

YETS 2018

PIC / WIC / FMCM YETS Activities & Re-commissioning Plans

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PIC

Power Interlock Controller

Summary of Activities

Description	Status	Comments
PLC Firmware upgrade (36x) from V2.8.3 to V2.8.6.	DONE	Triggered by CIP.AL14 failure in August
Exchange of the power supply crate (CIPS) of CIP. AL4.	DONE	One redundant +5V Power Supply in failure
Maintenance of the Supervision (WinCC OA).	DONE	General maintenance
Spare cable for RQ10.L8	DONE	EPC/PIC connection
Powering Test (AccTesting)	W10/11/12	
Cryo. Communication test.	W12	
General services connection test.	W12	
PP60A Permit test.	W12	
PIC – BIC Connection test.	W12	

Summary of Activities

VersionDog [Data Management for automotive]

The screenshot shows the VersionDog Client interface with a 'Component overview' table. The table lists components such as PIC_UA23_AL2, PIC_UA23_XL2, PIC_UA27_MR2, etc., along with their local and server versions and comparison status. Two annotations are present:

- A blue box with the text "All CPUs Upgraded" and an arrow pointing to the PIC_UL14_L11 component.
- A red box with the text "Still few issues under investigation by BE/ICS" and two red arrows pointing to the PIC_UL14_L11 and PIC_UL14_XL1 components.

Check-in possible	Name	Component type	Tags	Lock state	Edit state (time of check)	Local version	Local <-> Server	Server version	Server <-> Device	Backup <-> Previous backup
No (no "edit" rights)	CPU_CCK_CIPACC	Simatic S7			Equal (23/01/2018 09...	3 [V1-0]	Equal	3 [V1-0]	Equal	Not compared
No (no "edit" rights)	PIC_TZ76_AL7	Simatic S7	FW v2.8.6		Equal (04/12/2017 15...	3 [v3-1]	Equal	3 [v3-1]	Equal	Not compared
No (no "edit" rights)	PIC_TZ76_AR7	Simatic S7	FW v2.8.6		Equal (04/12/2017 15...	3 [v3-1]	Equal	3 [v3-1]	Equal	Not compared
No (no "edit" rights)	PIC_UA23_AL2	Simatic S7	FW v2.8.6		Equal (15/01/2018 10...	4 [V3-1]	Equal	4 [V3-1]	Equal	Not compared
No (no "edit" rights)	PIC_UA23_XL2	Simatic S7	FW v2.8.6		Equal (15/01/2018 10...	3 [v3-1]	Equal	3 [v3-1]	Equal	Not compared
No (no "edit" rights)	PIC_UA27_MR2	Simatic S7	FW v2.8.6		Equal (04/12/2017 15...	4 [V3-1]	Equal	4 [V3-1]	Equal	Not compared
No (no "edit" rights)	PIC_UA27_XR2	Simatic S7	FW v2.8.6		Equal (04/12/2017 15...	4 [V3-1]	Equal	4 [V3-1]	Equal	Not compared
No (no "edit" rights)	PIC_UA43_AL4	Simatic S7	FW v2.8.6		Equal (04/12/2017 15...	5 [V3-1]	Equal	5 [V3-1]	Equal	Not compared
No (no "edit" rights)	PIC_UA43_ML4	Simatic S7	FW v2.8.6		Equal (04/12/2017 15...	2 [v3-1]	Equal	2 [v3-1]	Equal	Not compared
No (no "edit" rights)	PIC_UA47_AR4	Simatic S7	FW v2.8.6		Equal (04/12/2017 15...	2 [v3-1]	Equal	2 [v3-1]	Equal	Not compared
No (no "edit" rights)	PIC_UA47_MR4	Simatic S7	FW v2.8.6		Equal (04/12/2017 15...	2 [v3-1]	Equal	2 [v3-1]	Equal	Not compared
No (no "edit" rights)	PIC_UA63_AL6	Simatic S7	FW v2.8.6		Equal (04/12/2017 15...	3 [v3-1]	Equal	3 [v3-1]	Equal	Not compared
No (no "edit" rights)	PIC_UA63_ML6	Simatic S7	FW v2.8.6		Equal (04/12/2017 15...	3 [v3-1]	Equal	3 [v3-1]	Equal	Not compared
No (no "edit" rights)	PIC_UA67_AR6	Simatic S7	FW v2.8.6		Equal (04/12/2017 15...	3 [v3-1]	Equal	3 [v3-1]	Equal	Not compared
No (no "edit" rights)	PIC_UA67_MR6	Simatic S7	FW v2.8.6		Equal (04/12/2017 15...	3 [v3-1]	Equal	3 [v3-1]	Equal	Not compared
No (no "edit" rights)	PIC_UA83_AL8	Simatic S7	FW v2.8.6		Equal (07/12/2017 13...	3 [v3-1]	Equal	3 [v3-1]	Equal	Not compared
No (no "edit" rights)	PIC_UA83_ML8	Simatic S7	FW v2.8.6		Equal (07/12/2017 13...	3 [v301]	Equal	3 [v301]	Equal	Not compared
No (no "edit" rights)	PIC_UA83_XL8	Simatic S7	FW v2.8.6		Equal (04/12/2017 15...	2 [v3-1]	Equal	2 [v3-1]	Equal	Not compared
No (no "edit" rights)	PIC_UA87_AR8	Simatic S7	FW v2.8.6		Equal (04/12/2017 15...	2 [v3-1]	Equal	2 [v3-1]	Equal	Not compared
No (no "edit" rights)	PIC_UA87_MR8	Simatic S7	FW v2.8.6		Equal (04/12/2017 15...	3 [v3-1]	Equal	3 [v3-1]	Equal	Not compared
No (no "edit" rights)	PIC_UA87_XR8	Simatic S7	FW v2.8.6		Equal (15/01/2018 10...	5 [V3-1]	Equal	5 [V3-1]	Equal	Not compared
No (no "edit" rights)	PIC_UJ33_AL3	Simatic S7	FW v2.8.6		Equal (15/01/2018 10...	3 [v3-1]	Equal	3 [v3-1]	Equal	Not compared
No (no "edit" rights)	PIC_UJ33_AR3	Simatic S7	FW v2.8.6		Equal (15/01/2018 10...	3 [v3-1]	Equal	3 [v3-1]	Equal	Not compared
No (no "edit" rights)	PIC_UL14_AL1	Simatic S7	FW v2.8.6		Equal (15/01/2018 10...	3 [v3-1]	Equal	3 [v3-1]	Equal	Not compared
No (no "edit" rights)	PIC_UL14_LL1	Simatic S7	FW v2.8.6		Equal (15/01/2018 10...	3 [v3-1]	Equal	3 [v3-1]	Equal	Not compared
No (no "edit" rights)	PIC_UL14_XL1	Simatic S7	FW v2.8.6		Equal (15/01/2018 10...	3 [v3-1]	Equal	3 [v3-1]	Equal	Not compared
No (no "edit" rights)	PIC_UL557_LR5	Simatic S7	FW v2.8.6		Equal (04/12/2017 15...	3 [v3-1]	Equal	3 [v3-1]	Equal	Not compared
No (no "edit" rights)	PIC_UL557_XR5	Simatic S7	FW v2.8.6		Equal (04/04/2017 15...	2 [v3-1]	Equal	2 [v3-1]	Equal	Not compared
No (no "edit" rights)	PIC_USC55_AL5	Simatic S7	FW v2.8.6		Equal (04/04/2017 15...	3 [v3-1]	Equal	3 [v3-1]	Equal	Not compared
No (no "edit" rights)	PIC_USC55_LL5	Simatic S7	FW v2.8.6		Equal (04/04/2017 15...	3 [v3-1]	Equal	3 [v3-1]	Equal	Not compared
No (no "edit" rights)	PIC_USC55_XL5	Simatic S7	FW v2.8.6		Equal (04/04/2017 15...	2 [v3-1]	Equal	2 [v3-1]	Equal	Not compared
					Edited (04/12/2017 1...	3 [v3-1]	Equal	3 [v3-1]	Equal	Not compared



Summary of Activities

CIP.AL4 Faulty Power Supply

1 - CIP.UA43.AL4 Powering interlock controller for the long arc cryostat A34, even side
CFP_UA43_CIPAL4 DATA Connection OK

I/O Status | Powering | Monitoring | Params

PLC INPUTS

Local Power Supplies

ST_SUPPLY_PLC	ST_SUPPLY_5VBUS_1	ST_SUPPLY_5VELEC_1
ST_SUPPLY_24V_1	ST_SUPPLY_5VBUS_2	ST_SUPPLY_5VELEC_2
ST_SUPPLY_24V_2		

Cable Connect Signals

ST_CONNECT_CIPPA	ST_CONNECT_CIPPB3
ST_CONNECT_CIPPB1	ST_CONNECT_CIPPC
ST_CONNECT_CIPPB2	ST_CONNECT_CIPPS

AUG - UPS

ST_PWR_PERM_AUG	ST_PWR_PERM_UPS
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CRYO_MAINTAIN

ST_CRYO_COMM_ERROR	ST_CRYO_COMM_ENABLE
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CPLD Monitoring

ST_MATRIX_BIT_1	ST_MATRIX_BIT_5
ST_MATRIX_BIT_2	ST_MATRIX_BIT_6
ST_MATRIX_BIT_3	ST_MATRIX_BIT_7
ST_MATRIX_BIT_4	ST_MATRIX_BIT_8

ANYBUS Monitoring

ST_ERROR_ANY_1	ST_POWER_ANY_1
ST_ERROR_ANY_2	ST_POWER_ANY_2
ST_ERROR_ANY_3	ST_POWER_ANY_3

CIBU Interfaces

ST_LOOP_ESS_CIRCUITS	ST_BINFO_B1B2
ST_LOOP_AUX_CIRCUITS	ST_MATRIX

Failure

PLC OUTPUTS

CPLD addressing

CMD_A0	CMD_A3
CMD_A1	CMD_A4
CMD_A2	CMD_R_W

ANYBUS Reset

CMD_REBET_ANY_1
CMD_REBET_ANY_2
CMD_REBET_ANY_3

Signal Init		Give Multiple	Remove All	
Forced Mode	CMW server			Select

Summary of Activities

WinCC OA

- General maintenance:
 - Performance improvements.
 - QPS_OK Flickering (2nd trial).
 - **History buffer (PIC, WIC, QPS)**
(<https://its.cern.ch/jira/browse/ENS-20347>):

Time range changes after a query.	To be deployed
Page up/down bug.	To be deployed
Entity filter issue.	To be deployed
Export to excel CSV and print on user AFS folder.	Pending
Extend filter to multiple choice.	Pending

Commissioning after EYETS

- Commissioning without beam
 - Individual System tests for all PIC devices.
 - PIC – BIS Interface test.
- Commissioning during Machine Checkout
 - Beam Dump triggered by:
 - AUG
 - UPS
 - CRYO
 - POWERING_FAILURE
- Commissioning with beam
 - No need to perform any tests.
- Reference:
 - EDMS 896390 - LHC-OP-MPS-0005 (MPS Aspects of the Powering Interlock System Commissioning).

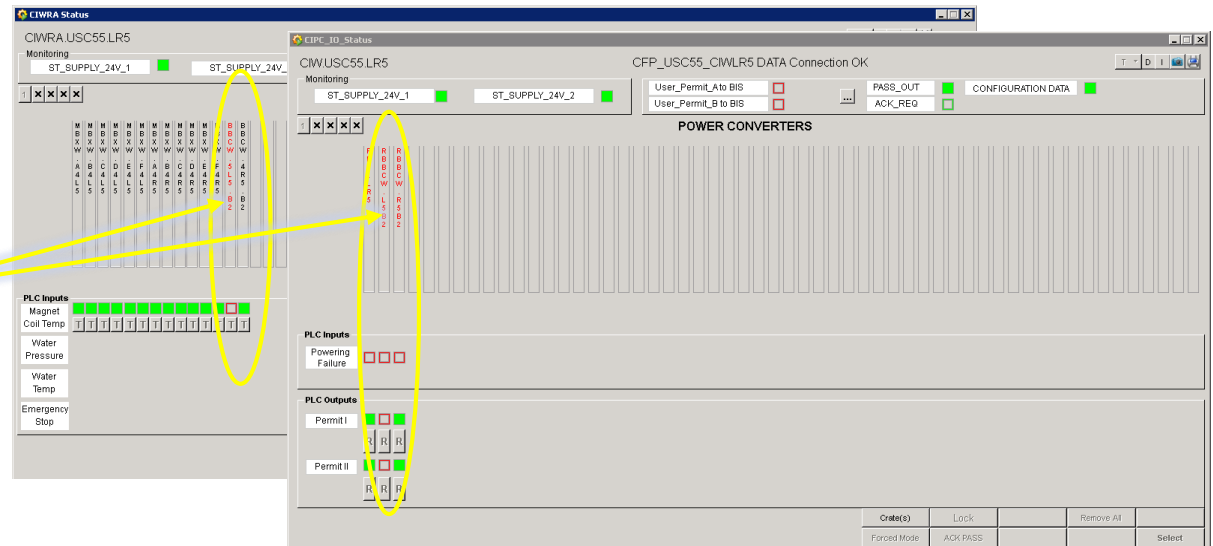
WIC

Warm Interlock Controller

Summary of Activities

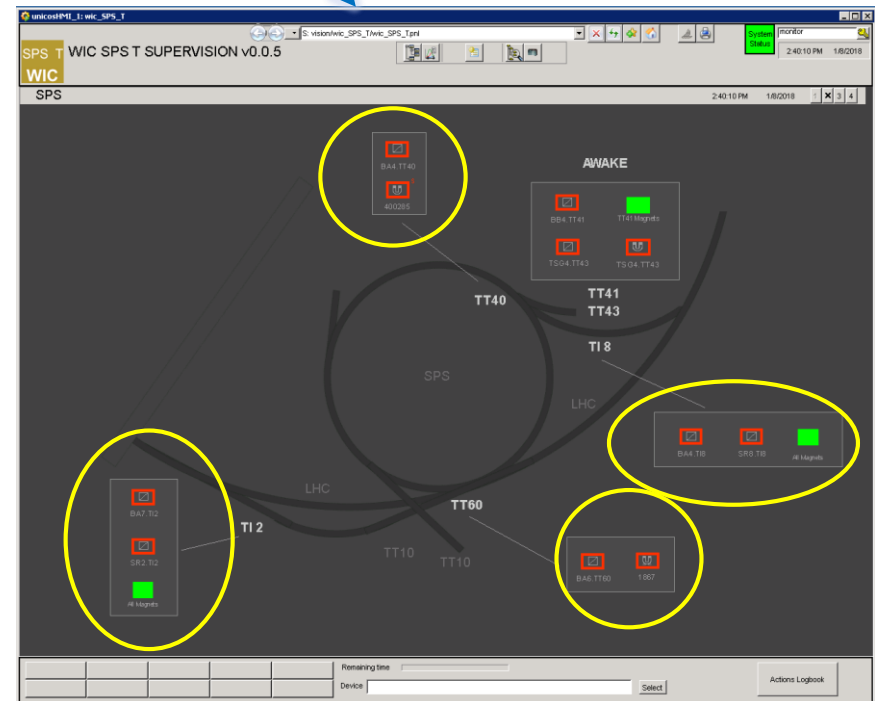
- LHC Point 1:
 - Add 2 input signals for the Beam-Beam Compensator Wires in L1 & R1 + 2 power converters (No changes on the “User_Permit_to_BIS” definition).
 - => Involves HW & SW modifications.
 - Same work as done in P5 during EYETS 16-17.
 - Full re-commissioning scheduled:
 - L1: Week 8.
 - R1: Week 10.

Example in P5



Summary of Activities

- LHC-SPS Transfer lines:
 - Upgrade to the latest “non-safety” generic code.
 - CPU Firmware upgraded
 - Move to a dedicated HMI (Ti2, Ti8, TT40, TT60).
 - **Done !**
 - TT41 was upgraded in Oct. 17.
- Full re-commissioning:
 - Magnet part: **Done !**
 - PC part t.b.d. in the CCC **with OP.**
 - Starting from 6th of March.
 - **BIS outputs tests.**



Investigation on TI2 (1)

- Sporadic communication losses with some PLC deported I/O Slaves.
- Happened during a week only in 2017:
 - Short period: from 13/11 to 20/11.
 - Had an impact on LHC operation twice (13/11 and 15/11)
 - External event ?

System	Start Time	End Time	OP Duration	State	Faulty Elemer	Description	AWG	Expert	R2E Status	Parent	Child Count
Machine Interlock Systems » Other	15-11-2017 12:05:32	15-11-2017 12:39:16	33min 44s	OP Ended	RMSI.L2B1	tripped in SB (FA); WIC problem ?	Requires review	Requires review	Not R2E related		0
Machine Interlock Systems » Other	13-11-2017 22:56:32	13-11-2017 23:03:26	06min 54s	OP Ended	MSI.L2B1	tripped during Stable beams due to a WIC problem in TI2	Requires review	Requires review	Not R2E related		0

- Same behaviour already observed over the past years.

Investigation on T12 (2)

- Analysis on T12 & T18 PROFIBUS-DP bus:
 - Measurements done.
 - Comparison with last year measurements analysis on-going.
- Hardware architecture similarities between TE-ABT and TE-MPE
 - Similar problems recently seen on the LBDS.
 - TE-ABT organised an audit with Siemens.
 - Waiting for the final report of the audit by end of February.
- JIRA issue: MAGINT-243

FMCM

Fast Magnet Current Monitor

Summary of Activities

- **No changes** of the FMCM firmware
- New SATURN converters installed on RD1.LR1/5 and RD34.LR3/7 during EYETS 2016/2017:
 - In 2017, **no dump** recorded for RD1.LR1/5, RD34.LR3/7 because of **electrical disturbances**.

Description	Status	Comments
Exchange of one unit with a brand new spare (if available !)	PENDING	TI2 or TI8 Transfer line
Inspection of all HV Box	W5	To complete missing data (divider values)

Re-commissioning

without beam

- For all FMCMs (12 in LHC and 14 in SPS-TLs): **Trigger, threshold validation (d/I) and propagation to BIS**, as described on the MPS document - [EDMS 896393](#).

4	S	For each FMCM, program a current step into the powering cycle (TL devices) or create an FGC_STATE fault on the power converter (LHC) and validate the correct triggering of the FMCM with the BIS ; optimize threshold if required with increasing beam intensity/energy (Note: The threshold is not dependent on the beam intensity/energy, but may for safety reasons be further decreased for high beam intensity).	BE/OP, TE/MPE
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Re-commissioning

with beam

- Trigger, threshold validation, propagation to BIS and verification of beam excursion and losses with **pilot beams at 450 GeV and 6.5 TeV** (EOF tests).

	Rep.	Action	Group(s) Responsible
1	S	<p>For each FMCM (or a selection in case of a short winter-stop;), program a current step into the powering cycle (or provoke an FGC_STATE fault) and validate the correct triggering of the FMCM with the BIS</p> <p>Determine the maximum beam excursion observed in the vacuum chambers of the TL/LHC and possible beam losses before the beam was dumped. These tests can be done as an end of fill (EOF) test.</p>	BE/OP, TE/MPE
2	N	<p>In case of relevant changes of optics or powering configurations potentially affecting the protection timescales and thresholds, the abovementioned test shall be repeated with the FMCM masked in order to establish a new reference and to confirm the beam dump to happen via BLMs in IR7.</p> <p>Determine the maximum beam excursion observed in the vacuum chambers of the TL/LHC and the reaction time of the BLM system (which ideally should trigger in IR7). These tests can be done as an end of fill (EOF) test, the interlocked BPMs in IR6 should be masked and the monitoring factor of a selected set of primary collimators in IR7 decreased in order to trigger the BLMs with the used pilot beam.</p>	BE/OP, TE/MPE



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