

5/4/04

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## **CSC-DT Data Exchanging Transition Board Upgrade**

The CSC Track Finder accepts up to 2 track segments from MB2/1 per  $30^0$  sector; however, when two segments exist, the DT Trigger serializes the data across 2 BX. The CSC Track Finder accepts just one segment per BX to reduce the number of connections. A flag must be sent to denote if a sent segment actually belongs to the previous BX as the second of two segments.

The CSC Track Finder sends all track segments from ME1/3 to the DT Track Finder along with a flag bit to denote whether a segment satisfies  $|\eta| < 1.04$ . Thus up to 6 stubs can be delivered to DT Track Finder.

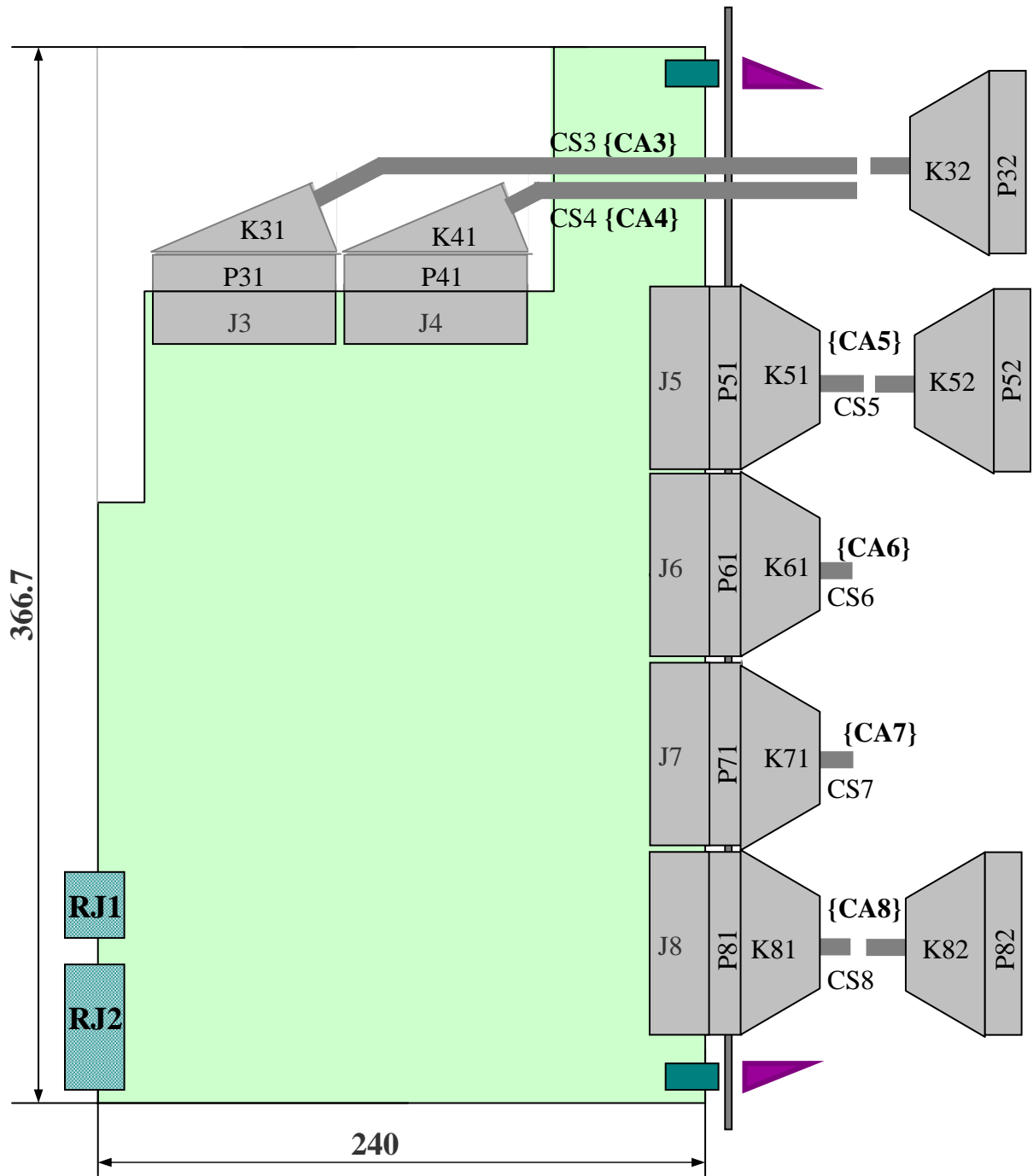
The data words exchanged between the DT and CSC Track Finders are summarized in Tables 1 and 2.

**Table 1.** Data delivered from the CSC to the DT. Two connections are needed, each of which delivers 3 stubs. Data should be sent at 40 MHz using LVDS

Signal	Bits/ stub	Bits/ 3 Stubs (ME1: $30^0$ )	Bits/ 6 Stubs (ME1: $60^0$ )	Description
PHI	12	36	72	Azimuth Coordinate
ETA	1	3	6	DT/CSC Region Flag
QTY	3	9	18	Derived from 4 bit Quality
BXN	-	2	4	2 LSB of Bunch Crossing Number
CLK	-	1	2	Clock for Data
BC0	-	1	2	Bunch Crossing 0
Total	16	52	104	

**Table 2.** Data delivered from the DT to the CSC. Two stubs from one chamber in the same bunch crossing are transmitted on consecutive bunch crossings. Two connections from two different DT Sector Processors are implemented using LVDS at 40 MHz.

Signal	Bits/ stub	Bits/ 2 stubs (MB1: $60^0$ )	Description
PHI	12	24	Azimuth Coordinate
PHIb	5	10	PHI Bend Angle
QTY	3	6	Quality
FL	1	2	2 <sup>nd</sup> Muon of Previous BX
BXN	2	4	2 LSB of Bunch crossing Number
CLK	1	2	Clock for Data
BC0	1	2	Bunch Crossing 0
CAL	1	2	Special DT mode
Total	26	52	

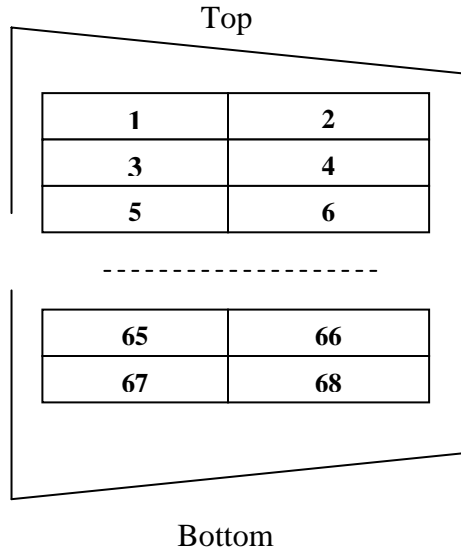


- J3÷J8: AMP787190-7 – Amplimite Connector, 68 Cont  
 {CA3}, {CA4}: P31 ÷ P42 - P4AMP749621-7 –Amplimite Plug Assembly, 68 Pin  
 K31, K41 - AMP749204-2 – Amplimite Backshell Kit, 68 Pos.  
 K32, K42 – AMP749195-2 – Amplimite Backshell Kit, 68 Pos.  
 CS3, CS4 – Belden 1403A – 34 Pairs SCSI2 Cable, Non halogen  
 {CA5} ÷ {CA8}: P51 ÷ P82 - P4AMP749621-7 –Amplimite Plug Assembly, 68 Pin  
 K51 ÷ K82 - AMP749195-2 – Amplimite Backshell Kit, 68 Pos.  
 CS5 ÷ CS8 – Belden 1403A – 34 Pairs SCSI2 Cable, Non halogen

Fig.1. CSC/DT Transition Board Connections

**Pin's Numbering**

Front view of J3-J8:



**Cable Assembly, Stub and Bit definition**

Cable Assembly: CA3 ÷ CA8

Stub definition: S1÷S6

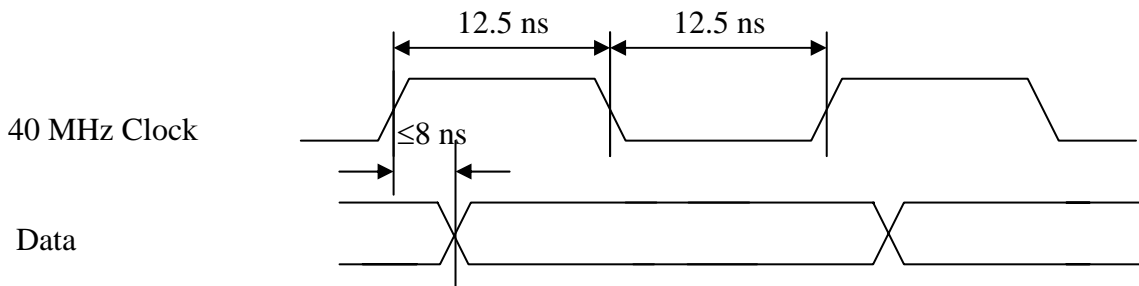
Bit definition:

- According to Table 1 and Table 2 above.
- RES – Reserved pin
- S\_DATIN, S\_DATOUT, S\_READY, S\_CK - serial verification bits, not realized at CSC

**Timing Diagram**

The data communication between CSC and DT is providing over ~ 10 m long cables.

The timing diagram for data pass from CSC to DT is the following:



The valid data are appeared not late than 8 ns follow the grow edge of the 40 MHz clock.

Pin	Bit	Pin	Bit
1	PHI0-	2	PHI0+
3	PHI1-	4	PHI1+
5	PHI2-	6	PHI2+
7	PHI3-	8	PHI3+
9	PHI4-	10	PHI4-
11	PHI5-	12	PHI5+
13	PHI6-	14	PHI6+
15	PHI7-	16	PHI7+
17	PHI8-	18	PHI8+
19	PHI9-	20	PHI9+
21	PHI10-	22	PHI10+
23	PHI11-	24	PHI11+
25	PHIB0-	26	PHIB0+
27	PHIB1-	28	PHIB1+
29	PHIB2-	30	PHIB2+
31	PHIB3-	32	PHIB3+
33	PHIB4-	34	PHIB4+
35	QTY0-	36	QTY0+
37	QTY1-	38	QTY1+
39	QTY2-	40	QTY2+
41	FL-	42	FL+
43	CAL-	44	CAL+
45	BXN0-	46	BXN0+
47	BXN1-	48	BXN1+
49	BC0-	50	BC0+
51	GND	52	GND
53	CLK-	54	CLK+
55	GND	56	GND
57	RES0-	58	RES0+
59	RES1-	60	RES1+
61	RES2-	62	RES2+
63	RES3-	64	RES3+
65	GND	66	RES (SDATIN_CON1)
67	GND	68	RES (SDAT2

**Table 3.** DT to CSC Connection 1 (J3)

Note: DT to CSC Connection 2 (J4) is the same

Pin	Bit	Pin	Bit
1	S1_PHI0-	2	S1_PHI0+
3	S1_PHI1-	4	S1_PHI1+
5	S1_PHI2-	6	S1_PHI2+
7	S1_PHI3-	8	S1_PHI3+
9	S1_PHI4-	10	S1_PHI4-
11	S1_PHI5-	12	S1_PHI5+
13	S1_PHI6-	14	S1_PHI6+
15	S1_PHI7-	16	S1_PHI7+
17	S1_PHI8-	18	S1_PHI8+
19	S1_PHI9-	20	S1_PHI9+
21	S1_PHI10-	22	S1_PHI10+
23	S1_PHI11-	24	S1_PHI11+
25	S1_ETA--	26	S1_ETA+
27	S1_QTY0-	28	S1_QTY0+
29	S1_QTY1-	30	S1_QTY1+
31	S1_QTY2-	32	S1_QTY2+
33	S2_PHI0-	34	S2_PHI0+
35	S2_PHI1-	36	S2_PHI1+
37	S2_PHI2-	38	S2_PHI2+
39	S2_PHI3-	40	S2_PHI3+
41	S2_PHI4-	42	S2_PHI4+
43	S2_PHI5-	44	S2_PHI5+
45	S2_PHI6-	46	S2_PHI6+
47	S2_PHI7-	48	S2_PHI7+
49	S2_PHI8-	50	S2_PHI8+
51	S2_PHI9-	52	S2_PHI9+
53	S2_PHI10-	54	S2_PHI10+
55	S2_PHI11-	56	S2_PHI11+
57	S2_ETA--	58	S2_ETA-+
59	S2_QTY0-	60	S2_QTY0+
61	S2_QTY1-	62	S2_QTY1+
63	S2_QTY2-	64	S2_QTY2+
65	GND	66	GND
67	GND	68	RES (S_DATOUT_CON1))

**Table 4.** CSC to DT1 Connection A (S1, S2, J5)

Note: CSC to DT2 Connection A (S4, S5, J7) is the same

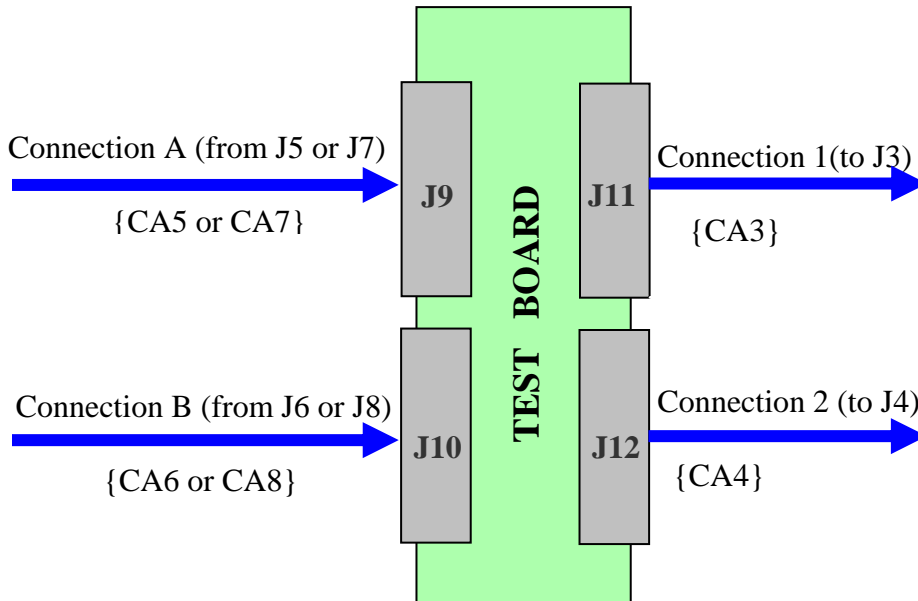
Pin	Bit	Pin	Bit
1	S3_PHI0-	2	S3_PHI0+
3	S3_PHI1-	4	S3_PHI1+
5	S3_PHI2-	6	S3_PHI2+
7	S3_PHI3-	8	S3_PHI3+
9	S3_PHI4-	10	S3_PHI4-
11	S3_PHI5-	12	S3_PHI5+
13	S3_PHI6-	14	S3_PHI6+
15	S3_PHI7-	16	S3_PHI7+
17	S3_PHI8-	18	S3_PHI8+
19	S3_PHI9-	20	S3_PHI9+
21	S3_PHI10-	22	S3_PHI10+
23	S3_PHI11-	24	S3_PHI11+
25	S3_ETA--	26	S3_ETA+
27	S3_QTY0-	28	S3_QTY0+
29	S3_QTY1-	30	S3_QTY1+
31	S3_QTY2-	32	S3_QTY2+
33	S1-3_BXN0-	34	S1-3_BXN0+
35	S1-3_BXN1-	36	S1-3_BXN1+
37	S1-3_BC0-	38	S1-3_BC0+
39	GND	40	GND
41	S1-3_CLK-	42	S1-3_CLK+
43	GND	44	GND
45	RES0-	46	RES0+
47	RES1-	48	RES1+
49	RES2-	50	RES2+
51	RES3-	52	RES3+
53	RES4-	54	RES4+
55	RES5-	56	RES5+
57	RES6-	58	RES6+
59	RES7-	60	RES7+
61	RES8-	62	RES8+
63	RES9-	64	RES9+
65	RES (S_CK_CON2)	66	RES (S_READY_CON2)
67	GND	68	RES (S_DATOUT_CON2)

**Table 5.** CSC to DT1 Connection B (S3, J6)

Note: CSC to DT2 Connection B (S6, J8) is the same

## Test Board

The Test Board allows SP02 DT Interface stand alone test using connection between TB outputs and inputs. It is necessary to provide a preliminary testing just before the real DT Transition Board is delivered. The Test Board adapts two output connectors J5 (J7) and J6 (J8) to be pin-to-pin compatible with the input connectors J3 and J4 according to the pin assignment listed in Tables 3, 4, 5.



J9 ... J12: AMP787190-7 – Amplimate Connector, 68 Cont.

Fig. 2. Test Board Connections

Appendix 1

Transition Board, Cable Assembly and Test Board Components are listed in the following tables.

Item	Reference	Manufacture Part #	Distributor Part #	1 PCB Qty	4 PCBs Qty	Part & Package
<b>Capacitors</b>						
1	C1...C4	Kemet T494C476K010AS	Digi-Key 399-1776-1-ND	4	16	Cap 47UF 10V Tant 6032
2	C5...C8	Kemet C0603C103K5RACTU	Digi-Key 399-1091-1-ND	48	192	Cap 0.01UF 50V Ceramic 0603
<b>Connectors</b>						
3	J1	AMP 100159-1	Digi-Key 100159-1-ND	1	4	2 mm Header 55 Pos Extn
4	J2	AMP 100141-1	Digi-Key 100141-1-ND	1	4	2 mm Z-Pack/ B Male Header 125 pos
5	J3 ... J8	AMP 787190-7	Digi-Key A23736-ND	6	24	Conn 68 Pos .05 Ampl Pecp Rtagl
<b>Test Points</b>						
6	TP1 ...TP162	Sullins Electronics PZC36SAAN	Digi-Key S1011-36-ND	162	648	ST Single Male Header 36 Pos
<b>Semiconductors</b>						
7	U1 ... U14	Texas Instruments SN75LVDT390D	Digi-Key 296-6900-5-ND	14	56	Quad LVDS Line Receiver W/Term
8	U15 ... U40	Texas Instruments SN75LVDS391D	Digi-Key 296-6929-5-ND	26	104	Quad LVDS Line Driver

Table 6. Transition Board Assembling Components

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<b>Item</b>	<b>Reference</b>	<b>Manufacture Part #</b>	<b>Distributor Part #</b>	<b>1 Item Qty</b>	<b>2 Items Qty</b>	<b>Part &amp; Package</b>
<b>Plug Assembly</b>						
1	P31...P81 P32...P82	AMP749621-7	Digi-Key A3304-ND	12	24	Amplimite Plug 68 Pos
<b>Backshell Kit</b>						
2	K31, K41	AMP 749204-2	Digi-Key A23586-ND	2	8	Amplimite Kit 68 Pos
3	K51...K81	AMP 749195-2	Digi-Key A3308-ND	6	12	Amplimite Kit 68 Pos
<b>Cable</b>						
4	CS3...CB8	Belden 1403A		6 x 5 m	12 x 5 m	34 Pairs SCSI Cable

Table 7. Cable Assembling Components

<b>Item</b>	<b>Reference</b>	<b>Manufacture Part #</b>	<b>Distributor Part #</b>	<b>1 Item Qty</b>	<b>2 Items Qty</b>	<b>Part &amp; Package</b>
<b>Connectors</b>						
1	J9...J12	AMP787190-7	Digi-Key A23736-ND	4	8	Amplimite Conn. 68 Pos

Table8 . Test Board Assembling Components