



Aircraft Field Service using the DaqBook®

Aviation

Application Note #32

For business aircraft companies, fast and efficient maintenance is critical in meeting safety requirements and flight schedules. To expedite troubleshooting, aircraft engineers are relying on portable PC-based data acquisition systems.

Application Summary

An electrical engineering department at a major manufacturer and operator of business aircraft gets weekly requests to assist field-service engineers with a wide variety of technical problems. Just about any electrical system can be involved with these technical crises, which require the simultaneous collection of numerous variables for troubleshooting purposes. Because of the wide variety of complex aircraft systems and signal levels, off-the-shelf instruments do not provide the performance required to conduct thorough testing.

Potential Solution

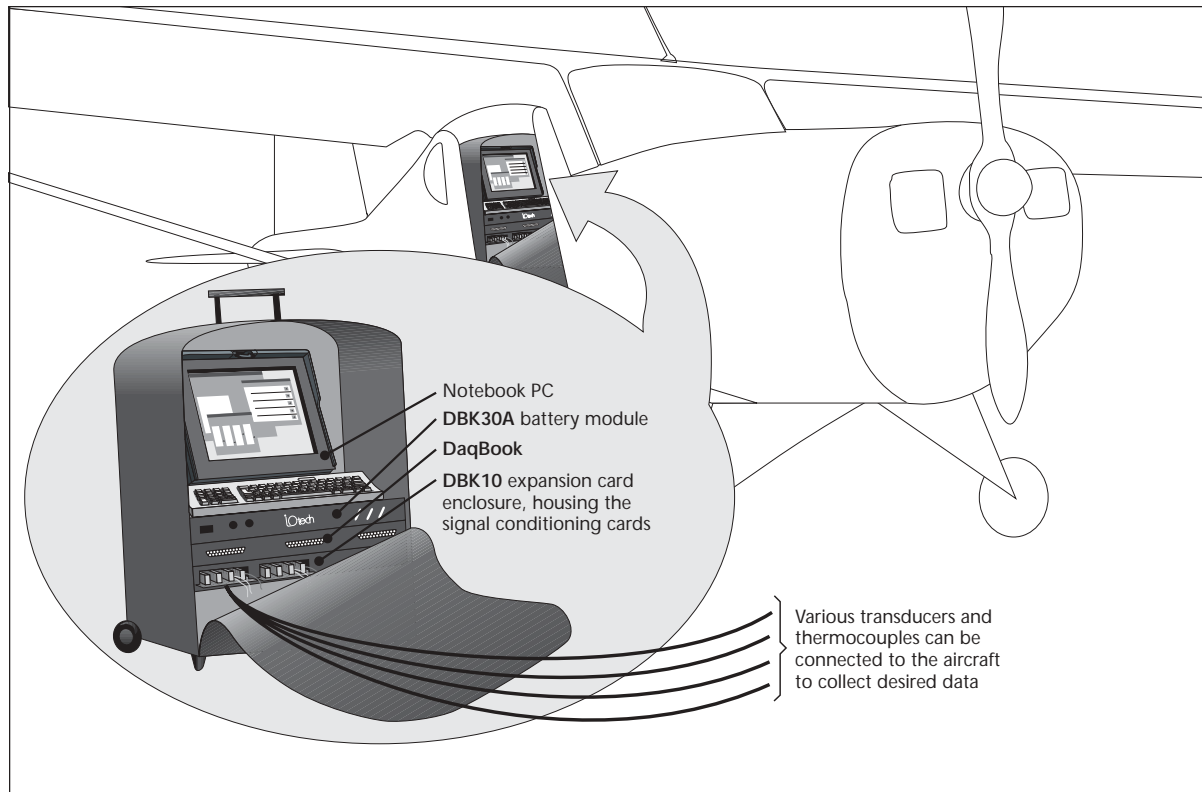
Until recently, the only data acquisition instruments available for aircraft troubleshooting were either large strip-chart recorders that made data

transfer inconvenient or even larger test-and-measurement instruments that took up too much room in the aircraft being tested. In addition to large size and lack of portability, there were no convenient sources of 110 AC power aboard many planes to operate the systems.

IOtech's Solution

The aircraft engineers worked with IOtech to develop a self-contained, battery-operated, portable PC-based data acquisition system based on IOtech's DaqBook. The system accommodated eight differential (16 single-ended) analog inputs (expandable to 256), two analog outputs, four digital inputs, 24 general purpose digital I/O channels (expandable to 192), and five frequency/pulse I/O channels.

Housed in a DBK10 expansion enclosure for signal conditioning cards, IOtech's DBK11 screw-terminal and DBK82 thermocouple cards were used to connect various transducers and thermocouples to the DaqBook. A DBK80 multiplexer (MUX) card was used when more than 16 inputs were required.



Housed in a soft-sided suitcase, the compact DaqBook data acquisition system is easily wheeled to various test sites and mounted inside aircraft

The system was powered by a DBK30A, NiCad battery module, which was ideal for in-flight testing applications. The DaqBook, DBK10, and DBK30A all matched the typical form factor of a notebook PC (8-1/2" x 11" x 1-3/8") and were fastened together with Velcro-style tabs. The compact system was packaged in a soft-sided suitcase that was easily wheeled to various test sites. The total system weighed less than 20 pounds, much less than previous test systems.

In a typical troubleshooting scenario, the system is rolled to an aircraft in a maintenance hanger or on a tarmac. The appropriate transducers are attached to various aircraft components and/or aircraft operating systems to gather data from desired sources. As the signals are collected, the DaqBook converts the data and transfers it to the PC. DaqView, a Windows-based data-logging software program supplied with all of IOtech's DaqBook systems, allows users to set up the application and save acquired data directly to disk or hard drive.

Conclusion

The DaqBook's A/D performance and programmable channel/gain sequencer make the system particularly useful for applications, like aircraft system testing, that require flexibility, high channel-count and speed requirements. The system's extensive I/O and signal conditioning capabilities, combined with its high mobility and low cost per channel, make it an effective alternative to larger, less-capable strip-chart recorders and other test-and-measurement instruments.

DaqBook/2000 Series

The DaqBook/2000® series of portable data acquisition devices are available with either a built-in Ethernet interface (model /2000E), or a parallel-port interface (model /2000A or /2000X). The Ethernet-based DaqBook/2000E can attach directly to the Ethernet port of a PC, or to an installed Ethernet network. The DaqBook/2000E also contains three parallel expansion ports, which can attach to an additional three parallel DaqBooks, thereby quadrupling the channel capacity of a single Ethernet link to the PC.

Features

- Analog input, frequency input, timer output, digital I/O, and analog output; all in one compact and portable enclosure
- Available with either an Ethernet PC connection, or a parallel port which can link directly to a PC parallel port, or with an interface to PCI bus, PC-Card slot, or ISA slot
- 16-bit, 200-kHz A/D converter
- Synchronous analog, digital, and frequency measurements
- 8 differential or 16 single-ended analog inputs (software selectable per channel)
- Expandable up to 256 analog input channels, while maintaining 200-kHz (5 μs per channel) scan rate
- Expandable up to 1024 analog inputs with DaqBook/2000E plus three slave parallel DaqBooks
- 512 location channel/gain FIFO, capable of scanning all channels, including expansion channels and digital/counter channels, at 5 μs per channel
- Trigger modes include analog, digital, & software, with <5 μs latency
- Virtually infinite pre-trigger buffer
- Optional four channel, 16-bit, 100-kHz analog output card installs internally
- 40 digital I/O lines scanned synchronously or asynchronously with analog inputs
- Digital I/O is expandable up to 272 lines, including isolation and relay closure options
- Four cascadable counter/pulse input channels scanned synchronously or asynchronously with analog inputs
- Two timer/pulse output channels
- Digital calibration — no potentiometers
- Multi-unit scan synchronization
- Vehicle network interface option



Signal Conditioning Options

- Signal conditioning and expansion options for thermocouples, strain gages, accelerometers, isolation, RTDs, etc.—over 40 DBK I/O expansion options in all



Software

- DaqView™ software with eZ-PostView™
- Included drivers for Visual Basic®, Delphi™ and C++ for Windows®, DASyLab®, TestPoint®, and LabVIEW®

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