

Controls Issues in 2008

- Operations Point of View -

Rende Steerenberg BE/OP

with the help of:

C. Carli, K. Cornelis, H. Damerau, T. Eriksson, K. Hanke,
E. Hatziangeli, D. Kuchler, D. Manglunki, G. Metral, B. Mikulec,
F. Peters, E. Piselli, R. Scrivens, E. Siesling, F. Tecker, J.
Wenninger,.....and all those I might not have mentioned



Topics:

- # Common Controls Issues
- # Controls Issues per Machine
- # OASIS
- # Diagnostics tools
- # Support
- # Outlook: long run and short shut down
- # Conclusions

- # Scope:
 - LINAC2, LINAC3, LEIR, PS Booster, PS, AD, CTF, SPS

Common Controls Issues

(1)

- # The 2008 run was much less hampered by controls issues compared to 2007.
- # Timing problems:
 - ▣ During the start-up period a wrongly deployed TG8 firmware caused serious timing problems, blocking the majority of the front-ends several times. As a result the PS received the very high intensity beam that was destined to go to ISOLDE.
 - ▣ Bug in existing driver, intensively used to decouple timing-wise the PS complex from SPS, caused a timing freeze of about 10 seconds. As a result the SPS lost the full intensity CNGS beam at high energy, causing a vacuum leak.
 - ▣ Both problems were quickly solved thanks to quick and efficient reaction from CO.
 - ▣ Badly functioning TG8 cards lead to trips of the CTF klystrons. It is foreseen to upgrade the system with the new timing cards

Common Controls Issues

(2)

Impressive hole in the SPS vacuum chamber
following a beam loss

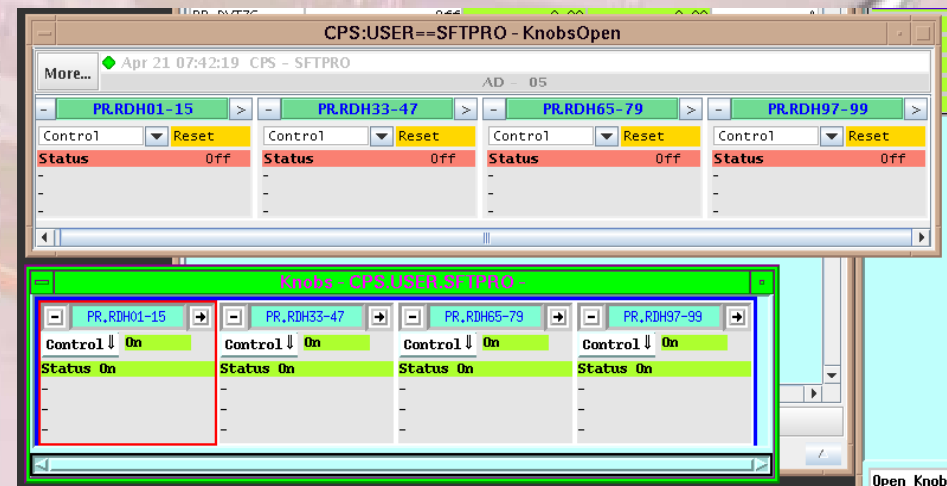


Common Controls Issues

(3)

Java working sets and knobs:

- During the first part of the year problems with the JAVA working sets were still reported
- Acquisition values did not update, working sets or knobs got frozen or TGM time out error was displayed
- Incoherencies between X-motif/Java gradually reduced
- The situation improved after the start up thanks to the reactive support from CO.
- Nevertheless the old console manager, working sets and knobs remains required in some cases.



Common Controls Issues

(4)

- # The functioning of the **PS complex** is still **relying heavily** on a large number of **X-Motif applications**, which are extremely important operational tools and need good support in case of problems.
 - ▣ These applications **will gradually be replaced**, but this will take time.
 - ▣ Progress will depend on system renovation, INCA implementation and available resources

- # New implementation of the **Passerelle** program, enabling use for **FESA and GM** devices.

Common Controls Issues

(5)

Equipment naming is no longer a matter between **OP** and **CO** but also the **equipment groups**.

- This year an important case could be solved to the satisfaction of the parties involved, thanks to the very cooperative approach of PO (TE/EPC)
- Initial naming of vacuum equipments was corrected following discussions between OP and the vacuum group
- Solid strategy, satisfying all parties, should be put in place and respected

Controls Issues: LINAC3 and LEIR

LINAC 3:

- Ran only for testing 18 GHz micro wave generator in 2008
- Renovation of ramping cavities and de-buncher control started in 2004, but never finished
- Proper control software is missing, specialist application is available
- Suffered also from vacuum controls renovation and a general point is the missing PVSS integration for the vacuum controls.

LEIR

- Machine did not run in 2008, but will be restarted in 2009
- Hybrid of LSA and 'old' PS controls and has therefore not a coherent approach for archiving
- Be aware that LEIR is now in a long shut down during which many developments have been ongoing (LSA) → Dry-run foreseen
- The removed GFAs will be replaced by new CVORB's
- FESA classes will be upgraded (possibly 2.10 for all)
- Many surprises around the corner?

Controls Issues: LINAC2 / PS Booster

LINAC2:

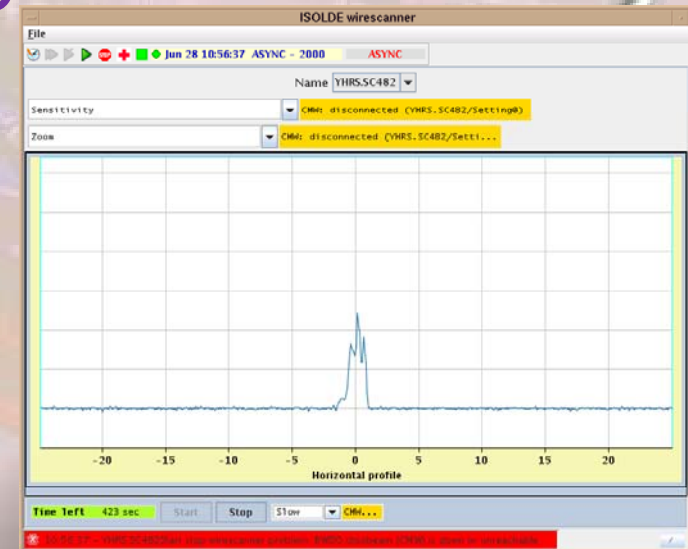
- Difficult start with the **renovated vacuum control**
 - Large effort to get standard information in the working sets
 - **PVSS** was only available in PS windows environment, now it also available under LINUX

PS Booster:

- **Archiving** caused again several times **problems**. It was **fixed** and then working well
- The **Booster** operation **relies heavily on** the **archives** as they suffer from a lack of active users to house all the operational and MD beams
- **The request for more users is ignored** since a couple of years. As a consequence an operational beams like the **LHC50** **has no active user**

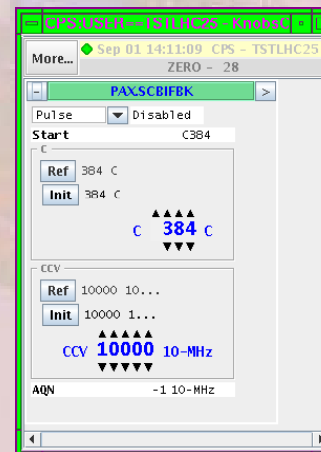
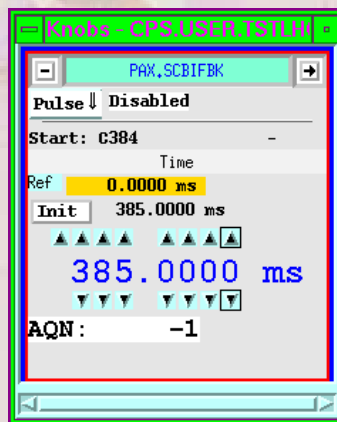
Controls Issues: ISOLDE

- # The **controls situation for ISOLDE** was largely improved during the year.
- # The beam diagnostic front-end **DISOBEAM** needed **regular reboots** and this **problem is not yet solved**
- # **Vacuum controls** needed often a specialist
- # **All workstations needed a reboot from time to time.**
 - ▣ After a **memory upgrade** the situation has improved
- # **REX controls** were and are still **not CO standard** and were **often unstable**. The REX Control system **upgrade** is foreseen for **next year**.
 - ▣ Nevertheless **CO gives an excellent support**, especially the old **CO Labview** section and A. Bland
 - ▣ Nowadays **CO is fully involved** in the REX Trap **control system renovation**



Controls Issues: PS

- # A long pending problem (since 2007), causing occasional beam losses are the sometimes missing modulation functions for the controlled longitudinal blow up 3
 - approximately once every 15 min to 2 hours
 - Source (hardware/software) could still not be identified
- # The TSM, used to perform timing diagnostics and to compare the actual machine timing with a stored reference has problems to display the last cycles of long super cycles correctly
- # **X-motif knobs** are **still required** in some cases. There is for the moment no solution to the below shown case in the Java version



Controls Issues: AD

- # The beginning of the year the AD suffered from **database related problems** that caused difficulties in using the **cycle editor**
 - Much **time** was **lost for debugging** hampering machine operation.
- # AD also uses archives, but **problems** with the **archiving** created a substantial **loss of time** in order to ensure that the data in the archives were correct.
- # **Incoherencies** between X-motif and Java knobs

Controls Issues: CTF3

- # Machine operation is severely affected by **front-ends** that are **at the limit of their capabilities**
 - ▣ According to CO there is **no upgrade** from RIO2 to RIO3 CPU's **possible** at the moment as the **HW** is **not available**
 - ▣ CO plans to **distribute** some **tasks** from these front-ends to other ones as a temporary solution
- # The **JAVA console manager** has improved significantly
- # CTF had also many problems with the control of a new BPM system, but this is under the responsibility of a CTF3 collaborator from LAPP, Annecy.

OASIS

(1)

- # The **OASIS system** is one of the, if not the **most important diagnostic tool**.
- # The statistics for 2008 are as following:

Machines	Number of signals available	Number of connections requested	Number of slave connections		Number of connections failed	
LINAC2	140	1425	23	1.6%	122	8.6%
LINAC3	67	32	0	0%	19	59%
LEIR	213	137	0	0%	1	0.7%
PS Booster	748	6035	121	2%	366	6%
PS	890	21141	646	3.1%	1860	8.8%
AD	56	2721	153	5.6%	208	7.6%
CTF3	159	22872	5150	22.5%	4039	17.7%
SPS	139	5720	283	4.9%	542	9.5%
Total	2412	62206	6595	10.6%	7488	12%

Justifying a strong and very reactive support team !

OASIS

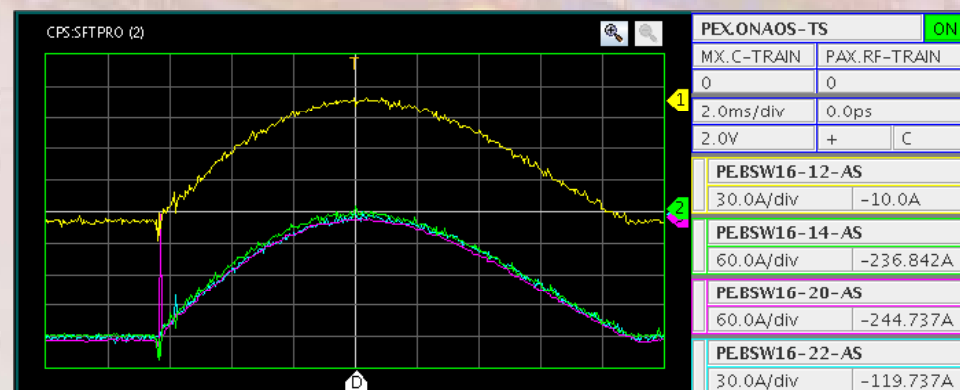
(2)

- # These **statistics do not show** the **channels** connected **without signal** on the cables
- # They **do** also not **reflect** the often **poor signal quality** that makes it difficult, if not impossible, to exploit the signals correctly for diagnostics
- # It **does not indicate** the many **problems** we had **with** not or wrongly **triggering** of scopes
- # **Noise** on **second channel** of newly installed OASIS scopes in Linac2 was not solved by the end of the run
- # **OASIS did not follow** the **increase in power converters** in **building 365**, making **diagnostics** on different beam operations **in parallel impossible**.
 - Proposed solution will become available at 2009 start up

OASIS

(3)

- # In the middle of the 2008 run an attempt was made to **calibrate signals to real currents** and to **add physical units**.
 - ▣ An **not requested attempt** was made, but badly followed up.
 - ▣ Calibrations of identical signals were different and none of them corresponded to the real current, causing more confusion than clarity.
 - ▣ On OP request these calibrations and units were removed.
 - ▣ Impact of **changes should be evaluated** prior to well **managed integration and validation**



OASIS

(4)

Many problems with the OASIS viewer in CTF, but also other machine:

- ✦ Sometimes impossible to connect signals
- ✦ Wrong signals got connected
- ✦ Many slave connections
- ✦ The above mentioned situation has been improved significantly over the run

The screenshot displays the OASIS VIEWER application interface. On the left, a waveform plot shows two signals: a yellow one and a green one. The top right panel, 'Vscope settings', shows configuration for 'PE.BSW16-12-AS1' and 'PE.BSW16-14-AS1', both with an offset of -10.000. The bottom left panel, 'OASIS messages', contains two error messages: 'The offset value is out of range . cern.oasis.util.ValueOutOfRangeException: The value -244.73684210526315 is out of range for the trace offset setting.' and 'The offset value is out of range . cern.oasis.util.ValueOutOfRangeException: The value -119.73684210526316 is out of range for the trace offset setting.' The bottom right panel, 'Application Error', displays the message 'Unable to launch the application.' with details for 'Oasis Viewer' published by 'CERN' from 'http://abwww.cern.ch'. A separate window titled 'OASIS messages' shows a log entry: 'tablespace 'PSCO' cern.oasis.util.NoFreeLaneException: Connecting PA.WCM03-AS with PEX.ONAOS-TS for OASIS VIEWER on cwo-ccc-b51c (priority: 5.0)... Trying channel CR.CHANNEL75... Impossible, the hardware is not compatible. Checking priority of other clients... No client with a lower priority.'

OASIS

(5)

Impedance management did not work for a considerable period of time. (14 April until 30 June)



This coincided with **start up period** and **orbit measurement saturation problems**, which required good OASIS signals to diagnose and debug the CODD problems

OASIS

(6)

- # On several occasions **attempts or plans** were made to **extend** the **OASIS** functionalities.
- # The **first priority** for **OP** is to have a **good working OASIS** system, with **strong and efficient pro-active support**.
- # At the end of the 2008 run a **signals quality inventory was made** for PS Booster and PS.
 - ▣ Good collaboration between **CO** and the different equipment groups should solve the majority of the signal quality and no signal issues during the shut down.

First consolidate the present OASIS and make it work reliably before extending it with new and less important functionalities

Diagnostic Tools (1)

- # The transfer of front-end responsibility over the different equipments groups increases the need to have enhanced diagnostic tools in the CCC
 - Also the responsibility within a vertical slice is very often distributed over several persons
- # **DIAMON** is a tools that can contribute to this enhanced diagnostics, but the introduction was incomplete and without proper validation. Now **DIAMON** is working well

The image displays three screenshots of diagnostic tools used in a control room environment.

- Top Left:** A terminal window titled "Laser Console [cpsoplogging alarms denis]". It shows a list of active alarms with columns for Date, Time, Identifier, System Name, and Problem Description. Recent alarms include "TGS Unexpected WME interrupt" and "Parameter subscription failure".
- Top Right:** A window titled "CPS Machine" showing a summary of "TOTAL ERRORS : 90" and "MASKED EQUIPMENTS : 17". Below this is a table of error logs with columns for Time, ID Name, Class, Element, Equipment Description, Faults Description, and Faults.
- Bottom Left:** A network diagram showing a grid of hosts for CPS, with various status indicators (green, red, yellow) for different equipment groups.
- Bottom Right:** A window titled "xlucic: cpsop@abcop1 viewing P" showing a network diagram with nodes labeled "cs-ccr-loop" and "cs-ccr-inf", along with various status indicators.

Diagnostic Tools

(2)

- # For the faster **cycling machines** the **timing diagnostics** tool (TIMDIAG) is of **major importance**. The last time a fully working version was available to OP was in 2004. Since then we requested a new version every year.
- # The **LASER** alarm tree was **adapted** successfully to the needs of OP **over several iterations** and has become **now** the **general alarm tools** in the CCC

Support

- # The **OP issues report tool (JIRA) works well for longer term issues.**
 - We should have only one place to store and manage this information and we should not create other bug report means that are managed separately
- # However, **short term and more urgent problems** should be **solved efficiently by the piquet team.**
 - Piquet team members have often many other less exploitation related work.
 - Get them more involved in implementation of renovated or newly installed systems will enhance their competence and contribute to the reduction of down time.
- # OP has in general a good response on requested support by specialists during day time.

Long run and short shutdown

- # The **regular preventive and upgrade maintenance work**, both HW and SW, will have to be reviewed
- # **Some of this can be postponed**, but some will need to be **scheduled to take place in the short technical stops** during the period concerned.
- # **CO** is also **required to do interventions/upgrades** due to the initiatives and scheduled work by **equipment groups**.
- # What this exactly implies needs to be reviewed and implication are to be discussed in the **CO3**.

No real problems foreseen, short stops required, work needs to planned carefully.

Conclusions

(1/2)

- # **2008 was a better year compared to 2007**
 - # Less problems with CCM, working sets and knobs
 - # Some problems remained
 - # The list of issues is surely not exhaustive and all additional information is very welcome

- # **Timing issues can have large consequences:**
 - # Thorough testing and validation of new SW and HW
 - # Measures to try prevent damage have been taken

- # **OASIS remains a weak point, but improved over the year**
 - # Largest diagnostic system, used across all accelerators
 - # No new developments, but make present system work reliably
 - # Proper validation of new releases and implementations
 - # Large system requires maintenance
 - # Systematic checks would prevent many problems
 - # Strong, efficient and pro-active support required and justified

Conclusions

(2/2)

- # Sharing front-end responsibilities require more enhanced, but simple diagnostic tools
 - # OP does not like to call the wrong specialist Sunday morning at 2:00
- # JIRA OP issue report works well. Single place of issue management
- # Piquet service team and specialist service of vital importance for machine operation.

During the shut down a lot of work is ongoing. OP hopes to benefit from this for the upcoming long run !!!...

Acknowledgement

- # We would like to **thank the piquet service** that intervened under not always easy circumstances.
 - # They keep together with the specialists the control system running
- # We would like to **thank all the specialists** that helped debugging our systems, in particular:
A. Bland, M. Jonker, E. Roux and C.-H. Sicard