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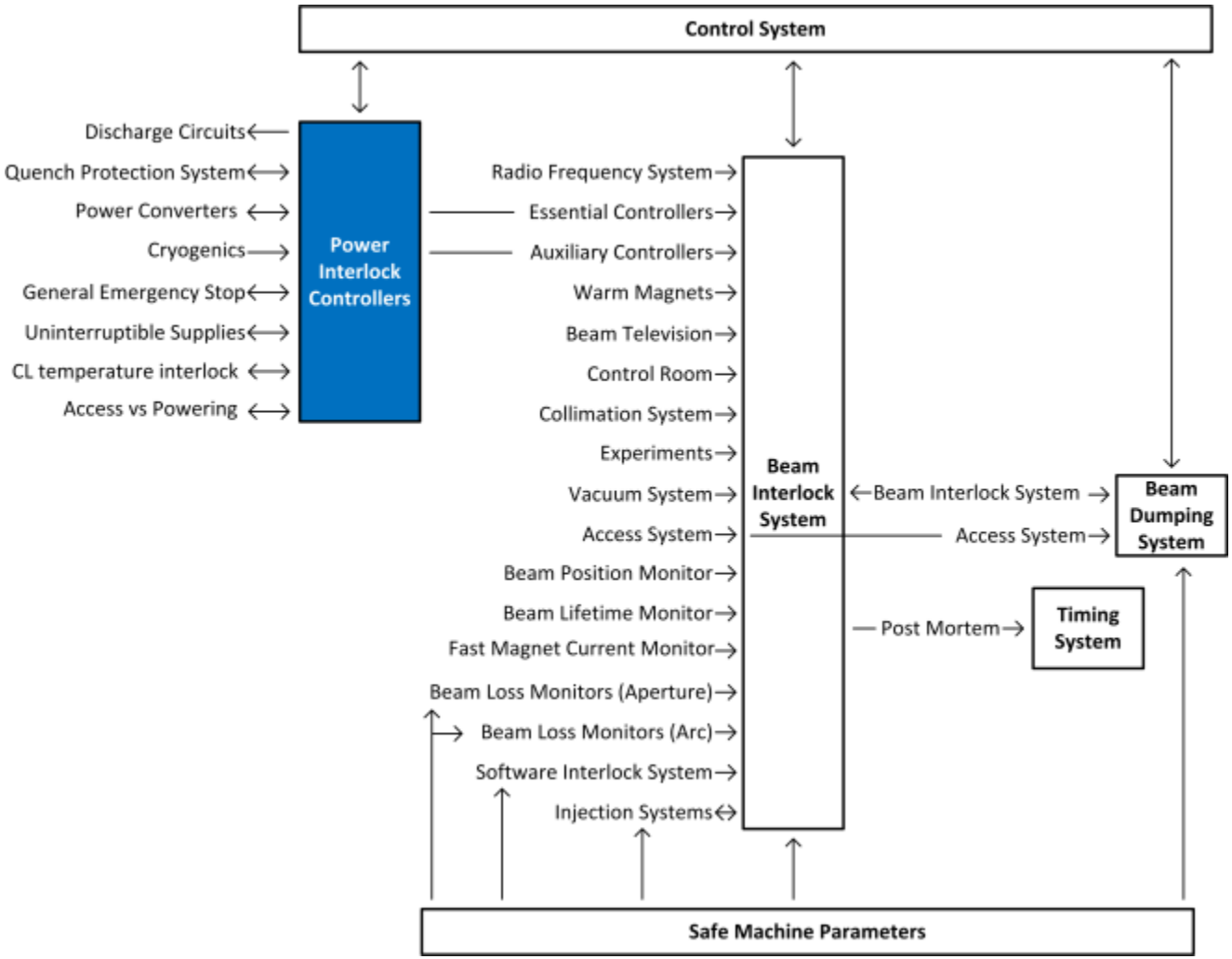
PIC configuration (maskable/unmaskable circuits)

I. Romera

MPP meeting – 07.03.2014

Powering and Beam Interlocks



Definition of essential and auxiliary

- **Essential circuits** are connected to unmaskable input of BIS
  => **BEAM DUMP** under any condition (including safe beams)

- **Auxiliary circuits** are connected to maskable input of BIS
  => BEAM DUMP if unsafe beams (can be masked on the BIS when running with safe beams)

  NOTE: No difference between Essential and Auxiliary definition with unsafe beams!

- **None of the above** => **no impact** on beam

Interface to the Beam Interlock System

- **Redundant** beam dump request propagation to the BIS
- XILINX XC95144 **CPLD for faster transmission** of unmaskable signals

Max 16 Inputs / Patch Panel
Max 96 Inputs / Total

PROFIBUS

SIEMENS 319 CPU

MATRIX

ESSENTIAL CIRCUITS

=

UNMASKABLE BEAM DUMP REQUEST OF THIS PIC

ESSENTIAL + AUXILIARY CIRCUITS

=

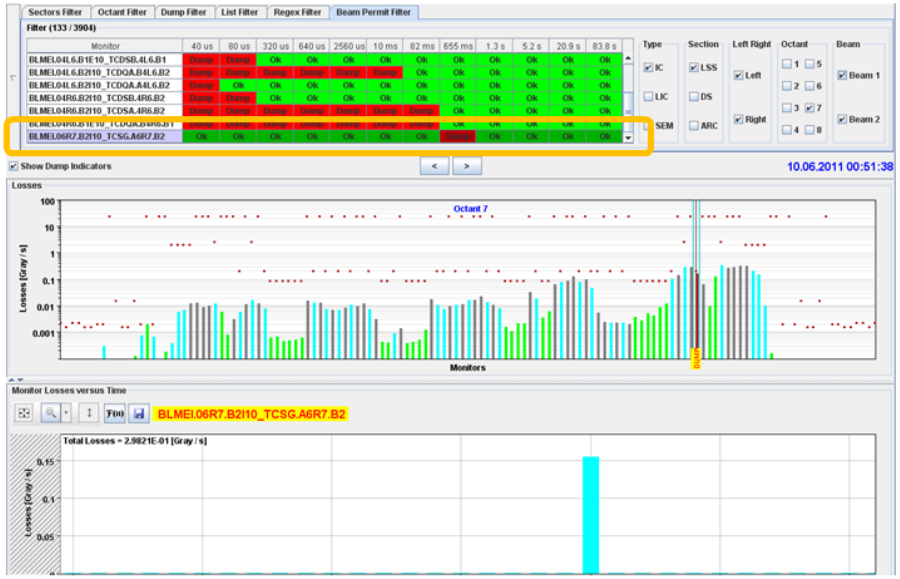
MASKABLE BEAM DUMP REQUEST OF THIS PIC

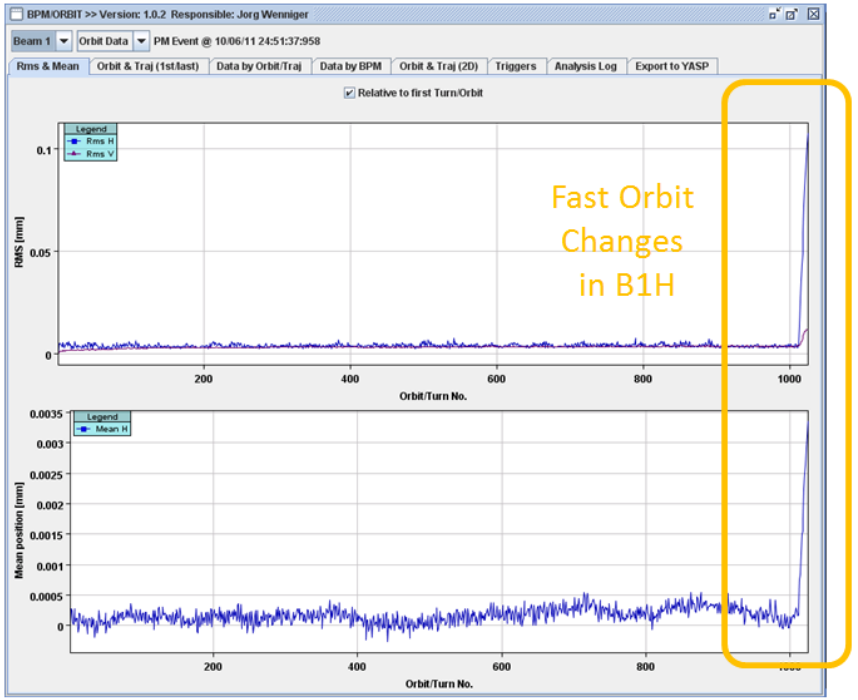
Initial configuration (2009)

- RB, RQD, RQF, RQX, RD1-4, RQ4-RQ10 as **unmaskable** (essential for operation)
- RCS, RQT%, RSD%, RSF%, RCBXH/V and RCB% (except RCBCHS5.L8B1) as **maskable** (not essential with safe beam)
- RCD, RCO, ROD, ROF, RQS, RSS **no impact**

Modifications during Run1

- **RQSX3:** Included in **Maskable** PIC configuration after trip provoking fast orbit changes and beam losses in SR7 (event on June 2011 – ECR 1203408)

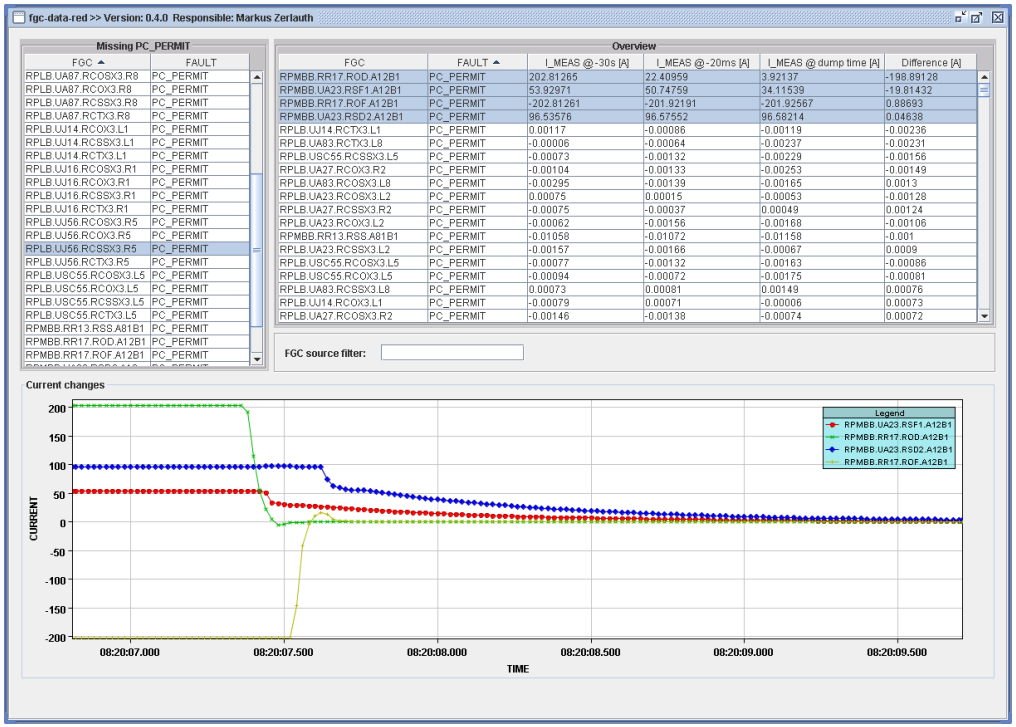




Proposed changes for Run2

- **ROD/ROF:** Trips on such circuits provoked several dumps due to EMC on neighbouring circuits (typically RSF and RSD…) => **MASKABLE**

30-APR-11 8:20AM => Octupole circuit ROD.A12B1 tripped due to fault in the auxiliary power supply. This one would not trigger the dump on it's own, but **it took down due to electromagnetic coupling as well 3 more circuits RSF1.A12B1, ROF.A12B1 and RSD2.A12B1, and the RSF1.A12B1** eventually dumped the beams some 70ms after the initial fault.



13-APR-12 6:59PM => Internal failure of power converter ROD.A12B1 (due to AUX power supply), requiring exchange of power module. Clean dump.

11-JUN-12 17:01PM=>Trip of ROD.A81B1 (RR13) , followed by ROF.A81B1 and RSF1.A81B1 looks like a SEU.Under investigation by the MPE experts.Clean dump.

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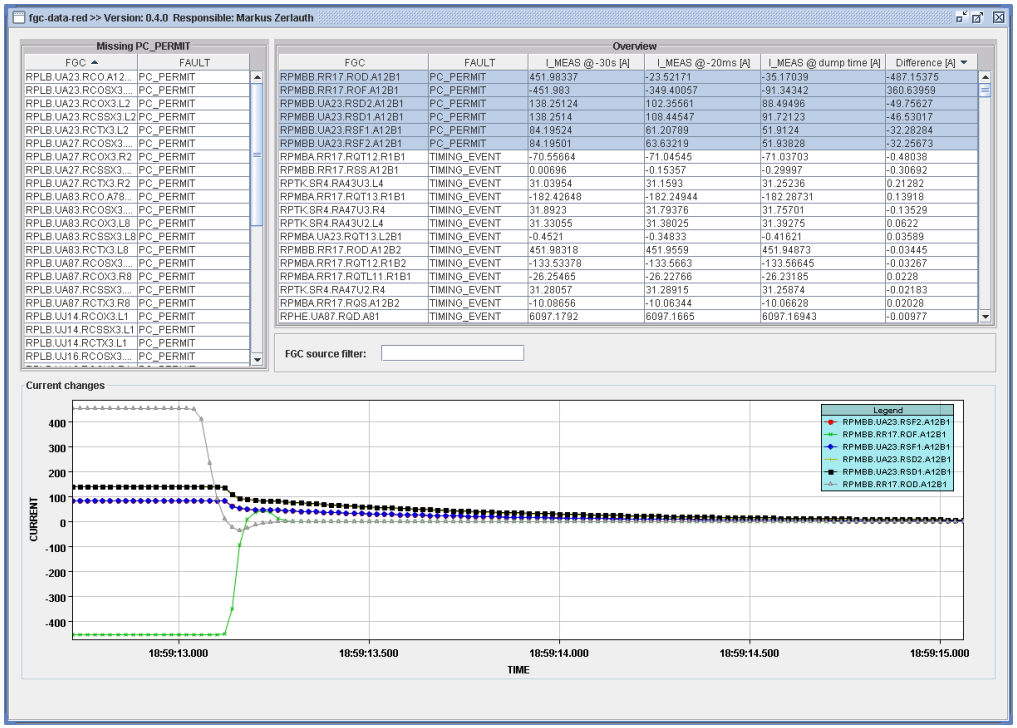

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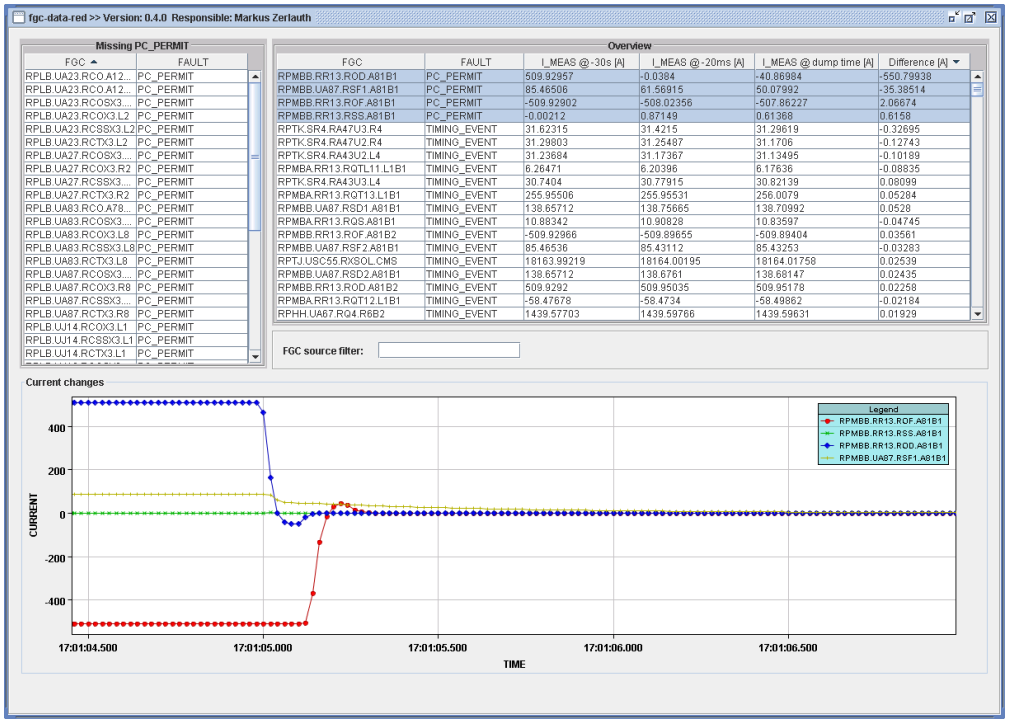

Proposed changes for Run2

- **RCBCHS5.L8B1:** Circuit repaired and back to operation => **MASKABLE**
  - Highly resistive circuit (around 22 mohm) on the cold side at 4.5 K. It was replaced by a nc circuit during Run1…

- **RQS:** Proposal to be included in **MASKABLE** configuration
  - From M. Giovannozzi "*to correct the beam coupling, these circuits have the same function as the RQSX3, which were included in the PIC configuration*"
  - No evidence of beam dumps found during Run1 in PostMortem DB

How to deploy new configuration…

- Apply changes to **reference DB**
- Generate **configuration data** (script)
- **Download new configuration** to PLC, MATRIX and WinCC
- Repeat **commissioning** procedure

- Time estimated for changes: **2 days!**