MPP Meeting

Loss of PP60A 08.05.2017

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Thanks to
Jonas Arroyo Garcia (BE/ICS) for its feedback.

Outline

- Introduction

- PP60A lost on 08.05.2017

- QPS_OK filtering method in details

- Conclusions

Introduction

60A Power Permit implementation

- **No hardware interlocks** for 60A orbit correctors
- Protection **guaranteed by Power Converters**
- Interlocks **to avoid unnecessary quenches** of magnets and current leads and to help operations
- **PC_PERMIT_60A** derived from cryogenic and powering conditions and **sent via GMT** to EPC gateways
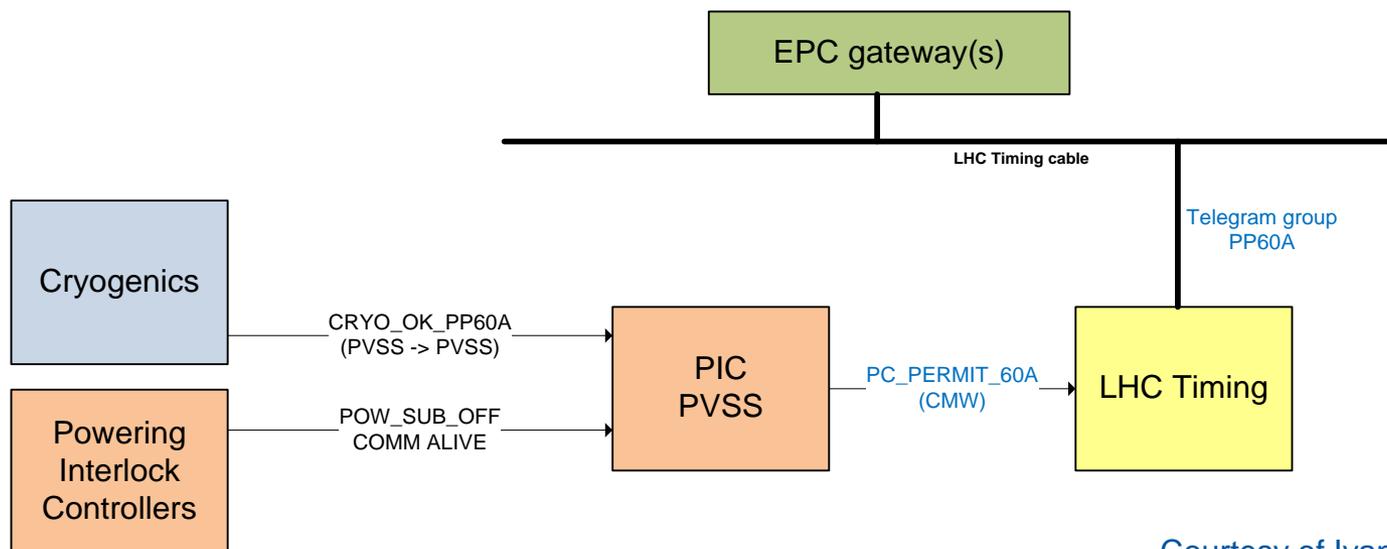
Courtesy of Ivan Romera Ramirez

Introduction

Two operating modes

- Power Permit **Without** beam
  - Global Protection
  - PLC communication alive
  - Cryo PP60A
  - CMW connection alive
- Power Permit **With** Beam
  - Beam_Info_B1B2
  - PLC communication alive

In fact, PP60A logic from the PIC is always true when operation with beam !
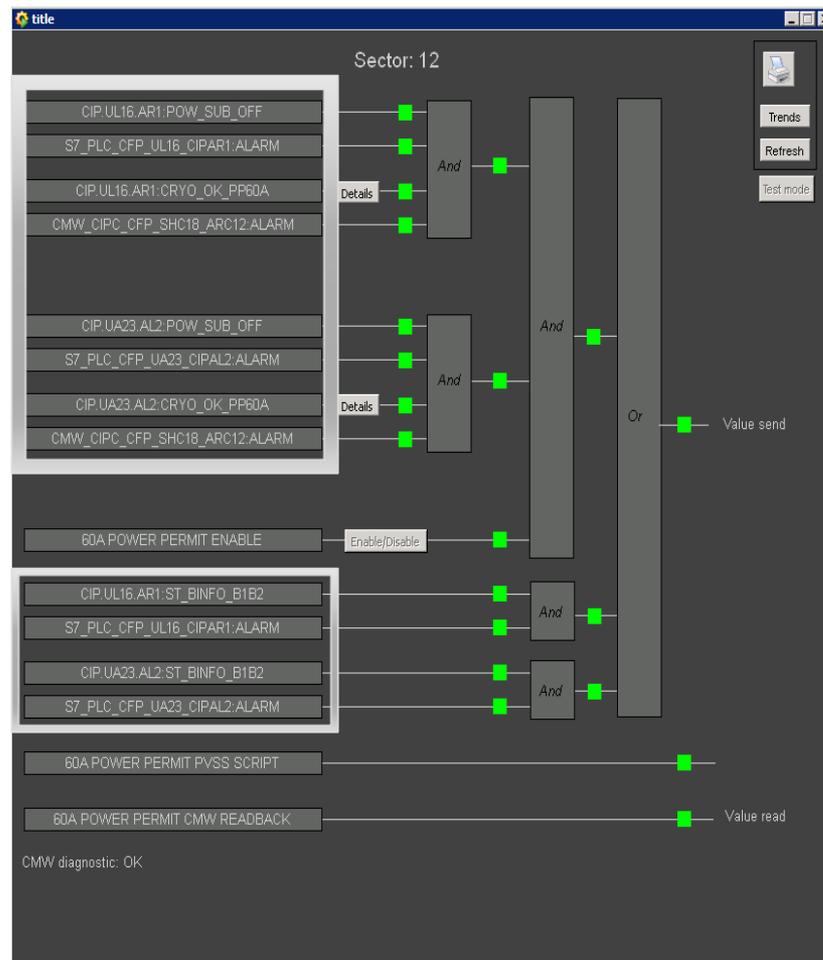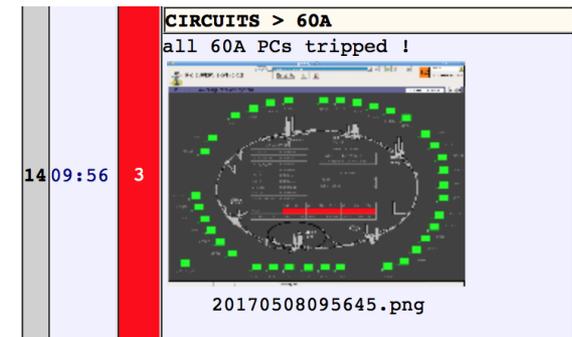
PP60A lost on 08.05.2017

Circumstances

- First message (SMS/Mail) from PIC server on Tuesday 2nd Mai:
  - F: pic.interlock@cern.ch
    S: **pic_1 - Bad - Time synchro PM1_CMW_FE** -> DS driver 30 - 05/02/2017 18:21:19 (milli:654)
  - F: pic.interlock@cern.ch
    S: **pic_1 – OK - Time synchro PM1_CMW_FE** -> DS driver 30 - 05/02/2017 18:21:21 (milli:647)

- The frequency of these messages increased exponentially over the 7 next days.

- Initially, these messages were not considered important because they had no effect on the operation.

- All PP60A lost on 08.05.2017.

CIRCUITS > 60A
all 60A PCs tripped !

14 09:56 3

20170508095645.png
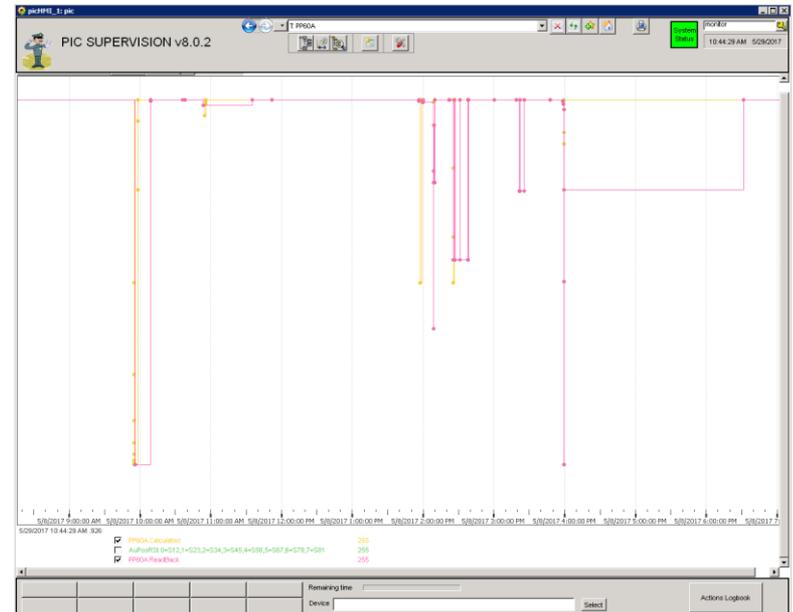
PP60A lost on 08.05.2017

What happened (1)

- New QPS_OK filtering method deployed during EYETS.

- **Overload** of the WinCC server:
  - CCC complained of:
    - Slowdown of the PIC application.
    - Unexpected and uncoherent behaviour of the PIC application.

- WinCC server goes to emergency mode (automatic disconnection of services to save resources).

- Messages appeared.

- **NO consequences** for operation **with beam**.

PP60A lost on 08.05.2017

What happened (2)

- At 21.43 on 07.05.2017 the RQ5.LR3 circuit tripped:
  - **No beam**
- BE/ICS requested authorization to make an intervention on the WinCC.
- The intervention:
  - Shutdown of the WinCC **No consequences**
  - Change of QPS_OK filtering polling time to 10 sec (Mitigation of WinCC overload).
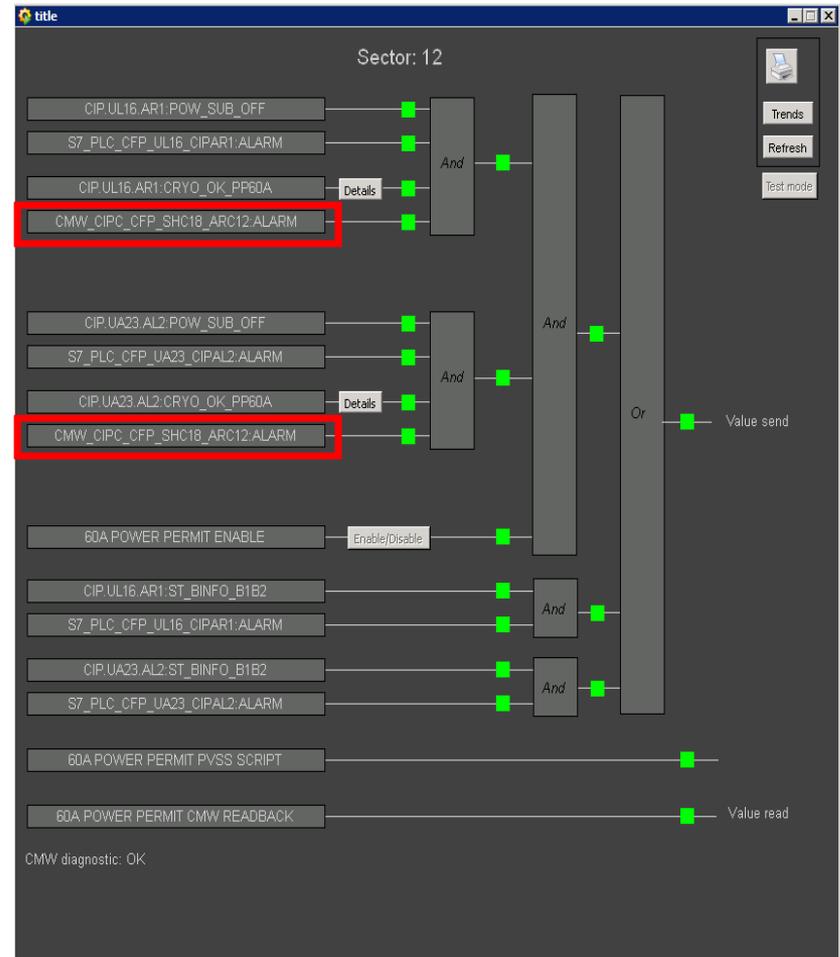 - **WinCC server restarted.**

PP60A lost on 08.05.2017

What happened

- At restart, WinCC is disconnected from CMW server.

➡ Without Beam:
All PP60A lost

- Mitigation:
  - Masking the CMW connection check for a time set at WinCC restart

# QPS_OK filtering method in details

QPS_OK filtering method in details

- The reason of change is to fix the issues of:
  - Sporadic missing QPS updates.
  - Flooding of QPS_OK events.

< 2017	From now on
Event based	Poling based
Low CPU load	High CPU load
Sensitive to missed QPS events	Immunity against missing QPS events

QPS_OK filtering method in details
Mitigation of WinCC Overload

- Current mitigation:
  - Polling time changed from 4 sec to 10 sec (with the agreement of Markus and Zinur).
  - The server load is now stable between 50-80%.
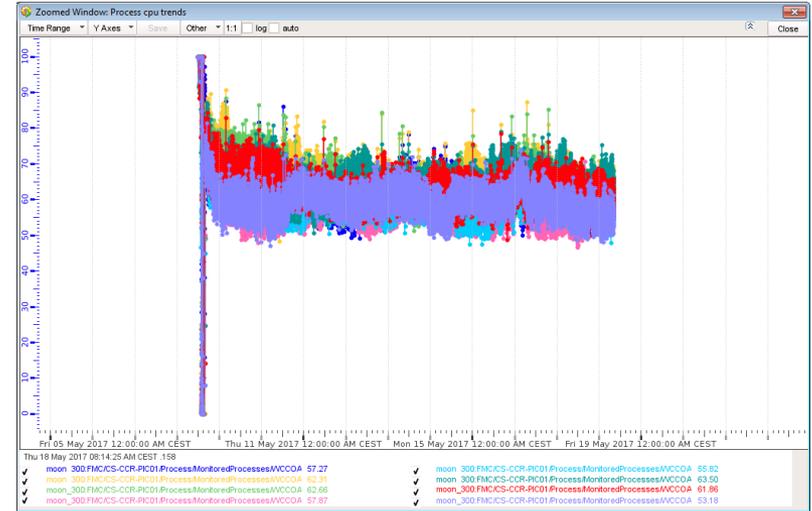
- Future mitigation (to return to 4 sec of polling):
  - Exchange of the server (hardware) with a more powerful one.
  - Optimization of QPS code.
  - Optimization of QPS_OK WinCC scripts (using C++ code to compute QPS signal avalanches).

Conclusion (1st)

PP60A lost on 08.05.2017

- The PP60A lost was a consequence of a WinCC maintenance, which would **have not occurred with beam**.

- WinCC maintenance in **operation without beam** can provoke the lost of all PP60A due to CMW disconnection.

- WinCC overload had **no effect when in operation with beam**.

- Improvement of QPS_OK filtering scripts and upgrade of the WinCC server (ongoing) are required.

Thank you for your attention

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