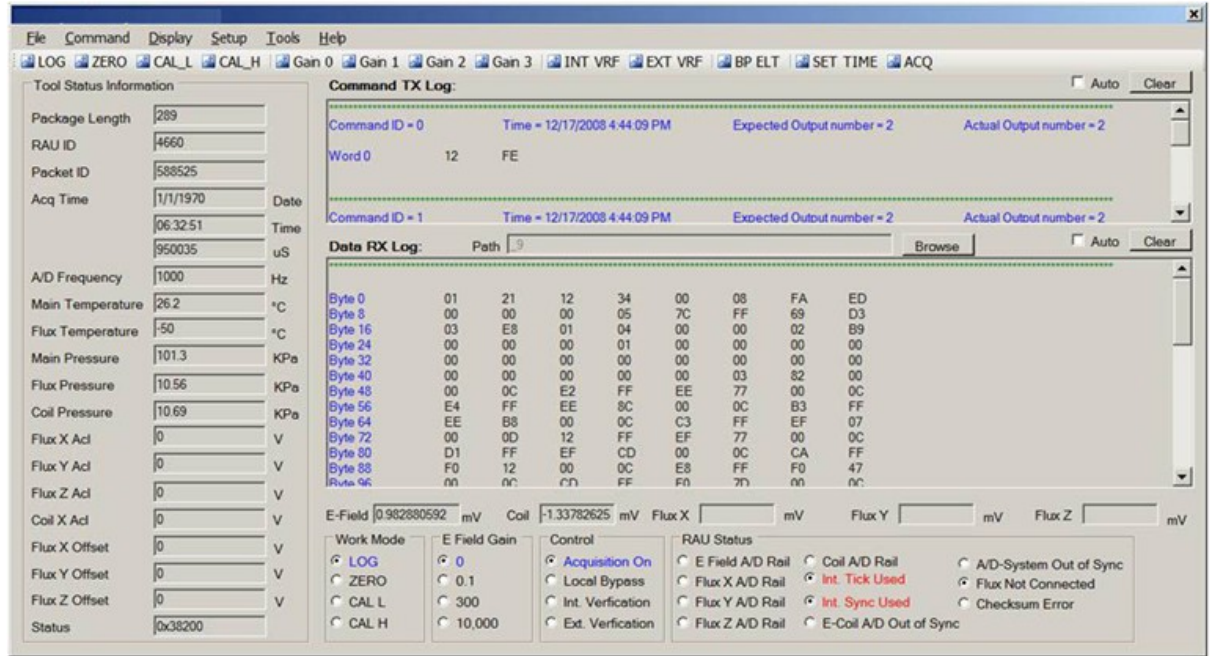


Figure 1. KMS Acquisition and Monitoring software control and status main screen

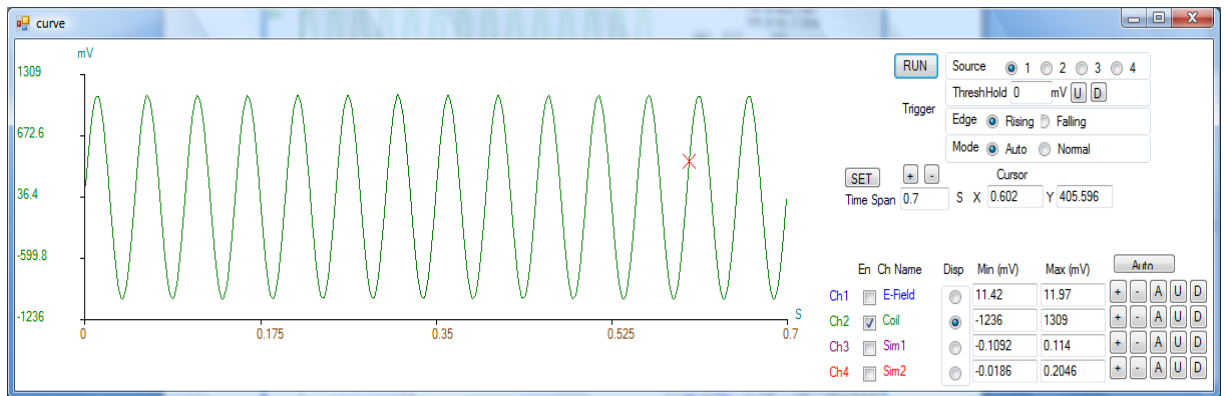


Figure 2. KMS Acquisition and Monitoring software real time waveform display

Product Specifications

Number of channels:	Up to 6, isolated channel modules
A/D resolution	24 bit
Signal bandwidth:	DC to 40 kHz with two low pass filter settings (default 500Hz and 40 kHz, can be adjusted), additional low pass filter with half of the sampling rate is implemented inside 24-bit sigma-delta A/D
Sampling rate:	Up to 312 kHz
Input impedance:	10 M Ω , or adjust to specific application
Input signal level:	-2.5V ~ +2.5V, with ground or actively driven shielding provided
8 Gain with AGC:	Up to 10,000, adjust to specific application, with 8 gain setting with AGC (Automatic Gain Control)
DC offset removal:	Each channel has its own 16-bit D/A to remove external DC offset
Timing control:	GPS synchronized
Wireless network:	Long range wireless up to 8 km (5 miles) depending on terrain or unlimited with relaying mode
Data saving and retrieving:	Data is saved on SD card; the files can be retrieved from SD card or directly copied to PC through USB mass storage mode without removing the SD card
Data monitoring:	Data can be read back through USB port or wireless network for real-time waveform display and quality check
On-board temperature measurement	Yes
Power supply:	External +6.5 ~ 30Vdc supply or directly from USB of computer
Temperature rating:	-30°C to 70°C
Additional interface:	Optional digital interface to accommodate additional customer timing and digital interface requirements
Enclosure:	Waterproof, compact, lightweight, impact resistant