

Target Design – Status and Plans

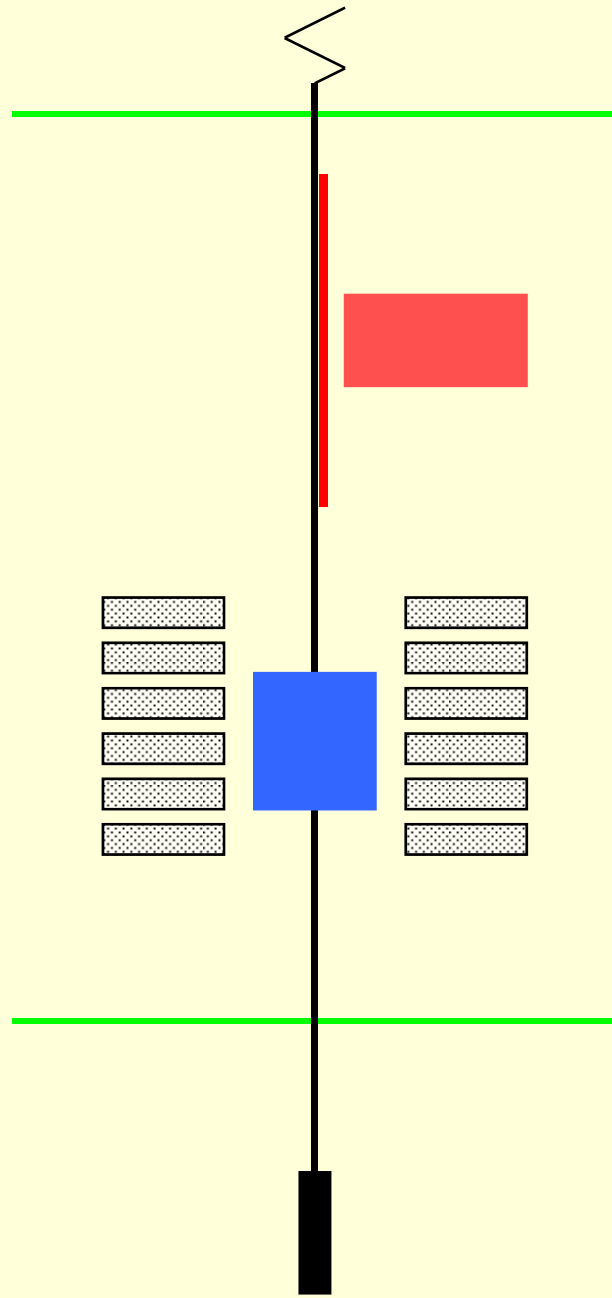
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Outline

- Tests on pre-prototype
- Prototype Status
- Plans

Schematic design



Diaphragm spring

Position measurement

Array of coils

Magnet(s)

Linear Drive

Target

Pre-Prototype

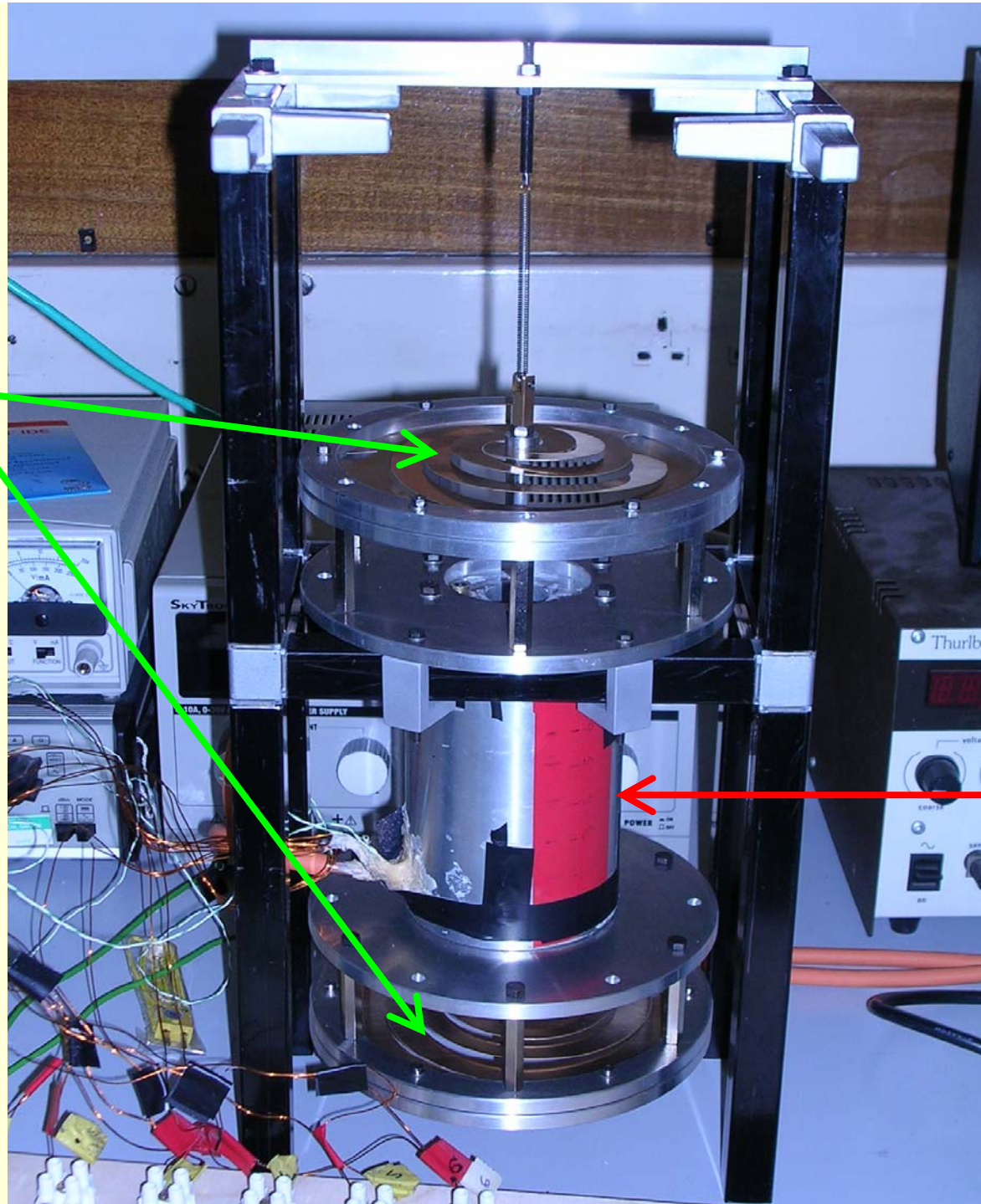
- Coils potted in thermally-conductive resin
- Sintered Nd-Fe-B magnets
- Be-Cu diaphragm spring suspension
- Water cooling

- Mounted vertically
- Timing circuits used to switch coils.

Test Layout (1)



Diaphragm
springs

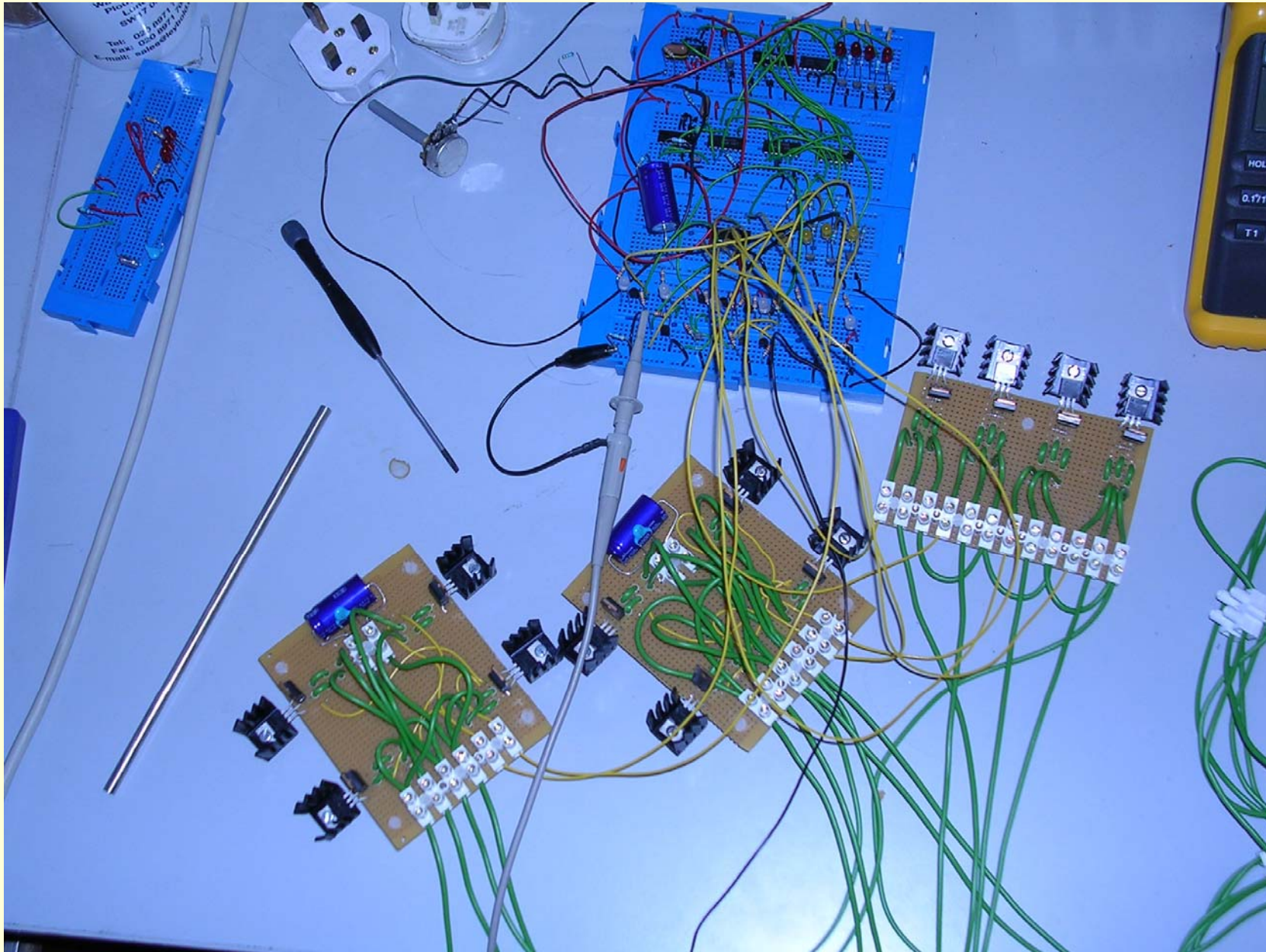


Coil
jacket

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Electronics



Control Circuit – Paul Smith

- Development of first drive circuit
 - Timing circuit to control actuation
 - MOSFET H-bridges to switch coils
 - Coils activated in pairs
 - 8 Hz continuous cycle achieved (without cooling)
- Start on second drive circuit
 - Microprocessor controlled
 - Variable timing allowed
 - Optical couplers to isolate supplies
 - Higher current construction
 - Incorporation of position sensing

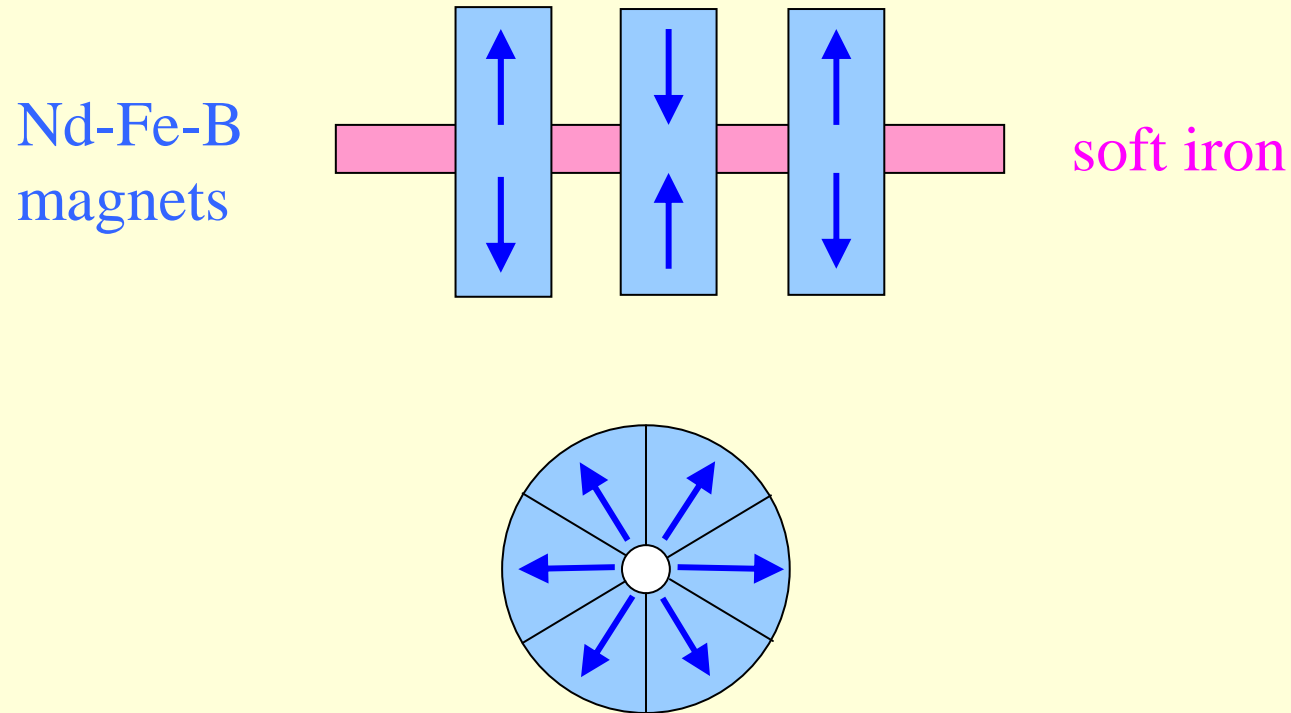
Full Prototype Construction

- Pre-prototype
 - Not enough acceleration
 - Insufficient travel
 - No commutator
- Full Prototype
 - Improved magnet design and magnet/coil flux linkage
 - More coils
 - Hall switch commutator possibilities

Full Prototype Status/Plans

- Design almost complete
- Construction of tooling for coil windings about to start
 - Coil winding and potting to follow
- Construction of jig to glue magnets (see fig.)
 - Magnet cutting and assembly
- Turning of outer cooling jacket
- Assembly in present stand (modified)
 - *(about 2 months)*
- Full mechanical and thermal testing

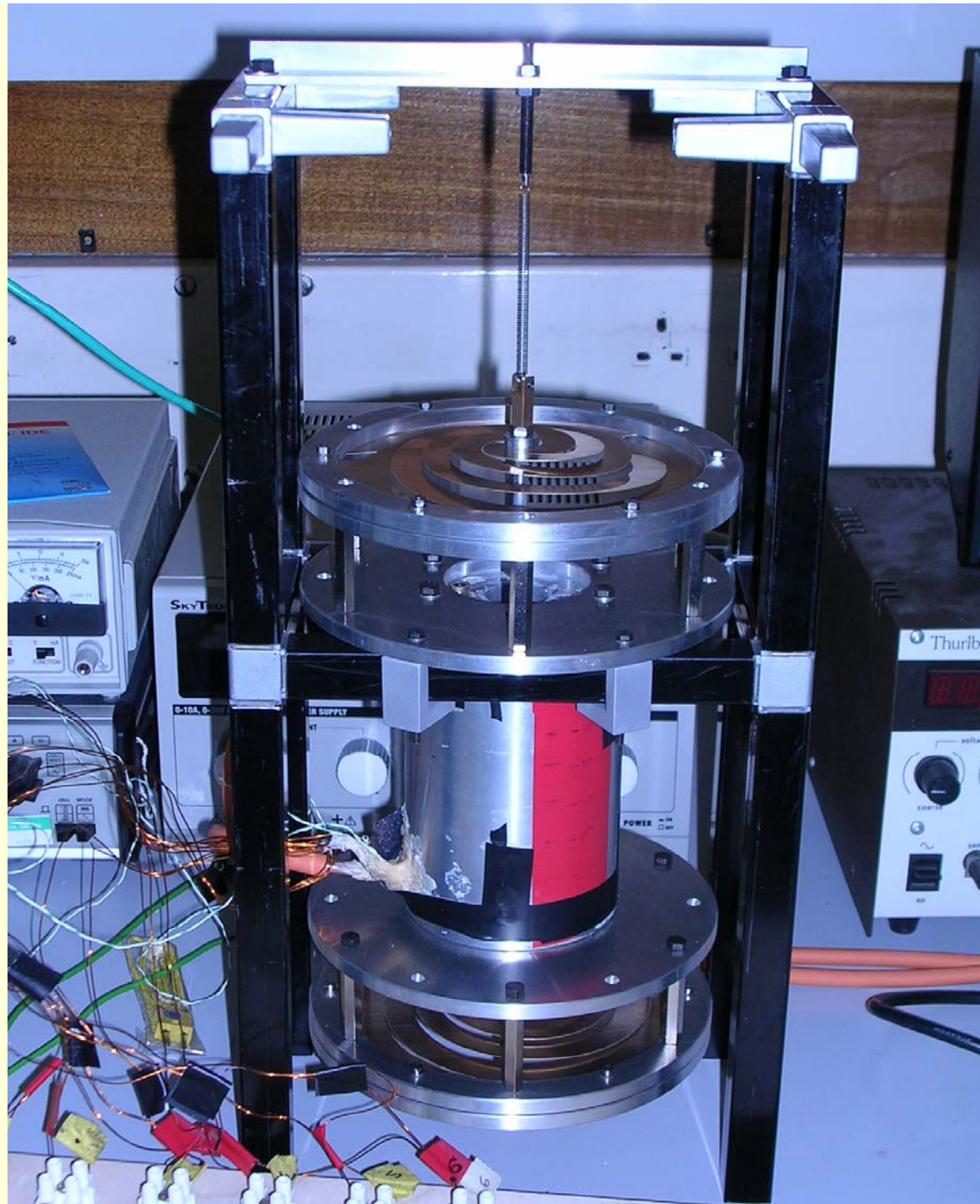
Improved armature design



Sector magnets – fixed together with aircraft glue

Outstanding Concerns

- Most worries concern the radiation and vacuum environment
 - Is potting resin acceptable to ISIS? (Sample provided)
 - May need guide-sleeve to prevent lateral motion
 - Is special “vacuum plastic” radiation hard?
 - Are cooling-water feedthroughs acceptable to ISIS? (If not, need more complicated chamber) – fig.
 - Radiation hardness of magnets (will also try Co-Sm)
 - Radiation harness of position-sensing electronics (read head and Hall sensors)



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Concerns Continued

- Heat load on target
 - Vacuum tests to be done with dummy load.
- Need involvement of ISIS engineers in design
- Would still like radiation tests and measurements *in situ*

Possible Schedule?

