LORD APPLICATION NOTE

Integrating Wireless Systems and Rotorcraft HUMS

Optimize communication, data analysis, and battery life with a Wireless Network

Drawbacks of *hardwired* HUMS:

Using a *hardwired* health and usage management system (HUMS) often proves impractical; the user is hampered by installation expense, cumbersome data collection processes, and hardware which is not suited for rotating parts; the required slip rings are often expensive and heavy, and they limit the number of sensors which can be installed.

LORD Microstrain Wireless Networks:

- Enable bi-directional communication with a HUMS
- Reduce installation limitations
- Allow for collection of a broader data set
- Can be set to sample only via event triggers and/or during specific flight regimes
- Enable data collection and storage in a centralized location

Wireless Sensor Network

Supplied Sensor

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SG-Link-RGD-LXRS®

Wireless Analog Input Sensor Node

- Four input channels + triaxial accelerometer
- Strain sensor signal conditioning
- Custom sample rates up to 4096 Hz
- MIL-STD-461F

WSDA-RGD

Ruggedized Wireless Sensor Data Aggregator

- ± 32 microsecond node-to-node synchronization
- Up to 2km line-of-sight range
- MIL-STD-810F (environmental) and MIL-STD-461E (EMI/RFI)

↔ HUMS

LORD MicroStrain LXRS® Protocol

LORD MicroStrain's proprietary Lossless Extended Range Synchronized (LXRS®) wireless protocol is a 2.4GHz, IEEE 802.15.4-compliant communication architecture combining microsecond time-synchronization with a scalable star network. User-controllable sampling rates are automatically coordinated over thousands of wireless sensor nodes, all with 100% reliable data throughput under most operating conditions.

REAL-WORLD APPLICATION:

Integrating a LORD MicroStrain Wireless Sensor Network with a Goodrich IVHMU

Because the interior of a rotorcraft airframe is considered a harsh RF environment, it is not hospitable for certain communication models required for HUMS monitoring. LORD MicroStrain's proprietary LXRS technology, however, is able to overcome this challenge and successfully record, transmit, and store the relevant data.

When integrated with a Goodrich IVHMU (with a 10/100 Base-T Ethernet interface and operating on a static IP network via TCP or UDP packets), the LORD MicroStrain Wireless Sensor Network (WSN) collected data with a success rate of more than 99.99%. Of the almost two million packets of data sent during the verification test, only ten were dropped.

In addition the WSN, acting as a network coordinator and data conduit, queried the Goodrich IVHMU for weight-on-wheels status. When the IVHMU indicated airborne status, the WSN and IVHMU synchronized, beginning a sampling session; when the IVHMU indicated touchdown, the WSN ceased sampling and entered sleep mode. This significantly increases battery life for the WSN, saving power which would otherwise be consumed while collecting unnecessary data.

Further, the WSN is able to successfully synchronize multiple nodes to within ±32 microseconds, giving the user a robust and comprehensive WSN for health and usage monitoring.

Note: LORD MicroStrain developed software specifically to integrate its WSN with the Goodrich IMHVU. Software solutions are available for other manufacturers' HUMS. Please contact our Sales and Support Staff for more information.

The LORD MicroStrain White Paper on this topic is available for purchase at AHS International:
https://vtol.org/store/product/integration-of-a-wireless-sensor-data-aggregation-system-and-hums-8800.cfm

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LORD MicroStrain® SENSING SYSTEMS

Wireless Simplicity, Hardwired Reliability.®