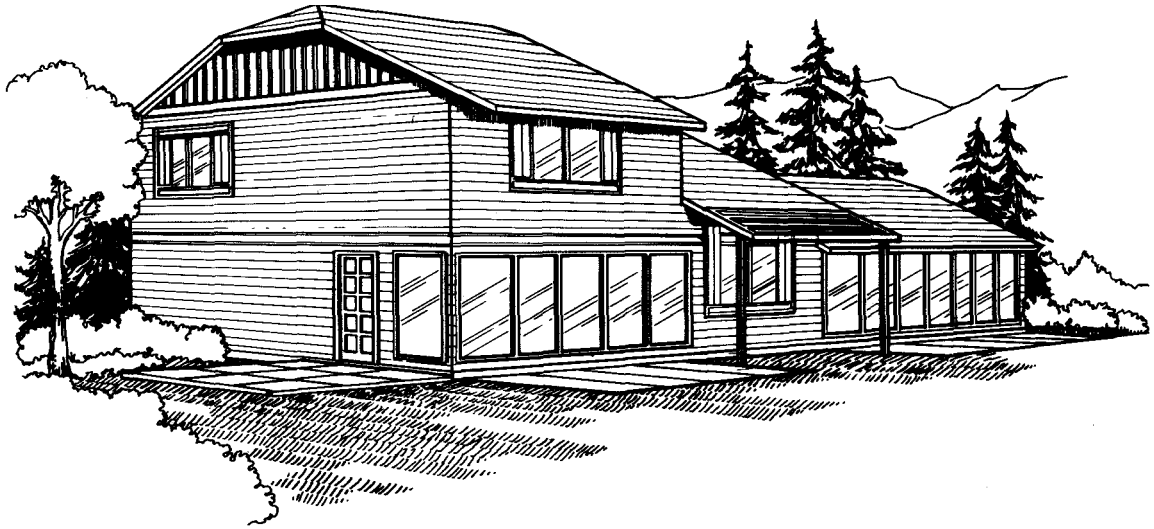
Eugene, OR



Builder: Trans Western Investors, Inc., Eugene, OR

Designer: Trans Western Investors, Inc.

Solar Designer: Trans Western Investors, Inc.

Price: $86,000

Net Heated Area: 1498 ft²

Heat Load: 46.5 x 10⁶ BTU/yr

Degree Days: 4726

Solar Fraction: 57%

Auxiliary Heat: 2.83 BTU/DD/ft²

Passive Heating System(s): Direct gain, isolated gain, sun-tempering

Recognition Factors: Collector(s): South-facing glazing, skylight, 265 ft² **Absorber(s):** Concrete and tile floor, block mass wall, water wall surface, brick hearth, concrete wall **Storage:** Concrete and tile floor, block mass wall, water wall, brick hearth, concrete wall—**capacity:** 13,500 BTU/°F **Distribution:** Radiation, natural and forced convection **Controls:** Registers, shutters, awning, dampers

Back-up: Air-to-air heat pump, wood stove

Domestic Hot Water: Passive 40-gallon preheat

This compact, 2-story home in Eugene, Oregon includes a combination of passive solar space and water heating systems in a design that has demonstrated market acceptance. Energy-conservation features include landscaping that protects the house from winter winds, closets located along the north wall to reduce heat loss, air-lock entries, and insulated glass windows.

In one passive heating system, an insulated solar heat storage room is located in the rear of the garage. Heat is **collected** through the south-facing glass wall of this narrow room; the rear wall is surfaced with reflective MyiarTm to enhance collection. Solar heat is **absorbed** and **stored** in a 2tiered bank of water-filled 55-gallon drums which then **distribute** heat to the room by radiation. If temperatures in the storage room are high enough and the house needs heat, a differential thermostat in the storage room opens a motorized damper, and heated air rises to the upper level of the house through an insulated duct. When the fan in the air-handling unit for the back-up heat pump station is operating, solar heat from the storage room is **distributed** throughout the house via the heat pump ductwork. Cool air is returned to the heat storage room through a low register in the livi ng room wall.

In the other passive heating system, solar heat is **collected** through south-facing windows and a skylight in the 2-story living room, and through south and west windows in a greenhouse. Masonry walls and tile floors **absorb** and **store** solar radiation. In the evening as the house gets cooler, the storage walls and floor **distribute** solar heat into the greenhouse, the living room, the adjacent stairwell, and the dining room by radiant flow. Heat accumulating near the greenhouse ceiling passes through a grille into the master bedroom right above. High and low supply registers in the masonry walls allow air to flow between the living room and greenhouse, and between the living room and stairwell.

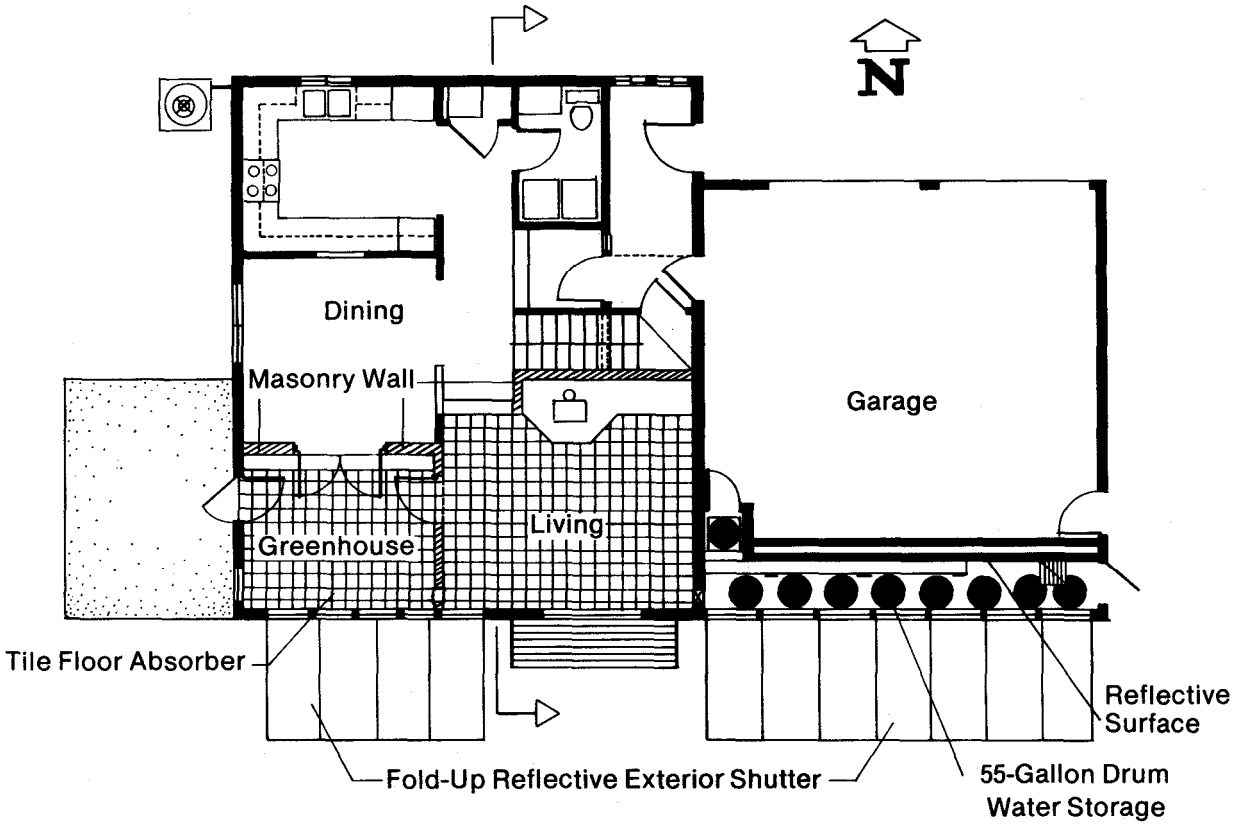
Heat from the living room and greenhouse can also be returned to the air-handler and distribution system through a return duct in the upper-level powder room. A destratification duct conveys heated air accumulating near the second-story ceiling back to the first story.

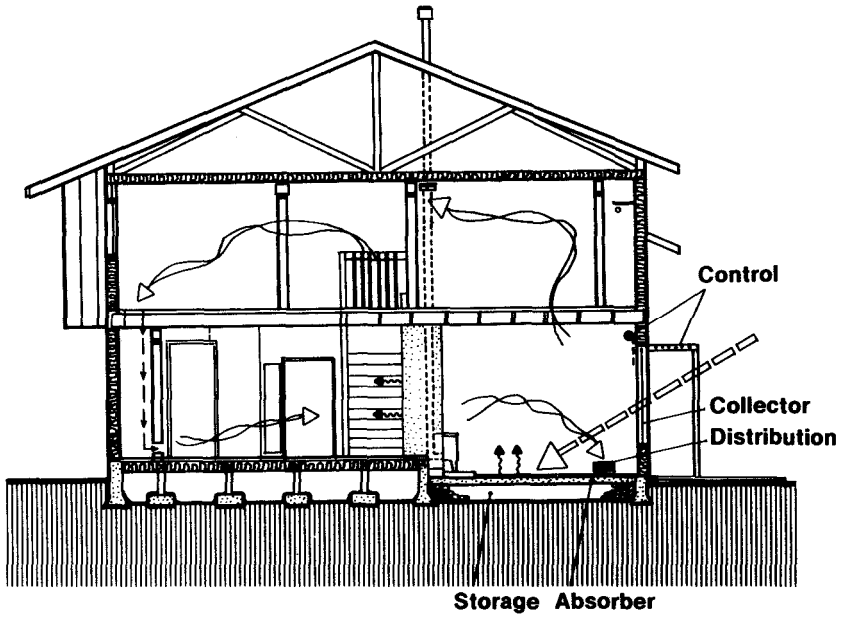
All three bedrooms receive limited amounts of direct sunlight, but none of them have storage mass.

The south-facing collection area is shuttered at night to **control** heat loss: Pease ™ roll shutters are manually closed over windows in the living room and master bedroom; the heat storage room and greenhouse each have an automatic exterior shutter with reflectivesurfaces that, when the shutter is open, enhance solar collection. These shutters are **controlled** by adjustable photocells and operated by electric garage door openers.

In the summer, south-facing glazing in the heat storage room, greenhouse, and master bedroom can be shuttered during the day to reduce solar gain and the fold-down shutter on the greenhouse is converted to an awning. Cooling the house is accomplished by opening the skylight and the windows, which induces cross-ventilation. In the cooling season, the heat storage room is isolated from the house by closing the damper in the supply vent; this room can be ventilated by opening the eastfacing door.

A preheat tank and the upper tier of water-filled drums in the heat storage room constitute a passive preheat system for domestic water. City water pressure forces water through the preheat components and into the domestic water heater.





This plan is from the book
“Passive Solar Homes – 91 new award-winning, energy-conserving single-family homes”,
The U.S. Department of Housing and Urban Development, **1982**

The solar homes designs in this book were the winners of HUD’s fifth (and final) cycle of demonstration solar homes. The 91 winning home plans in the book were selected from 550 applications from builders.

This was a time of great interest and activity in the passive solar home designs – many of the winning homes show a level of innovation not found in most of today’s passive solar designs.