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NIRSPEC

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NIRSPEC Electronics Design Note 18.00
Fiber-optic Interface and Housekeeping Transputer

Introduction

The NIRSPEC front end transputers are a long way from the telescope control room, and the transputer links will only work over a few feet, so we need a way to extend them. The solution we have adopted is a pair of fiber-optic TRAMs[1] from Sundance Technologies. These take a single transputer link and transmit it over a distance up to 1 kilometer, using a set of optical fibers. This single link is used to pass commands to the transputers and return acknowledgments and data to the host Sparcstation. Using the fiber-optic link is completely transparent to software, simply extending the signals via a conversion to and from a different medium.

The transputers are interfaced to the Sparcstation via a Transtech Matchbox. The Matchbox connects to the external serial port of the Sparcstation, and provides a single transputer serial link to our transputer network. This single link goes to the "root" transputer, which will also be our "housekeeping" transputer, taking care of things like power management and monitoring cabinet temperatures. The housekeeping transputer is housed in its own box (a 2U rack-mount crate), from which three links go to the main transputer cabinet. The main cabinet holds all the other transputers in the system (see NEDN16 for details of the backplane layout). It is the single link from the host to the root transputer that has to be extended over the long distance.

Link implementation

The transputer link format has four serial links per transputer. Each link has two signal wires (one each direction) plus ground. For connections within a cabinet, the links are usually implemented as twisted pairs (signal plus ground). Across a backplane where connections are even shorter they can be implemented with wire-wraps.

In addition to the links, each transputer has three "subsystem" signals, Reset, Error and Analyze. These are used to control the network of transputers from the host computer. For instance the host knows when the transputers have a fatal error, or can reset the whole network when necessary. These signals are daisy-chained to each transputer in the network.

[1]TRAMs (TRansputer Application Modules) are a standard mezzanine board format for transputers.

The fiber-optic TRAMs carry the bi-directional serial link over 2 fibers, and use another pair to multiplex the subsystem signals. We will generally use a six-core fiber-optic cable in order to have a couple of spares.

Overall layout

The housekeeping transputer is on a DAQ17 board (see NEDN17 for details of this board), which is laid out in VME format. Since most of its connections are on its front panel, it is housed in the rack-mounted box through a hole in the rear panel. The connector panel of the DAQ17 is flush with the rear plate. Inside the box are card slides and a pair of DIN 96-pin connectors, so that the card can slide straight in as if it was plugging into a backplane. The rear panel of the box also has a cutout for the fiber-optic cable.

One of the TRAMs is housed in the housekeeping cabinet, and the other in a case with the Matchbox. In the housekeeping cabinet, the TRAM plugs into a TRAM site provided on the DAQ17 transputer board, but in the Matchbox case we mount it on standoff pillars and wire directly to its connectors. Conveniently, the TRAM format has sockets on top matching the pins underneath. This allows some TRAMS to be stacked on a single motherboard site.

In addition to the DAQ17 and the fiber-optic TRAM, the housekeeping box also houses two RS232 TRAMs. These each implement two standard serial ports[2] so that we can interface to our LakeShore temperature controllers and readouts, and a computer-controllable power strip for power management. These TRAMs are mounted on standoffs also. All three bidirectional links to the main transputer crate, plus the

[2]Transputer serial ports are *not* a standard format like RS232 or RS 422.