SPEAR3 Power Supply Controls

Clemens Wermelskirchen
Overview

- Unipolar power supplies
- Bitbus
- Bipolar power supplies
- MCOR30
- Special hardware
- RF system
- Power Supply Diagnostic Panels
Unipolar Power Supplies

- Large, free standing supplies
- Medium and small, rack mounted supplies
- Each power supply has individual Bitbus controller integrated into power supply (or rack)
- Dipole power supply has two controllers, one for the bulk supply and one for the chopper
- Precision ADC digitizes two readbacks per second, 7 readbacks total
**Bitbus**

- 4 Bitbus lines
- Serial lines, terminated
- Similar number of PS per line
- DB-9 connector on masters
- DB-15 connector on controllers
- Command execution takes about 10 msec
## Bitbus Power Supply List

<table>
<thead>
<tr>
<th>Link 0</th>
<th>Link 1</th>
<th>Link 2</th>
<th>Link 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>05G-QF1</td>
<td>118-TSP1</td>
<td>05G-QD1</td>
<td>MS1-BD</td>
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<tr>
<td>05G-QF2</td>
<td>118-TSP2</td>
<td>05G-QD2</td>
<td>MS1-BDBLK</td>
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<td>118-TSP3</td>
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<td>MS2-QFC</td>
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<td>07G-QD2</td>
<td>MS1-QD</td>
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<tr>
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<td>MS1-QDZ</td>
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<td>14G-QF2</td>
<td>MS1-SD</td>
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<td>15G-QF1</td>
<td>MS1-SDM</td>
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<td>16G-QF1</td>
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<td></td>
<td>17G-QD2</td>
<td></td>
</tr>
</tbody>
</table>
Bipolar Power Supplies (MCOR30)

- 8 power supplies per crate
- Correctors (14 crates)
- ID trims (2 crates)
- Magnet trims (2 crates)

- Individual IOC in each crate
- Each IOC has “regular” Ethernet and serial console connection
- Provision for “fast feedback” Ethernet on corrector crates
- Network distribution in rack 46 (all power supplies driven from two Ethernet fibers)
# MCOR30 Crate

<table>
<thead>
<tr>
<th>VME CPU module</th>
<th>MCOR30 module</th>
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<th>MCOR30 module</th>
<th>MCOR30 module</th>
<th>MCOR30 module</th>
<th>MCOR30 module</th>
<th>MCOR Backplane (digital communication)</th>
</tr>
</thead>
</table>

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MCOR30 Crate

- Crates are Eurocard form-factor (not VME crates)
- Crates and backplanes are identical to PEP MCOR crates
- SPEAR has 8 30 A modules (PEP has 16 12 A modules)
- Bulk supplies can not drive a total of 240 A, be aware(!).

- CPU is a regular VME CPU
  - adaptation done by “Frankenboard” sitting between CPU and backplane
- Digital (serial) communication between Frankenboard and Candi modules,
  update rate is 4 kHz

- CPU runs EPICS IOC, which gives direct access to power supplies from Ethernet
- Second Ethernet interface will be used for 4 kHz feedback system updates
MCOR Racks
Special Hardware

- 1 MCOR30 supply feeds QMS switchyard (6 chassis), which selects 1 out of 94 quadrupole trims
- 4 Bitbus-controlled TSP supplies feed 5 TSP switchyards, which select 1 out of 16 (32) TSPs per power supply
- Kicker power supplies are integrated into kicker controls (Allen-Bradley)
RF System

The RF power supply is controlled through the LLRF control system.
Power Supply Diagnostic Panels

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Power Supply Diagnostic Panels

![MCOR Diagnostics Interface]

- 01G Correctors
- 02G Correctors
- 03G Correctors
- 04G Correctors
- 05G Correctors
- 06G Correctors
- 07G Correctors
- 08G Correctors
- 09G Correctors
- 10G Correctors
- 11G Correctors
- 12G Correctors
- 13G Correctors
- 14G Correctors
- 15G Correctors
- 16G Correctors
- 17G Correctors
- 18G Correctors
- QSS Pwr Supplies
- ID Pwr Supplies
- BIS–C8H
- 118–QMS1
Power Supply Diagnostic Panels

![Power Supply Diagnostic Panel](image-url)