

ISR Work Progress Report

CMS Week December 9th 2003

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ISR Status

- ✓ There are 97 chambers after last Tuesday deliveries from Legnaro and CIEMAT.
- ✓ The HV cabling (+ gas piping) has been completed on all chamber that went through the alignment calibration procedure (65)
- ✓ 81 Chambers were tested with cosmic rays, some more than once. Most MB2 and MB3 chambers have been repaired. MB1 still to do.
- ✓ Latest chambers under gas, HV tests started on MB3s



Not much space left

DT Chambers at ISR

Type	@ISR	Align		HV/Gas	HV Cable	CR TEST
		L	R			
MB1P	18	7	7	14	14	18
MB1M	8	3	3	6	6	8
MB4/9,11	2	0	0	0	0	2
All MB1,4	28	10	10	20	20	28
MB2P	23	7	6	13	13	18
MB2M	10	4	3	7	7	5
MB4/10	6	0	0	0	0	6
All MB2,4	39	11	9	20	20	29
MB3P	18	8	7	15	15	15
MB3M	10	5	5	10	10	9
MB4/4	2	0	0	0	0	0
All MB3,4	30	13	12	25	25	24

HV Cable => Connectors soldered on Phi SL cables and tested

HV Test Upgrades

- New monitoring program (S. Braibant, P. Giacomelli, M. Giunta) gives online displays of current and voltage for each channel. Statistics of time under HV, trips et cetera is push button retrievable from database. Installed on two SY127 crates (24 Chambers)
- Old System (Mary-Cruz) still used for acceptance tests and to identify problem boards.
- HV patch panels are used on chambers with final cabling.
- Final CAEN system allows to test a chamber in CMS conditions. Limited by rudimentary monitoring program.
- Will be extended to 8 chambers as adequate monitoring becomes available.

HV Monitoring Crate:

CMS_DT:SY127_ISR_3

08/12/2003 09:05:16

Wires

Trend	V0 (V)	VMon (V)	I0 (uA)	Imon (uA)	kUp (V/s)	RDwn (V/s)	Trip (s)	Status		
MB4C34	3600	3594	10	0.1	100	100	100	ON		
MB3Cx5	2000	0	30	0.1	100	100	999	OFF		
MB3C10	3600	3592	10	0.3	100	100	100	ON		
MB3C04	3600	3594	10	0.3	100	100	100	ON		
MB2C18	3600	3590	10	0.2	100	100	100	ON		
MB2C17	3600	3592	5	0	100	100	100	ON		
MB3C12	3600	3590	10	0.2	100	100	100	ON		
MB3C01	3600	3592	15	0.2	100	100	100	ON		
MB2C19	3600	3594	10	0	100	100	100	ON		
MB2C21	3600	3596	10	1.7	100	100	100	ON		
MB4C31	3600	3594	10	0.3	100	100	100	ON		
MB1C99	200	0	15	0	100	100	999	OFF		

Strips

Trend	V0 (V)	VMon (V)	I0 (uA)	Imon (uA)	kUp (V/s)	RDwn (V/s)	Trip (s)	Status		
MB4C34	1800	1794	15	0.3	100	100	100	ON		
MB3Cx5	1800	0	40	0	100	100	999	OFF		
MB3C10	1800	1794	15	1.3	100	100	100	ON		
MB3C04	1800	1794	15	0	100	100	100	ON		
MB2C18	1800	1798	15	0.2	100	100	100	ON		
MB2C17	1800	1796	15	0.4	100	100	100	ON		
MB3C12	1800	1796	15	2.1	100	100	100	ON		
MB3C01	1800	1798	10	0	100	100	100	ON		
MB2C19	1800	1798	15	0.4	100	100	100	ON		
MB2C21	1800	1796	15	0	100	100	100	ON		
MB4C31	1800	1798	15	0.5	100	100	100	ON		
MB1C99	1800	0	15	0	100	100	100	OFF		

ALARMS:



- Chamber ON/OFF
- Set default values
- Change Config.
- Write Config. File

Trip auto-recover ON

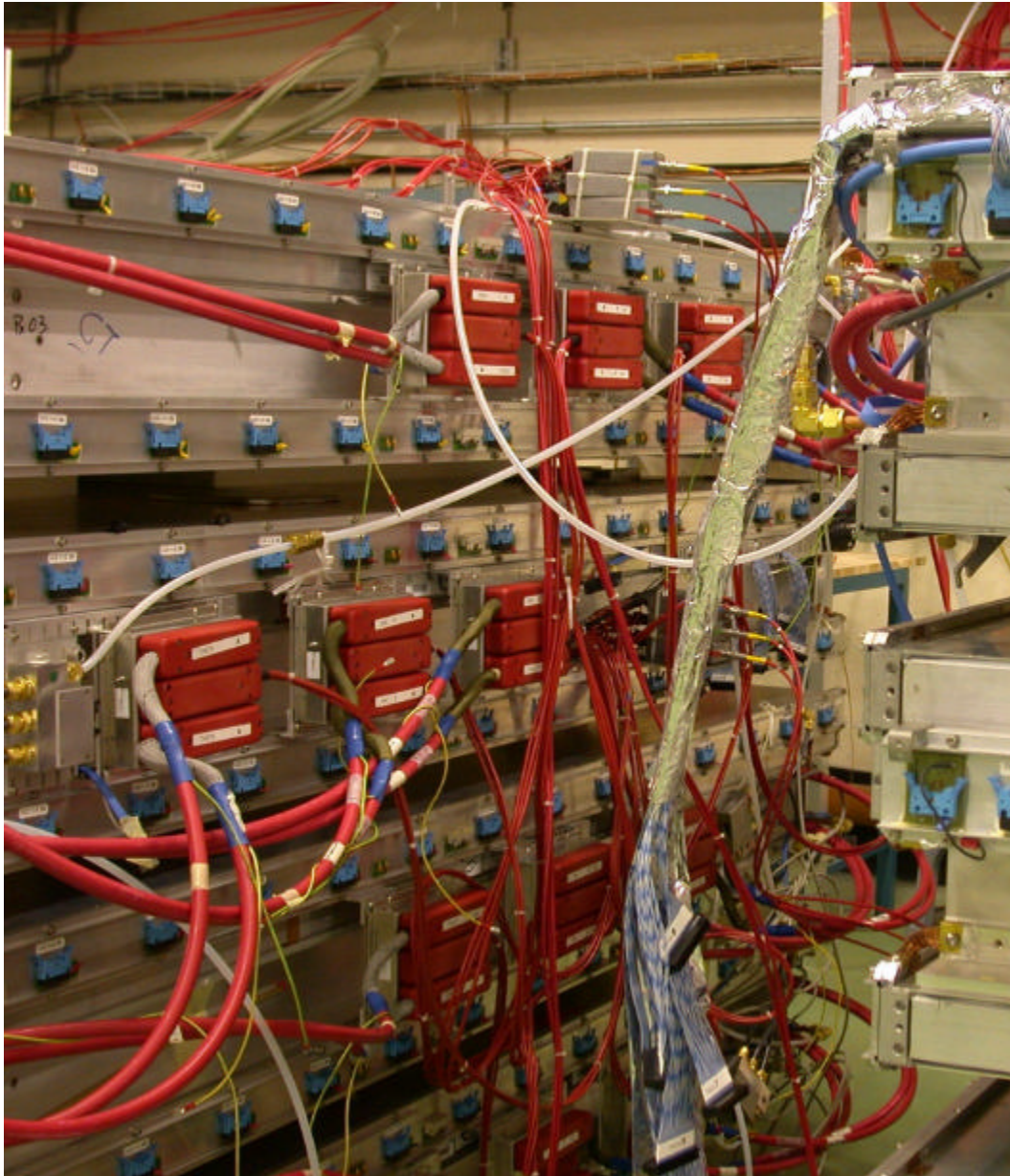
- Chamber stat.
- Global trending
- Check gas

CLOSE

IBeams

Trend	V0 (V)	VMon (V)	I0 (uA)	IMon (uA)	RUp (V/s)	RDwn (V/s)	Trip (s)	Status		
MB4C34	1200	1196	15	0	100	100	100	ON		
MB3Cx5	1200	0	40	0	100	100	999	OFF		
MB3C10	1200	1198	15	0.5	100	100	100	ON		
MB3C04	1200	1198	15	0.1	100	100	100	ON		
MB2C18	1200	1198	15	0	100	100	100	ON		
MB2C17	1200	1198	15	0	100	100	100	ON		
MB3C12	1200	1198	15	0.6	100	100	100	ON		
MB3C01	1200	1198	15	0	100	100	100	ON		
MB2C19	1200	1198	15	0	100	100	100	ON		
MB2C21	1200	1198	15	0.1	100	100	100	ON		
MB4C31	1200	1196	15	0.1	100	100	100	ON		
MB1C99	1200	0	15	0	100	100	100	OFF		

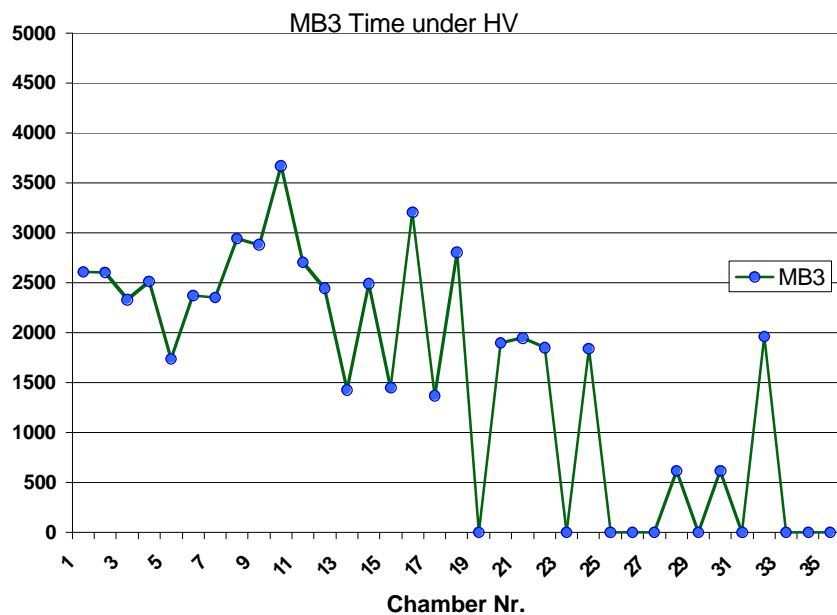
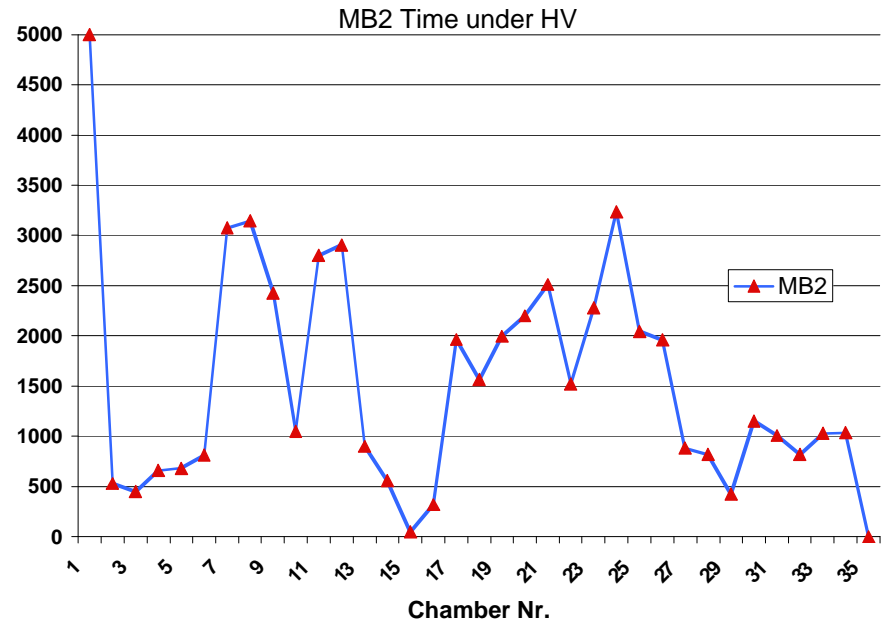
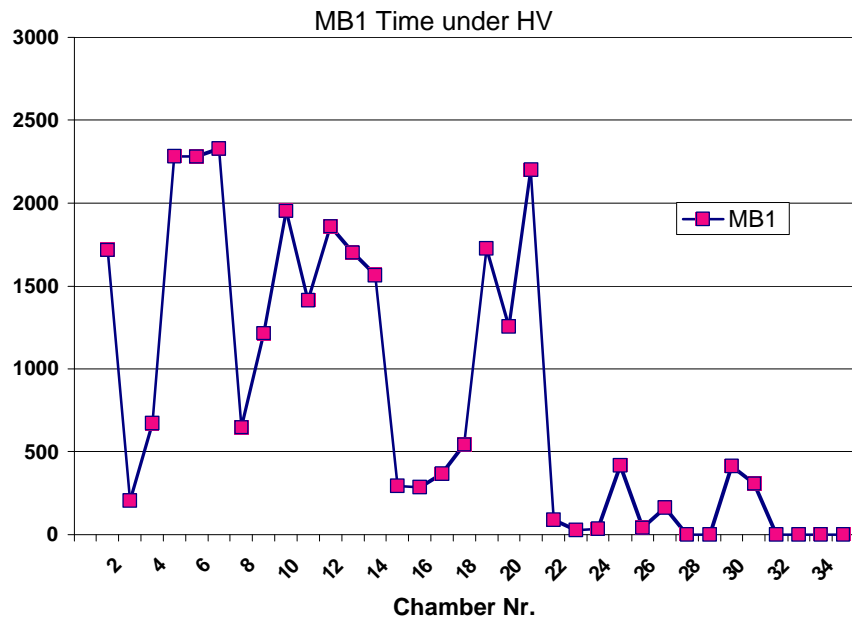
HV Test System



The HV from the CAEN Sy127 is distributed to six connectors with a home made box.

Without Patch Panels one distributor box is needed for one chamber and **ALL pins are connected to HV.**

With HV PP one distributor box is connected to 2 chambers, **ONLY used pins are connected to HV.** It is also possible to connect the chambers to the final HV system.



Chamber alignment, dressing and CR testing require frequent chamber restacking.

Priority given to plus side MB2 and MB3.

HV long terms interferes with above work.

Some Bad Surprises

- The chambers are tested with scalers and front-end DCS after the dressing procedure is completed. The chambers are put under HV and all SLs are tested.
- 3 MB3 chambers failed at this stage: **MB3P14** and **MB3P12**, for YB+2 installation, on 28/11/03 (repaired and tested again with cosmics) and **MB3P04**, for YB+1, on 5/12/03. All failures occurred during power up.
- These chambers were taken off the HV test at the end of June after:

MB3P04 **2513h**, MB3P12 **2444h**, MB3P14 **2490h**
- **MB2P17** (YB+2 installation) gave clicking sounds (discharges outside the cell) when put under HV for the DCS-scaler test. The problem is mainly on the Phi2SL B connector but has not been localized.

wires MB3C04

05/12/2003 18:23:36

tool acting on

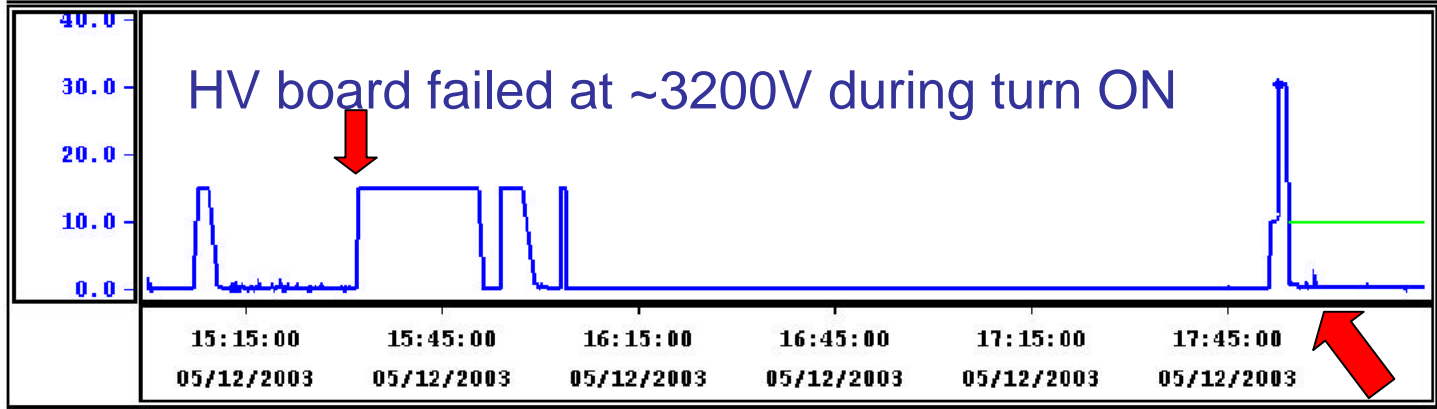
- iMon
- vMon

start dd mm yyyy hr mn sc Y Min 0
5 12 2003 15 0 0 Y Max 30.2
stop dd mm yyyy hr mn sc Avg 2.50349

statistics legend
time

iMon

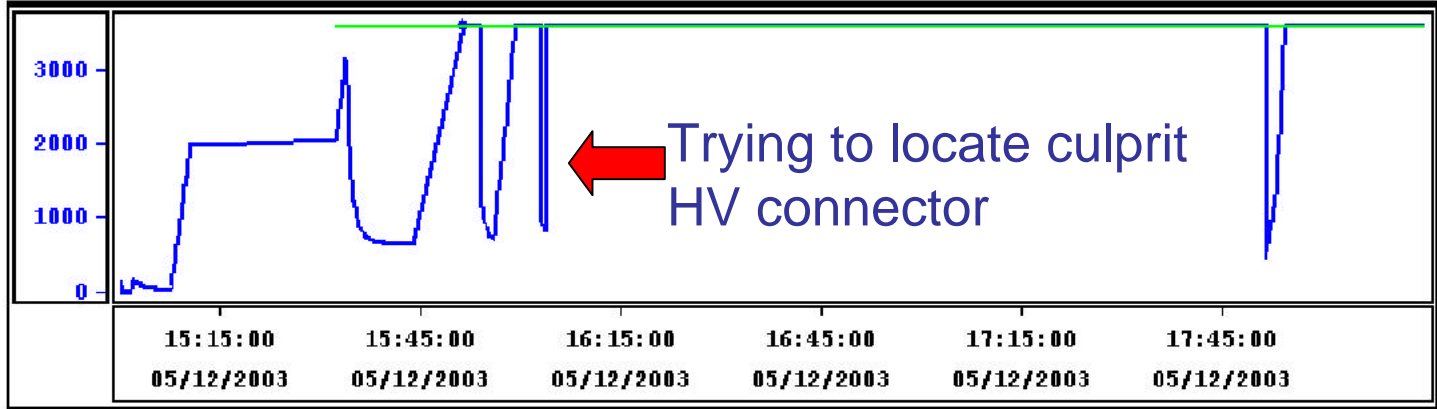
1:1

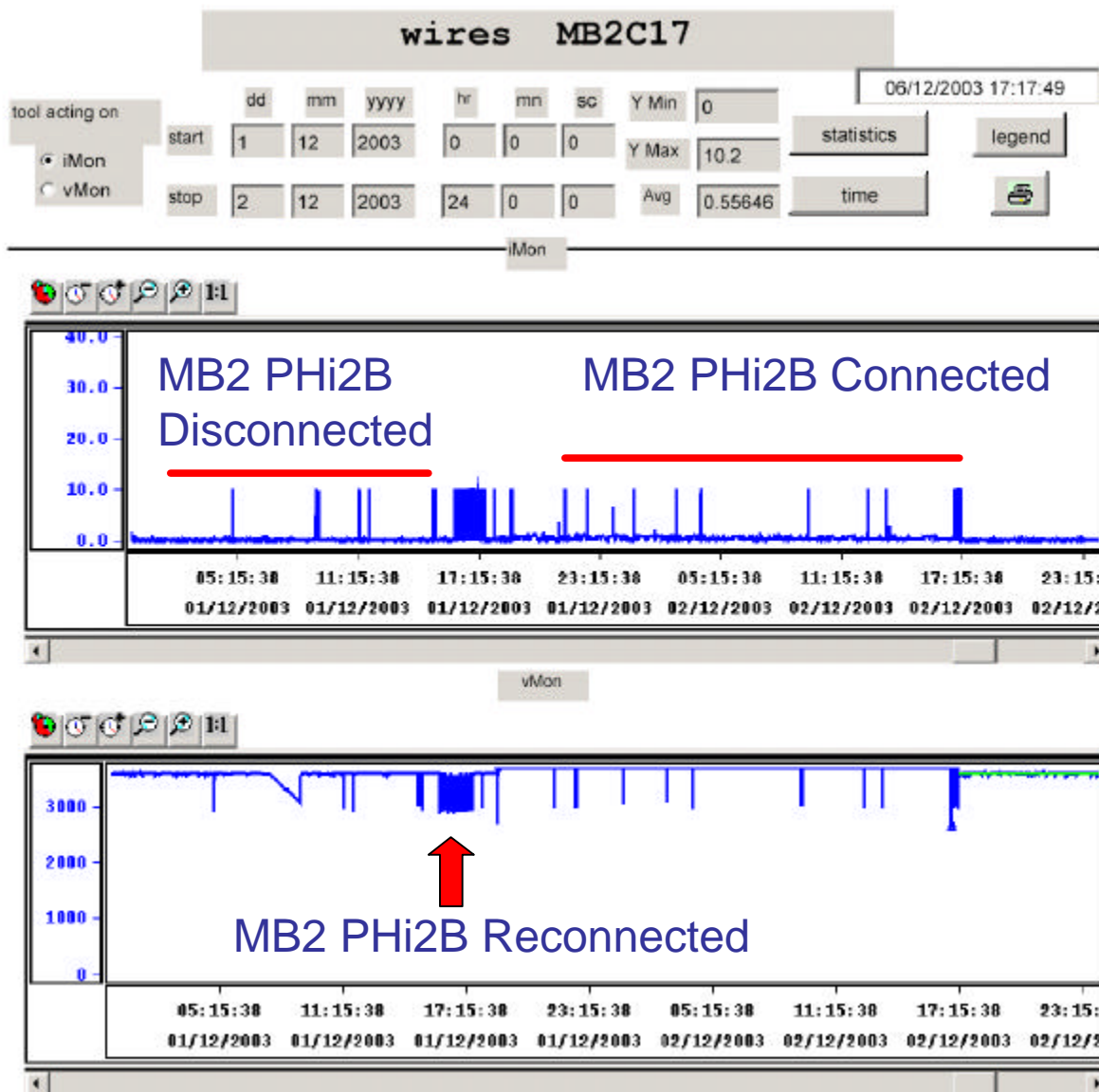


Glitch after inserting HV (Ignore)

vMon

1:1



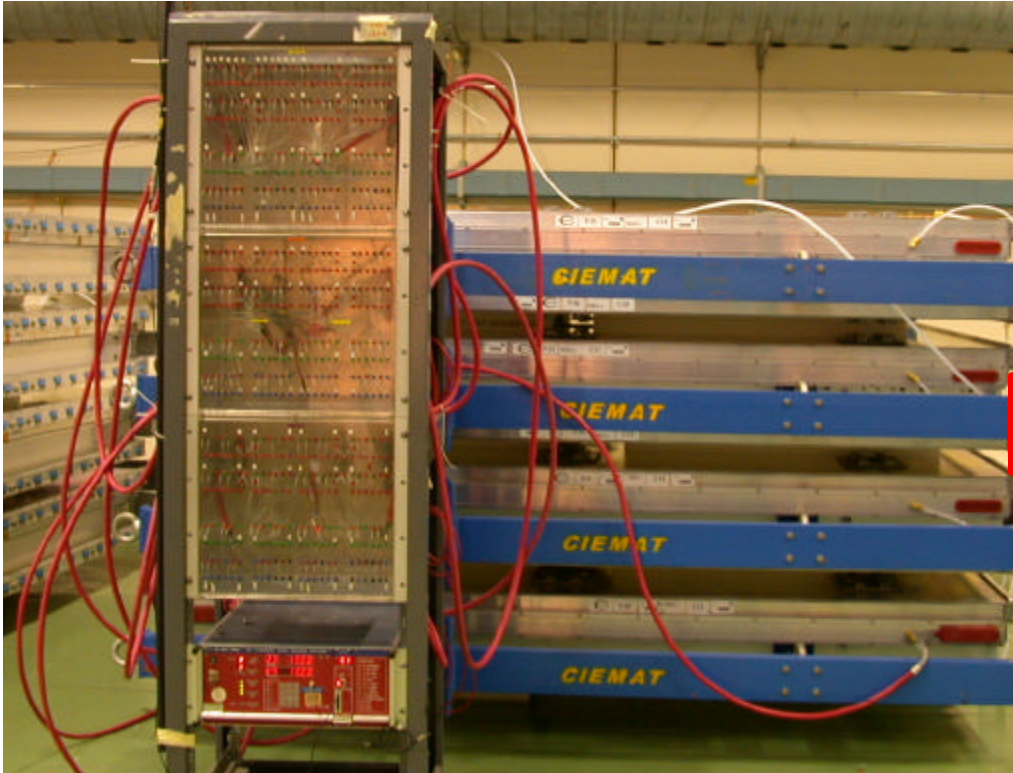
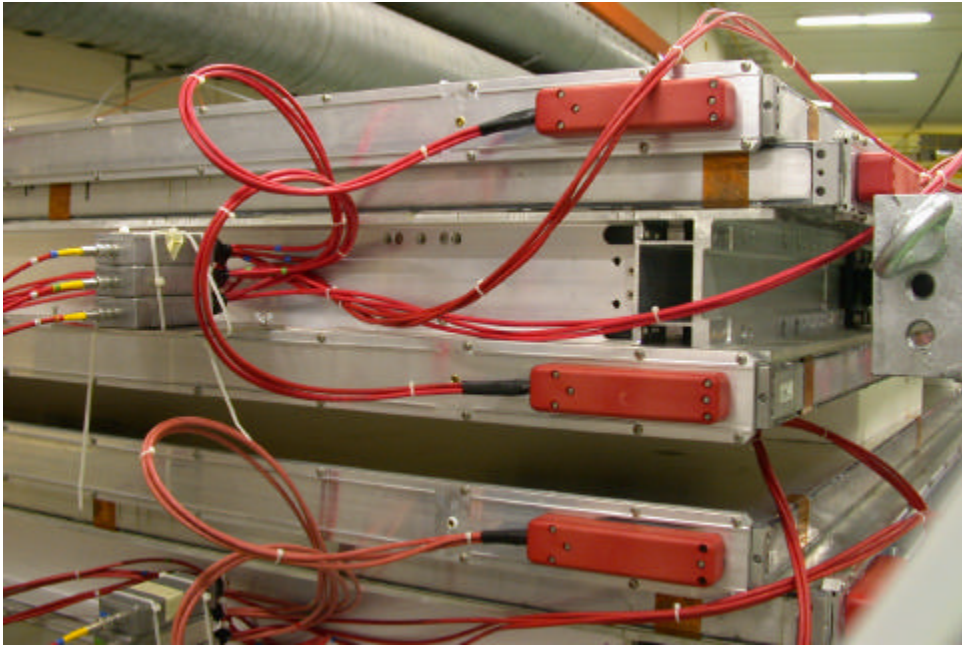


MB2P17 and MB2P24 are on the same HV channel.

MB2P17 was discharging (clicking) the problem was localized on MB2P17 Phi2 B connector that was removed until 01/12 at 16:30 when it was put back to take data with scalers.

Since this did not help to find the problem, Phi2B was put under HV on the CLONE system (allows to isolate HV boards) but the clicking disappeared.

Back to the standard HV system still low clicking rate????



HV Long Term Test

- One HV channel/Chamber
- All Wire pins connected together, same for Strip, Cathode and Ground pins
- At present 12 Chambers can be tested
- Extension to 24DT ready in January 03

HV Acceptance Test

- One HV channel / Layer
- Disconnect boxes Configured for each DT type
- Allows to identify/remove problem channels
- Only pins connected to HV boards are under HV

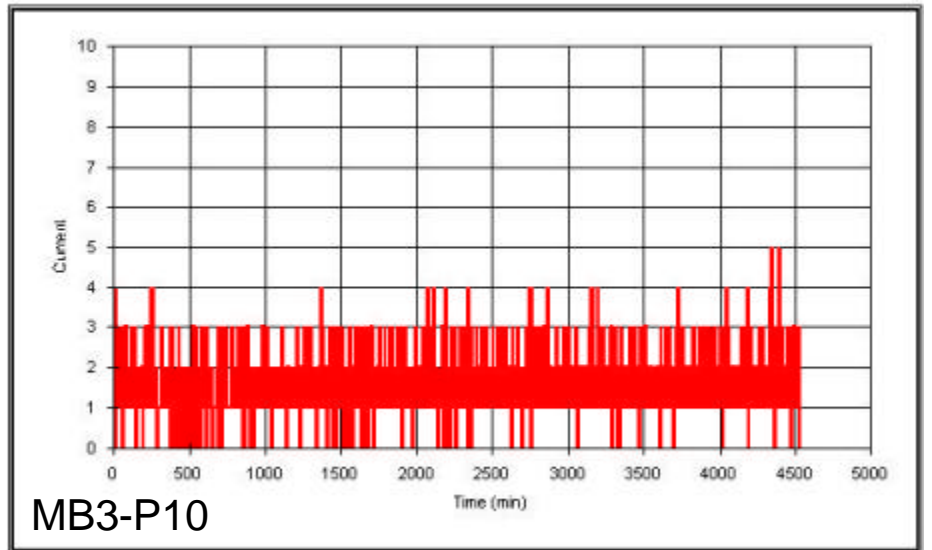
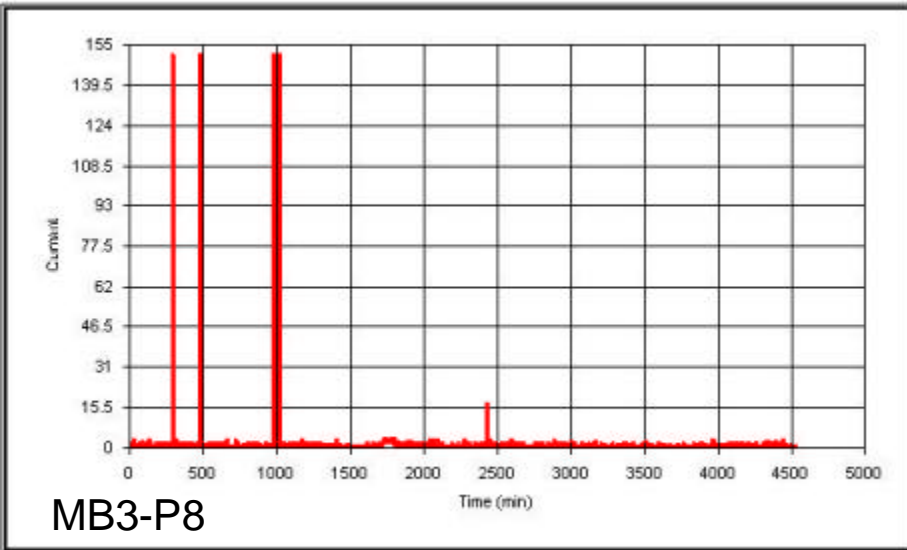
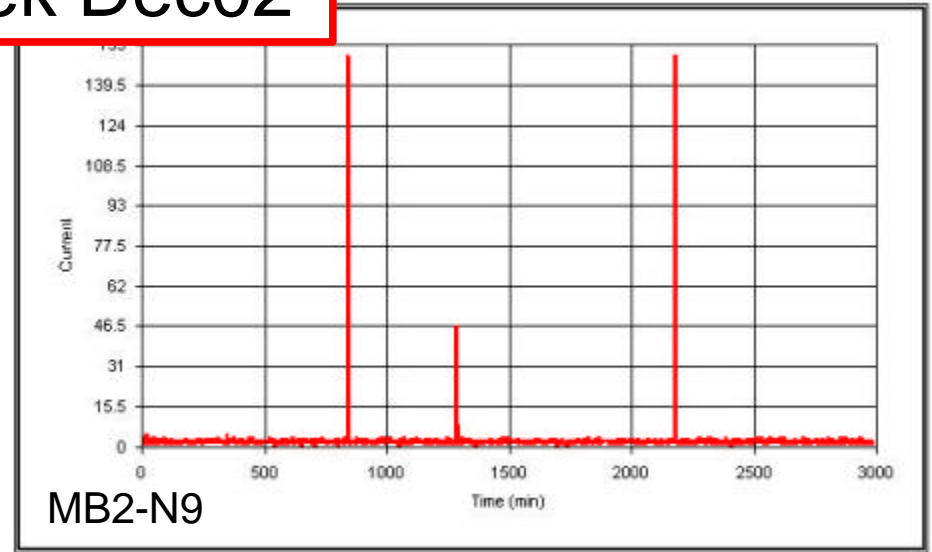
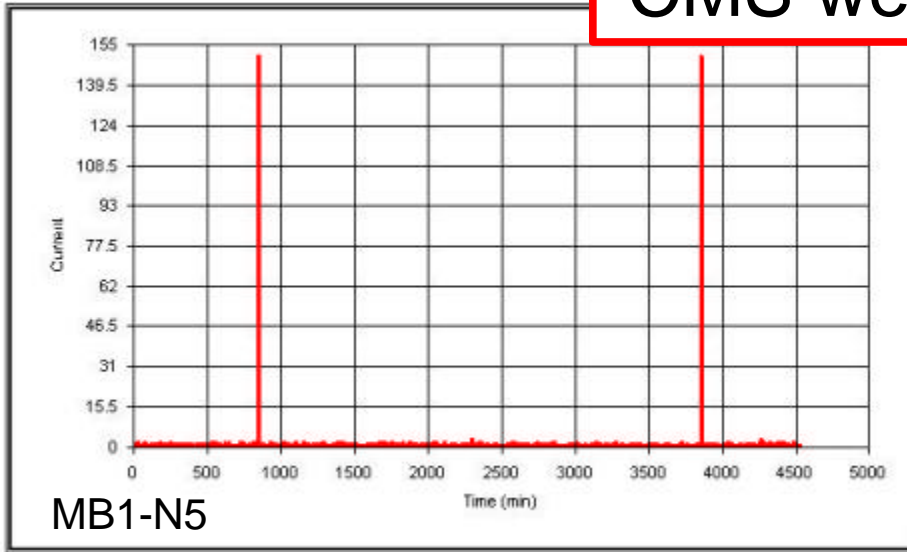
CMS week Dec02

Observe discharges outside the cells in Long Term Test (clicking sound)

➔ Patch Panels unisex or DT specific?

HV Long Term Test Current Monitor

CMS week Dec02



wires MB2C18

06/12/2003 16:56:26

tool acting on

start dd mm yyyy hr mn sc Y Min 0
5 12 2003 0 0 0 Y Max 5.1
stop dd mm yyyy hr mn sc Avg 1.16849

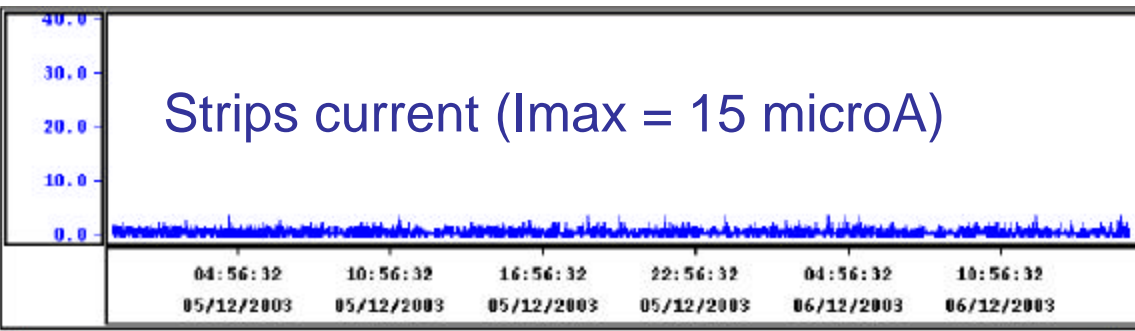
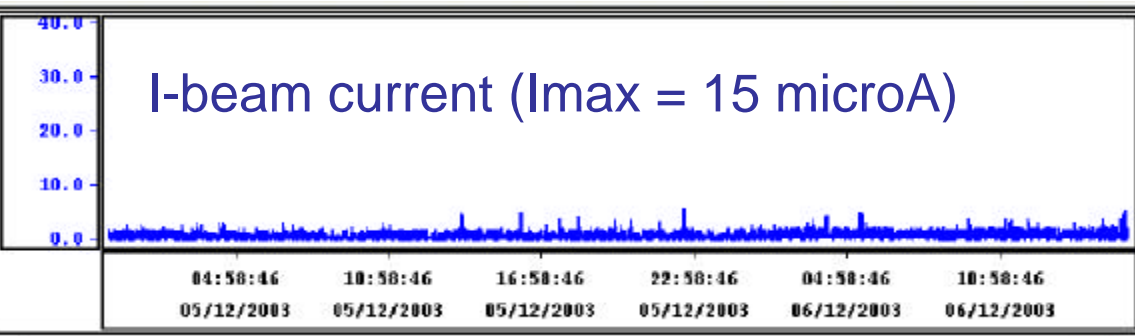
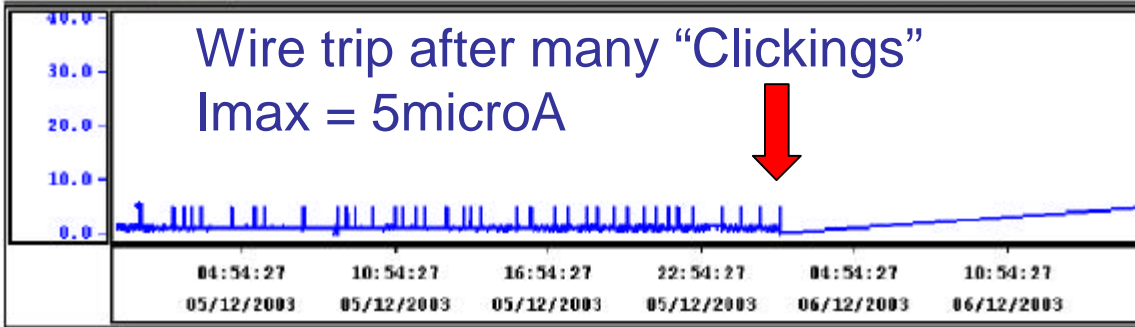
statistics

legend

time



Mon



Discharges outside the cell volume:

overcurrent on wires,
Voltage drops below 3000V,

no current spikes seen on I-beams or strips

wires MB2C21

06/12/2003 17:03:04

tool acting on

dd mm yyyy hr mn sc

Y Min 2888

start

5 12 2003

0 0 0

Y Max 3596

statistics

legend

iMon
 vMon

stop

6 12 2003

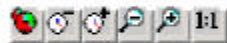
17 0 0

Avg 3592.89

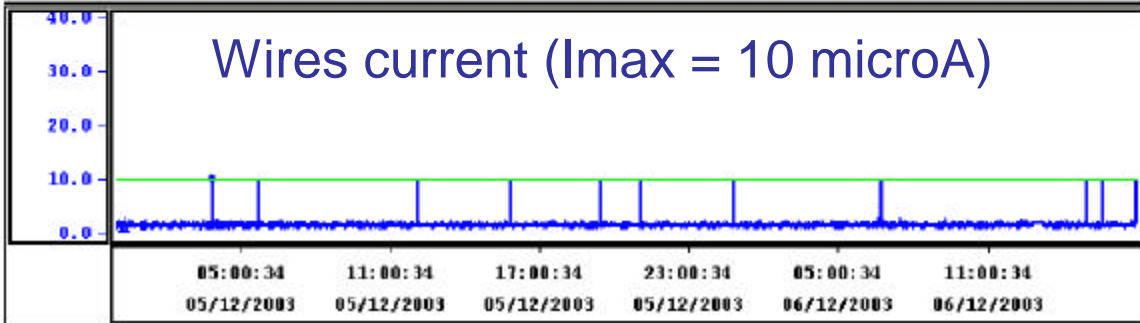
time



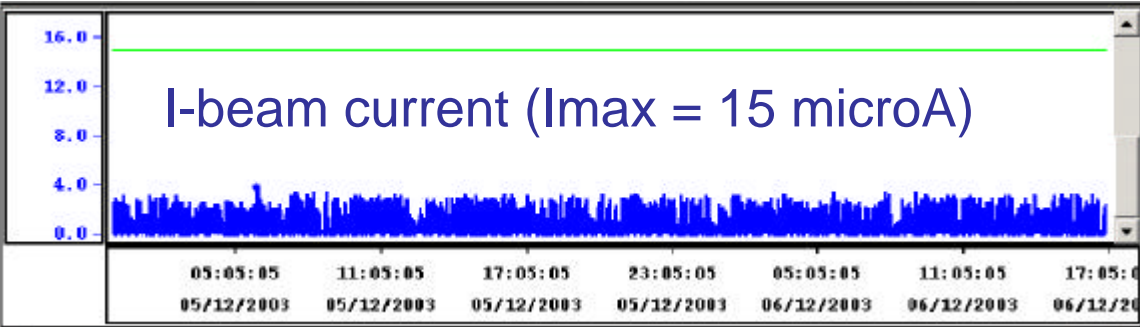
iMon



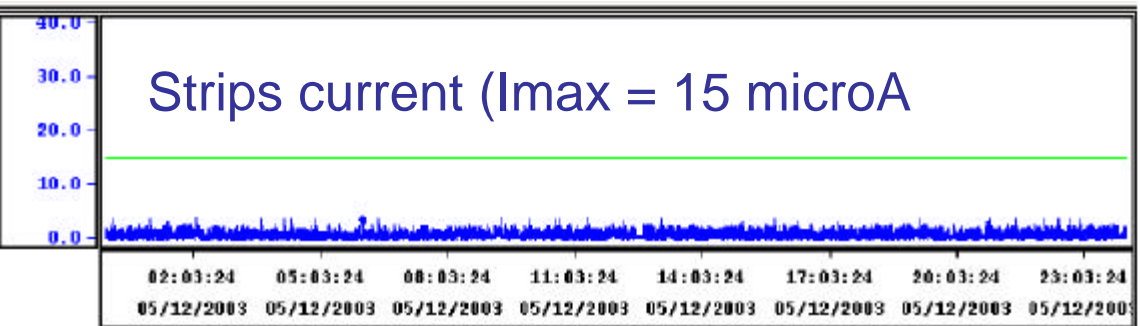
Wires current (I_{max} = 10 microA)



I-beam current (I_{max} = 15 microA)



Strips current (I_{max} = 15 microA)



The discharges occur at different rates in different chambers.

Is this rate tolerable?

Will it stay at this level?

Will the discharge damage some components?

- The “clicking sound” problem is not new, I reported it at the December CMS week last year.
- The discharge occurs outside the cell volume because there are no corresponding spikes in the I-beam and strips currents.
- I assumed that the discharges were due to pins under HV that are not connected to the HV boards inside the gas volume. This happens and it actually damaged a wire on a MB1 chamber but obviously it is not the only cause.
- The discharges are present in many if not all chambers with varying degrees of frequency and intensity (maybe different causes are still out there).
- MB2P17 is anomalous because the discharges are varying in frequency without apparent reasons.
- Obviously this problem must have been spotted during the tests at the assembly sites.

Why it was not discussed and followed up?

Some Open Problems

- HV boards:
 - Is the thermal cycle effective in screening defective boards?
 - If it is, we should replace **ALL** boards that have not been screened (procrastinating does not help)
 - If it is not, what are we doing about it ?
 - Does the HV Long Term Test help? Most failures are at HV ramp up after a long HV off time but last year we went for months switching HV OFF/ON daily without failures.
 - Can we design a jig to test the HV boards outside the chambers?

Some Open Problems

- HV boards:

- Are there other failure modes ? Like cracked capacitors?
- What is the fraction of boards exchanged?

- Discharges:

- There are many chambers that had a history of clicking during the HV test. Some are ready to install chambers.

MB2P17 is one of them.

- Is the procedure for fixing this problem the same at all assembly sites?

- Why does it fails with time (is it the handling/transport)?

Some Open Problems

- Dangling connections

- the HV connection to the I-beam is a known weak point
We must develop procedures to improve it, i.e. spring connection also at the front-end side.

- the insertion force of the pins is not adequate. Can we find better pins? Other people had the same problem, we should inquire.

YES it is late but it is better late than never

Can we install the chambers in these conditions?

The next failures will be on the detector.