Analysis of the possibility of using of a ALICE/LHCb type power converter in TT2A target test

by

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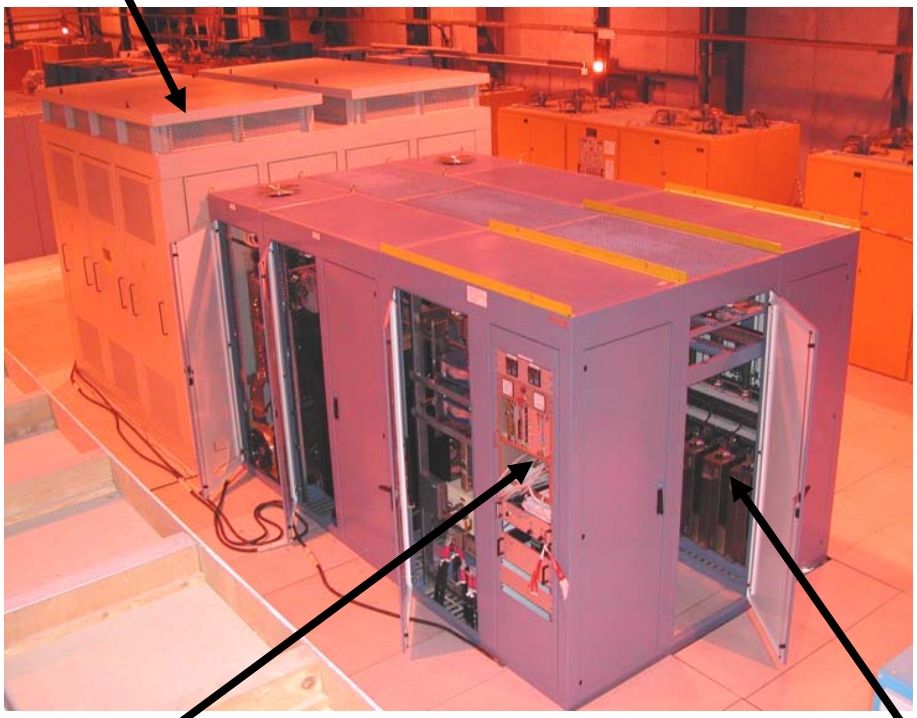
Main characteristics of power converter type ALICE/LHCb, rated 950V, 6500A

2 x Power transformers in parallel, housed in the same cubicle



High precision current control electronics

2 x rectifier bridges in parallel

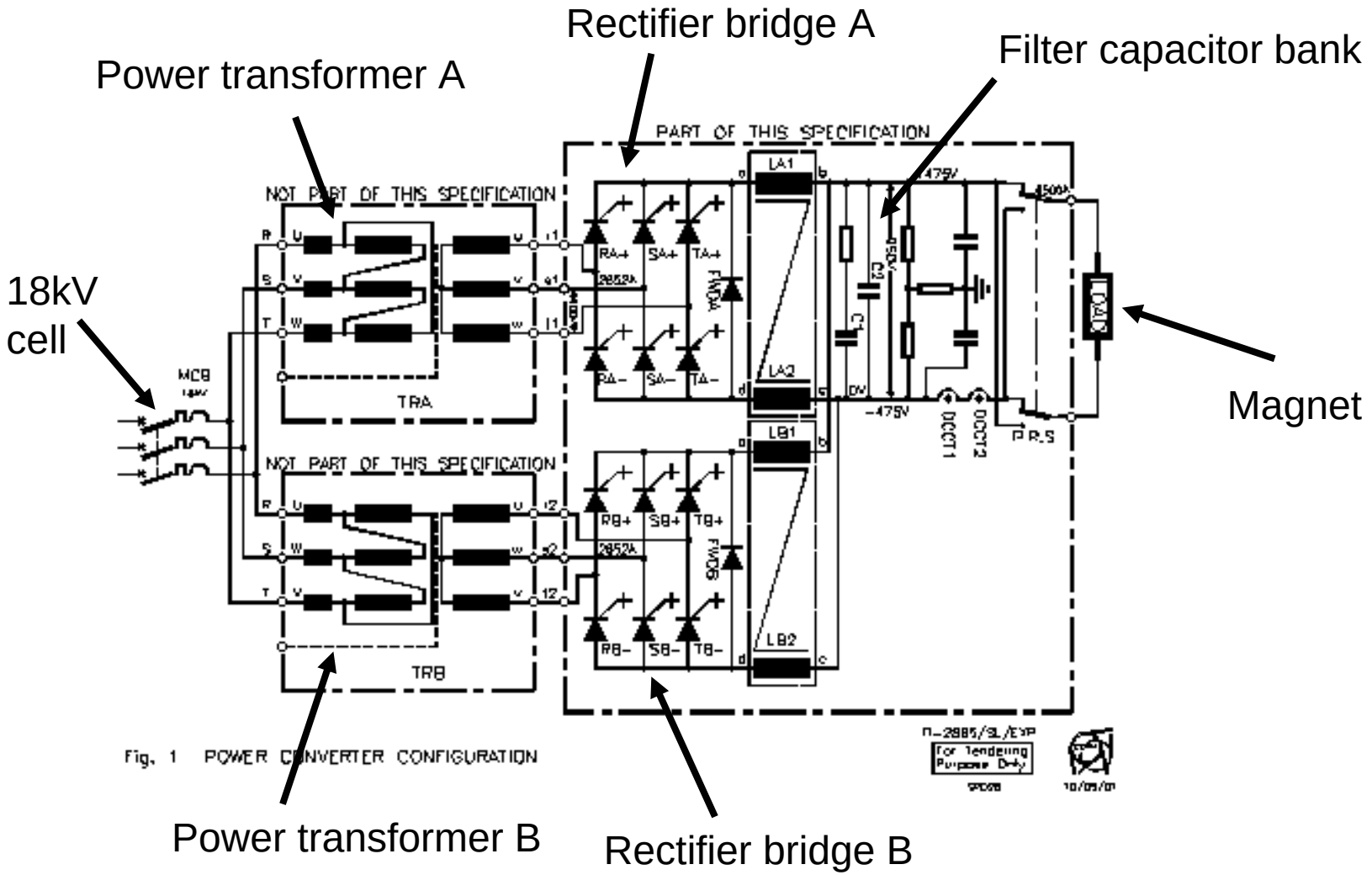
Total DC output ratings:
6500Adc, 950Vdc, 6.7 MW

AC input ratings (per rectifier bridge):
2858Arms, 900Vac (at no load), 4.5 MVA

Each power transformer ratings
Primary side: 154Arms, 18kVac
Secondary side: 3080Arms, 900Vac
Nominal power: 4.8 MVA

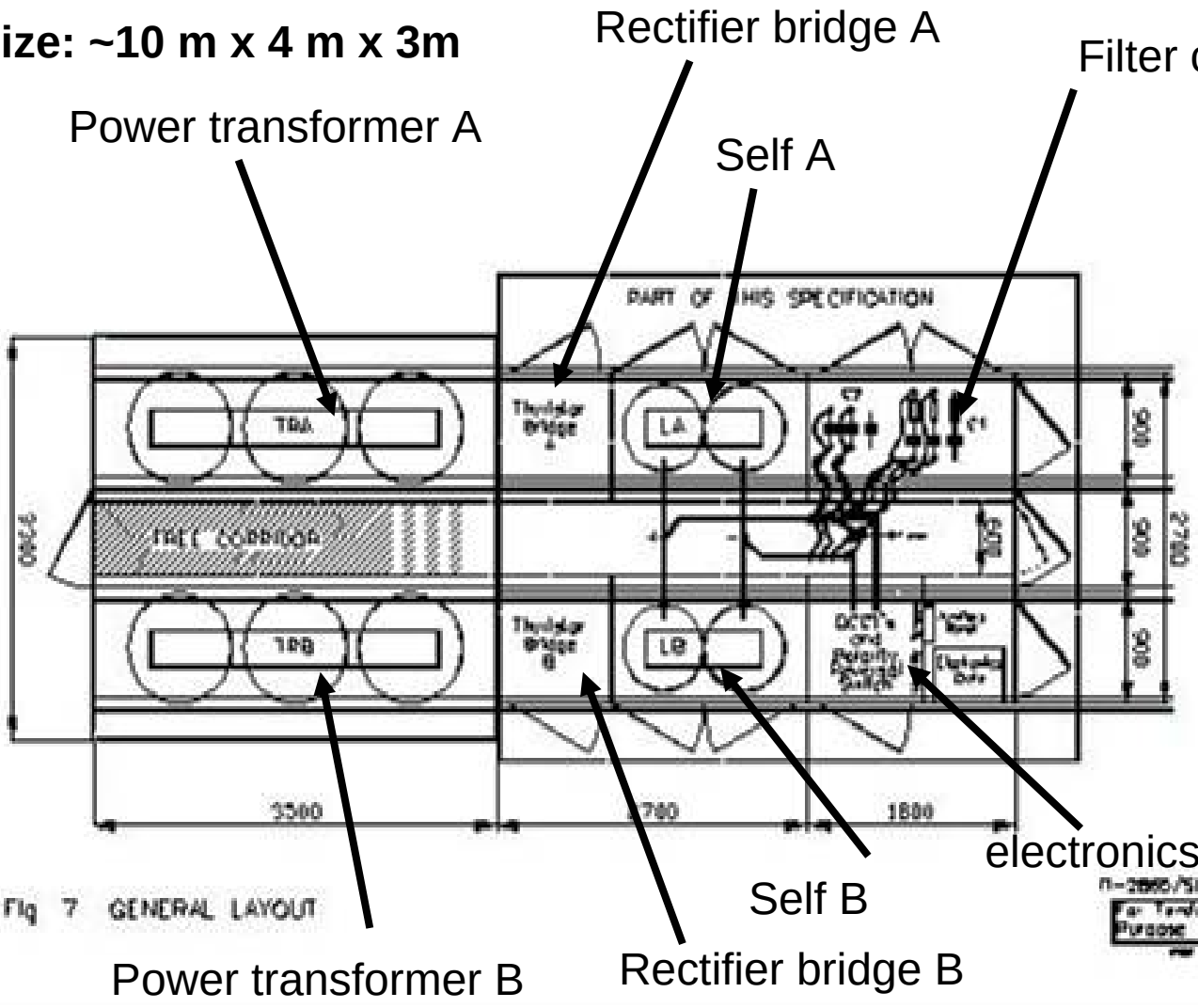
Other
- Air forced cooling;
- Fed by two18 kV lines

Power Converter Topology



Power Converter size and layout

size: ~10 m x 4 m x 3m



Assembled in 8 parts:

- **2 transformers (13 ton each);**
- **2 rect bridges: (~ 0.6 ton each)**
- **2 selfs (~4 ton each);**
- **1 capacitor bank (< 1 ton);**
- **1 electronic rack (< 1 ton);**

Power Converter connectivity requirements

- DC cabling, between power converter and magnet

1000Vdc isolation; 7000Apeak (15s pulse every 30 min)

-AC cabling, between 18kV cell and each power converter transformer (x2)

18kVac isolation; 143Arms.peak; (15s pulse every 30 min)

- 18kV cell

Total AC current calibration: 2*143 = 286 Arms

Main technical details still to be verified

-***Best solution for connecting to a 18kV cell (CERN TS-EL group)***
- one available cell at building 269;
- one available cell at building 193 (AD);
- two used cells at building 287 (A7) – check for the possibility of joining a new one temporarily ?;
- check for other solutions, if any

-***Location of the power converter (CERN AB/PO group)***
- One solution, ***still need to be verified!!!!***
In the ISR gallery,
availability of the space?? (today used for storage of material);
the capacity of the existing crane?
- check for other solutions, if any

-***Cabling paths for the power lines (CERN TS/EL group)***

Availibility of the power converter:- considered options

-Buying a new LHCb /ALICE converter:

-As an option on the former contract;

-Renting one LHCb or ALICE converter for the test period (checked by A. Fabich):

-LHCb: **impossible**, the converter will be used during that time in LHCb;
-ALICE: the time scheduling for the tests as it was presented to the ALICE team may not be compatible with the ALICE test schedule. ALICE test program is not yet completely known and will be detailed within short advance to testing time

Cost indications

-*Power converter (AB/PO group)*

-***New power converter of ALICE/LHCb type (option on former contract)***
400 kCHF
- 300kCHF for ractifier part, 100kCHF for 2 power transformers with cubicle);

-***Possibility of lending one ALICE/LHCb spare transformer (~50 kCHF of economy)***

-*AC and DC connectivity (TS/EL group)*

-***Cabling from an existing cell in bld 269***
<100kCHF;

Rough Estimated man-power to pursue with the project

AB/PO group:

-***Feasibility study:*** 1 to 2 months eng.;

-***Follow-up of contract, reception tests of power converter and transformer (in case of buying new ones):*** 3 months eng. + 3 months tech.

-***Commissionning:*** 1 month eng. + 1 month tech