

CCM Board Testing

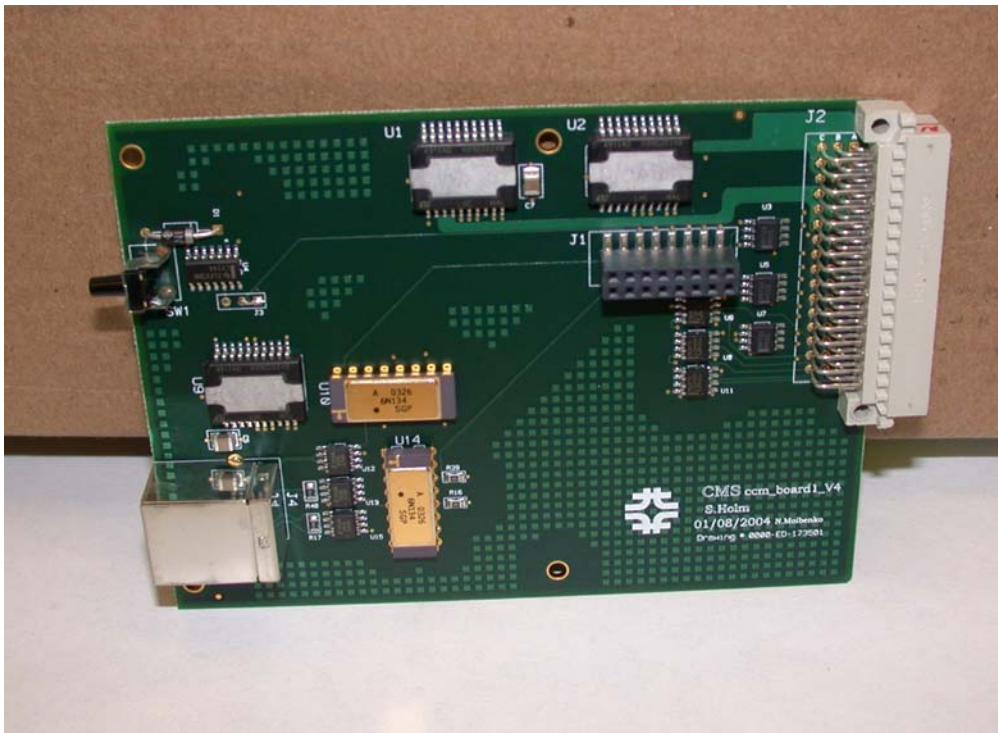
k.w.b = Known Working Board

Board 1 testing

Visual Inspection – look for all parts being installed similar to a k.w.b.

Solder a short across R15 on bottom of board.

Solder a short across J3 on top of board, two right most holes.



TEST SETUP

Remove power from backplane if it's on. (Power supply "Output On/Off" button).

Using a k.w.b. 3, 4 & 5 connect Board 1 to Board 5.

Plug 4-board unit into backplane (Blue cable and Orange fiber connected).

FE Boards should be plugged into slots J3, J5, J14 and J16 of the HO-Backplane.

Turn on the +6.5v supply then the +5.0v supply.

With four FE boards installed on backplane the currents on the P.S. Display should be: +6.5v: ~ 1.97A +5.0v: ~ 2.39 A

!If there is a large difference then there is a problem.

Double Click the CCM_Debugger software on the PC, it will open in a new window.

!Make sure com port 2 button(upper right) is selected in CCM_Debugger window

Click “File Open” button, Select Sequential_Core.sls from CCM Testing folder.

Click “Run Once”, the middle section of the window should display the results. The Node # column will contain the CCM hardwired ID. The Status will display the contents of the Status register and the RdData column will display a count of 01-20 in rows 25-63 every other row as shown below.

The current of the supplies should increase to: +6.5v : ~ 2.16A +5.0v : ~ 3.73A

The screenshot shows the CMS HCAL CCM debugger interface. The title bar reads "CMS HCAL CCM debugger, v1.4.1, filename - C:\ccm_debugger\CCM_TESTING\sequential_core.sls". The menu bar includes File Open, File Save, File Save As, New File, Compile, Run Once, Run, Stop, Show/Hide, Setup, and Exit.

The main window is divided into three sections:

- Left Panel (Command Log):** Displays a list of commands and their outputs, including "put 63 32;", "get 0;", "put 63 8;", and various "write" and "get" commands for different boards and registers.
- Center Panel (Table):** A table with columns: #, Comd, Code, DataWr, ArLng, RLhg, Node#, Status, and RdData. It shows the results of the commands, with rows 25-63 displaying a count of 01-20 in the RdData column.
- Right Panel (Control Panel):** Contains buttons for ComPort1, ComPort2, ComPort3, ComPort0, and an Assign button. Below these is a section titled "Bit presentation of selected bytes".

#	Comd	Code	DataWr	ArLng	RLhg	Node#	Status	RdData
1	>63	BF	20		0			
2	<0	40			3	01	00	00
3	>63	BF	08		2	01	04	
4	M0	C0		8	2	01	04	
5	M0	C0		8	2	01	04	
6	M0	C0		8	2	01	04	
7	M0	C0		5	2	01	04	
8	M0	C0		5	2	01	04	
9	M0	C0		8	2	01	04	
10	M0	C0		8	2	01	04	
11	M0	C0		8	2	01	04	
12	M0	C0		5	2	01	04	
13	M0	C0		5	2	01	04	
14	M0	C0		8	2	01	04	
15	M0	C0		8	2	01	04	
16	M0	C0		8	2	01	04	
17	M0	C0		5	2	01	04	
18	M0	C0		5	2	01	04	
19	M0	C0		8	2	01	04	
20	M0	C0		8	2	01	04	
21	M0	C0		8	2	01	04	
22	M0	C0		5	2	01	04	
23	M0	C0		5	2	01	04	
24	M0	C0		4	2	01	04	
25	<4	44			3	01	04	01
26	M0	C0		4	2	01	04	

CMS HCAL CCM debugger, v1.4.1, filename - C:\ccm_debugger\CCM_TESTING\sequential_core.sls

File Open File Save File Save As New File Compile Run Once Run Stop Show/Hide Setup Exit

```

w 0 0 1 13 0 20; * write datas to i2c core4 board2 gol1 registers
w 0 8 1 20 1 21; * write datas to i2c core4 board2 gol2 registers
w 0 16 4 0 0 32 22 16 51; * write datas to i2c core5 board1 CCA
w 0 16 4 1 0 32 23 18 51; * write datas to i2c core5 board1 CCB
w 0 16 4 2 0 32 24 16 51; * write datas to i2c core5 board1 CCA
w 0 16 1 3 0 25; * write datas to i2c core5 board1 gol1 registers I
w 0 16 1 4 1 32; * write datas to i2c core5 board1 gol2 registers
w 0 129 4 32 1;
get 4;
w 0 129 4 33 1;
get 4;
w 0 129 4 34 1;
get 4;
w 0 129 1 35 0;
get 4;
w 0 129 1 36 1;
get 4;
w 0 130 4 16 1;
get 4;
w 0 130 4 17 1;
get 4;
w 0 130 4 18 1;
get 4;
w 0 130 1 19 0;
get 4;
w 0 130 1 20 1;
get 4;
w 0 136 4 16 1;
get 4;
w 0 136 4 17 1;
get 4;
w 0 136 4 18 1;
get 4;
w 0 136 1 19 0;
get 4;
w 0 136 1 20 1;
get 4;
w 0 144 4 0 1;
get 4;
w 0 144 4 1 1;
get 4;
w 0 144 4 2 1;
get 4;
w 0 144 1 3 0;
get 4;
w 0 144 1 4 1;
get 4;

```

#	Comd	Code	DataWr	ArLng	RLhg	Node#	Status	RdData
32	M0	C0		4	2	01	04	
33	<4	44			3	01	04	05
34	M0	C0		4	2	01	04	
35	<4	44			3	01	04	06
36	M0	C0		4	2	01	04	
37	<4	44			3	01	04	07
38	M0	C0		4	2	01	04	
39	<4	44			3	01	04	08
40	M0	C0		4	2	01	04	
41	<4	44			3	01	04	09
42	M0	C0		4	2	01	04	
43	<4	44			3	01	04	10
44	M0	C0		4	2	01	04	
45	<4	44			3	01	04	11
46	M0	C0		4	2	01	04	
47	<4	44			3	01	04	12
48	M0	C0		4	2	01	04	
49	<4	44			3	01	04	13
50	M0	C0		4	2	01	04	
51	<4	44			3	01	04	14
52	M0	C0		4	2	01	04	
53	<4	44			3	01	04	15
54	M0	C0		4	2	01	04	
55	<4	44			3	01	04	16
56	M0	C0		4	2	01	04	
57	<4	44			3	01	04	17
58	M0	C0		4	2	01	04	
59	<4	44			3	01	04	18
60	M0	C0		4	2	01	04	
61	<4	44			3	01	04	19
62	M0	C0		4	2	01	04	
63	<4	44			3	01	04	20

ComPort1 ComPort2 ComPort3
ComPort0 ComPort0 ComPort0
ComPort0 ComPort0 Assign

Bit presentation of selected bytes

63 Line(s), 321 bytes

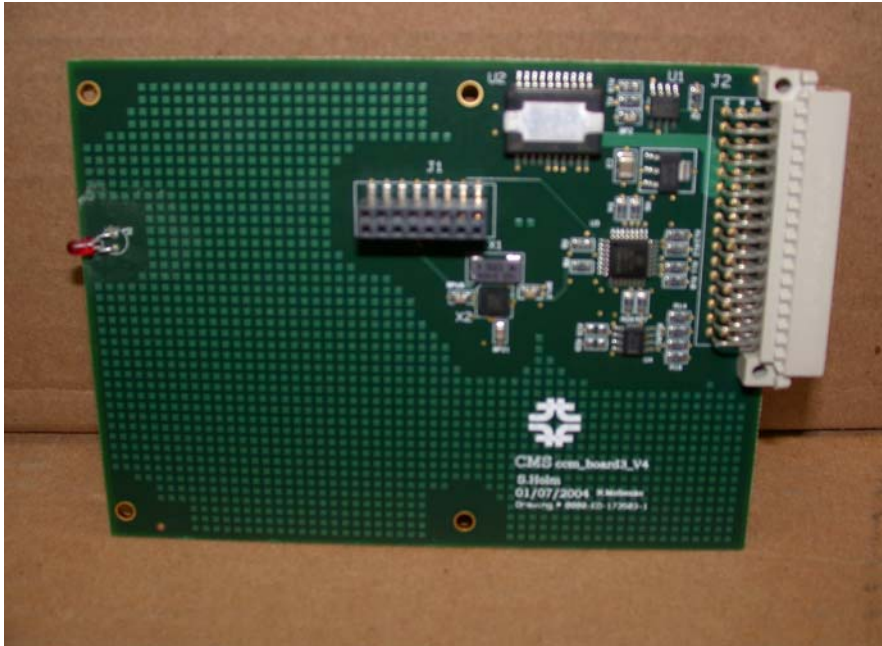
If boards passes the test then put a green dot on and put into “pass” box, if fail put into “fail” box.

5/11/2004

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Board 3 testing

Visual Inspection – look for all parts being installed similar to a k.w.b.



TEST SETUP

Remove power from backplane if it's on. (Power supply "Output On/Off" button).

Using a k.w.b. 3, 4 & 5 connect Board 3 to Board 5 and then Board 4 to Board 3.

Plug 4-board unit into backplane (Blue cable and Orange fiber connected). FE Boards should be plugged into slots J3, J5, J14 and J16 of the HO-Backplane.

Turn on the +6.5v supply then the +5.0v supply.

With four FE boards installed on backplane the currents on the P.S. Display should be: +6.5v: ~ 1.97A +5.0v: ~ 2.39 A

!If there is a large difference then there is a problem.

The LED on Board 3, 4 and 5 should turn on. *If the LED on Board 3 doesn't turn on and Board 4 and Board 5 LED are on there is usually a problem with the QPLL2 device. Set the board aside and go to next board.*

Double Click the CCM_Debugger software on the PC, it will open in a new window.

!Make sure com port 2 button(upper right) is selected in CCM_Debugger window

Click “File Open” button, Select Sequential_Core.sls from CCM Testing folder.

Click “Run Once”, the middle section of the window should display the results. The Node # column will contain the CCM hardwired ID. The Status will display the contents of the Status register and the RdData column will display a count of 01-20 in rows 25-63 every other row as shown on Board 1 testing.

The current of the supplies should increase to: +6.5v : ~ 2.16A +5.0v : ~ 3.73A

Click “File Open” button, Select QIE_Reset_Test.sls from CCM Testing folder.

Click “Run”, the middle section of the window should display the results. This puts the program into a continuous loop of executing the commands. Using the Oscilloscope probe the FE cards U15 pin 6. The oscilloscope should display a 25ns 3v positive going pulse.

If boards passes the test then put a dot on and put into “pass” box, if fail put into “fail” box.

5/12/2004

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BOARD 5 TESTING

Add eight *0.01uf 0805 SMT Capacitors* to the back of the board , 6 across connector J4 and one each across resistor R2 and R13.

CLEAN : Use solder flux cleaner spray to clean the flux off of the board, blow residue off board with compressed air. Clean with Windex.

Visually inspect the boards for cleanliness on both sides – clean when needed.

Break the shunts on SW1 for the board ID. The ID is an 8-bit hex number that is read back through the slow control system. Pin 1 of SW1 is the LSB. Pin 1 is closest to the FPGA U16. Write the board ID number(decimal) on the top of Connector J4 with a permanent pen.

Visual inspect with a k.w.b. 5.

Connect to k.w.b 1 and 3 & 4. Plug the orange fiber optic cable into the board and install onto backplane.

Turn on the +6.5v supply then the +5.0v supply.

With four FE boards installed on backplane the currents on the P.S. Display should be: +6.5v: ~ 1.97A +5.0v: ~ 2.39 A

!If there is a large difference then there is a problem.

Double Click the CCM_Debugger software on the PC, it will open in a new window.

!Make sure **com port 2** button(upper right) is selected in CCM_Debugger window

Click “File Open” button, AD_results_v5.sls from CCM Testing folder.

Click “Run Once”, the middle section of the window should display the results. The Node # column will contain the CCM hardwired ID. The Status will display the contents of the Status register and the RdData column will display the results of the A/D convertor. Row 7 & 12 should have a number close to BAh. Row 13 ~ CAh and row 14 ~ ECh. Row 62 = 2F and row 61 = CF.

The current of the supplies should increase to: +6.5v : ~ 2.16A +5.0v : ~ 3.73A

CMS HCAL CCM debugger, v1.4.1, filename - C:\ccm_debugger\CCM_TESTING\ad_results_v5.sls

File Open File Save File Save As New File Compile Run Once Run Stop Show/Hide Setup Exit

```

get 0 ; read reg #0
put 63 24;
put 63 8;
put 62 47;
put 61 207;
get 16 ; read reg #32 AD1 Temp1
get 17 ; read reg #33 AD2 Temp2
get 18 ; read reg #34 AD3 Temp3
get 19 ; read reg #35 AD4 Temp4
get 20 ; read reg #36 AD5 Temp5
get 21 ; read reg #37 AD6 Temp6
get 22 ; read reg #38 AD7 Temp_CCM
get 23 ; read reg #39 AD8 Voltage 1 - Divided by 3
get 24 ; read reg #40 AD9 Voltage 2 - Divided by 2
get 25 ;
get 26;
get 27;
get 62;
get 61;
put 63 12; QIE Reset & Leave clock to backplane Enabled

```

#	Comd	Code	DataWr	ArLng	RLhg	Node#	Status	RdData
1	<0	40			3	1F	04	00
2	>63	BF	18		2	1F	04	
3	>63	BF	08		2	1F	04	
4	>62	BE	2F		2	1F	04	
5	>61	BD	CF		2	1F	04	
6	<16	50			3	1F	04	00
7	<17	51			3	1F	04	BA
8	<18	52			3	1F	04	18
9	<19	53			3	1F	04	00
10	<20	54			3	1F	04	00
11	<21	55			3	1F	04	00
12	<22	56			3	1F	04	BA
13	<23	57			3	1F	04	CA
14	<24	58			3	1F	04	EC
15	<25	59			3	1F	04	00
16	<26	5A			3	1F	04	00
17	<27	5B			3	1F	04	00
18	<62	7E			3	1F	04	2F
19	<61	7D			3	1F	04	CF
20	>63	BF	0C		2	1F	04	

ComPort1 ComPort2 ComPort3
ComPort0 ComPort0 ComPort0
ComPort0 ComPort0 Assign

Bit presentation of selected bytes

Source modified 20 Line(s), 25 bytes

Click “File Open” button, select Pulse_testing.sls from CCM Testing folder.

Click “Run”, the middle section of the window should display the results. This puts the program into a continuous loop of executing the commands. Using the Oscilloscope probe the four FE cards U15 pin 6(25ns 3v positive going pulse), U16 pin 6 and then pin 7 for the high to low transistion. Time scale should be on 20ns per division. Change the scale to 200us per division and check pin C15 of the FE board connector – a 800us pulse should be displayed.

Leave the scope on the 200us scale and reverse the procedure for the next board under test.

Click “Stop”,

Click “File Open” button, Select Sequential_Core.sls from CCM Testing folder.

Click “Run Once”, the middle section of the window should display the results. The Node # column will contain the CCM hardwired ID. The Status will display the contents of the Status register and the RdData column will display a count of 01-20 in rows 25-63 every other row as shown on Board 1 testing.

The screenshot shows the CMS HCAL CCM debugger v1.4.1 interface. The main window displays a table of execution results. The table has the following columns: #, Comd, Code, DataWr, ArLng, RLhg, Node#, Status, and RdData. The data rows show a sequence of commands (MO CO) and responses (<4 44) for nodes 32 through 63. The RdData column contains values from 04 to 20, increasing by 1 every two rows. The status register values are consistently 04. The interface also includes a command log on the left and a bit presentation panel on the right.

#	Comd	Code	DataWr	ArLng	RLhg	Node#	Status	RdData
32	MO	CO		4	2	01	04	
33	<4	44			3	01	04	05
34	MO	CO		4	2	01	04	
35	<4	44			3	01	04	06
36	MO	CO		4	2	01	04	
37	<4	44			3	01	04	07
38	MO	CO		4	2	01	04	
39	<4	44			3	01	04	08
40	MO	CO		4	2	01	04	
41	<4	44			3	01	04	09
42	MO	CO		4	2	01	04	
43	<4	44			3	01	04	10
44	MO	CO		4	2	01	04	
45	<4	44			3	01	04	11
46	MO	CO		4	2	01	04	
47	<4	44			3	01	04	12
48	MO	CO		4	2	01	04	
49	<4	44			3	01	04	13
50	MO	CO		4	2	01	04	
51	<4	44			3	01	04	14
52	MO	CO		4	2	01	04	
53	<4	44			3	01	04	15
54	MO	CO		4	2	01	04	
55	<4	44			3	01	04	16
56	MO	CO		4	2	01	04	
57	<4	44			3	01	04	17
58	MO	CO		4	2	01	04	
59	<4	44			3	01	04	18
60	MO	CO		4	2	01	04	
61	<4	44			3	01	04	19
62	MO	CO		4	2	01	04	
63	<4	44			3	01	04	20

63 Line(s), 321 bytes

Click “File Open” button, Select FRAM_Load.sls from CCM Testing folder.

Click “Run Once”, the middle section of the window should display the results. The Node # column will contain the CCM hardwired ID.

Click “File Open” button, Select FRAM_Read.sls from CCM Testing folder.

Click “Run Once”, the middle section of the window should display the results. The Node # column will contain the CCM hardwired ID. The Status will display the contents of the Status register and the RdData column will display a count of 10-33, beginning in row 2. As shown in the following picture.

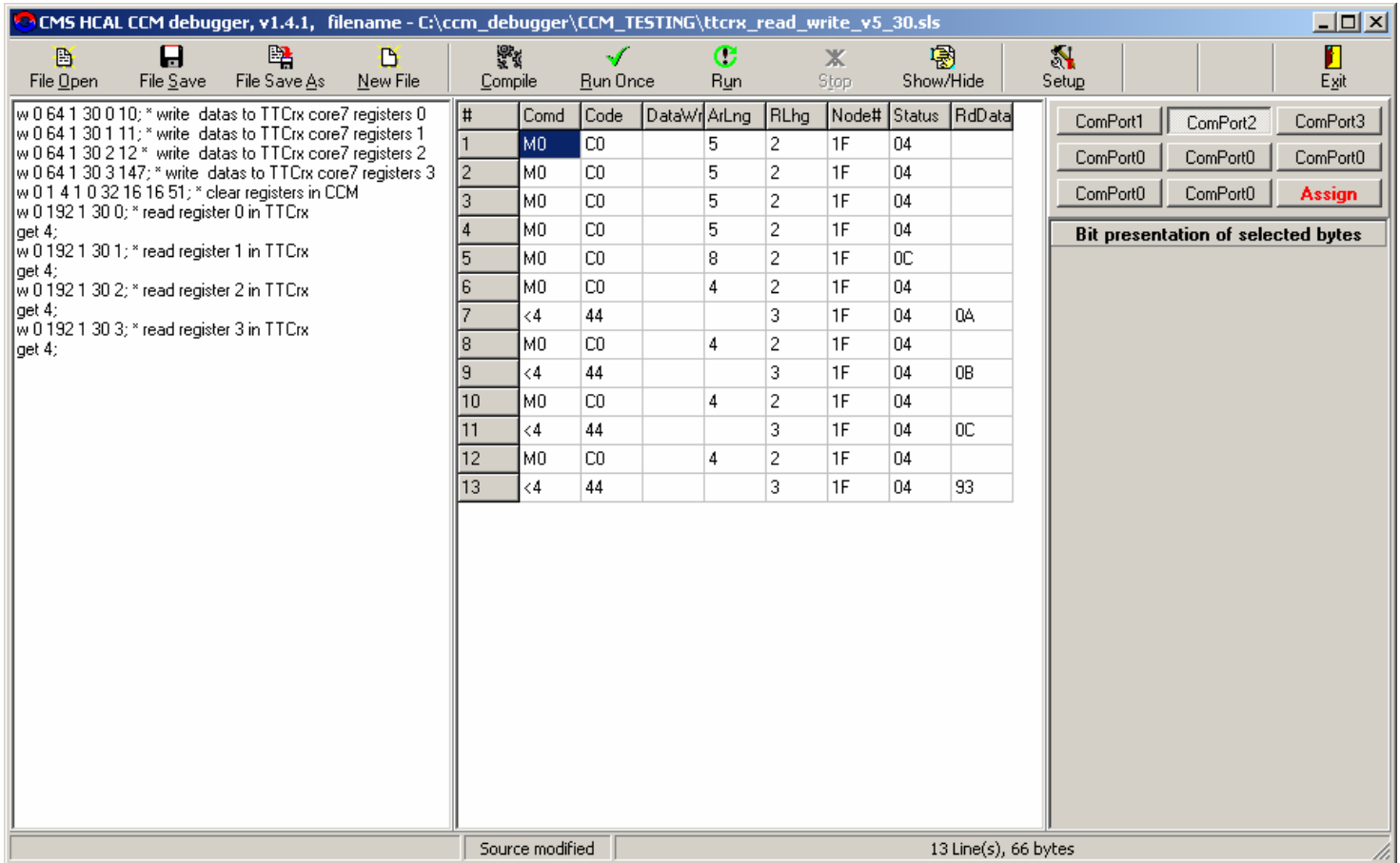
CMS HCAL CCM debugger, v1.4.1, filename - C:\ccm_debugger\CCM_TESTING\FRAM_read_4fe.sls

#	Comd	Code	DataWr	ArLng	RLhg	Node#	Status	RdData
1	M0	C0		4	2	1F	04	
2	<4	44			3	1F	04	10
3	<5	45			3	1F	04	11
4	M0	C0		4	2	1F	04	
5	<4	44			3	1F	04	12
6	<5	45			3	1F	04	13
7	M0	C0		4	2	1F	04	
8	<4	44			3	1F	04	14
9	<5	45			3	1F	04	15
10	M0	C0		4	2	1F	04	
11	<4	44			3	1F	04	16
12	<5	45			3	1F	04	17
13	M0	C0		4	2	1F	04	
14	<4	44			3	1F	04	18
15	<5	45			3	1F	04	19
16	M0	C0		4	2	1F	04	
17	<4	44			3	1F	04	20
18	<5	45			3	1F	04	21
19	M0	C0		4	2	1F	04	
20	<4	44			3	1F	04	22
21	<5	45			3	1F	04	23
22	M0	C0		4	2	1F	04	
23	<4	44			3	1F	04	24
24	<5	45			3	1F	04	25

36 Line(s), 96 bytes

Click “File Open” button, Select TTCrx_Read_Write.sls from CCM Testing folder.

Click “Run Once”, the middle section of the window should display the results. The Node # column will contain the CCM hardwired ID. The Status will display the contents of the Status register and the RdData column data read back from the TTCrx. As shown in the following picture.



If boards passes the test then put a dot on and put into “pass” box, if fail put into “fail” box.

5/17/2004

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