DRAFT

The CDF Reset Crate

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1.0 Introduction

The CDF Reset Crate is a necessary component of the CDF Upgrade. The Front-End electronics and the readout system for event data is described in the document "CDF Front End Electronics Upgrade" [1]. It is assumed that the reader is familiar with the concepts of that document. Figure 1 presents an overview of the data acquisition (DAQ) architecture for the CDF Upgrade and illustrates how the CDF Reset Crate fits in.

The CDF Reset Crate provides the ability to issue a remote reset to Front-End, L1 Trigger[2], and XFT[3] crates. Due to their remote location, this capability is especially required by the Front-End crates. A commercial VMEbus Readout Controller (VRC) will be used to readout the crates. Due to the possibility of the processor on this board hanging, it is essential to be able to provide a remotely driven reset signal to crates inaccessible during running conditions. In addition, from a system control perspective, it is desirable to have this remote reset capability for all the crates used in the experiment data collection.

2.0 System Requirements

In order to remotely reset a crate in the front-end, L1 Trigger and XFT systems, it is necessary to issue a reset pulse to the Tracer module[4]. The Tracer module serves as the system interface module in these systems. The Tracer will receive a reset pulse though a modular connector on its front panel. When it receives reset, the Tracer will drive the SYSRESET* signal low on the VMEbus backplane. This will be seen by the VRC, which will then attempt a re-boot.

The reset signal will be differential RS-422. This will provide the required drive capability and reduce the possibility of a false reset being detected by the Tracer.

3.0 System Implementation

In designing a hardware implementation, it was sought to minimize custom design. To this end, an MVME162 [5] was chosen as system controller and VMEbus master of the CDF Reset Crate. The MVME162 is the same VMEbus module, the VRC, which will be used to read out other VMEbus based crates. Thus; we have experience with it from both a hardware and software perspective.

Communication with the MVME162 will be accomplished through remote procedure calls (RPCs) over Ethernet. Software resident on the MVME162 will need to recognize commands which instruct it to reset a single crate, group of crates, or a system reset of all crates.

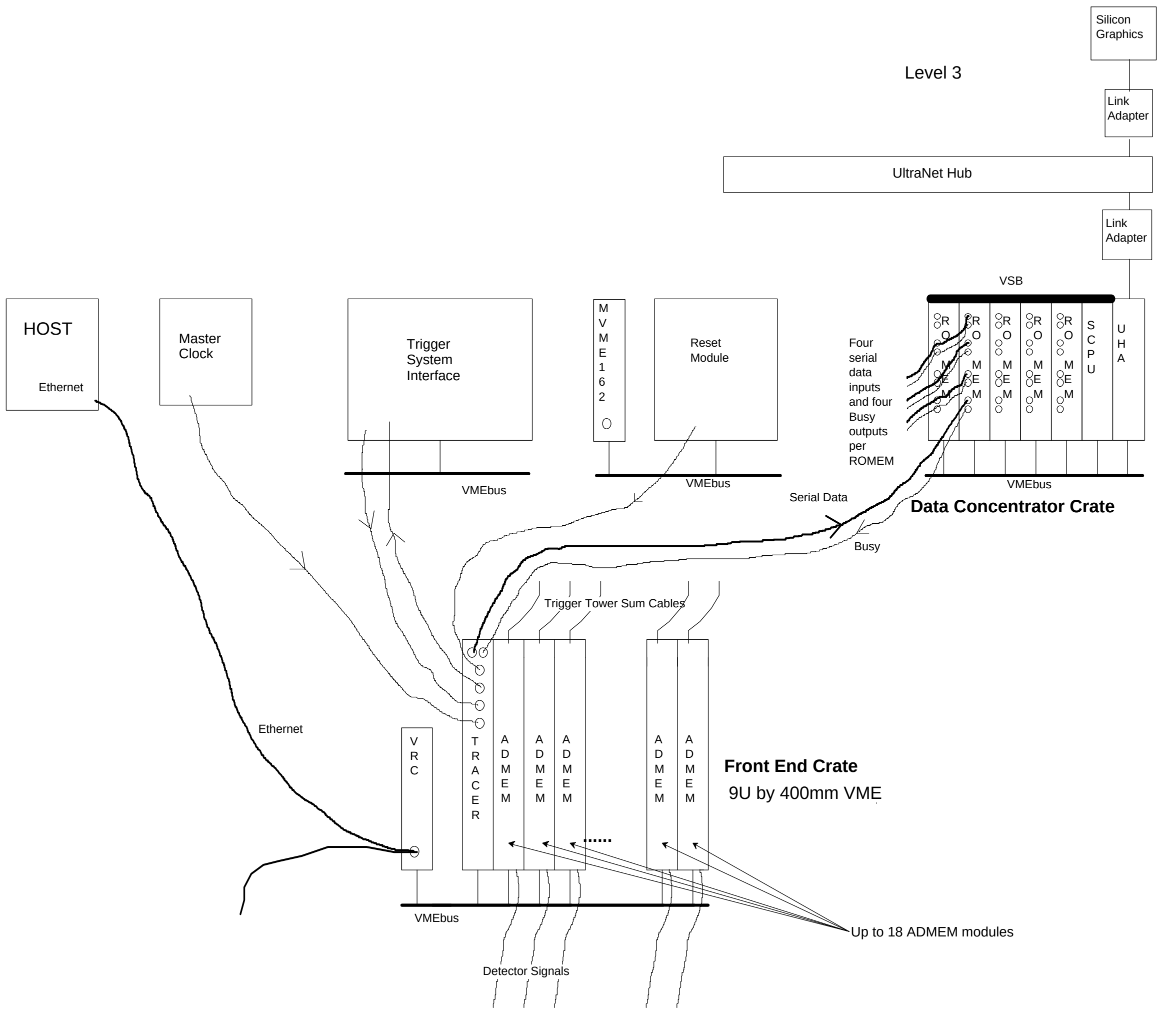

Figure 1. OVERVIEW OF THE FRONT-END/DAQ SYSTEM

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The MVME162 has the feature that it allows up to four Industry Pack [6] modules to be used. An Industry Pack module, IP-Digital 24, is available from GreenSpring Computers, Inc. [7] which will allow us to drive 24 single-ended digital lines. These lines are available from the MVME162 front panel in the form of a 50 conductor cable which provides alternating signals and ground.

If all four industry pack positions of the MVME162 are utilized, a total of 96 reset lines can be controlled from a single module.

In order to turn these single-ended signals into RS-422 it is necessary to design a custom module. Each custom module will accept the 50 conductor cable which comes from the MVME-162. The module will then run the received signals through a RS-422 driver. Each differential signal pair will be routed to one of 24 modular jacks on a double wide front panel. The signal will then be in the form required by the Tracer.

The custom module will plug into a 6U standard VMEbus crate and will draw its power from the backplane. It will, however, have no VMEbus master or slave capabilities.

4.0 Custom Module

4.1 Description

The custom module required by the system will be called the Reset Pulser. The module will consist of a 6U x 120 mm VMEbus sized Printed Circuit Board (PCB) with an additional wing board mounted near the front panel and spaced one card position over, see Figure 2. Thus; the Reset Pulser will occupy two slots, but make only a single backplane connection. The backplane connection is made only to acquire power, no VMEbus functionality is required.

Figure 3 illustrates how the front panel will look. The 50-pin connector accepts the cable being driven by the MVME162. These signals will then be received by the Reset Pulser and run through RS-422 drivers. These drivers, deliver the signal to the front panel modular jacks located on the main and wing boards.

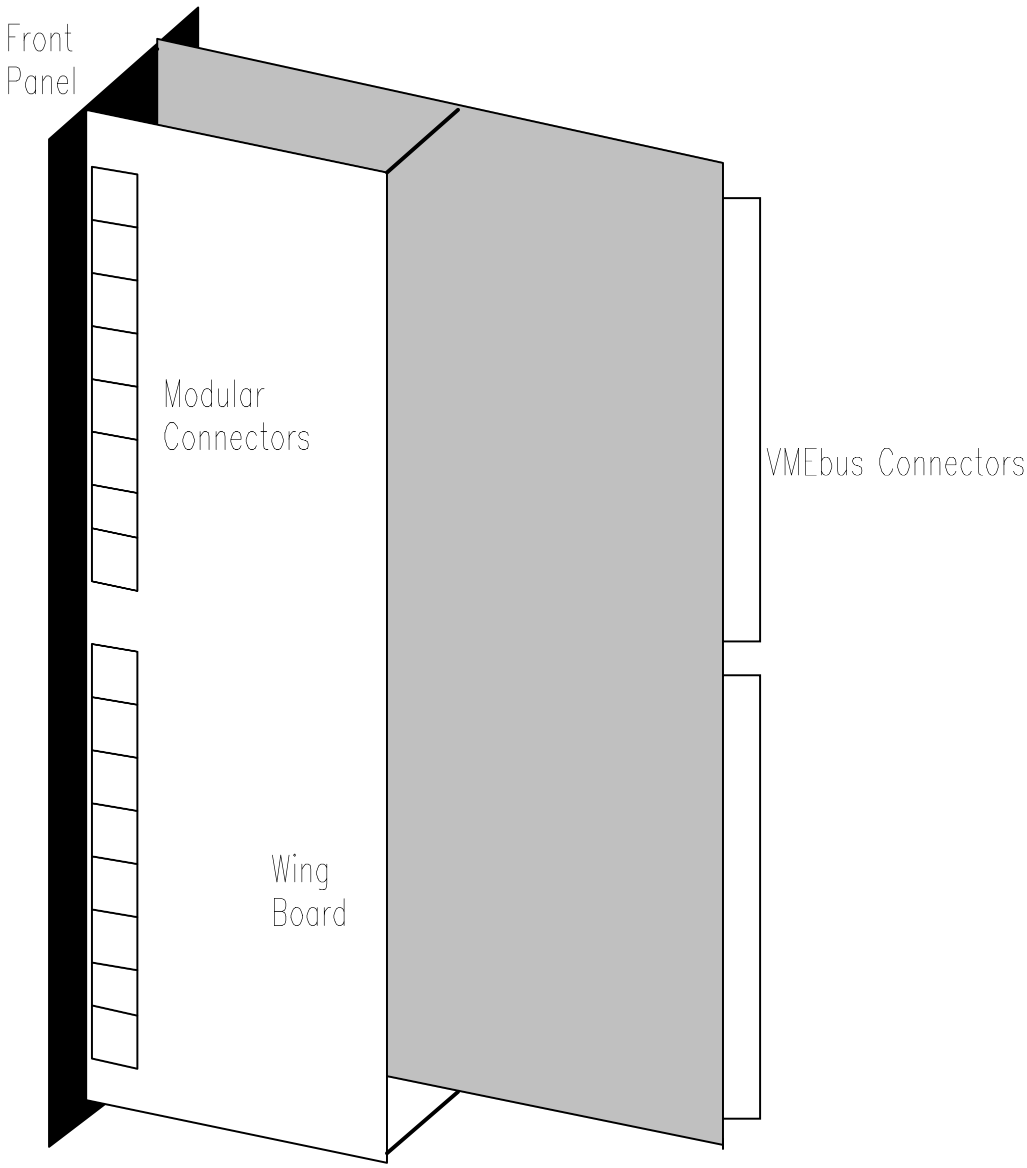

Figure 2. Mechanical Drawing of Reset Pulser

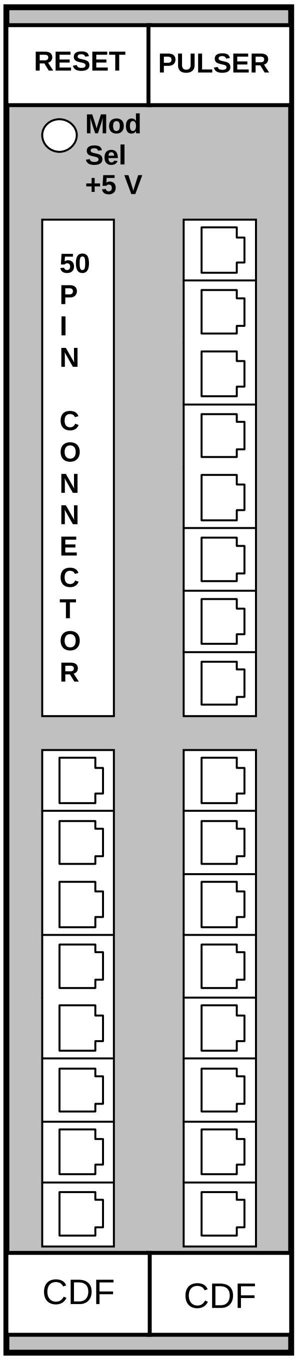

Figure 3. Reset Pulser Front Panel

4.2 Cost

A breakdown of anticipated costs for each Reset Pulser is listed below.

Parts Cost of Custom Module

Printed Circuit Board		$700
DIN Connectors	2 @	$7
Front Panel/Ejectors		$50
50 Pin Cable Connectors	2 @	$5
24 RS-422 Drivers	24 @	$5
8 position modular jack	3 @	$10
Miscellaneous		$50

Total		$974

4.3 Power

The Reset Pulser will draw its power from a single VMEbus slot. A VMEbus slot provided 6 pins of +5 volts derated at 1.25 Amps per pin. So, a total of 7.5 amps of +5 volts is available.

Power will be drawn by 24 RS-422 drivers. A typical RS-422 driver, DS36F95, will draw 28 mA when outputs are enabled. The total supply current for the Reset Pulser, will therefore be around 24(RS-422 drivers) * 28ma, for a total of 672 mA. Maximum power consumption for a single Reset Pulser will be 3.3 Watts.

5.0 Power

MVME162	4A @ +5V 100ma @ +12V 100 ma @ -12V	-->	22.4 Watts
IP-Digital 24	4@ 260ma of +5V	-->	1.3 Watts
Custom Module	4@ 3.3 Watts	-->	13.2 Watts

	Total		36.9 Watts

6.0 Costs

The following is a run-down of the costs required to build a CDF Reset Crate.

6U VMEbus Crate and Power Supply and Cooling		$2500 (?)
MVME162		$1800
VxWorks License		$400
IP-Digital 24 (plus 2 spares)	6 @	$265
IP Engineering Kit		$125
Custom Reset Modules (plus 2spares)	6 @	$974 (?)
Cables		80 @ $ (?)

Total		$12249 +

References

[1] G. Drake, T. Droege, C. Nelson, T. Shaw and K. Turner, *CDF Front End Electronics Upgrade*, CDF/DOC/PIG/2447 (1994).

[2] H. Frisch, M. Shochet, G. Sullivan, D. Toback, J. Wahl, and P. Wilson, *Conceptual Design of the L1 Calorimeter Trigger for the Run II Upgrade*, CDF/DOC/TRIGGER/CDFR/xxxx (1994).

[3] J. Freeman, R. Hughes, K. Schurecht, K. Turner, T. Wesson and P. Wilson, *The XFT Track Processor Design Report*, (1994).

[4] T. Shaw, *Specification for TRigger And Clock + Event Readout Module*, (1994).

[5] Motorola, Inc., **MVME162 Embedded Controller**, Phoenix, AZ.

[6] GreenSpring Computers, Inc., *IndustryPack Logic Interface Specification*, 1204 O'Brien Drive, Menlo Park, CA 94025. (ph) 415-327-1200.

[7] GreenSpring Computers, Inc., **GreenSpring 1994 Catalog** , 1204 O'Brien Drive, Menlo Park, CA 94025. (ph) 415-327-1200.