

# Walden, CO

**Builder:** Habitat Design and Construction Company, Walden, CO

**Designer:** Passive Solar Home Design Co., Denver, CO

**Solar Designer:** Passive Solar Home Design Co.

**Price:** \$75,000

**Net Heated Area:** 1660 ft<sup>2</sup>

**Heat Load:** 168.3 x 10<sup>6</sup> BTU/yr

**Degree Days:** 10,426

**Solar Fraction:** 36%

**Auxiliary Heat:** 6.20 BTU/DD/ft<sup>2</sup>

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

**Recognition Factors: Collector(s):** Greenhouse glazing, south-facing glass doors, 295 ft<sup>2</sup>

**Absorber(s):** Brick floor and wall, concrete wall, clay-tiled floor, water-filled benches

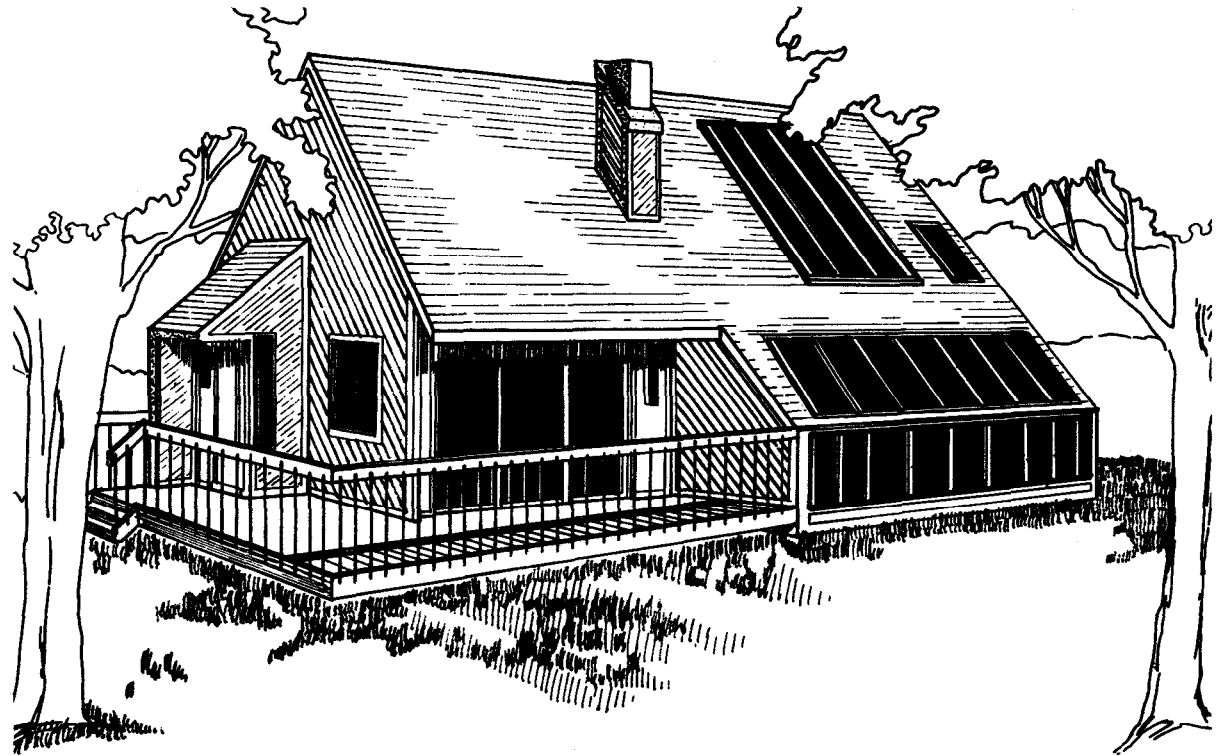
**Storage:** Brick floor and wall, concrete wall, clay-tiled floor, water-filled benches—**capacity:** 10,547 BTU/°F

**Distribution:** Radiation, natural and forced convection  
**Controls:** Thermostat, ducts, vents, louvers, shades

**Back-up:** Gas boiler (100,000 BTU/H)

**Domestic Hot Water:** Liquid flat-plate collectors (70 ft<sup>2</sup>), 82-gallon storage

**Passive Cooling Type:** Convection



This 3-bedroom design has an attached greenhouse and a study loft opening onto a 2-story living room. The design includes extensive energy-conservation features dictated by the 10,000 degree day climate. The house is compact, with air-lock vestibules and closets along the north walls. Use of weather-stripping, high R-value insulation in walls and roof, and triple glazing on nonsouth windows reduces heat loss and infiltration. Double-glazed south windows are fitted with Window-Quilt insulating drapes.

Solar heat that is **collected** through greenhouse windows is **absorbed** and **stored** in the concrete wall separating the greenhouse and kitchen. Solar radiation passes through the greenhouse and then through the French doors into the dining room, where it strikes brick flooring that **absorbs**

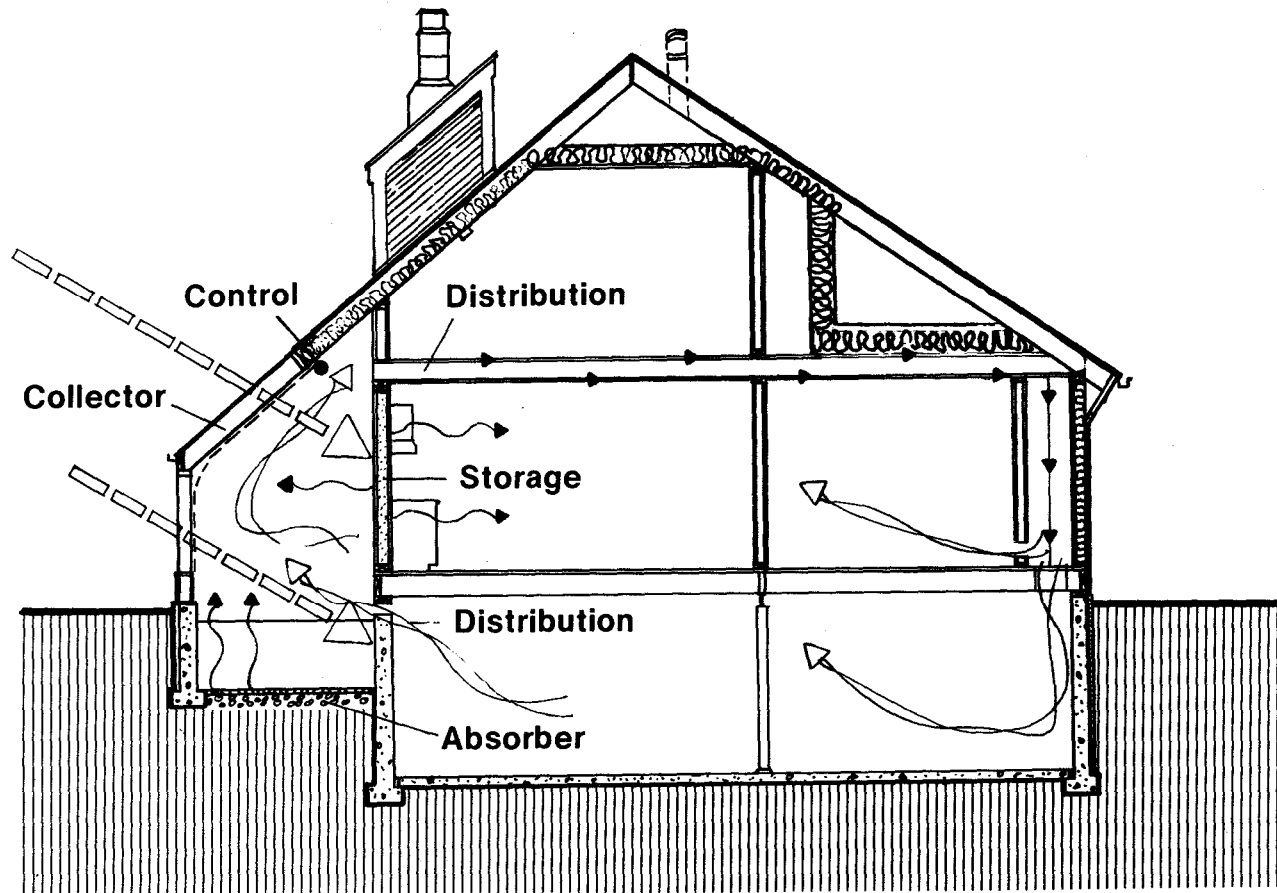
and **stores** it for radiant **distribution** at night.

Greenhouse heat can be **distributed** to northern bedrooms with a fan assist. When the temperature in the greenhouse reaches a pre-set point, a sensor-control unit high on the wall activates a variable-speed fan that forces heated air to the north side of the house, through a duct in the loft floor joists. An attic duct then carries heat into the bedrooms and basement. Cool air is returned to the greenhouse through a basement vent. Nighttime heat losses in the greenhouse are **controlled** by the quilted insulating shades.

In the living room, solar heat **collected** through south-facing glass doors is **absorbed** and **stored** in the clay-tiled floor,

the brick-faced walls, and two water-filled benches. At night, stored heat is **distributed** radiantly and accumulates near the ceiling of the loft. A thermostat **controls** a recirculating fan which pushes hot loft air back down to the living room floor.

During the summer days, the greenhouse is protected from overheating by a seasonally installed louver and by reflecting shades. Greenhouse ventilation is provided by turbine vent and a photovoltaic ceil-controlled exhaust fan. The loft is vented directly through a roof turbine vent and an operable skylight. Natural cross-ventilation is adequate for cooling in this mountain climate where heat is often required in July.



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.

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