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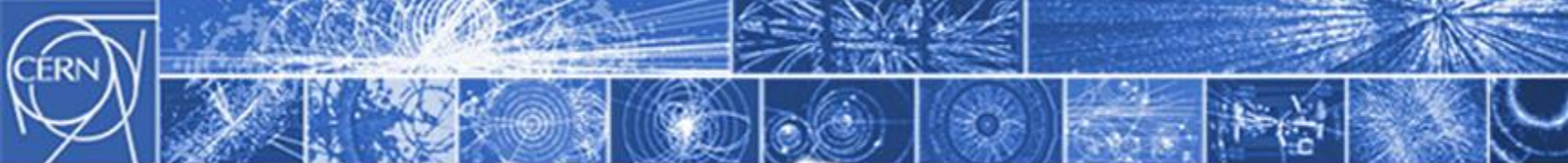17/03/2017

Beam Interlock System
MPS EYETS 2016-2017

MPS COMMISSIONING PROCEDURE

MPS Aspects of the Beam Interlock System Commissioning

List of the foreseen BIS tests:

LHC BIS optical fibres measurement campaign

All the optical fibres involved in the Beam Permit loops have to be verified

Hardware commissioning

(Prior to any MPS test, the BIS IST have been validated)

Test A – Test links from User Systems to BIS

Test B – Test links from Software Interlock System to BIS

Test C – Test the Setup Beam Flag transmission through the GMT

Test D – Test links from BIS to Beam Dump

Test E – Test links from (LHC-ring) BIS to Injection Interlock System

Machine Checkout

Execute the BIS Pre-operational Checks => no error must be received

Provoke the generation of a Dump event and check coherency BIS IPOC results

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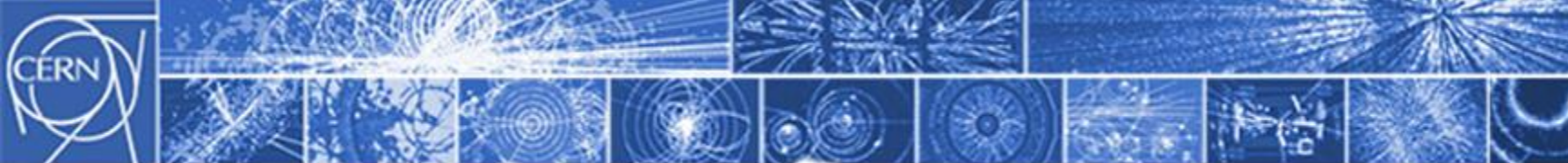
LHC BIS optical fibres measurement campaign

Similar measurement campaign has been performed in 2011 during a Technical Stop and in 2014 after LS1.

The goal of these measurements are twofold:

- Measure the optical power margin on each link (the maximum attenuation allowed before loosing the Beam Permit signal). In case of low power margin, the optical components of the BIS are exchanged (preventive maintenance)

- Measure the optical attenuation on each fibre. These figures are compared with the previous campaigns results and the initial attenuation values provided by EN/EL. In case of large attenuation EN/EL will be informed and shall take the necessary actions

This measurement campaign acts on the BIS availability only
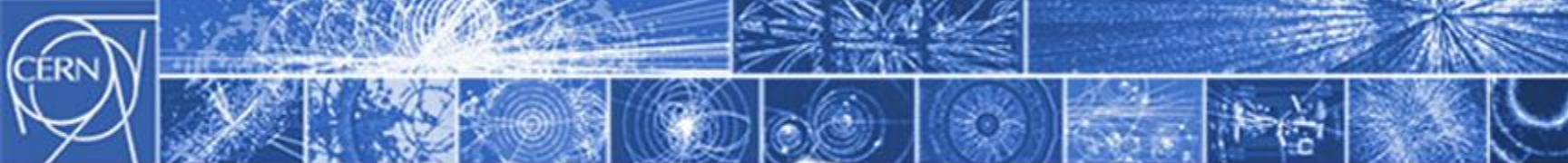
Hardware commissioning; TEST A consideration (slide 1):

*(**Test A** – Tests links from User Systems to BIS)*

Users with automatic test method

System Name	Connections(*)	Automatic test mode
Collimators	36	Yes
Powering Interlock Controllers	32	Yes
Vacuum	30	Yes
Beam Loss Monitor System	16	Yes
Fast Magnet Current Change Monitor	12	Yes
Warm Magnet Interlocks	8	Yes

The automatic tests are covering 70 % of the LHC BIS User connections

For these Users the connection between the User System electronic and the BIS is automatically checked

➢ The equipment owner is responsible of the procedure and the execution of these tests, except for the BLM's (exceptionally for this EYETS), the BIS team will manage these tests

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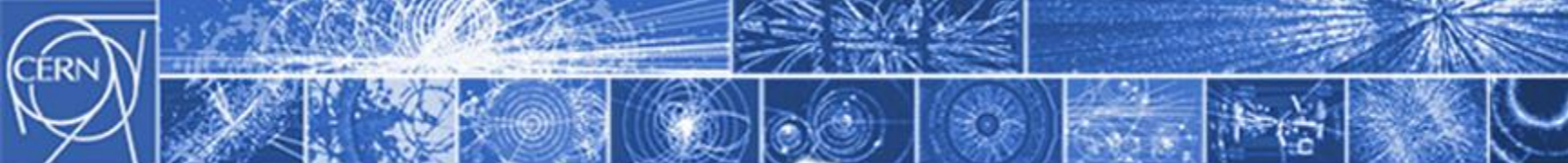
Hardware commissioning; TEST A consideration (slide 2):
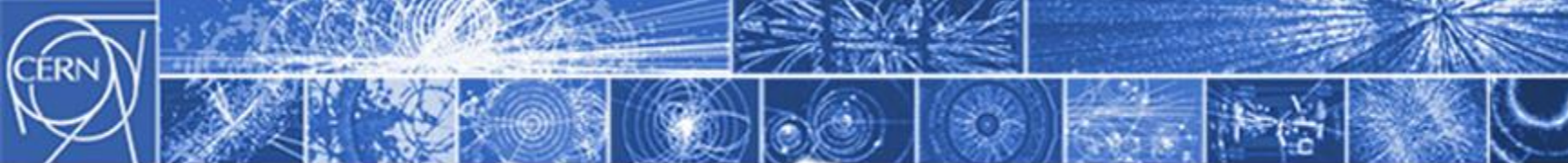
Users without automatic test method

For these Users, there is no systematic test.
All equipment owners have been contacted in January ; they have been asked to inform the BIS team in case of modification of their systems.

Currently the following User System connections must be (re)validated:
- Cristal collimator in TZ76 (new connection => full hardware test)
- BTV in TZ76 (BIS channel inputs have changed => full hardware test)
- All LHC WIC connection (New software deployed => software test only)
- Collimator in IR5 (new wire collimator installed => software test only)
- RF Faraday Cages (New software deployed => software test only)

All these tests will be performed before the machine check out => no impact on LHC schedule

Hardware commissioning; test B to E:

Test B – Tests links from Software Interlock System to BIS

➢ need to be performed with LHC operator (10')

Test C – Tests the Setup Beam Flag transmission through the GMT

✓ Test performed with automatic software

Test D – Tests links from BIS to Beam Dump
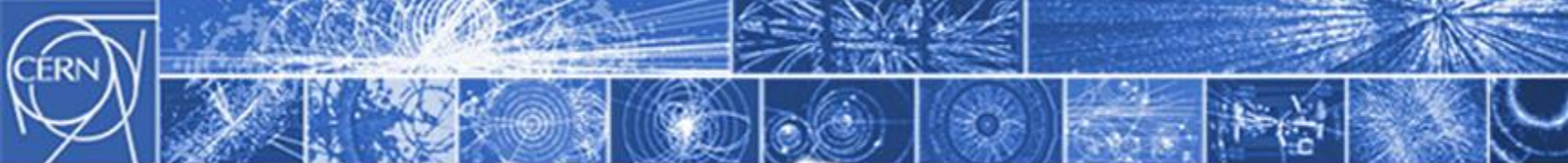
➢ need to be performed with ABT team (30')

Test E – Tests links from BIS to Injection Interlock System

✓ Test performed manually by MI team (10')

During Machine Checkout tests

Execute the BIS Pre-operational Check during Machine Checkout (10')

Provoke the generation of a Dump event, checked the BIS IPOC, analyze the results (30')

BIS Local loop

As presented at the 138th MPP meeting and in conformity with the document https://edms.cern.ch/document/1739915/1, the BIS Local Loop has been established on the 06 Feb. 17

This local Loop provides the Beam Permit to "True" to the ABT systems. During this EYETS this local loop is intended to:
- Validate the new TSU
- Validate the new CIBDS

The ABT systems in point#6 have to be reconnected to the Operational BIS loops and the operational configuration has to be re-established before any MPS tests on the BIS.