

09/12/2003

DT chamber meeting



Muon detector DCS status

**M. Bellato, S. Braibant, P. Giacomelli, M. Giunta, M.
Passaseo**

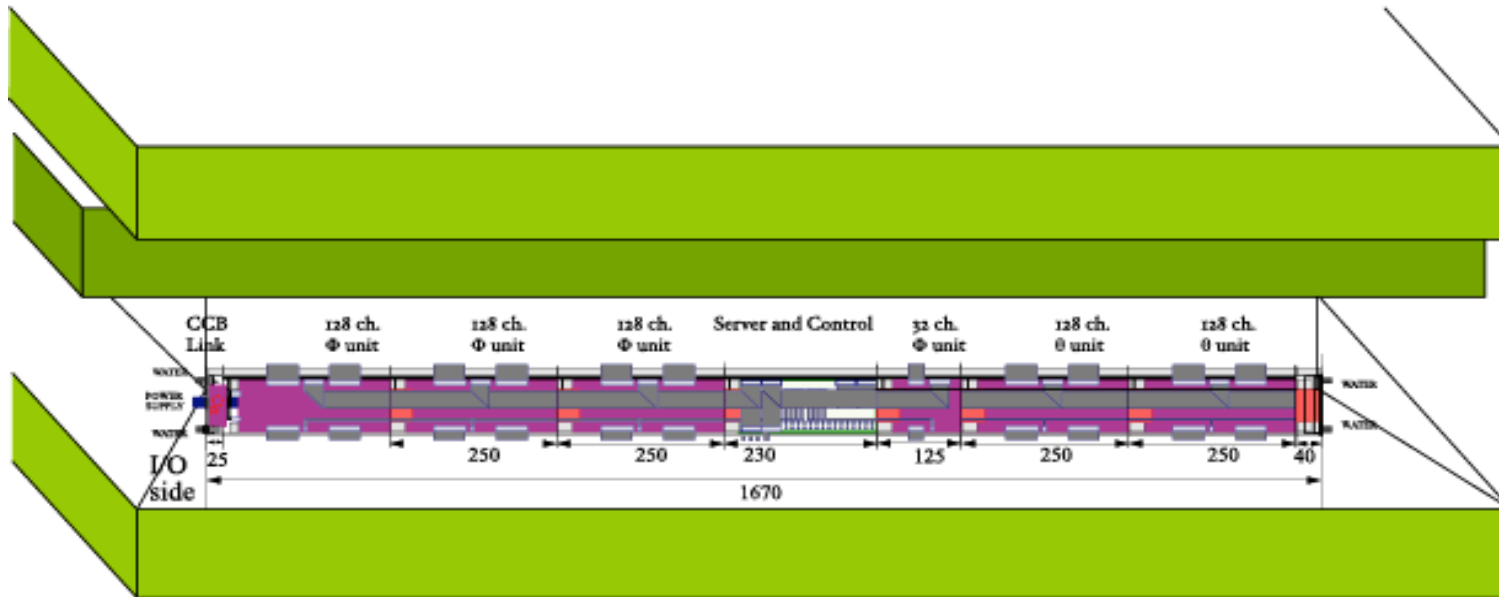
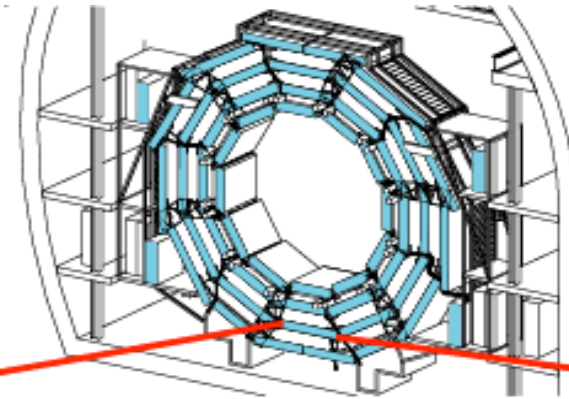


DT DCS Supervision

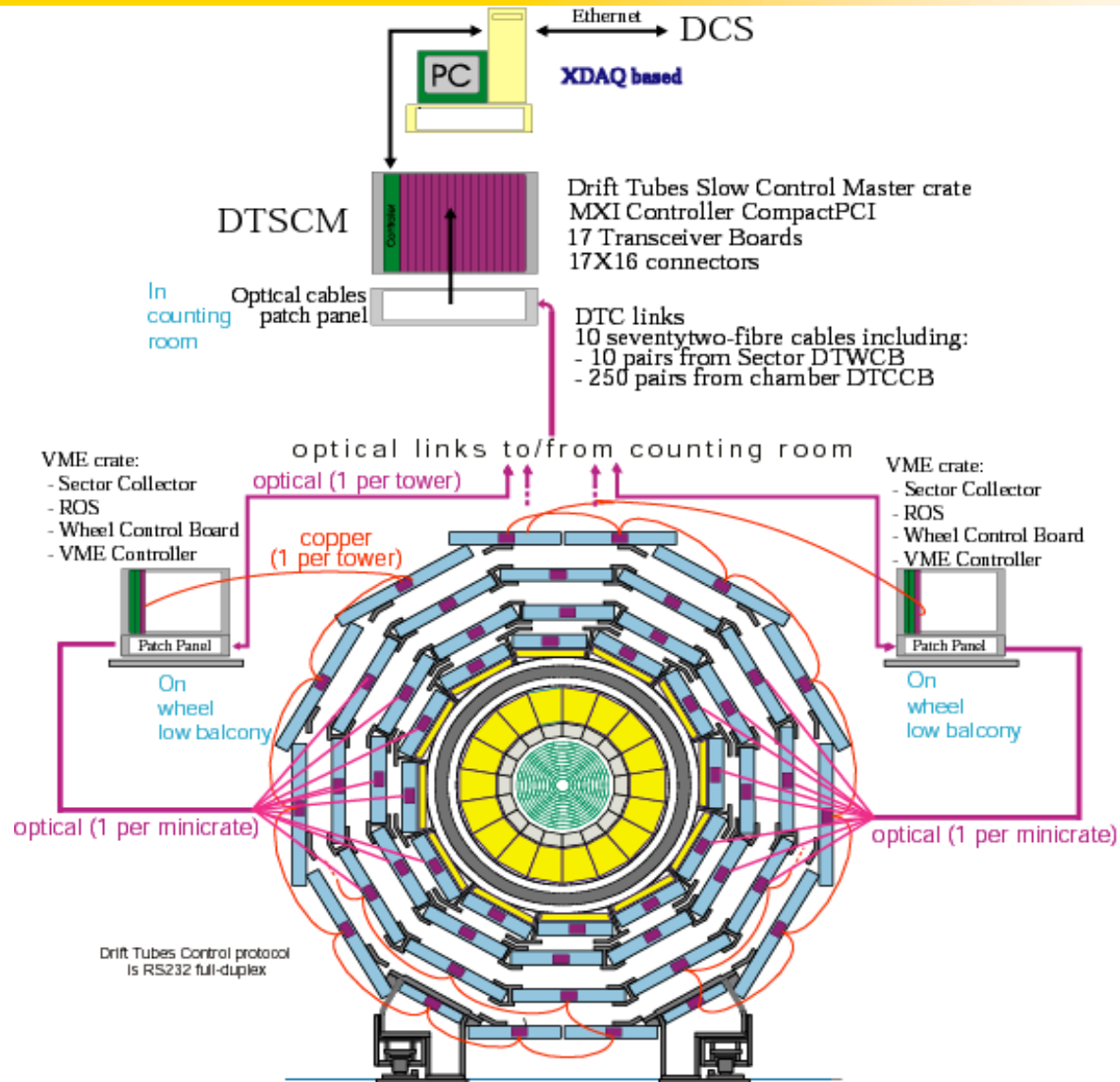
- Minicrates 250
 - (Readout Boards) through Chamber Control Board (CCB)
 - (Trigger Boards) through CCB
 - (Front-End Boards) through CCB
 - Control Boards
- VME crates for Tr+Ro 10 crates
- DT Front-End DDU's 1 crate
- HV + LV 4 racks per wheel
- Alignment Leds on DT 10000
- DT TTC branch 1
- Gas Lines, Cooling Lines 250

DT Minicrate

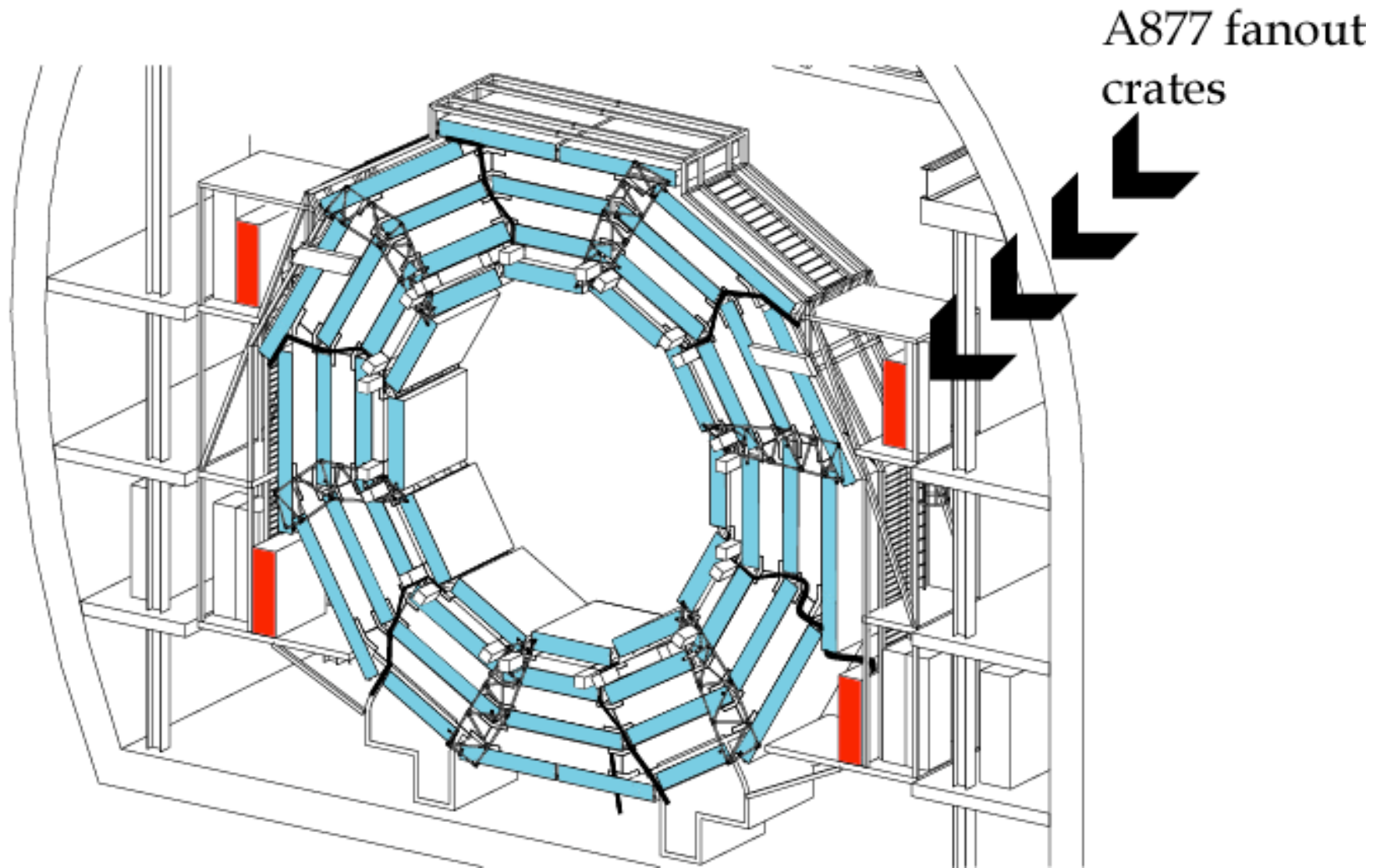
- attached to one side of each chamber
- different sizes (MB1-MB4)
- water cooled
- houses RO, TRIG, CCB boards
- highly integrated
- qualified electronics
- one prototype successfully tested with structured beam



DT DCS Layout (Minicrate)

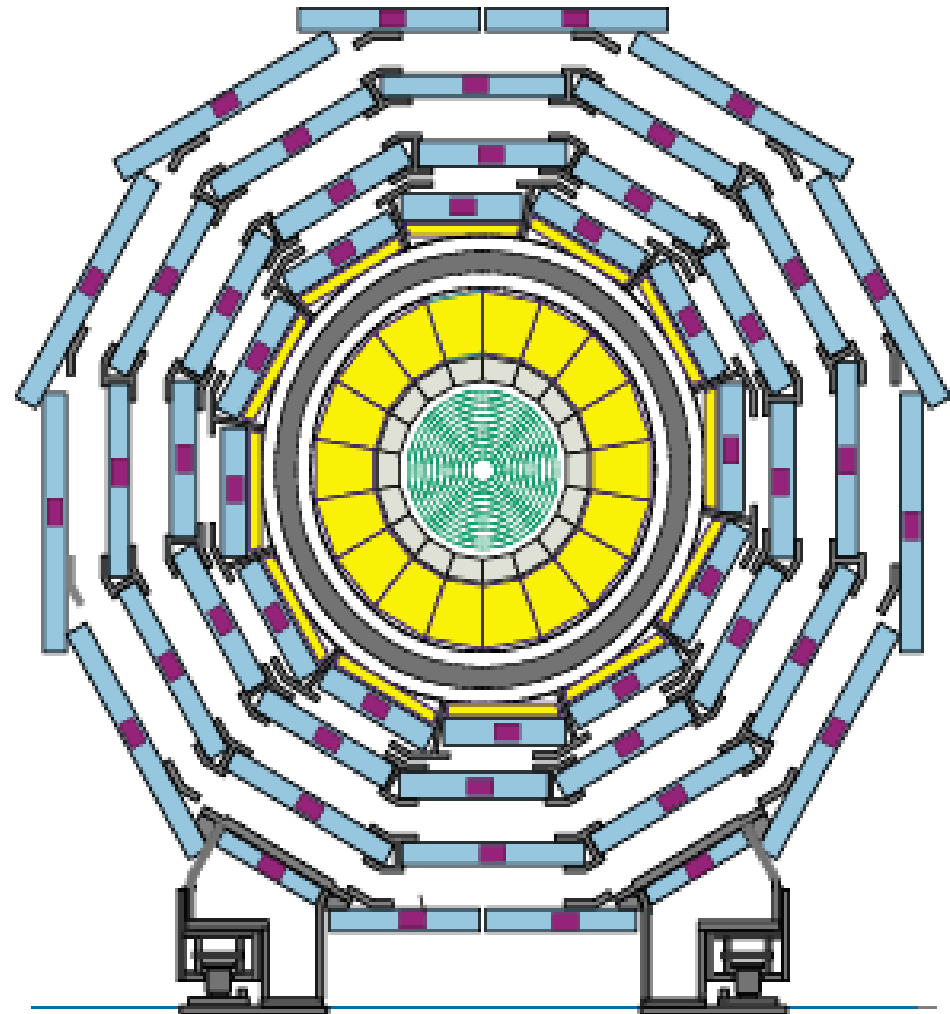


DT DCS Layout (HV+LV)



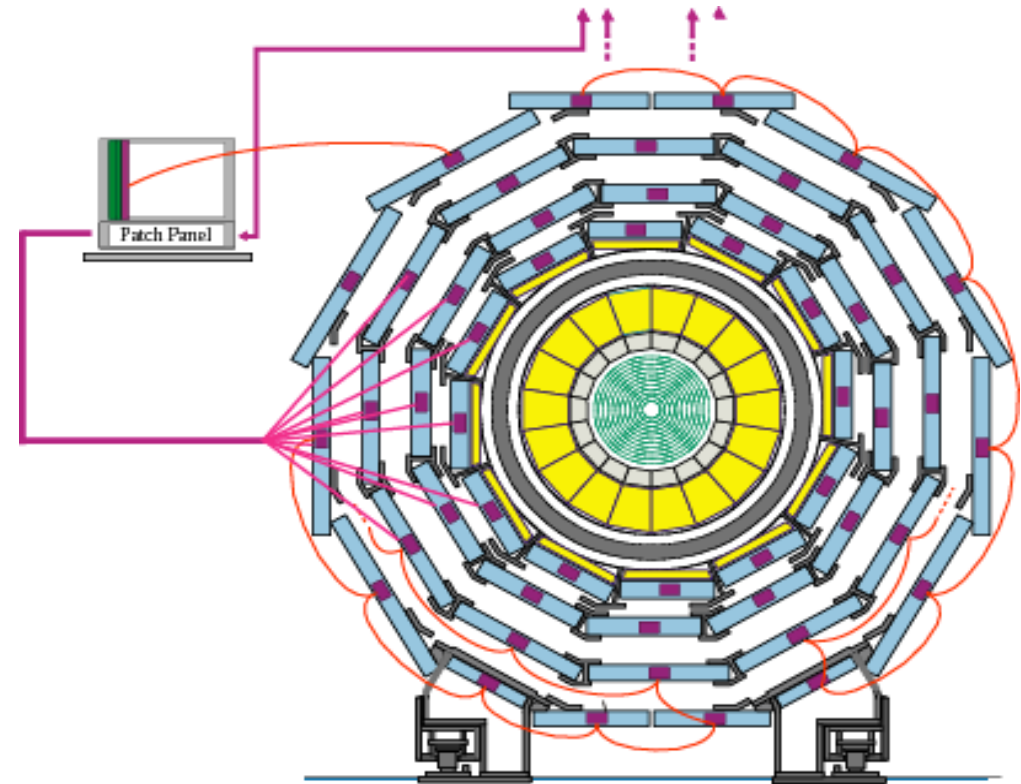
DTSC components -1

- CONTROL BOARD
 - Housed in cooled minicrates
 - Microprocessor based
 - External world I/F via serial optical link(s)



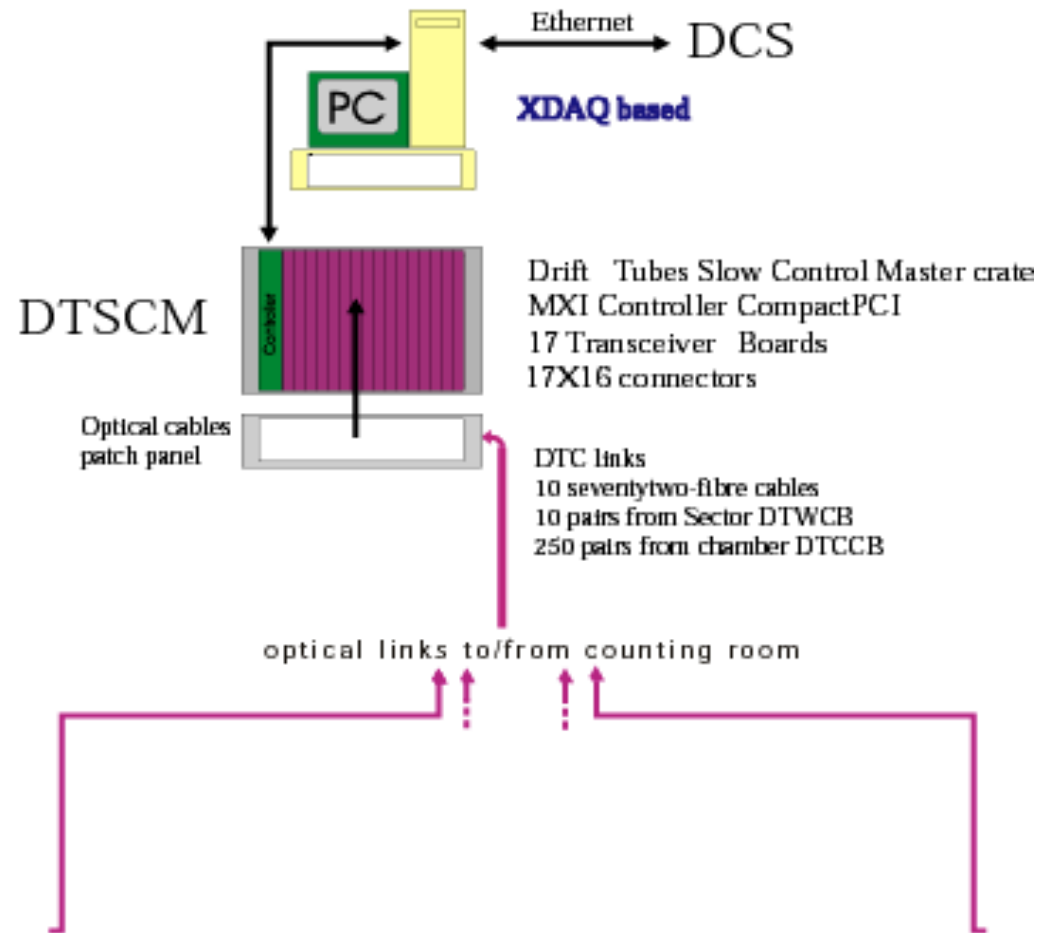
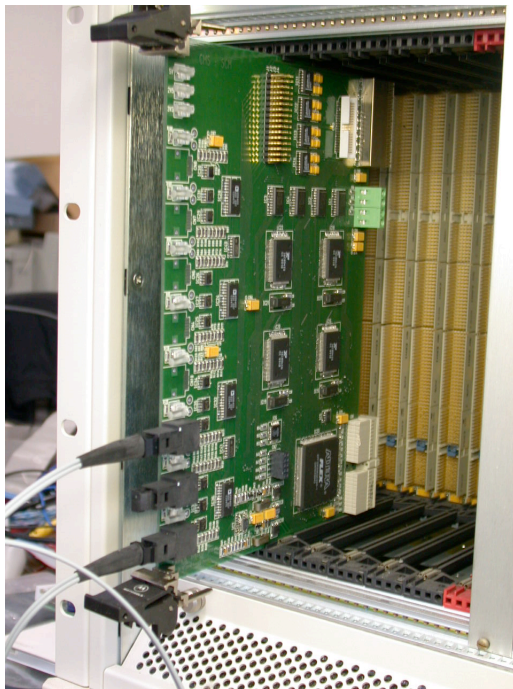
DTSC components - 2

- SERIAL LINKS
 - One direct link from each control board to counting room (optical asynchronous)
 - One direct link from half wheel control board to counting room (optical asynchronous)
 - One daisy chained link from sector collector to control boards (half wheel - copper)
 - One local link for maintenance

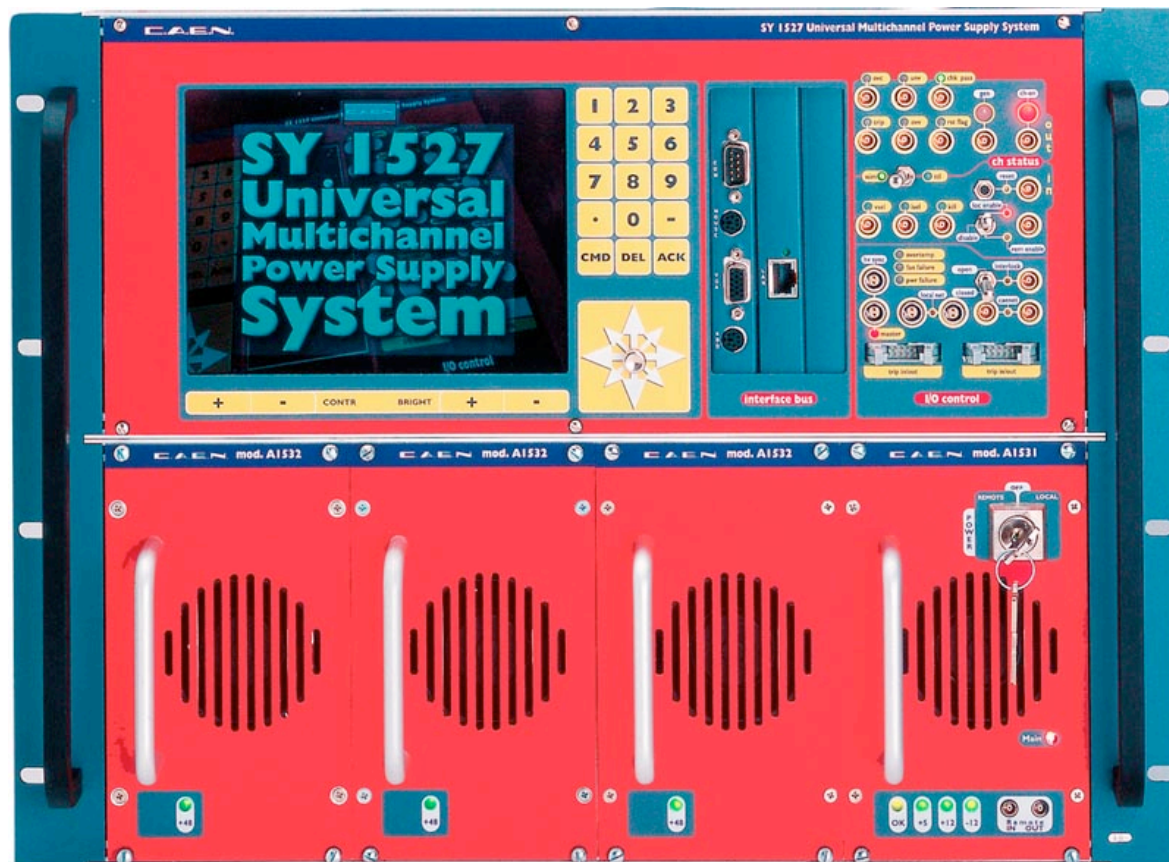


DTSC components - 3

- SLOW CONTROL MASTER (SCM)
 - Sits in the counting room
 - 260 RS232 optical connections
 - Houses the DCS interface

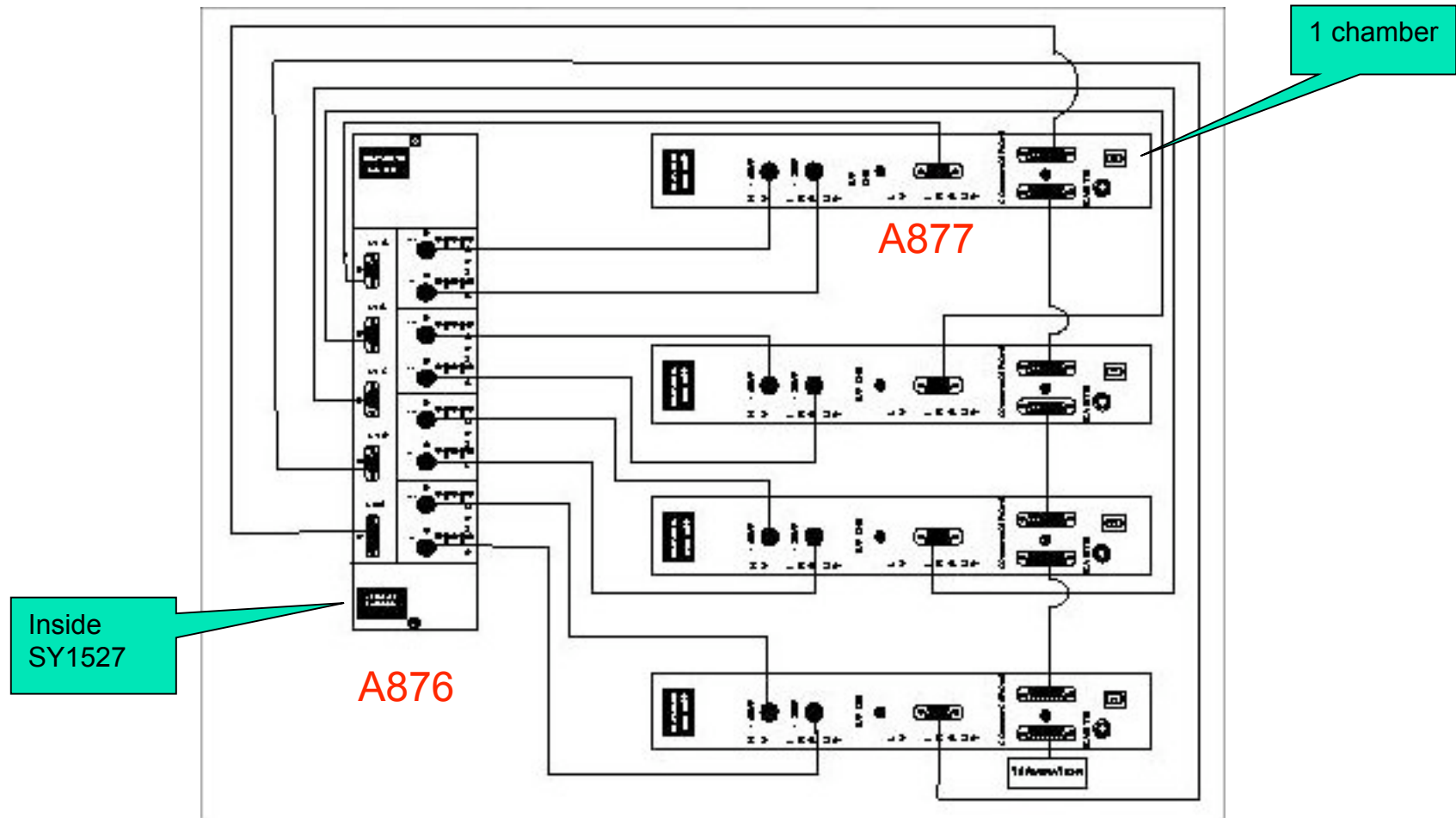


DTSC components - 4



- A877 fanout crates in UXC55
- SY1527 with A876 distributor boards in USC55

DT HV Power Supply Overview





DT Control Board

- Clock distribution
- Test Pulse signals distribution
- Distribution and Readout of analog signals
- Distribution and Readout of control signals
- Temperature monitoring
- Trigger Board and Readout Board ASICs setup and housekeeping



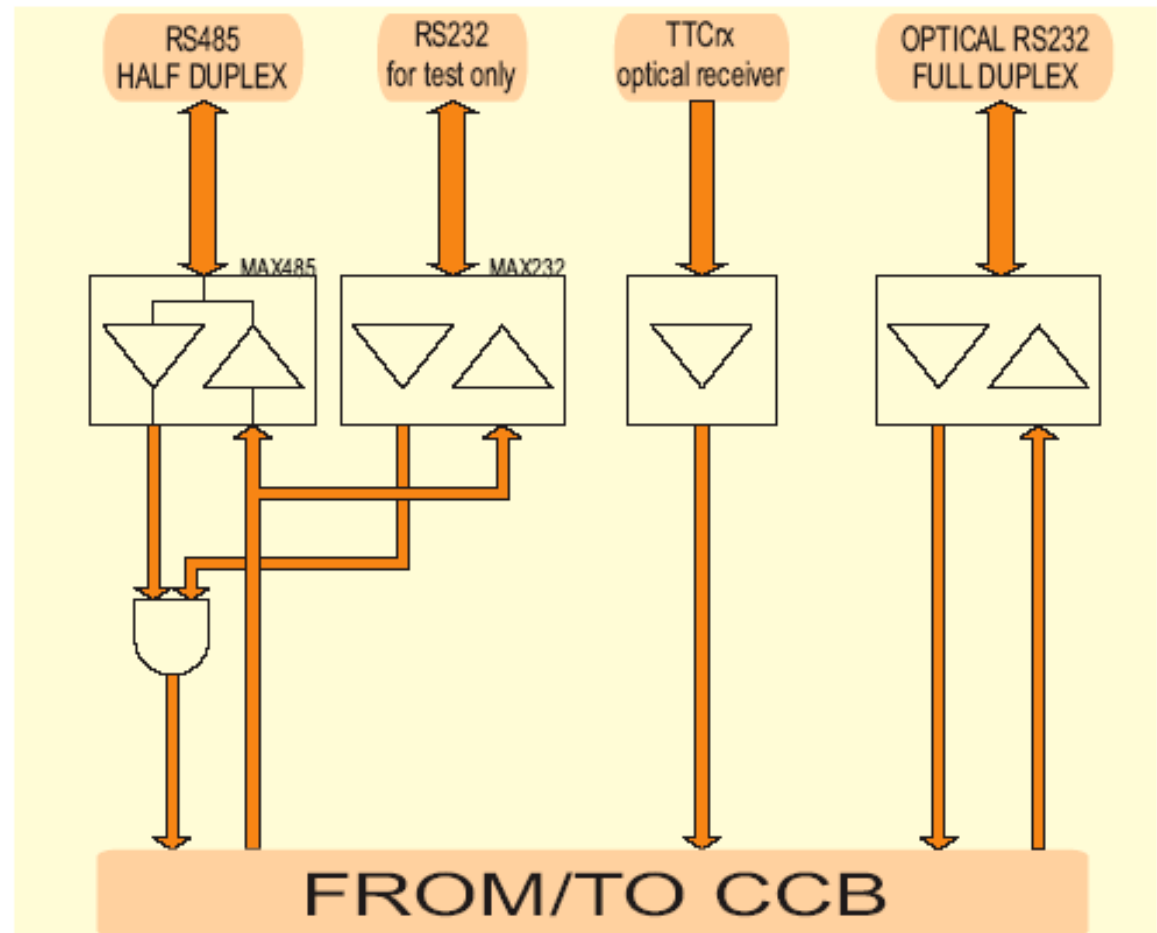
CCB status and tests

- Six prototypes fully working
 - Design has been validated during May03 testbeam with full MB1 minicrate operation
- Ready for production
- Acceptance tests
 - Performed as part of full minicrate production tests
 - Minicrate tests exercise all the functionalities of CCB
- Qualification tests
 - Almost all components have been irradiated and qualified with an earlier CCB version
 - Few components (due to engineering changes) still need to be tested
 - A full CCB test with protons planned before mass production (Nov. 03)
- Burn-in test planned with CCB powered and clocked

Link Board

Essentially a level translator for the CCB communication channels :

- TTC optical receiver
- DCS main channel optical transceiver
- DCS backup channel electrical rtx
- Service channel transceiver





Link Board status and tests

- Two prototypes fully working
 - Design has been validated during May03 testbeam with full MB1 minicrate operation
- Ready for production
- Acceptance tests
 - Performed as part of full minicrate production tests
 - Minicrate tests exercise all the functionalities of Link Board
- Qualification tests
 - All components have been irradiated and qualified with an earlier LB version
 - A full Link Board test with protons planned before mass production
- Burn-in test planned

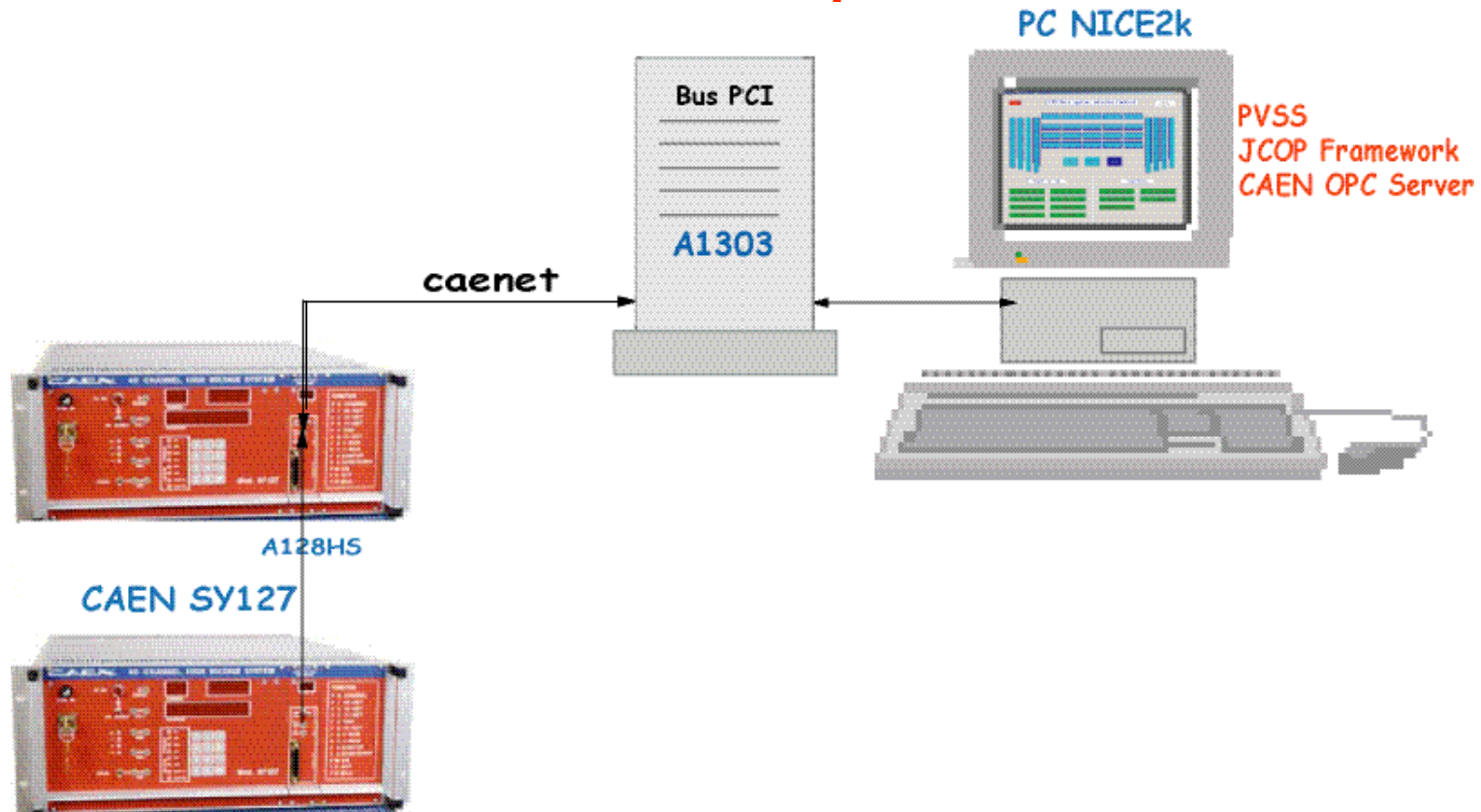


A software example: HV control at the ISR

- ☞ This program uses many software tools such as PVSS, JCOP framework, OPC servers, etc. with a simple hardware setup located at the ISR
- ☞ A User Manual of the program is available as CMS note: **CMS IN 2003/047** “A PVSS Application for the High Voltage Control System of the Muon DT Chambers at the ISR: USER Manual“

Hardware setup

ISR setup



PVSS-based HV control

Double-click to change value

HV Monitoring Crate: CMS_DT:SY127_ISR_2 15/10/2003 11:28:35

Wires								Strips									
Trend	V0 (V)	VMon (V)	I0 (uA)	IMon (uA)	RUUp (V/s)	RDwn (V/s)	Trip (s)	Status	Trend	V0 (V)	VMon (V)	I0 (uA)	IMon (uA)	RUUp (V/s)	RDwn (V/s)	Trip (s)	Status
MB3C32	3600	3594	5	0.1	100	100	10	ON	MB3C32	1800	1798	15	0	100	100	99	ON
MB3C17	3600	3598	5	0.2	100	100	10	ON	MB3C17	1800	1800	15	0	100	100	99	ON
MB3C21	3600	3596	5	0.1	100	100	10	ON	MB3C21	1800	1798	15	0	100	100	99	ON
MB3C15	3600	3596	5	0.4	100	100	10	ON	MB3C15	1800	1798	15	1.4	100	100	99	ON
MB3C13	3600	3596	5	0	100	100	10	ON	MB3C13	1800	1798	15	0	100	100	99	ON
MB3C30	3600	3594	5	0.1	100	100	10	ON	MB3C30	1800	1798	15	0	100	100	99	ON
MB3C24	3600	3596	5	0.2	100	100	10	ON	MB3C24	1800	1800	15	0	100	100	99	ON
MB3C28	3600	3598	5	0.3	100	100	10	ON	MB3C28	1800	1798	15	0.3	100	100	99	ON
MB3C20	3600	3592	5	0	100	100	10	ON	MB3C20	1800	1798	15	0	100	100	99	ON
MB3C22	3600	3594	5	0.1	100	100	10	ON	MB3C22	1800	1798	15	0	100	100	99	ON
MB1Cxx	3600	0	15	0	100	100	999	OFF	MB1Cxx	1800	0	40	0	100	100	999	OFF
MB1C18	3600	0	15	0	100	100	999	OFF	MB1C18	1800	0	40	0	100	100	999	OFF

ALARMS:

Chamber ON/OFF

Set default values

Change Config.

Write Config. File

Trip auto-recover: ON

CLOSE

Chamber stat.

Global trending

Check gas

IBeams							
Trend	V0 (V)	VMon (V)	I0 (uA)	IMon (uA)	RUUp (V/s)	RDwn (V/s)	Status
MB3C32	1200	1200	15	0	100	100	99 ON
MB3C17	1200	1204	15	0	100	100	99 ON
MB3C21	1200	1200	15	0.1	100	100	99 ON
MB3C15	1200	1202	15	0	100	100	99 ON
MB3C13	1200	1200	15	0	100	100	99 ON
MB3C30	1200	1200	15	0	100	100	99 ON
MB3C24	1200	1200	15	0	100	100	99 ON
MB3C28	1200	1202	15	0	100	100	99 ON
MB3C20	1200	1198	15	0.1	100	100	99 ON
MB3C22	1200	1198	15	0	100	100	99 ON
MB1Cxx	1200	0	40	0	100	100	999 OFF
MB1C18	1200	0	40	0	100	100	999 OFF

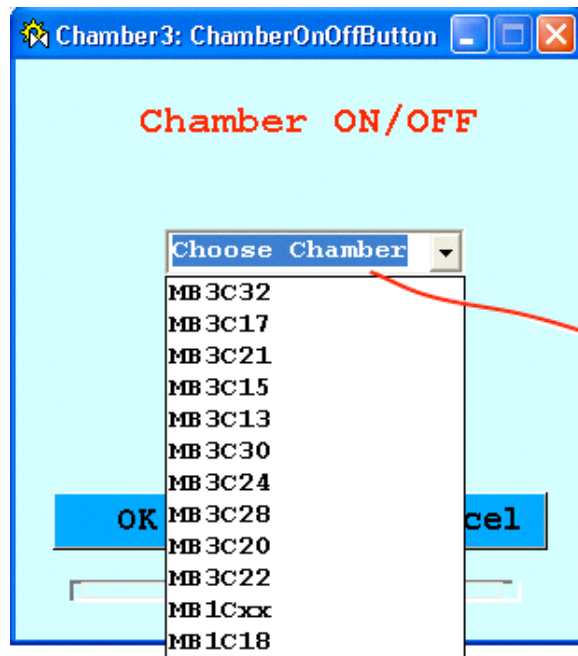
Chamber name Click to see trending of this channel

Automatic ramp up/down of 1 DT chamber

Manual ramp up/down of 1 channel

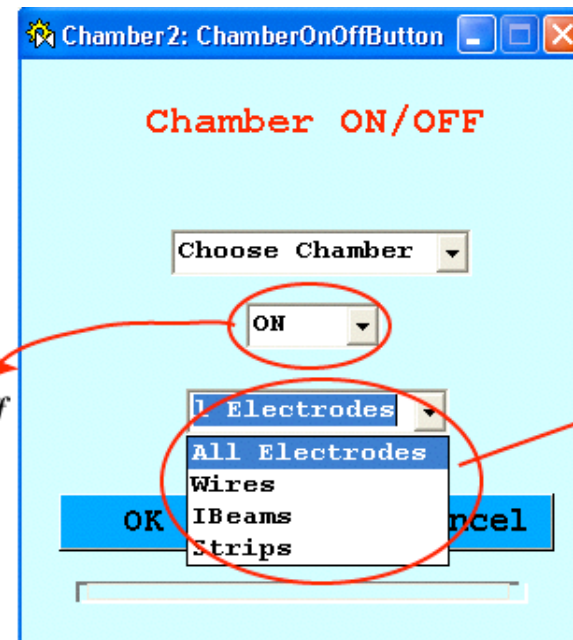
Compute chambers statistics

HV On/Off switching



Popdown menu to select chamber

Select On/Off



Pop down menu to select electrode (default is All electrodes = chamber)



HV Channel plots

wires MB3C21

tool acting on iMon vMon

start dd mm yyyy hr mn sc Y Min Y Max Avg

stop dd mm yyyy hr mn sc

25/09/2003 12:44:37

statistics legend

time

Select iMon or vMon

Click to access zoom

Gives ymin - ymax and average over selected period of time

Access the curve's legend

Statistics with thresholds

CLOSE



HV channels statistics

(NoName)

Chamber statistics
based on vMon

start dd mm yyyy hr mn sc
 3 10 2003 0 0 0

stop 3 10 2003 12 3 0 **Now**

Thresholds:

Wires	Strips	I Beams
3500	1700	1100

One Chamber:

Station: MB1 Chamber nr: (dd)

compute

Chamber ON for:

All Chambers:

write file

CLOSE



HV channels statistics

Start Time: 2003.09.25 00:00:00.000

Stop Time: 2003.12.06 00:00:00.000

Chamber Name	ON Time	W Trips	S Trips	I Trips
MB1_C01	1d 1:36:40	1	1	1
MB1_C10	2d 15:30:8	0	0	0
MB1_C12	7d 22:40:37	6	0	0
MB1_C16	2d 19:15:12	0	0	0
MB1_C18	15d 2:20:37	3	1	1
MB1_C19	1d 6:50:52	3	2	0
MB1_C20	26d 4:31:45	3	0	0
=====				
MB2_C17	7d 1:33:15	1	1	0
MB2_C18	1d 18:52:4	2	0	0
MB2_C19	19d 0:43:40	0	0	0
MB2_C21	7d 3:12:56	0	0	0
MB2_C24	23d 19:12:42	0	0	0
MB2_C25	4d 4:31:37	1	1	0
MB2_C26	12d 3:50:49	0	0	0
MB2_C36	8d 16:14:23	2	1	0
=====				
MB3_C08	11d 13:13:4	2	0	1
MB3_C13	67d 10:24:0	29	0	0
MB3_C15	45d 1:57:0	114	1	0
MB3_C16	23d 10:53:29	9	1	4
MB3_C17	64d 22:11:33	107	0	0
MB3_C18	6d 23:29:10	17	3	0
MB3_C20	63d 11:42:12	80	1	1
=====				



HV Channels alerts

Alert panel

Short	Prio	Time	DP element/Description	Alert text	Dir.	Value	Ack	Ack. time	Num	>	...
E	60	9/23/2003 4:42:03 PM	SY127_ISR_2_board09_ch002.actual.1	Tripped	WEN	FALSE					...
E	60	9/23/2003 4:42:30 PM	SY127_ISR_2_board09_ch002.actual.1	Over Current	CAME	TRUE					...
E	60	9/23/2003 4:42:30 PM	SY127_ISR_2_board09_ch002.actual.1	Over Voltage	WEN	FALSE					...
E	60	9/23/2003 4:54:26 PM	SY127_ISR_2_board01_ch001.actual.1	Over Current	CAME	TRUE					...
E	60	9/23/2003 4:54:30 PM	SY127_ISR_2_board01_ch001.actual.1	Over Current	WEN	FALSE	xxx	9/23/2003 4:59:59 PM			...
E	60	9/23/2003 4:57:16 PM	SY127_ISR_2_board01_ch001.actual.1	Over Current	CAME	TRUE					...
E	60	9/23/2003 4:57:20 PM	SY127_ISR_2_board01_ch001.actual.1	Over Current	WEN	FALSE	xxx	9/23/2003 4:59:59 PM			...
E	60	9/23/2003 4:59:07 PM	SY127_ISR_2_board09_ch002.actual.1	Tripped	CAME	TRUE	xxx	9/23/2003 5:00:00 PM			...
E	60	9/23/2003 4:59:12 PM	SY127_ISR_2_board09_ch002.actual.1	Over Current	WEN	FALSE	xxx	9/23/2003 5:00:00 PM			...
E	60	9/23/2003 4:59:21 PM	SY127_ISR_2_board09_ch002.actual.1	Over Voltage	CAME	TRUE	xxx	9/23/2003 5:00:00 PM			...
E	60	9/23/2003 5:00:04 PM	SY127_ISR_2_board09_ch002.actual.1	Tripped	WEN	FALSE					...
E	60	9/23/2003 5:00:34 PM	SY127_ISR_2_board09_ch002.actual.1	Over Voltage	WEN	FALSE					...
E	60	9/23/2003 5:00:34 PM	SY127_ISR_2_board09_ch002.actual.1	Over Current	CAME	TRUE					...
E	60	9/23/2003 5:01:58 PM	SY127_ISR_2_board01_ch002.actual.1	Over Current	CAME	TRUE					...
E	60	9/23/2003 5:02:03 PM	SY127_ISR_2_board07_ch002.actual.1	Over Current	CAME	TRUE					...
E	60	9/23/2003 5:02:08 PM	SY127_ISR_2_board07_ch002.actual.1	Over Current	WEN	FALSE	!!!				...
E	60	9/23/2003 5:02:10 PM	SY127_ISR_2_board01_ch002.actual.1	Over Current	WEN	FALSE	!!!				...

Settings
 Configuration: [] Time range: Closed Any interval Interval: 9/23/2003 3:02:46 PM - 9/23/2003 5:02:44 PM Max: []
 Alert status: All Prio.: [] Sign: [] Descr.: [] Alert text: [] DP: []

Properties... Lists... Set filter Trend... Stop Cancel Close Help

Running 201



PVSS-based HV control

- ☞ PVSS-based HV control program is continuously used at the ISR to control up to 24 DTs at the time
- ☞ Will also be used during installation at Pit 5
- ☞ Want to develop a similar functionality for the final HV system based on CAEN SY1527 power supplies equipped with A876 and A877 HV boards. Should have support from the JCOP group



Software Components

- Control Board Firmware
 - Boot sequence, local monitoring, SEU checking, DCS communication
- DTSCM Firmware
 - Transparent bridging of 260 optical serial communication channels
- DCS run control
 - Minicrate setup, online monitoring, alarms
 - Sector Collectors setup and monitoring
 - ROS setup and monitoring
 - DDU setup and monitoring
 - TTC setup and control
- Condition Database logging
- High Voltage and Low Voltage setup and monitoring
- Gas and pressure gauges monitoring (CERN provided)
- Rack monitoring (CERN provided)
- Graphical User Interface(s)



Software Layout-1

Muon Barrel Slow Control is built around the embedded MC controller

A software "backbone" is being built on top of XDAQ environment

All MC related tasks (Front-end control, Trigger boards control, Readout boards control, alignment, ...) can be seen as a set of XDAQ classes

Communications with hardware are routed through a software server to SCM

Controls of VME crates on balconies is on a different path w.r.t. to MCs

Clients are of different natures and purposes

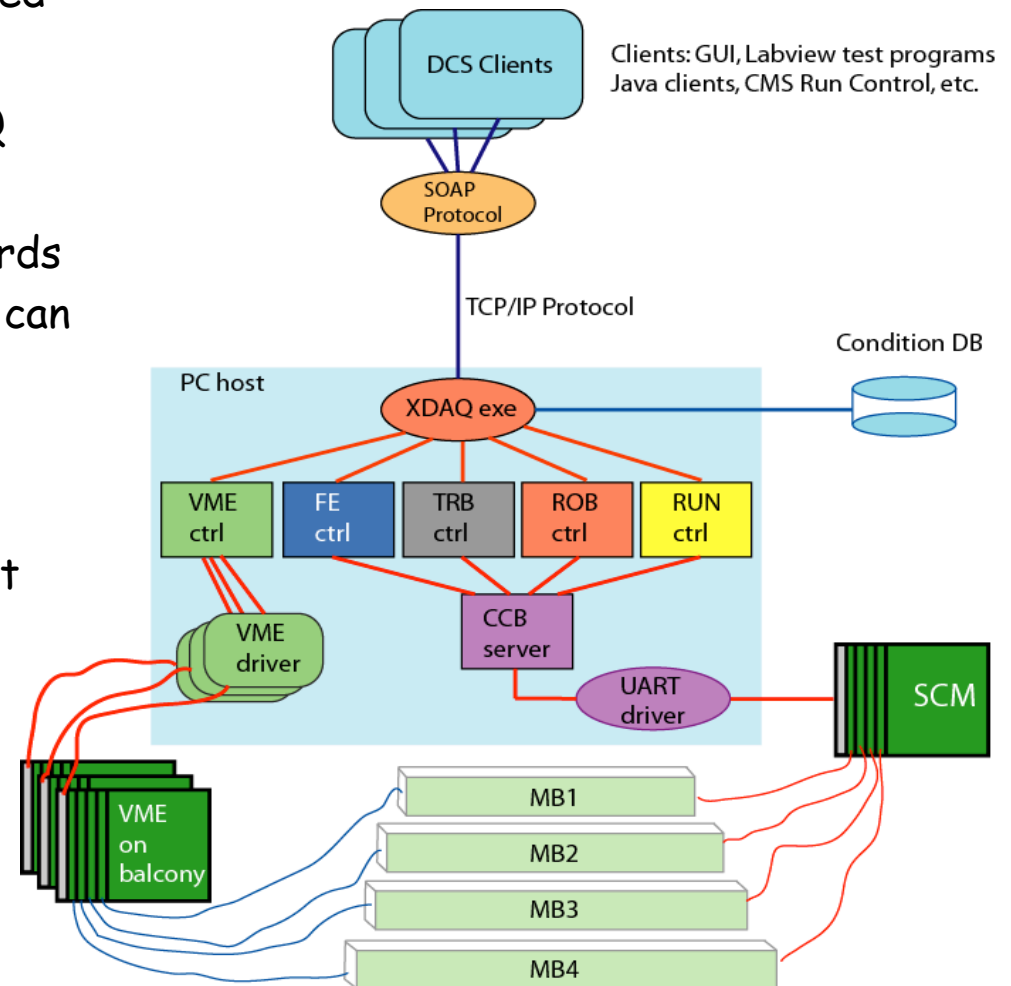
Graphical User Interface (PVSS)

Labview programs for MC local tests

CMS Central Run Control

Any PVSS/Java/C++ client

Any client can access the XDAQ objects through SOAP





Software Status

- Control Board Firmware OK
 - Boot sequence, local monitoring, SEU checking, DCS communication
- DTSCM Firmware OK
 - Transparent bridging of 260 optical serial communication channels
- DCS run control
 - Minicrate setup, online monitoring, alarms Testbeam version
 - Sector Collectors setup and monitoring Testbeam version
 - ROS setup and monitoring Testbeam version
 - DDU setup and monitoring NO
 - TTC setup and control Testbeam version
- Condition Database logging NO
- High Voltage and Low Voltage setup and monitoring Testbeam version
- Gas and pressure gauges setup and monitoring CERN provided
- Rack monitoring CERN provided
- Graphical User Interface(s) NO



Hardware Status

- Chamber Control Board (CCB) Ok ready for production
- Optical fibres In procurement
- Slow Control Master (SCM) Prototyping
- High Voltage Crate Controller First modules from CAEN
- Low Voltage Crate Controller Prototype from CAEN
- VME Controllers on balconies SBS-618 ??



2004 DCS plan vs. manpower

- Hardware
 - CCB mass production OK
 - SCM completion of prototyping OK
 - Purchase of fibres TBD
 - Choice of VME Controller for balconies TDB
- Software
 - Start of migration of CCB related subtasks to XDAQ TBD
 - CCB UART server OK
 - PVSS prototype for HV and LV CAEN Controller OK
 - Build new datapoints for A877, A876 boards and channels OK?
 - Build new datapoints for the generic HV channel OK?
 - Start of GUI development TDB



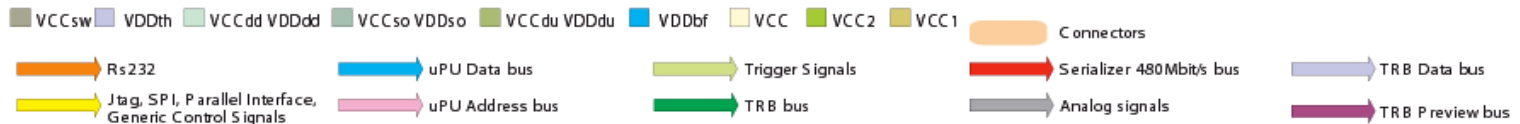
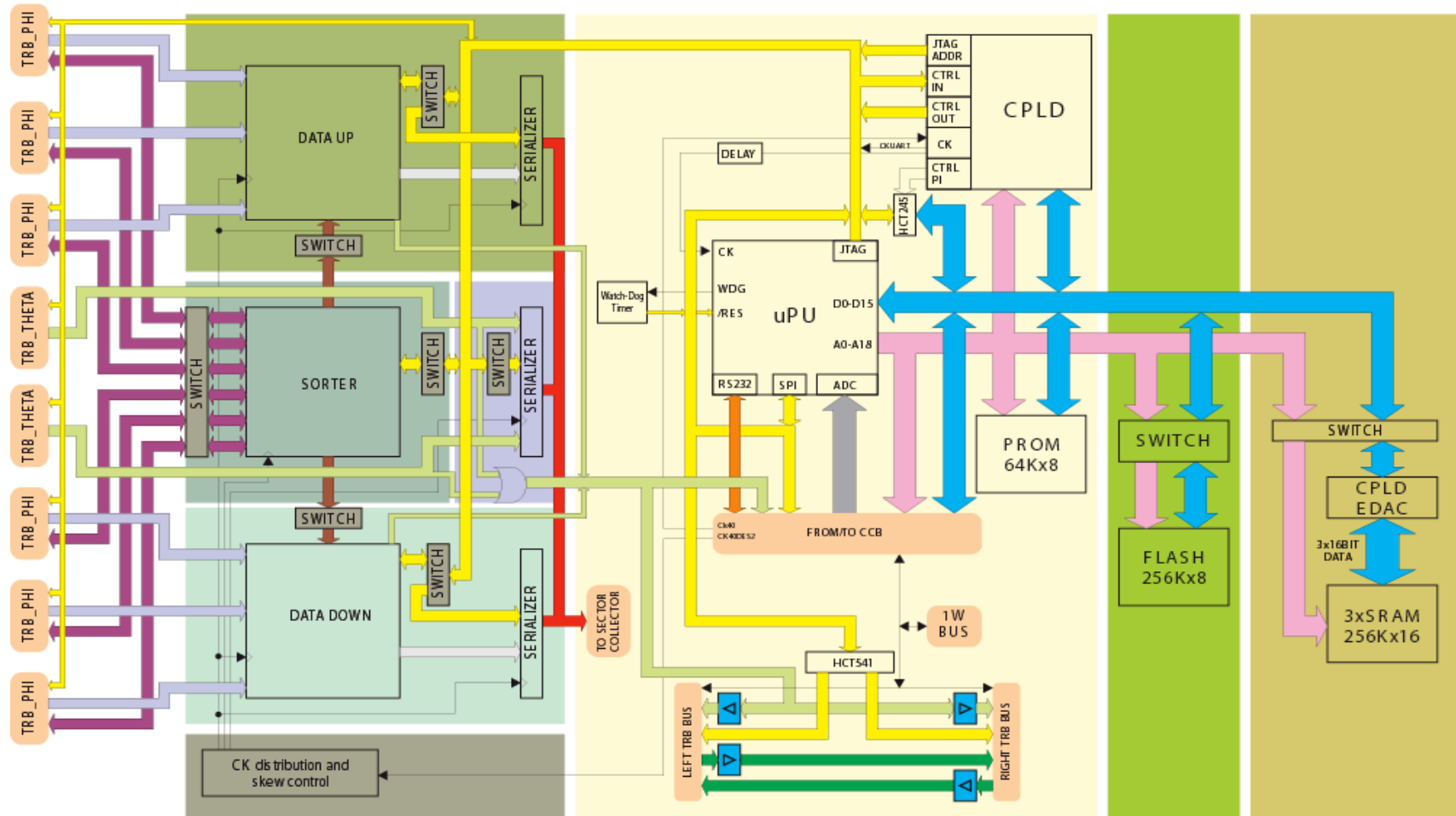
Conclusions

- Hardware system design is almost complete
- Software design not yet finalized for all items
- Small group of people
- Lot of work to be done!



DT Control Board

SERVER BOARD



09/12/2003

Status Report on Muon DCS

30

DT HV Power Supply Block Diagram

