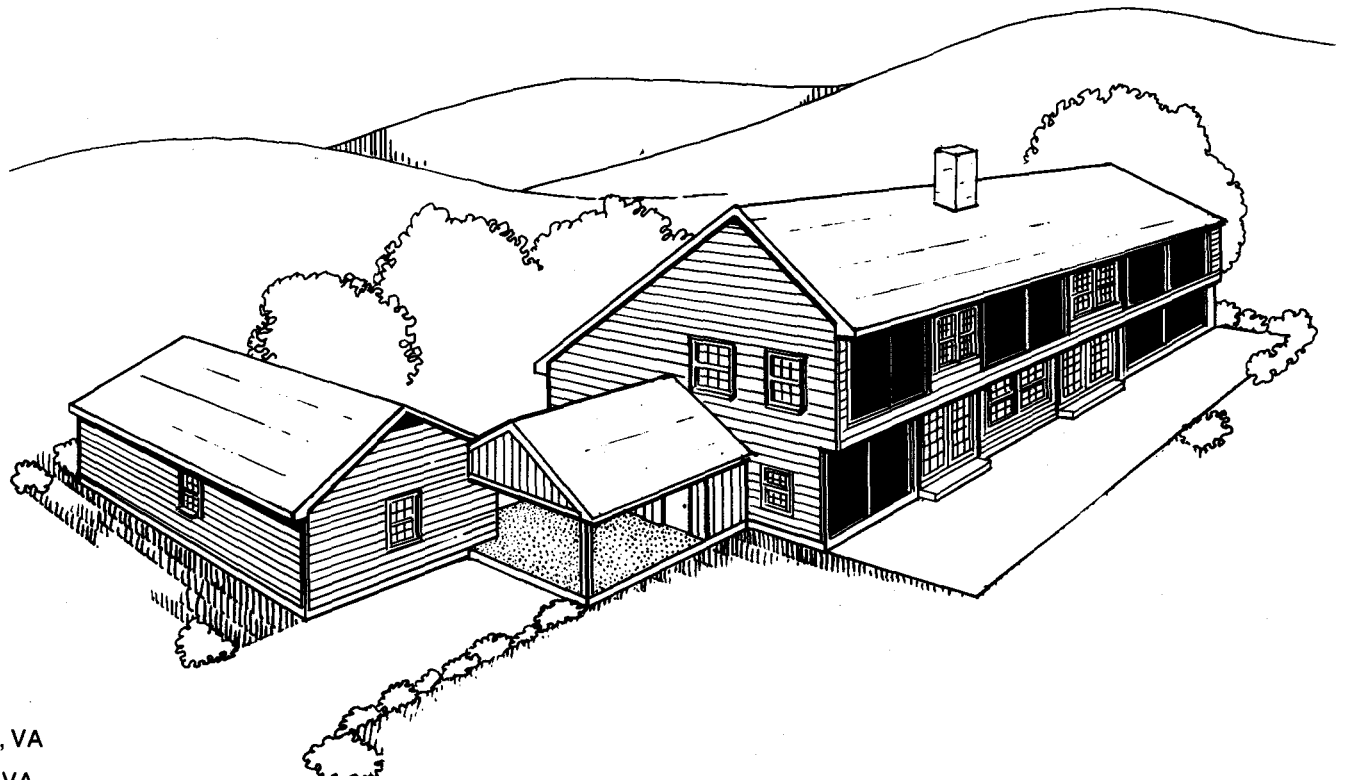


Winchester, VA



Builder: Hinman Homes, Inc., Stephens City, VA

Designer: Crawford Hinman, Stephens City, VA

Solar Designer: One Design, Inc., Winchester, VA

Price: \$130,000

Net Heated Area: 2035 ft²

Heat Load: 45.3 x 10⁶ BTU/yr

Degree Days: 4224

Solar Fraction: 76%

Auxiliary Heat: 1.29 BTU/DD/ft²

Passive Heating System(s): Direct gain, indirect gain

Recognition Factors: **Collector(s):** South-facing windows, acrylic panels, 402 ft² **Absorber(s):** Surface of fiberglass water tanks, brick wall **Storage:** Brick wall, water in fiberglass tanks—**capacity:** 18,835 BTU/°F **Distribution:** Radiation, natural convection **Controls:** Moveable insulating shades, window quilts, overhang, vents

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

Domestic Hot Water: DHW preheat system

Passive Cooling Type: Natural and night ventilation

This passive solar house is a contemporary adaptation of a New England saltbox. Its innovative southern elevation of glass does not face the street. From the north with its prim center hall entrance, the house looks completely traditional with typical carriage lamps, small paned windows with shutters, and lintel moulding. The house is on a ridge of a heavily wooded, 2-acre lot outside of Winchester, Virginia, in a development where traditional homes are popular and tastes are conservative.

Garage, breezeway, evergreens, and heavy woods to the northwest protect against winter winds. The advantage of the ridge site, however, is its exposure to summer breezes and good drainage to cut down problems of indoor humidity.

The primary solar collectors are five floor-to-ceiling acrylic panels on the south side,

three upstairs and two down. Two French doors on the ground floor and double-hung windows on both floors, all double glazed, also act as collectors. All of these windows are standard "six-over-six," small pane sash structure that match the conventional windows on the east, west, and lower north sides. On these three elevations windows are triple glazed.

Owing to the deep saltbox dip of the roof, there are no upstairs windows to the north. Under these eaves, there are closets, bathrooms, and storage areas that act as buffers for the rest of the rooms.

Much of the collected solar energy is absorbed by modular fiberglass water tanks snapped together in five stacks of four tanks each. They stand behind the acrylic glazing at a distance of about 6 inches. Each tank has a capacity of 14.7 cubic feet and measures 94 x 12 x 22.5 inches.

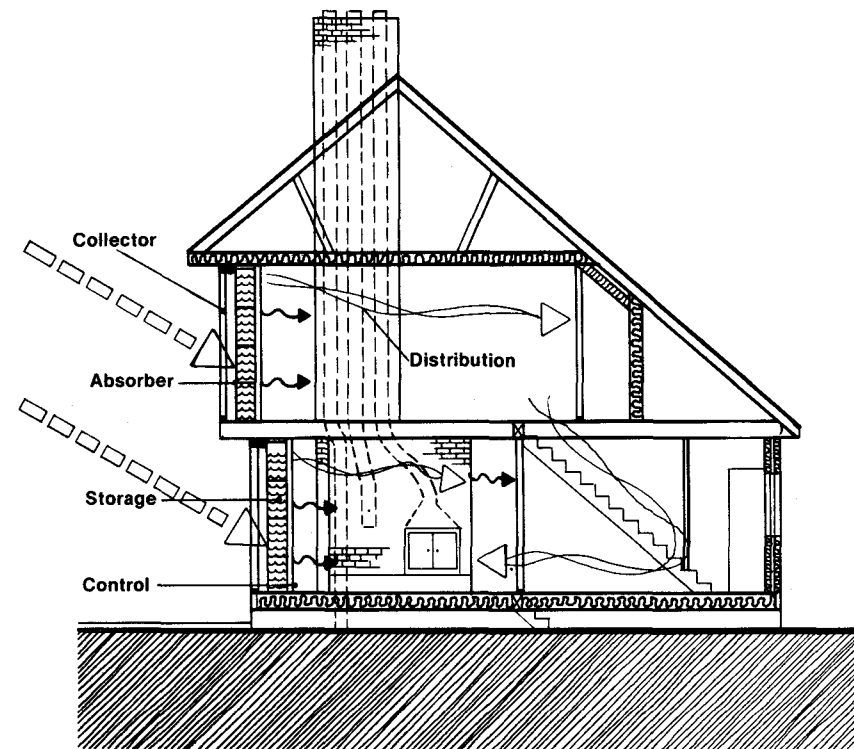
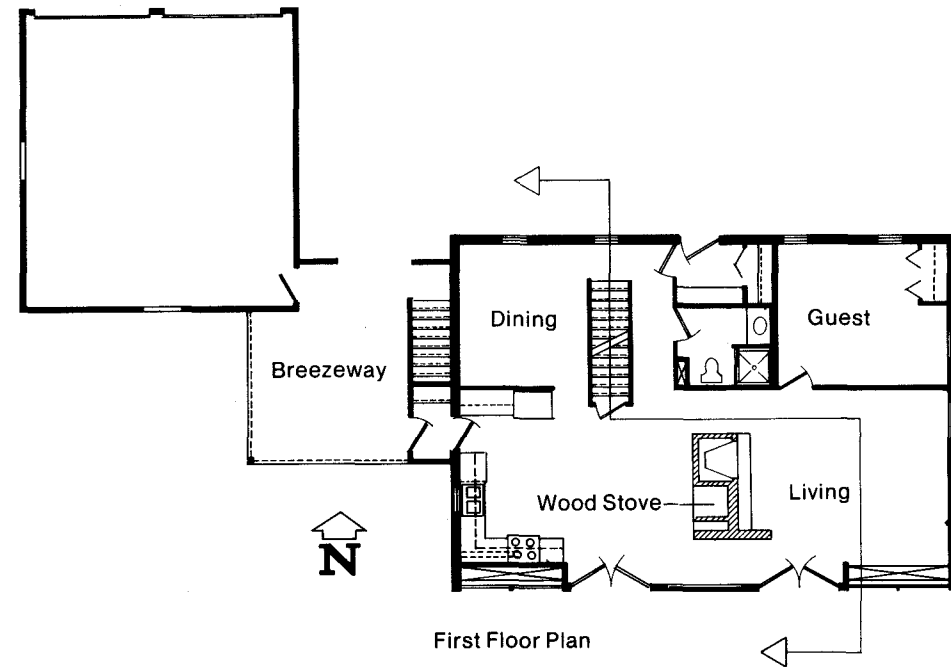
Direct solar radiation to the living space, however, is **absorbed** and **stored** in a dark brick wall that forms the central core of the ground floor plan. Its "5" shape frames the woodburning kitchen range and the fireplace and chimney in the living room.

Distribution of heat is by radiation and natural convection. The water walls provide radiant heat at night when bifolding doors, closed in the daytime primarily to conceal the tanks, are opened to allow heat to radiate into the living room and three upstairs bedrooms. Heat from the water wall behind the kitchen is circulated via the toe space and cabinet soffit.

Heat loss is **controlled** by moveable insulating shades on the water wall glazing and window quilts (R-3) on all windows and doors. These shades and quilts are raised and lowered according to the time of day and the fluctuations of weather.

Cooling during the summer is by natural ventilation. Contributing to the efficiency of the system is an overhang, 1 foot 8 inches deep, which surrounds the house and shades all windows from summer sun. Continuous ridge and soffit vents will release attic heat.

The builder has paid close attention to energy-conserving features, with an emphasis on sealing and caulking. Front and side entrances have insulated air-lock vestibules. Waste heat from the refrigerator is used to preheat the domestic hot water.



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.

www.BuildItSolar.com

