High-Voltage Supply Requirements Review

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Requirements Update

- Changes / clarification as a result of recent engineering work
  - ➔Remove “split ground” requirement

- Changes in response to the PDR (5/20/2003)
  - ➔PMT pulse-coupling transformer specifications change (Proposed)
  - ➔Require conformal coating on PMT Base Board (Proposed)

- Changes as a result of baseline change (Iseg➔EMCO)
  - ➔Single-board to two-board
  - ➔Fixed to scaled 1st dynode voltage

Design / Specification Review

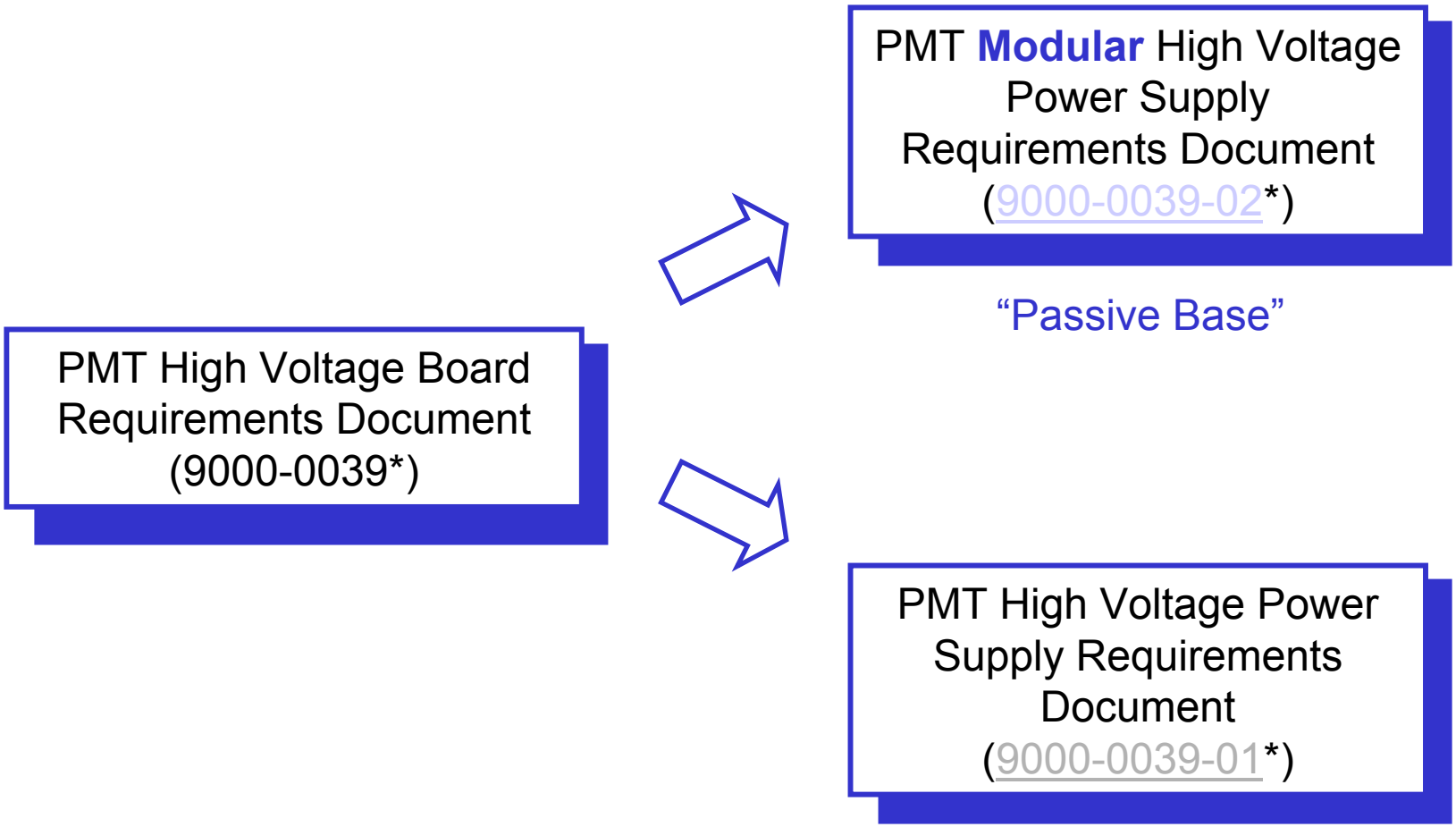
- PMT HV Base Board (“passive base”)

- HV Control Board

- HV Generator

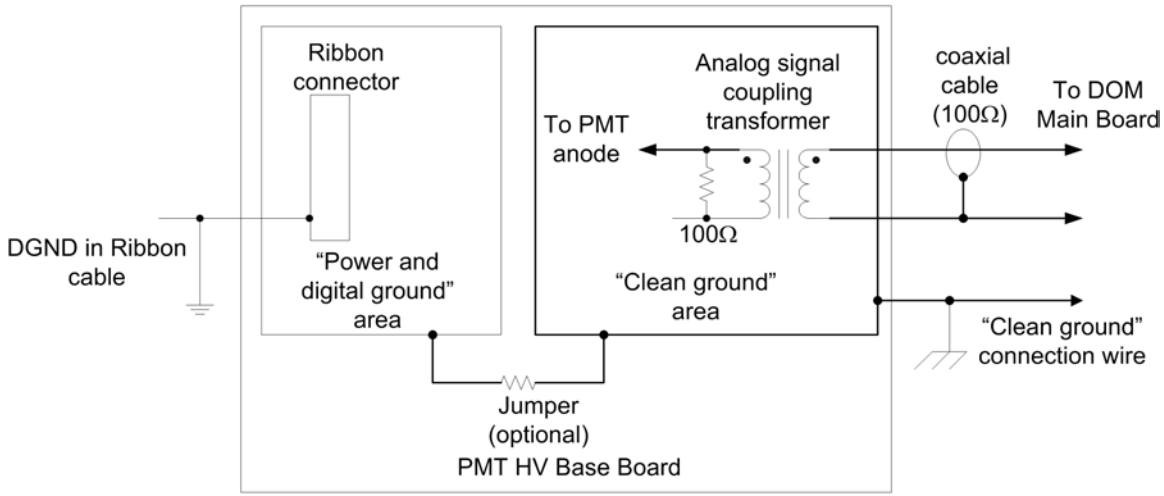
Requirements Update

Documentation



*George Anderson has been maintaining these documents.

Change due to Engineering Evaluation



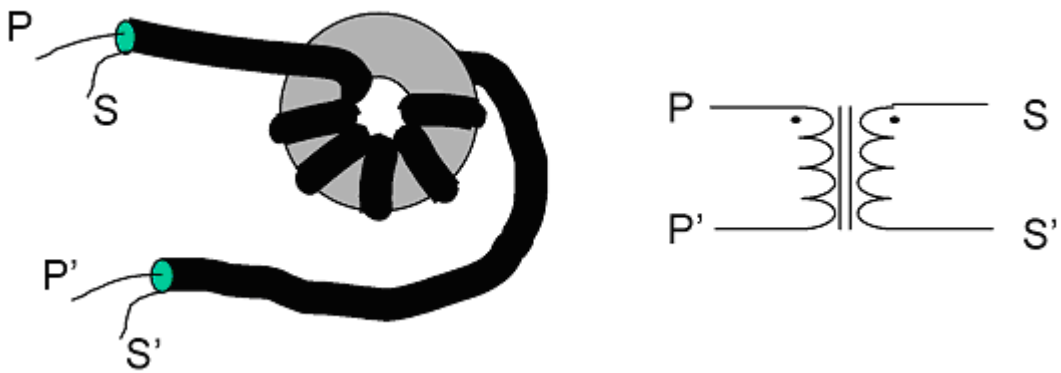
Delete: **3.2.2.5.3 Split Power/Digital and Analog Grounds**

- Iseg has been unable to implement this requirement (The trial version has major functional problems)
- Noise levels are acceptable w/o this requirement
- The split-ground requirement does not apply to the "EMCO" approach

Change in response to PDR (5/20/03)—No.1

Action Item # PDR-4: Coax negative margin

The RG178 coaxial cable used for the PMT signal output transformer operates beyond the manufacturers voltage rating.



It is possible to construct a transformer using a bifilar winding using silicone-insulated wire.

See a PowerPoint presentation:
toroid_alternative_design2.pdf

Change in response to PDR (5/20/03)—No.2

Action Item # PDR-17: Conformal coating

- One of the open items needed to be closed for procurement
- Requirement was “hacked away” at Zeuthen meeting earlier this year
- Efficient way to avoid trouble from dust, finger prints, etc.
- May be compatible with board wash
- Recommend keeping this requirement

Changes as a result of (Iseg→EMCO)

Terminology change and document re-organization

PMT Modular HV Power Supply (9000-9939-02)

HV Control Board

Digital Interface

HV Generator

PMT HV Base Board

The Modular HV Power Supply consists of two boards (three possible component sources)

1st Dynode voltage scales with Cathode-Anode voltage (~40%)

Specifications Review

PMT HV Base Board

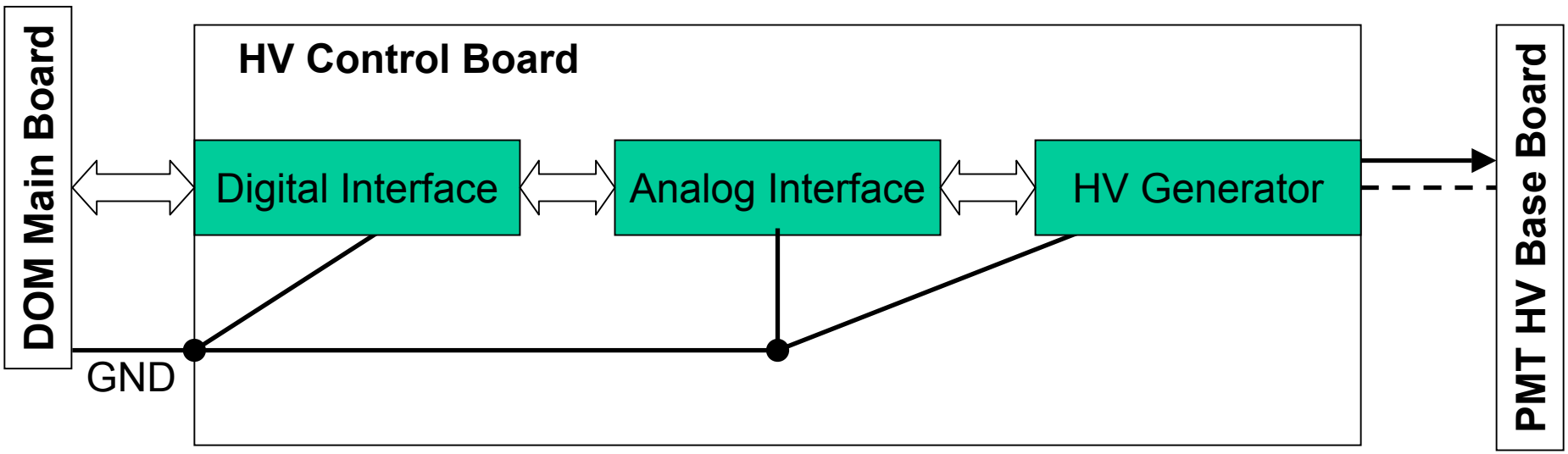
- 150MOhm total resistance
- Capacitor between each dynode interval
- Toroidal transformer for output

- EMCO 9731 has been evaluated with favorable results
- Needs a minor correction
- Needs layout improvement
- Needs some circuit improvement

BLEEDER1x.pdf

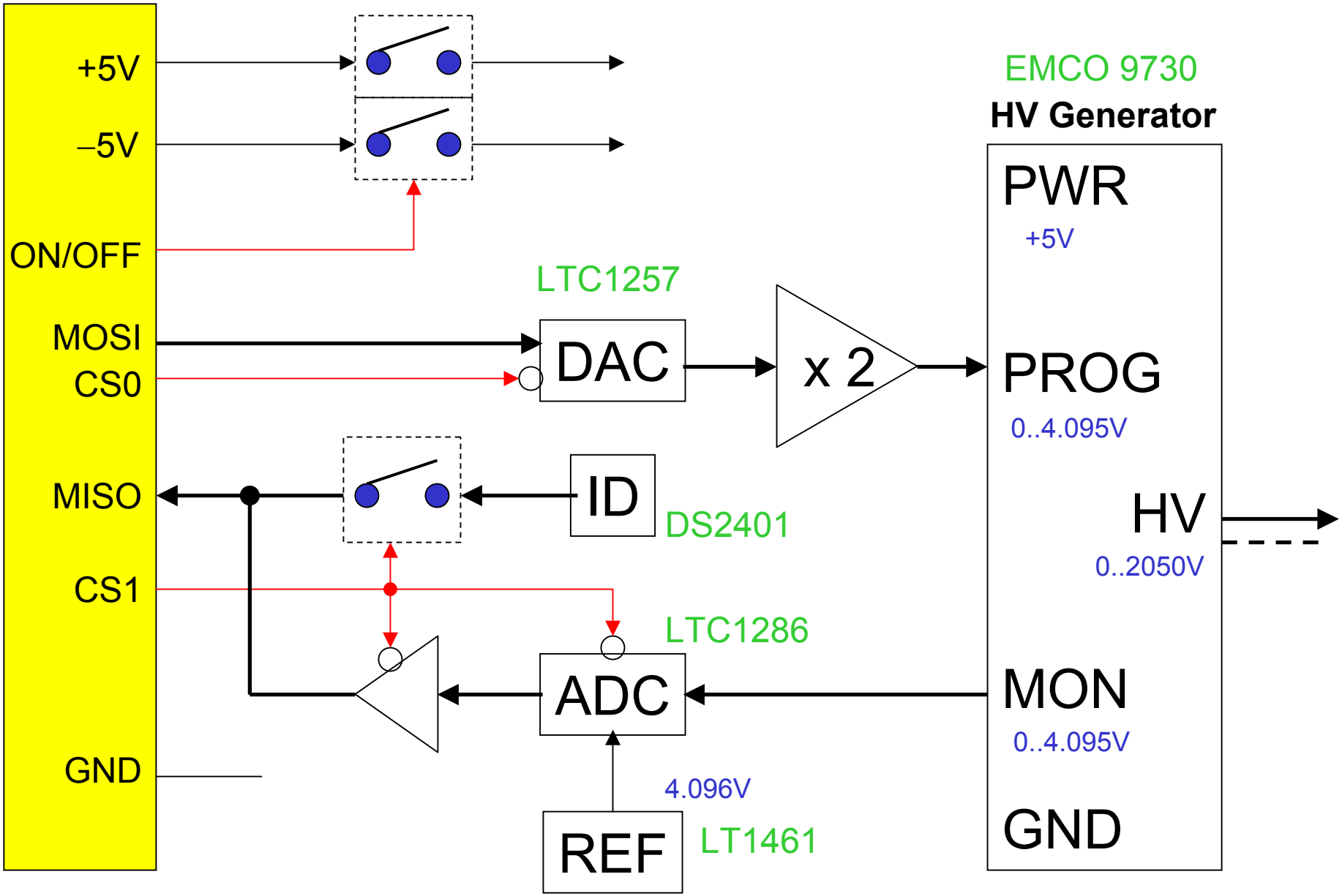
HV Control Board

- Implements the same interface as the Iseg board
- Same ADC, DAC as the Iseg board
- Carries the HV generator
- No HV traces on control board



HV Control Board

Schematic: HV_MODULE_B_sch.pdf



HV Generator

Proposed spec changes:

Change PROG range from 0..4095V to 0..2047V
➔ Eliminates x 2 OP-AMP

Change MON range from 0..4095V to 0..2047V
➔ Eliminate 0..4096V REF

Change output cable from RG178/U to something else
➔ Meet cable voltage rating

Eliminate “GAIN ADJUST” trim pot
➔ No need for true 12-bit accuracy

➔ Overall simplicity and increased reliability

Conclusion

- PMT HV Base Board
  - Needs a few technical decisions to move on:
    - Toroidal transformer specification
    - Conformal coating
  - Needs to choose a supplier
- HV Control Board
  - Satisfactory prototype design
  - To be supplied by UW-Madison
- HV Generator
  - Minor specification changes to be made
  - In contact with one vendor