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symtx application note

real life solutions to real test problems

Satellite Power Sub-System Test

Customer Problem:

A major manufacturer of communications satellites required a custom test solution to test the power management system and power sensors for a new high-visibility, time critical product.

The satellite's power management system was designed to control power supplied to the satellite under varying conditions (switching on batteries when solar power is not available, etc.). The test system was designed to provide loads to test out primary power, and simulate different power conditions.

Key Test Requirements:

- Thermal analysis and cooling systems to manage very high powered load dissipation.
- Precise load simulation under high power conditions.
- Ability to simulate uplink and down-link satellite channels, including telemetry links.
- Short delivery schedule required concurrent engineering to design the test system during product development.
- System self test

Solution:

The system was implemented using VXI hardware along with standard GPIB instrumentation. Testing consisted of simulating various power situations to the DUT to characterize different conditions.

A high current (40V, 70A) power supply (customer specified) is used to simulate batteries and other spacecraft power sources. It is also used to test the high power load sensors. The power supply, routed through a relay MUX, provides the capability to simulate HLP CMDs.

An oscilloscope is used to monitor various test points in the system, and is also routed through the MUX.



Our Mission:

Symtx develops custom test systems for electronics manufacturers, to enable them to meet their production goals.

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Two four-channel D/As simulate analog commands to the satellite, and provide constant current for thermistor calibration.

The 64-channel scanning A/Ds are used with signal conditioning modules to monitor battery voltages, power supply buses, bi-level telemetry signals and analog telemetry signals. A resolver is used to measure critical phase information from multiple test points in the system.

The relay driver is used to switch in various loads and controls. The transmitter/receiver card is used to communicate with the satellite using 32-bit Manchester code, and 64-bit Manchester Telemetry protocol.

All system software was created using ANSI-C, running under UNIX. The customer required this approach for compatibility with multiple platforms.

System Implementation:

Achieving the customer's technical goals within the extremely time-critical schedule required concurrent engineering and a team approach. Symtx was able to put together a very competitive bid, with a quick delivery schedule, and successfully win this and the next five out of six projects.

Instrumentation list:

VXI Mainframe
MXIBUS Extender
4-Channel D/As (2 ea)
64-Channel Scanning A/Ds (3 ea)
72-Channel Relay Driver
64-Channel Relay MUXs (2 ea)
Synchro Resolver
RS-422 Serial Interface
Low Current Power Supply
High Current Power Supply
Oscilloscope



Satellite power sub-system tester VXI chassis (detail).

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