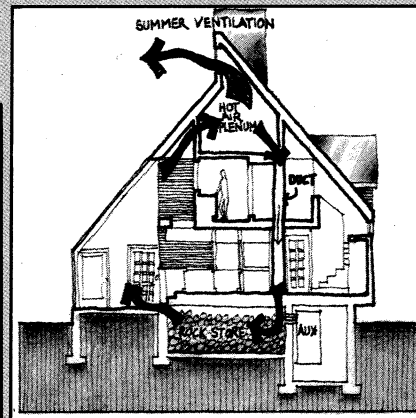


A Probe of Passive Performance

Glass and lightly stained cedar interplay in the handsome geometry of the southern facade of the Langley house designed and built by the Bourgeois-Moran team. The brick mass wall in the sunspace provides a decorative boundary for the kitchen workspace (inset). Warmed air collected from the greenhouse in the upper plenum is ducted to the remote rockbed, which boosts the forced-hot-air auxiliary furnace (above). In the summer, clerestory glazing is opened for whole-house venting.



Barbara Putnam

plenum above and rockbed below, the kitchen area would be the most consistently heated space. The adjoining, two-story sunspace would function as both eating nook and circulation zone, therefore requiring few furnishings that might shade the direct-gain mass. At the cost of losing a measure of thermal efficiency, the solar collection area was included as primary living space. R-9 night insulation was planned to minimize heat losses.

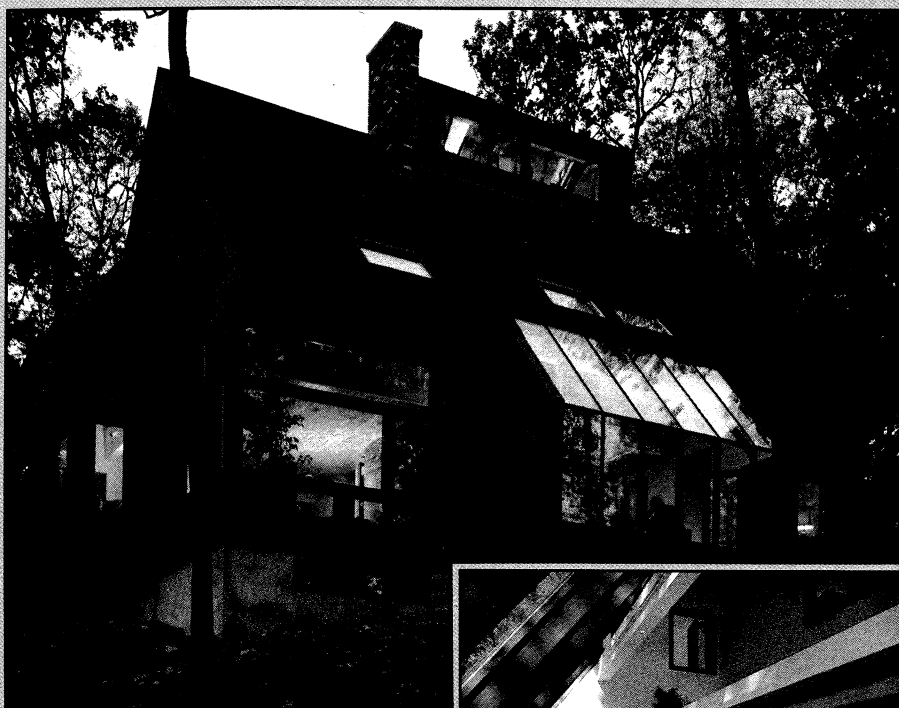
The Langley's are also a musical family. For occasional performances with family and friends, the expansive living room, opened up with west-facing glass, adjoins a raised music area. The platform serves nicely as an informal stage. Two teenage daughters needed smaller private spaces. The girls ended up with compact but exciting two-story bedrooms with large sleeping lofts.

All the rooms that face south can be opened to the sunny core. Operable doors and windows are opened or closed as passive heating or cooling is required. For primary space heating, the Langleys, who each work and are soon to be empty-nesters, wanted a flexible program that would deliver high-grade heat to peripheral rooms quickly, and only as needed. A passive-hybrid, forced hot-air system was chosen for its simplicity and economy.

The environmentally attuned design team placed the garage to the northwest as a wind buffer with the driveway to the south for solar-assisted snow removal. Similarly, a woodbin to the east of the entry is exposed to the south to help keep the wood dry. Judiciously placed plantings and a sparing use of glass keep the northern facade relatively enclosed for minimal heat loss.

Hybrid Heating

Choosing ducts, fans, and dampers over pipes, pumps, and valves, the Bourgeois-Moran design team, together with consulting



Randolph Foulds

By Steve Bliss

Many passive solar homes surpass the thermal performance goals set by their designers. This success is often the result of careful management and low indoor temperatures, or conservative calculations to begin with. In too many homes, though, great performance comes only at the expense of good design, or worse—the homes demand a heavy sacrifice of comfort from the occupants.

Few such compromises were made in the architecturally ambitious Langley home, where careful consideration of living patterns and site issues remained a major concern throughout the project. In addition to the usual siting and layout requirements of passive solar design, views to all directions were to be preserved, the solar collection space was also to serve as living space, and the heating program was to be flexible—providing heat only when and where it was needed. Architecturally, this house in western Massachusetts is an unqualified success; the owners treasure their home. Yet the thermal performance has not been encouraging. A close examination of the project suggests why performance goals have not been met and what steps might be taken to



correct the problems.

As is the case with good custom homes—solar and non-solar alike—the initial design grew out of hours of conversation between the owners and the architect, probing their “philosophy of living” and feelings about the particular setting. Ken and Joan Langley and their teenage children were swept up in the design process. In their words, “we really got hooked on the idea of building when (we) suddenly realized how much the house would really be ours.”

The plan has primary living spaces cantilevered over the south-sloping landscape toward mountain views and summer-shading deciduous trees. As cooking is a central activity of the Langley family, a large sunspace/kitchen area was designed as the spatial and thermal focus of the home. With a hot-air

Steve Bliss is an associate editor at Solar Age.