

# SPEAR3 Power Supply Controls

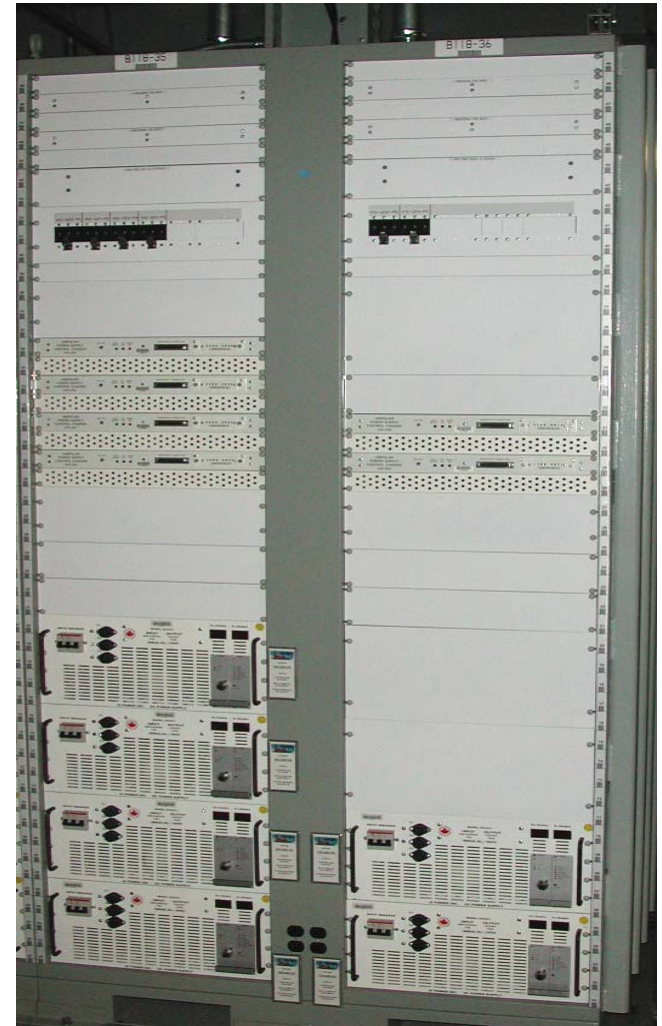
Clemens Wermelskirchen

# Overview

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

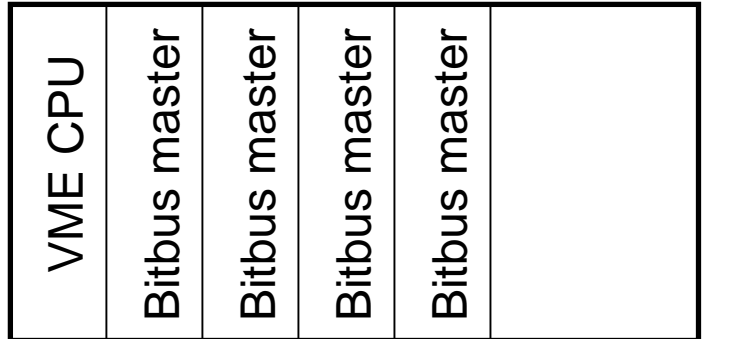
# Unipolar Power Supplies

- ❖ 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

B118-29-17



- ❖ 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



SPEAR3 Power Supply Controls

# Bitbus Power Supply List

## Link 0

05G-QF1  
05G-QF2  
06G-QF1  
06G-QF2  
07G-QF1  
07G-QF2  
08G-QF1  
08G-QF2  
11G-QF1  
11G-QF2  
12G-QF1  
12G-QF2  
13G-QF1  
13G-QF2  
14G-QF1  
14G-QF2  
15G-QF1  
15G-QF2  
16G-QF1  
16G-QF2  
17G-QF1  
17G-QF2

## Link 1

118-TSP1  
118-TSP2  
118-TSP3  
118-TSP4  
BTS-Q8  
BTS-Q9  
BTS-B7H  
BTS-B8V  
BTS-B9V  
MS1-QFX  
MS1-QFY  
MS1-QFZ  
MS1-QDX  
MS1-QDY  
MS1-QDZ  
MS1-SD  
MS1-SDM  
MS1-SF  
MS1-SFM

## Link 2

05G-QD1  
05G-QD2  
06G-QD1  
06G-QD2  
07G-QD1  
07G-QD2  
08G-QD1  
08G-QD2  
11G-QD1  
11G-QD2  
12G-QD1  
12G-QD2  
13G-QD1  
13G-QD2  
14G-QD1  
14G-QD2  
15G-QD1  
15G-QD2  
16G-QD1  
16G-QD2  
17G-QD1  
17G-QD2

## Link 3

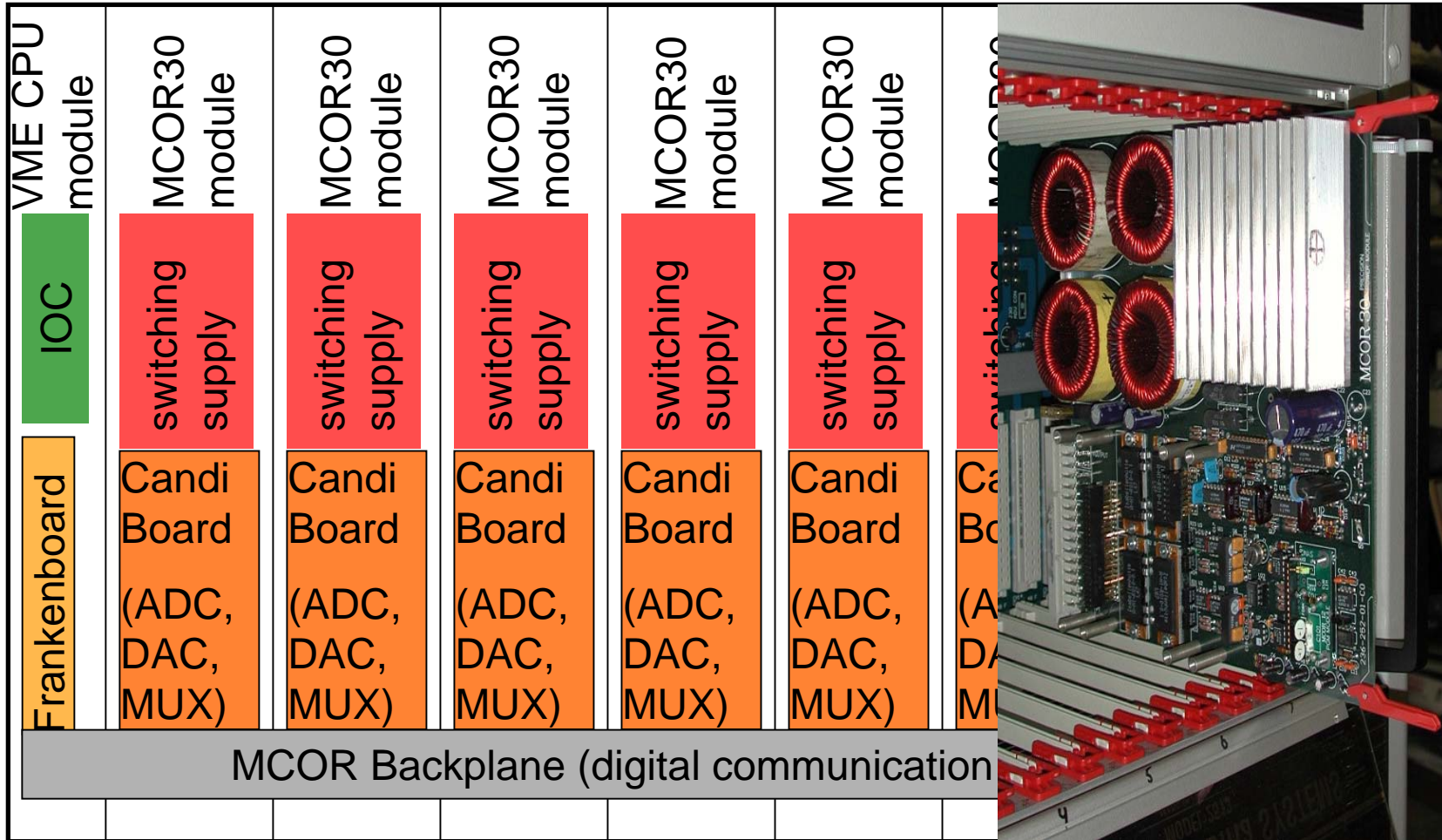
MS1-BD  
MS1-BDBLK  
MS1-QFC  
MS2-QFC  
MS1-QF  
MS1-QD

# 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





# 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

H&V CORRECTORS/QMS/ SKEW QUADS

B118-38

B118-39

B118-40

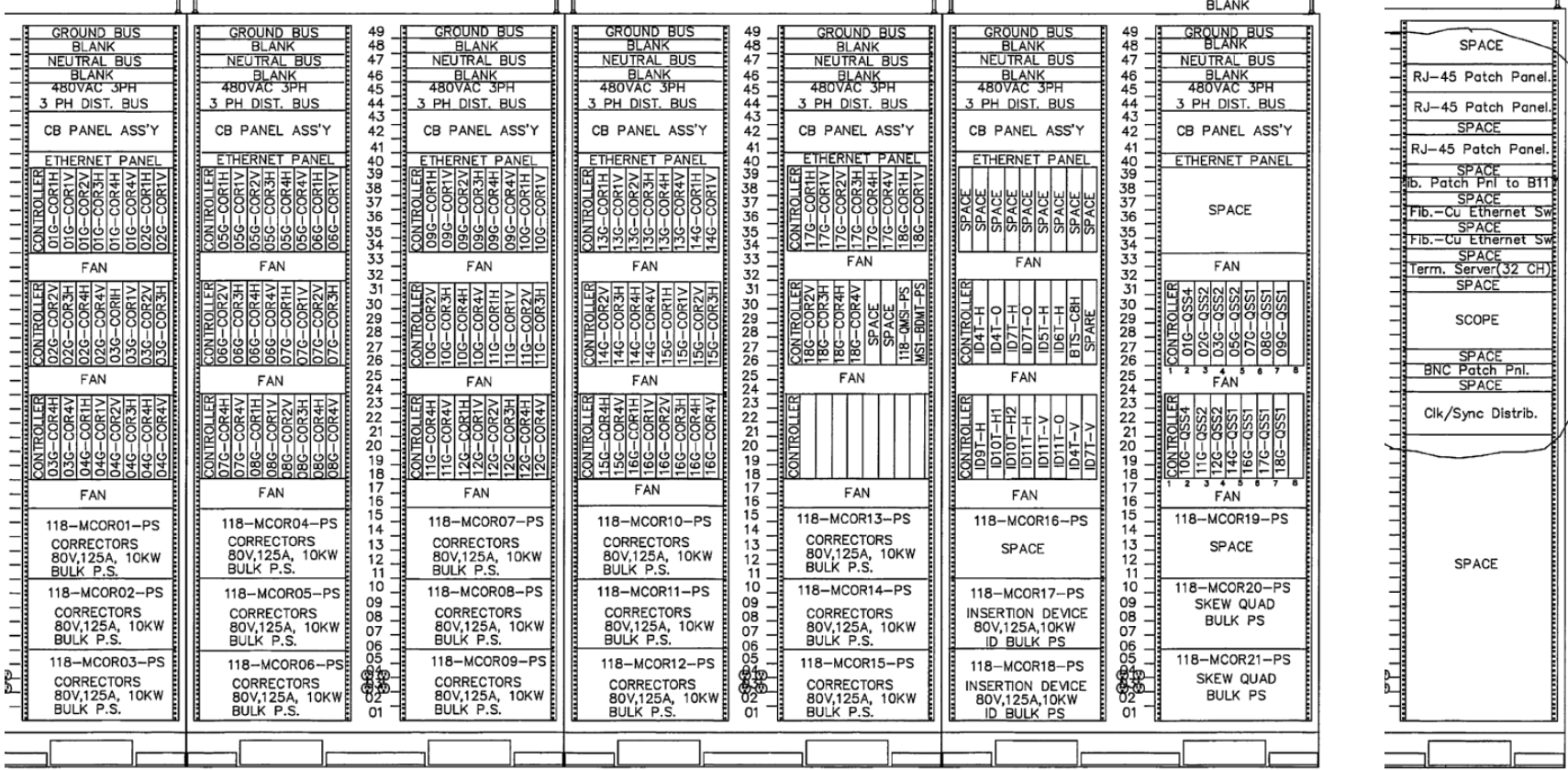
B118-41

B118-42

B118-43

B118-44  
BLANK

B118-46



# 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

EDMROOT:[DATAFILES.DIAGNOSTICS]bitbus\_diagnostics.edl

### Bitbus Power Supply Diagnostics

05G-QD1	05G-QF1	MS1-BD	
05G-QD2	05G-QF2	MS1-BDBLK	
06G-QD1	06G-QF1	MS1-QD	
06G-QD2	06G-QF2	MS1-QDX	
07G-QD1	07G-QF1	MS1-QDY	
07G-QD2	07G-QF2	MS1-QDZ	
08G-QD1	08G-QF1	MS1-QF	
08G-QD2	08G-QF2	MS1-QFC	
11G-QD1	11G-QF1	MS2-QFC	
11G-QD2	11G-QF2	MS1-QFX	
12G-QD1	12G-QF1	MS1-QFY	
12G-QD2	12G-QF2	MS1-QFZ	
13G-QD1	13G-QF1	MS1-SD	
13G-QD2	13G-QF2	MS1-SDM	
14G-QD1	14G-QF1	MS1-SF	
14G-QD2	14G-QF2	MS1-SFM	
15G-QD1	15G-QF1		
15G-QD2	15G-QF2	BTS-B7H	
16G-QD1	16G-QF1	BTS-B8V	118-TSP1
16G-QD2	16G-QF2	BTS-B9V	118-TSP2
17G-QD1	17G-QF1	BTS-Q8	118-TSP3
17G-QD2	17G-QF2	BTS-Q9	118-TSP4

EDMROOT:[DATAFILES.DIAGNOSTICS]BITBUS\_PS\_DIAGNOS...

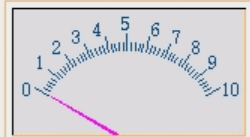
### Bitbus Power Supply MS1-BD

OFF

ON

OFF

RESET



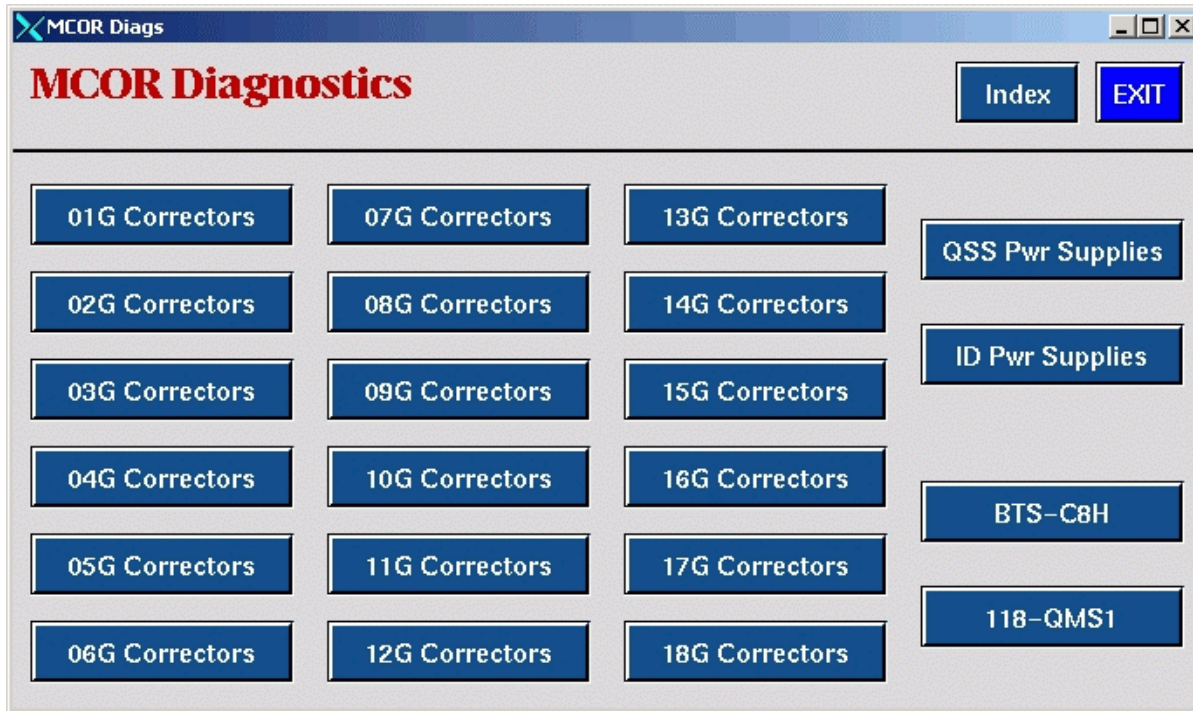
0.00 A

0 0.000 100

Local mode	<input type="checkbox"/>	Xduct 1 current:	0.000 A
PS READY	<input type="checkbox"/>	Xduct 2 current:	0.000 A
PS On Status	<input type="checkbox"/>	DAC current:	0.000 A
Mag. Interlock 0	<input type="checkbox"/>	Ripple current:	0.000 A
Mag. Interlock 1	<input type="checkbox"/>	Ground current:	0.000 A
Mag. Interlock 2	<input type="checkbox"/>	Output voltage:	0.00 V
Mag. Interlock 3	<input type="checkbox"/>	Cntl temperature:	0.0 F
Xduct 1 Status	<input type="checkbox"/>	Spare voltage:	0.00 V
Xduct 2 Status	<input type="checkbox"/>	ADC Offset:	0.002 %
GND Current fault	<input type="checkbox"/>	ADC Gain:	0.002 %
Fault latch status	<input type="checkbox"/>	DAC Offset:	0.002 %
PS Status 0	<input type="checkbox"/>	DAC Gain:	0.002 %
PS Status 1	<input type="checkbox"/>	Last reset code:	0
PS Status 2	<input type="checkbox"/>	Last turn OFF code:	0
PS Status 3	<input type="checkbox"/>	Self-test error code:	0
Calibration status	<input type="checkbox"/>	Cal. error code:	0
Hardware status	<input type="checkbox"/>	dI/dt limit:	<input type="text" value="n"/> A/s
Message:			

Bitbus address:	0 : 0	Cmd/Rsp:	2771580 / 0
Chassis type:	0	Xduct 1 V/I:	0.000
Serial number:		Xduct 2 V/I:	0.000
Magnet ID:		GND current V/I:	0.000
Firmware version:		PS voltage V/V:	0.000
Calibration date:		Reference Voltage:	0.000 V

# Power Supply Diagnostic Panels



# Power Supply Diagnostic Panels

