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
*George Anderson has been maintaining these documents.
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

• 150MΩ 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
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