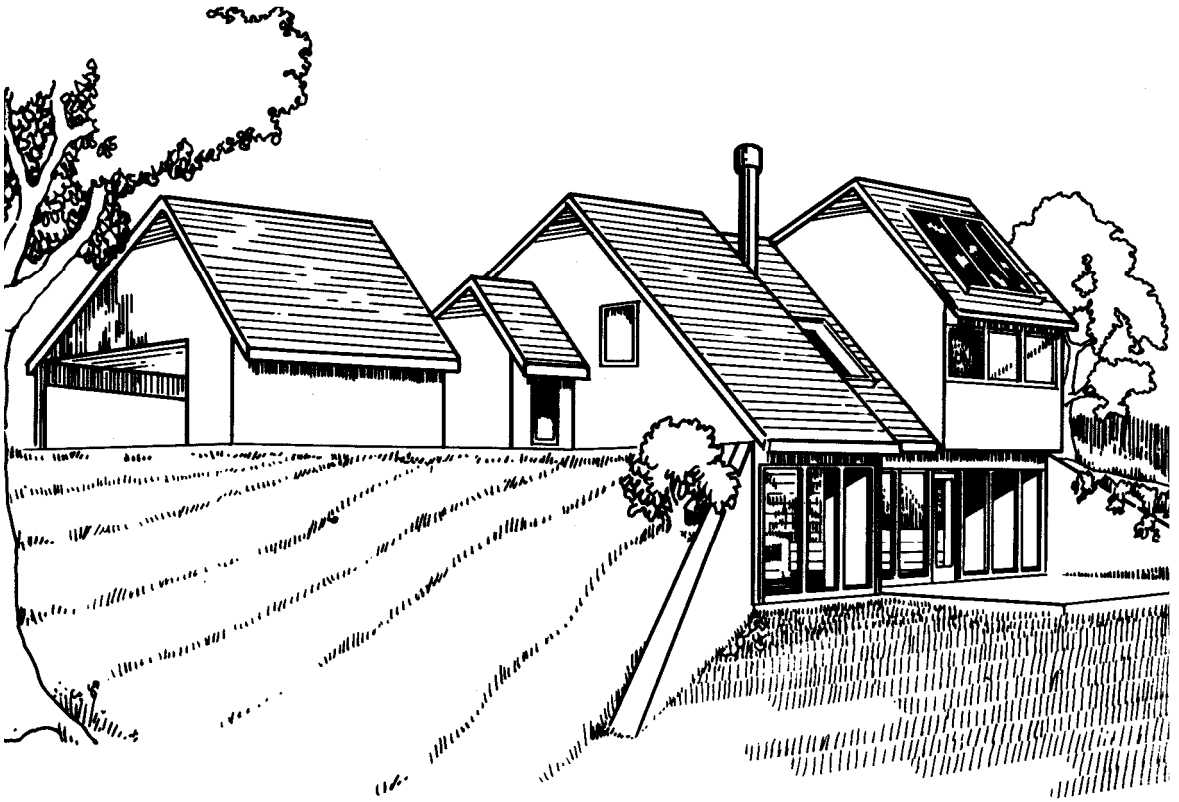
Winston, OR



Builder: James L. Richey, Jr., Building Contractor, Winston, OR

Designer: Sunwood Building and Design, Roseburg, OR

Solar Designer: Sunwood Building and Design

Price: $75,000

Net Heated Area: 1652 ft²

Heat Load: 70.6 x 10⁶ BTU/yr

Degree Days: 4496

Solar Fraction: 30%

Auxiliary Heat: 6.69 BTU/DD/ft²

Passive Heating System(s): Direct gain

Recognition Factors: Collector(s): Double-glazed windows, 246 ft²**Absorber(s):** Concrete floor, mass walls, brick tile floor **Storage:**Concrete floor, concrete block walls—**capacity:** 17,183 BTU/°F **Distribution:** Radiation, natural and forced convection **Controls:** Window shutters, thermostat, overhang, moveable insulation

Back-up: Electric furnace, wood stove

Domestic Hot Water: Active solar closed loop

The Cape Cod home has great appeal to buyers, and this example of that popular style has been successfully modified to include a passive solar energy system. This system is simple and reliable. Sunlight is collected through double-glazed windows on the home's south-facing walls and through skylights on the south-facing roof. A total of 246 square feet of openings is used for solar collection.

The sun's energy is absorbed by the brick tile floor surface and the surface of a concrete block wall that is located inside the home. Heat from the absorber surfaces is carried through the brick tiles into the concrete floor slab and also into the concrete block wall to be stored. The concrete blocks are covered with concrete in order to increase their storage capacity.

Heat stored in the mass of the floor and walls is distributed as it radiates to the living space when the indoor air temperature goes down. A 1/4-horsepower blower in the ducting system draws heat from the ridge of the home and redistributes it to the rest of the living space. When the heat storage mass gives up all its heat to the living space, a differential thermostat turns on the back-up electric furnace which distributes heat throughout the duct system. There is also a wood stove.

When the sun sets, the homeowner covers the skylights with wood shutters that are filled with rigid insulation; insulating curtains are lowered over the south-facing windows. These moveable devices control heat loss.

The home has been built so that conversion to a heat pump back-up system could be made easily. The electric furnace is designed to accept a heat pump coil, and all compressor pipes have been installed.

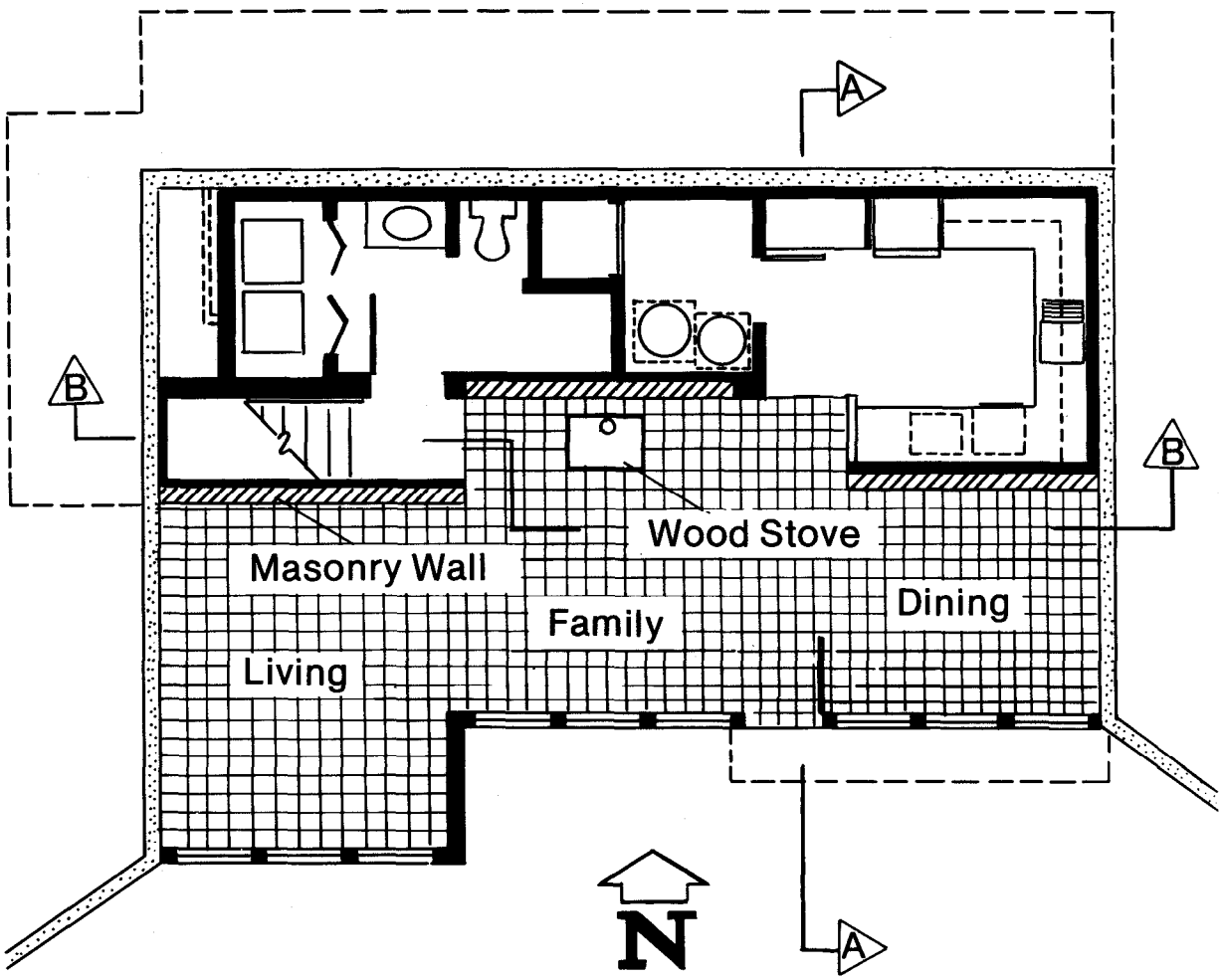
In order to prevent heating the house in the summertime, the skylights are covered by insulated shutters during the daytime, and the shades on the windows are adjusted to keep out direct sunlight. During summer nights, the skylight shutters are opened and the shades are folded up. This allows interior heat to radiate out.

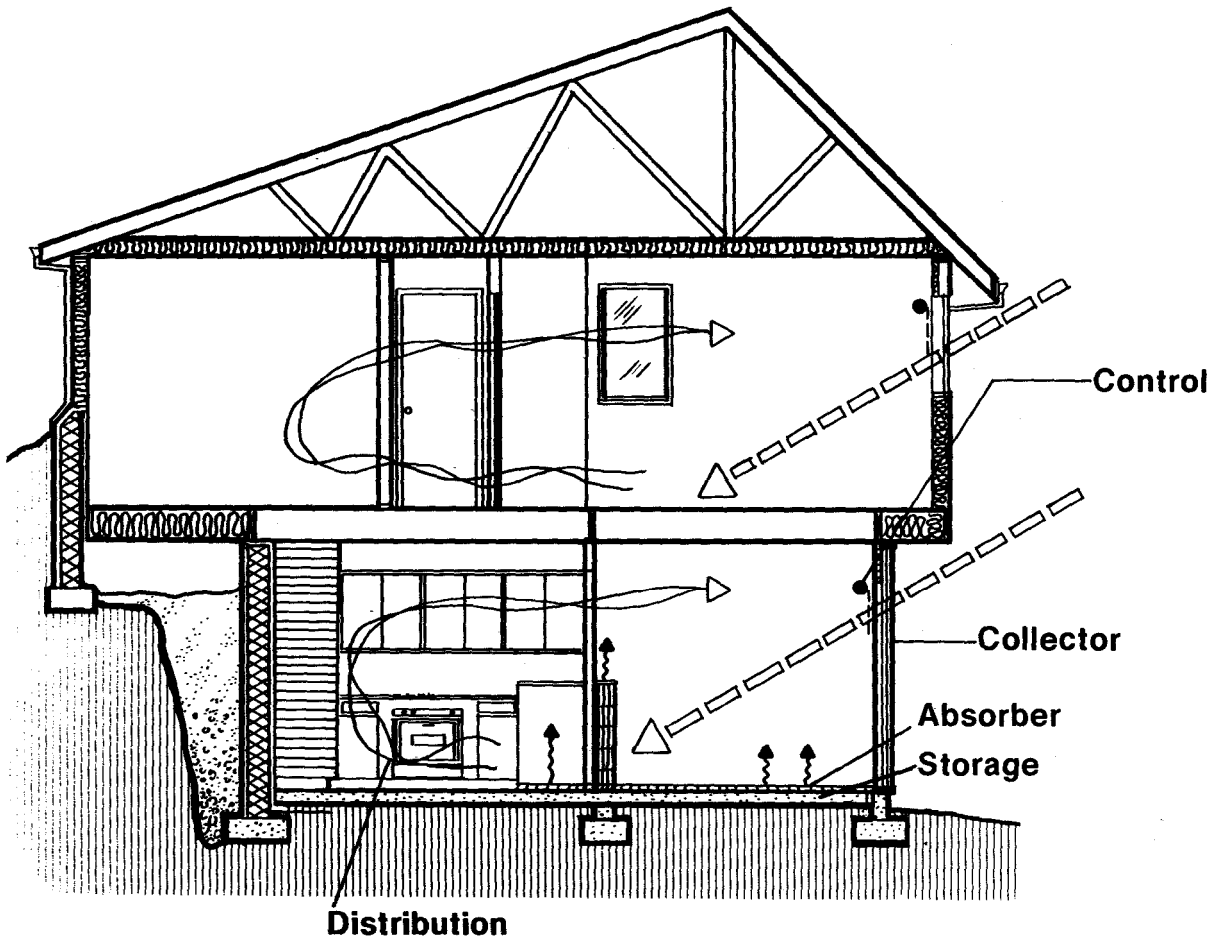
Overhangs shade the windows from the high summer sun. Openings on the north and south side of the home allow cross-ventilation. An exhaust fan at the home's upper level can be used to help create cooling drafts.

Most of the domestic hot water is preheated by the sun. The south-facing roof supports three active solar collectors. A solution of water and antifreeze is pumped through the collectors to a double-walled heat exchanger in the storage tank and then back to the collector. In the heat exchanger, the antifreeze transfers its heat to a supply of potable water. This preheated water then supplies a conventional electric domestic hot water tank.

Many details of the design make the home energy conserving. Most of the lower floor is located below grade and is also partially earth-bermed. This moderates the temperature extremes by surrounding the living space on the lower floor with the constant temperature of earth below the frost line. Windows and doors are weather-stripped.

All exterior walls are insulated to at least R19. The roof is insulated to R-30. All windows can be covered with moveable insulation at night. Storage, utility, and bathrooms are located on the north wall to shield the living space. The concrete slab and perimeter are insulated with 2-inch rigid foam.





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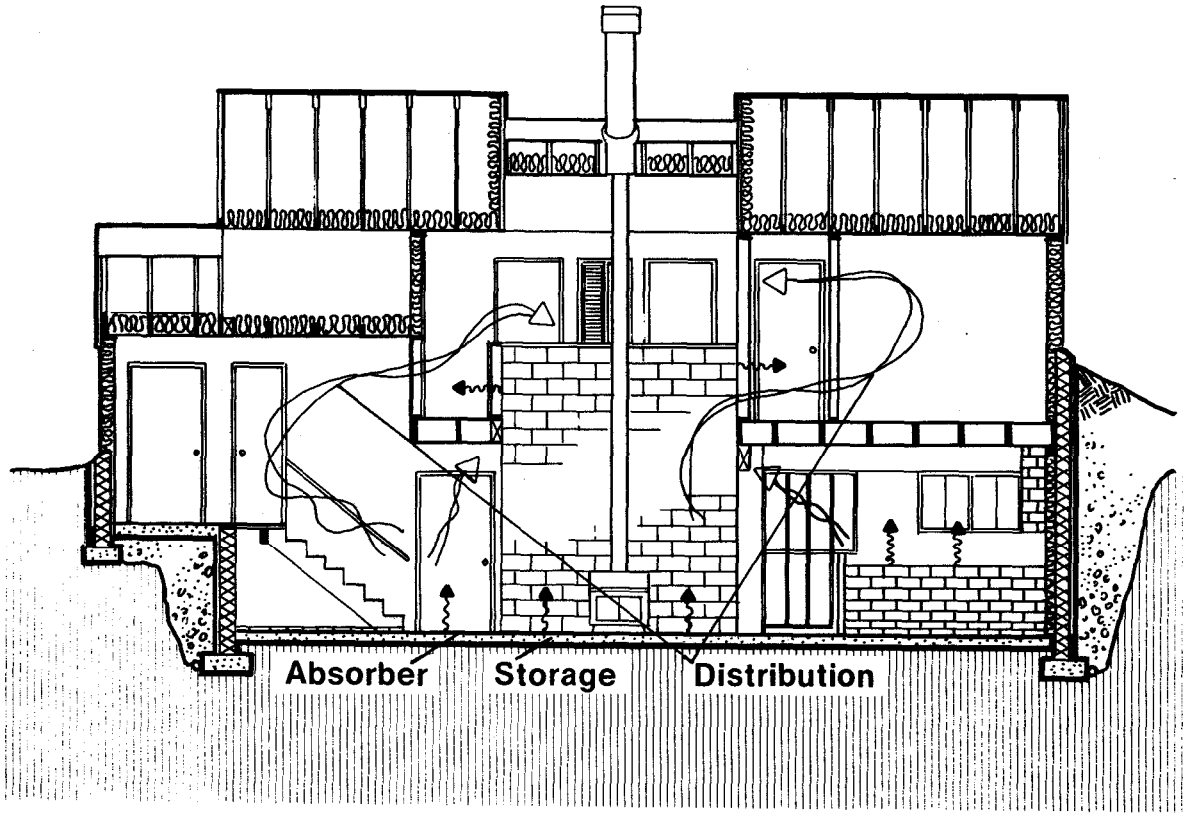

B-B

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