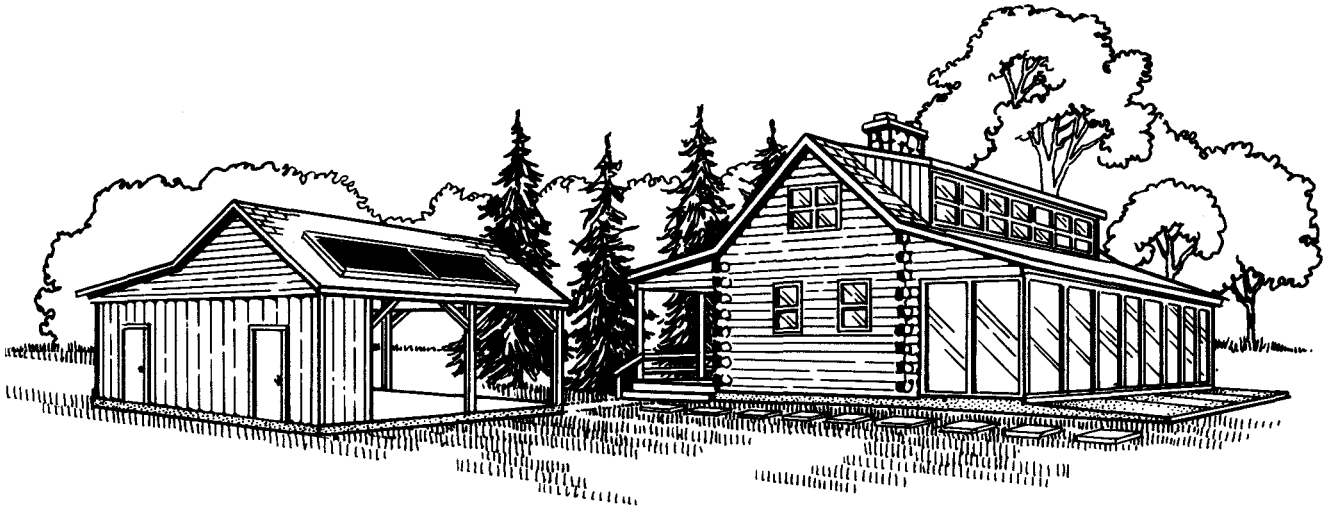
Winchester, VA



Builder: Solar Design Studio & Assoc., Winchester, VA

Designer: New England Log Homes, Inc., Hamden, CT

Solar Designer: Solar Design Studio & Assoc., Winchester, VA

Price: $97,000

Net Heated Area: 1920 ft²

Heat Load: 55.9 x 10⁶ BTU/yr

Degree Days: 4305

Solar Fraction: 68%

Auxiliary Heat: 2.25 BTU/DD/ft²

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

Recognition Factors: Collector(s): South-facing dormer windows, double glazed acrylic panels, 369 ft² **Absorber(s):** Concrete slab floor, fiberglass water tanks **Storage:** Concrete slab floor, water in fiberglass tanks—**capacity:** 14,510 BTU/°F **Distribution:** Radiation, natural and forced convection **Controls:** Vents, ducts, dampers, insulated shades

Back-up: Air-to-air heat exchanger, electric resistance baseboard heaters, woodburning stove

Domestic Hot Water: Liquid flat-plate collector (63 ft²) used for DHW and hot-tub heating

This updated log house combines the traditional qualities of a log cabin-snug in winter, cool in summer-with passive solar components to meet the demands of climate in Virginia's northern Shenandoah Valley. The compact farmhouse design is in keeping with other rustic but high-priced houses on 5-acre lots in a rural development north of Winchester.

In the case of this house, the south-facing back porch has been transformed into a solar **collector** by enclosing all three of its sides in double-walled acrylic glazing. The south glazing is fixed except for a center sliding door; the east and west sides can be dismantled in summer to provide cross-ventilation.

Energy is **absorbed** and **stored** in the 6-inch concrete slab floor of the porch and in eight fiberglass water tanks, each 2 feet by 8 feet by 12 1/2 inches, set along the south log wall of the house.

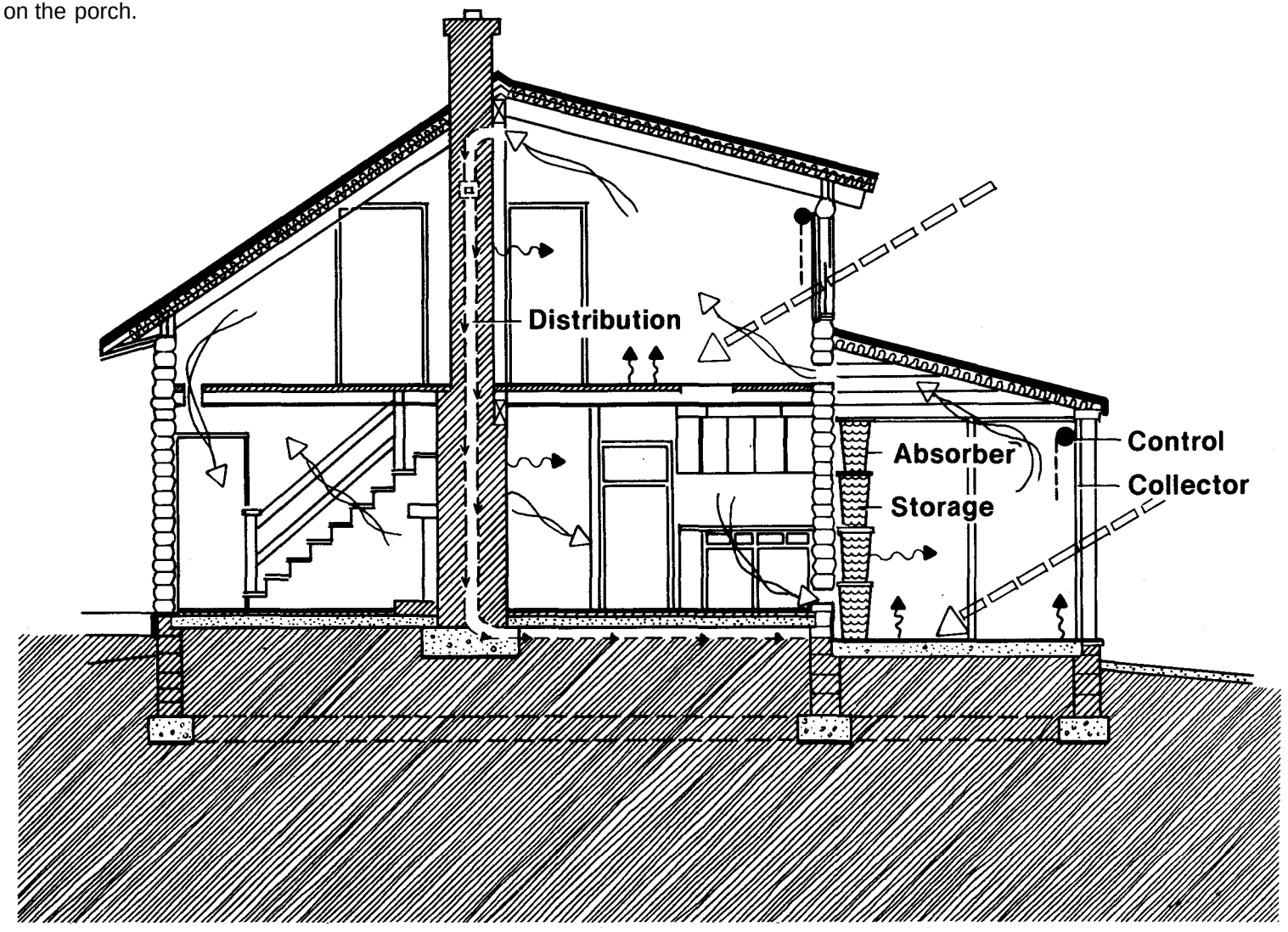
The second-floor southern exposure has a row of seven conventional dormer windows under a 1-foot-wide overhang.

Heat stored in the water tanks is **distributed** by natural convection, rising through a row of warm air vents at the top of the porch wall into the upstairs bedrooms. Excess heat is returned through a vent at the peak of the roof and pulled down a chimney duct by a destratification fan. The forced-air return duct continues under the living area slab floor and returns to the greenhouse/ porch. At the base of the south wall of the house is a row of return air vents with backdraft dampers that allow a natural convecting flow to occur through the greenhouse. A dual directional damper at floor level at the base of the chimney duct diverts warm air from the second-floor ridge directly to the first-floor living areas at times when no heat is stored in the greenhouse.

Window quilts on all inside windows (R-5) and adjustable insulating shades (R-8) on the greenhouse glazing **control** heat loss in winter and heat buildup in summer. Roof insulation is R-36. Between all logs, two layers of rope caulk, two layers of foam gasket, and a hardboard spline minimize infiltration.

Back-up heat comes from electric base-board heaters and a woodburning kitchen range that sits back to back with a fireplace with adjustable outside air intake, glass doors, and an air-to-air firebox heat ex-changer.

An active solar collector on the south roof of the carport heats domestic hot water and is also used for a hot tub on the porch.



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 ofHUD'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.