BFEM_ACD_Tile_Cabling_V4.doc (formerly called Cable_connection_V5.doc)

BFEM ACD cable connections

This document describes the physical cable connections of the BFEM ACD instrument. One should be able to connect up the TEM cables, pmt lemo, and HV connection cables using this document.

This document also shows how the pulse heights in the event data stream correlate with the physical locations of the scintillator tiles on the BFEM.

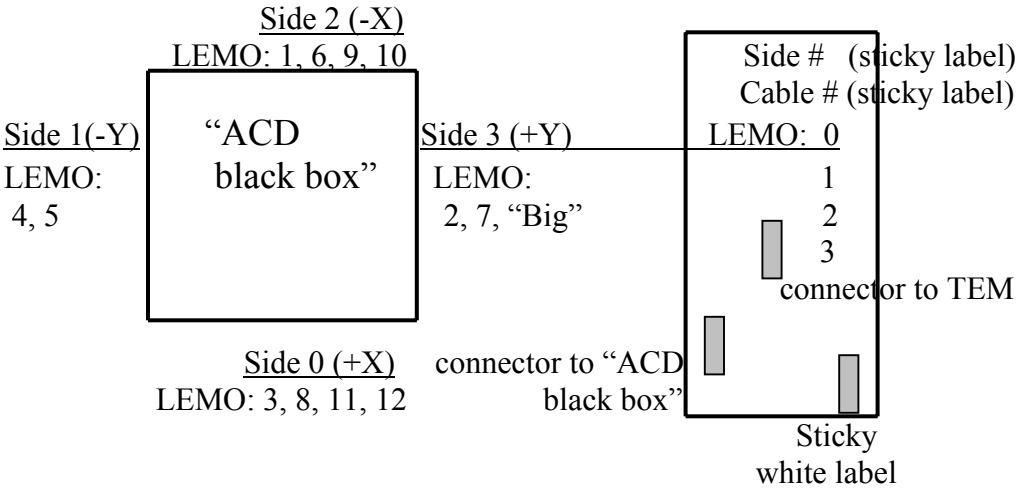
A.Moiseev, original doc. 03/26/01

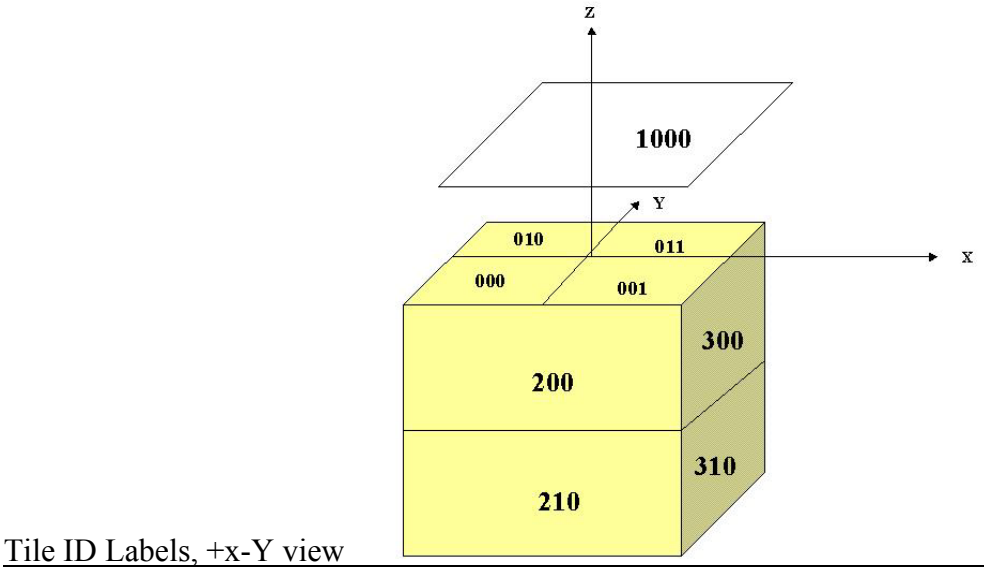
Physical Connections of Cables and Connectors:

Every ACD FEE board (located in ACD FEE VME crate) is to be connected with its corresponding "ACD black box" side and TEM connector as given in the Table 1. The cables with 25-pin CANON connectors go from the FEE boards to the corresponding TEM input (corresponding cable #). The LEMO cables go from the FEE board to the corresponding "ACD black box" side. The HV cable connects BERTAN HV Power Supply with HV connector "HV in" on "ACD black box" side 0/cable 1.

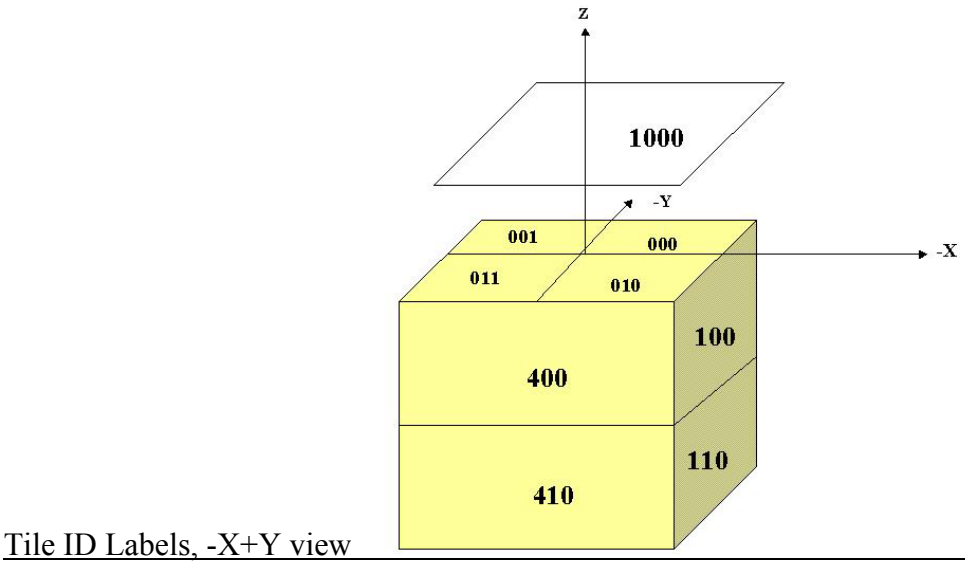
FEE board side/cable label	TEM input Cable	FEE Board label	ACD Box side	FEE board channel (LEMO)	ACD Box (LEMO)	Ritz Root ID	Index	Slot in ACD Chassis
"Side 0 Cable 1"	1	5	Side 0	0	Spare S2		1	0 (lower) HV Cntrl
HV				1	8 side U	300	7	
Controller				2	11 top R	011	13	
				3	12 top L	001	19	
"Side 1 Cable 3"	3	3	Side 1	0	4 side L	210	3	1
				1	5 side U	200	9	
				2	Spare S1		15	
				3	3 side L	310	21	
"Side 2 Cable 2"	2	7	Side 2	0	1 side L	110	2	2
				1	6 side U	100	8	
				2	9 top R	000	14	
				3	10 top L	010	20	
"Side 3 Cable 0"	0	2	Side 3	0	Dead		0	3
				1	7 side U	400	6	
				2	Big	1000	12	
				3	2 side L	410	18	
XGT	4	4	7523	0	+X,+Y	2011	4	4 (upper)
			9725	1	+X,-Y	2001	10	
			9779	2	–X,-Y	2000	16	
			9809	3	–X,+Y	2010	22	

FEE Board Example





Tile ID Labels, +x-Y view



Tile ID Labels, -X+Y view

Correlation of Event Data Format in terms of BFEM coordinates.

In order to analyze the data from the ACD, we need to know which ACD tile's data comes out at what point in the data flow. This map reflects the state of the ACD as it was set up for SLAC integration 2/25/01.

The mapping scheme is taken from the BEAM TEST USERS Guide, version 1.5(http://www.slac.stanford.edu/~hansl/glast/bt99/bt99.bk.pdf) and uses the coordinate system there, which is the same as that used for the balloon flight. The columns of this table are described as:

1) index - this is the index of the array in the data packets. The data (housekeeping, pulse heights, and rates all come in 4 by 6 arrays (data[4][6]) but if you wanted to access them sequentially, the index would tell you how they are arranged in memory.

2) Cable - the number of the cable connector on the TEM board (4 pmt channels per connector). This is also sometimes called the "board" number, but I prefer to use "cable" to emphasize that this number is not related to a given physical electronics board.

3) Channel - which pmt channel for a given cable.

4) BFEM and BTEM Tile [BFEM - balloon flight engineering model, BTEM - beam test engineering model]. The tile "coordinates" are given with the center of the coordinates inside the ACD. (the sides of the ACD only have two tiles so we only need two axes to specify them uniquely, but the top contains 4 smaller tiles (+ 1 big tile), so we need three axes. The first axis indicates the side (e.g. +z indicates the "top" of the ACD). The second axis tells which half of the side to find the tile. The third axis (if any) gives which half of the half-side contains the tile. The one "big" tile covers the entire top so it only has the coordinate - +z.

The channels marked XGT are the ones being used by the gamma target experiment. Of course N/A is for the 6th board which is not being used in the balloon.

Index	Cable	Channel	BFEM Ritz #	BFEM Tile	BTEM tile
0	0	0		dead	-x-z
1	1	0		Spare S2	
2	2	0	110	-x-z	+y-z
3	3	0	210	-y-z	+x-z
4	4	0	2011	XGT +x+y	
5	5	0		N/A	-y-z
6	0	1	400	+y+z	-x+z
7	1	1	300	+x+z	
8	2	1	100	-x+z	+y+z
9	3	1	200	-y+z	+x+z
10	4	1	2001	XGT +x-y	
11	5	1		N/A	-y+z
12	0	2	1000	+z (big)	+z-x-y
13	1	2	011	+z+x+y	
14	2	2	000	+z-x-y	
15	3	2		Spare S1	+z+x+y
16	4	2	2000	XGT -x-y	
17	5	2		N/A	
18	0	3	410	+y-z	+z-x+y
19	1	3	001	+z+x-y	
20	2	3	010	+z-x+y	+z (big)
21	3	3	310	+x-z	+z+x-y
22	4	3	2010	XGT -x+y	
23	5	3		N/A	

The LEMO connectors attach to sides 0-3 of the ACD "black box" as follows:

side	TEM cable	side direction
side 0	cable 1	+x
side 1	cable 3	-y
side 2	cable 2	-x
side 3	cable 0	+y

The XGT connections to cable 4/board 4 are :

XGT	PMT channel	corner
LA7523	0	+x+y
LA9725	1	+x-y
LA9779	2	-x-y
LA9809	3	-x+y