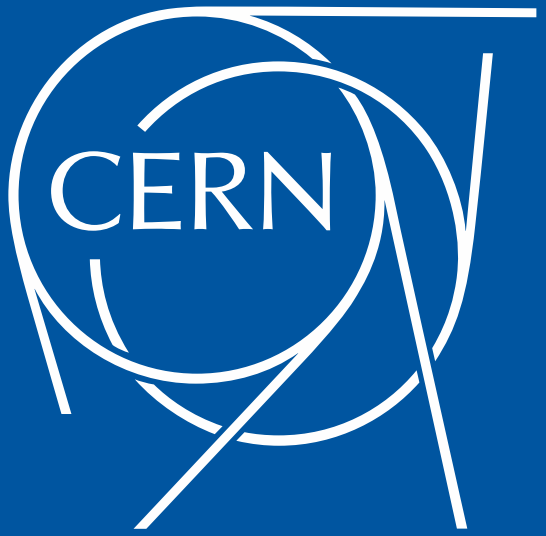

CERN

Session 2:
Preparation for the Powering Tests

M. Modena and D. Wollmann

Content and Remarks

Content:

2.1 MP3 **TWiki** webpage
2.2 Status of OLD docs/procedures
2.3 Powering Procedure (**PP**) and Tests Criteria
2.4 Analysis Manual (**AM**)
2.5 Circuits issues list
2.6 General interaction with other HWC actors: (M&M, SW developers, ELQA, EPC, EE, QPS,…)
2.7 Test Signature duties/rights
2.8 Open questions summary

Remarks:

- For many subjects we rise **questions** for discussion and (hopefully!) answers.
- *Exclusion*: the SW analysis tools (treated in the next Session).

2.1: MP3 TWiki Page

- The MP3 Twiki page was started in March 2013 *(main developer B. Auchmann)*.
  - Revealed as a very good choice in order to have:
  - An UNIQUE website to store, archive, keep update, share any kind of info about LHC magnets circuits, their tests and raising issues.
  - MP3 TWiki was perfectly in function at beginning of powering tests and from that moment it was daily used by MP3 to follow the activities. The tool is very friendly for edit/modify (widely use for AM writing!)
  - No doubt that TWiki page is an ADDED VALUE to MP3 activities and will be kept updated and further developed.

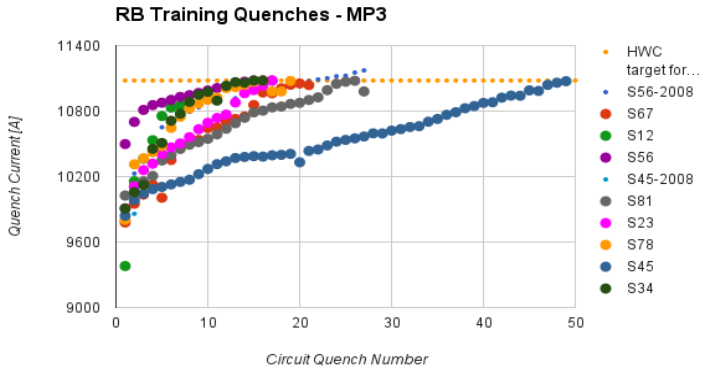
https://twiki.cern.ch/twiki/bin/view/MP3/WebHome

2.1: MP3 TWiki Page

LHC CIRCUITS
- MAIN DIPOLE
- MAIN QUADRUPOLE
- IT
- IPQ
- IPD
- 600 A EE
- 600 A no EE
- 600 A no EE crowbar
- 80-120 A
- 60 A
- WARM
- EXPERIMENTS

Data and database
Old MP3 site
eLogbook
MTF
Layout Database
Circuit modeling
Interesting Workshops
Timber
LHC page 1
LHC Design Report
APEX PM Database Viewer

Systems and equipment
Powering Interlock System
ELQA results webpage
Entities and signals naming
FGC settings
Power Converters
QPS
DFB & DSL
GIS Machine map
Risk analysis



Training quenches during HWC 2014-2015 occurring until I_PNO+100 A has been reached for the first time

Circuit	Status	#M Firm 1	#M Firm 2	#M Firm 3	#MQ Firm 1	#MQ Firm 2	#MQ Firm 3	#MQ total	#CQ total
RB.A12	11080 A reached	50	95	9	2	1	4	7	7
RB.A23	11080 A reached	56	58	40	0	1	15	16	16
RB.A34	11080 A reached	44	81	29	1	5	8	14	14
RB.A45	11080 A reached	48	44	62	0	3	48	51	49
RB.A56	11080 A reached	28	42	84	0	0	15	15	14
RB.A67	11080 A reached	57	36	61	0	1	20	21	20
RB.A78	11080 A reached	53	40	61	2	8	6	16	16
RB.A81	11080 A reached	64	24	66	0	3	26	29	26
	Total:	400	420	412	5	22	142	169	162

#M: Number of magnets in a sector.
#MQ: Number of magnet training quenches in a sector.
#CQ: Number of circuit quenches in a sector.
Note that #MQ can be larger than #CQ because in a few cases two magnets have a training quench at the same time.

Training quenches occurring after I_PNO+100 A was reached for the first time (so mainly at flat-top and during Run 2)

MP3 Team
- Members
- Meetings
- Tasks
- MP3 Recommendations
- MP3-OP
- MP3 review 28/4/2015

Circuit Information
- General info on circuits
- LHC sector layout
- Converter information
- Energy Extraction info
- ELQA info
- QPS info
- Electrical disturbances
- Summary of circuits with issues

Powering Tests
- HWC Coordination
- Daily HWC meetings
- HWC procedures and sequencer
- HWC training
- HWC before 2013
- 2013 7 TeV Powering test
- HWC 2014
- CCC support
- Analysis Manual
- Quench database

TWiki Tools
- TWiki editing guide
- Site Index
- Search
- Changes
- Notifications
- Statistics
- PDF Generator
- Preferences
- Circuit Browser
- Topic Template

2.1: MP3 TWiki Page

- MAIN QUADRUPOLE
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Risk analysis

The distribution of magnet assemblers (1=Alstom, 2=Ansaldo, 3=Noell) is given in MB-by_firm_run_1_and_2.xlsx (for Run 1 and Run 2).

Reception tests

The database of reception-test magnet training is available here.

QPS-IST 2014/2015: Quench Heater Discharges

The paths to the quench heater discharges of QPS-IST 2014/2015 can be found in the files: S12.MB, S12.MQ, S23.MB, S23.MQ, S34.MB, S34.MQ, S45.MB, S45.MQ, S56.MB, S56.MQ, S67.MB, S67.MQ, S78.MB, S78.MQ, S81.MB, S81.MQ, IPQ, IPD

Quench files

The following files contain quenches that occurred in the LHC since the start in 2008. For the moment the files mainly contain the quenches after LS1. The target is that all quenches during previous HWC campaigns and during Run 1 are also in.

In time there should be perfect correlation between the training quenches in the files below and the events flagged as "training quench" in APEX.

Blue values in the files below mean that the data are (or should be) calculated automatically from the contents of the other cells sometimes in combination with layout data.

The data should be ordered chronologically!!!!

After editing a file, you can quit without saving. Google will save it automatically.

Please do not modify the files too much (e.g. by using sorting etc.). Better copy-paste the values into a local excel file before manipulation.

Please first contact the MP3 before presenting these quench data in meetings/workshops/conferences/...!!!!!

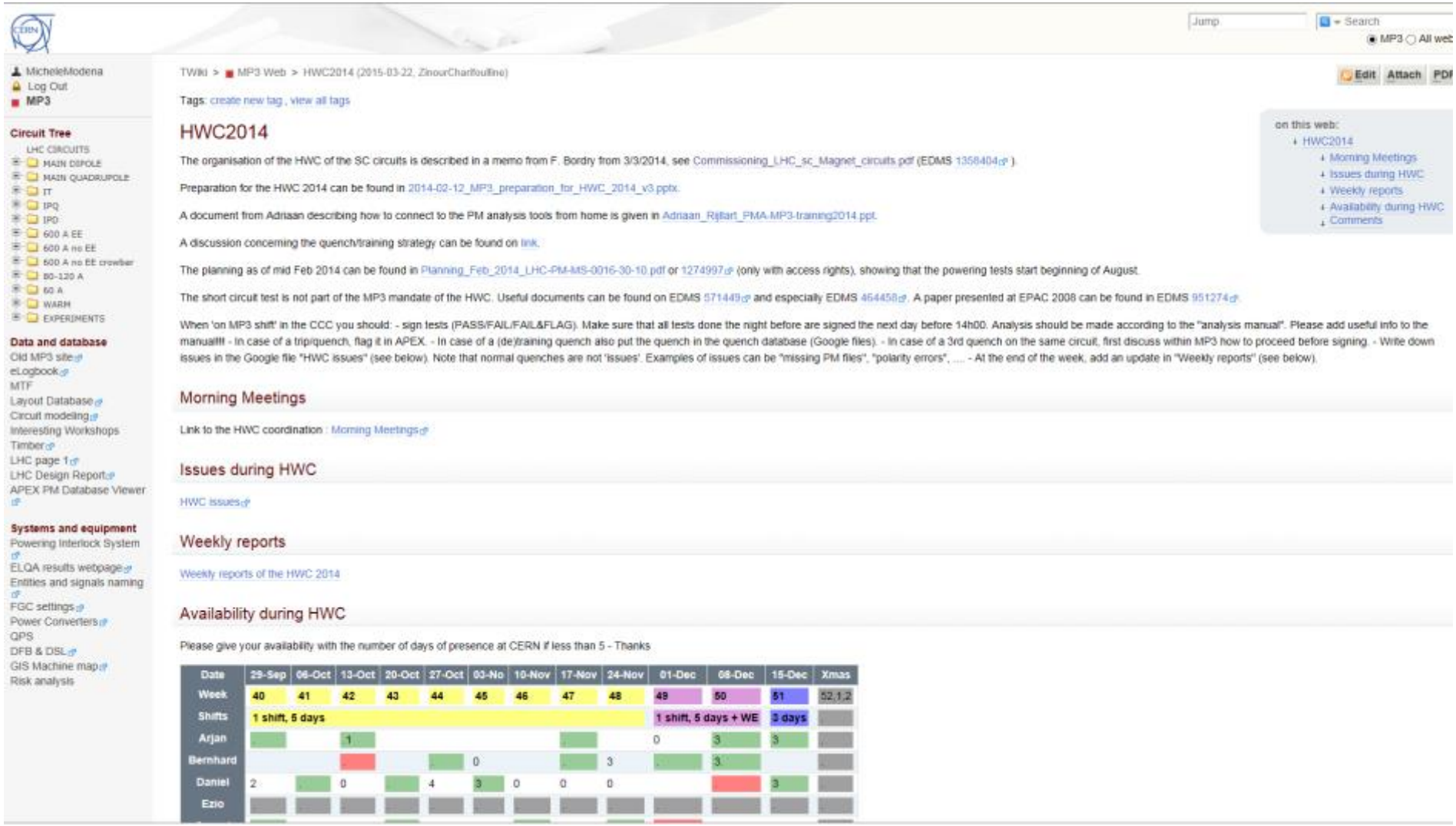
Circuit Type	Contents	Includes:	Number
60 A	training quenches	2008 to present	28
80-120 A	training quenches	2008 to present	102
600 A	training quenches	a few from 2008, 02/2013, 1/9/2014 to present	> 280
IPQ	all quenches incl. heater-induced	02/2013, 1/9/2014 to present	> 274
IPD	all quenches incl. heater-induced	2008 to present, minus heater-induced 2008-2013	43
IT mains	all quenches incl. heater-induced	02/2013, 1/9/2014 to present	4
RQ	all quenches incl. heater-induced	1/1/2008 to 19/8/2008 1/1/2009 to 3/12/2009	> 50
RB	all quenches incl. heater-induced	14/6/2007 to 3/11/2008 1/1/2009 to 18/2/2010 1/9/2014 to present The file has separate sheets for the 8 sectors	S12: 57 S23: 84 S34: >20 S45: >240 S56: 227 S67: 93 S78: >90 S81: 142

Concerning RB and RQ: Quench analysis results that are characteristic for the circuit are not included in the quench tables, but are (or will be) part of the analysis manual. These include:

- Earth current
- Maximum temperature and pressure in the arc
- EE dump voltage and maximum temperature
- EE switches response
- Current decay
- Converter voltage

Note also that heater analysis is (will be) done by an independent LabView tool and is therefor not included in these quench files.

2.1: MP3 TWiki Page



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MP3

Circuit Tree
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DFB & DSL
GIS Machine map
Risk analysis

TWiki > MP3 Web > HWC2014 (2015-03-22, ZinouarCharfoulline)

Edit Attach PDF

Tags: create new tag , view all tags

on this web:
- HWC2014
  - Morning Meetings
  - Issues during HWC
  - Weekly reports
  - Availability during HWC
  - Comments

HWC2014

The organisation of the HWC of the SC circuits is described in a memo from F. Bordry from 3/3/2014, see Commissioning_LHC_sc_Magnet_circuits.pdf (EDMS 1358404).

Preparation for the HWC 2014 can be found in 2014-02-12_MP3_preparation_for_HWC_2014_v3.pptx.

A document from Adriaan describing how to connect to the PM analysis tools from home is given in Adriaan_Rijllart_PMA-MP3-training2014.ppt.

A discussion concerning the quench/training strategy can be found on link.

The planning as of mid Feb 2014 can be found in Planning_Feb_2014_LHC-PM-MS-0016-30-10.pdf or 1274997 (only with access rights), showing that the powering tests start beginning of August.

The short circuit test is not part of the MP3 mandate of the HWC. Useful documents can be found on EDMS 571449 and especially EDMS 464458. A paper presented at EPAC 2008 can be found in EDMS 951274.

When 'on MP3 shift' in the CCC you should: - sign tests (PASS/FAIL/FAIL&FLAG). Make sure that all tests done the night before are signed the next day before 14h00. Analysis should be made according to the "analysis manual". Please add useful info to the manual!!! - In case of a tripquench, flag it in APEX. - In case of a (de)training quench also put the quench in the quench database (Google files). - In case of a 3rd quench on the same circuit, first discuss within MP3 how to proceed before signing. - Write down issues in the Google file "HWC issues" (see below). Note that normal quenches are not 'issues'. Examples of issues can be "missing PM files", "polarity errors", ... - At the end of the week, add an update in "Weekly reports" (see below).

Morning Meetings

Link to the HWC coordination : Morning Meetings

Issues during HWC

HWC issues

Weekly reports

Weekly reports of the HWC 2014

Availability during HWC

Please give your availability with the number of days of presence at CERN if less than 5 - Thanks

Date	29-Sep	06-Oct	13-Oct	20-Oct	27-Oct	03-No	10-Nov	17-Nov	24-Nov	01-Dec	08-Dec	15-Dec	Xmas
Week	40	41	42	43	44	45	46	47	48	49	50	51	52,1,2
Shifts	1 shift, 5 days									1 shift, 5 days + WE		3 days	
Arjan			1							0	3	3	
Bernhard						0			3		3		
Daniel	2		0		4	3	0	0	0			3	
Ezio													

2.1: MP3 TWiki Page

Statistics for MP3 Web

Month:	Topic views:	Topic saves:	File uploads:	Most popular topic views:	Top viewers:	Top contributors for topic save and uploads:
2015-04	1115 (122 unique users)	45 (11 unique users)	14 (8 unique users)	452 WebHome 142 MP3-OP 69 MP3review2015 54 Meetings 40 QuenchDatabase 40 SummaryIssues 25 HWC2014 22 RBA34 21 MAINDIPOLE 16 AnalysisManual	141 ArjanVerweij 103 ZinourCharifoulline 78 JeanPhilippeTock 75 SandrineLENAOUR 55 GerardWillering 55 IvanRomera 50 AndreasWagnerSecondary 46 BernhardAuchmann 45 PerHagen 42 DanielWollmann	29 ArjanVerweij 11 GerardWillering 3 DanielWollmann 3 ZinourCharifoulline 2 JeanPhilippeTock 2 BernhardAuchmann 2 FelixRodriguezMateos 2 SandrineLENAOUR 2 MateuszBednarek 2 IvanRomera
2015-03	5162 (236 unique users)	188 (10 unique users)	31 (6 unique users)	2655 WebHome 271 AnalysisManual 260 RBA34earthfailure 258 QuenchDatabase 163 Meetings 154 RBA34 140 SummaryIssues 111 HWC2014 91 Analysis_Manual_RB 79 MAINDIPOLE	479 GerardWillering 466 ZinourCharifoulline 428 ArjanVerweij 247 PerHagen 212 SandrineLENAOUR 204 GijsDeRijk 164 JeanPhilippeTock 160 LynEvans 157 MicheleModena 134 BernhardAuchmann	78 ArjanVerweij 64 ZinourCharifoulline 37 GerardWillering 14 DanielWollmann 8 MateuszBednarek 6 BernhardAuchmann 5 SandrineLENAOUR 5 PerHagen 1 MicheleModena 1 IvanRomera
2015-02	4885 (116 unique users)	286 (12 unique users)	58 (8 unique users)	2043 WebHome 462 AnalysisManual 396 QuenchDatabase 174 Analysis_Manual_RB 169 Meetings 145 Analysis_Manual_600A 142 HWC2014 133 Analysis_Manual_IPQ 107 SummaryIssues 91 Analysis_Manual_RQ	612 GerardWillering 569 ArjanVerweij 401 PerHagen 324 SandrineLENAOUR 288 ZinourCharifoulline 276 JeanPhilippeTock 224 BernhardAuchmann 215 AndreasWagnerSecondary 210 SandorFeher 134 MateuszBednarek	98 ArjanVerweij 86 GerardWillering 39 BernhardAuchmann 33 ZinourCharifoulline 29 DanielWollmann 28 MateuszBednarek 10 SandrineLENAOUR 6 IvanRomera 5 JeanPhilippeTock 4 MicheleModena

Comments / feedback?
(on TWiki page in general)

https://twiki.cern.ch/twiki/bin/view/MP3/WebHome

2.2: Status of OLD docs/procedures

- From a correct QA point of view we should check and UPDATE or put OBSOLETE all the (old) official EDMS docs & procedure for naming, checking, testing, magnet systems that are not used since long time. *Do we have to plan for this check/action?*

Some example of documents:

-EDMS 338035 Engineering Specification: *"GENERAL PARAMETERS FOR ENERGY EXTRACTION OF THE LHC SUPERCONDUCTING CIRCUITS"* (RELEASED)

-EDMS 355662 Eng. Spec.: *"THE ELECTRICAL CIRCUITS IN THE LHC REFERENCE DATABASE"* (RELEASED)

-EDMS 356568 Functional Specification: *"DESCRIPTION OF QPS SIGNALS IN LHC"* (APPROVAL CLOSED)

-EDMS 361532 Func. Spec.: *"POWERING SUBSECTORS"* (RELEASED)

-EDMS 536799 Func.l Spec.: *"NAMING OF QPS SIGNALS IN LHC"* (ENGINEERING CHECK)

-EDMS 717559 Test Proc.: *"THE COMMISSIONING OF THE HARDWARE IN THE LHC SECTORS: INDIVIDUAL SYSTEM TESTS OF 13 KA AND 600 A ENERGY EXTRACTION FACILITIES"* (RELEASED)

-EDMS 722413 Eng. Spec.: *"THE COMMISSIONING OF THE HARDWARE IN THE LHC SECTORS: FAILURE SCENARIOS FOR THE ELECTRICAL CIRCUITS"* (RELEASED)

-EDMS 1001985 Eng. Spec.: *"ACCESS AND POWERING CONDITIONS FOR THE SUPERCONDUCTING CIRCUITS IN LHC"* (RELEASED)

-EDMS 1012328 Eng. Spec.: *"TRANSITION FROM POWERING PHASE 1 TO POWERING PHASE 2 AND VICE VERSA"* (RELEASED)

2.3 Powering Procedures and Tests Criteria

Major review before HWC:

- update information
- coherent approach for all procedures (same chapter numbering, etc.)
- lots of info into Appendices to keep the main document compact.
- Removal of obsolete tests.

Circuit	EDMS	Status
Parameters	1375861	Version 1.1 released on 26/8/2014.
RB	874713	Version 5.0 released on 21/10/2014. Version 5.1
RQ	874714	Version 5.0 released on 21/10/2014. Version 5.1
IT	874886	Version 2.0 released on 2/12/2014.
IPQ	874884	Version 3.1 to be released, Jan 2015.
IPD	874885	Version 4.0 released on 21/8/2014.
600 A	874716	Version 5.0 released on 14/9/2014. Version 5.1
80 and 120 A	874722	Version 4.0 released on 25/8/2014.
60 A	874724	Version 4.1 to be released, Jan 2015
Powering of Group of Circuits (PGC)	916266	Version 1.0: Released.

https://twiki.cern.ch/twiki/bin/view/MP3/HWCProceduresInfo

New structure	Old Structure
Extended Introduction / Circuit and QPS signal description	Brief Introduction
Summary of tests including overview plot with test sequence **and test analysis matrix**	Summary of tests including overview plot with test sequence.
Detailed test description with graph, table for required analysis and criteria	Sequencer task for each test
Test sequence matrix (updated)	Test sequence matrix
Appendix: test parameters, sequencer tasks, MTF profile, …	Appendix: test parameters, circuit details, quench analysis, MTF profile, …

Example: RB - PLI3.A2 old versus new

12. TEST SEQUENCE PLI3 (@ I_INTERM_2)

12.1 **PLI3.A5**: CURRENT CYCLE TO I_INTERM_2

(combined with current lead verification)

IMPORTANT: Before this step is performed a time of 3-4 hours of preparation for the calorimetric measurements is needed. The cryogenic team should be warned.

This test is for checking the magnet and the Current Leads performance, as well as for calorimetric measurements

#	Action	Description	Parameters	Criteria
1	PC reset	Verify with CRYO that the sector has been prepared for calorimetric measurements.		
2	Snapshot	Confirm with the QPS operator that the 0A snapshot has been taken using both boards A and B and that the bus-bars detector is running.		
3	Flat-top at I_MIN_OP	Turn on the PC. Once in standby (I_MIN_OP), wait at least TIME_INTERM_1 and make sure the QPS multiple snapshots have been taken using both boards A and B. After waiting, reset the PC maximum absolute current error.		
4	Ramp to I_SM	Ramp the current to I_SM at DIDT_PNO and ACC_PNO.		
5	Extended flat-top at I_SM	Wait at least TIME_INTERM_2 and make sure the QPS multiple snapshots have been taken using both boards A and B.	R_bus R_mag	<10 e-9 Ω <50 e-9 Ω
6	**Holding point**	**Before continuing, MP3 and CRYO must give their permit.**	dT/dt all over the arc	<5mK/hr
7	Ramp to I_INTERM_2	Ramp the current to I_INTERM_2 at DIDT_PNO and ACC_PNO.		
8	Extended flat-top at I_INTERM_2	Reset the PC maximum earth current. Wait at least TIME_INTERM_2 and make sure the QPS multiple snapshots have been taken using both boards A and B. Confirm with Cryo that the calorimetric measurement has been performed. After waiting, acquire the PC maximum earth current.	I_EARTH_PLI3_A5	<I_EARTH_MAX
9	Ramp down to I_MIN_OP	Ramp the current to I_MIN_OP at DIDT_PNO and ACC_PNO.		
10	Flat-bottom at I_MIN_OP	Wait at least TIME_ZERO at I_MIN_OP. After waiting, acquire the PC maximum absolute current error.	I_ERR_PLI3_A5	< I_ERR_MAX
11	Put PC in stand-by	Put PC in stand-by		
12	Turn off the PC	Wait at least TIME_INTERM_2 and make sure the QPS multiple snapshots have been taken using both boards A and B. Confirm with Cryo that the calorimetric measurement has been performed.		

ONLINE Analysis by CL:
- Check of the stability of the 4 current leads in terms of valve opening, temperature, and resistive voltage, during flat-top for a duration of 1 hr.

Analysis by MP3:
- Splice resistance value resulting from electrical and calorimetric measurements.

OFFLINE Analysis by QPS:
- Indicate the splice resistance inside and outside magnets and the compensation fine tuning parameters

Required approvals from: MP3, CRYO and QPS/EE.

DATA TRANSFER TO MTF:

Resp.	Parameter	Unit	Analysis Source	Description
PC	I_EARTH_PLI3_A5	A	Online	Maximum earth current
PC	I_ERR_PLI3_A5	A	Online	Maximum error current

The offline data analyzed by QPS/EE will be transferred through an excel file to MTF; in particular, they will store:
- the bus-bar splice resistance from n-QPS (R_{bus});
- the internal splice resistance from n-QPS (R_{mag});
- the resistance from snapshot on board A (R_A);
- the resistance from snapshot on board B (R_B).

The offline calorimetric data analyzed by MP3/CRYO will be transferred through an excel file to MTF.

5.8 **TEST SEQUENCE PLI3** (@ I_INTERM_2)

Three tests are performed at this current level, which are summarised in Fig. 5.7.

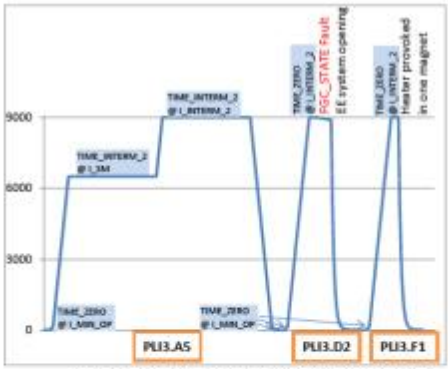

Figure 5.7: Power cycles during the PLI3 test sequence.

5.8.1 **PLI3.A2 OR PLI3.A5**: CURRENT CYCLE TO I_INTERM_2

PLI3.A2 is a simple current cycle at I_INTERM_2 during TIME_INTERM_2, while PLI3.A5 is a current cycle with 2 current levels (I_SM, I_INTERM_2) during TIME_INTERM_2 each. PLI3.A5 can be performed with calorimetric measurement (original purpose). In case of calorimetric measurement, the cryogenic cooling must be stable and maintained constant during the whole cycle. The aim of this test is to check the performance of the current leads and also the splices resistance, and, in case of calorimetric measurements, to detect abnormal heating in the magnets environment.

The current to earth and the current error from the power convertor are checked during the sequence.

The required analysis and signatures are listed below.

Responsible	Type of analysis	Criterion
	Automatic analysis on earth current and error current	I_EARTH_PLI3_A5 < I_EARTH_MAX I_ERR_PLI3_A5 < I_ERR_MAX
MP3	Splice signals	R_bus<10 nOhm R_mag<20 nOhm
	Current lead	46 < TT891A < 54K
	Calorimetric (if done)	dT/dt (TT821)< 5 mK/hr

Fine tuning of compensation parameters can be also performed by the QPS team

- Improved readability
- Visualization of powering cycle for each test
- Summary table with responsible team, required analysis and criteria

2.3 Powering Procedures: Comments / Questions / Discussion

- Only partially approved sources for QPS signal description available → updates/corrections required?!
- Little feedback from outside MP3 during approval process.
- Detailed review of sequencer tasks by M&M.
- Update in January 2015 after first experiences with HWC (e.g. update of responsible teams → signatures).
- Do we release **new (corrected) versions** after HWC?
- Do we need to **add extra tests** to early detect wrong signal polarities, cabling issues, mismatch of magnet and signal namings, … ?
- Should we add tests for combined powering of RCO/RCD?
- Should the PGC tests be added to the PP of each circuit?
- Should PIC2 tests be re-integrated into PP test procedure?

2.4 Analysis Manual

- Main **support for MP3-CCC** team.
- Step-by-step **description**s of analysis to be performed incl. screen shots → **evolved during HWC**.
- Helpful tool for fast **update and distribution** of adjustments/updates in analysis!
- **Clean-up required to maintain future usability** and to assure full coherence with quench Google files data requirements!
- **Complement of PGC** section!
- Review required for **QPS analysis for PIC2** (automation/PIC module?)?!
- Review criteria for **EE PM analysis module** → automatic analysis often failed but MP3 passed the tests nevertheless.

https://twiki.cern.ch/twiki/bin/view/MP3/AnalysisManual

Analysis_Manual_600A

The following types of analysis have to be performed:

Test	PC analysis	QPS analysis	EE analysis	Splice analysis	Leads analysis	Quench analysis
PCC	PC	MP3	-	-	-	-
PIC2	-	MP3	MP3	-	-	-
PCS	-	MP3	-	MP3	MP3	-
PLI3.b1	-	-	MP3 after EE ok	-	-	-
PNO.d3	PC	-	-	-	-	MP3 *
PNO.b1	-	-	MP3 after EE ok	-	-	MP3 *
PNO.a3	-	MP3	-	MP3	MP3	MP3 *
PNO.x1	-	-	-	-	-	MP3 *

*** Only in case of a quench**

2.5 Circuits issues list

- We have to set a unique list of issues for sharing and follow up (ex. already in Twiki we have one complete list (i.e. summary of "official issues" on circuits) + another in "logbook style" following the popping up of +/- important items and issues during HWC)
- HWC shows that this list must be agreed and shared with EIC, and others HWC actors, for comment, actions tracking, resolution → maybe other tool more appropriate?

https://twiki.cern.ch/twiki/bin/view/MP3/SummaryIssues
Link to Google doc with HWC issues

HWC issues

File Edit View Insert Format Data Tools Add-ons Help View only

	A	B	C	D	E	F
1	Circuit Name	Date	Time	Description of the issue	Action	Resolved
76	RB.A56	24.01.2015	15:17:00	Voltage across dump resistors too low: 1.5 and 3 V instead of 7.5 V	mail sent to Knud	treated by MPE
77	RQF.A56	24.01.2015	17:45:00	One U_RES_SPLICE signal (B11R5) goes up to -1.6 mV during the ramp	mail sent to Reiner, Jens and MP3	compensation factors nee to be updated for the segment of the QD/QF circuit that is in the odd point (due to the relocation of the short circuit)
78	RQ10.R6	24.01.2015	12:04:00	One board seems to be dead on lead 2 U_RES of RQ10.R6	mail sent to Reiner, Jens and MP3	
79	RSD1.A56B2, ROF.	24.01.2015	9:19:52	I_DCCT signal flips its sign at the nominal current i.e. it reads +600A instead of -600A. This creates a high dI/dt spike. Is this behavior normal?		according to Reiner this issue does not affect the protection. Boards will be upgraded in the future so there is no point to waste time on fixing this issue now.
80	RCBXH/V1.L2	28.01.2015	13:40:18	Timestamp QPS PM is 23 minutes wrong. In the test of yesterday it was OK.	Mail sent to Reiner	
81	RQTF.A23B2	28.01.2015	21:18:54	Timing of signals in the QPS PM file not corresponding with PM time stamp and both boards have 75 ms difference	Mail sent to Reinera and Jens. Failed test.	
82	RCBCV5.R2B1	02.02.2015	20h18:51	Offset in V_meas of PC -80 mV, which is higher than the maximum 50 mV offset. Other parameters are OK.	Mail sent to Valerie. Failed and flagged.	
83	RB.A56	03.02.2015	20:33:50			
84	RCBXH1.R8	07.02.2015	8:23:25	PCS, current lead temperature drops to 290 K < 293 K.	Mail sent to Antonio, failed and flagged.	Sandor confirms this is normal and procedure will be updated. Signed passed.
85	RSD2.A78B2	13.02.2015	19:20			
86						

2.6: INTERACTION with other HWC systems/actors (1/2). FIRST thoughts (some points will be more developed in Section3 and 4)

a. **M&M:** the reference persons for the HWC follow-up. Interaction quite smooth. Some questions could arise about the follow-up of the open issues (*refer to previous point on "Circuit issues list"*).

b. **SW Developers**: Their reaction time to signalized incorrect functioning or setting problems is/was very fast! Of course the best would be to have all SW tool available and debugged in advance to the HWC… (*refer to next Session 3)*.

c. **ELQA**: The interaction was very good (also due to active presence in MP3). In general is no a direct interaction MP3/ELQA tests activities (standard ELQA come before powering tests, and for any problems they come after the tests).

d. **EPC**: The interaction was smooth since they are also strongly present in the HWC keeping also a signature right.

e. **CRG**: Much less problems compare to the past, but the cooling of the inner triplets current leads shown that situation can be ameliorated.

2.6: INTERACTION with other HWC systems/actors (1/2). FIRST thoughts (some points will be more developed in Section3 and 4)

e. **EE**: A new powerful analysis tool for quick and precise analysis of the EE systems was released during HWC to. Thresholds setting of the tool is not yet completely set. (*This aspect need to be solved, refer to next Sessions 3 and 4)*

f. **QPS**: The most impacting interaction. The HWC has suffered from not enough debugging time for the new QPS before the starting of the powering tests. Lesson to learn for future: *(will be deeply treated in Session 4!)*

g. ***PIC:*** Interaction was very good good (also due to active presence in MP3).

2.7: Test signatures duties/rights

- The signature policy was changed just before and during the HWC (ex. EE). This seems was not optimized, some questions still open. *Do we have to revise this policy?*

  If not, we need a correct and sufficient AM development to keep the signature in MP3.

2.7: Tests signatures Duties / Rights

Test	PIC analysis	QPS analysis	Discharge analysis and waveform	Earth & error current analysis	FWT analysis	EE analysis	V feelers analysis	Splice analysis	Symm quench	Quench analysis	DFB analysis
PIC1	PIC	MP3	-	-	-	-	-	-	-	-	-
PCC	-	-	PC	-	-	-	-	-	-	-	-
PQC	-	-	-	-	-	-	-	-	-	-	-
PIC2	PIC	MP3	-	-	-	MP3	-	-	-	-	-
PLI1.a2	-	-	-	Online	-	-	-	(MP3**)	-	-	-
PLI1.b2	-	-	PC	PC	-	MP3	(MP3***)	(MP3**)	-	-	-
PLI1.d2	-	-	PC	PC	-	-	-	(MP3**)	-	-	-
PLI2.s1	-	-	-	Online	-	-	-	MP3	-	-	-
PLI2.b2	-	-	PC	Online	PC	MP3	(MP3***)	(MP3**)	-	-	-
PLI2.e2	-	-	PC	Online	-	-	-	-	-	-	-
PLI2_f1 on RB	-	-	PC	Online	PC	MP3	(MP3***)	(MP3**)	-	MP3	-
PLIM_b2 on RB	-	-	PC	PC	PC	MP3	(MP3***)	(MP3**)	MP3	-	-
PLIS_s2 on RB	-	-	-	Online	-	-	-	MP3	-	-	-
PLI3.a5	-	-	-	online	-	-	-	MP3	-	-	MP3
PLI3.d2	-	-	PC	PC	PC	MP3	(MP3***)	(MP3**)	-	-	-
PLI3.f1	-	-	PC	PC	PC	MP3	(MP3***)	(MP3**)	MP3	MP3	-
PNO_b2_on_RB RB quench Analysis	-	-	PC	online	PC	MP3	(MP3***)	(MP3**)	MP3	MP3*	-
PNO.a6	-	-	-	online	-	-	-	MP3	-	MP3*	MP3

2.8: OPEN QUESTIONS Summary

Twiki webpage:

- Comments / feedback?

Status of OLD docs/procedures:

- Do we have to plan a cleaning actions? (i.e. put them in OBSOLETE status)

Powering Procedures:

- Do we release new (corrected) versions after HWC?
- Do we need to add in PP extra tests to early detect wrong signal polarities, cabling issues, mismatch of magnet and signal namings, … ?
- Should we add combined powering RCO/RCD?
- Should the PGC tests be added to the PP of each circuit?
- Should PIC2 tests be re-integrated into PP test procedure?

Circuits issues list:

- Define an unique list for sharing info and tracking actions

Test signatures duties/rights:

- Signature policy should be revised?

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