File: ctp_cables.doc
Version: 10 July 2008

ALICE trigger system - internal cable and optical connections

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1. BC clock cables

Cable length: **Table 1**

Label: sub-detector number (1 to 24)

Cable: CERN part number:

6ns: 04.69.11.087.0
8ns: 04.69.11.089.8
10ns: 04.69.11.090.5

2. CTP BC input cable (TTCmi to BUSY board)

Label: BC

Cable: 10ns, CERN part number 04.69.11.090.5

Mnemonic	*Number*	BC clock	BUSY		FO board		
		Length	*Input*	*Length*	*Board*	*Connector*	*Length*
SDD	**1**	8ns	1	1.6m	6	1	1.0m
MCH	**2**	8ns	2	1.6m	6	2	1.0m
MTR	**3**	8ns	3	1.8m	6	3	1.5m
DAQ	**4**	8ns	4	1.8m	6	4	1.5m
SPD	**5**	6ns	5	2.0m	5	1	1.5m
TOF	**6**	6ns	6	2.0m	5	2	1.5m
V0	**7**	6ns	7	1.6m	5	3	1.0m
Spare	*8*		*8*		*5*	*4*	
TRD	**9**	8ns	9	1.1m	4	1	1.5m
ZDC	**10**	8ns	10	1.1m	4	2	1.5m
EMC	**11**	8ns	11	0.9m	4	3	2.0m
Spare	*12*		*12*		*4*	*4*	
TPC	**13**	6ns	13	2.0m	3	1	2.0m
PMD	**14**	6ns	14	1.8m	3	2	2.0m
ACORDE	**15**	6ns	15	1.8m	3	3	1.5m
Spare	*16*		*16*		*3*	*4*	
SSD	**17**	10ns	17	2.1m	2	1	2.0m
FMD	**18**	10ns	18	2.0m	2	2	2.0m
T0	**19**	10ns	19	1.6m	2	3	2.0m
Spare	*20*		*20*		*2*	*4*	
HMPID	**21**	8ns	21	2.1m	1	1	2.5m
PHOS	**22**	8ns	22	2.0m	1	2	2.5m
CPV	**23**	8ns	23	2.0m	1	3	2.0m
Spare	*24*		*24*		*1*	*4*	

Table 1 BC clock, BUSY and FO board cables - length and labels

3. CTP ORBIT input cable (TTCmi to BUSY board)

Label: ORBIT

Cable: 10ns, CERN part number 04.69.11.090.5

4. BUSY cables (LTU to FI board)

Cable length: **Table 1**

Label: sub-detector number (1 to 24)

Cable: standard ALICE LVDS cable

Connector: CERN part number 09.31.28.050.9; mail crimp pin 09.31.28.800.5

5. FO board cables (FO board to LTU)

Cable length: **Table 1**

Label: sub-detector number (1 to 24)

Cable: flat and twist, 8 pairs, CERN part number 04.21.22.416.0

Connector: 16-pin IDC socket, CERN part number 09.55.03.316.4

Strain relief: CERN part number 09.55.03.416.1

6. FI board cables (to BUSY/L0/L1)

Cable length: 0.5m

Cable: flat and twist, 13 pairs, CERN part number 04.21.22.426.8

Connector: 26-pin IDC socket, CERN part number 09.55.03.326.2

Strain relief: CERN part number 09.55.03.426.9

7. Trigger input patch cables (patch panel to L0/L1 board)

Cable length:

Inputs 1-6 and 13-18: 1.6m
Inputs 7-12 and 19-24: 2.0m

Labels:

L0: 30 + input number (1 to 24)
L1: 31 + input number (1 to 24)

Cable: standard ALICE LVDS cable

Connector: CERN part number 09.31.28.050.9; mail crimp pin 09.31.28.800.5

From	*Label*	*I^2C patch Connector*	*I^2C board Address*	*Length*
FO 1-6, INT		0	0	0.27m
BUSY, L0, L1, L2		1	1	0.5m
LTC 1	1	2	2	2.0m
LTC 2	2	3	3	2.0m
LTC 3	3	4	4	2.0m
LTC 4	4	5	5	2.0m
LTC 5	5	6	6	2.5m
LTC 6	6	7	7	2.5m

Table 2 I^2C cables - connections, length and labels

8. I^2C cables

From the Local Trigger Crates 1-6:

Cable: flat and twist, 2 pairs, cut from CERN part number 04.21.22.416.0 (8 pairs) or 04.21.22.426.8 (13 pairs)

Connector: 10-pin IDC socket, CERN part number 09.55.03.310.0

Strain relief: CERN part number 09.55.03.410.7

Cable length: **Table 2**

From the CTP backplane:

Cable: 10 way flat cable, CERN part number 04.21.22.310.9

Connector: 10-pin IDC socket, CERN part number 09.55.03.310.0

Strain relief: CERN part number 09.55.03.410.7

Cable length: **Table 2**

9. VME crate control panel cables

Cable: 10 way flat cable, CERN part number 04.21.22.310.9

Connector: 9-pin IDC D-type socket, CERN part number 09.21.20.010.6
9-pin IDC D-type plug, CERN part number 09.21.20.020.4

Strain relief: CERN part number 09.21.20.300.9

Cable length: crates C2xT (top): 0.6m; crates C2xB (bottom): 1.3m

10. Optical patchcords

Patchcord: single mode with ST/PC connectors

Length: crates C2xT (top): 1.8m; crates C2xB (bottom): 2.2m

Quantity: 35 of each, delivered 2.07.2007

11. TOF BC clock (from TTCex in the TTCmi crate)

Cable length: 6ns (from TTCmi to TTCex)

Label: TOF

12. Fanin/Fanout BC clock (Fanin/Fanout crate in C23)

NIM input, connected to the TTCmi NIM clock output (crate C25B). There are two cables - labelled 1 and 2. Only the cable 2 is used; *the cable 1 is broken*.

Cable length: ~35ns

13. LTU synchronisation - setting of the BC delay

The synchronisation measurements were done on 14 November 2007 by Roman Lietava; the results are shown in **Table 3** (those initial values are now *obsolete*; current measurements/settings are shown in **Table 4**). The length of the BC clock cable (in ns) and the length of the FO-to-LTU cables (in meters; calculated in ns assuming the propagation delay of 5ns/m) have been taken from **Table 1**.

The expected difference is based on the difference in cable length; the following formula has been used:

Difference [ns] = CTP BC clock cable [ns] - LTU BC clock cable [ns] + FO-to -LTU cable [ns].

The CTB BC clock cable length is 10ns (see section 1).

Measured values - settings of the BC delay on the LTU board - are listed in **Table 3** as ***BC Delay (measured)***; each count correspond to ~1ns.

Note: During the measurements, the *BC DELAY* on the BUSY board **must be set to 0** (a reminder).

The corresponding settings that should be used for the LTU configuration are shown as ***BC Delay (setting)***:

BC Delay (setting) = BC Delay (measured).

Reminder: The CTP signals are sampled at the LTU with the *negative edge* of the **BC** clock.

Mnemonic	BC clock	FO board cable		*Difference*	*BC delay* *(measured)*	*BC delay* *(setting)*
	Delay	*Length*	*Delay*			
SDD	8ns	1.0m	5ns	7ns	1	1
MCH	8ns	1.0m	5ns	7ns	0	0
MTR	8ns	1.5m	7.5ns	9.5ns	4	4
DAQ	8ns	1.5m	7.5ns	9.5ns	2	2
SPD	6ns	1.5m	7.5ns	11.5ns	4	4
TOF	6ns	1.5m	7.5ns	11.5ns	5	5
V0	6ns	1.0m	5ns	9ns	3	3
TRD	8ns	1.5m	7.5ns	9.5ns	4	4
ZDC	8ns	1.5m	7.5ns	9.5ns	3	3
EMC	8ns	2.0m	10ns	12ns	7	7
TPC	6ns	2.0m	10ns	14ns	8	8
PMD	6ns	2.0m	10ns	14ns	8	8
ACORDE	6ns	1.5m	7.5ns	11.5ns	7	7
SSD	10ns	2.0m	10ns	10ns	4	4
FMD	10ns	2.0m	10ns	10ns	3	3
T0	10ns	2.0m	10ns	10ns	2	2
HMPID	8ns	2.5m	12.5ns	14.5ns	8	8
PHOS	8ns	2.5m	12.5ns	14.5ns	8	8
CPV	8ns	2.0m	10ns	12ns	6	6

Table 3 BC delay setting, LTU boards (*now obsolete; see **Table 4** for current values*)

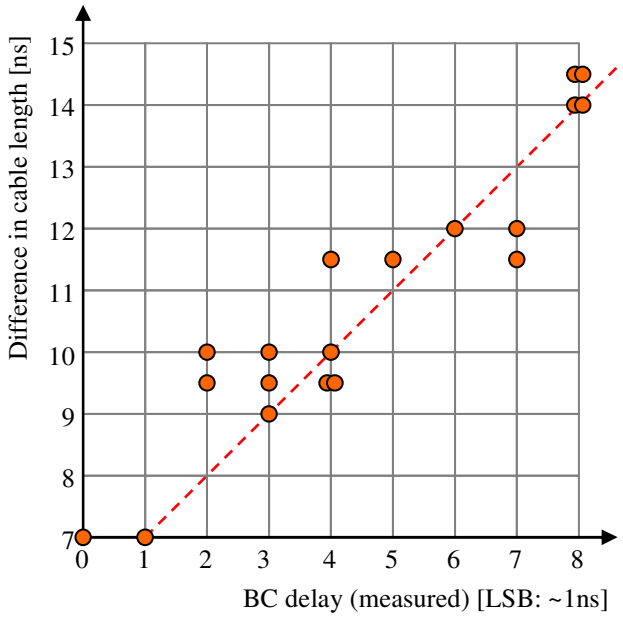

Figure 1 Estimated delay difference compared to the measured values

The plot in **Figure 1** compares the estimated values of the delay with the measured ones. The errors are in the range of 1-2 ns, as expected.

Following the employment of the new TTC Machine Interface (TTCmi) and the introduction of the *LTUvi* configuration, the measurements in **Table 3** have become obsolete. Current measurements/settings are shown in **Table 4**; the values will be updated following any system change.

Description of the system change:
Switch to the new TTCmi; introduction of the LTUvi configuration

Date: 18 June 2008
Operator: Roman Lietava
BC DELAY (BUSY board): **0**

Mnemonic	***BC delay-old*** ***(measured)***	***Difference*** ***(new - old)***	***BC delay*** ***(measured)***	***BC delay*** ***(setting)***
SDD	1	2	3	3
MCH	0	3	3	3
MTR	4	2	6	6
DAQ	2	2	4	4
SPD	4	3	7	7
TOF	5	2	7	7
V0	3	2	5	5
TRD	4	6	10	10
ZDC	3	6	9	9
EMC	7	5	12	12
TPC	8	6	14	14
PMD	8	7	15	15
ACORDE	7	4	11	11
SSD	4	7	11	11
FMD	3	7	10	10
T0	2	6	8	8
HMPID	8	8	16	16
PHOS	8	7	15	15
CPV	6	5	11	11

Table 3 Current BC delay setting, LTU boards

Note: Differences between the new and the "old" measurements that appear to be inconsistent, that are large/larger from other sub-detectors, *etc.* , should be investigated. Just a reminder…