

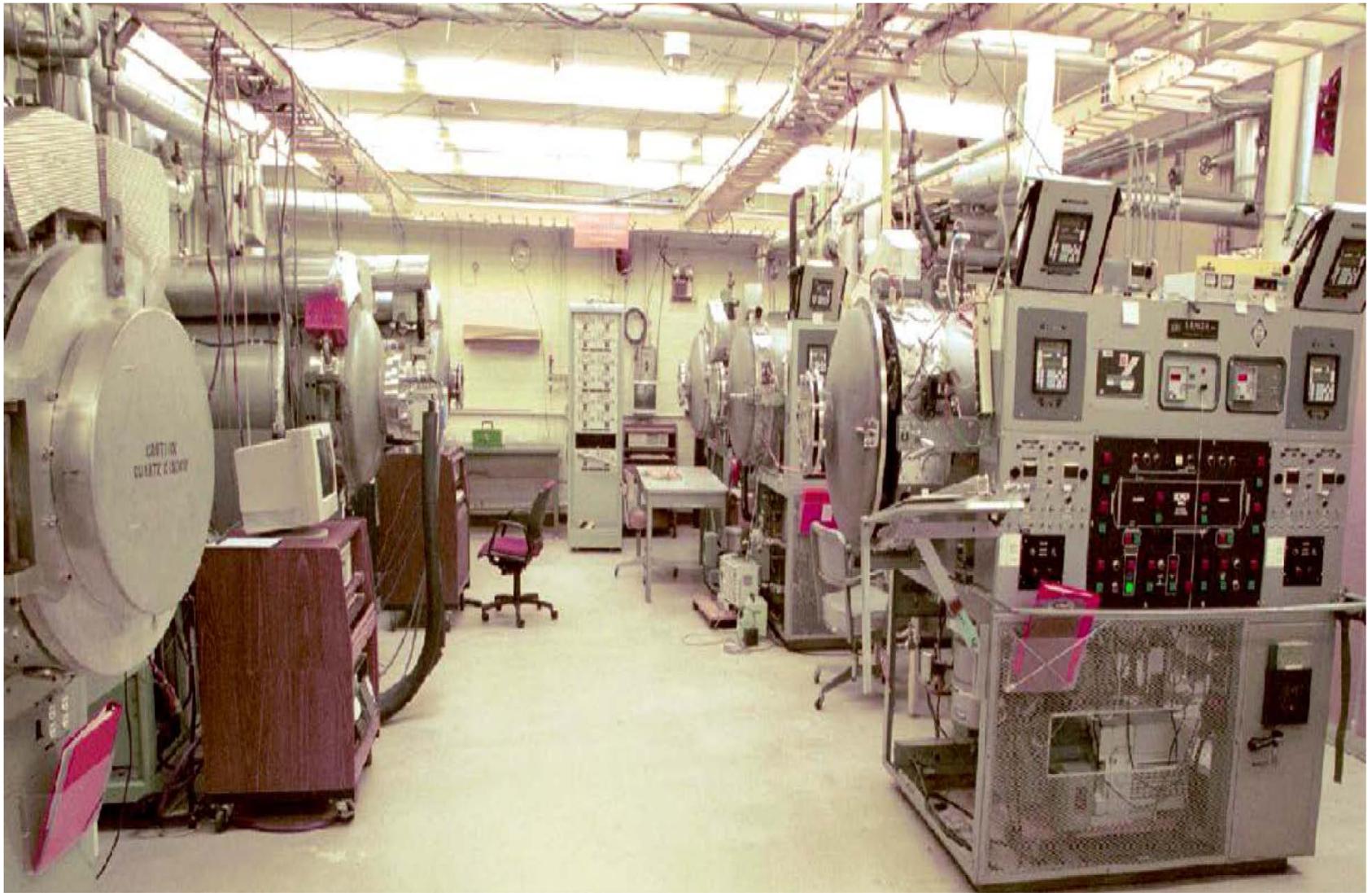
JPL'S Upgrade of Ten Small Chambers and Laboratory Facility

Patrick Martin

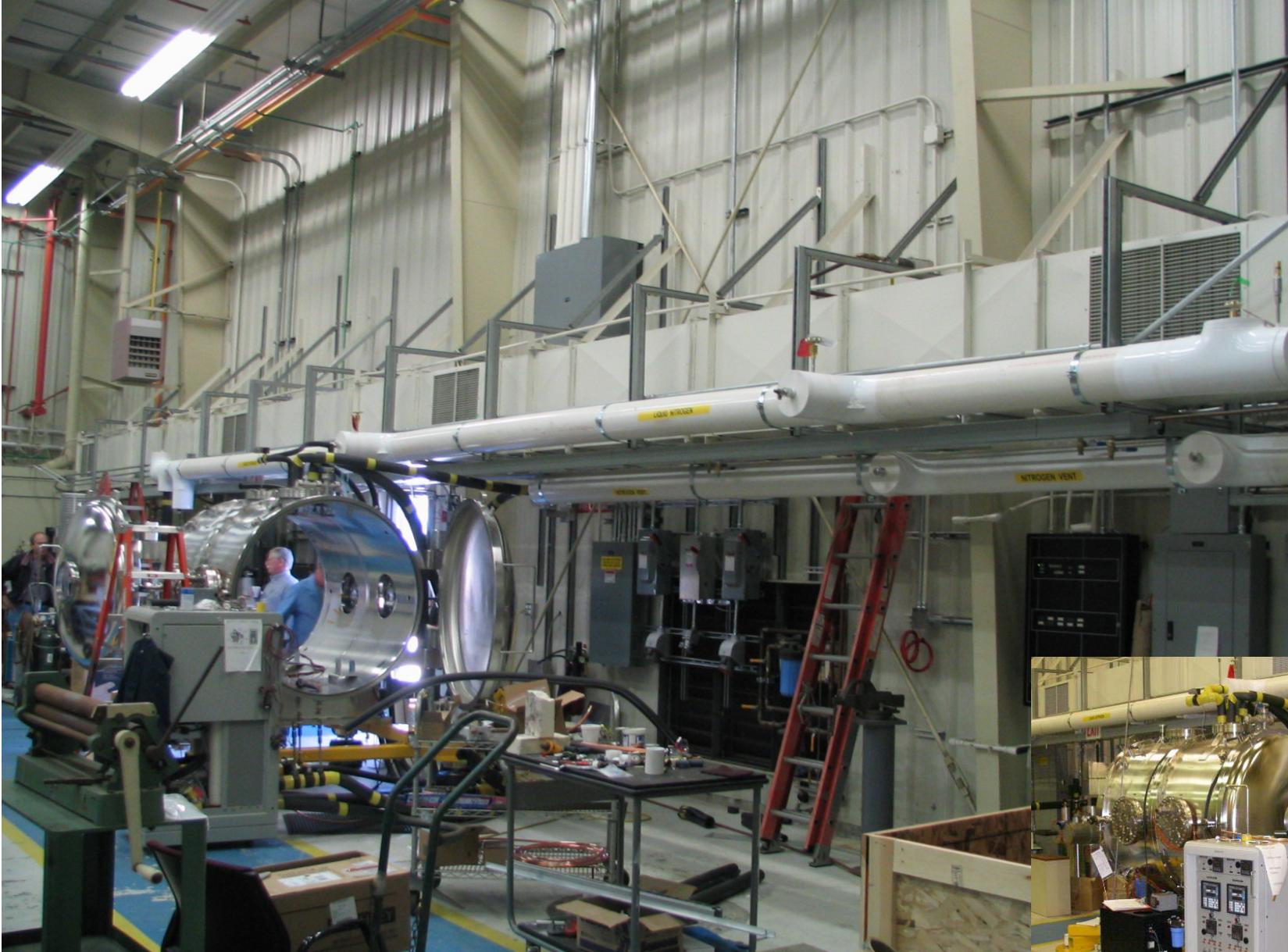
Andy Rose

27th Space Simulation Conference

Nov, 2012

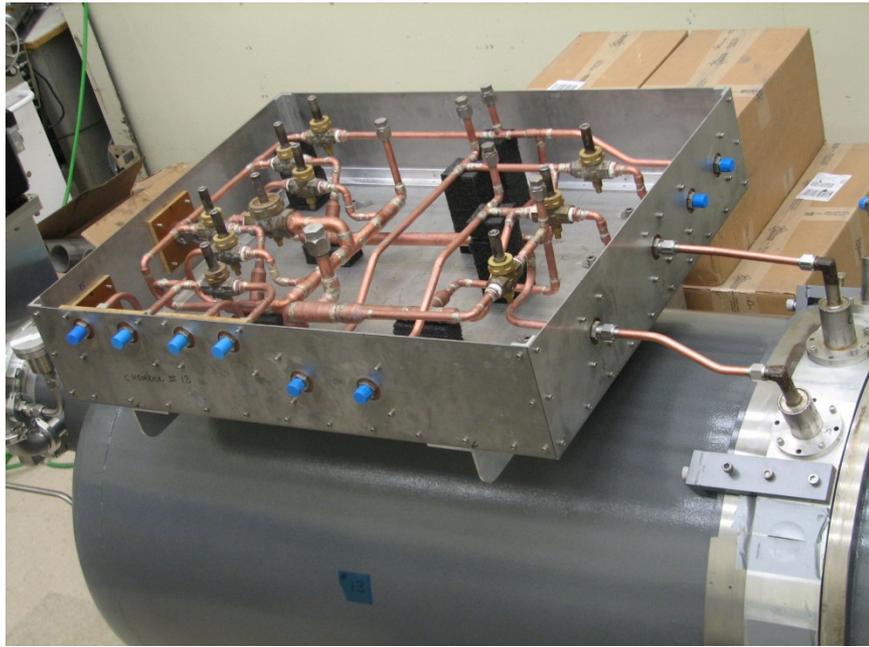
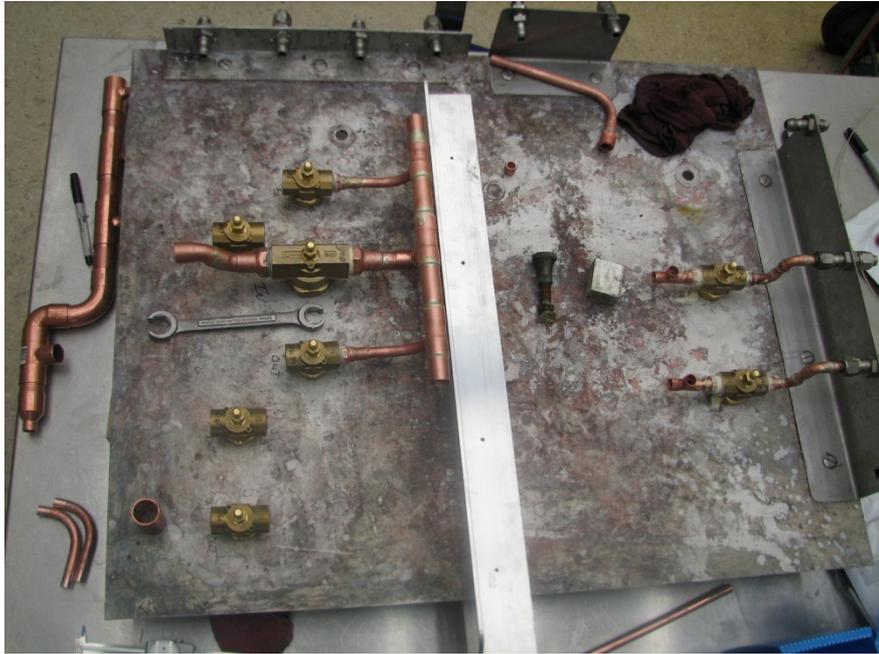


JPL's Small Chamber Laboratory Before Retrofit



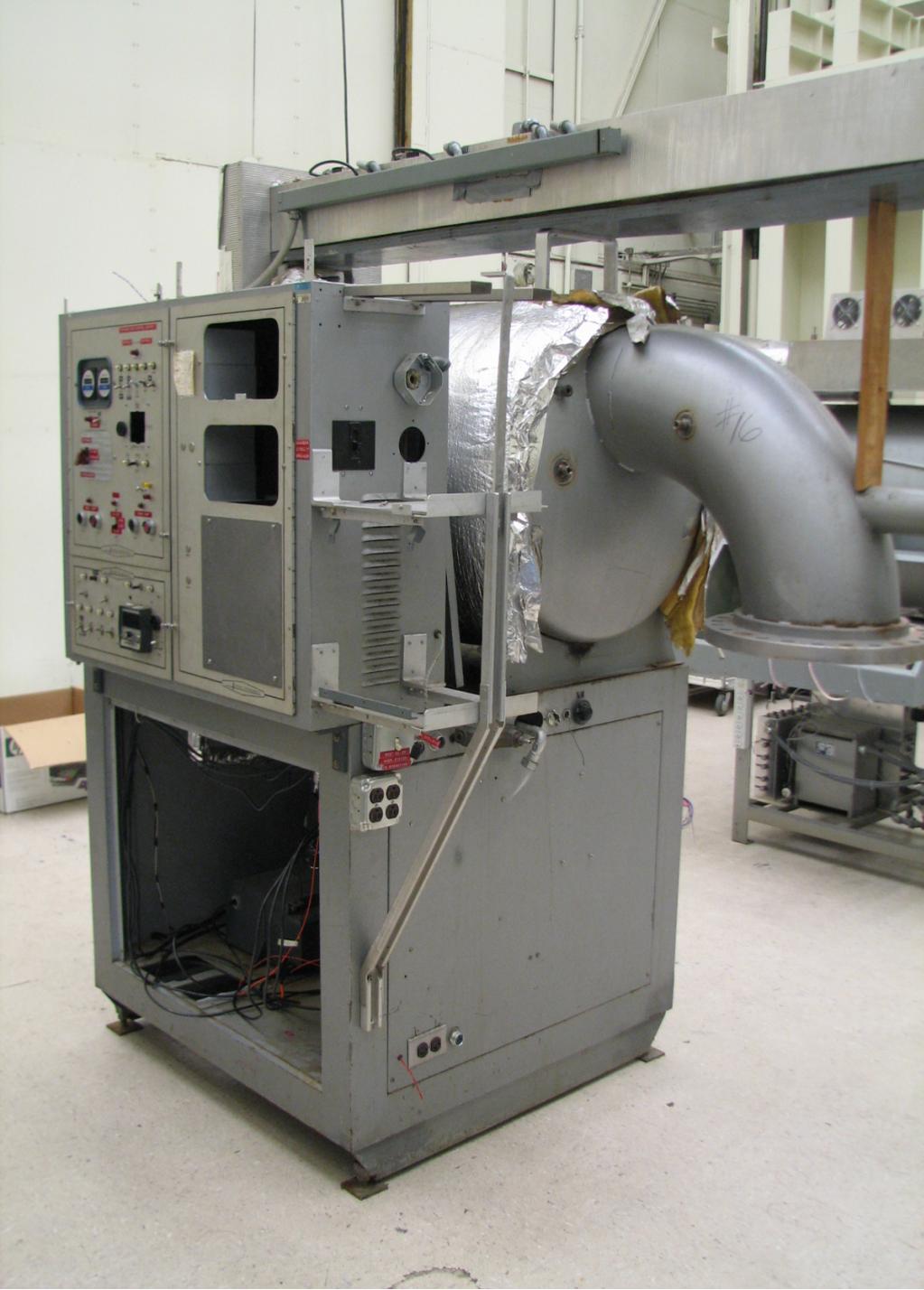
Relocate Chambers to a Temporary Facility

The Thermal Conditioning Unit



**Chamber Before
Modifications**





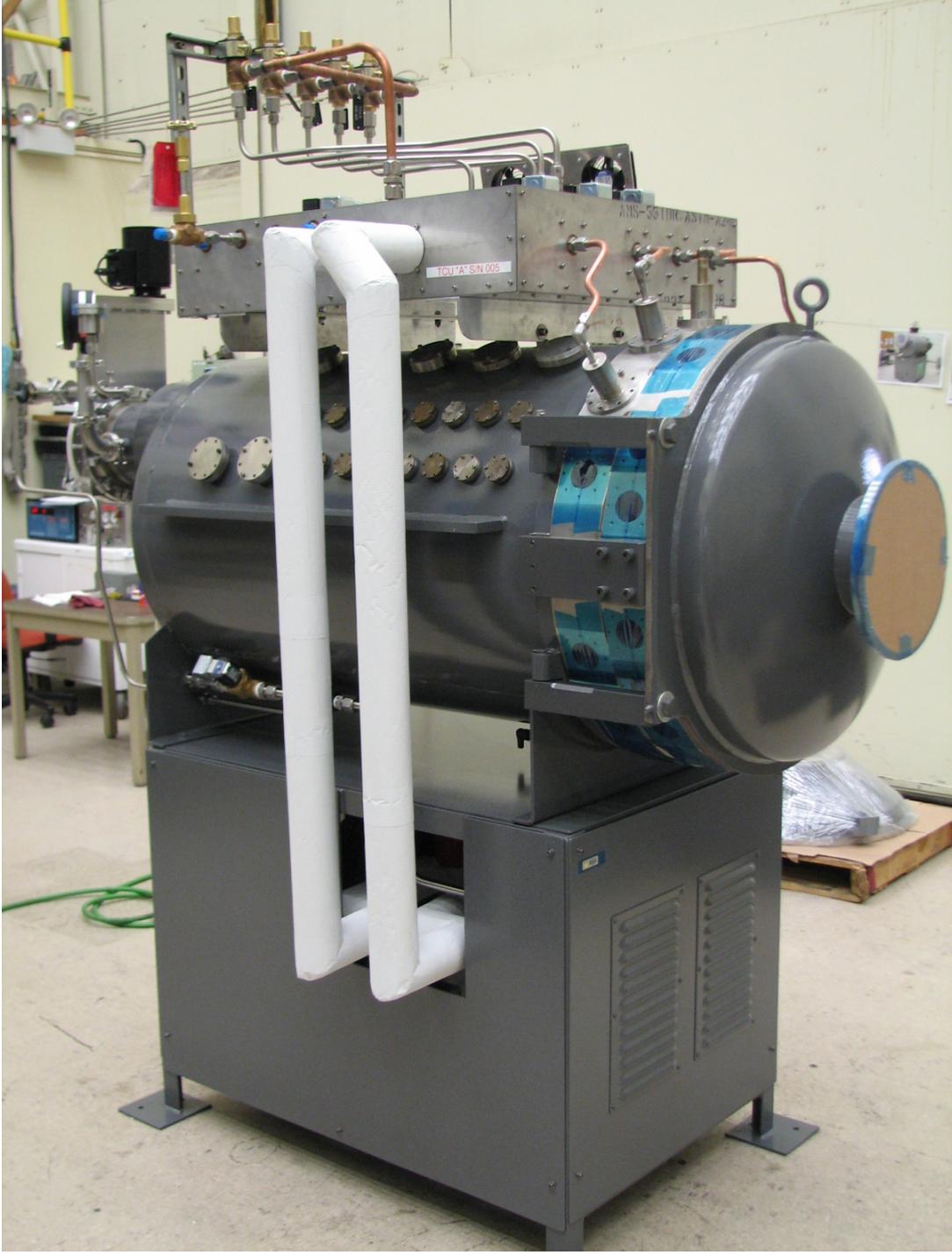
Chamber Modifications



1. Built New Support Frames
2. Mounted the chamber
3. Sent them out for Powder Coating



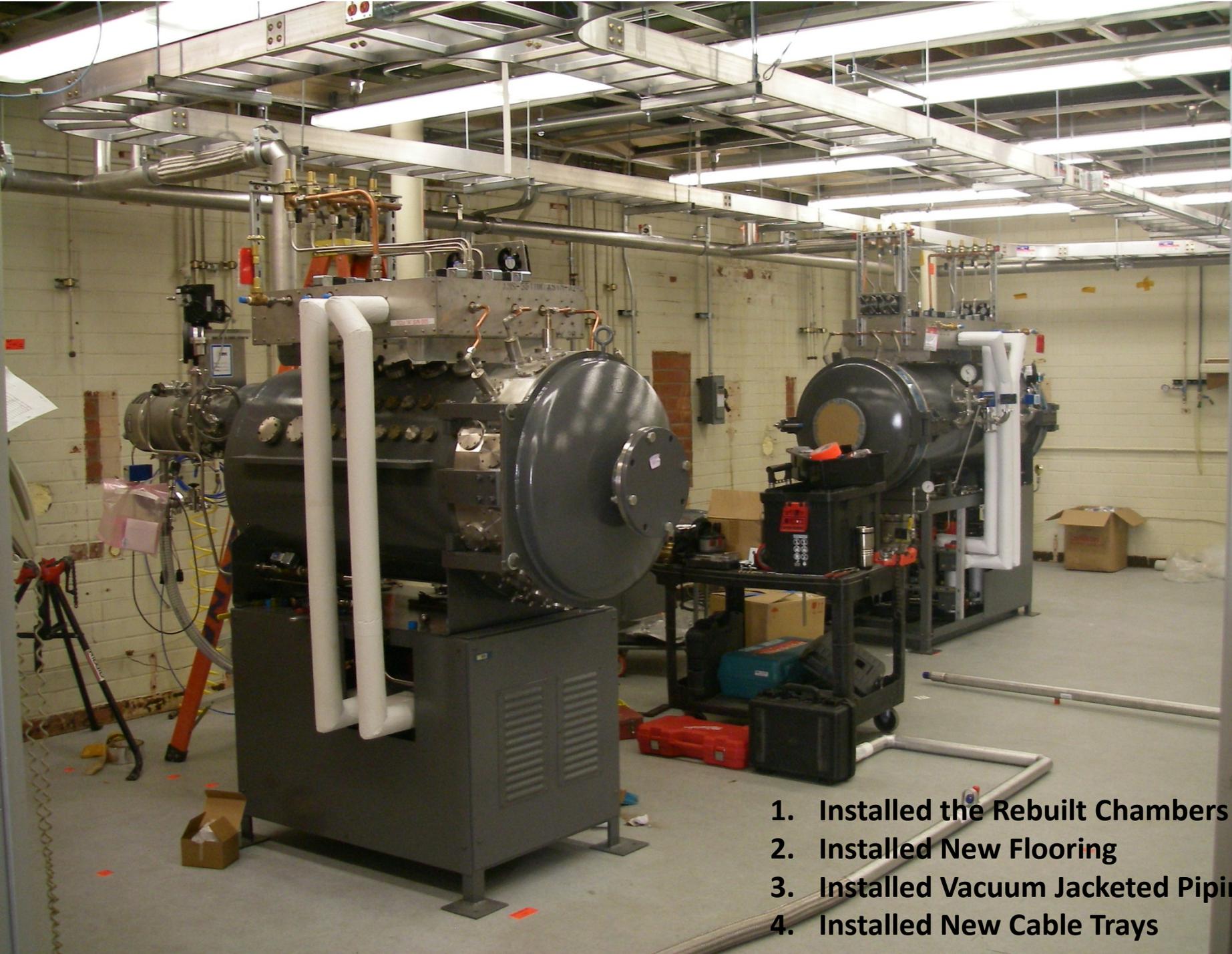
- 1. Installed the pumps and heaters**
- 2. Installed Gages and Valves**
- 3. Installed the Piping**
- 4. Installed the TCU**



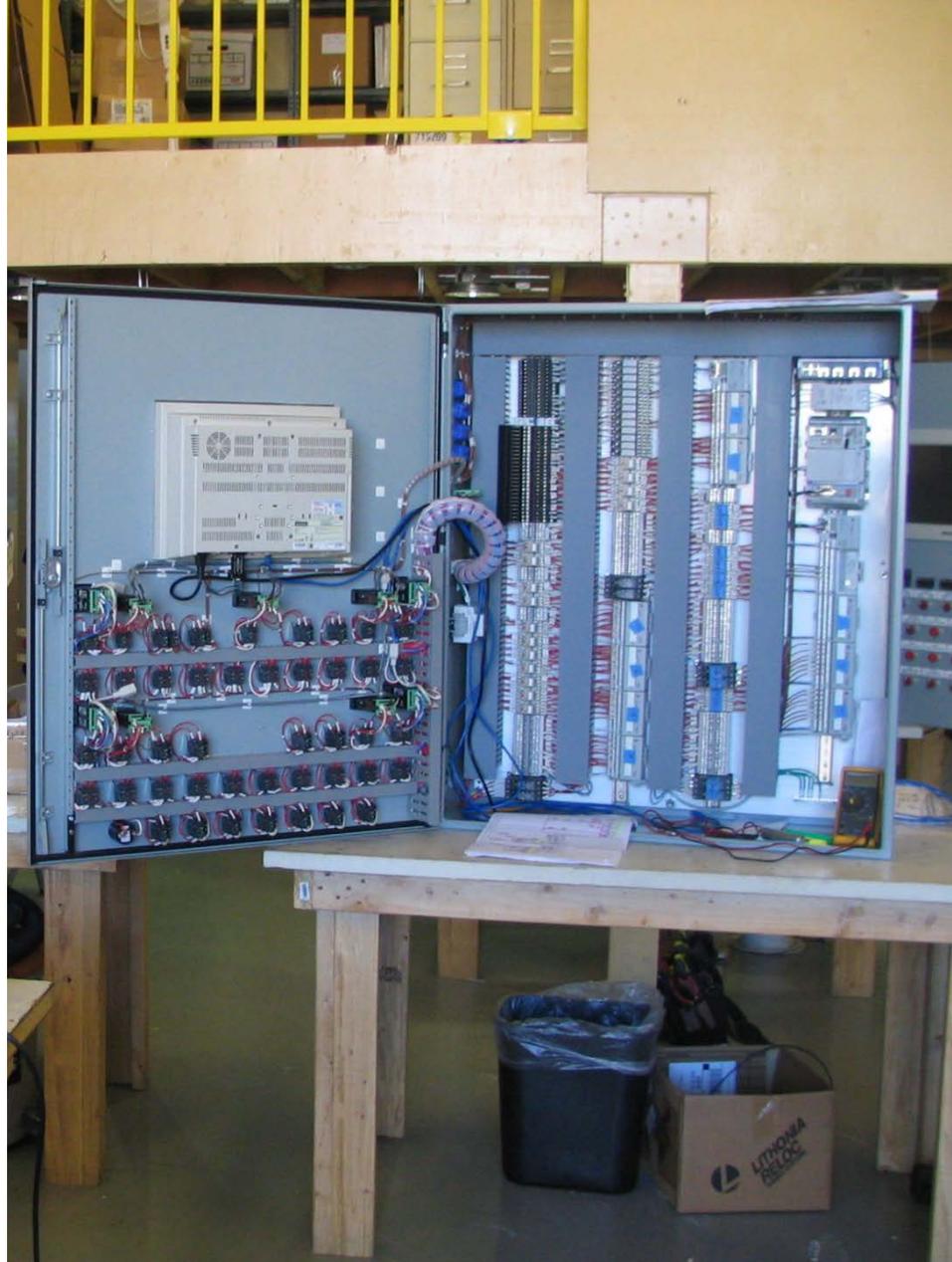
Completed the piping



Gutted the old Chamber Room



1. Installed the Rebuilt Chambers
2. Installed New Flooring
3. Installed Vacuum Jacketed Piping
4. Installed New Cable Trays



Built and Installed New Control Cabinets for each Chamber



Spreading out the Chambers and Performing a Lean 6 Ω Event



Power Distribution Tree



Original Chamber



Rebuilt Chamber

Lessons Learned

- Constant, accurate, and open communications between all parties is especially important when working with an outside general contractor and multiple subcontractors. Miscommunication is truly the root of most bad circumstances and issues.
- Overlapping schedules for construction and the testing of flight hardware, requires constant coordination meetings at all levels to ensure a successful outcome.
- Not all 10/100 Base-T Ethernet controllers are the same; the units that were used in our design presented several communications issues that took many iterations to resolve, and the reset button on the beta units we received wore out in a few months.
- Purchase the software license outright and provide it to the contractor instead of allowing them to use a developmental version. Doing so, will save time and reduce frustration from notification screens that pop up during testing and training.
- The development of a detailed “acceptance test procedure” and stepping through each of the chamber operations and functions one at a time was paramount to the final verification. And the ATP facilitated preparation of Standard Operating Procedures which JPL requires for certifying chambers.
- Incorporating manual switches to allow bypassing the HMI computer has been invaluable for keeping the chamber running when an HMI computer locks up or fails.

The success of this project can be attributed to so many people that it would not be reasonable to list everyone's name; the many people that worked to help realize the success of this project know who they are and are to be congratulated for their contribution to this highly successful accomplishment.