OCTOBER 1, 2002

THE SOLAR MEGAPHONE

AUBURN UNIVERSITY

Hot Water System

Matt Edmondson and Brian Mcgee inspect the Fast Jack system so the Photovoltaic panels can be properly installed.

The hot water system in our home was a primary consideration in the formulation of our engineering team strategy. We began work on this part of the mechanical system in the fall of 2001. Thus, our major goal was to use the smallest amount of energy to heat water as well as transporting it to its destination. This involved three main strategies:

- Use of Flat-Plate Collectors,
- Use of Recycled Water,
- Use of a Hot-Water Only System.

The decision to make a hot-water-only system not only made our system more efficient, and capable of recycling preheated water, but also allowed us to conserve the energy collected by our thermal flat plate collectors.

View of heat exchanger used in the hot water system to transfer heat from Glycol to water.

After completing extensive evaluations of flat plate collectors available in today's marketplace, we chose two Heliodyne Gobie 408 units for our hot water heating system. This product provides the best overall efficiency by combining heat loss and heat gain parameters, thus resulting in a system that works well within our design solution.

Expansion tank that holds pressure in the water lines running from the hot water tank.

The energy collected by our Heliodyne panels is transferred to a water system via a cross flow heat exchanger. This method allows warm water to flow through highly insulated PVC pipes into our heavily insulated water storage tank.

The decision to utilize a hot-water only system was driven by contest parameters. If this home were placed for "normal" residential use, we would have included a cold-water tank and lines.

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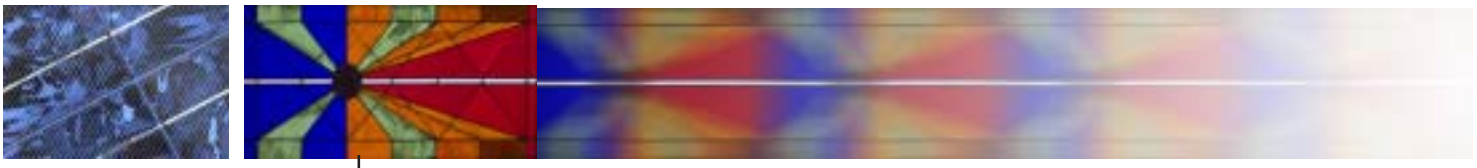

Our basic plumbing system is similar to those found in Recreation Vehicles or in rural areas where shallow wells are used for a water source. Unlike municipal systems, which deliver water to the home under pressure, these systems must rely on a pump to generate the pressure necessary to move the water throughout the home.

To keep this pump from shutting on and off constantly, an expansion tank is used to provide a pressure buffer. This tank is outfitted with a programmable logic control that allows pressure to fluctuate within range of 20 pounds per square inch before the pumps turn on.

To make the most of the energy we collect, all of the lines and tanks are heavily insulated. In addition, we made a decision to recycle some of the water in our home. This feature may be the most unique aspect of our hot water system.

Grey water will be filtered with a particulate filter. A manual value allows us to direct water to the flexible waste bladder or through a filter for recycling. This filter is adequate for competition because the water in the home will not be used for drinking. Once our home moves back to Auburn, this filter will be replaced with one that produces drinking quality water.

Our hot water system also includes a system within a system that allows us to route excess hot water to our radiant hot water system when the temperatures in the house fall below a certain level. The system uses a programmable logic control that reads air and water temperatures to determine when the system goes on and off.

Our mechanical team worked hard to design a system that captured solar energy efficiently and ensured that we made the most of this energy. So far, except for the malfunction of a pressure-release valve, and a cascade of related problems that followed, the system has exceeded expectations.

"When the air vent failed, all of us were exhausted... Patience and perseverance are old fashioned words but they meant something in this case. By staying calm and depending on one another, we got the job done."

—Drew Freeman, ME

"Sometimes a problem can illuminate a better way of doing something. The failure of our air vent caused a number of problems. In solving these problems we found a way to make the system more efficient."

—Rory Jones, ME