The aerial remote interface and control unit (ARICU) is a member of Parker Electronic Systems Division’s family of networked fiber optic distributed solutions. The ARICU incorporates Parker’s patented optic network communication technology and delivers top performance for a variety of enhanced performance aircraft applications.

Overview

The aerial remote interface and control unit (ARICU) is a digital distributed processing unit which is compatible with the EIA/ANSI 709.1 and SAE AS-5370 open protocol standards. Stand-alone units may be used for remote sensing and control applications. The ARICU provides a powerful solution when networking multiple autonomous ARICUs using the fiber optic AS-5370 network to form remote, distributed control systems with a modular, expandable number of inputs and outputs. Each ARICU provides DO-160D qualified data acquisition, protocol conversion, and sense and control functions for up to 66 inputs and outputs, and is packaged in an enclosure intended for aircraft applications. Data reliability and integrity is enhanced since every unit can be powered from either of two sources of 28VDC power, and can continue to perform even in the presence of faults or physical damage to parts of the distributed system.

Sense and control systems employing ARICUs benefit from the combined advantages of distributed processing and fiber optic interconnects, and are scalable to match the number of sense and control points required. Additional I/O can be accommodated by adding another ARICU to the ring. Locating units close to the sensors or control points helps to minimize the amount of wiring, and reduces the weight, cost and complexity of the resulting wire harnesses. Since all communications and data sharing is handled over proven fiber optic networks, connections are simple, reliable, and totally immune to EMI and HIRF.

The ARICU includes extensive built-in test capability. It provides weak-link detection by monitoring received optical power, fiber diode transmit current detection, and internal electronics health status. Full EIA/ANSI 709.1 network capability combined with ColdFire on-board processing power makes the ARICU an excellent choice for aerospace, as well as other distributed sense and control applications. Custom software services are available to adapt the ARICU to specific application software requirements.

Features

- Safe, EMI-immune 66-channel data acquisition, protocol conversion, and control solution
- Flexible, adaptable, reliable, and network programmable.
- Designed for DO-178B Level B and DO-160-D requirements.
- Accepts two sources of primary power.
- Redundant two sources of primary power.
- Distributed architecture allows operation with damage or faults.
- Each unit provides lightning and HIRF protected interfaces.
- Compatible with EIA/ANSI 709.1 and SAE AS-5370 network protocols.

Bidirectional Fiber Optic Network Features

Fiber optic networks provide high throughput, immunity to electromagnetic disturbances, the ability to handle ground potential differences and tamper-resistance. The patented Parker implementation of fiber optic EIA/ANSI 709.4 and SAE AS-5370 adds several key features:

- **Compatible with aerospace-qualified multimode fiber optic cables and SMA connectors.**
- **Bi-directional communication on a single fiber - for reduced costs and improved reliability.**
- **Ring redundant topology - systems continue to function in the presence of a link or node failure.**
- **Continuous link monitoring - identifies marginal network paths before a failure occurs.**
- **Extensive built-in link tests and diagnostics assure integrity of the fiber optic network.**
- **Excellent optical link budgets.**

**Moving at the Speed of Flight**
ARICU Specifications

The ARICU is housed in a machined chassis qualified to DO-160-D to meet environmental requirements, and is configured for use with 62.5/125 or 100/140 micron multimode fiber. The case of the ARICU is the thermal and chassis ground interface, and can be mounted in any orientation. The ARICU has four connectors for its electrical interfaces including power, and 2 fiber optic connectors for the network interfaces. The unit receives power from 2 separate inputs, with an input range from 16 to 36 volts, protected to 80 volts transient/surge and lightning per DO-160D environmental specifications.

Input and Output Features:

- **16 discrete opto-isolated inputs (28V with max of 5K ohm source impedance, measures DC state, frequency, pulse width, pulse count or switch closure to 400 Hz)**
- **1 discrete opto-isolated input (115VAC with max of 50K ohm source impedance, measures DC state, frequency, pulse width, pulse count or switch closure to 400 Hz)**
- **3 analog differential inputs (15-bit plus sign, 50 KHz conversion rate, 1 KHz sample rate, better than 0.5% full-scale accuracy)**
  - 2 general purpose differential channels (voltage, resistance, current, 5-wire interface)
  - 1 strain gauge or temperature channel
- **Quadrature Decoder (5 input pairs) compatible with ANSI 709.1 (grey code)**
- **2 LVDT/RVDT interfaces with excitation and demodulation (5 Vrms, 50 Hz to 10 kHz)**
- **9 ARINC 429 (5 Receivers, 4 Transmitters) high and low-speed simplex differential interfaces**
- **2 RS-422 high-speed opto-isolated serial interfaces (programmable protocol implemented in software, up to 1.5 Mbits per second)**
- **9 analog galvanically isolated differential outputs, two are 12-bit ±10V or ±15 mA, 7 are 8-bit ±10V or ±15 mA, 1500 V isolation**
- **16 discrete opto-isolated outputs (28V/Open or Ground/Open)**
  - Each solid state switch handles up to 2A DC, 6A surge (500 mS), 4000 V isolation
- **1 RS-232 compatible serial maintenance port**
- **SAE AS-5370 Fiber Optic network (deterministic ANSI 709.1)**
- **10/100 Ethernet port and protocol stack (optional; consult factory)**
- **2 unregulated 26.5VDC sources (50 mA each) and 1 galvanically isolated, regulated 26.5VDC reference source (50 mA)**
- **Other interface types and voltage levels can be accommodated.**

Environmental Specifications

- **Operating temperature/altitude effects**
  - DO-160D Category D2 and V.
- **Humidity** – DO-160D Category C
- **Lightning effects** – DO-160D Category A3C3 and A3E3 to 300V/1200A
- **Shock** – DO-160D Category B
- **Vibration** – DO-160D Category S, Zone 5
- **EMI**
  - Emissions - DO-160D Category L,
  - Susceptibility -DO-160D Category B,
  - induced effects -DO-160D Category C.
  - RF susceptibility - DO-160D Category R (HIRF) and MIL-STD 461E.
- **Power input** – DO-160D Category A with 50 mS power interrupt, voltage spike per Category B

ARICU Optional Versions

The ARICU is readily tailored to customer requirements. Optional features include custom I/O configurations, application software, and 10/100 Ethernet. Systems engineering and application software assistance are available to implement complex distributed control system requirements. Please contact us to discuss your specific requirements.

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