LHC Beam Dumping System

Preparation for Reliability Run

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OUTLINE

- Main interventions on LBDS performed during EYETS
- Objectives of LBDS Reliability Run
- Preparation for LBDS Reliability Run
- First Planning Proposal (Optimistic)
- Still to be defined…

Main LBDS activities during EYETS

- Cleaning and sparking test campaign during this EYETS (Ongoing):
  - Many generators cleaned / exchanged, GTO stacks exchanged
  - Added separation between GTO stack and PTU crates

- Decoupling of the retrigger boxes on MKB generators (Ongoing):
  - Following the self-trigger of one MKBH that triggered the generator next to it.

- Upgrade of TSU cards (Done):
  - Following card failure in 2016: Power supply weaknesses identified and corrected
  - New asynchronous dump scenarios identified: (138th MPP 2016 – E.Carlier)
    - In case of bad contact on the cable between TSU and RTD, a pulse is sent on the retrigger lines.
      => Hardware upgraded
    - In case of glitches on the BRF signal, synchronous triggers are issued asynchronously.
      => Firmware upgraded

- Upgrade of CIBDS cards (New cards in production):
  - New hardware, new firmware, added test mode capability (135th MPP 2016 – S.Gabourin)

- Increased CIBDS Re-Trigger Delay up to 320us (Done).

- Preventive exchange of all LBDS PLC power supplies (154) / LBDS PLC ASi-Bus renovation

- Some software updates (PLC / IPOC)

All these changes need revalidation under operational conditions before operation with beam.

Objectives of LBDS Reliability Run

- Validate the good state of LBDS HV generators & control systems (LOCAL):
  - We need a lot of dumps to validate the stability of kicker waveform over time
  - We need cycles up to 7 TeV with long flat-top to validate the HV sustainability, with some margin for operation.
  - Changes on the retrigger line, new power supplies

- Validate the upgraded TSU & CIBDS cards (REMOTE):
  - We need a lot of arm / dump to validate the correct behaviour of TSU and CIBDS cards during arm/dump actions
  - We need long time with BIS armed to validate the stability of BIS loops.

Not a lot of time:

$\Rightarrow$ We can combine these two (LOCAL/REMOTE) during one reliability run

Preparation for LBDS Reliability Run

- Local BIS loops: New BIS hardware and software to be deployed in Point6
  -> Ongoing (Ready for mid-mars)

- BETS-Simulator used to generate the main bends current cycles for BETS
  -> Ready

- New Sequencer tasks needed to arm / start cycle / dump with local BIS:
  -> Ongoing (Ready for mid-mars)

- New XPOC server for the validation of every dump action:
  - Local BIS = no 'BeamDumped' timing event:
    - XPOC-Local server has to start sessions on LBDS trigger (CMW subscription)
    - No BI data = reduced XPOC configuration including only LBDS systems
  - New analysis module for Re-Trigger line check (TSU&CIBDS pulses)
    -> Ongoing (Ready for mid-mars)

- …?

First Planning Proposal (Optimistic)

- LBDS not ready before mid-march (HV Tests ongoing + VSC intervention)
- CIBDS not ready before mid-march either (Perhaps end of March?)
- LHC Cold Checkout starts on 25 April

Reliability run possible from 20 march to 24 April = 5 weeks

Typical planning:

During day (8h-20h):

- Arm / Dump every 1min at injection for 1h
- Fast ramp 10min / Flat-top 40min at 7 TeV / Dump / Ramp down 10min

During night (20h-8h):

- Ramp 20min / Flat-top 11h20 at 7 TeV / Dump / Ramp down 20min

If CIBDS is not ready, LBDS will start the reliability run in LOCAL

Still to be defined

- Strategy for validation for operation?
  - Flat-tops at 6.5 TeV and/or 7TeV ? For how long?
  - Number of Arm/Dump to perform ?
  - Time to stay in armed state ?
  - …

- Are 5 weeks enough for the validation of TSU&CIBDS ?
  - Shall we roll back to previous hardware (with known bugs) ?
  - New TSU firmware validated in lab, we are confident…

Spares slides / Removed…