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## Input from:

1. *MPS Aspects of the Beam Loss Monitor System Commissioning*  
LHC-OP-MPS-0009 v.3      EDMS Id: 896394 v.3  
**Date: 2010-01-07**
  - Describes the tests to verify the correct functioning of the MP functionalities of the BLM system: “**Tests of the tests**”
2. MPS tracking tool webpage
  - In principle: No changes from what was done at the end of run 1

# But ...

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- Few tests have been done differently than described in the 2010 document  
→ update
- Several tests were decided not to be necessary at 2012 start-up and that they shall be taken out of the new document
- Where all tests done as described in the document?
  - Direct Dump BLMs were not tested (even though reported tested)?
  - Reaction time test at 7 TeV, optics change
  - Source test not done during each shut-down
- Take out the quench tests
- Update the introduction to reflect system changes
- Write a separate document for the “blind-out” systems
- Add SIS BLM HV test
  - move back to higher test frequency
- A number of tests are now executed automatically (sanity checks, cron tasks)
  - Need to verify that they are indeed executed

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- Better define the required repetition of the tests

- Before

N	Not to be repeated
S	To be repeated after every Shutdown
P	Periodical repetition required, like 1 x per month; details to be defined in text
O	To be repeated when LHC optics is changed
X	To be repeated when crossing scheme is changed

- Add (R – relevant repairs):

- F-TC Update of firmware of Threshold comparator
    - F-CF Update of firmware of front end card
    - F-CS Update of firmware of combiner card

# Test threshold and reaction time

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- Fast failure scenarios with low intensity beams to verify that BLM thresholds and reaction times are adequate. **The scenarios that must be tested include:**
  - Powering failure of RD1.LR1 and/or RD1.LR5.
  - Powering failure of selected normal-conducting quadrupoles in IR3 and/or IR7.
  - Powering failure of separation dipoles in IR3 and/or IR7.
- The tests must be performed **at start-up at injection energy and at physics energy.** They must be **repeated for RD1.LR1 and RD1.LR5** when the **beta squeezing is reduced significantly.**
  - A powering failure is initiated on the selected circuit. Any FMCM or powering interlock must be masked to ensure that the BLM system will see the beam loss as first protection system.
  - The post-mortem data is analyzed to determine the losses, the beam intensity, beam position at the moment when the BLM system removed its USER\_PERMIT and at the moment when the beam was dumped.
- In 2012: not done at 7 TeV.
  - done at 450 GeV? Could not find the logbook entry (wrong link)

# Direct Dump BLM

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- Test interface of direct BLMs with the beam dumping system (same test as 7.3.4 of [1]).
- Reduce the voltage setting of the abort threshold.
- Dump the injected beam on the collimator TCDQ and TCSG (with local bump). The threshold must have been lowered sufficiently, to provoke a beam dump request.
  - Eduardo: probably already probe bunch will trigger with current thresholds. Possible to disable adjacent standard BLMs?
- Record the beam dump.
- This test must be repeated for each beam and for both TCDQ and TCSG.
- From the amount of lost beam and the BLM reading, deduce the nominal threshold setting.
- Are there variations with respect to the impact conditions?
- Measure delay between the time where the loss signal exceeds the threshold and the time of the beam dump (time stamps in logging DB).

# **Not necessary. in the new version of the MPS checks will be deprecated.**

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1)

10pA signal monitoring (BLM test 712), acquisition chain test via 10pA test signal (one count within 100 s).

Test that the limits for “test OK” are correct: reduce and increase bias voltage below and above threshold (verify that the test fails and that the USER\_PERMIT is to FALSE).

## **Laboratory test on one card for each firmware.**

2)

100pA signal test (BLM test 711). The bias current is increased by 100 pA and the 1.3 second running sum is measured and checked.

1) Test the functionality of the T1 and T2 counting (verify that warning issued and USER\_PERMIT set to FALSE).

To be applied to all crates.

2) Verify that the test can be failed (by artificially increasing the bias current).

Laboratory test on one card for each firmware.

## **Not necessary. in the new version of the MPS checks will be deprecated.**

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3)

EMC test (BLM test 730) based on the 40ms and 1.3s running sums.

Observe noise level.

Switch on/off possible interference sources (motors, kickers, PCs ...).

**To be verified for every ionization chamber.**

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Comment 2012: A new process has been added from this year on the relevant front end computers to monitor the CISV behaviour.

The experts have have monitor for long period of times the correct reception and decoding of the energy information.

For test:

- Beam Energy Reception test (BLM test 350)
- Disconnect CISV input cable (observe error in toggle bit) and verify that energy is set to FFFF (max. energy).
- Disconnect CISV output cable (observe lost packets) and verify that energy is set to FFFF (max. energy).
- **To be done for every BLECS.**