



# Memorandum

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**To:** Band 6 Cartridge and B3/6 OMT Groups

**cc:** Bill Shillue      Bob Treacy      Christophe Jacques

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**Date:** 2008-05-07

**Revs:** 1.0    2008-05-07    jee    Initial

**Subject:** Temperature Stability in Photonics' Lab Liebert Air Conditioning System

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To help specify the type of air conditioning system required for the Mixer, Cartridge, and OMT test lab, we measured the performance of the Liebert Air Conditioning System installed the Photonics Lab, which consists of the following:

LIEBERT CHALLENGER/3000 PRECISION ENVIRONMENTAL SYSTEM,  
Model: #BF036E-AAE1, NOMINAL 3 TON, DOWN FLOW CONFIGURATION.

Using Liebert's [documentation](#) to decode the model number (found in P2P under PO 302529) this air-cooled unit is powered with 460V/60Hz/3Ø, and includes an "Advanced Microprocessor", electric reheat, and infrared humidifier.

The microprocessor changes compressor efficiency and compressor fan speed to maintain a more constant cooling capacity than conventional compressor-based heat/cooling systems. The electric reheat option further stabilizes the temperature range, especially when the system calls for dehumidification but the temperature is already at the set-point. Although the LO group's air conditioner uses an on-off reheat system, Liebert has available for this unit a "SCR" reheat option that is claimed to provide finer temperature control by proportionally controlling the heaters.

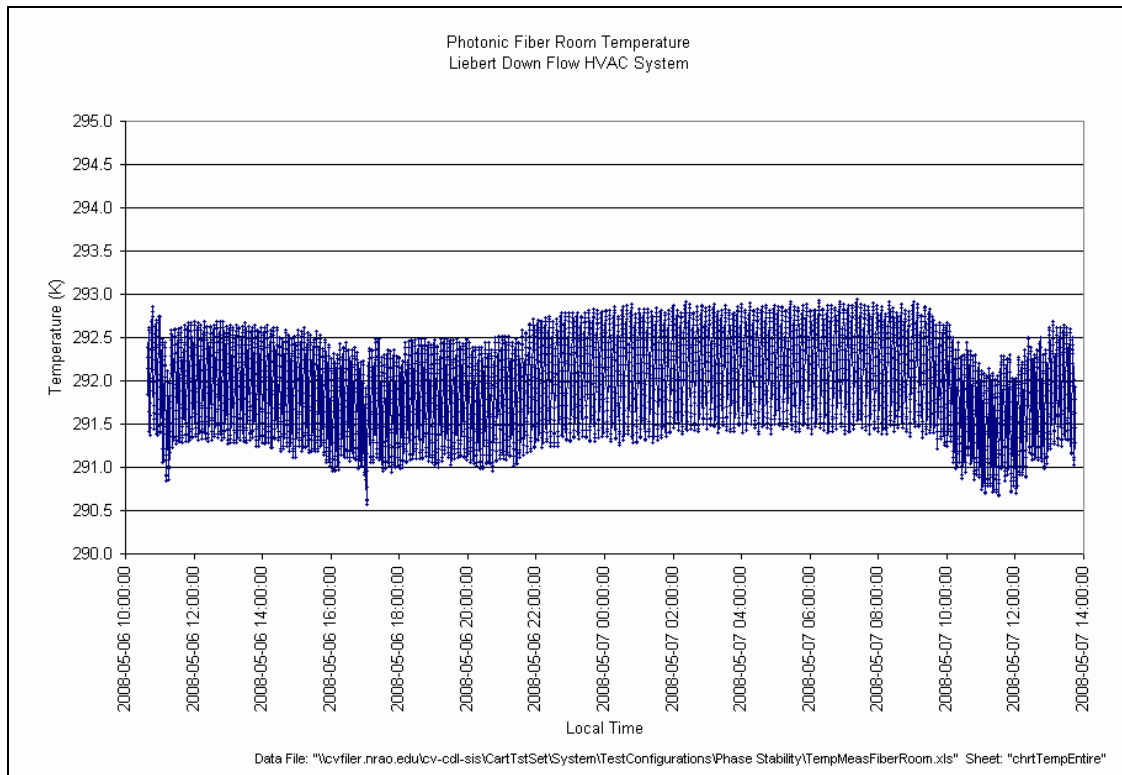
We measured the temperature control of this unit by placing a temperature sensor connected to a LakeShore 216 Temperature Meter under the floor in the supply plenum of the LO Photonics lab. The LO Photonics lab is lightly loaded at this point, and spikes in the data occur only during working hours and might result from the lab door opening. [Figure 1](#) shows that temperature is maintained to about  $\pm 0.75^\circ\text{C}$ .

To further reduce the short-term temperature fluxuations ([Figure 2](#)), we recommend including the SCR reheat option for our test lab air conditioning system, if possible<sup>1</sup>. However, it's likely that cartridge phase drift measured with the existing hardware will continue to be worst than specs, even with the new air conditioning system, because the current set up requires the room temperature to be stable to about  $\pm 0.3^\circ\text{C}$ .

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<sup>1</sup> The manual claims SCR reheat is available only for certain supply voltages.

**Figure 1: Temperature Graph**



**Figure 2: Expanded 2 Hr View of Temp Changes**

