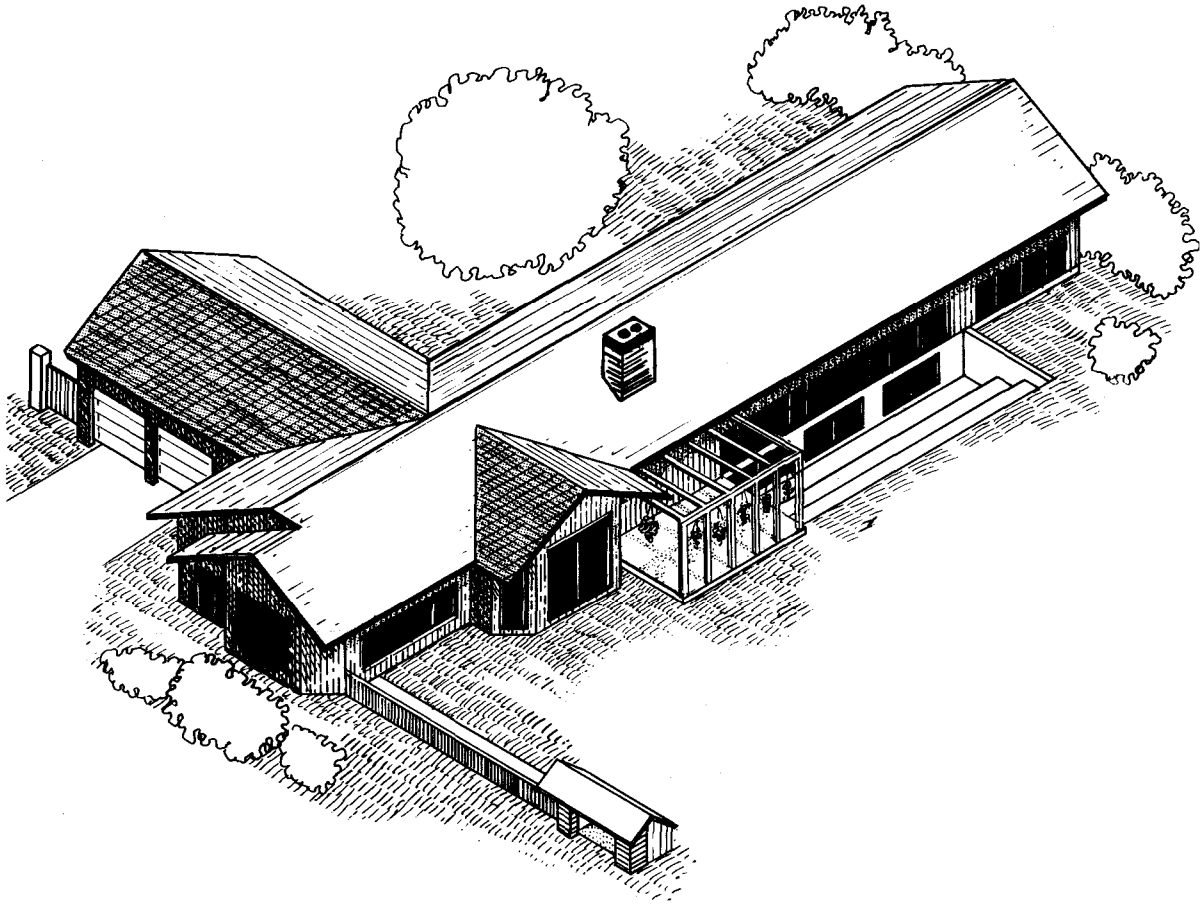
Sedgwick County, KS



Builder: John M. Roberts, Wichita, KS

Designer: Allen and Mahone, Watertown, MA

Solar Designer: Allen and Mahone

Price: $132,000

Net Heated Area: 3411 ft²

Heat Load: 98.9 x 10⁶ BTU/yr

Degree Days: 4620

Solar Fraction: 63%

Auxiliary Heat: 2.33 BTU/DD/ft²

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

Recognition Factors: Collector(s): South-facing glass, 469 ft² **Absorber(s):** Darkened north wall surface, ceramic tile floor **Storage:** Tile and concrete mass floor, thermal mass walls—**capacity:** 10,300 BTU/°F **Distribution:** Radiation, natural convection **Controls:** Window quilts, fixed overhang, removable louvers, canvas shade

To the casual observer, this large, simply designed home would appear to be of standard ranch-style construction. It was specifically designed to be compatible with other non-solar homes in its subdivision.

The home is located 31/2 miles east of Kansas City, an area subject to temperature extremes, with hot, humid summers and cold winters. The flat topography allows cold winter winds to penetrate from the northwest. To protect the major living spaces from these winter winds, closets and secondary spaces are located on north walls of the house. A garage on the north and a garden wall to the west act as additional buffers. There are at present no trees or shrubs on the level, 160 x 125 foot lot, which was originally part of a wheat field. Landscaping will be left to the buyer.

The home is divided into four collection/ storage/ living zones: the living/dining area, the family room, the three bedrooms, and the basement. Sunlight radiates directly into all of these except for the bedrooms. All areas have mass thermal storage walls and floors. The walls are 8-inch solid con-

crete blocks faced with plaster. The floors are 6-inch concrete slabs covered with ceramic tile.

Sunlight **collects** in the three direct gain living areas by passing through double-paned glass on the south wall. Heat is **absorbed** by the plaster on the walls and ceramic tile on the floor and is **stored** in the concrete mass of the walls and floors. Stored heat is **distributed** as it radiates from the thermal mass into the rooms; it is circulated within the rooms by natural convection.

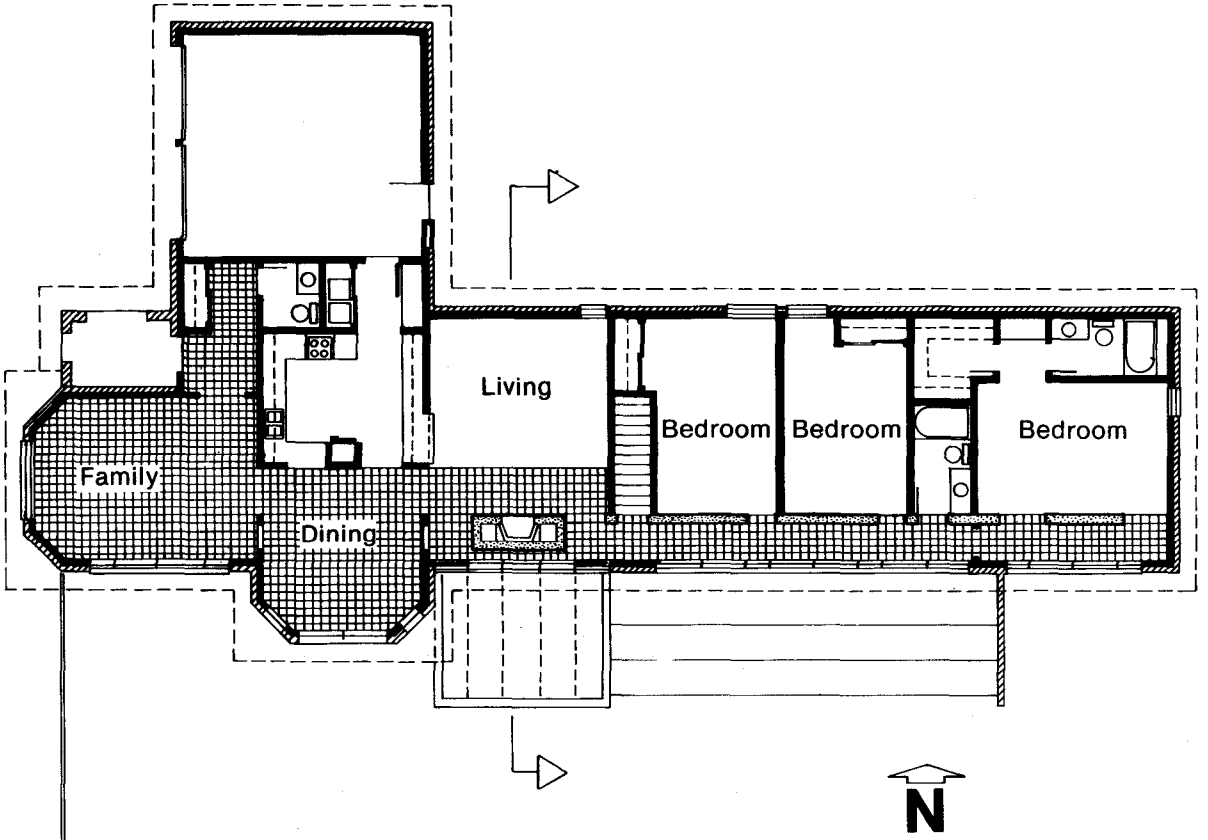
For the bedrooms, sunlight enters and is collected in the south-facing hallway where it strikes the mass wall and floor and is **absorbed** and **stored** by the masonry. Heat then radiates into the bedrooms where it is **distributed** by a convective loop. An operable **control** transom above the doors also allows heated air to circulate from the hallway to the bedrooms, but heat can also be admitted simply by opening the doors whenever privacy is not required.

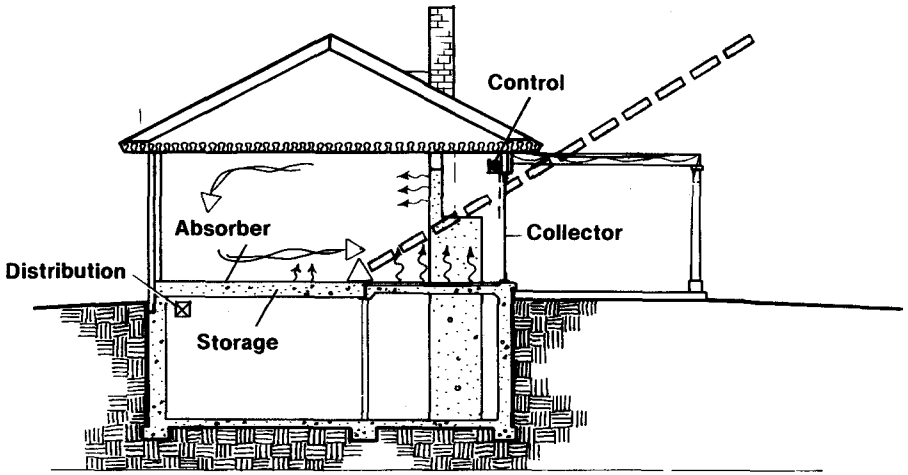
The solar system **control** requires some minimal occupant operation. Major south windows are insulated at night with Window Quilts™. These are manually operated roller shades with side tracks to reduce air leaks. They are available commercially.

In summer, heat gain is reduced through Shading of the south glass by fixed overhangs. The lower areas of the larger windows also receive shading from removable louvers; these are stored during winter months.

The trellis over the patio is fitted with manually retractable shades. This **control** feature allows the owner to shade the family room windows, preventing heat gain, or to allow the sun to enter when heating is desired.

Insulation is R-19 in the exterior walls and R-30 in the ceiling. The number of east and west windows is minimized to prevent winter heat loss. An air-lock entry is located to the southwest.





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