

BIS Dump trigger

Of the 6th Oct 2015

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MPP AOB – 9th Oct 2015



What Happened

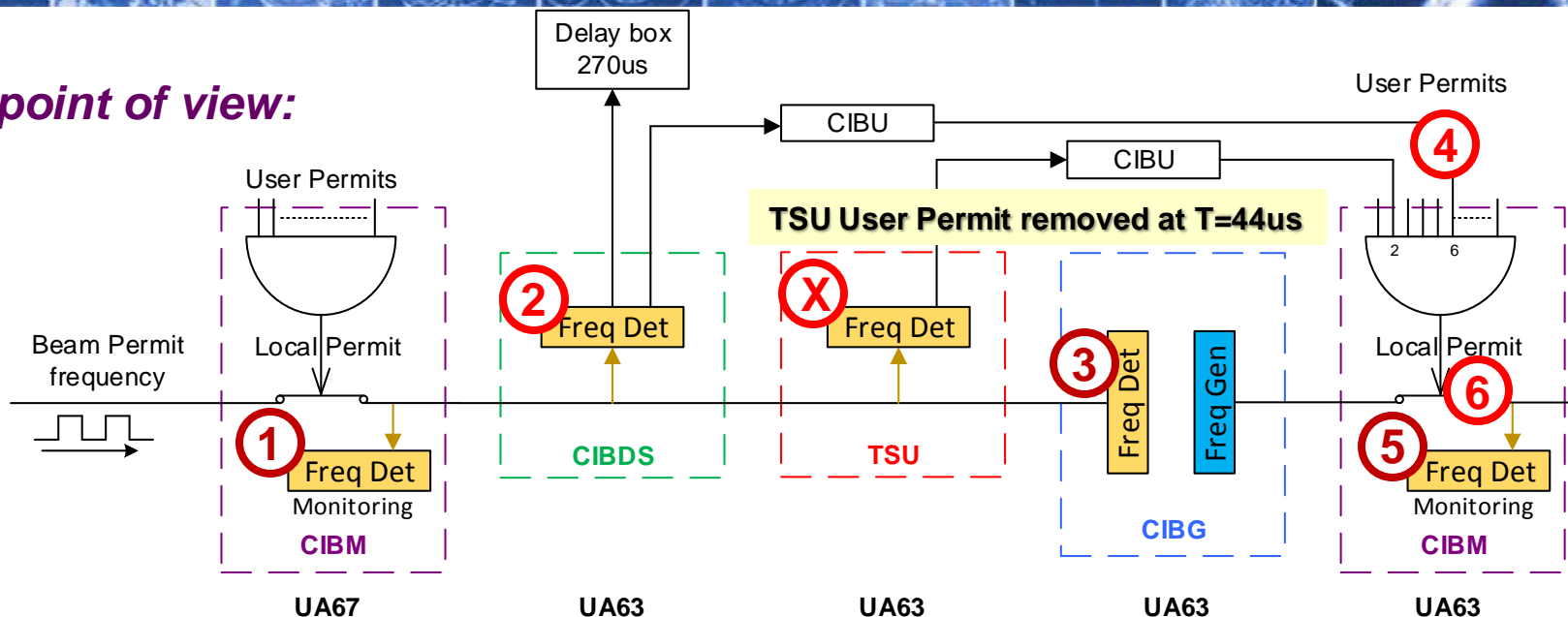
From the CIBDS point of view:

- On Tuesday 06-Oct at 04:42:42, the CIBDS triggered a dump due to a loss of Beam Permit frequency detection on Beam 1 Loop A.
 - The trigger was sent to the delay box, then to the retriggering lines (with a delay of 270us).
 - In parallel, the trigger was also sent to the CIBU to open the BIS loop (with a delay of a few us).

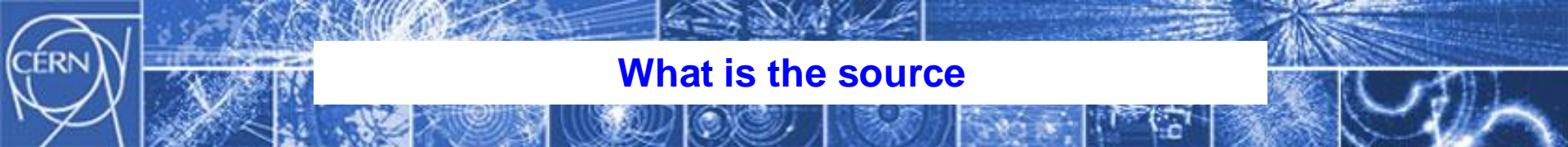
=> A **synchronous** dump was triggered on Beam 1 with 12 bunches.

What Happened

From BIS point of view:

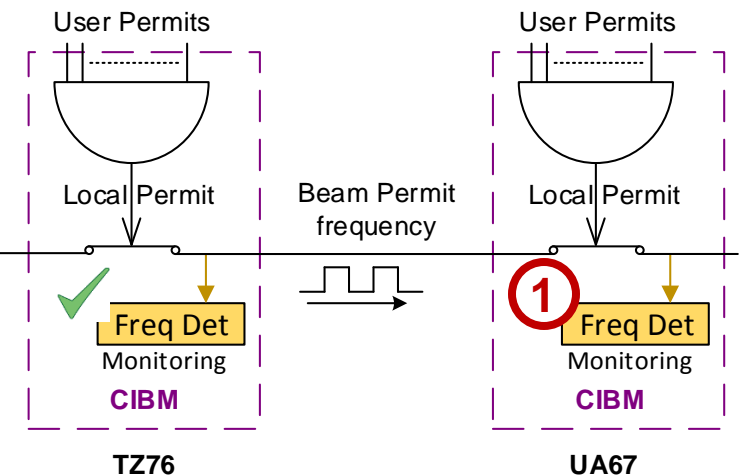


- ① $T=0\mu s$: The CIBM in UA 67 detects a loss of frequency. Keeps info for monitoring
- ② $T=2\mu s$: The CIBDS detects a loss of frequency (and fires the delay box and the CIBU)
- ③ $T=3\mu s$: The CIBG detects a loss of frequency. Stops generating the Beam Permit
- ④ $T=4\mu s$: The CIBDS removes its User Permit on the CIBU linked to the CIBM in UA63
- ⑤ $T=5\mu s$: The CIBM in UA 63 detects a loss of frequency. Keeps info for monitoring
- ⑥ $T=6\mu s$: The CIBM in UA 63 opens the A loop as a User (the CIBDS) removed its User Permit
- ⓧ $T=?\mu s$: The TSU detects a loss of frequency



What is the source

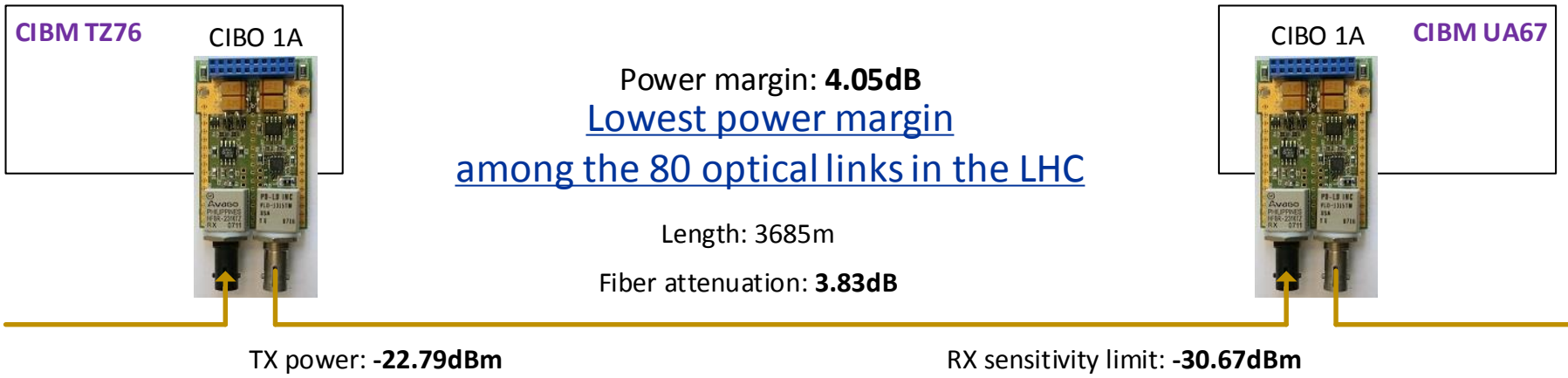
A bit backward on the BIS:



① T=0us : The CIBM in UA 67 detects a loss of frequency. Keeps info for monitoring

- This frequency loss occurs at the same time than a glitch detection
- ✓ No frequency loss detection or glitch detection in TZ76
- The problem might comes from the optical link between the CIBM in TZ76 and the CIBM in UA67

Considered optical link



3 parameters to increase power margin:

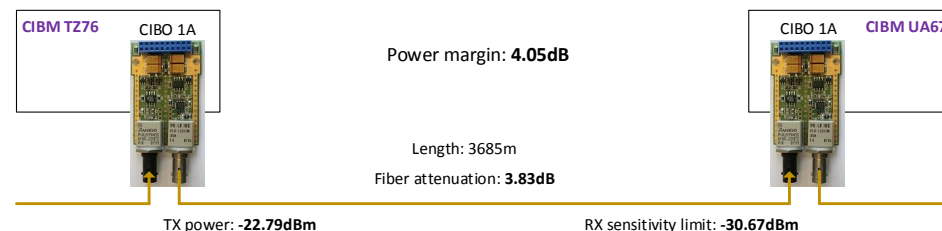
- Change the fibre
 - The 3 other active fibres have attenuations from 3 to 4.2 dB -> almost the same
 - The 2 spare fibres are actually monitored together with 2 short fibres. The average attenuation is 1dB/km -> almost the same
- Increase the RX sensitivity (by changing the CIBO in UA67)
 - The actual sensitivity is already quite high
- Increase TX power (by changing the CIBO in TZ76)
 - A CIBO is supposed to deliver a power from -17.5dBm to be installed in the machine

If no other dump is generated by the link before the EYTS:

- TS3 (9 to 13 Nov):
 - Re-measure this link (TX power/RX sensitivity/fibre attenuation)
 - Clean the optical components, check the plugs
 - Re-measure this link (TX power/RX sensitivity/fibre attenuation)
- EYTS* (from 14th Dec):
 - Replacement of the CIBO could** be done if considered necessary
- 2 other links present a low power margin and could** be treated at the same time

* After changing the optical component, it is necessary to test for a long time that the Beam Permit Loops are effectively working better. A TS looks short to change 1 or several CIBO.

** When replacing a CIBO, we change the power transmitted but also the sensitivity to the previous fibre => To be considered very carefully





About the CIBDS

- As shown in this presentation, the CIBDS has followed the expected behaviour.
- It induced a synchronous dump after a loss of Beam Permit frequency of several us.
- A new CIBDS is foreseen, but not for the end of this year.
- The actual step is to discuss about several points of improvements and documented in the actual engineering specification.



Spare slides

Spare Slides



Post Mortem

350 true/true	04:42:42+135008	-4 BEAM_PERMIT_LOOP: Output A Stopped	CIB.UA67.R6.B1
351 true/true	04:42:42+135008	-4 BEAM_PERMIT_LOOP: Input A Stopped	CIB.UA67.R6.B1
352 true/true	04:42:42+135008	-4 BEAM_PERMIT_LOOP: Output A Glitch	CIB.UA67.R6.B1
353 true/true	04:42:42+135009	-3 BEAM_PERMIT: A T->F	CIB.UA67.R6.B1
354 false/false	04:42:42+135010	-2 MATRIX_A_STATUS: Local_Permit T->F	CIBDS.UA63.L6
355 false/false	04:42:42+135010	-2 MATRIX_A_STATUS: Pulse_Delay_Box F->T	CIBDS.UA63.L6
356 true/false	04:42:42+135010	-2 BEAM_PERMIT_LOOP: INPUT_A_GLITCH	CIBG.UA63.L6
357 true/true	04:42:42+135010	-2 BEAM_PERMIT_LOOP: Output A Glitch	CIB.UA67.R6.B1
358 false/false	04:42:42+135011	-1 MATRIX_A_FSM_TRANSITIONS: Loose_detection	CIBDS.UA63.L6
359 false/false	04:42:42+135011	-1 MATRIX_A_FSM_STATE: STOP	CIBDS.UA63.L6
360 false/false	04:42:42+135011	-1 MATRIX_A_FSM_STATE: UNARMED	CIBDS.UA63.L6
361 false/false	04:42:42+135011	-1 MATRIX_A_FSM_STATE: CLEAR	CIBDS.UA63.L6
362 false/false	04:42:42+135011	-1 MATRIX_A_STATUS: Slow_Detect T->F	CIBDS.UA63.L6
363 false/false	04:42:42+135011	-1 MATRIX_A_STATUS: Fast_Detect T->F	CIBDS.UA63.L6
364 true/false	04:42:42+135011	-1 EXTERNAL_IO: BEAM_PERMIT_A T->F	CIBG.UA63.L6
365 true/false	04:42:42+135011	-1 STATE: FAST_DETECT_A T->F	CIBG.UA63.L6
366 true/false	04:42:42+135011	-1 BEAM_PERMIT_LOOP: INPUT_A_STOPPED	CIBG.UA63.L6
367 true/false	04:42:42+135012	0 STATE: A (C STATE A)	CIBG.UA63.L6
368 true/false	04:42:42+135012	0 STATE: SLOW_DETECT_A T->F	CIBG.UA63.L6
369 true/false	04:42:42+135012	0 STATE: A (C STATE A)	CIBG.UA63.L6
370 true/false	04:42:42+135012	0 STATE: RESET_DETECTORS_A	CIBG.UA63.L6
371 true/false	04:42:42+135012	0 STATE: A (C STATE A)	CIBG.UA63.L6
372 true/true	04:42:42+135012	0 USER_PERMIT: Ch 6-CIBDS Beam 1: A T->F	CIB.UA63.L6.B1
374 true/false	04:42:42+135013	1 BEAM_PERMIT_LOOP: INPUT_A_GLITCH	CIBG.UA63.L6
375 true/true	04:42:42+135013	1 BEAM_PERMIT_LOOP: Output A Glitch	CIB.UA63.L6.B1
376 true/true	04:42:42+135013	1 BEAM_PERMIT: A T->F	CIB.UA63.L6.B1
377 true/true	04:42:42+135013	1 BEAM_PERMIT_LOOP: Output A Stopped	CIB.UA63.L6.B1
378 true/true	04:42:42+135013	1 BEAM_PERMIT_LOOP: Input A Stopped	CIB.UA63.L6.B1
379 false/false	04:42:42+135014	2 MATRIX_A_STATUS: Fast_Detect F->T	CIBDS.UA63.L6
380 false/true	04:42:42+135014	2 LOCAL_PERMIT: A T->F	CIB.UA63.L6.B1
381 true/false	04:42:42+135015	3 BEAM_PERMIT_LOOP: OUTPUT_A_STARTED	CIBG.UA63.L6
382 true/true	04:42:42+135015	3 BEAM_PERMIT: A F->T	CIB.UA67.R6.B1
383 true/true	04:42:42+135015	3 BEAM_PERMIT_LOOP: Output A Started	CIB.UA67.R6.B1
384 true/true	04:42:42+135015	3 BEAM_PERMIT_LOOP: Input A Started	CIB.UA67.R6.B1
385 true/false	04:42:42+135018	6 BEAM_PERMIT_LOOP: INPUT_A_STARTED	CIBG.UA63.L6
386 true/false	04:42:42+135019	7 STATE: FAST_DETECT_A F->T	CIBG.UA63.L6
387 true/false	04:42:42+135022	10 EXTERNAL_IO: STOP_A T->F	CIBG.UA67.R6
388 true/false	04:42:42+135022	10 EXTERNAL_IO: STOP_A F->T	CIBG.UA67.R6
389 true/false	04:42:42+135022	10 STATE: EXTERNAL_STOP_A	CIBG.UA67.R6
405 false/true	04:42:42+135052	40 USER_PERMIT: Ch 2-LBDS-b1 (TSU): A T->F	CIB.UA63.L6.B1
406 false/true	04:42:42+135052	40 USER_PERMIT: Ch 2-LBDS-b1 (TSU): B T->F	CIB.UA63.L6.B1
408 false/false	04:42:42+135053	41 LOCAL_PERMIT: B T->F	CIB.UA63.L6.B1
409 false/false	04:42:42+135054	42 BEAM_PERMIT: B T->F	CIB.UA63.L6.B1
410 false/false	04:42:42+135054	42 BEAM_PERMIT_LOOP: Output B Stopped	CIB.UA63.L6.B1
411 false/false	04:42:42+135056	44 MATRIX_B_FSM_TRANSITIONS: Loose_detection	CIBDS.UA63.L6
412 false/false	04:42:42+135056	44 MATRIX_B_FSM_STATE: UNARMED	CIBDS.UA63.L6
413 false/false	04:42:42+135056	44 MATRIX_B_FSM_STATE: STOP	CIBDS.UA63.L6
414 false/false	04:42:42+135056	44 MATRIX_B_FSM_STATE: CLEAR	CIBDS.UA63.L6
415 false/false	04:42:42+135056	44 MATRIX_B_STATUS: Slow_Detect T->F	CIBDS.UA63.L6
416 false/false	04:42:42+135056	44 MATRIX_B_STATUS: Pulse_Delay_Box F->T	CIBDS.UA63.L6
417 false/false	04:42:42+135056	44 MATRIX_B_STATUS: Local_Permit T->F	CIBDS.UA63.L6
418 false/false	04:42:42+135056	44 MATRIX_B_STATUS: Fast_Detect T->F	CIBDS.UA63.L6

9th

419 true/false	04:42:42+135056	44 BEAM_PERMIT_LOOP: INPUT_B_STOPPED	CIBG.UA63.L6
420 false/false	04:42:42+135057	45 USER_PERMIT: Ch 6-CIBDS Beam 1: B T->F	CIB.UA63.L6.B1
422 true/false	04:42:42+135059	47 BEAM_PERMIT_LOOP: OUTPUT_B_STOPPED	CIBG.UA63.L6
423 true/false	04:42:42+135059	47 STATE: B (C STATE B)	CIBG.UA63.L6
424 true/false	04:42:42+135059	47 STATE: SLOW_DETECT_B T->F	CIBG.UA63.L6
425 true/false	04:42:42+135059	47 STATE: B (C STATE B)	CIBG.UA63.L6
426 true/false	04:42:42+135059	47 STATE: RESET_DETECTORS_B	CIBG.UA63.L6
427 true/false	04:42:42+135059	47 STATE: B (C STATE B)	CIBG.UA63.L6
428 true/false	04:42:42+135059	47 EXTERNAL_IO: BEAM_PERMIT_B T->F	CIBG.UA63.L6
429 true/false	04:42:42+135059	47 STATE: FAST_DETECT_B T->F	CIBG.UA63.L6
430 true/true	04:42:42+135063	51 BEAM_PERMIT: B T->F	CIB.UA67.R6.B1
431 true/true	04:42:42+135063	51 BEAM_PERMIT_LOOP: Output B Stopped	CIB.UA67.R6.B1
432 true/true	04:42:42+135063	51 BEAM_PERMIT_LOOP: Input B Stopped	CIB.UA67.R6.B1
433 true/false	04:42:42+135074	62 EXTERNAL_IO: STOP_B T->F	CIBG.UA67.R6
434 true/false	04:42:42+135074	62 EXTERNAL_IO: STOP_B F->T	CIBG.UA67.R6
435 true/false	04:42:42+135074	62 STATE: EXTERNAL_STOP_B	CIBG.UA67.R6
503 true/false	04:42:42+135185	173 BEAM_PERMIT_LOOP: INPUT_B_GLITCH	CIBG.UA63.L6
529 false/false	04:42:42+135226	214 MATRIX_A_STATUS: Fast_Detect T->F	CIBDS.UA63.L6
530 true/true	04:42:42+135226	214 BEAM_PERMIT: A T->F	CIB.UA67.R6.B1
531 true/true	04:42:42+135226	214 BEAM_PERMIT_LOOP: Output A Stopped	CIB.UA67.R6.B1
532 true/true	04:42:42+135226	214 BEAM_PERMIT_LOOP: Input A Stopped	CIB.UA67.R6.B1
533 true/true	04:42:42+135226	214 BEAM_PERMIT_LOOP: Output A Glitch	CIB.UA67.R6.B1
534 true/false	04:42:42+135227	215 EXTERNAL_IO: STOP_A T->F	CIBG.UA67.R6
535 true/false	04:42:42+135227	215 EXTERNAL_IO: STOP_A F->T	CIBG.UA67.R6
536 true/false	04:42:42+135227	215 STATE: EXTERNAL_STOP_A	CIBG.UA67.R6
537 true/false	04:42:42+135229	217 BEAM_PERMIT_LOOP: INPUT_A_STOPPED	CIBG.UA63.L6
538 true/false	04:42:42+135229	217 BEAM_PERMIT_LOOP: INPUT_A_GLITCH	CIBG.UA63.L6
539 true/false	04:42:42+135230	218 STATE: FAST_DETECT_A T->F	CIBG.UA63.L6
555 false/false	04:42:42+135256	244 BEAM_PERMIT_LOOP: Input B Stopped	CIB.UA63.L6.B1
573 true/true	04:42:42+135391	379 BEAM_PERMIT_LOOP: Output A Glitch	CIB.UA67.R6.B1
575 true/false	04:42:42+135394	382 BEAM_PERMIT_LOOP: INPUT_A_GLITCH	CIBG.UA63.L6
582 true/true	04:42:42+135468	456 BEAM_PERMIT_LOOP: Output B Glitch	CIB.UA67.R6.B1
583 true/true	04:42:42+135469	457 BEAM_PERMIT_LOOP: Output A Glitch	CIB.UA67.R6.B1
585 true/false	04:42:42+135472	460 BEAM_PERMIT_LOOP: INPUT_A_GLITCH	CIBG.UA63.L6
609 true/false	04:42:42+135782	770 BEAM_PERMIT_LOOP: INPUT_A_GLITCH	CIBG.UA63.L6
612 true/true	04:42:42+135796	784 BEAM_PERMIT_LOOP: Output A Glitch	CIB.UA67.R6.B1
626 true/true	04:42:42+135838	826 BEAM_PERMIT_LOOP: Output A Glitch	CIB.UA67.R6.B1
629 true/false	04:42:42+135840	828 BEAM_PERMIT_LOOP: INPUT_A_GLITCH	CIBG.UA63.L6
647 true/false	04:42:42+135891	879 BEAM_PERMIT_LOOP: INPUT_A_GLITCH	CIBG.UA63.L6
653 true/false	04:42:42+135999	987 TIME: EVENT_RECEIVED	CIBG.UA67.R6
661 false/false	04:42:42+136000	988 MARKER: OTHERS	CIBDS.UA67.R6
672 false/false	04:42:42+136000	988 MARKER: OTHERS	CIBDS.UA63.L6
679 true/false	04:42:42+136000	988 TIME: EVENT_RECEIVED	CIBG.UA63.L6
690 true/true	04:42:42+136000	988 MARKER: Others	CIB.UA67.R6.B1
692 false/false	04:42:42+136000	988 MARKER: Others	CIB.UA63.L6.B1
726 true/true	04:42:42+136001	989 USER_PERMIT: Ch 14-BETS TCDQ beam-1: A T->F	CIB.UA67.R6.B1
727 true/true	04:42:42+136002	990 USER_PERMIT: Ch 14-BETS TCDQ beam-1: B T->F	CIB.UA67.R6.B1
730 false/false	04:42:42+136004	992 LOCAL_PERMIT: A T->F	CIB.UA67.R6.B1
731 false/false	04:42:42+136004	992 LOCAL_PERMIT: B T->F	CIB.UA67.R6.B1
748 false/false	04:42:42+136050	1038 MARKER: LHC Post Mortem	CIB.UA67.R6.B1
749 false/false	04:42:42+136050	1038 MARKER: LHC Post Mortem	CIB.UA63.L6.B1
877 false/false	04:42:42+210101	75089 USER_PERMIT: Ch 3-LBDS-b1 (PLC): A T->F	CIB.UA63.L6.B1
878 false/false	04:42:42+210101	75089 USER_PERMIT: Ch 3-LBDS-b1 (PLC): B T->F	CIB.UA63.L6.B1
879 false/false	04:42:42+300661	165649 USER_PERMIT: Ch 2-LBDS-b1 (TSU): B F->T	CIB.UA63.L6.B1
880 false/false	04:42:42+300661	165649 USER_PERMIT: Ch 2-LBDS-b1 (TSU): A F->T	CIB.UA63.L6.B1



CIBM Glitches vs Loss of Beam Permit

