

COOLING WITH OPERABLE SKYLIGHTS

by Steve Baer

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We have been experimenting with a silicone rubber hinge that is bonded to a tempered glass skylight with silicone sealant (Figure 1). It allows one to make an inexpensive, operable skylight.

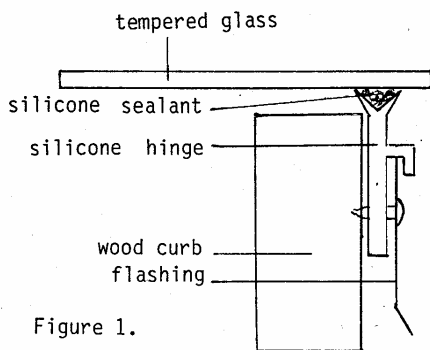


Figure 1.

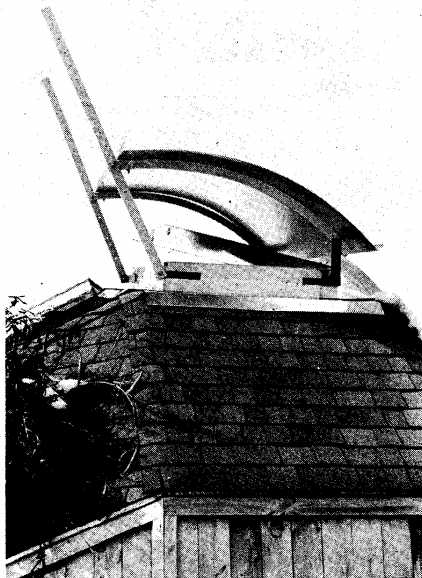


Figure 2. Open skylight protected by Sunbender reflector/shade.

I replaced four fixed skylights, each 3 feet by 5 feet, in my own house, with these opening skylights. As Figure 2 shows, our Sunbender reflector shade protects the open skylight from rain. Figure 3 shows the mechanism I use to operate the skylights.

One of the principle reasons for making the skylights operable was to learn how open skylights can contribute to space cooling.

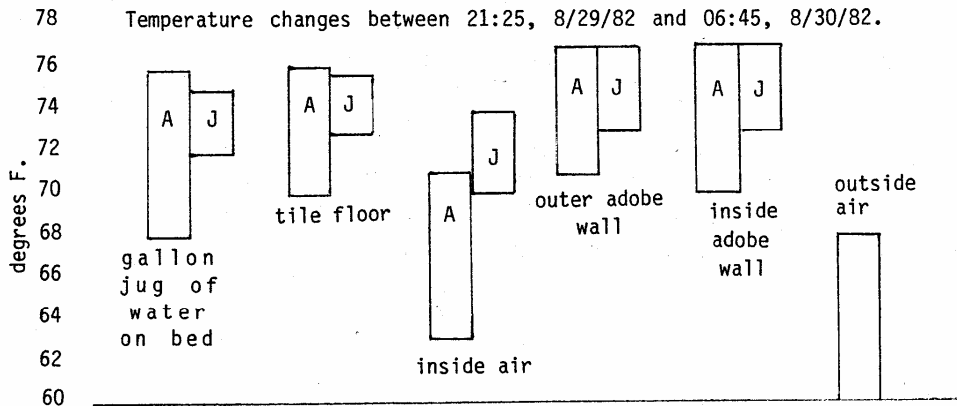
I compared the rate of heat loss of two identical bedrooms, each with 10.3 square feet of opened screened window. Bedroom A had a skylight vent opened 5.3 square feet, unscreened. Bedroom J had the skylight vent closed. Both bedrooms were isolated from each other and the rest of the house. Each bedroom is 120 square feet.

The graphs below show the large cooling effect of the open skylight. Temperatures were measured between 9:25 pm on August 29, 1982 and 6:45 am on August 30, 1982 in Corrales, New Mexico. Readings were made in identical 120 square foot bedrooms with slab floor, adobe walls and exterior R-15 insulation.

Temperatures of the inside adobe surface, outside adobe surface, inside air, outside air, tile floor, and a gallon jug of water standing



Figure 3. A simple skylight latch.



on the bed were measured in each room. In all cases, temperatures in Room A, with the open skylight, were significantly lower over the course of the overnight test period.

These findings are significant in that they point to the great potential for passive nighttime cooling in the Southwestern climate. Particularly in massive structures

with exterior insulation, nighttime cooling through open skylights can bring radiant and air temperatures down to a comfortable level during sleeping hours. With proper shading and ventilation, and the tempering effect of massive building components, this "coolth" can be maintained indoors, throughout even the hottest summer days.