LHC Hardware Commissioning

Documentation on Powering Tests

MPP, kick-off meeting
Sept 21st 2006

frm

CERN
CH-1211 Geneva 23
Switzerland

the **Large Hadron Collider** project

LHC Project Document No.
LHC-D-HCP-0001 rev 1.0

CERN Div./Group or Supplier/Contractor Document No.
AB/AT/TS

EDMS Document No.
477145

Date: 2004-09-29

Engineering Specification

RELEASED

GENERAL PROCEDURE FOR THE COMMISSIONING OF THE ELECTRICAL CIRCUITS OF A SECTOR

Abstract

This document describes the sequence of the steps which lead to the commissioning of the electrical circuits of each sector. It gives the backbone of the general procedures and refers to more detailed documents which in turn describe the individual system tests and hardware commissioning procedures.

CERN
CH-1211 Geneva 23
Switzerland

the **Large Hadron Collider** project

LHC Project Document No.
LHC-D-HCP-0003 rev 1.0

CERN Div./Group or Supplier/Contractor Document No.
AB/AT/TS

EDMS Document No.
519716

Date: 2006-07-05

RELEASED

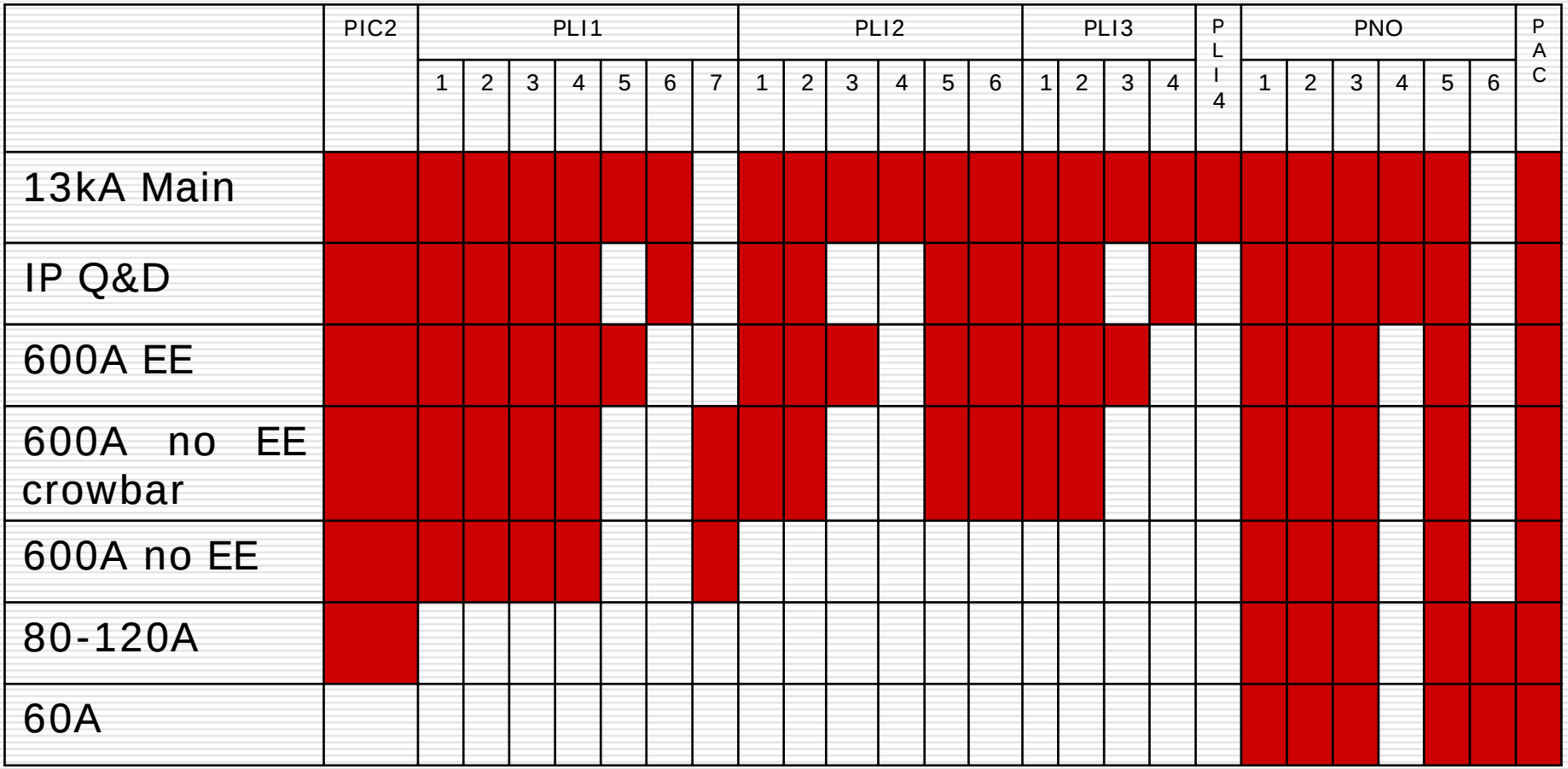
Hardware Commissioning Procedure

THE COMMISSIONING OF THE HARDWARE IN THE LHC SECTORS

POWERING OF THE SUPERCONDUCTING CIRCUITS OF A SECTOR UP TO NOMINAL CURRENT

Abstract

This document describes the sequence of the steps which lead to the powering of the superconducting circuits of a sector to nominal current. It covers the phases after the connection of the power cables to the current leads up to the powering in unison of all the circuits of a sector to nominal current.


PIC2
PLI1
1 2 3 4 5 6 7
PLI2
1 2 3 4 5 6
PLI3
1 2 3 4
PLI4
PNO
1 2 3 4 5 6
PAC
13kA Main
IP Q&D
600A EE
600A no EE crowbar
600A no EE
80-120A
60A

CERN
CH-1211 Geneva 23
Switzerland

the **Large Hadron Collider** project

LHC Project Document No.
LHC-D-HCP-0010 rev 0.1

CERN Div./Group or Supplier/Contractor Document No.
TS

EDMS Document No.
758068

Date: 2006-07-20

IN WORK

Hardware Commissioning Procedure

THE COMMISSIONING OF THE HARDWARE IN THE LHC SECTORS

POWERING STRATEGIES FOR THE COMMISSIONING OF THE SUPERCONDUCTING CIRCUITS IN SECTORS 7-8 AND 8-1

Abstract

The present document describes the schedule of the activities which lead to the powering of the superconducting circuits of the LHC sectors 7-8 and 8-1. After specifying the superconducting electrical circuits present in sectors 7-8 and 8-1 together with the commissioning procedures required by each one, the commissioning strategy is defined and the detailed schedule (sets of the day) presented taking into consideration the constraints given by the different subsystem responsible (e.g. power converters, magnets, DFBs, etc.).

CERN
CH-1211 Geneva 23
Switzerland

the **Large Hadron Collider** project

LHC Project Document No.
LHC-D-HCP-0004 rev 1.0

CERN Div./Group or Supplier/Contractor Document No.
AB/AT/TS

EDMS Document No.
531773

Date: 2006-07-06

RELEASED

Hardware Commissioning Procedure

THE COMMISSIONING OF THE HARDWARE IN THE LHC SECTORS

THE COMMISSIONING OF THE INNER TRIPLET REGION

Abstract

This document describes the sequence of the steps which lead to the commissioning of **the complete inner triplet**. It gives the backbone of the general procedures and refers to more detailed documents associated to the different systems, which in turn describe the individual system tests and the hardware commissioning procedures.

CERN
CH-1211 Geneva 23
Switzerland

the **Large Hadron Collider** project

LHC Project Document No.
LHC-MW-HCP-0002 rev.1.0

CERN Div./Group or Supplier/Contractor Document No.
AB/AT/TS

EDMS Document No.
573115

Date: 2005-07-13

IN WORK

Test Procedure

THE COMMISSIONING OF THE HARDWARE IN THE LHC SECTORS

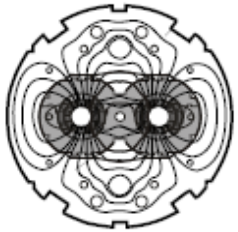
GENERAL PROCEDURE FOR THE COMMISSIONING OF THE WARM ELECTRICAL CIRCUITS

Abstract

This document describes the set of tests which will be carried-out to condition and validate for operation all **the components of the electrical circuits for the normal conducting magnets.**

These tests also include the commissioning of the controls, the timing and interlock system (WIC).

CERN
CH-1211 Geneva 23
Switzerland



the
Large
Hadron
Collider
project

LHC Project Document No.
LHC-D-HCP-0011 rev 0.1

CERN Div./Group or Supplier/Contractor Document No.
TS / AB / AT

EDMS Document No.
766220

Date: 2006-08-11

IN WORK

Hardware Commissioning Procedure

THE COMMISSIONING OF THE HARDWARE IN THE LHC SECTORS

SPECIFICATIONS OF THE POST-MORTEM ANALYSIS TOOLS FOR THE MAIN EQUIPMENT OF THE LHC SUPERCONDUCTING CIRCUITS

Abstract

This document describes the tools required by the power converters, the powering interlock and the quench protection systems for managing and analysing the post-mortem data.

CERN
CH-1211 Geneva 23
Switzerland

the **Large Hadron Collider** project

LHC Project Document No.
LHC-D-HCP-0012 rev 0.1

CERN Div./Group or Supplier/Contractor Document No.
TS / AB / AT

EDMS Document No.
766988

Date: 2006-08-16

IN WORK

Hardware Commissioning Procedure

THE COMMISSIONING OF THE HARDWARE IN THE LHC SECTORS

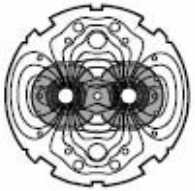
SPECIFICATION OF THE POST-MORTEM GLOBAL ANALYSIS TOOLS FOR THE LHC SUPERCONDUCTING CIRCUITS

Abstract

After a failure during the operation or the commissioning of the LHC, as well as following every test carried out during the so-called powering tests of the superconducting circuits, a coherent set of post-mortem information will be required from the various sub-systems involved in the event to analyse de causes of the failure or to evaluate the results of the test.

As a prolongation of the document [1] describing the specifications for the Post-Mortem analysis tools necessary to each main system alone (i.e. quench protection, power converters and PIC), this document describes the specifications for the post-mortem tool needed for the so-called global analysis of the superconducting circuits.

CERN
CH-1211 Geneva 23
Switzerland



the
Large Hadron Collider
project

LHC Project Document No.
LHC-D-ES-0006 rev 1.0

CERN Div./Group or Supplier/Contractor Document No.
AB/AT/TS

EDMS Document No.
722413

Date: 2006-07-20

RELEASED

Engineering Specification

THE COMMISSIONING OF THE HARDWARE IN THE LHC SECTORS

FAILURE SCENARIOS FOR THE ELECTRICAL CIRCUITS

Abstract

This document describes the failure scenarios for the Electrical Circuits which are relevant during the Hardware Commissioning. The objective is to identify show stoppers and define the strategies to repair, recover or do with them.

Documents existing at present

- Powering
  - General procedure
  - Powering to nominal of sc magnet circuits
  - Powering to nominal of resistive magnet circuits
  - Strategies (for optimizing durations)
  - Inner triplets
- Post-Mortem specifications
  - Per system (QPS, PIC, converters)
  - Global Analysis
- Failure scenarios
  - Electrical circuits (DC)