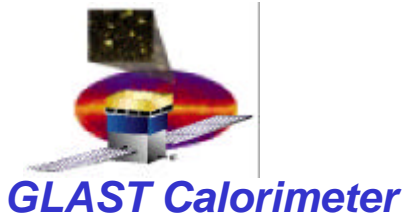


CAL MiniEM Specifications

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Naval Reseach Lab
22 July 2003





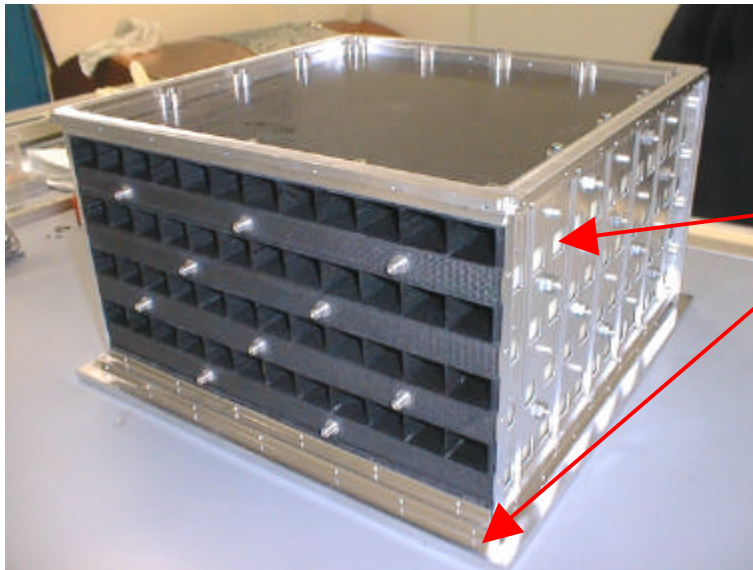
CAL MiniEM Objectives

CAL MiniEM
22 Jul 2003

- **Support T&DF nonflight hardware and nonflight software development and test**
 - Provide flight-like electrical interface to TEM
 - Provide fully populated GCRC – GCRC5
 - Provide fully (?) populated GCFE – GCFE7
 - Provide two layers of CDEs with DPD attached to AFEE boards.
 - Provide MGSE to support CAL with TEM/PS mounted below.
 - MiniEM assembly and test will use good engineering practice but will not be performed using flight controlled procedures and methods.
- **Limitations**
 - Will not support environmental testing (or will not be verified prior to delivery)
 - No vibration testing (other than shipping) permitted
 - Thermal testing is possible, but will add no value to this structure.
 - Form and dimensions do not meet CAL EM/Flight IDD
 - Potential restriction on orientations: +Z vertical only



- Reuse CAL verification model 2 (VM2) as base structure for MiniEM
 - GFRP structure with 96 cells to individually support the CDE
 - Aluminum shell to close the cells and provide the interfaces with the AFFE boards and the grid

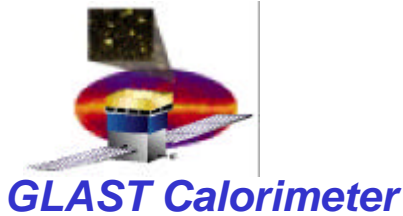


VM2 structure

- Differences VM2 – EM
 - Base plate has no GRID mounting tabs
 - Closeout plates have large sqr holes for DPD wires
 - Carbon structure designed for CDE crystal length of 333 mm (vs 326 mm for EM/Flt)
 - Structure does not meet flight quality requirement and shall not be used for demo or presentation.
- Issues:
 - Required orientations?
 - Handling MGSE and fixtures?

- ❑ **Populate the top two rows with prototype nonflight CDEs (24 total)**
 - **Consist of EM nonflight spares, Swales bonding tests.**
 - **VM2 structure designed for 333 mm Csl length, EM crystal length is short by 7mm – shim with extra bumpers if necessary.**
 - **Install without elastic bands (reworked prototype crystals don't have correct chamfers).**
 - CDEs will not be held as securely as in EM.
 - **Issues:**
 - What orientations are required, +Z up only – possibly makes assembly easier
- ❑ **Install EM AFEE cards (4)**
 - **These are the remaining 4 cards to be delivered to SLAC**
 - **Issues**
 - There are no GCRC5's to populate these cards
 - There are insufficient GCFE7s or 9s to populate these cards.
 - **Proposals**
 - Package more GCFE7s from T31D wafers at OSE
 - Steal flight GCRC5s from T31D packaging at ASAT





MiniEM Environmental Requirements

CAL MiniEM
22 Jul 2003

- **MiniEM is intended for support of laboratory testing at room temperature only.**
 - Performance over CAL temperature range will not be tested or guaranteed.
 - Since the CDE population of the structure is incomplete, MiniEM should not be subjected to vibration testing or excessive dynamic loading (except for shipping).
 - AFEE boards will NOT be staked or conformal coated.
- **Humidity requirements for MiniEM are no different than for flight CAL units.**
 - However, risk of long term exposure to air-conditioned laboratory environment is probably not a significant performance risk for the short useful life of the MiniEM.



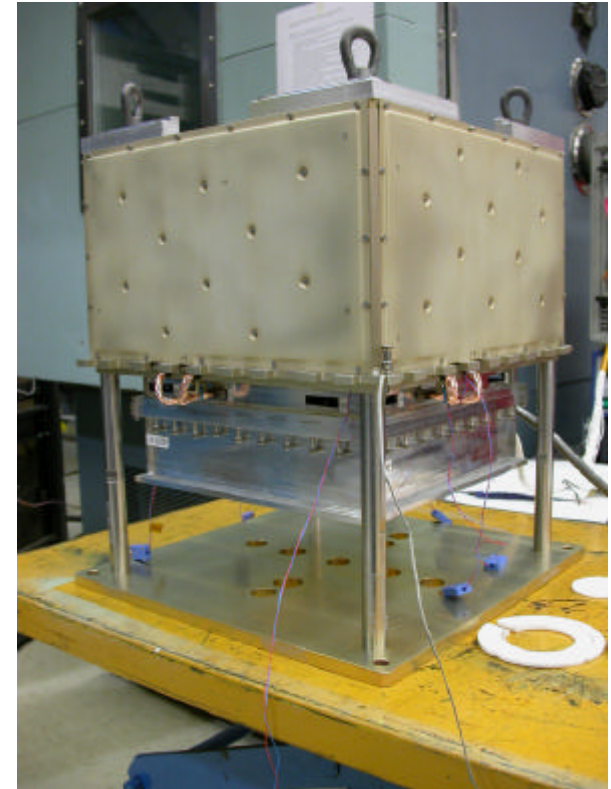
Schedule

| | |
|---|---------------|
| Receive VM2 Structure and AI parts | 15 Aug |
| Adapt base plate, etc to MGSE and support fixtures | 1 Sep |
| Install CDE | 8 Sep |
| Install AFEE boards | 15 Sep |
| Functional Testing | 21 Sep |
| Ship to SLAC | Oct 6 |
| Arrive at SLAC | Oct 10 |

- ❑ The schedule is contingent upon the availability of VM2 structure and ASICs are on time.
- ❑ GCRC5 and GCFE7 ASICs will not be tested at the part level but will be tested after assembly at the board level.
- ❑ Challenge may be 24 CDEs by 8 Sep, possibilities are being investigated – including contribution of CERN beam test CDEs from CEA/France



- ❑ Package T31D GCFE7s at OSE
- ❑ Dedicate potential flight GCRC5s from T31D to MiniEM
- ❑ Requirements for support of orientations other than +Z vertical
- ❑ Requirements on CAL support stand for mounting and access to TEM/PS
- ❑ Requirements, if any, on CAL support stand for mounting of TRK.
- ❑ Requirements for loading GCFE7s on AFEE layers without CDEs
- ❑ Shipping Container? Adapt to and borrow EM container or try to use BTEM container.



EM CAL on support stand
w/ upper lifting fixtures
attached