HVB Production, etc.

DT CHAMBERS:
Assembly of HVB_v5 Boards
Material for Test of HV Supplies
Wire Production

HVB & HV test:
from a visit to IHEP/Beijing, with E. Borsato and L. Modenese
and from discussions on HV tests

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050315

HVB Production

Present status of High Voltage Board HVB_v5 production:

All PCBs delivered; other components available as well.

Shipping now restant of components to IHEP in Beijing, for assembly, 'asap'.

Expect continuation of the assembly at ~1300 HVB/month, with bi-weekly shipments of ~600-700 HVBs to CERN.

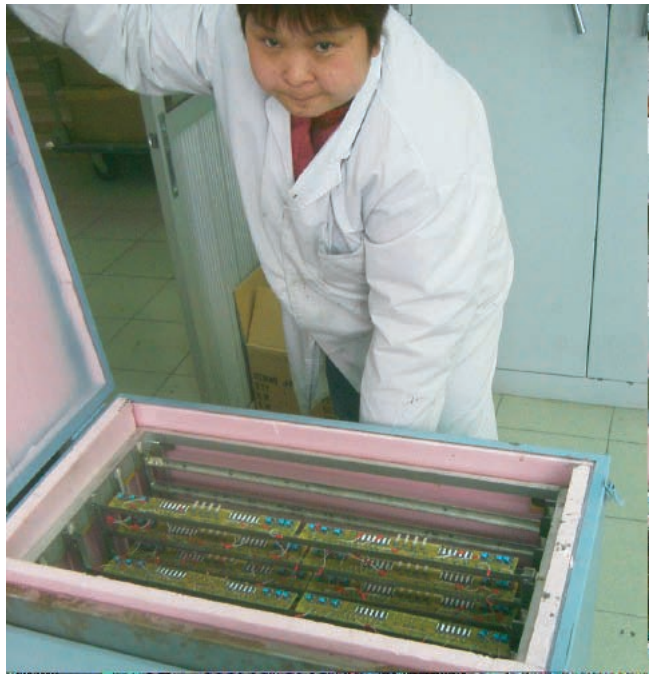
Only batches received after January 2005 have pin protection mounted (IHEP had been asked not to mount them, in 2004; worth ~1500 HVBs).

Quality of recent batches had degraded.

End of February, E. Borsato, L. Mondenese and H. Reithler paid a visit to IHEP, to understand origin of problems and to find a solution to restore a good quality.

The photos attached are from this visit.

After soldering components, deposit glue



then leave curing in the oven.

HVB Assembly (1)

Measures/improvements at soldering, gluing, testing and packaging phases:

Avoid sharp edges on ends of wires and pins.

Ensure soldering-through of pins (robustness; contact).

Ensure correct orientation of pins and capacitors (space).

Mount pin protections prior to first glue deposition, to avoid glue on pin contact.

Insulate with glue also pad-less unused wire connection.

Add drop of glue under pin protections and capacitors, as mechanical protection.

Remove rests of glue from support jig after each use, to avoid damage of GND contacts.

Some improvements on HV test jig (HV protection, gas tightness, gas distribution) and on software.

Ensure gas purity by also flushing over night.

Test HV with 6 ON/OFF cycles (1 h) then 1 ON cycle (2 h).

Quality Control: do visual inspection of every HVB after soldering, after gluing, and after testing. Good light and a large lens are essential (available).

HV test; at front the 3 test jigs loaded with HVBs.

It is all about Quality Control.

HVB Assembly (2)

Summary of HVB_v5 assembly:

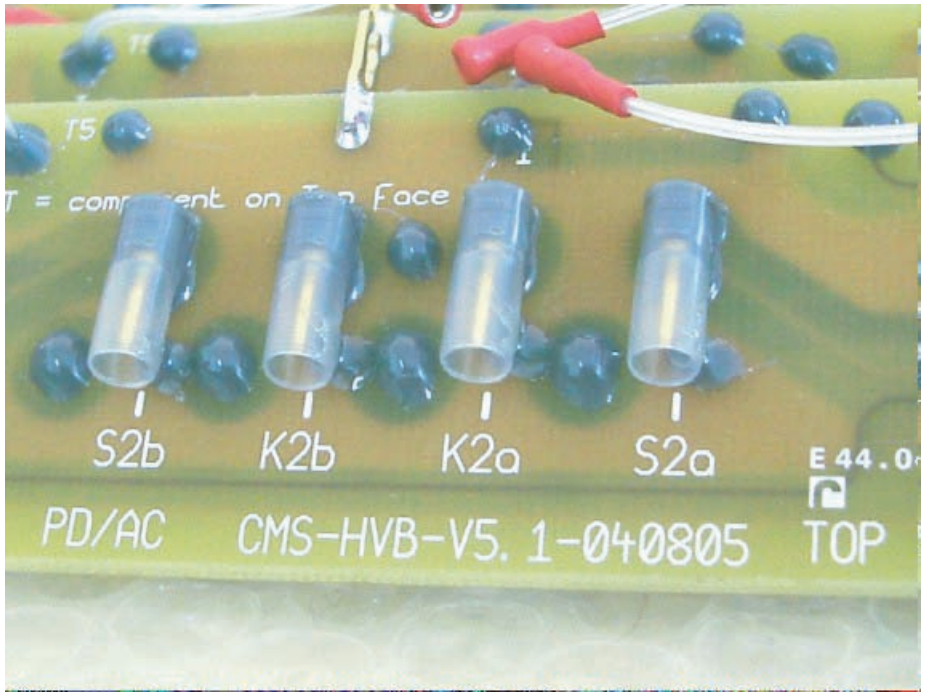
Visit and discussions at the assembly site were important and fruitful.

All weak points understood; can easily be avoided; cure has been implemented.

Assembly manual updated, to reflect these points.

Batch of ~700 HVBs available at IHEP has been retrofitted accordingly, prior to shipment (last Friday).

Looking forward to a rapid assembly of good and safe HVB_v5.



Detail of a good HVB. The protection around the HV pins is visible; all pads are fully protected by glue.

DT HV Components

The DT HV system consists of:

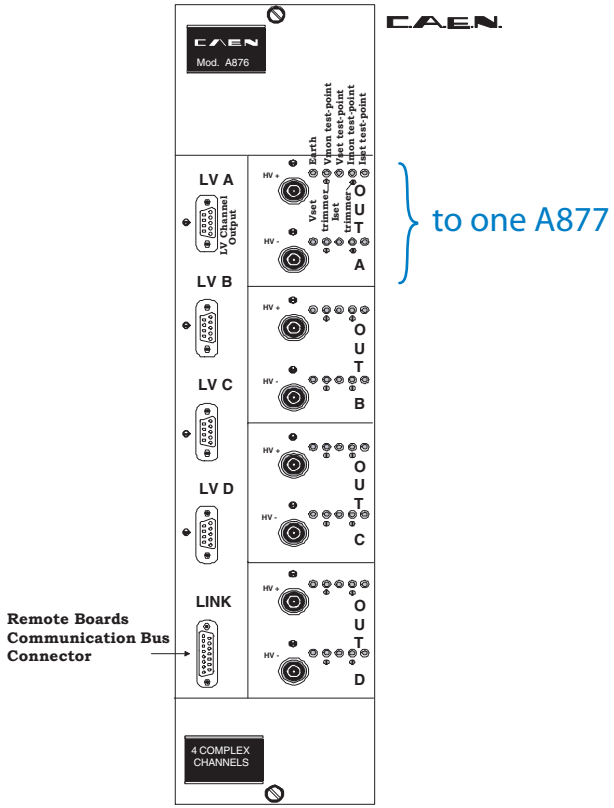
In Control Room (up to 8 modules fit into one SY1527 system crate):

- 60 modules A876 (Master Boards; one for each Sector, i.e. for 4 A877 modules);

In Cavern, on the wheels (up to 8 modules fit into one A881 crate):

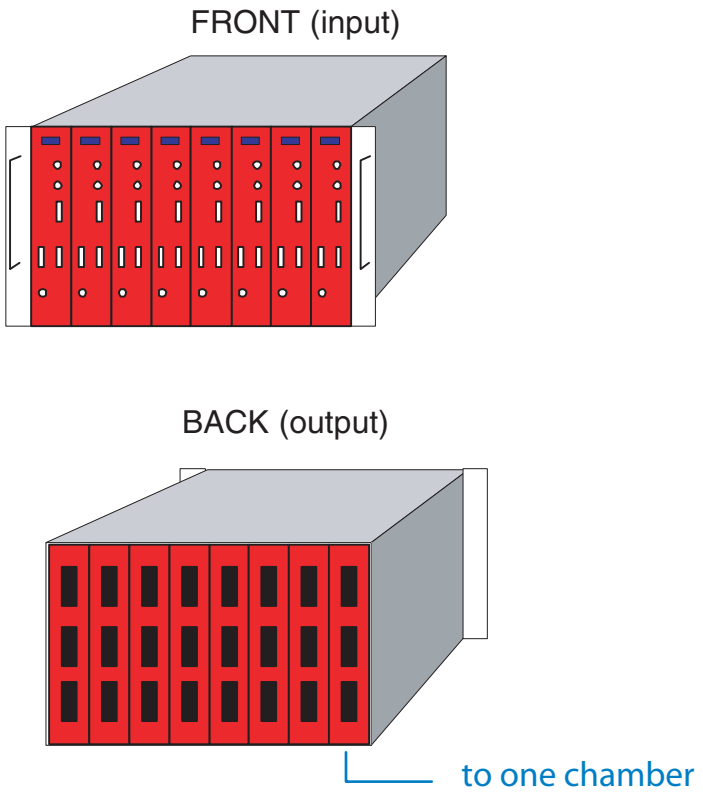
- 190 modules A877 with 3 channels (Remote Boards; one module for each MB1, MB2, MB3, + 10 spares);
- 60 modules A877 with 2 channels (smaller Remote Boards; one module for each MB4).

2.5 Mod. A876 Master Board Front Panel



Mod. A881 Chassis

The Mod. A881 Chassis consists of one standard 19" Euro crate whose purpose is to house up to eight Mod. A877 Remote Boards. The modules shall be inserted in the way shown in Fig. A.1.



HV Supply Tests Proposed

TEST PROPOSAL for CAEN HV modules

Test n. 1 : min. output voltage, max current;

Test n. 2 : max output voltage, max current;

Test n. 3 : ramp-up / ramp-down cycles at max current;

Test n. 4 : min. output voltage, no load (insulation test of the BJTs chain)

E. Borsato

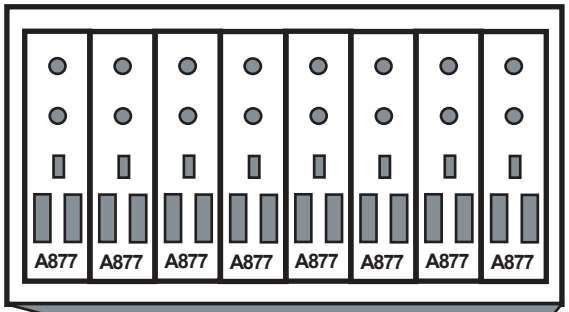
All modules should be tested for basic functionality, as acceptance test.
E.B. recommends a longer test period for Test n. 4 - as long as affordable.
Cables needed for all tests (dedicated ones, or to be reused at CMS?)
Special HV loads (with connectors) are to be built, for tests 1-3.

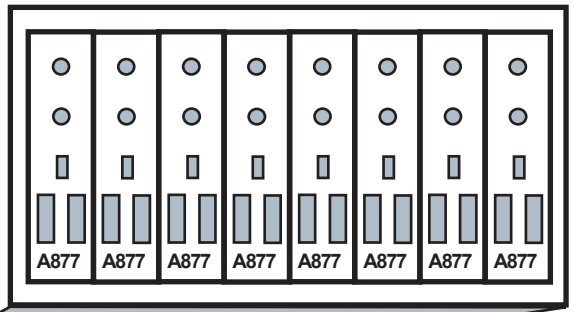
Hardware coupling between HV of Wire and Strip (main special feature of this system): not mentioned in CAEN manual nor in test procedures. An important test we must do.

Rack for Test of HV Supplies

BASIC TEST UNIT: 1 rack housing 1 SY1527 crate and 4 A881 crates

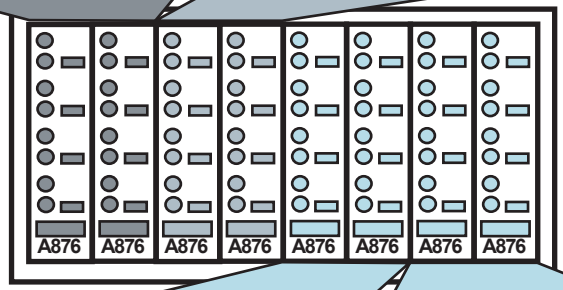
TEST n. 1:
8 mod. A877
in A881 crate, with
Load boxes at rear side
(1 time slot per module)





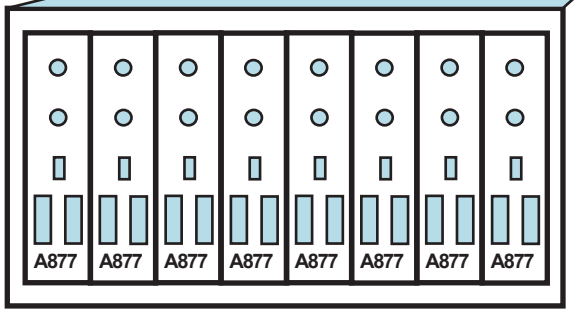
TEST n. 2 & 3:
8 mod. A877,
with Load boxes
(1 time slot per
module)

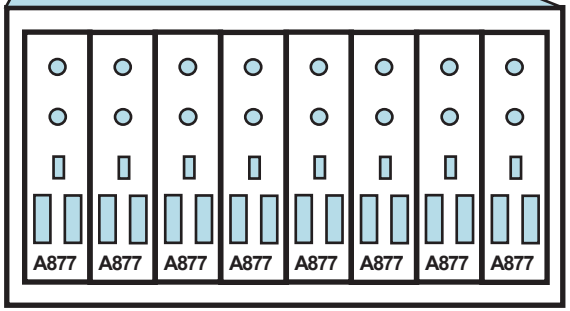
48 Load boxes, each with
16 HV resistors



8 modules A876
in
SY1527 sys. crate

TEST n. 4:
8 + 8 mod. A877,
no Load boxes
(2 time slots per
module)

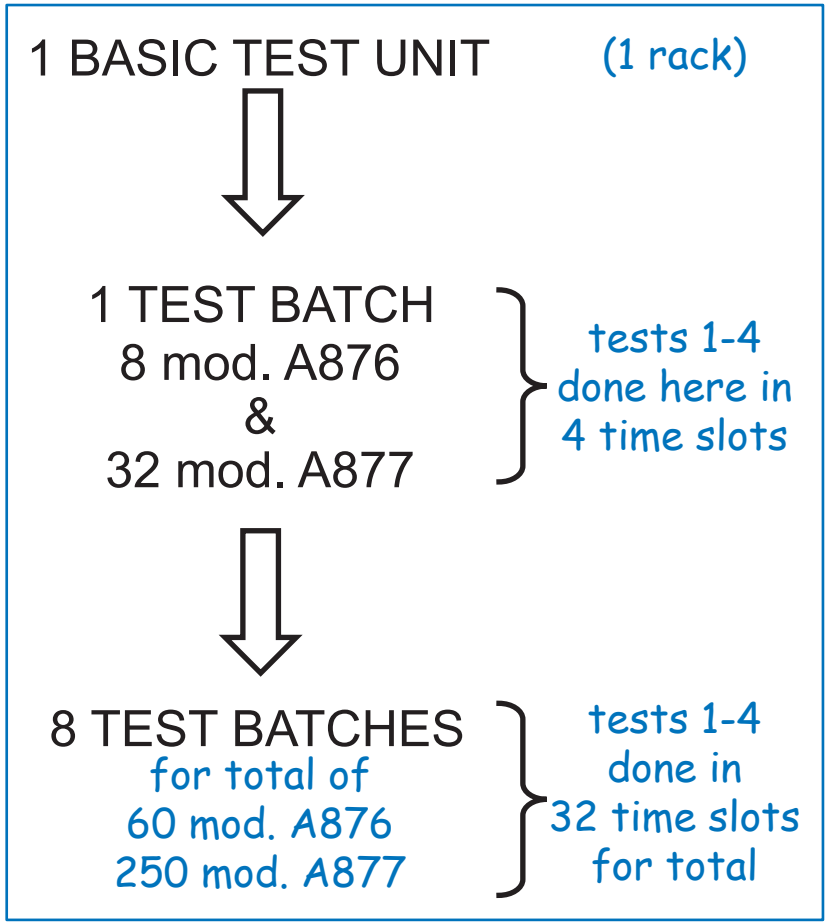




E. Borsato

Cycle the tests through all modules (=4 time slots). Resistive loads needed for tests 1-3.

Test Sequences



"time slot": about 1 week

Testing with 1 Test Unit, each module is submitted to Test n. 4 for 2 time slots.

With further 5 Test Units, each module can then be submitted to Test n. 4 for 22 time slots, i.e. at least ten times longer. These 5 Test Units do not need Load boxes and hence cost 5 times less - a factor 2 in cost is worth a factor 11 in testing time.

Proposed configuration (if long term test needed):
1 Test Unit with cables and Load boxes,
5 Test Units with cables only.
Permits basic tests (of 2 time slots) and simultaneously a long term validation (of 22 time slots) at moderate cost & effort.

The **main decision** to be taken is thus whether the test of the HV supplies should be:
a) a "short" acceptance test of functionality, or
b) also a long term test.
For 'a)' ~1 rack, while for 'b)' ~1+5 racks.

Wire Production

Legnaro received ~all wires needed for completion (includes Torino).

CIEMAT and Aachen needing wires now.

New wire production being delivered (...just in time):

- 5 spools arrived at Aachen last week,
- 15 spools arrived today.
- Last batch due within ~ 6 weeks.

4 spools were certified at Aachen and shipped to CIEMAT (1 spool rejected)

Starting certification of the 15 spools at Aachen.