Document No.

AB-CO-QA-0001-01-20

CERN AB DEPARTMENT

CH-1211 Geneva 23 Switzerland CERN Div./Group or Supplier/Contractor Document No AB/CO/MI

EDMS Document No. 822773

Date: 31 MAY 2007

Quality Assurance Definition BEAM INTERLOCK SYSTEM

NAMING CONVENTION

Abstract

This document describes the naming convention adopted for the Beam Interlock Systems of the SPS, the SPS-LHC/CNGS transfer lines and the LHC. It is applied to the names of all electronics cards used by the protection system and to its exchanged hardware signals that are accessible through the control system and visible in the CERN Control Centre (CCC).

Prepared by : J. Mariethoz AB/CO B. Puccio AB/CO M. Zerlauth AB/CO

Checked by : R. Schmidt AB/CO B. Todd AB/CO Approval Leader : R. Billen AB/CO

Distribution List:

M. Arruat, V. Baggiolini, M. Jonker, J. Lewis, M. Peryt, K. Sigerud, M. Sobczak, V. Tsaplin, J. Wozniak, Z. Zaharieva (AB/CO)

F. Follin, R. Giachino, V. Kain, J. Wenninger (AB/OP)

- T. Bogey, E. Bravin, S. Burger, B. Dehning, G. Ferioli, J-J. Gras, L. Jensen, J. Koopman (AB/BI)
- E. Carlier, J. Uythoven (AB/BT)
- A. Dinius, K. Fischer, A. Frassier (AB/PO)
- M. Donze, A. Masi (AB/ATB)
- L. Arnaudon, A. Butterworth (AB/RF)

J-Ch. Billy, R. Gavaggio, I. Laugier (AT/VAC)

A. Vergara Fernandez, B. Perea Solano (TS/HDO)

L. Hammouti, T. Ladzinski, P. Ninin (TS/CSE)

R. Hall-Wilton, D. Macina, D. Swoboda (TS/LEA)

L. Deront (PH/DT1), M. Ferro-Luzzi (PH/LBD)

Page 2 of 14

History of Changes

Rev. No.	Date	Pages	Description of Changes
1.0	23-Feb-2007	All	Ready for distribution and approval
1.1	04-Apr-2007	All	Including comments after submission for approval
1.2	31-May-2007	9	Chapter 5.3 split in two: one for SPS and for the TL
		12	Modification for the Extraction-BIS part of Table#7, when two Controllers are installed in the same FEC.
		13	Few modifications in Appendix 3

Page 3 of 14

Table of Contents

1.	PREAMBLE4
2.	NAMING OF BOARDS
3.	NAMING OF THE INDIVIDUAL SYSTEMS
4.	NAMING OF THE SOFTWARE DEVICES7
5.	SIGNAL NAMES
5.1	ENTITIES CODES FOR SIGNAL ISSUED AND RECEIVED BY THE BIS
5.2	QUANTITY CODE FOR SIGNAL ISSUED AND RECEIVED BY THE LHC BIS8
5.3 ONL`	QUANTITY CODE FOR SIGNAL ISSUED AND RECEIVED BY THE SPS BIS (WITH Y ONE BEAM)
5.4 BIS	QUANTITY CODE FOR SIGNAL ISSUED AND RECEIVED BY THE TRANSFER LINE (WITH ONLY ONE BEAM)
5.5	SIGNALS ISSUED AND RECEIVED BY THE USER SYSTEMS IN THE LHC 10
5.6	SIGNALS ISSUED AND RECEIVED BY THE USER SYSTEMS IN THE SPS AND
THE	TRANSFER LINES
6.	APPENDIX#111
7.	APPENDI X#212
8.	APPENDI X#313
9.	REFERENCES:

1. PREAMBLE

The Beam Interlock System (**BIS**) was originally conceived and designed for the LHC [1]. During the development it was always foreseen that the *BIS* would be capable of providing a robust modular solution for any other Beam Interlock System required by CERN.

The BIS is expected to be deployed in four distinct, yet related environments:

I. The LHC Beam Interlock System (*LHC-BIS*):

It permits safe beam operation in the LHC accelerator in delivering the global BEAM_PERMIT information when connected systems are all giving their "green lights" (i.e. USER_PERMITS). With circulating beam, it transmits any beam dump request from connected systems to the LHC beam dumping system (LBDS).

II. The (LHC) Injection Beam Interlock System (INJ-BIS):

It provides permission to the injection kicker system (MKI) only when involved systems are <u>all</u> giving their USER_PERMITS. It permits safe injection into the LHC in inhibiting the process in case of failure.

III. The (SPS) Extraction Beam Interlock System (*EXT-BIS*):

The system is used for a safe extraction toward the SPS-LHC and CNGS Transfer Lines (TT60, TI2, TT40, TI8, and TT41). It provides permission to the extraction kicker system (MKE) when involved systems are all giving their USER_PERMITS. In case of failure, it inhibits the extraction.

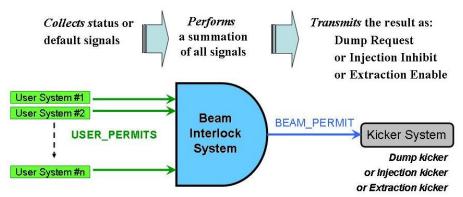
IV. The SPS Beam Interlock System (SPS-BIS):

The system is similar as the *LHC-BIS* and will replace the current one named "SPS Emergency Beam Dump Interlock System". It permits safe SPS beam operation and transmits any request from connected systems to the SPS beam dumping system.

The Functionality of the above Beam Interlock Systems is always identical:

- gather USER_PERMIT signals coming from User Systems (any equipment interconnected to the Beam Interlock System with the purpose of interlocking is designated a User System)

- perform an AND function of the received signals
- This result is produced either by one BIC or by several ones.
- The outcome, named BEAM_PERMIT, is transmitted to another BIC or to a Kicker.
- *Note*: The BEAM_PERMIT signal can be used for cascading two BIS (not shown in the picture below). For example, the BEAM_PERMIT of the LHC-BIS is used as a USER_PERMIT input signal to the INJ-BIS.



In all cases, the same hardware solution is used with a central element called the *Beam Interlock Controller (BIC)* and distant elements called the Beam Interlock *User Interfaces* (see Figures in Appendix#1)

Depending on the environment, the arrangement, the configuration and the setting of the used BICs will be different. As for example:

• A different programming for the on-board programmable devices in order to get a BEAM_PERMIT with a latched mode for the LHC-BIS and with a non- latched mode for the 3 others BIS.

• A hierarchical architecture for the EXT-BIS with one "master" and several "slave" BICs. The "master" will have a different Matrix programming. In addition, it is foreseen to install two independent slaves in the same crate.

• A unique boards set for a BIC involved in the SPS-BIS (only one beam) and a double set of boards for a BIC used in the LHC-BIS (2 beams).

2. NAMING OF BOARDS

A *Beam Interlock Controller* is identified with a VME crate. It is composed of several boards:

• The *Manager* module (CIBM). This card performs the critical operations of the Beam Interlock System via two redundant matrices. A BIC crate has either one or two CIBM.

• The *Test & Monitoring* module (CIBT). This card liaises with the *Manager* module; it gathers the monitoring information from the *User Interfaces* and transmits this to the *Manager*.

• The *Back-Plane* card (CIBP). This patching card routes the signals coming from the different *User Interfaces* to the *CIBM* module and/or to the *CIBT* module. There are 2 *CIBP* versions: *CIBPL* for the LHC-BIS and *CIBPS* for the others BIS.

• The *Extender* cards (CIBE). This card routes the VME backplane to the CIBP board. There are 2 *CIBE* versions: *CIBEA* and *CIBEB*.

• The optical daughter card (CIBO) is the used interfaces for the transmission/reception of the Beam Permit signal. There are mounted on the CIBM card and on the CIBG card.

• The two display daughter cards: CIBTD (for CIBT board) and CIBMD (for CIBM board).

• The *Generator* module (CIBG). This card achieves the initialisation and the generation of the frequency carried though the 2 redundant Beam Permit Loops. There is only one *Generator* module per Loop.

Depending of the environment, the following table (not exhaustive) indicates the number of involved boards in a BIC:

		LHC	INJ	EXT^*	SPS
CIBM	<i>Manager</i> module	2	1	1 (x 2) [*]	1
CIBMD	CIBM's Display daughter card	2	1	1 (x 2) [*]	1
CIBT	Test & Monitoring module	2	1	1 (x 2) [*]	1
CIBTD	CIBT's Display daughter card	2	1	1 (x 2) [*]	1
CIBPS	Back-Plane card (SPS Version)	0	1	1	1
CIBPL	Back-Plane card (LHC Version)	1	0	0	0
CIBEA	Extender card (type-A)	4	2	2 (x 2) [*]	2
CIBEB	Extender card (type-B)	2	1	1 (x 2) [*]	1
CIBO	Optical daughter card for CIBM	4	2	2 (x 2) [*]	2
CIBG ^{**}	<i>Generator</i> module ^{**}	(4)	(2)	(2)	(2)
CIBO	Optical daughter card for CIBG	(4)	(2)	(2)	(2)

(*): Inside an *EXT-BIS* crate it is conceivable to install 2 set of boards.

(**): CIBG is not installed in every crate: only two modules per beam and per system.

Page 6 of 14

Up to 2x14 User Interfaces could be connected to a BIC. The elements composing a User Interface are:

CIBUS or	User Interface with single connection: for one beam system (SPS-BIS, EXT-BIS, INJ-BIS) and for LHC-BIS (when the "User_Permit" is on both beams)	
CIBUD	User Interface with double connection (LHC only): "User_Permit" on individual beam	
CIBD	Power Distribution module for User Interface	
	(2 redundant CIBD are used per User Interface (either CIBUD or CIBUS)	

<u>Note:</u> Only the CIBM and CIBG boards have a VME-bus interface and therefore have a corresponding FESA device name for remote monitoring purposes.

3. NAMING OF THE INDIVIDUAL SYSTEMS

The equipment codes [2] CIP, CIW and CIB refer respectively to the Powering Interlock System, the Warm Magnet Interlock System and the Beam Interlock System. These equipment codes are used for the complete accelerator complex.

The following table gives some examples for individual interlock systems names [3][4] as referenced in the LHC Layout database:

	Interlock system name
PIC example	CIP.UA83. AL8
WIC example	CIW.UA47.LR4
BIC proposal	CIB.UA87.R8

Here below some examples for BIC system names and Front-End Computer (FEC) names as respectively referenced in the LHC Layout database and in the network database:

I. For the LHC Beam Interlock System (LHC-BIS):

BIC system name	FEC name
CIB.UA87.R8	CFV-UA87-CIBR8
CIB.UJ33.U3	CFV-UJ33-CIBU3

II. For the (LHC) Injection Beam Interlock System (*INJ-BIS*):

CIB.SR2.INJ1	CFV-SR2-CIBINJ1

III. For the (SPS) Extraction Beam Interlock System (*EXT-BIS*):

CIB.BA6.EXT1	CFV-BA6-CIBEXT1
CIB.BA4.TT40	CFV-BA4-CIBTT40

IV. For the SPS Beam Interlock System (SPS-BIS):

CIB.BA1.S1 CFV-BA1-	CIBS1
---------------------	-------

In appendix#2, at the end of this document, a table shows all the proposed names for the different BICs and Front-End Computers.

Page 7 of 14

4. NAMING OF THE SOFTWARE DEVICES

The interlock system names are also used as identifiers for the software devices deployed on front-end computers, i.e. the FESA devices.

As written in Chapter 2, a BIC system is composed of either one or two CIBM board(s). In addition, there is possibly one (or two) CIBG board(s) installed in the crate. These boards are remotely accessible as FESA devices.

Here below some examples of FESA names when there is only one set of boards installed in a BIC system (i.e. a BIC crate):

BIC system name	FESA device name	FESA device name description
CIB.SR2.INJ1	CIBM.SR2.INJ1	for the unique CIBM board of the crate
Ш Ш	CIBG.SR2.INJ1	for a CIBG board placed in the crate
		both are installed in the BIC system dedicated to the injection part of LHC beam 1

CIB.BA1.S1	CIBM.BA1.S1	for the unique CIBM board of the crate
ш ш	CIBG.BA1.S1	for a CIBG board placed in the crate
		both are in the BIC system dedicated to the sextant 1 part of the SPS ring

In some cases (LHC-BIS and EXT-BIS), there are two sets of boards installed in a BIC crate. Here below some examples:

BIC system name	FESA device name	FESA name device Description
CIB.UA63.L6	CIBM.UA63.L6.B1	for the CIBM managing the Beam 1 part
и и	CIBM.UA63.L6.B2	for the CIBM managing the Beam 2 part
	CIBG.UA63.L6.B1	for a CIBG handling the Beam 1 Permit loop
		all are installed in the LHC BIC system dedicated to the left of point 6

CIB.BA4.TT40	CIBM.BA4.TT40.1	for the CIBM managing 1st half of TT40 signals	
"" " CIBM.BA4.TT40.2		for the CIBM managing 2 nd half of TT40 signals	
		both are installed in the BIC system dedicated to the TT40 part of the SPS Transfer lines	

Page 8 of 14

5. SIGNAL NAMES

5.1 ENTITIES CODES FOR SIGNAL ISSUED AND RECEIVED BY THE BIS

It has been defined that a BIC system will include the VME crate with the installed cards as well as all the User interfaces (CIBU) which are connected to this VME crate. The RS422 links in between the BIC cards and the User interfaces are considered to be internal to the system and no signal names are defined for the time being. All signals connected to the outside world will use the corresponding 'BIC Name' as the signal entity (see chapter 3 for details).

Examples for entity codes:

CIB.US15.L1 (for all signals connected to the LHC BIC left of point 1),

CIB.BA4.S4 (for all signals connected to the SPS BIC in BA4)

5.2 QUANTITY CODE FOR SIGNAL ISSUED AND RECEIVED BY THE LHC BIS

Designation for LHC BIS and for INJ-BIS	Proposed SIGNAL_NAME
Beam-1's User Permit channel 'A' from User system	ST_UPERM_B1_A_UsrName
Beam-1's User Permit channel 'B' from User system	ST_UPERM_B1_B_UsrName
Beam-2's User Permit channel 'A' from User system	ST_UPERM_B2_A_UsrName
Beam-2's User Permit channel 'B' from User system	ST_UPERM_B2_B_UsrName
Both Beam's User Permit channel 'A' from User system	ST_UPERM_B1B2_A_UsrName
Both Beam's User Permit channel 'B' from User system	ST_UPERM_B1B2_B_UsrName
Beam-1 Info to User system	CMD_BINFO_B1_UsrName
Beam-2 Info to User system	CMD_BINFO_B2_UsrName
Both Beam Info to User system	CMD_BINFO_B1B2_UsrName
Beam-1 Permit channel 'A' to next BIC or to Kicker system	CMD_BPERM_B1_A
Beam-1 Permit channel 'B' to next BIC or to Kicker system	CMD_BPERM_B1_B
Beam-2 Permit channel 'A' to next BIC or to Kicker system	CMD_BPERM_B2_A
Beam-2 Permit channel 'B' to next BIC or to Kicker system	CMD_BPERM_B2_B
Beam-1 Permit channel 'A' received from previous BIC	ST_BPERM_B1_A
Beam-1 Permit channel 'B' received from previous BIC	ST_BPERM_B1_B
Beam-2 Permit channel 'A' received from previous BIC	ST_BPERM_B2_A
Beam-2 Permit channel 'B' received from previous BIC	ST_BPERM_B2_B
Beam-1 Local Permit channel 'A' for Beam 1	CMD_LOC_BPERM_B1_A
Beam-1 Local Permit channel 'B' for Beam 1	CMD_LOC_BPERM_B1_B
Beam-2 Local Permit channel 'A' for Beam 2	CMD_LOC_BPERM_B2_A
Beam-2 Local Permit channel 'B' for Beam 2	CMD_LOC_BPERM_B2_B
Beam-1 Status of Safe Beam Flag channel 'A'	ST_SBF_B1_A
Beam-1 Status of Safe Beam Flag channel 'B'	ST_SBF _B1_B
Beam-2 Status of Safe Beam Flag channel 'A'	ST_SBF _B2_A
Beam-2 Status of Safe Beam Flag channel 'B'	ST_SBF_B2_B

<u>Note:</u> "UsrName" is the *User System*'s abbreviation as "VAC" for the Vacuum system (see list in Appendix#3).

Examples for complete signal names could be the following: CIB.US15.L1: ST_UPERM_B1_A_VAC and CIB.US15.L1: ST_UPERM_B1_B_VAC

Page 9 of 14

5.3 QUANTITY CODE FOR SIGNAL ISSUED AND RECEIVED BY THE SPS BIS (WITH ONLY ONE BEAM)

For the SPS-BIS, there is only one beam. Therefore the beam type is not specified in the SIGNAL_NAME as shown in the following table:

Designation for SPS BIS and for EXT-BIS	Proposed SIGNAL_NAME
User Permit channel 'A' from User system	ST_UPERM_A_UsrName
User Permit channel 'B' from User system	ST_UPERM_B_UsrName
Beam Info to User system	CMD_BINFO_UsrName
Beam Permit channel 'A' to next BIC or to Kicker system	CMD_BPERM_A
Beam Permit channel 'B' to next BIC or to Kicker system	CMD_BPERM_B
Beam Permit channel 'A' received from previous BIC	ST_BPERM_A
Beam Permit channel 'B' received from previous BIC	ST_BPERM_B
Beam Local Permit channel 'A'	CMD_LOC_BPERM_A
Beam Local Permit channel 'B'	CMD_LOC_BPERM_B

Examples for complete signal names could be the following:

CIB.BA4.S4: ST_UPERM_A_VAC CIB.BA4.S4: ST_UPERM_B_VAC CIB.BA4.S4: ST_BINFO_VAC

5.4 QUANTITY CODE FOR SIGNAL ISSUED AND RECEIVED BY THE TRANSFER LINE BIS (WITH ONLY ONE BEAM)

For the EXT-BIS, there is only one beam as well. Due to the hierarchical structure (Master BIC inputs are Slave BICs outputs), the signal names "ST_BPERM" are becoming "ST_UPERM" as shown in the following table:

Designation for SPS BIS and for EXT-BIS	Proposed SIGNAL_NAME
User Permit channel 'A' from User system	ST_UPERM_A_UsrName
User Permit channel 'B' from User system	ST_UPERM_B_UsrName
Beam Info to User system	CMD_BINFO_UsrName
Beam Permit channel 'A' from Master BIC to Kicker system	CMD_BPERM_A
Beam Permit channel 'B' from Master BIC to Kicker system	CMD_BPERM_B
Beam Permit channel 'A' received from a Slave BIC	ST_UPERM_A_BicName
Beam Permit channel 'B' received from a Slave BIC	ST_UPERM_B_BicName
Beam Local Permit channel 'A'	CMD_LOC_BPERM_A
Beam Local Permit channel 'B'	CMD_LOC_BPERM_B

Page 10 of 14

5.5 SIGNALS ISSUED AND RECEIVED BY THE USER SYSTEMS IN THE LHC

The following quantity codes are recommended to be used by ALL *User Systems* of the BIS. This will help maintaining coherency in the signal naming for the signals exchanged in between the BIS and the *User Systems* by defining identical names for the signal at the USER side.

The Entity codes is in these cases of course the *User System*, e.g CIP.UA83.AL8 (for a PIC in UA83, managing the arc left of point 8).

Designation for LHC BIS and for INJ-BIS	Proposed SIGNAL_NAME
Beam-1's User Permit channel 'A' to BIC	CMD_UPERM_B1_A
Beam-1's User Permit channel 'B' to BIC	CMD_UPERM_B1_B
Beam-2's User Permit channel 'A' to BIC	CMD_UPERM_B2_A
Beam-2's User Permit channel 'B' to BIC	CMD_UPERM_B2_B
Both Beam's User Permit channel 'A' to BIC	CMD_UPERM_B1B2_A
Both Beam's User Permit channel 'B' to BIC	CMD_UPERM_B1B2_B
Beam-1 Info received by User system	ST_BINFO_B1
Beam-2 Info received by User system	ST_BINFO_B2
Both Beam Info received by User system	ST_BINFO_B1B2
Note concerning the above signals: The User Systems have the possib indication of the availability of the beam operation. This information, named BEAM_INFO is available via the CIBU. More c	
Beam-1 Permit channel 'A' received by Kicker system	ST_BPERM_B1_A
Beam-1 Permit channel 'B' received by Kicker system	ST_BPERM_B1_B
Beam-2 Permit channel 'A' received by Kicker system	ST_BPERM_B2_A
Beam-2 Permit channel 'B' received by Kicker system	ST_BPERM_B2_B

Examples for complete signal names could be the following:

CIP.UA83.AL8: CMD_UPERM_B1B2_A

CIP.UA83.AL8: ST_BINFO_B1B2

5.6 SIGNALS ISSUED AND RECEIVED BY THE USER SYSTEMS IN THE SPS AND THE TRANSFER LINES

Designation for SPS BIS and for EXT-BIS	Proposed SIGNAL_NAME
User Permit channel 'A' to BIC	CMD_UPERM_A
User Permit channel 'B' to BIC	CMD_UPERM_B
Beam Info received by User system	ST_BINFO
Beam Permit channel 'A' received by Kicker system	ST_BPERM_A
Beam Permit channel 'B' received by Kicker system	ST_BPERM_B

LHC Project Document No. AB-CO-QA-0001-01-20

Page 11 of 14

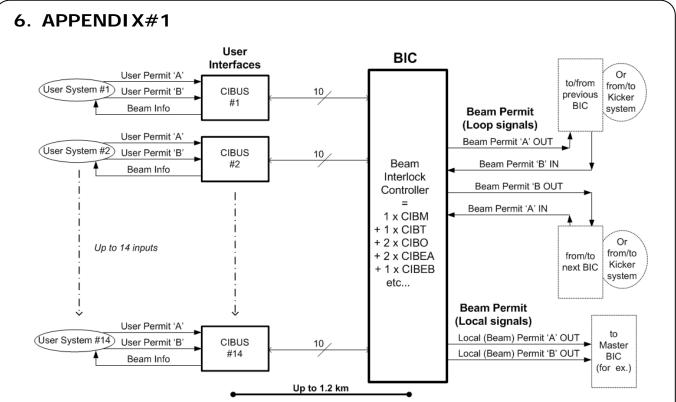
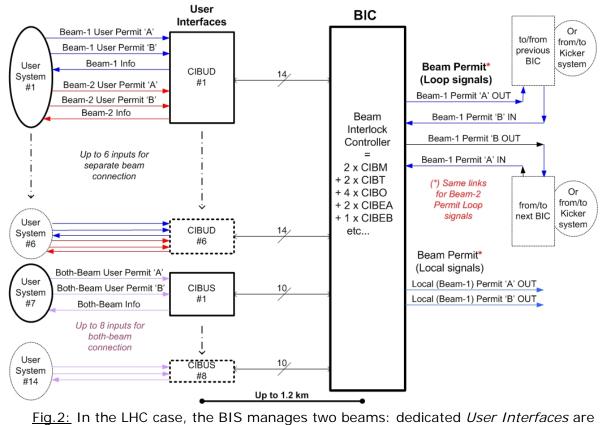


Fig.1: For most of the Beam Interlock Systems, the *Beam Interlock Controller* and the distant *User Interfaces* (type CIBUS) are composing the hardware solution



available for double connection (type CIBUD) and the corresponding signals are dual.

LHC Project Document No.

Page 12 of 14

7. APPENDIX#2

The following table gives the names for the different BICs and Front-End Computers:

LHC BIC in R1 CIB U315.R1 CFV-U315-CIBR1 U315 CYCIB 02US15 LHC BIC in R2 CIB.UA23.L2 CFV-UA23-CIBL2 UA23 CYCIB.01UA23 LHC BIC in R2 CIB.UA23.L3 CFV-UA33-CIBR2 UA27 CYCIB.01UA23 LHC BIC in IP3 underground CIB.U33.U3 CFV-UA3-CIBR2 UA27 CYCIB.01UA33 LHC BIC in IP3 underground CIB.UA43.L4 CFV-UA47-CIBR2 UA47 CYCIB.01UA43 LHC BIC in IP3 underground CIB.UA43.L4 CFV-UA47-CIBR4 UA47 CYCIB.01UA44 LHC BIC in R4 CIB.UA65.L5 CFV-UA57-CIBR4 UA47 CYCIB.01UA44 LHC BIC in R5 CIB.UA63.L6 CFV-UA67-CIBR6 UA63 CYCIB.01UA64 LHC BIC in R5 CIB.UA63.L6 CFV-UA67-CIBR6 UA63 CYCIB.01UA65 LHC BIC in R6 CIB.UA63.L6 CFV-UA67-CIBR6 UA63 CYCIB.01UA64 LHC BIC in R6 CIB.UA63.L6 CFV-UA67-CIBR6 UA63 CYCIB.01UA65 LHC BIC in R6 CIB.UA63.L6 CFV-UA647-CIBR6 UA63 CYCIB.01UA64 LHC BIC in R6 <t< th=""><th></th><th>bliowing table gives the han</th><th>les for the differe</th><th></th><th></th><th></th></t<>		bliowing table gives the han	les for the differe			
LHC BIC in R1 CIB U315.R1 CFV-U315-CIBR1 US15 CYCIB 02US15 LHC BIC in L2 CIB UA23.L2 CFV-UA23-CIBL2 UA23 CYCIB.01UA23 LHC BIC in R2 CIB.UA27.R2 CFV-UA27-CIBR2 UA23 CYCIB.01UA23 LHC BIC in IP3 underground CIB.U33.U3 CFV-UA37-CIBR2 UA23 CYCIB.01UA33 LHC BIC in IP3 underground CIB.UA43.L4 CFV-UA47-CIBR4 UA47 CYCIB.01UA43 LHC BIC in R4 CIB.UA47.R4 CFV-UA47-CIBR4 UA47 CYCIB.01UA43 LHC BIC in R5 CIB.UA63.L6 CFV-UA36-CIBR4 UA47 CYCIB.01UA43 LHC BIC in R5 CIB.UA63.L6 CFV-UA67-CIBR4 UA47 CYCIB.01UA63 LHC BIC in R5 CIB.UA63.L6 CFV-UA67-CIBR6 UA63 CYCIB.01UA63 LHC BIC in R6 CIB.SR7.S7<			BIC Name	FEC Name	Loc.	Rack
LHC BIC in L2 CIB UA23.L2 CFV-UA23-CIBL2 UA23 CYCIB.01UA23 LHC BIC in R2 CIB.UA27.R2 CFV-UA37-CIBR2 UA27 CYCIB.01UA23 LHC BIC in IP3 underground CIB.U33.U3 CFV-U333-CIBU3 UJ33 CYCIB.01UA33 LHC BIC in IP3 underground CIB.UA43.L4 CFV-U343-CIBU3 UJ43 CYCIB.01UA43 LHC BIC in R4 CIB.UA47.R4 CFV-UA47-CIBR4 UA43 CYCIB.01UA43 LHC BIC in R5 CIB.U366.R5 CFV-UA47-CIBR4 UA43 CYCIB.01UA53 LHC BIC in R5 CIB.U366.R5 CFV-UA47-CIBR4 UA43 CYCIB.01UA63 LHC BIC in R5 CIB.UA67.R6 CFV-UA63-CIBR6 UA67 CYCIB.01UA63 LHC BIC in R7 underground CIB.Z76.U7 CFV-I287-CIBS7 SR7 YYACS.01SR3 LHC BIC in R7 CIB.UA87.R8 CFV-UA83-CIBL8 UA83 CYCIB.01UA63 LHC BIC in R8 CIB.UA87.R8 CFV-UA83-CIBL7 UA87 CYCIB.01UA83 LHC BIC in CCR CIB.CR.LR CFV-CRR-CIBST SR7 YYACS.01SR3 LHC BIC in CCR CIB.B		LHC BIC in L1	CIB.US15.L1	CFV-US15-CIBL1	US15	CYCIB.01US152
LHC BIC in R2 CIB UA27.R2 CFV-UA27-CIBR2 UA27 CYCIB.01UA23 LHC BIC in IP3 underground CIB.UJ33.U3 CFV-UJ33-CIBU3 UJJ33 CYCIB.01UA23 LHC BIC in IP3 underground CIB.UJ33.U3 CFV-UJ33-CIBU3 UJJ33 CYCIB.01UA23 LHC BIC in L4 CIB.UA47.R4 CFV-UA3-CIBL4 UA47 CYCIB.01UA43 LHC BIC in R4 CIB.UA57.R4 CFV-UJ3C55-CIBL5 USC55 CYCIB.01UA43 LHC BIC in R5 CIB.UJ56.R5 CFV-UJ3C5-CIBL5 USC55 CYCIB.01UA63 LHC BIC in R6 CIB.UA67.R6 CFV-UA63-CIBL6 UA63 CYCIB.01UA63 LHC BIC in IP7 underground CIB.IZ76.U7 CFV-TZ6-CIBU7 TZ76 CYCIB.01UA63 LHC BIC in IP7 underground CIB.UA87.R8 CFV-UA83-CIBR4 UA87 CYCIB.01UA63 LHC BIC in C8 CIB.UA87.R8 CFV-UA83-CIBR4 UA87 CYCIB.01UA63 LHC BIC in C8 CIB.UA87.R8 CFV-UA83-CIBR4 UA87 CYCIB.01UA63 LHC BIC in C8 CIB.UA87.R8 CFV-UA83-CIBR4 UA87 CYCIB.01UA83 LHC BIC in		LHC BIC in R1	CIB.US15.R1	CFV-US15-CIBR1	US15	CYCIB.02US152
Sign LHC BIC in IP3 underground CIB.UJ33.U3 CFV-UJ33-CIBU3 UJ33 CYCIB.01UJ33 LHC BIC in IP3 surface CIB.SR3.S3 CFV-SR3-CIBS3 SR3 TYACS.01SR2 LHC BIC in L4 CIB.UA43.L4 CFV-UA47-CIBL4 UA43 CYCIB.01UA43 LHC BIC in L4 CIB.UA43.L4 CFV-UA47-CIBR4 UA47 CYCIB.01UA43 LHC BIC in L4 CIB.UA56.R5 CFV-USC55-CIBL5 USC55 CYCIB.01UJ56 LHC BIC in R5 CIB.UA67.R6 CFV-UA67-CIBR4 UA43 CYCIB.01UJ65 LHC BIC in P7 underground CIB.UA67.R6 CFV-UA67-CIBR4 UA63 CYCIB.01UJ65 LHC BIC in P7 underground CIB.UA67.R6 CFV-UA67-CIBR4 UA63 CYCIB.01UA63 LHC BIC in P7 underground CIB.UA87.R8 CFV-UA83-CIBL4 UA67 CYCIB.01127 LHC BIC in R8 CIB.UA87.R8 CFV-UA83-CIBL4 UA87 CYCIB.01127 LHC BIC in R4 CIB.BA7.R3 CFV-DA8-CIBS7 SR7 YACS.01SR7 LHC BIC in R4 CIB.CR.LHC CFV-CRC-CIBLT0 CYCIB.010483 CYCIB.010483		LHC BIC in L2	CIB.UA23.L2	CFV-UA23-CIBL2	UA23	CYCIB.01UA23
LHC BIC in IP3 surface CIB.SR3.S3 CFV-SR3-CIBS3 SR3 YYACS.01SR3 LHC BIC in L4 CIB.UA43.L4 CFV-UA43-CIBL4 UA43 CYCIB.01UA43 LHC BIC in R4 CIB.UA47.R4 CFV-UA43-CIBR4 UA47 CYCIB.01UA43 LHC BIC in R5 CIB.UJ56.R5 CFV-UJ56-CIBR5 UJ56 CYCIB.01UJ56 LHC BIC in L6 CIB.UJ66.R6 CFV-UA67-CIBR6 UA47 CYCIB.01UJ66 LHC BIC in R6 CIB.UJ67.R6 CFV-UA67-CIBR6 UA63 CYCIB.01UJ66 LHC BIC in P7 surface CIB.R7.S7 CFV-UA83-CIBL8 UA63 CYCIB.01UJ66 LHC BIC in R7 SR7 YACS.01SR7 CHV-UA83-CIBL8 UA63 CYCIB.01UJ68 LHC BIC in R8 CIB.UA87.R8 CFV-UA83-CIBL8 UA63 CYCIB.01UJ48 LHC BIC in CCR CIB.CR.LHC CFV-CR-CIBLHC CCR R A 0421 SPS BIC in BA1 CIB.BA1.S1 CFV-BA2-CIBS2 BA2 RA 1314 SPS BIC in BA3 CIB.BA3.S3 CFV-BA4-CIBS4 BA4 RA 0423 SPS BIC in BA4 CIB.BA4.S4		LHC BIC in R2	CIB.UA27.R2	CFV-UA27-CIBR2	UA27	CYCIB.01UA27
Sign LHC BIC in L4 CIB.UA43.L4 CFV-UA43-CIB.L4 UA43 CYCIB.01UA43 LHC BIC in R4 CIB.UA47.R4 CFV-UA47-CIBR4 UA47 CYCIB.01UA43 LHC BIC in L5 CIB.UA67.R4 CFV-UA47-CIBR4 UA47 CYCIB.01UA53 LHC BIC in L5 CIB.UA63.L6 CFV-UA63-CIBR5 UJ56 CYCIB.01UA53 LHC BIC in R5 CIB.UA67.R6 CFV-UA67-CIBR6 UA67 CYCIB.01UA63 LHC BIC in R6 CIB.UA67.R6 CFV-UA67-CIBR6 UA67 CYCIB.01UA63 LHC BIC in R7 underground CIB.TZ76.U7 CFV-TZ76-CIBR7 UA67 CYCIB.01UA63 LHC BIC in R8 CIB.UA87.R8 CFV-UA83-CIBR8 UA87 CYCIB.01UA63 LHC BIC in R8 CIB.UA87.R8 CFV-UA83-CIBR8 UA87 CYCIB.01UA83 LHC BIC in BA1 CIB.BA1.S1 CFV-UA83-CIBR8 UA87 CYCIB.01UA83 LHC BIC in BA2 CIB.BA4.S3 CFV-BA3-CIBS1 BA1 RA 0404 SPS BIC in BA4 CIB.BA4.S3 CFV-BA3-CIBS2 BA2 RA 1313 Siave BIC in BA4		LHC BIC in IP3 underground	CIB.UJ33.U3	CFV-UJ33-CIBU3	UJ33	CYCIB.01UJ33
Bit LHC BIC in R4 CIB.UA47.R4 CFV-UA47-CIBR4 UA47 CYCIB.01UA47 LHC BIC in L5 CIB.USC55.L5 CFV-USC55-CIBL5 UJ56 CYCIB.01USC5 LHC BIC in R5 CIB.UJ66.R5 CFV-USC5-CIBL5 UJ56 CYCIB.01USC5 LHC BIC in R6 CIB.UA67.R6 CFV-UA63-CIBR6 UA67 CYCIB.01UA61 LHC BIC in IP7 underground CIB.TZ76.U7 CFV-TZ76-CIBU7 TZ76 CYCIB.01UA63 LHC BIC in IP7 surface CIB.SR7.S7 CFV-UA83-CIBL8 UA83 CYCIB.01UA83 LHC BIC in R8 CIB.UA87.R8 CFV-UA83-CIBL8 UA83 CYCIB.01UA83 LHC BIC in R8 CIB.CR.LHC CFV-BA1-CIBS1 BA1 RA 0404 SPS BIC in BA1 CIB.BA2.S2 CFV-BA2-CIBS2 BA2 RA 1314 SPS BIC in BA3 CIB.BA4.S4 CFV-BA4-CIBS4 BA4 RA 0904 SPS BIC in BA4 CIB.BA6.S5 CFV-BA5-CIBES5 BA5 RA 2603 SPS BIC in BA4 CIB.BA6.EXT1 CFV-BA4-CIBS4 BA4 RA 0904 SPS BIC in BA5 CIB.BA6.EXT1	SIS	LHC BIC in IP3 surface	CIB.SR3.S3	CFV-SR3-CIBS3	SR3	YYACS.01SR3
LHC BIC in L6 CIB.UA63.L6 CFV-UA63-CBL6 UA63 CYCIB.01UA63 LHC BIC in R6 CIB.UA67.R6 CFV-UA67-CIBR6 UA67 CYCIB.01UA63 LHC BIC in IP7 underground CIB.TZ76.U7 CFV-TZ76-CIBU7 TZ76 CYCIB.01UA63 LHC BIC in IP7 surface CIB.SR7.S7 CFV-TZ76-CIBU7 TZ76 CYCIB.01UA83 LHC BIC in CB CIB.UA83.L8 CFV-UA83-CIBL8 UA83 CYCIB.01UA83 LHC BIC in CCR CIB.CCR.LHC CFV-CCR-CIBL/C CCR RA 0621 SPS BIC in BA1 CIB.BA1.S1 CFV-BA3-CIBS2 BA2 RA 1314 SPS BIC in BA2 CIB.BA2.S2 CFV-BA3-CIBS3 BA3 RA 0404 SPS BIC in BA3 CIB.BA4.S4 CFV-BA3-CIBS3 BA3 RA 0423 SPS BIC in BA4 CIB.BA5.S5 CFV-BA3-CIBS5 BA5 RA 2603 SPS BIC in BA6 CIB.BA6.S6 CFV-BA6-CIBS5 BA6 RA 1313 Slave BIC for TT60 (1 of 2) CIB.BA6.TF00A u u u u u u u u u u </th <td>LHC BIC in L4</td> <td>CIB.UA43.L4</td> <td>CFV-UA43-CIBL4</td> <td>UA43</td> <td>CYCIB.01UA43</td>		LHC BIC in L4	CIB.UA43.L4	CFV-UA43-CIBL4	UA43	CYCIB.01UA43
LHC BIC in L6 CIB.UA63.L6 CFV-UA63-CBL6 UA63 CYCIB.01UA63 LHC BIC in R6 CIB.UA67.R6 CFV-UA67-CIBR6 UA67 CYCIB.01UA63 LHC BIC in IP7 underground CIB.TZ76.U7 CFV-TZ76-CIBU7 TZ76 CYCIB.01UA63 LHC BIC in IP7 surface CIB.SR7.S7 CFV-TZ76-CIBU7 TZ76 CYCIB.01UA83 LHC BIC in CB CIB.UA83.L8 CFV-UA83-CIBL8 UA83 CYCIB.01UA83 LHC BIC in CCR CIB.CAR.LHC CFV-CCR-CIBL/C CCR RA 0621 SPS BIC in BA1 CIB.BA1.S1 CFV-BA1-CIBS1 BA1 RA 0404 SPS BIC in BA2 CIB.BA2.S2 CFV-BA3-CIBS2 BA2 RA 1314 SPS BIC in BA3 CIB.BA4.S4 CFV-BA3-CIBS3 BA3 RA 0423 SPS BIC in BA4 CIB.BA5.S5 CFV-BA3-CIBS5 BA5 RA 2603 SPS BIC in BA6 CIB.BA6.S6 CFV-BA6-CIBS5 BA6 RA 1313 Slave BIC for TT60 (1 of 2) CIB.BA6.TT60A """"""""""""""""""""""""""""""""""""		LHC BIC in R4	CIB.UA47.R4	CFV-UA47-CIBR4	UA47	CYCIB.01UA47
LHC BIC in L6 CIB.UA63.L6 CFV-UA63-CIBL6 UA63 CYCIB.01UA63 LHC BIC in R6 CIB.UA67.R6 CFV-UA67-CIBR6 UA67 CYCIB.01UA61 LHC BIC in IP7 underground CIB.TZ76.U7 CFV-TZ76-CIBU7 TZ76 CYCIB.01UA63 LHC BIC in IP7 underground CIB.TZ76.U7 CFV-TZ76-CIBU7 TZ76 CYCIB.01UA83 LHC BIC in IP7 underground CIB.SR7.S7 CFV-UA83-CIBL8 UA83 CYCIB.01UA83 LHC BIC in CR CIB.UA83.L8 CFV-UA83-CIBL8 UA87 CYCIB.01UA83 LHC BIC in CCR CIB.CCR.LHC CFV-CCR-CIBL/C CCR RA 0621 SPS BIC in BA1 CIB.BA1.S1 CFV-BA3-CIBS2 BA2 RA 1314 SPS BIC in BA2 CIB.BA4.S4 CFV-BA3-CIBS3 BA3 RA 0404 SPS BIC in BA4 CIB.BA4.S4 CFV-BA3-CIBS3 BA4 RA 0904 SPS BIC in BA5 CIB.BA5.S5 CFV-BA5-CIBS5 BA5 RA 2603 SPS BIC in BA6 CIB.BA6.TF00A # # # # Slave BIC for TT60 (1 of 2) CIB.BA6.TF00A	Ъ	LHC BIC in L5	CIB.USC55.L5	CFV-USC55-CIBL5	USC55	CYCIB.01USC55
LHC BIC in L6 CIB.UA63.L6 CFV-UA63-CIBL6 UA63 CYCIB.01UA63 LHC BIC in R6 CIB.UA67.R6 CFV-UA67-CIBR6 UA67 CYCIB.01UA61 LHC BIC in IP7 underground CIB.TZ76.U7 CFV-TZ76-CIBU7 TZ76 CYCIB.01UA63 LHC BIC in IP7 underground CIB.TZ76.U7 CFV-TZ76-CIBU7 TZ76 CYCIB.01UA83 LHC BIC in IP7 underground CIB.SR7.S7 CFV-UA83-CIBL8 UA83 CYCIB.01UA83 LHC BIC in CR CIB.UA83.L8 CFV-UA83-CIBL8 UA87 CYCIB.01UA83 LHC BIC in CCR CIB.CCR.LHC CFV-CCR-CIBL/C CCR RA 0621 SPS BIC in BA1 CIB.BA1.S1 CFV-BA3-CIBS2 BA2 RA 1314 SPS BIC in BA2 CIB.BA4.S4 CFV-BA3-CIBS3 BA3 RA 0404 SPS BIC in BA4 CIB.BA4.S4 CFV-BA3-CIBS3 BA4 RA 0904 SPS BIC in BA5 CIB.BA5.S5 CFV-BA5-CIBS5 BA5 RA 2603 SPS BIC in BA6 CIB.BA6.TF00A # # # # Slave BIC for TT60 (1 of 2) CIB.BA6.TF00A	Ŧ	LHC BIC in R5	CIB.UJ56.R5	CFV-UJ56-CIBR5	UJ56	CYCIB.01UJ56
LHC BIC in IP7 underground CIB.TZ76.U7 CFV-TZ76-CIBU7 TZ76 CYCIB.01TZ76 LHC BIC in IP7 surface CIB.SR7.S7 CFV-SR7-CIBS7 SR7 YYACS.01SR7 LHC BIC in L8 CIB.UA83.L8 CFV-UA83-CIBL8 UA83 CYCIB.01UA83 LHC BIC in CCR CIB.UA87.R8 CFV-UA83-CIBL8 UA83 CYCIB.01UA83 LHC BIC in CCR CIB.CCR.LHC CFV-CCR-CIBLHC CCR RA 0621 SPS BIC in BA1 CIB.BA1.S1 CFV-BA1-CIBS2 BA2 RA 1314 SPS BIC in BA2 CIB.BA3.S3 CFV-BA2-CIBS2 BA2 RA 1314 SPS BIC in BA3 CIB.BA5.S5 CFV-BA4-CIBS4 BA4 RA 0904 SPS BIC in BA6 CIB.BA6.S6 CFV-BA6-CIBS5 BA5 RA 2603 SPS BIC in BA6 CIB.BA6.S6 CFV-BA7-CIBS7 BA6 RA 1313 Slave BIC for TT60 (1 of 2) CIB.BA7.TT60B CFV-BA7-CIBT60 BA7 RA 3318 Slave BIC for Ti20pstream CIB.BA7.TT60A ## ## ## ## Slave BIC for Ti20pstream CIB.BA7.TT60A	-	LHC BIC in L6	CIB.UA63.L6	CFV-UA63-CIBL6	UA63	CYCIB.01UA63
LHC BIC in IP7 surface CIB.SR7.S7 CFV-SR7-CIBS7 SR7 YYACS.01SR7 LHC BIC in L8 CIB.UA83.L8 CFV-UA83-CIBL8 UA83 CYCIB.01UA83 LHC BIC in R8 CIB.UA87.R8 CFV-UA83-CIBR8 UA87 CYCIB.01UA83 LHC BIC in CCR CIB.CCR.LHC CFV-UA83-CIBR8 UA87 CYCIB.01UA83 LHC BIC in CCR CIB.CCR.LHC CFV-CCR-CIBLHC CCR RA 0621 SPS BIC in BA1 CIB.BA1.S1 CFV-BA1-CIBS1 BA1 RA 0404 SPS BIC in BA2 CIB.BA3.S3 CFV-BA3-CIBS2 BA2 RA 1314 SPS BIC in BA3 CIB.BA4.S4 CFV-BA3-CIBS4 BA4 RA 0904 SPS BIC in BA5 CIB.BA5.S5 CFV-BA5-CIBS5 BA5 RA 2603 SPS BIC in LS6 CIB.BA6.TT60A ## ## ## ## Slave BIC for TE0 (2 of 2) CIB.BA7.T12U ## ## ## ## Slave BIC for T12downstream CIB.BA4.T12D CFV-BA4-CIBEXT2 BA4 RA 0904 Slave BIC for T140 (2 of 2) CIB.BA4.T140A <td< th=""><td></td><td>LHC BIC in R6</td><td>CIB.UA67.R6</td><td>CFV-UA67-CIBR6</td><td>UA67</td><td>CYCIB.01UA67</td></td<>		LHC BIC in R6	CIB.UA67.R6	CFV-UA67-CIBR6	UA67	CYCIB.01UA67
LHC BIC in L8 CIB.UA83.L8 CFV-UA83-CIBL8 UA83 CYCIB.01UA83 LHC BIC in R8 CIB.UA87.R8 CFV-UA83-CIBR8 UA87 CYCIB.01UA87 LHC BIC in R8 CIB.UA87.R8 CFV-UA83-CIBR8 UA87 CYCIB.01UA87 LHC BIC in CCR CIB.CCR.LHC CFV-CCR-CIBLHC CCR RA 0621 SPS BIC in BA1 CIB.BA1.S1 CFV-BA1-CIBS1 BA1 RA 0404 SPS BIC in BA2 CIB.BA2.S2 CFV-BA2-CIBS2 BA2 RA 1314 SPS BIC in BA3 CIB.BA3.S3 CFV-BA3-CIBS3 BA3 RA 0423 SPS BIC in BA4 CIB.BA5.S5 CFV-BA4-CIBS4 BA4 RA 0904 SPS BIC in BA6 CIB.BA6.S6 CFV-BA6-CIBS5 BA5 RA 2603 SPS BIC in BA6 CIB.BA6.TF60A ## ## ## ## Slave BIC for TT60 (1 of 2) CIB.BA7.TT60B CFV-BA7-CIBTE60 BA7 RA 3318 Slave BIC for Ti2downstream CIB.BA7.TT2U ## ## ## ## Slave BIC for Ti2downstream CIB.BA4.TT40A CFV-SR2-CI		LHC BIC in IP7 underground	CIB.TZ76.U7	CFV-TZ76-CIBU7	TZ76	CYCIB.01TZ76
LHC BIC in L8 CIB.UA83.L8 CFV-UA83-CIBL8 UA83 CYCIB.01UA83 LHC BIC in R8 CIB.UA87.R8 CFV-UA83-CIBR8 UA87 CYCIB.01UA87 LHC BIC in R8 CIB.UA87.R8 CFV-UA83-CIBR8 UA87 CYCIB.01UA87 LHC BIC in CCR CIB.CCR.LHC CFV-CR-CIBLHC CCR RA 0621 SPS BIC in BA1 CIB.BA1.S1 CFV-BA1-CIBS1 BA1 RA 0404 SPS BIC in BA2 CIB.BA2.S2 CFV-BA2-CIBS2 BA2 RA 1314 SPS BIC in BA3 CIB.BA3.S3 CFV-BA3-CIBS3 BA3 RA 0423 SPS BIC in BA4 CIB.BA5.S5 CFV-BA4-CIBS4 BA4 RA 0904 SPS BIC in BA6 CIB.BA6.S6 CFV-BA6-CIBS5 BA5 RA 2603 SPS BIC in BA6 CIB.BA6.TF00A ## ## ## ## Slave BIC for TT60 (1 of 2) CIB.BA7.TT60B CFV-BA7-CIBTE0 BA7 RA 3318 Slave BIC for Ti2downstream CIB.BA7.TT2U ## ## ## ## Slave BIC for Ti2downstream CIB.BA4.TT40A CFV-SR2-CIBT				CFV-SR7-CIBS7	SR7	YYACS.01SR7
LHC BIC in CCR CIB.CCR.LHC CFV-CCR-CIBLHC CCR RA 0621 SPS BIC in BA1 CIB.BA1.S1 CFV-BA1-CIBS1 BA1 RA 0404 SPS BIC in BA2 CIB.BA2.S2 CFV-BA2-CIBS2 BA2 RA 1314 SPS BIC in BA3 CIB.BA3.S3 CFV-BA3-CIBS3 BA3 RA 0423 SPS BIC in BA4 CIB.BA4.S4 CFV-BA4-CIBS4 BA4 RA 0904 SPS BIC in BA5 CIB.BA5.S5 CFV-BA5-CIBS5 BA5 RA 2603 SPS BIC in BA6 CIB.BA6.S6 CFV-BA6-CIBS6 BA6 RA 1313 Slave BIC for Tt60 (1 of 2) CIB.BA6.Tf60A ## ## ## Slave BIC for Tt60 (2 of 2) CIB.BA7.Tf2U ## ## ## ## Slave BIC for Ti2downstream CIB.BA7.Tf2U ## ## ## ## ## Slave BIC for Tt30 (1 of 2) CIB.BA7.Tf2U ## ## ## ## ## ## ## Slave BIC for Tt30wnstream CIB.BA4.TT40B CFV-SR2-CIBT12D SR2 YYACS.01S <			CIB.UA83.L8	CFV-UA83-CIBL8	UA83	CYCIB.01UA83
LHC BIC in CCR CIB.CCR.LHC CFV-CCR-CIBLHC CCR RA 0621 SPS BIC in BA1 CIB.BA1.S1 CFV-BA1-CIBS1 BA1 RA 0404 SPS BIC in BA2 CIB.BA2.S2 CFV-BA2-CIBS2 BA2 RA 1314 SPS BIC in BA3 CIB.BA3.S3 CFV-BA3-CIBS3 BA3 RA 0423 SPS BIC in BA4 CIB.BA4.S4 CFV-BA4-CIBS4 BA4 RA 0904 SPS BIC in BA5 CIB.BA5.S5 CFV-BA5-CIBS5 BA5 RA 2603 SPS BIC in BA6 CIB.BA6.S6 CFV-BA6-CIBS6 BA6 RA 1313 Slave BIC for TT60 (1 of 2) CIB.BA6.T60A ## ## ## Slave BIC for TT60 (2 of 2) CIB.BA7.T160B CFV-BA7-CIBT160 BA7 RA 3318 Slave BIC for Ti2downstream CIB.BA7.T12U ## ## ## ## Slave BIC for T140 (2 of 2) CIB.BA7.T12D CFV-SR2-CIBT12D SR2 YYACS.01S Master BIC for T30wnstream CIB.BA4.T140A CFV-BA4-CIBEXT2 BA4 RA 0904 Slave BIC for T140 (2 of 2) CIB.BA4.T140B ##<						CYCIB.01UA87
Sec SPS BIC in BA1 CIB.BA1.S1 CFV-BA1-CIBS1 BA1 RA 0404 SPS BIC in BA2 CIB.BA2.S2 CFV-BA2-CIBS2 BA2 RA 1314 SPS BIC in BA3 CIB.BA3.S3 CFV-BA2-CIBS3 BA3 RA 0423 SPS BIC in BA4 CIB.BA4.S4 CFV-BA4-CIBS4 BA4 RA 0904 SPS BIC in BA5 CIB.BA4.S4 CFV-BA5-CIBS5 BA5 RA 2603 SPS BIC in BA6 CIB.BA6.S5 CFV-BA6-CIBS6 BA6 RA 1313 SPS BIC in BA6 CIB.BA6.EXT1 CFV-BA6-CIBS6 BA6 RA 1313 Siave BIC for Tf60 (1 of 2) CIB.BA6.TF60A ## ## ## Slave BIC for Tf60 (2 of 2) CIB.BA7.TF60B CFV-BA7-CIBTF60 BA7 RA 318 Slave BIC for Ti2downstream CIB.BA7.TI2U ## ## ## ## Slave BIC for Ti2downstream CIB.BA4.TT2D CFV-BA4-CIBEXT2 BA4 RA 0904 Slave BIC for Ti40 (1 of 2) CIB.BA4.TT40A CFV-BA4-CIBEXT2 BA4 RA 0904 Slave BIC for TT40 (2 of 2) CIB.BA4.TT40A<			CIB.CCR.LHC	CFV-CCR-CIBLHC		
Sign SPS BIC in BA2 CIB.BA2.S2 CFV-BA2-CIBS2 BA2 RA 1314 SPS BIC in BA3 CIB.BA3.S3 CFV-BA3-CIBS3 BA3 RA 0423 SPS BIC in BA4 CIB.BA4.S4 CFV-BA4-CIBS4 BA4 RA 0904 SPS BIC in BA5 CIB.BA5.S5 CFV-BA5-CIBS5 BA5 RA 2603 SPS BIC in BA6 CIB.BA6.S6 CFV-BA6-CIBS6 BA6 RA 1313 Master BIC for Beam-1 Extraction in LSS6 CIB.BA6.TT60A ## ## Slave BIC for TT60 (1 of 2) CIB.BA7.TT60B CFV-BA7-CIBTT60 BA7 RA 3318 Slave BIC for Ti2upstream CIB.BA7.T12U ## ## ## ## Slave BIC for Ti2upstream CIB.BA7.T12U ## ## ## ## Slave BIC for Ti2upstream CIB.BA7.T12U ## ## ## ## Slave BIC for Ti40 (1 of 2) CIB.BA4.T12U ## ## ## ## Slave BIC for TT40 (2 of 2) CIB.BA4.T140A CFV-BA4-CIBEXT2 BA4 RA 0904 Slave BIC for TT40						
Sign SPS BIC in BA2 CIB.BA2.S2 CFV-BA2-CIBS2 BA2 RA 1314 SPS BIC in BA3 CIB.BA3.S3 CFV-BA3-CIBS3 BA3 RA 0423 SPS BIC in BA4 CIB.BA4.S4 CFV-BA4-CIBS4 BA4 RA 0904 SPS BIC in BA5 CIB.BA5.S5 CFV-BA5-CIBS5 BA5 RA 2603 SPS BIC in BA6 CIB.BA6.S6 CFV-BA6-CIBS6 BA6 RA 1313 Master BIC for Beam-1 Extraction in LSS6 CIB.BA6.TF60A ## ## Slave BIC for TT60 (1 of 2) CIB.BA7.TT60B CFV-BA7-CIBTT60 BA7 RA 3318 Slave BIC for Ti2upstream CIB.BA7.T12U ## ## ## ## Slave BIC for Ti2upstream CIB.BA7.T12U ## ## ## ## Slave BIC for Ti2upstream CIB.BA7.T12U ## ## ## ## Slave BIC for Ti2upstream CIB.BA7.T12U ## ## ## ## Slave BIC for Ti40 (1 of 2) CIB.BA4.TT40A CFV-SR2-CIBT12D SR2 YYACS.01S Slave BIC for TT40		SPS BIC in BA1	CIB.BA1.S1	CFV-BA1-CIBS1	BA1	RA 0404
SPS BIC in BA3 CIB.BA3.S3 CFV-BA3-CIBS3 BA3 RA 0423 SPS BIC in BA4 CIB.BA4.S4 CFV-BA4-CIBS4 BA4 RA 0904 SPS BIC in BA5 CIB.BA5.S5 CFV-BA5-CIBS5 BA5 RA 2603 SPS BIC in BA6 CIB.BA6.S6 CFV-BA6-CIBS6 BA6 RA 1313 Master BIC for Beam-1 Extraction in LSS6 CIB.BA6.EXT1 CFV-BA6-CIBEXT1 BA6 RA 1313 Slave BIC for TT60 (1 of 2) CIB.BA6.EXT1 CFV-BA6-CIBEXT1 BA6 RA 1313 Slave BIC for TT60 (2 of 2) CIB.BA7.TT60B CFV-BA7-CIBT60 BA7 RA 3318 Slave BIC for Ti2upstream CIB.BA7.TT2U ## ## ## ## Slave BIC for Ti2upstream CIB.BA4.TT2U CFV-SR2-CIBTI2D SR2 YYACS.01SI Master BIC for T140 (1 of 2) CIB.BA4.TT40A CFV-BA4-CIBEXT2 BA4 RA 0904 Slave BIC for T140 (2 of 2) CIB.BA4.TT40A CFV-BA4-CIBEXT2 BA4 RA 0904 Slave BIC for T140 (2 of 2) CIB.BA4.TT40A CFV-BA4-CIBET40 BA4 RA 0904						
SPS BIC in BA6 CIB.BA6.S6 CFV-BA6-CIBS6 BA6 RA 1313 Master BIC for Beam-1 Extraction in LSS6 CIB.BA6.EXT1 CFV-BA6-CIBEXT1 BA6 RA 1313 Slave BIC for TT60 (1 of 2) CIB.BA6.TT60A ## ## ## ## ## Slave BIC for TT60 (2 of 2) CIB.BA6.TT60A ## ## ## ## ## ## Slave BIC for T120pstream CIB.BA7.TT60B CFV-BA7-CIBTT60 BA7 RA 3318 Slave BIC for Ti20pstream CIB.BA7.TI2U ## ## ## ## Master BIC for Talopstream CIB.BA7.TI2D CFV-SR2-CIBTI2D SR2 YYACS.01S Master BIC for Talopstream CIB.BA4.EXT2 CFV-BA4-CIBEXT2 BA4 RA 0904 Slave BIC for T140 (1 of 2) CIB.BA4.TT40A CFV-BA4-CIBEXT4 BA4 RA 0904 Slave BIC for T140 (2 of 2) CIB.BA4.TT40B ## ## ## ## Slave BIC for T141 (1 of 2) CIB.BA4.TT40B ## ## ## ## Slave BIC for T141 (2 of 2)	3IS					RA 0423
SPS BIC in BA6 CIB.BA6.S6 CFV-BA6-CIBS6 BA6 RA 1313 Master BIC for Beam-1 Extraction in LSS6 CIB.BA6.EXT1 CFV-BA6-CIBEXT1 BA6 RA 1313 Slave BIC for TT60 (1 of 2) CIB.BA6.TT60A ## ## ## ## ## Slave BIC for TT60 (2 of 2) CIB.BA6.TT60A ## ## ## ## ## ## Slave BIC for T120pstream CIB.BA7.TT60B CFV-BA7-CIBTT60 BA7 RA 3318 Slave BIC for Ti20pstream CIB.BA7.TI2U ## ## ## ## Master BIC for Talopstream CIB.BA7.TI2D CFV-SR2-CIBTI2D SR2 YYACS.01S Master BIC for Talopstream CIB.BA4.EXT2 CFV-BA4-CIBEXT2 BA4 RA 0904 Slave BIC for T140 (1 of 2) CIB.BA4.TT40A CFV-BA4-CIBEXT4 BA4 RA 0904 Slave BIC for T140 (2 of 2) CIB.BA4.TT40B ## ## ## ## Slave BIC for T141 (1 of 2) CIB.BA4.TT40B ## ## ## ## Slave BIC for T141 (2 of 2)	SPS-B					
SPS BIC in BA6 CIB.BA6.S6 CFV-BA6-CIBS6 BA6 RA 1313 Master BIC for Beam-1 Extraction in LSS6 CIB.BA6.EXT1 CFV-BA6-CIBEXT1 BA6 RA 1313 Slave BIC for TT60 (1 of 2) CIB.BA6.TT60A ## ## ## ## Slave BIC for TT60 (2 of 2) CIB.BA7.TT60B CFV-BA7-CIBTT60 BA7 RA 3318 Slave BIC for Ti2upstream CIB.BA7.TT2U ## ## ## ## Master BIC for Ti2upstream CIB.BA7.TT2U ## ## ## ## Slave BIC for Ti2upstream CIB.BA7.T12U ## ## ## ## Master BIC for Beam-2 Extraction in LSS4 CIB.BA4.EXT2 CFV-BA4-CIBEXT2 BA4 RA 0904 Slave BIC for T140 (1 of 2) CIB.BA4.TT40A CFV-BA4-CIBEXT4 BA4 RA 0904 Slave BIC for T140 (2 of 2) CIB.BA4.TT40A CFV-BA4-CIBEXT4 BA4 RA 0904 Slave BIC for T141 (1 of 2) CIB.BA4.TT40B ## ## ## ## Slave BIC for T141 (2 of 2) CIB.BA4.TT40B ## ##				CFV-BA5-CIBS5		
Stave BIC for Ti2upstream CIB.BA6.EXT1 CFV-BA6-CIBEXT1 BA6 RA 1313 Slave BIC for TT60 (1 of 2) CIB.BA6.TT60A ## ## ## ## Slave BIC for TT60 (2 of 2) CIB.BA7.TT60B CFV-BA7-CIBTT60 BA7 RA 3318 Slave BIC for Ti2upstream CIB.BA7.TT2U ## ## ## ## Slave BIC for Ti2upstream CIB.BA7.TI2U ## ## ## ## Slave BIC for Ti2upstream CIB.BA7.TI2U ## ## ## ## Slave BIC for Ti2upstream CIB.BA7.TI2U ## ## ## ## Master BIC for Ti2upstream CIB.BA4.TI2U ## ## ## ## Master BIC for Ti8upstream CIB.BA4.TT40A CFV-BA4-CIBEXT2 BA4 RA 0904 Slave BIC for TT40 (1 of 2) CIB.BA4.TT40B ## ## ## ## Slave BIC for TT41 (1 of 2) CIB.BA4.TT41A CFV-BA4-CIBTT41 BA4 RA 0904 Slave BIC for TT41 (2 of 2) CIB.BA4.TT41B ## ## ## ## Slave BIC for TT41 (2 of 2) CIB.BA4.TT41B G						
SinceExtraction in LSS6CIB.BA6.EXT1CFV-BA6-CIBEXT1BA6RA 1313Slave BIC for TT60 (1 of 2)CIB.BA6.TT60A"""""""""""""""""""""""""""""""""						
SinceExtraction in LSS6CIB.BA6.EXT1CFV-BA6-CIBEXT1BA6RA 1313Slave BIC for TT60 (1 of 2)CIB.BA6.TT60A"""""""""""""""""""""""""""""""""						
Siave BIC for TT60 (2 of 2) CIB.BA0.TT60A Slave BIC for TT60 (2 of 2) CIB.BA7.TT60B CFV-BA7-CIBTT60 BA7 RA 3318 Slave BIC for Ti2upstream CIB.BA7.TI2U Slave BIC for Ti2downstream CIB.SR2.TI2D CFV-SR2-CIBTI2D SR2 YYACS.01S Master BIC for Beam-2 Extraction in LSS4 CIB.BA4.EXT2 CFV-BA4-CIBEXT2 BA4 RA 0904 Slave BIC for Ti8upstream CIB.BA4.TT8U Slave BIC for TT40 (1 of 2) CIB.BA4.TT40A CFV-BA4-CIBTT40 BA4 RA 0904 Slave BIC for TT40 (2 of 2) CIB.BA4.TT40B "" "" "" Slave BIC for TT41 (1 of 2) CIB.BA4.TT41A CFV-BA4-CIBTT41 BA4 RA 0904 Slave BIC for TT41 (2 of 2) CIB.BA4.TT41B "" "" "" Slave BIC for TT41 (2 of 2) CIB.BA4.TT41B "" "" ""						
Slave BIC for TT60 (2 of 2) CIB.BA7.TT60B CFV-BA7-CIBTT60 BA7 RA 3318 Slave BIC for Ti2upstream CIB.BA7.TI2U """ "" "" "" "" "" "" "" "" "" "" "" "				CFV-BA6-CIBEXT1	BA6	RA 1313
Slave BIC for Ti2upstream CIB.BA7.TI2U ##						
Image: Slave BIC for Ti2dpstream CIB.BA7.1120 Slave BIC for Ti2downstream CIB.SR2.TI2D CFV-SR2-CIBTI2D SR2 YYACS.01SI Master BIC for Beam-2				CFV-BA7-CIBTT60		RA 3318
Slave BIC for TT40 (1 of 2) CIB.BA4.T180 Slave BIC for TT40 (1 of 2) CIB.BA4.TT40A CFV-BA4-CIBTT40 BA4 RA 0904 Slave BIC for TT40 (2 of 2) CIB.BA4.TT40B """"""""""""""""""""""""""""""""""""	30					
Slave BIC for TT40 (1 of 2) CIB.BA4.T180 Slave BIC for TT40 (1 of 2) CIB.BA4.TT40A CFV-BA4-CIBTT40 BA4 RA 0904 Slave BIC for TT40 (2 of 2) CIB.BA4.TT40B """"""""""""""""""""""""""""""""""""	ż	Slave BIC for Ti2downstream	CIB.SR2.TI2D	CFV-SR2-CIBTI2D	SR2	YYACS.01SR2
Slave BIC for TT40 (1 of 2) CIB.BA4.T180 Slave BIC for TT40 (1 of 2) CIB.BA4.TT40A CFV-BA4-CIBTT40 BA4 RA 0904 Slave BIC for TT40 (2 of 2) CIB.BA4.TT40B """"""""""""""""""""""""""""""""""""	0					
Slave BIC for TT40 (1 of 2) CIB.BA4.T180 CFV-BA4-CIBTT40 BA4 RA 0904 Slave BIC for TT40 (2 of 2) CIB.BA4.TT40A CFV-BA4-CIBTT40 BA4 RA 0904 Slave BIC for TT41 (1 of 2) CIB.BA4.TT41A CFV-BA4-CIBTT41 BA4 RA 0904 Slave BIC for TT41 (2 of 2) CIB.BA4.TT41B """"""""""""""""""""""""""""""""""""	C1					
Slave BIC for TT40 (1 of 2) CIB.BA4.T180 CFV-BA4-CIBTT40 BA4 RA 0904 Slave BIC for TT40 (2 of 2) CIB.BA4.TT40A CFV-BA4-CIBTT40 BA4 RA 0904 Slave BIC for TT41 (1 of 2) CIB.BA4.TT41A CFV-BA4-CIBTT41 BA4 RA 0904 Slave BIC for TT41 (2 of 2) CIB.BA4.TT41B """"""""""""""""""""""""""""""""""""	۲A					
Slave BIC for TT40 (2 of 2) CIB.BA4.TT40B " " " " " " " " " " " " " " " " " " "						
Slave BIC for TT40 (2 of 2) CIB.BA4.TT40B Image: CIB.BA4.TT40B Image: CIB.BA4.TT40B Slave BIC for TT41 (1 of 2) CIB.BA4.TT41A CFV-BA4-CIBTT41 BA4 RA 0904 Slave BIC for TT41 (2 of 2) CIB.BA4.TT41B Image: CIB.BA4.TT41B	ω	· · · · · · · · · · · · · · · · · · ·				
Slave BIC for TT41 (2 of 2) CIB.BA4.TT41B "" "" "" Slave BIC for Ti8downstream CIB.SR8.TI8D CFV-SR8-CIBTI8D SR8 YYACS.01S		· · · · ·				
Slave BIC for Ti8downstream CIB.SR8.TI8D CFV-SR8-CIBTI8D SR8 YYACS.01SI Image: Comparison of the state of the stat		· · · · ·				
		· · · · ·				
<u>ທ</u>		Slave BIC for Ti8downstream	CIB.SR8.TI8D	CFV-SR8-CIBTI8D	SR8	YYACS.01SR8
	S					
Injection BIC for Beam1 CIB.SR2.INJ1 CFV-SR2-CIBINJ1 SR2 YYACS.01S	INJ-BIS	Injection BIC for Beam1	CIB.SR2.INJ1	CFV-SR2-CIBINJ1	SR2	YYACS.01SR2
Injection BIC for Beam2 CIB.SR8.INJ2 CFV-SR8-CIBINJ2 SR8 YYACS.01S	Ž	,				YYACS.01SR8
		-				

LHC Project Document No. AB-CO-QA-0001-01-20

Page 13 of 14

8. APPENDIX#3

The following table proposes the abbreviation names for the different LHC User Systems:

User Systems Abbreviation Notes Vacuum system VAC	
Image: Second system LASS LHC Beam dumping system LBDS LHC Control Room CCC Operator Buttons BLM at aperture limitations* BLM_UNM (*) Very likely there are also some un-mass BLM's in the arcs BLM in arcs BLM_MSK (*) Very likely there are also some un-mass BLM's in the arcs BLM in arcs BLM_MSK (*) Very likely there are also some un-mass BLM's in the arcs PIC essential circuits PICL_UNM PIC Left of IP (essential circuits) (Unmaskable input) PICR_UNM PIC Right of IP (essential circuits) PIC auxiliary circuits PICL_MSK PIC Right of IP (auxiliary circuits) (Maskable input) PICR_MSK PIC Right of IP (auxiliary circuits) Warm Magnets Interlock system WIC The component of the c	
LHC Beam dumping system LBDS LHC Control Room CCC Operator Buttons BLM at aperture limitations* BLM_UNM (') Very likely there are also some un-masl BLM's in the arcs BLM in arcs BLM_MSK (') Very likely there are also some un-masl BLM's in the arcs PIC essential circuits PICL_UNM PIC Left of IP (essential circuits) (Unmaskable input) PICR_UNM PIC Right of IP (essential circuits) PIC assiliary circuits PICL_MSK PIC Left of IP (auxiliary circuits) (Maskable input) PICR_MSK PIC Left of IP (auxiliary circuits) Varm Magnets Interlock system WIC Experiments (Detector part) ATL_DET ATL_OET ALICE CMS_DET CMS CMS Experiments (movable devices) ATL_MOV TOT_MOV LHCB_DET LHCb LHCb Experiment Magnets ATL_MAG CMS_MAG Collimation system COLL_ENV Collimation (Environmental parameters)	
Image: Second system CCC Operator Buttons BLM at aperture limitations* (Unmaskable input) BLM_UNM (') Very likely there are also some un-mask BLM's in the arcs BLM in arcs (Maskable input) BLM_MSK (') Very likely there are also some un-mask BLM's in the arcs PIC essential circuits PICL_UNM PIC Left of IP (essential circuits) PIC auxiliary circuits PICL_MSK PIC Left of IP (essential circuits) PIC auxiliary circuits PICL_MSK PIC Left of IP (auxiliary circuits) (Maskable input) PICR_MSK PIC Left of IP (auxiliary circuits) Warm Magnets Interlock system WIC Experiments (Detector part) ATL_DET ATLAS LHCE CMS_DET CMS CMS_DET CMS TOT_DET TOT_DET TOTEM LHCB LHCB_DET LHCb Experiment Magnets ATL_MAG ALI_MAG CMS_MAG LHCB_MAG Collimation system COLL_ENV Collimation (Environmental parameters)	
State BLM at aperture limitations* (Unmaskable input) BLM_UNM (') Very likely there are also some un-mask BLM's in the arcs BLM in arcs (Maskable input) BLM_MSK BLM_MSK PIC essential circuits (Unmaskable input) PICL_UNM PIC Left of IP (essential circuits) PIC auxiliary circuits PICL_MSK PIC Left of IP (essential circuits) (Maskable input) PICR_MSK PIC Left of IP (auxiliary circuits) Warm Magnets Interlock system WIC WIC Experiments (Detector part) ATL_DET ATL_DET LHCF_DET LHCF_DET LHCB_DET LHCB_DET ATLCE CMS_DET TOT_DET Experiments (movable devices) ATL_MOV TOT_MOV LCHB_MOV HCb Experiment Magnets ATL_MAG ALI_MAG CMS_MAG ATL_MAG ALI_MAG Collimation system COLL_ENV COLL_MOT Collimation (Environmental parameters) Collimation (Motor positions)	
Image: Second system BLM_UNM BLM's in the arcs Image: Second system BLM in arcs (Maskable input) BLM_MSK PIC essential circuits PICL_UNM PIC Left of IP (essential circuits) PIC auxiliary circuits PICR_UNM PIC Right of IP (essential circuits) PIC auxiliary circuits PICL_MSK PIC Left of IP (auxiliary circuits) (Maskable input) PICR_MSK PIC Right of IP (auxiliary circuits) Warm Magnets Interlock system WIC Experiments (Detector part) ATL_DET ATLAS LHCF_DET LHCF ALICE CMS_DET CMS_DET CMS Experiments (movable devices) ATL_MOV TOT_MOV LCHB_MOV Experiment Magnets ATL_MAG ALI_MAG CMS_MAG LHCB_MAG COllimation system Collimation system COLL_ENV Collimation (Motor positions)	
Image: Second State Sta	able
Image: Second system BLM_MSK PIC essential circuits PICL_UNM PIC Left of IP (essential circuits) PIC auxiliary circuits PICL_MSK PIC Left of IP (essential circuits) PIC auxiliary circuits PICL_MSK PIC Left of IP (auxiliary circuits) Warm Magnets Interlock system WIC Experiments (Detector part) ATL_DET ALI_DET ALICE CMS_DET CMS Experiments (movable devices) ATL_MOV TOT_DET LHCb Experiment Magnets ATL_MAG ALI_MAG CMS_MAG LHCB_MAG CMS_MAG COllimation system Collimation (Environmental parameters)	
Image: Section of the system Pice (Maskable input) Pice (Pice (Pi	
Image: Second system PIC Right of IP (essential circuits) PIC auxiliary circuits PICL_MSK PIC Left of IP (auxiliary circuits) Warm Magnets Interlock system WIC PIC Right of IP (auxiliary circuits) Warm Magnets Interlock system WIC Ither Content of the content of	
PIC auxiliary circuits PICL_MSK PIC Left of IP (auxiliary circuits) (Maskable input) PICR_MSK PIC Right of IP (auxiliary circuits) Warm Magnets Interlock system WIC Experiments (Detector part) ATL_DET ATLAS LHCF_DET LHCf ALI_DET ALICE CMS_DET CMS TOT_DET TOTEM LHCB_DET LHCb Experiments (movable devices) ATL_MOV TOT_MOV LCHB_MOV Experiment Magnets ATL_MAG ALI_MAG CMS_MAG LHCB_MAG COLL_ENV Collimation system COLL_ENV Collimation (Environmental parameters) Collimation (Motor positions) Collimation (Motor positions)	
Image: Second system PICR_MSK PIC Right of IP (auxiliary circuits) Warm Magnets Interlock system WIC Image: Second system Experiments (Detector part) ATL_DET ATLAS LHCF_DET LHCf ALI_DET CMS TOT_DET CMS TOT_DET TOTEM LHCB_DET LHCb Experiments (movable devices) ATL_MOV TOT_MOV LCHB_MOV Experiment Magnets ATL_MAG ALI_MAG CMS_MAG LHCB_MAG COLL_ENV Collimation system COLL_ENV Collimation (Motor positions)	
Warm Magnets Interlock system WIC Experiments (Detector part) ATL_DET ATLAS LHCF_DET LHCf ALI_DET ALICE CMS_DET CMS TOT_DET TOTEM LHCB_DET LHCb Experiments (movable devices) ATL_MOV TOT_MOV LCHB_MOV Experiment Magnets ATL_MAG ALI_MAG CMS_MAG LHCB_MAG Collimation system Collimation system COLL_ENV Collimation (Environmental parameters) Collimation (Motor positions) Collimation (Motor positions)	
Presented by the system Experiments (Detector part) ATL_DET ATL_AS LHCF_DET LHCf ALI_DET ALICE CMS_DET CMS TOT_DET TOTEM LHCB_DET LHCb Experiments (movable devices) ATL_MOV TOT_MOV LCHB_MOV Experiment Magnets ATL_MAG CMS_MAG LHCB_MAG Collimation system COLL_ENV Collimation (Environmental parameters) COLL_MOT Collimation (Motor positions)	
Yeight State LHCF_DET LHCf ALI_DET ALICE CMS_DET CMS TOT_DET TOTEM LHCB_DET LHCb Experiments (movable devices) ATL_MOV TOT_MOV LCHB_MOV Experiment Magnets ATL_MAG ALI_MAG CMS_MAG LHCB_MAG Collimation system Collimation system COLL_ENV Collimation (Environmental parameters) COLL_MOT Collimation (Motor positions)	
Yein ALI_DET ALICE CMS_DET CMS TOT_DET TOTEM LHCB_DET LHCb Experiments (movable devices) ATL_MOV TOT_MOV LCHB_MOV Experiment Magnets ATL_MAG ALI_MAG CMS_MAG LHCB_MAG COLL_ENV Collimation system COLL_MOT	
Yeight Service CMS_DET CMS CMS LHCB_DET TOTEM LHCB_DET LHCb Experiments (movable devices) ATL_MOV TOT_MOV LCHB_MOV Experiment Magnets ATL_MAG ALI_MAG CMS_MAG LHCB_MAG CMS_MAG Collimation system COLL_ENV Collimation (Environmental parameters) COLL_MOT Collimation (Motor positions)	
Yield TOT_DET TOTEM LHCB_DET LHCb Experiments (movable devices) ATL_MOV TOT_MOV LCHB_MOV Experiment Magnets ATL_MAG ALI_MAG CMS_MAG LHCB_MAG LHCB_MAG Collimation system COLL_ENV Collimation (Environmental parameters) COLL_MOT Collimation (Motor positions)	
Yeg LHCB_DET LHCb Experiments (movable devices) ATL_MOV TOT_MOV LCHB_MOV ATL_MOV Experiment Magnets ATL_MAG ALI_MAG CMS_MAG LHCB_MAG ATL_MAG Collimation system COLL_ENV COLL_MOT Collimation (Environmental parameters) Collimation (Motor positions)	
LCHB_MOV Experiment Magnets ATL_MAG ALI_MAG CMS_MAG LHCB_MAG Collimation system COLL_ENV COLL_MOT Collimation (Environmental parameters) Collimation (Motor positions)	
LCHB_MOV Experiment Magnets ATL_MAG ALI_MAG CMS_MAG LHCB_MAG Collimation system COLL_ENV COLL_MOT Collimation (Environmental parameters) Collimation (Motor positions)	
LCHB_MOV Experiment Magnets ATL_MAG ALI_MAG CMS_MAG LHCB_MAG Collimation system COLL_ENV COLL_MOT Collimation (Environmental parameters) Collimation (Motor positions)	
Experiment Magnets ATL_MAG ALI_MAG CMS_MAG LHCB_MAG LHCB_MAG Collimation system COLL_ENV Collimation (Environmental parameters) COLL_MOT Collimation (Motor positions)	
ALI_MAG CMS_MAG LHCB_MAG Collimation system COLL_ENV Collimation (Environmental parameters) COLL_MOT Collimation (Motor positions)	
CMS_MAG LHCB_MAG Collimation system COLL_ENV COLL_MOT Collimation (Motor positions)	
LHCB_MAG Collimation system COLL_ENV Collimation (Environmental parameters) COLL_MOT Collimation (Motor positions)	
Collimation system COLL_ENV Collimation (Environmental parameters) COLL_MOT Collimation (Motor positions)	
COLL_MOT Collimation (Motor positions)	
RF & Transverse Damper RF	
Beam life time BCT	
Beam excursion BPM	
Beam Aperture Kicker MKA	
Injection Kicker MKI	
Screens BTV	
LHC Sequencer (via the Timing) LSEQ	
LHC Safe Beam Parameters SBP	
Fast Magnet Current Change FM_xxxx When several FMCM units are connected	
Monitors same BIC, xxxx indicates the monitored cil	cuit
name. For example: FM_RQ4, FM_RQ5, FM_RD	34

<u>Note (1)</u>: the above abbreviation names are intended to easily distinguish the different User Systems and the different connection types. They are only used internally by the BIS.

<u>Note (2):</u>

For the complete up-to-date list of all signals for all Beam Interlock Systems, refer to the naming database (<u>http://cern.ch/service-acc-naming</u>).

Page 14 of 14

9. REFERENCES:

- [1]: The Beam Interlock System, Engineering Specification. LHC-CIB-ES-0001-00-10 (EDMS Document No. 567256)
- [2]: LHC Equipment Codes Main Systems: https://edms.cern.ch/cedar/plsgl/codes.systems
- [3]: Naming of the LHC Entities and theirs parameters for the Cern Control Centre: https://edms.cern.ch/file/473091/1.0/LHC-C-QA-0002-10-00.pdf
- [4]: Basic Syntactic Rules for Naming of LHC Entities and theirs parameters for the Cern Control Centre: <u>https://edms.cern.ch/file/473086/1.0/LHC-C-QA-0001-10-00.pdf</u>
- [5]: Interfacing to the Beam Interlock System: the CIBU-User-Manual. (EDMS Document No. 636589)