

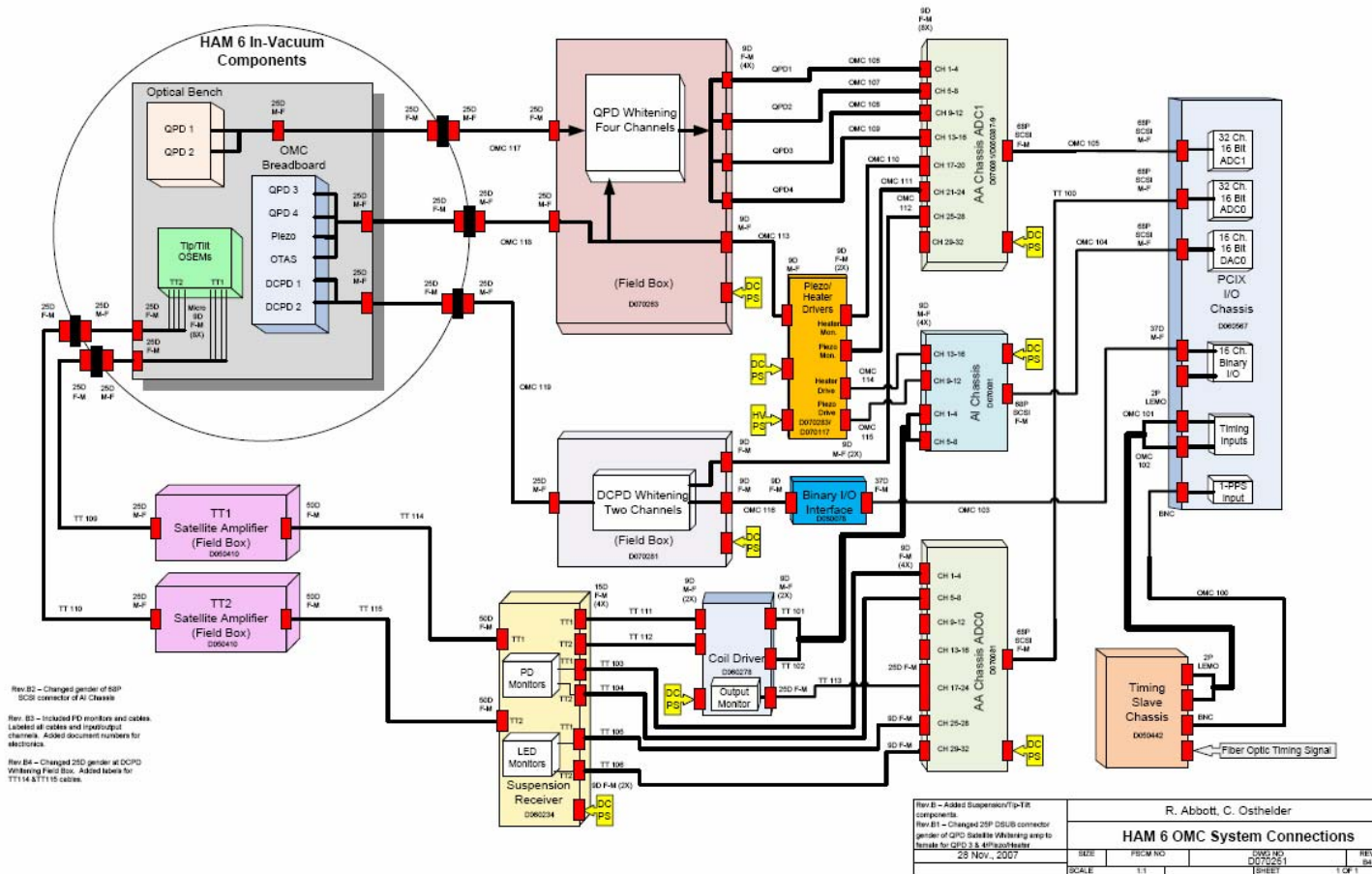
# Overview of ELIGO Output Mode-cleaner ISC Controls

**Weekly CDS Meeting**  
15 January 2008

**Rich Abbott, Charles  
Osthelder  
CIT**

15<sup>th</sup> January, 2008

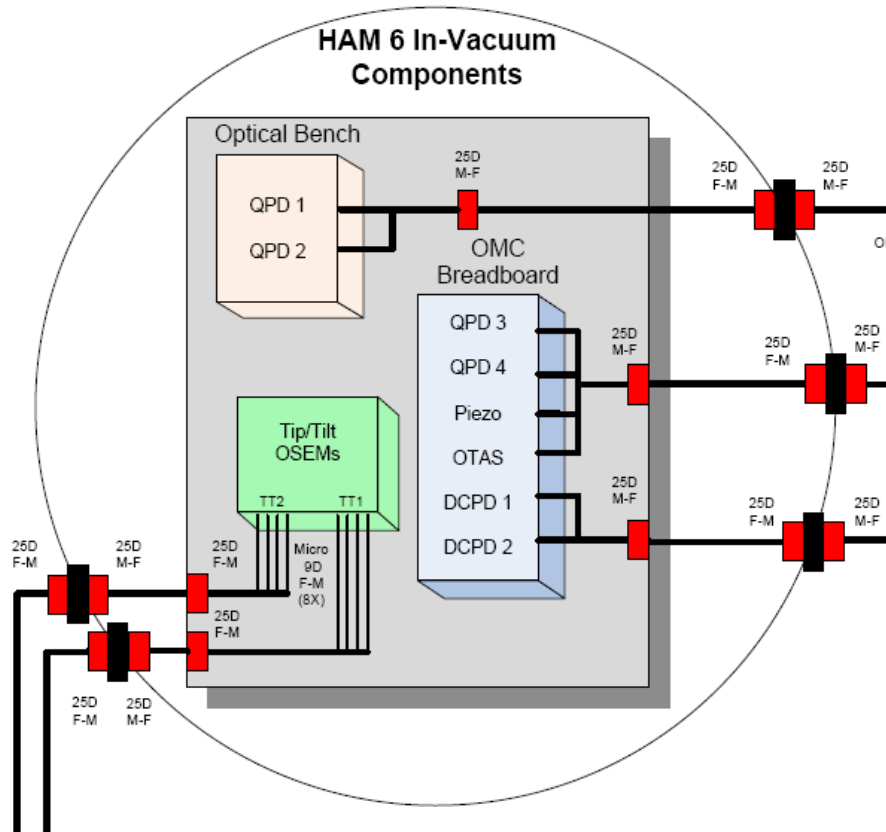
# Very Busy Diagram



15<sup>th</sup> January, 2008

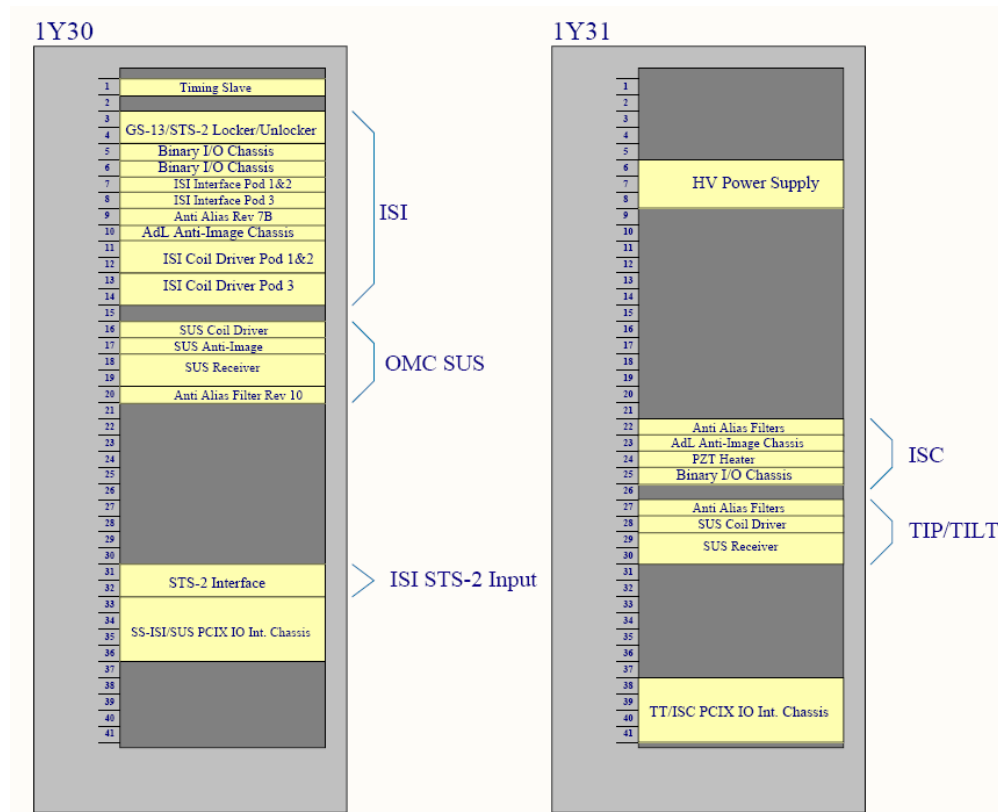
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» **Components in HAM6**



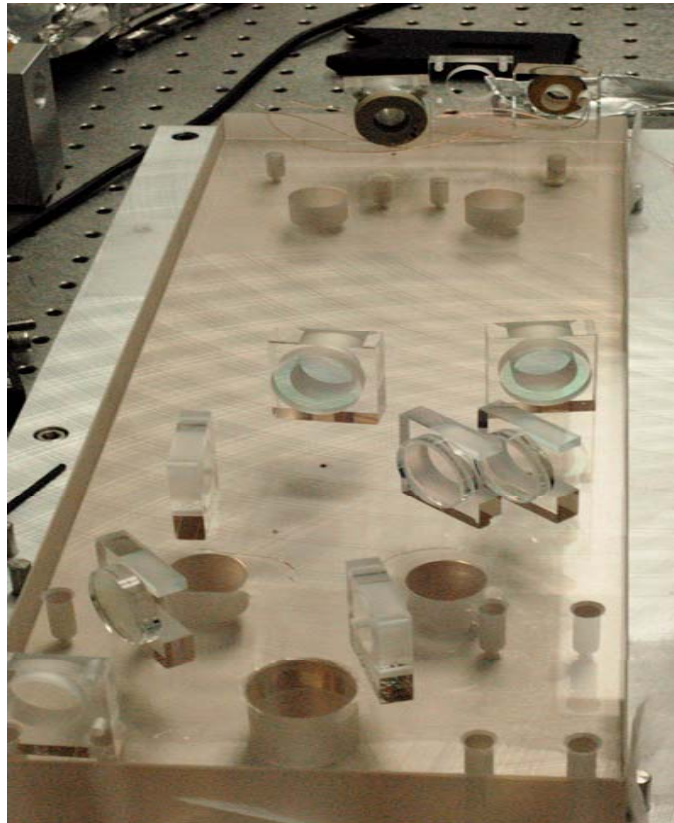
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- Opted for two racks to have room for growth



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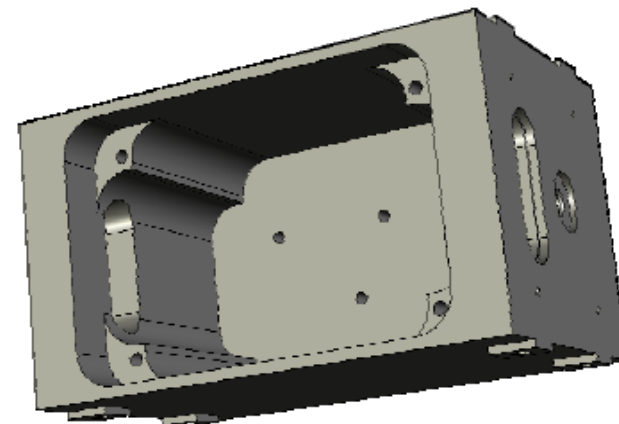
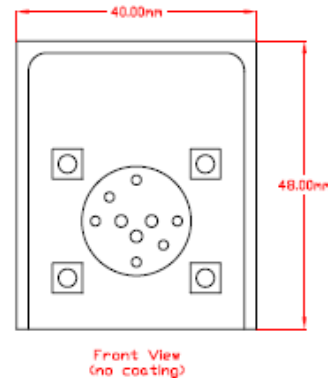
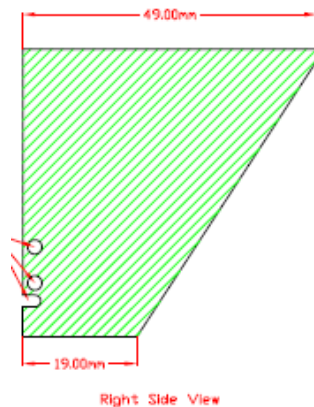
- » The “Breadboard” used to mount the OMC cavity parts



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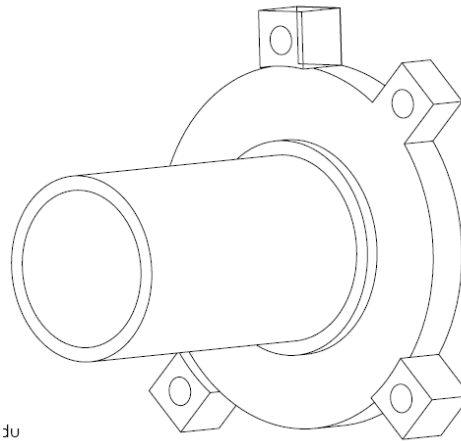
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- The main ISC components of the Eligo OMC are:
  - » Two in-vacuum DC Photodetectors
    - Used to detect the transmitted light through the OMC optical cavity as part of the DC readout technique.
    - All parts are designed to be cooled solely by radiation cooling



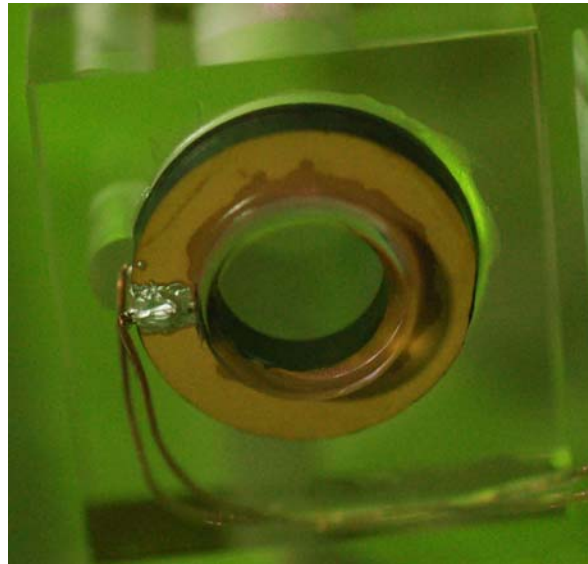
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- » **OMC Thermal Actuation System (OTAS)**
  - Consists of an aluminum cylinder heated at one end
  - Provides the means for slow, quiet adjustment of the OMC optical cavity length for coarse frequency control
  - A few degrees C is all that's needed



### » Piezo Actuator

- Provides the means for fast adjustment of the OMC optical cavity length for fine frequency control.
- Piezo is driven from 0 to ~300 volts by a newly designed HV driver



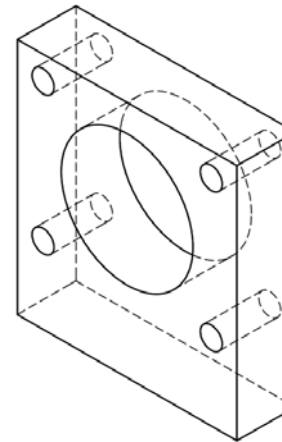
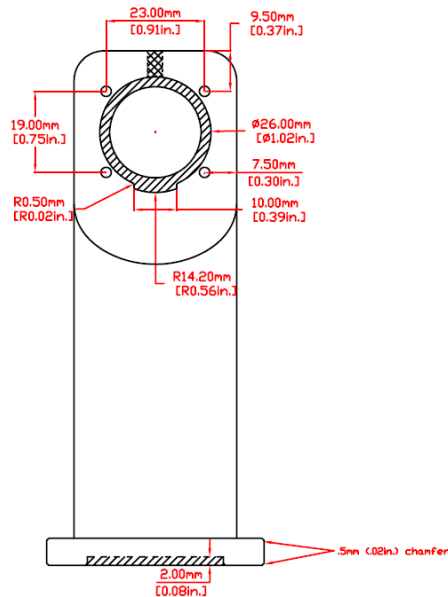
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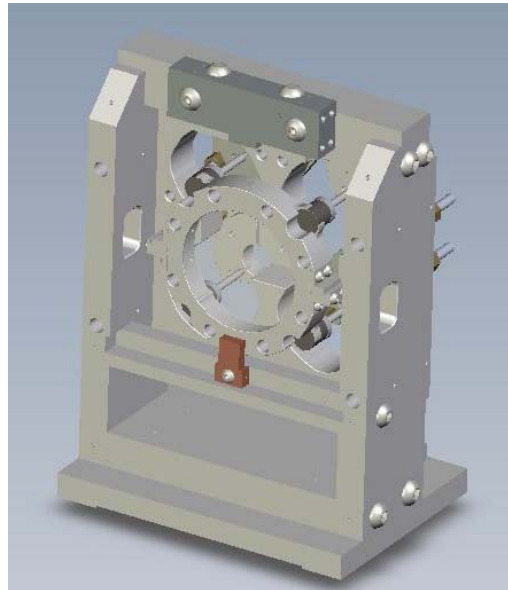
## » 4 Quadrant Photodetector (QPD)

- Two QPDs are located on the glass breadboard for the OMC, an additional pair are located on the main optical table
- Signals transmitted out of the vacuum system on shielded cable
- A “sense-wire” for each QPD’s wiring to pickup ambient noise



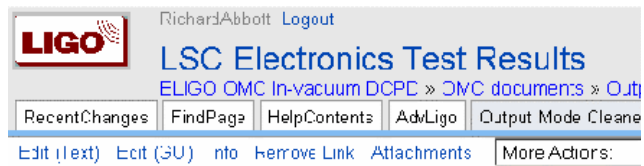
15<sup>th</sup> January, 2008

- » **Tip Tilt Steering Stages (Developed at ANU)**
  - Two Tip/Tilt stages are located on the optical table in HAM6. They provide angle and position adjustment to steer into the OMC cavity



- **DCC and Wiki** [http://lhocds.ligo-wa.caltech.edu:8000/advligo/LSC\\_Electronics\\_Test\\_Results](http://lhocds.ligo-wa.caltech.edu:8000/advligo/LSC_Electronics_Test_Results)

- » **Baseline Data Examples**



### LSC Electronics Baseline Data

The links below show representative data for each of the designs.

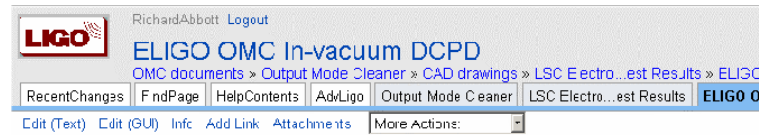
[ELIGO OMC In-vacuum DCPD](#)

[ELIGO OMC QPD Whitening Board](#)

[ELIGO OMC DCPD Whitening Board](#)

[ELIGO OMC Heater Driver Board](#)

[ELIGO OMC High Voltage Driver Board](#)



### D060572-B1

#### SR-785 Machine Setup Files

Ⓜ "Frequency Response setup file for Stanford Research SR-785"

Ⓜ "Noise spectrum setup file for Stanford Research SR-785"

#### Frequency Response Data

Ⓜ "PDF plot of PD frequency response 1Hz to 100kHz"

Ⓜ "PDF plot of Bias Path frequency response 1Hz to 100kHz"

Ⓜ "SR-785 frequency Response for normal signal path of DCPD"

Ⓜ "SR-785 frequency Response for PD bias path of DCPD to show coupling to normal PD output"

#### Noise Power Spectra

Ⓜ "PDF Overlay of input noise, output noise, Spice simulation and 25mA shotnoise"

Ⓜ "SR-785 noise power spectral density 1Hz to 1000Hz"

Ⓜ "SR-785 noise power spectral density 1Hz to 100kHz"

#### Schematic and Testing Notes

Ⓜ "Detailed schematics and board layout for this revision of the DCPD"

Ⓜ "Text file with testing notes and file descriptions"

15<sup>th</sup> January, 2008