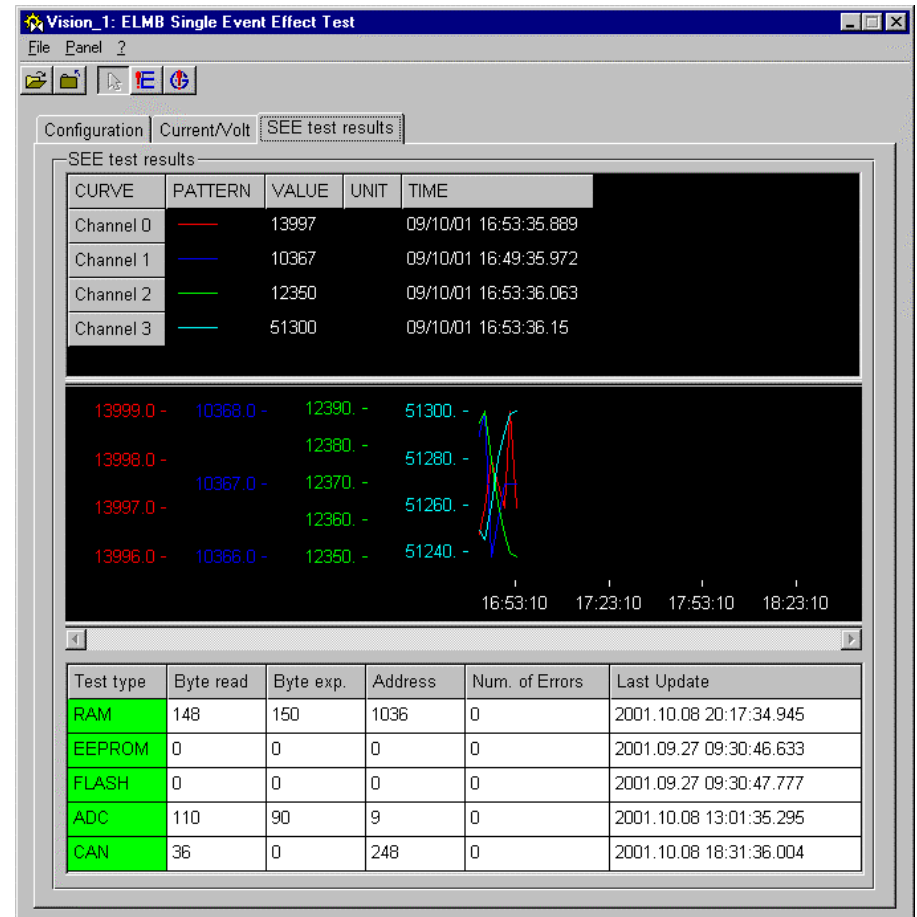


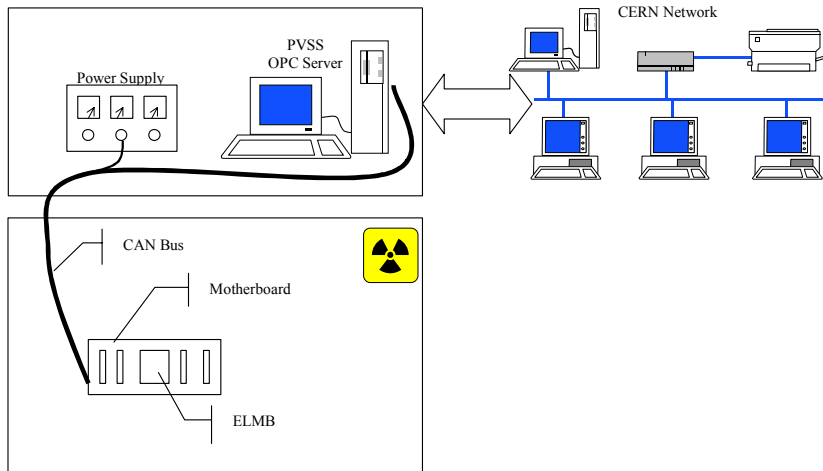


TCC2

- **Overview of setup**
- **Preliminary Results**
- **Limitations**
- **Summary**
- **Future**



Overview of setup



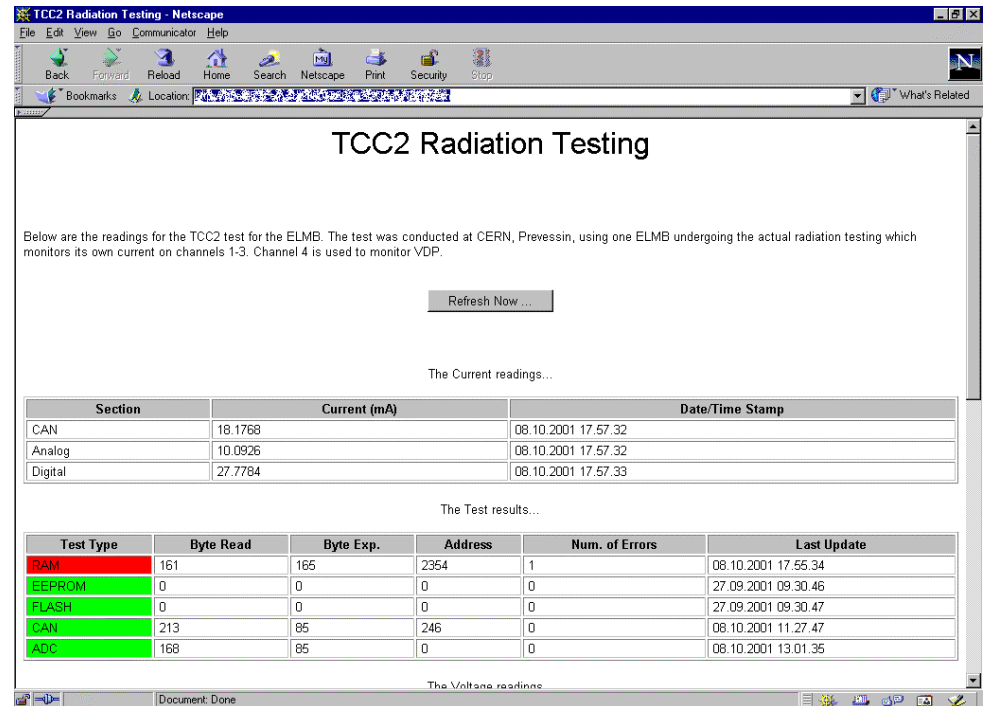
- **One PC in non-radiation area, with power supply**
- **One ELMB on Motherboard in radiation area**
- **Connected via CAN bus**
- **Power supplied via CAN bus**
- **ELMB measures own currents and voltage**



Preliminary Results

Over two months:

- **3 soft resets**
- **3 hard resets**
- **2 PVSS crashes**
- **2 archive made disk full**
- **1 fatal error (openhost/NICAN card, PVSS, ELMB)**
 - No recovery possible

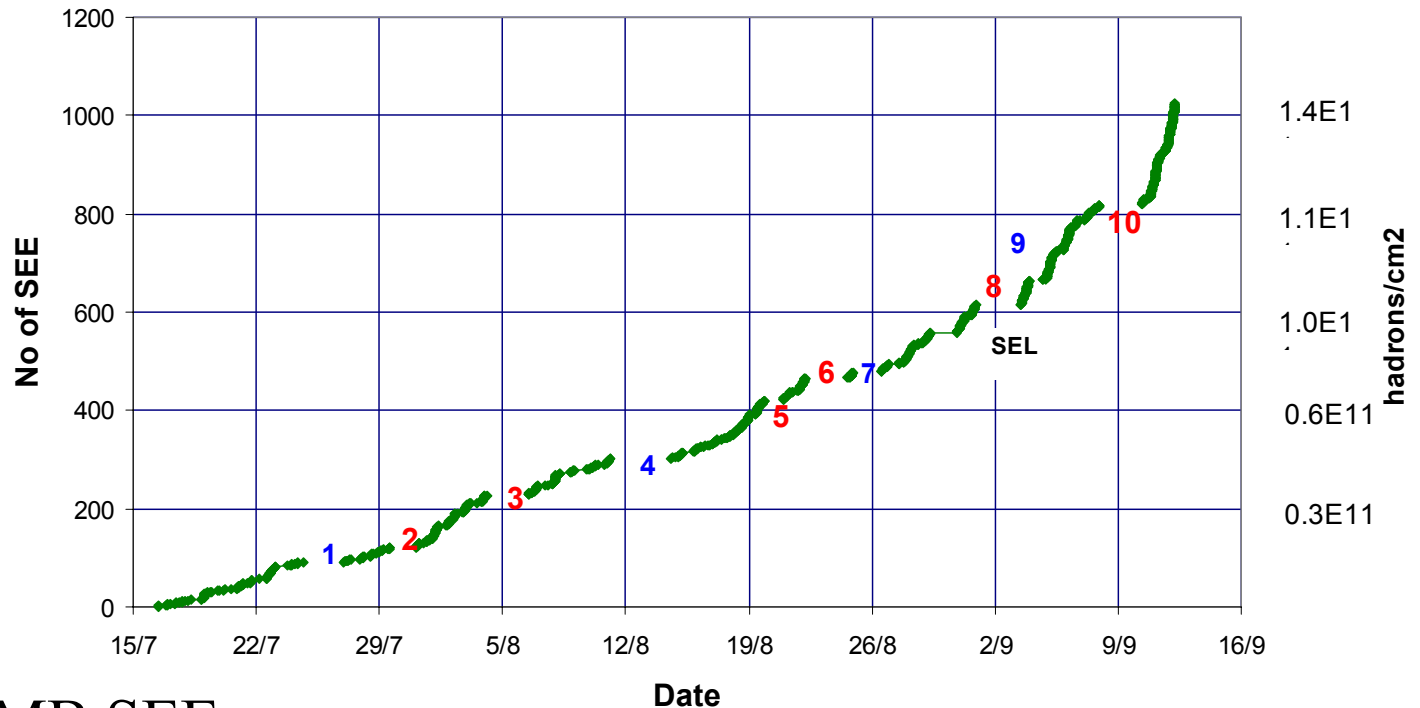




ATLAS
DCS

Total SEEs

Total number of SEEs in the ELMB SRAM
1st ELMB tested during 2001



Red - ELMB SEEs

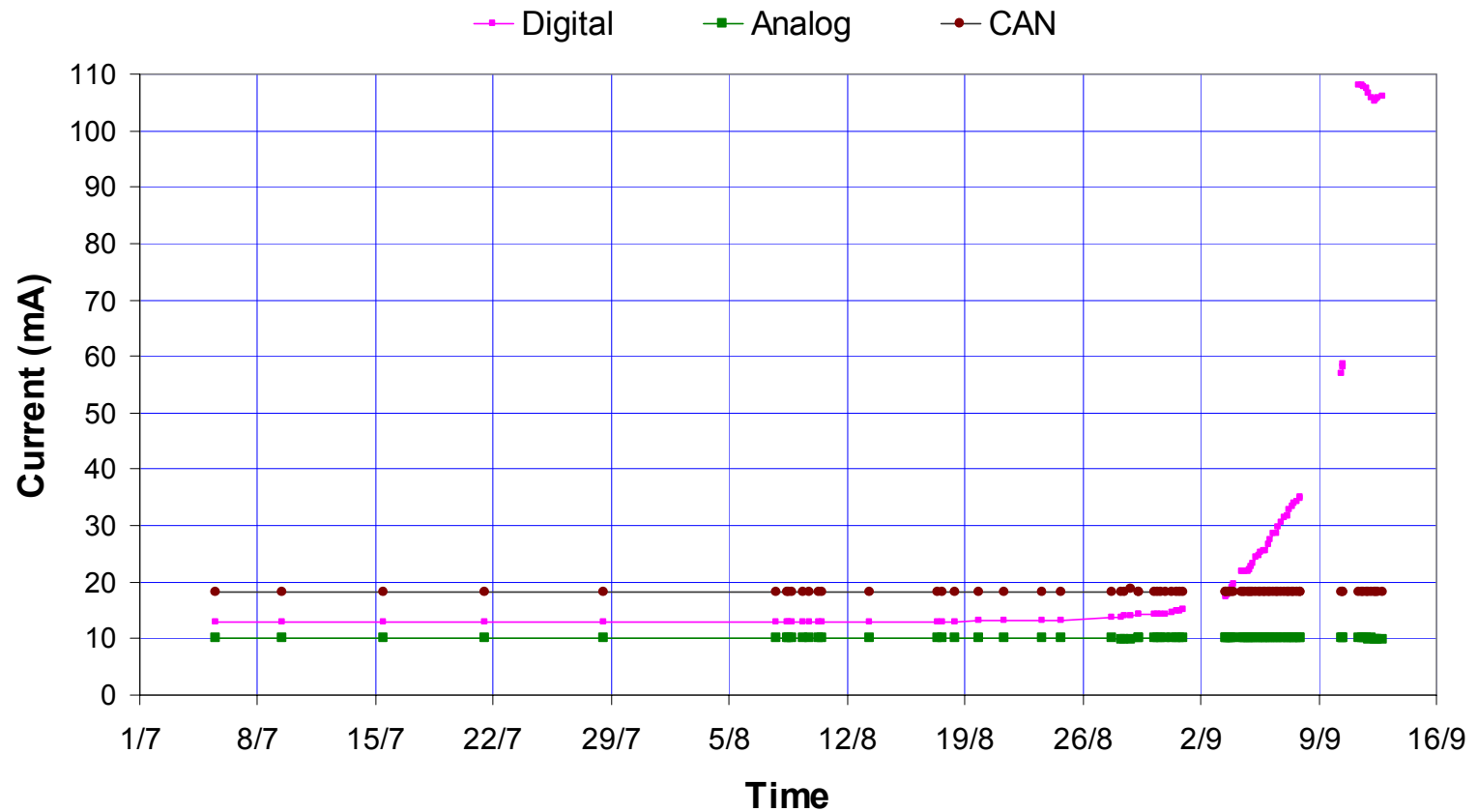
Blue - Data lost for some other problem



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DCS

Current Levels

TCC2-2001 ELMB power supply currents

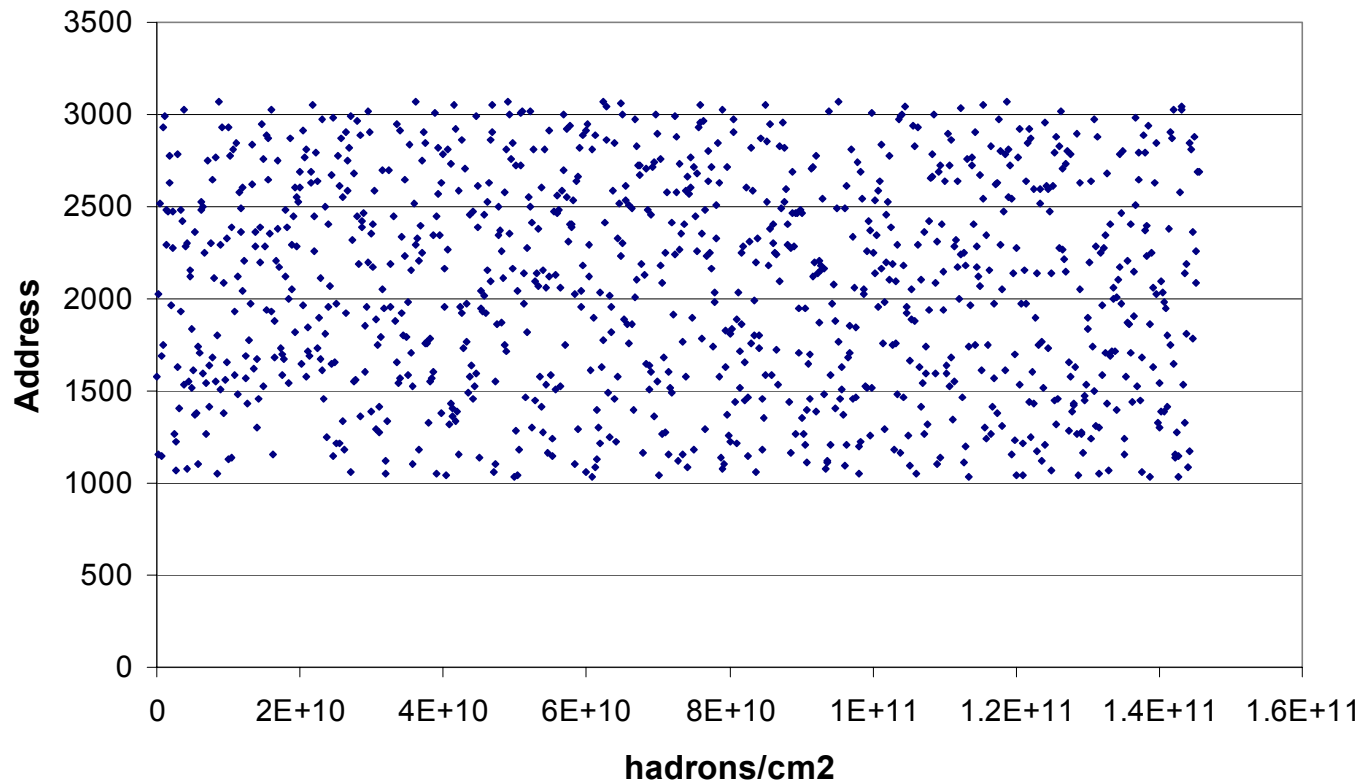




ATLAS
DCS

Address Distribution

TCC2 - 1 Distribution of SRAM addresses where SEE occurred





Limitations

- **PVSS crash**
 - Worst possible outcome - not only losing data but all control lost
- **Disk full when archiving**
 - Very difficult to regain control without losing a lot of data
- **Communication lost**
 - No current readings
 - Difficult to diagnose further
 - Hard reset is only option
- **Not all messages passed through OPC Server**
 - Not all messages archived
- **Remote control only possible with PVSS**
 - Web interface currently only displays information
 - VNC also available but must be installed on remote PC
- **No real time alarms**
 - SMS message would be useful



Summary

- **Over 8 weeks, 6 ELMB errors observed**
 - 1 error in 9.3 ELMB days
- **MDT Barrel 1:**
 5.4×10^9 h/cm²
- **TCC2:**
 1.4×10^{11} h/cm²
- **25 times greater dose rate than expected**
 - 1 error in 233.3 ELMB days
- **Many errors seen in RAM**
- **FLASH unaffected (only errors seen where due to error in message)**
- **ADC susceptible**
- **Digital current increase**



Future

- **Full analysis of results for both ELMBs**
 - Attempt to diagnose every failure
- **Obtain accurate radiation readings**
- **Test irradiated ELMBs for possible recovery**
- **Repeat test with more than one ELMB**
- **Software monitoring for automatic soft reset**
- **ELMB in non-radiation area for automatic hard reset**
- **Requirement for more messages to be passed to PVSS from OPC Server**
 - (Boot-up, Emergency, etc.)