Date: October 26, 1998 / Update February 2, 1999

To: BRAHMS detector Group

From: F. Videbaek

Subject: **High Voltage requirements and systems in BRAHMS**.

This note summarizes the requirements to High Voltage for the different detectors, capabilities of available systems, what systems needs to be purchased, distribution on crate type, and their physical placement. The information has come from the detector groups. The information is in progress of being confirmed and signed off by the responsible physicist for each detector. This document will be the reference for HV requirements and forms the base for decisions how to utilize existing crates and modules and what to purchase. The previous version of the document (October 98) was concerned with a choice between Leroy and Caen systems for the drift-chambers due to a uncertainty in regard to production of certain Lecroy modules of the 1450 series. This has since been clarified and Lecroy 1450 series has been selected. The last page of the document is a signoff page.

Some of the objectives for the system requirements are

1. Must be remotely controlled and monitored.
2. Should have as short cable distances as possible to minimize ground problems, and cable clutter.
3. For budgets reasons it is necessary to recycle as much as possible from existing pool of HV supplies, despite the desire for a uniform approach.

Information presented for each detector. This is the key information that needs to be supplied and checked.

1. Number of channels, number of devices (PMTs etc) served by each HV-channel.
2. Voltage range and polarity
3. Operating current
4. Trip limits; accuracy in reading of currents;
5. Sensitivity in voltage setting (accuracy).
6. Other special requirements. This should include low-Voltage supplies needed.

<u>Avilable HV supplies</u>

- Lecroy 4032 (6 available) and pods (L4032A1N) serial
- Lecroy 1440 mainframes (3 available, 39 Neg. pods available) serial
- Lecroy 1450 system[1]; ARCNET interface
- Bertan N/P (local control only), has been used in E866. Are undesirable due to non-local control. Only for laboratory and test use.

Mid-Rapidity spectrometer

MTP1 and MTP2 (each)

Responsible: F.Jundt JJGaardhoje

Number	Function	Voltage range (V)	Polarity N / P	current (microA)	Limit Det./Suppl	Read Accuracy
1	Anode	1200-1300	P	<100nA	- / 500 μA	nA
1	Drift Voltage	5000-6000	N	0.1mA		nA
1	Gating Grid	-100/-200	N			

supplies: L1471P, L1471N.

Calibration Chamber

Responsible: R. Debbe

This is the drift velocity monitors. The drift length is 2 cm, and the field strength should be as for the TPC. Thus the requirements are

Field 600V N ; current < mA

Anode Field: 1800V; current < micro A

(Drift velocity monitor)

Driftchambers

Responsible: R.Debbe

Calibration drift chambers WM1, WM2 (former FT3 and FT4 in E866)

[1] Will only be used as indicated in beginning of document if existing HV systems cannot be used for reasons of accuracy, range settings etc.

Number of channels	Function	Voltage range (V)	Polarity N / P	current (μA)	limit (μA)	other
2		2500	N	NA	<=1	2nA acc.

Needs to voltages per chamber. Can be satisfied by a single L1471N module.

TOFW

Responsible: D.Beavis

160-240 PMTs

1 or 2 tubes per HV channel 1600-1800 V (N)

current

supply: 1440 16 N pods

GASC (deferred detector)

Responsible: R.Debbe

24 PMT

1 or 2 tubes per HV channel V (N)

current

Supply: 4032

Global Detectors

Multiplicity:

Responsible: S.Sanders

24 channels of 50V for Si-detectors.

(pos/negative still an issue)

current < .4 microA / 7 strip.

current limits

supply: L1469/mod (either Phenix or modified Phenix design). 3 Modules included in the Centrality detector Budget.

Scintillator tiles

Responsible: Y.K.Lee

40 channels HV

1750V (2100V) max negative.
Current range 0.65mA per channel

Beam-beam counters

Responsible: B.Budick
8 +8 ... 2700V N
24+32 3/4" 1600V-1700V N
Supply: L4032 is needed due to voltage range for larger tubes.

Forward Spectrometer

T1 and T2 (each)

Responsible: J.J.Gardhoje & F.Jundt (see laso MTP1 and MTP2)

Number	Function	Voltage range (V)	Polarity N / P	current (microA)	limit	other
1	Anode	1200-1300	P			
1	Drift Voltage	5000-6000	N			
1	Gating Grid	-100/-200	N			

H1

Responsible: J.J.Gardhoje
80 PMTs biased at -1700V (range 1600-1800V).
1 PMT per HV channel
current:
supply: 1440

C1

Responsible: R.Debbe
32 H1161 and H1164-10 PMT
operating 1500-1800V (2500 Max)
H1160 1mA
H1164-10 0.5 mA

supply: Lecroy 1440 system would be convenient with H1 nearby.

Driftchambers

Responsible: R.Debbe

Calibration drift chambers WF1, WF2 (former FT1 and FT2 in E866)

Number	Function	Voltage range (V)	Polarity N / P	current (microA)	limit	other
			P			
4[2]		~2500V	N			20nA accr.

See also MRS chambers.

Wire chambers T3, T4 and T5

Responsible: Z.Majka

3*3 detector packages; The positive is for the node wires. The Negative for the Field and Cathode wires. Field and Cathode are on separate voltages Just 3 supplies will serve each module with appropriate splitters on chamber.

- T3
  - 3 channels 2500V Positive (anode)
  - 3 channels 2500V Negative (field) current ~ 1mA
  - 3 channels 2500V Negative (cathode) current microA
- T4
  - 3 channels 2500V Positive (anode)
  - 3 channels 2500V Negative (field) current ~ 1mA
  - 3 channels 2500V Negative (cathode) current microA
- T5
  - 3 channels 2500V Positive (anode)
  - 3 channels 2500V Negative (field) current ~ 1mA
  - 3 channels 2500V Negative (cathode) current microA

Final configuration

9 channels 1471N, 1471P, == 2 modules

[2] Two channels per chamber.

9 channels 1461N == 1 modules.

H2

Responsible: J.J.Gardhoje

20-32 slats => 40-64 PMT's

1 per PMT ; 1600-1800V Negative

current

supply: Lecroy 1440

RICH

Responsible: J.Olness

2*2 that is 76 PMTs of type R5900-03-M4; With present design likely only 4 HV feeds are needed. Voltage: 800V Negative

Current

supply: 1 a single L1461N suffices.

Distribution of HV main frames:

HV Main frame #1

Will be placed near pivot since it will serve fixed detectors as well as some in MRS and FS.

L1458

1 slot 1471N (Drift voltage MTP1, MTP2, T1, T2

1 slot 1471P Anode voltage MTP1,MTP2, T1 T2

1 slot 1471N Chamber voltages for calibrations drift chambers

The setup was changed from 1461 to 1471 because of current reading capabilities

3 slots modified 1469 (Phenix) for Multiplicity Si-detectors.

Current load estimated to

1 spare 1471P, 1 1471N

HV Main frame #2/3

Near pivot or beam counters

L4032

42+36 slots for Beam counters. Can some tubes be from same connector? Each 4032 has a maximum of 32 channels. Therefore 3 main frames are needed.

HV Main frame #4

Back on MRS

L1440

16 slots for TOFW

Current load estimated

HV Main frame #5

Back on MRS

L4032

6 slots for GASC

HV Main frame #6

Placed Front forward platform

L1440

5 slots for H1

Current load estimated...

2 slots for C1

HV Main frame #7

Back forward platform

L1440

4 1440 slots for H2 (64 individual channels) [possible replacement L1461N (4)]

Total current load estimated...

HV Main frame #8

Back forward platform

L1458 main frame

3/4 slots for T3, T4, T5

2 L1471N, 2 L1471P, 1 L1461N

RICH 1 slot for L1461N

The HV systems will be controlled from a VME processor (slow controls crate). The interfaces are either serial (L1440, L 4032) or for the L1450 system controlled via ARCNET connection. The software is based on EPICS.

HV Signoff page

This page will be updated as information is being checked and agreed upon. Future changed will be included by date and changed item by a footnote information

Detector system	Signed off by	Date
TPC's (all)	Jundt	9/20/98
H1, H2	Bearden	10/23/98
C1		
RICH		
D.C. (T3,T4,T5)	Majka	10/23/98
Centrality Si	Sanders	10/23/98
Centrality Scint.tiles	Y.K.Lee	10.23/98
Calibration chambers	Debbe	9/20/98
TOFW		
Beam-Beam Counters		

Addendum:

Authorized configuration changes:

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Appendix:
Caen vs. Lecroy supplies.

The Caen supplies would use a SY527 main frame. These can hold

A832N (6KV) for Tpc drift voltages (12 ch per module)
A837P (2KV) for TPC anode voltages

Following the 10/22-24 meetings and the DC reconfiguration it was decided that the splitting of HV channels for each DC module is sufficient and thus reduces the HV channels to a very acceptable amount, and avoids the usage of L1469N modules.