Integrated Data Acquisition System 4

Lightweight, Fully Integrated Data Logging System for Parachute Testing.

Description
The IDAS-4 Integrated Data Acquisition System is a fully integrated solution for the collection of flight test data onboard the test article.

The IDAS-4 is intended to be used in a variety of flight test programs where the test requirements dictate the need for an easily configured autonomous data collection system for recording the dynamic environment present on the test article as well as GPS data of the test. The system has been designed for use in a variety of applications such as flight testing of parachute and unmanned aerial or terrestrial vehicles. The system incorporates a set of eight (8) sensors with signal conditioners as well as a commercial GPS receiver, high performance 16 bit analog to digital converter and Compact Flash based digital recorder in one ruggedized integrated unit.

The typical configuration of the system for parachute flight testing includes up to eight channels of analog data configured as follows: a) Two strain gage signal conditioning modules for use with bridge type load cells, b) One Tri-Axis accelerometer sensor, c) One barometric absolute pressure for altitude data, and d) Two thermocouple air temperature probes. In addition the system includes; a) The data logger, b) Commercial GPS Receiver, c) Pull away lanyard to initiate recording, d) Operator controls and indicators, e) Compact Flash memory card, and f) Rechargeable Nickel Metal Hydride (NiMh) battery.

The system is designed to allow the user to easily reconfigure the system for other applications and test requirements by installing different sensors and signal conditioners, selection of Compact Flash memory capacity for several days or weeks of data collection if necessary, and tailoring the test configuration on any commonly available computer system in the lab or in the field.
FEATURES:
• Dimensions Overall: 8.16 X 4.71 X 1.74 inches, Enclosure Dimensions: 7.4 X 4.71 X 1.74 inches.
• Weight approximately 2 pounds (less load cells).
• Design incorporates features necessary to withstand typical parachute test environments associated with shock, vibration, and temperature.
• Similar design has been certified for use on all Air Force aircraft by Wright Patterson AFB relative to radiated emissions (RE102) in accordance with MIL-STD-461E.
• Battery life under typical operating conditions 6 hours.
• Battery Recharge Time < 2 hours.
• 8 Analog Channels
• 16 bit resolution (65535 A/D Counts Full Scale)
• Removable Flash Memory Card 512Mb Standard (Optional up to 8 Gb).
• User Selectable Sample Rates: 40, 50, 100, 200, 500, 1000, 2000, 5000 Hz
• Modular sensors and signal conditioners integrated into data logger housing.

Typical configuration for parachute testing:
• 3 Axis Accelerometer (+/-40G X/Y +/-50G Z) with signal conditioning and anti aliasing filters (<=1% Accuracy) (+/- 4G and +/-12G Optional Available)
• Altimeter - Absolute pressure sensor module with signal conditioning and anti aliasing filters for barometric altitude (2.2 to 14.7 PSIG) (<=1% accuracy).
• Static Pressure port integrated into data logger enclosure (option to connect to static pressure manifold if required).
• Two Bridge type Load Cell Signal conditioning modules with bridge excitation and anti aliasing filters (<=0.25% accuracy depending on load cell).
• Two Type K thermocouple channels (-50 to +200 deg C / -58 to +392 deg F) with (<= +/- 1 deg Accuracy)
• Recording is started with by a remote activation “Pin Switch” operated with a 1/8th inch plastic coated cable pin or by simply applying power without the pin switch lanyard installed.
• Recording is stopped by pressing a protected pushbutton switch, or at the end of user specified recording period.
• Commercial (Non-Mil) GPS Receiver:

Features include:
• 51 channel acquisition and 14 channel tracking (65 Channel Total)
• 10Hz max update rate (1Hz default)
• Integrated LNA
• Power: 28mA tracking
• Sensitivity: -161dBm
• Accuracy: <2.5m
• Hot start: 1 Seconds
• Cold Start: 29 Seconds
• Supports active or passive antennas
• Supports SBAS (WAAS, EGNOS, MSAS)
• Remote GPS Antenna.
• GPS NMEA Data Recording:

The GPS receiver supports 10Hz sampling rates for some of the sentences and is limited to 1 Hz for less critical sentences. The receiver is configured for this application as follows:

NMEA Sentences Include:
• GPGGA sampled at 10 Hz, this sentence includes time, lat, lon, alt, # of satellites, and Horizontal Dilution of precision (HDOP). Provides 3D trajectory and x, y and z velocities.
• GPRMC sampled at 10 Hz, this sentence includes time, lat, lon, ground speed, heading and date.
• GPGSV sampled every 10 seconds, this sentence has locations of the satellites and information about the signal (SNR) from each one.
• GPVTG sampled at 1 Hz, this sentence provides ground speed and heading.
• GPZDA sampled at 1 Hz, this sentence provides basic (UTC) time and date information.
Operational Features

- Typical turn around time between tests of less than six minutes. This allows the test article to be returned to the riggers quickly after test article recovery for preparation for the next test.

  Typical Timeline for data logger / test article turn around between Tests:
  1. Recover test article
  2. Gain access to and eject compact flash card from data logger – 1 minute
  3. Check labeling on compact flash card and place card in storage container – 1 minute
  4. Remove preconfigured compact flash card for next test from storage container, check labeling on compact flash card, and install card in data logger.– 1 minute
  5. Inspect and secure data logger for next test – 3 minutes
  6. Return test article to riggers for them to prepare the test article for the next test.

- Quick Look Data Reduction Timeline:
  Typical Timeline for data logger / test article turn around between Tests:
  1. Plug compact flash card into computer – 15 seconds
  2. Copy data files from compact flash to card drive – 30 seconds
  3. Launch data reduction program – 10 seconds
  4. Open and unpack data files in data reduction program – 30 Seconds
  5. Plot and display raw (un-scaled) data for quick look review – 30 Seconds

- Configuration of recording parameters via text file stored on Compact Flash memory card.
  Parameters Include:
  1. Test Identification information (Text)
  2. Logger recording timeout in minutes.
  3. Analog Data Recording (On/Off).
  4. Number of channels being recorded (1-8)
  5. Analog data sample rate (40,50,100,200,500,1000,2000,5000 Hz)
  6. GPS Receiver baud rate (1200, 2400,4800, 9600, 19200,38400,57600,115200,230400)
  7. GPS Receiver serial port. (1 or 2)
  8. GPS Recording (On/Off).

External Dimensions:

Dimension in Inches