Control Sytem Hardware Upgrade
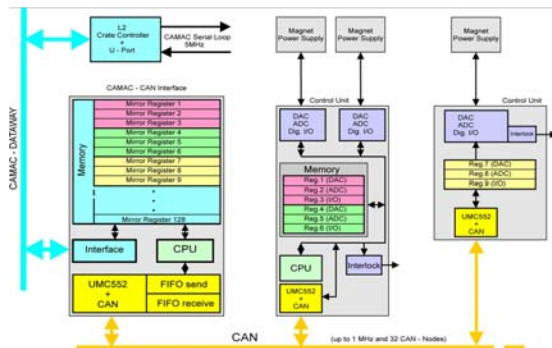
Guido Janser, Gregor Dzieglewski, Walter Hugentobler, Francois Kreis

Paul Scherrer Institute, 5232 Villigen, Switzerland

Abstract

The Paul Scherrer Institute builds, runs and maintains several particle accelerators. The proton accelerator HIPA, the oldest facility, was mostly equipped with CAMAC components until a few years ago. In several phases CAMAC was replaced by VME hardware and involved about 60 VME crates with 500 cards controlling a few hundred power supplies, motors, and digital as well as analog input/output channels. To control old analog and new digital power supplies with the same new VME components, an interface, so called Multi-IO, had to be developed. In addition, several other interfaces like accommodating different connectors had to be build. Through a few examples the upgrade of the hardware will be explained.
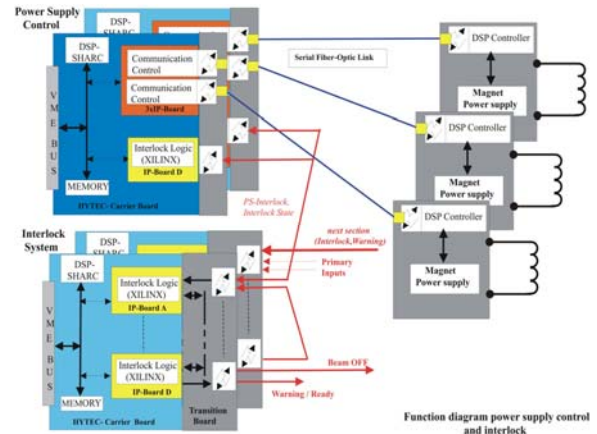
Old PS control (CAMAC)

Connectors

Burndy 28 pin ON/OFF **Status**

Lemo 3 pin **DAC**

Lemo 3 pin **ADC**

Burndy 4 pin **Interlock**

o **Functionality**
- Digital and Analog I/O
- Ramping
- SOL/IST comparison
- Interlock generation

New PS control (VME)

Function diagram power supply control and interlock

VICB8003 Carrierboaard
   DSP Control for 6 power supplies, comparison setpoint – actual value
   Current limits, ..., Interlock I/O
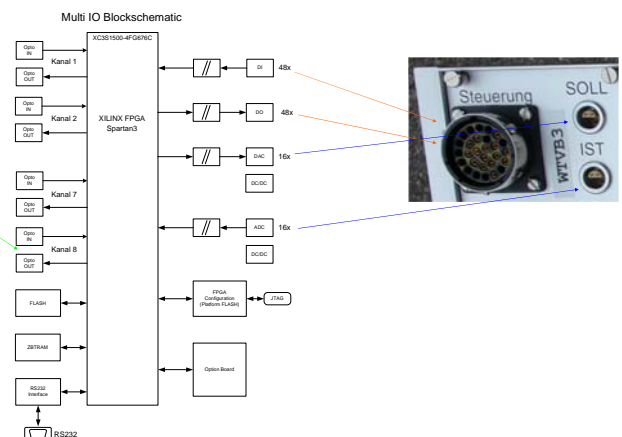

PSC-IP2 Industrypack
Optolink Interface 2 channel

PSILK-TM Transitionmodule for 6 PS and 10 Interlockchannels

Solution to control old analog powersupplies with the new VME components
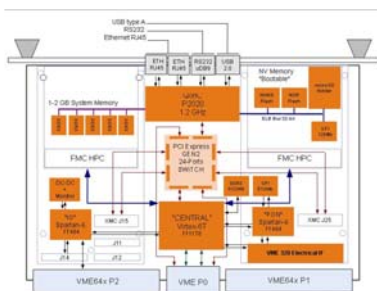

Multi IO Blockschematic

MULTI-IO
8 optolinks POF (plastic optical fiber)
16 analog out, 16 analog in
48 digital in
48 digital out
XILINX FPGA Spartan 3 (XC3S1500), Softcore µP Microblaze
FPGA functions: Serial Interface, DI, DO, AD, DA Interface , DAC ramping
Microblaze functions: Communication, Local control

Solution for SwissFEL and future Upgrades: MMC (Master Magnet Controller)

IFC 1210 Intelligent FPGA Controller

MMC Transitionmodule

Optolinks for 16 PS

External Synch Input

Fast access over Gigbit Link