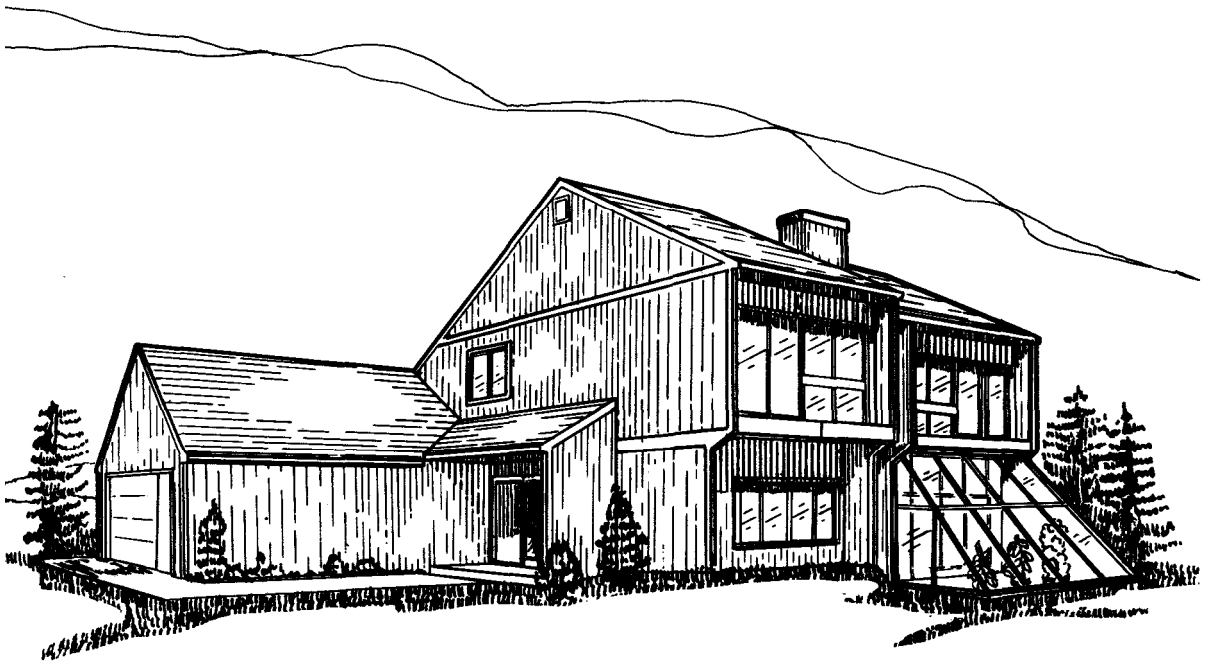
Kent, OH



Builder: Huth Westwood Builders, Akron, OH

Designer: Environmental Design Alternatives, Kent, OH

Solar Designer: Environmental Design Alternatives

Price: $130,000

Net Heated Area: 2158 ft²

Heat Load: 76.2 x 10^6 BTU/yr

Degree Days: 6037

Solar Fraction: 46%

Auxiliary Heat: 3.14 BTU/DD/ft²

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

Recognition Factors: Collector(s): Single- and double-glazed windows and doors, 423 ft² **Absorber(s):** Water tubes, ceramic tile floor **Storage:** Water tubes and mass floors—**capacity:** 16,345 BTU/°F **Distribution:** Radiation, natural and forced convection **Controls:** Insulating shutters, fixed and retractable overhangs

Back-up: Woodburning stove, gas heat

This modern 3-bedroom home features a double-glazed solar greenhouse that **collects** solar radiation. Sheltered inside the greenhouse is a single-glazed **collection** area that admits sunlight directly into the family room. This combination of passive collection modes allows immediate heating of the family room as soon as the sun shines, while the greenhouse provides a buffer and heat storage zone that will allow for a controlled circulation of heated air into the family room.

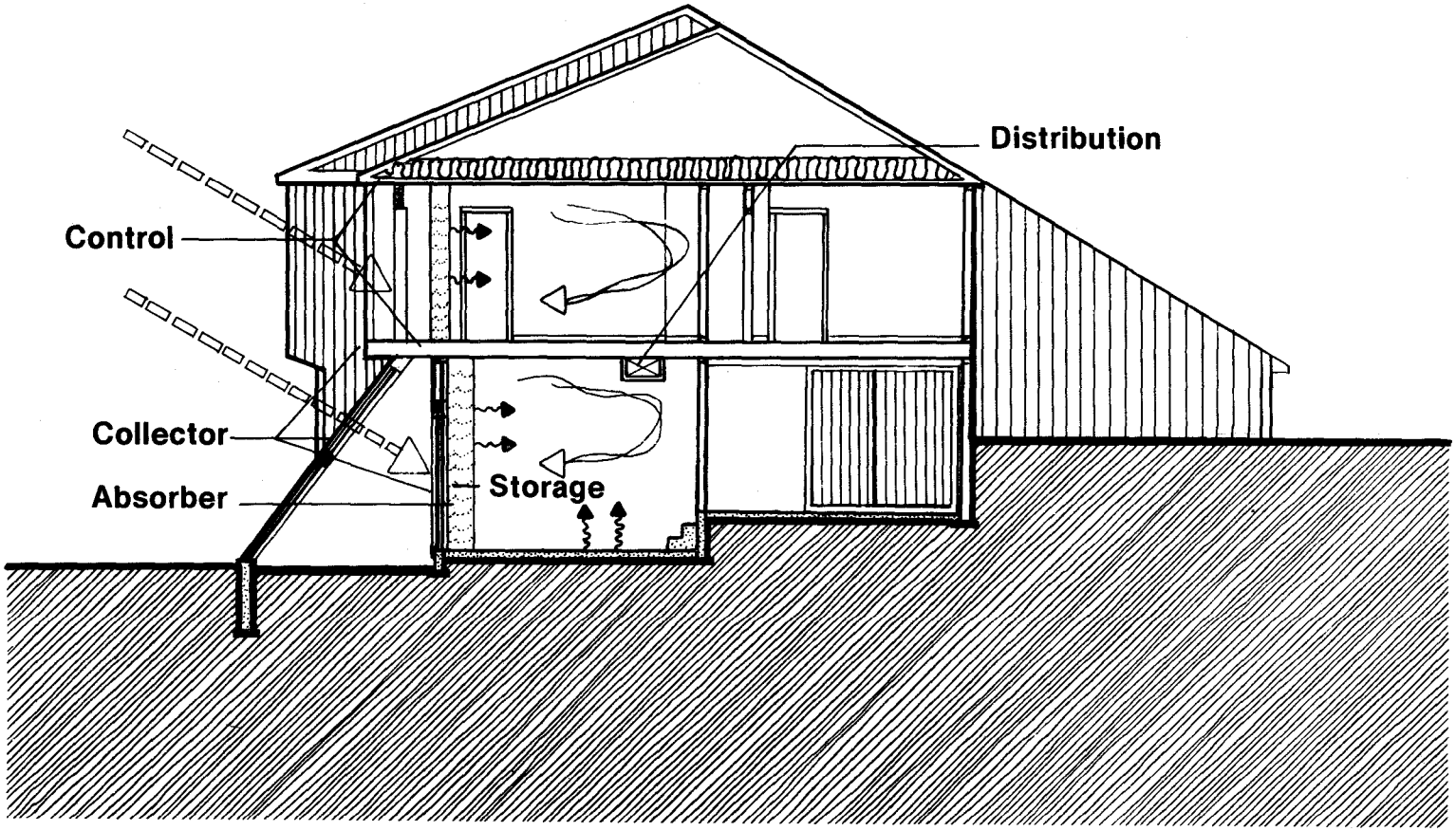
The kitchen and two upper-level bedrooms also have double-glazed apertures designed to collect solar radiation. There is also a west-facing pair of sliding glass doors admitting direct sunlight to the dining room. Just behind the collection areas, for the bedrooms and family room, there are Kalwall™ water tubes that **absorb** and **store** heat. In the dining room and kitchen ceramic tiles **absorb** for the 4-inch concrete slab **storage** floor that they cover.

Distribution of heat occurs by radiation from storage and natural convective flows, as well as by forced air distribution from the back-up furnace. Heated air from storage elements on the lower level pass to the upper level via the open staircase at the north wall, assisting in the heating of that area at night. For the most part, natural convection distributes heat within each room individually. The exceptions are the lower-level living room and upper-level bedroom in the northwest corner, which rely almost entirely on the gas furnace for heat. Back-up heat is available from a wood burning stove in the family room, and from the furnace, which has supply and return air grilles in all rooms, including the greenhouse. Heat loss is **controlled** by moveable insulating shutters on all glazed areas except the greenhouse.

Summer cooling is a matter of opening windows to create cross flows of fresh air. Upper-level collectors are shaded by fixed

roof overhangs; the lower-level collectors have moveable overhangs that are adjusted seasonally. Heat that builds up indoors is exhausted through the attic by a 2-speed, manually operated fan in the ceiling of the upper-level hallway.

Interior temperature stability is maintained with the help of partial earth berming on all walls, and winter wind infiltration has been reduced by using the garage as an air-lock entryway. Insulation in the walls is 3-inch urethane foam and in the roof 12 inches of poured cellulose.



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