

SIS and BIS data publication

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SIS trees

- ❑ A publication of the complete state of SIS trees was developed by E.Veyrunes from SPS-OP and implemented for the LHC SIS.
- ❑ The **LHC SIS injection and ring tree details** are now available over CWM through 6 devices:
 - LHC.SIS.RING_B1, LHC.SIS.RING_B2, LHC.SIS.RING_B1B2,
 - LHC.SIS.ING_B1, LHC.SIS.INJ_B2, LHC.SIS.INJ_B1B2
- ❑ Data published by those devices (property **Result**):
 - Names of interlocking tests (full names and short names),
 - List of masked tests,
 - For **all tests** in the tree:
 - Interlock state,
 - Mask state,
 - Latch state
- ❑ Final tuning in progress. NXCALS logging of the device data will be activated soon.

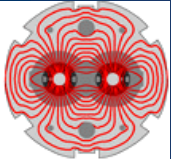
SIS GUI

Permits Tree

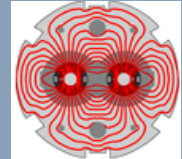
- P [AND] BBLR_POWERING_PERMITS
- X P [AND] EPC_PERMIT_ATLAS
- X P [AND] EPC_PERMIT_CMS
- X P [AND] INJ_B1B2_PERMIT
 - X L [AND] BIC_PREOP_CHECKS
 - L [AND] BLM_HEALTH_STATUS
 - L [AND] BLM_THRESHOLD_TABLE_STATUS
 - L [AND] DP_TRIM_RT
 - X I INJECTION_ENERGY
 - I INJECTION_REQUEST_BUCKET_NO_BUNCHES
 - L [AND] PC-CURRENTS
 - X L [AND] PC-STATES
 - X I PC_INTERLOCK_INJ_RB_OK
 - I PC_INTERLOCK_INJ_RD_OK
 - X L [AND] POST_MORTEM
 - X I POST_MORTEM_MACH_PROT_OK
 - X I POST_MORTEM_PERMIT
 - X L [AND] QPS-STATE
 - L [OR] RF_INJ
 - I SMP_PREOPS_CHECK
 - I SPS_BQM
 - I SPS_BQM_DUMP_ENABLED
 - I SPS_PROBE_CHECK
 - L [AND] VENTILATION_DOORS_OK
 - L [AND] WPS_IT
- X P [AND] INJ_B1_PERMIT
- X P [AND] INJ_B2_PERMIT
- X P [AND] IPQ_RQ_POWERING_PERMITS
- P [AND] POWERING_FPA_PERMITS
- P [AND] POWERING_PERMITS
- P [AND] RCBX_PERMITS
- X P [AND] RING_B1B2_PERMIT
- P [AND] RING_B1_PERMIT

Depth: 1 Show Font size: +1 -1 Reset

Expand All Collapse all



SIS tree displays



- Based on the published data new simple WEB displays based on WRAP have been prepared – one display for SIS ring trees and one for SIS injection trees.
 - A similar display will be put in place for BigSister to back up the audio messages.

https://wrap.cern.ch/dashboard/13860

Search dashboard LhcMagExp LHC-RING-SIS Status LHC-INJ-SIS Status

LHC.SIS.RING_B1 LHC.SIS.RING_B1B2 LHC.SIS.RING_B2

true false true

Active Interlocks

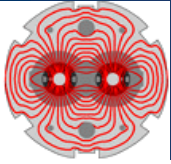
[RING_B1B2_PERMIT, BLM_VOLTAGES_STATUS, SMP_CHECK, BLM_HV_STATUS]

Masks

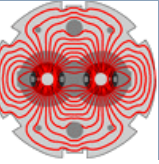
[PC_INTERLOCK_QUADS_B1_OK, RF_VOLTAGE_MIN_FT_B1, PC_INTERLOCK_CODS_B1H_OK, PC_INTERLOCK_BBLR_B1_OK, PC_INTERLOCK_CODS_B1V_OK]

[PC_INTERLOCK_RD_OK, PC_INTERLOCK_RB_OK, BLM_SR3_L_HV_STATUS, BLM_ENERGY_CHECK]

[PC_INTERLOCK_CODS_B2H_OK, PC_INTERLOCK_CODS_B2V_OK, PC_INTERLOCK_BBLR_B2_OK, PC_INTERLOCK_QUADS_B2_OK, RF_VOLTAGE_MIN_FT_B2]



BIS data decoding



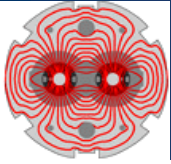
- Since ~2006 the BIS monitor application is used to analyse **coherently** the state of all inputs contributing to a BIS configuration.
 - Analysis of fast pulsing BIS inputs (example FEIs) to determine if true or false at the appropriate time (extraction etc.).
 - Provides the list of FALSE BIC inputs, masks etc.
- All **deployed BIS configurations** are covered:
 - SPS ring, LHC ring,
 - SPS injection, TT2-TT10,
 - SPS extractions LHCB1(2), AWAKE, HIRADMAT,
 - LINAC4, LINAC4RF,
 - PSB extraction

Time	User	Ring BCT	Extr BCT	BETS	Extr BIS
09:58:55	MD1	-1	-1	[Blue Bar]	[Red Bar]
09:58:31	HIRADMT2	-1	-1	[Blue Bar]	[Red Bar]
09:58:20	SFTPRO1	-1	-1	[Blue Bar]	[Red Bar]
09:58:16	MD1	-1	-1	[Blue Bar]	[Red Bar]
09:57:52	HIRADMT2	-1	-1	[Blue Bar]	[Red Bar]
09:57:42	SFTPRO1	-1	-1	[Blue Bar]	[Red Bar]
09:57:38	MD1	-1	-1	[Blue Bar]	[Red Bar]
09:57:14	HIRADMT2	-1	-1	[Blue Bar]	[Red Bar]
09:57:03	SFTPRO1	-1	-1	[Blue Bar]	[Red Bar]
09:57:00	MD1	-1	-1	[Blue Bar]	[Red Bar]
09:56:36	HIRADMT2	-1	-1	[Blue Bar]	[Red Bar]
09:56:25	SFTPRO1	-1	-1	[Blue Bar]	[Red Bar]
09:56:21	MD1	-1	-1	[Blue Bar]	[Red Bar]
09:55:57	HIRADMT2	-1	-1	[Blue Bar]	[Red Bar]
09:55:46	SFTPRO1	-1	-1	[Blue Bar]	[Red Bar]

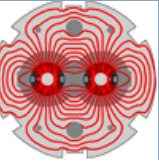
Interlock Channel List

- CIB.BA6.TT60A In 1 : Vacuum TT60
- CIB.BA6.TT60A In 3 : Operator Switch
- CIB.BA6.TT60A In 4 : MKE6 Status
- CIB.BA6.TT60A In 5 : MSE/MST Status
- CIB.BA6.TT60A In 7 : Crab Cavity LSS6
- CIB.BA6.TT60A In 8 : TT60 Converters currents
- CIB.BA6.TT60A In 9 : MSE/MST currents
- CIB.BA6.TT60A In 10 : MBB current
- CIB.BA6.TT60A In 13 : FMCH_MSE6183M
- CIB.BA6.TT60A In 14 : FMCH_MST6177M
- CIB.BA6.TT60A : SIS TT60_SW_PERMIT
- CIB.BA6.TT60B In 1 : TED TT60
- CIB.BA6.TT60B In 11 : DM1 LSS6

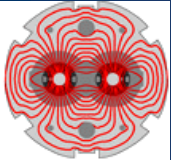
List of relevant interlocks



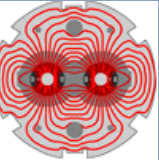
Decoded BIS data publication



- ❑ A first set of UCAP transformations have been setup to **concentrate the BIC data** corresponding to one of the BIS configurations.
- ❑ The **concentrated data is published** and processed by a second set of UCAP transformations that **provides the same decoding than the BIS monitor application**. The results (list of interlocking channels) are published over RDA3.
- ❑ The **injector chain devices** are:
 - BISMION.INTERLOCK.AWAKE
 - BISMION.INTERLOCK.HIRADMAT
 - BISMION.INTERLOCK.LHCB1
 - BISMION.INTERLOCK.LHCB2
 - BISMION.INTERLOCK.LINAC4
 - BISMION.INTERLOCK.LINAC4RF
 - BISMION.INTERLOCK.PSBEXT
 - BISMION.INTERLOCK.SPSINJ
 - BISMION.INTERLOCK.SPSRING
 - BISMION.INTERLOCK.TT10
- ❑ The published property **BisState** provides the BIC crate names, input channel numbers and channel names of interlocking inputs.
 - A set of data fields for ALL inputs with state = false,
 - A set of data fields for inputs that are in state = false and actively interlocking.
 - Excludes channels that are for example 'masked' by an external condition, a TED dump etc and ignored by the master BIC.



Decoded BIS data publication (2)



- ❑ The transformations are currently running on a test node – **very stable for the injectors.**
 - Issue with the LHC BIC data concentration – to be investigated.
 - Testing of the results for injectors ongoing.
- ❑ In the next week(s):
 - **Move** the devices from the test node to **the production node.**
 - **Activate NXCALS logging.** This will provide for each cycle (for LHC @ 1 Hz) the decoded list of interlocking BIC inputs for each configuration.
- ❑ This fully decoded and logically grouped interlock data enables:
 - Automation of interlock tests.
 - Construction display grouping SIS, BIS, external conditions (timing) etc.
 - Easy extraction of the history of interlocking channels (NXCALS).