



LHC Machine check out

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Be/op

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- **Vacuum**

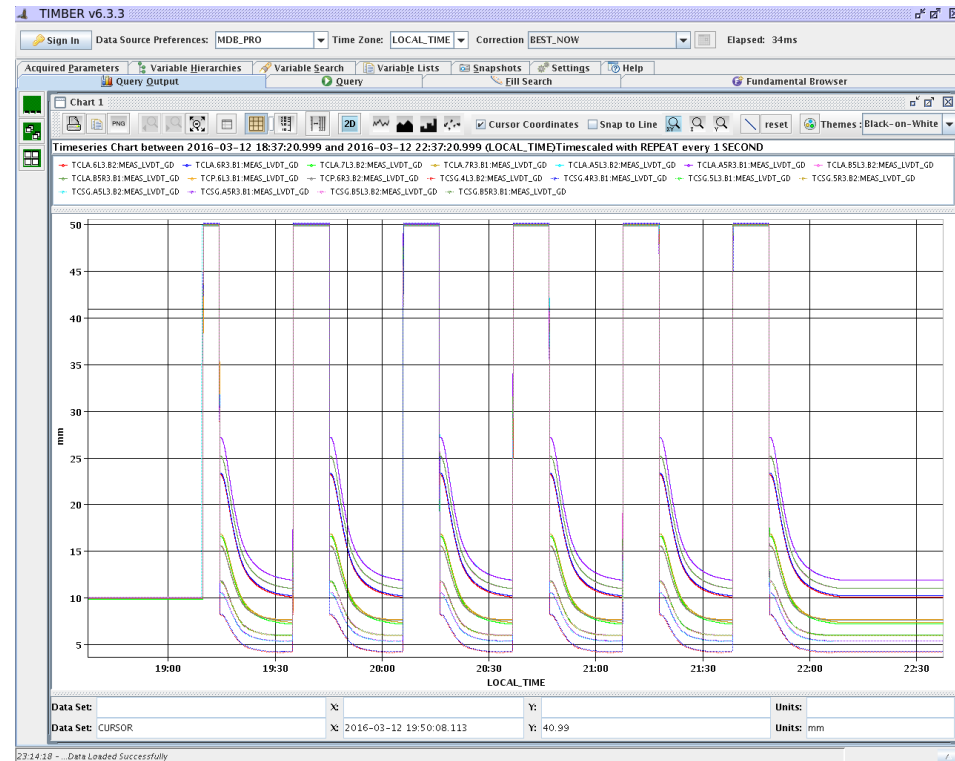
- **Ring & Transfer lines** : all sectors valves operational and tested
- **Vacuum valve interlock control** tests in progress
 - Validation BIS input
- **Alice** : OK
- **ATLAS**: Leak detection OK.
- **CMS** : **Vacuum Pumping will start 18/3.**
- **LHCb** : ok

- **Beam Instrumentation**

- BBQ, BCTDC, FBCT, BPF, BPM, BSRA,
- BWS, BRAN, OFB, QFB, BSRT, BSRI, BSRL, BQHT,
- **BTV test in progress**
- **BLM,**
 - Cards modification after the UPS test, **Done**
 - Synchronization between LAYOUT and LSA **Done**
 - Noise analysis for each detector in progress
 - Accesses for corrections should be expected.
 - Modulation checks delayed to **Thursday night**.
- Possible closure BLM **BIS loop Friday 18/3**
- **BQS(schottky) hardware ready for MD1**
- **DIDT to be tested with beam.**

LHC Beam Instrumentation					
Status of the sub-systems of LHC Beam Instrumentation					
BBQ	Electronics	FESA	Soft	Pick-ups	
BCTDC	Electronics	FESA	Soft	Transformer	Transmission
BCTF	BCTF-D	BCTF-A	BCTF-B	BCTF-TL	DAB Detectors
	FE	FESA	Soft	DAB	Detectors FE
	Soft				
BPF	Electronics	Pick-ups			
BLM	Back-End	Concentrator	Cryo	Logging	DB Diamond
	Direct Dump	Fast	FESA	Front-end	IC Thresholds
BPM	Interlock	Orbit	DABs	FE	FESA PUs
	Soft	DABs	FE	FESA	Orbit monitors PUs
	Soft				
BSRA	Detector	Electronics	FESA	Soft	
BTV	Electronics	FESA	GUI	Mechanics	
Orbit FB					
Q FB					
DIDT	Electronics	FESA	Logging	Software	
BRAN	BRAN-A	BRAN-B	BRAN-C	Detectors	Electronics FESA
	Detectors	Electronics	FESA	Detectors	Electronics FESA
BSRT	Electronics	Optics	Soft		
BWS	Electronics	FESA	PMT	Software	
Life-time					
BSRL	Det	Electronics	FESA	Soft	
Head-Tail	FESA	Scopes	PUs	Soft	Trigger
BQS	Soft	CTRL	DAQ	FESA	FE LOs
	PS	PUs	FE RF Test		
DOROS	DOROS-C	DOROS-S	Electronics-C	FESA-C	Electronics-S FESA-S
BGI	Cameras	Electronics	FESA	Optics	Soft
BOV					
BSRI	Camera	FESA	Soft	Optics	
MIM	Electronics	Software			

- **Collimator tests in progress**
- **Hardware Operational**
- Collimator tested trough the **operational cycle** well advanced
- Generation of **Collimator Settings** **ready** for machine check out tests.



MPP tests: position and temperature interlock tests planned for early next week.

LBDS

- **LBDS Both ON** re-Calibration almost completed.
ON Remote early next week.
- **BETS**
 - 450 GeV and 6.5 TeV to be tested.
- **XPOC** in progress
- Arming sequence >> **need BIS loop OK**
- Synchronization LBDS and RF to be checked.
- **Full machine check-out tests**
 - **Energy tracking** tests up to 6.5 TeV;
 - **Arming** the system connected to BIS once beam permits are OK
 - **Circulate and dump** sequence.
 - **Inject and Dump** sequence.
 - **Machine protection tests with loop closed.**

<https://edms5.cern.ch/file/896392/2/MPS-bc-LBDSv5.pdf>

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Switzerland



LHC Project Document No.
LHC-OP-MPS-0007

CERN Div./Group or Supplier/Contractor Document No.
TE/ABT/BTP

EDMS Document No.
896392

Date: 2009-03-19

MPS Commissioning Procedure
THE COMMISSIONING OF THE LHC MACHINE PROTECTION
SYSTEM
BEAM DUMP SYSTEM COMMISSIONING

- **BETS**

- **Energy Tracking at 450 GeV** test foreseen **Friday afternoon** (earliest)
- Test MSI & TDI

- **TCDQ**

- **Remote Operational**
Machine Protection test to be done

- **MKQAC**

- **Remote operational** (To be checked from CCC)

- **MKI's**

- **MKI8 fully HV conditioned, on Remote, Softstart successfully run from the CCC.**
- MKI 2 High voltage conditioning in progress
- Synchronization MKI and RF to be checked

- **WIC**

- TL's and LHC system operational.

- **PIC**

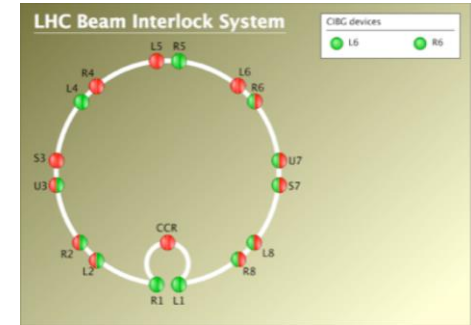
- Participation and validation of **UPS tests** – **Done**
- Execution of interlock test **HWC program** (more than 2000 PIC tests) – **Done**
- Functional test of **PIC-BIS** interfaces - **TO BE DONE AFTER THE END OF THE POWERING TESTS**
 - Check of **conformity of the electrical** interfaces PIC – BIS.
 - Validate **propagation of powering faults** from the electrical circuits to the BIC. (2 hrs).

- **FMCM:**

- Participation and validation of **UPS tests** - **Done**
- Threshold validations in the **SPS-Transfer Lines** - **DONE**
- Functional test of FMCM-BIS interfaces - **TO BE DONE AFTER THE END OF THE POWERING TESTS**
 - Provoke a trip of the FMCMs by triggering a PC fault.
 - LHC (12 devices) >> Thursday
 - **SPS TLs (7 out of 16 devices). Done**
 - Require about **2-3 hours** in total.

● BIS

- Additional input from ATLAS Roman Pots
 - NOT maskable input on BIC R1 in US15
- ✓ CIBU Connection successfully tested
- ✓ Pre-Operational checks successfully performed
- ✓ Beam Permit loops have been closed (BIS internal test mode)



● SMP

- ✓ Updated to Linux
- ✓ Pre-Operational checks successfully performed
- ✓ Machine Checkout Tests without beam completed
- Still to be done:
 - Tests which need Energy Tracking next week.
 - Tests with Beam (both foreseen during the following weeks)

- ❑ Monday 21/3 afternoon extraction to TED's
- ❑ **Beam Energy Tracking System (BETS).**
 - ❑ RB 45 56 67 78, Q4's MSD's at point 6

- ❑ **Condition to close the BIS LOOP in nominal condition:**
 - ❑ LHC access Key on Beam mode (22,23/3 evening)
 - ❑ LHC Vacuum valves open
 - ❑ Hardware commissioning **finished; all circuits ON and no faults**
 - ❑ **No interlock from non maskable clients.**

- ❑ Aim for complete machine **closure Friday 18/3.**
- ❑ Aim for LHCb & Alice pint 2,8 Closed and patrolled 14:00 **Monday 21/3**
- ❑ Aim for **LHC and EXP's closed Thursday 22/3**
 - ❑ *Access still possible if needed after that date.*

MO 14/3	Start systematic checkout of equipment & applications	BTV's check, Collimators, Vacuum Valve interlock
TU 15/3		Sector 78 not available for BETS (--> 17.3)
WE 16/3	Precycle available sectors & Machine check out tests overnights	
TH 17/3	Timing and Synchronisation check	
FR 18/3	BETS energy tracking first tentative at 450 GeV General Operational sequence test / Exp's communication tests	Forward detector interlock tests (AFP, ALFA, TOTEM): they can only start once we have the 4 sectors for BETS at injection + tested the BETS
SA 19/3	All available sectors Operational Machine Cycle Injection/Ramp/Squeeze/Collisions etc	
SU 20/3	Reliability Run at High Energy	
MO 21/3	Extraction TI2/8 to TED's / General Timing Synchronisation check	Schedule TI2/TI8 tests before Easter
TU 22/3	Run machine through the cycle - low beta & high beta	Beam energy distributed S45,56,67,78 powered (BETS tests)
WE 23/3	ATLAS closed and patrolled / First tentative to close Beam Interlock Loop	
TH 24/3	LBDS Machine Protection Tests / Beam Loop Closed	
FR 25/3		
SA 26/3		
SU 27/3		
MO 28/3		
TU 29/3	CMS valve opening	Close BIS loop, dump armed and triggered

Day planning and access request
will be discussed at 8:30 MCO Meetings