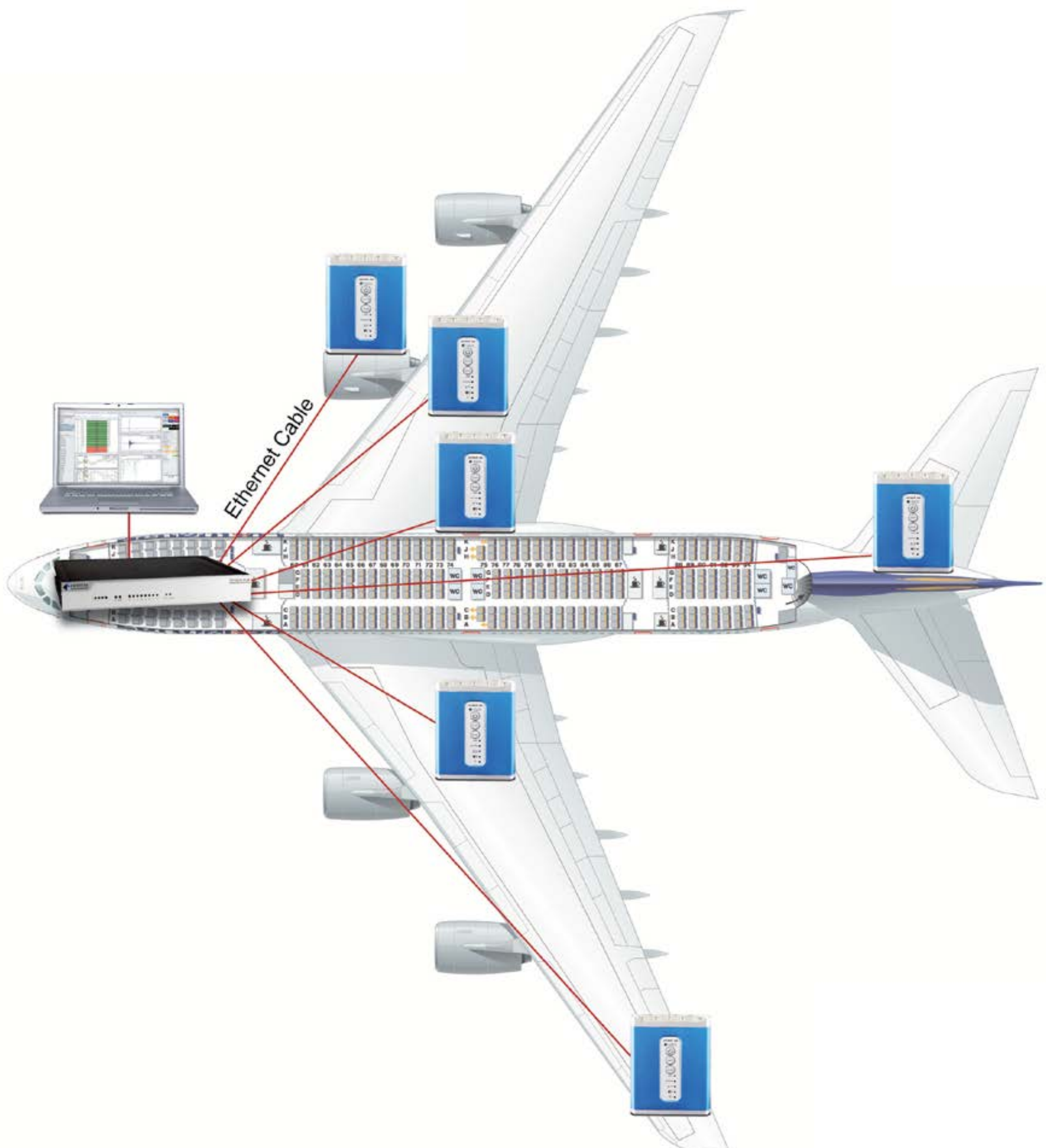
Synchronous Data Acquisition Across a Large Structure or Space

Application Note 037



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Dynamic data acquisition and machine monitoring in a large structure (e.g. airplane) or a large space (e.g. a factory or a plant) often requires data to be acquired synchronously at various locations. Better results can be achieved by placing several modules with smallest form factor across the structure or space and synchronizing data acquisition.

One of the major example of such an application is to simultaneously acquire data from a large aircraft. Testing the parts of the aircraft right from being built to testing the aircraft while flying is important to ensure the safety and longevity of the aircraft.

Locations from which the data needs to be acquired varied from narrowest corner of the cockpit to the most inaccessible tip of the aircraft wing. Having a compact design with ability to run without external power is essential for such testing. Synchronizing the data from all locations to access the impact of turbulence, takeoff and landing is a significant requirement for accurate analysis.

The Spider-20E is a diminutive 5.3 x 4.3 x 1 inch instrument weighing only 18 ounces making it flexible to be placed at any corner of a DUT or in a plant. The battery powered Spider-20E can run, measure and record data for several hours without an external power source (less wiring).

By connecting each of the Spider-20E's to a Spider–HUB (Ethernet Switch from Crystal Instruments) through the Ethernet cables, multiple Spider-20E systems could be linked together to form a high channel count system with synchronous data acquisition. (Figure 1.1 and Figure 1.2)

Ethernet connectivity allows Spiders to be located far from each other

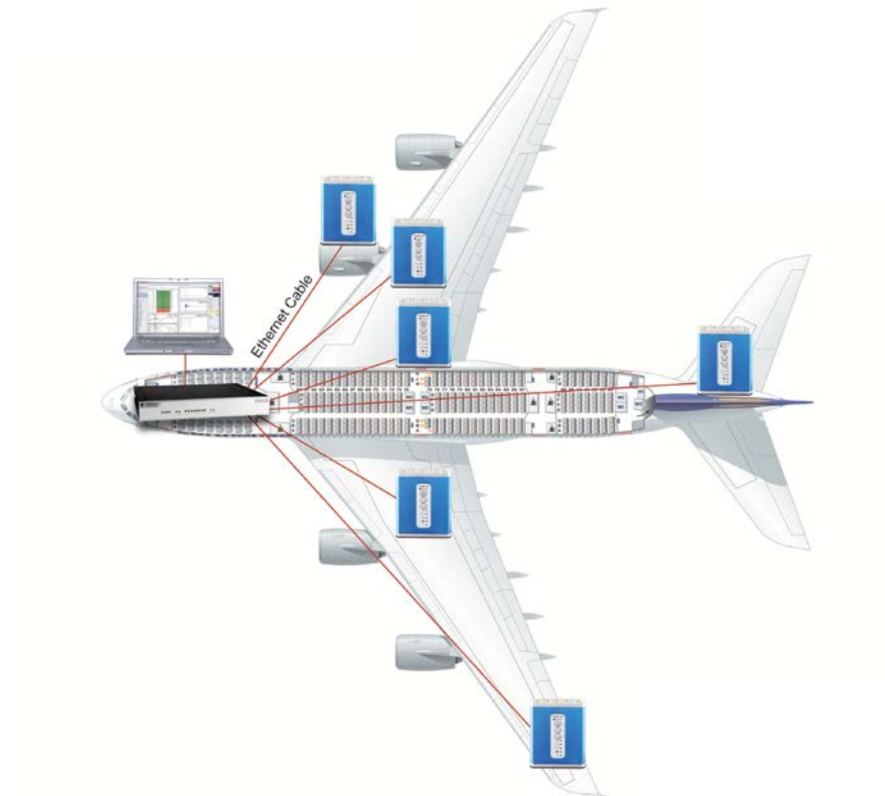

Figure 1.1

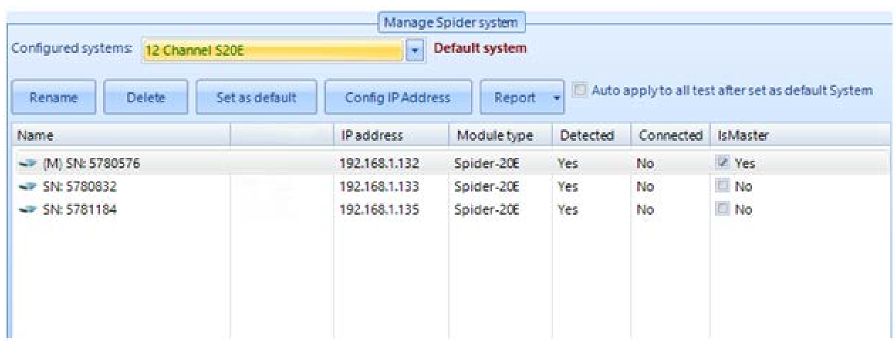

Figure 1.2

and from their host PC. Because the Spiders are close to measurement points, shorter sensor cables may be used. This distributed structure greatly reduces noise and electrical interference in the system.

Rated synchronization has been reliably achieved with Ethernet cable lengths even beyond 1,000 ft, making the Spider-20E system distributable across such big test objects. (Figure 1.3)

With such unique technology and high-speed Ethernet data transfer capability, the distributed components on the network truly act as one integrated system achieving phase difference of under 2 degrees up to 10 KHz frequency range.

Running on a battery, having a very compact size and Ethernet connectivity for synchronization makes the Spider-20E easily distributable across any large DUT or a space work as one system. The Spider-20E proved to be the best solution for such applications and has been selected for deployment.

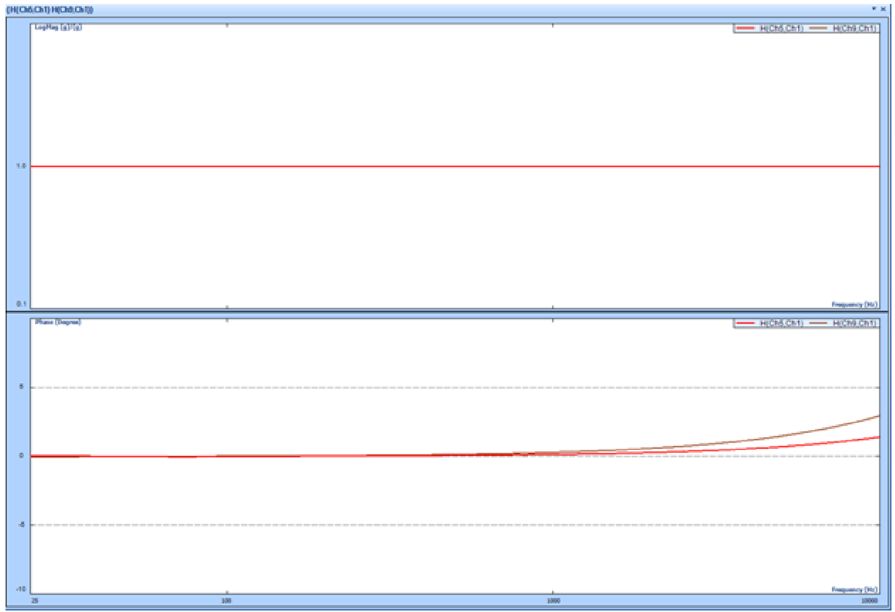

Figure 1.3

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