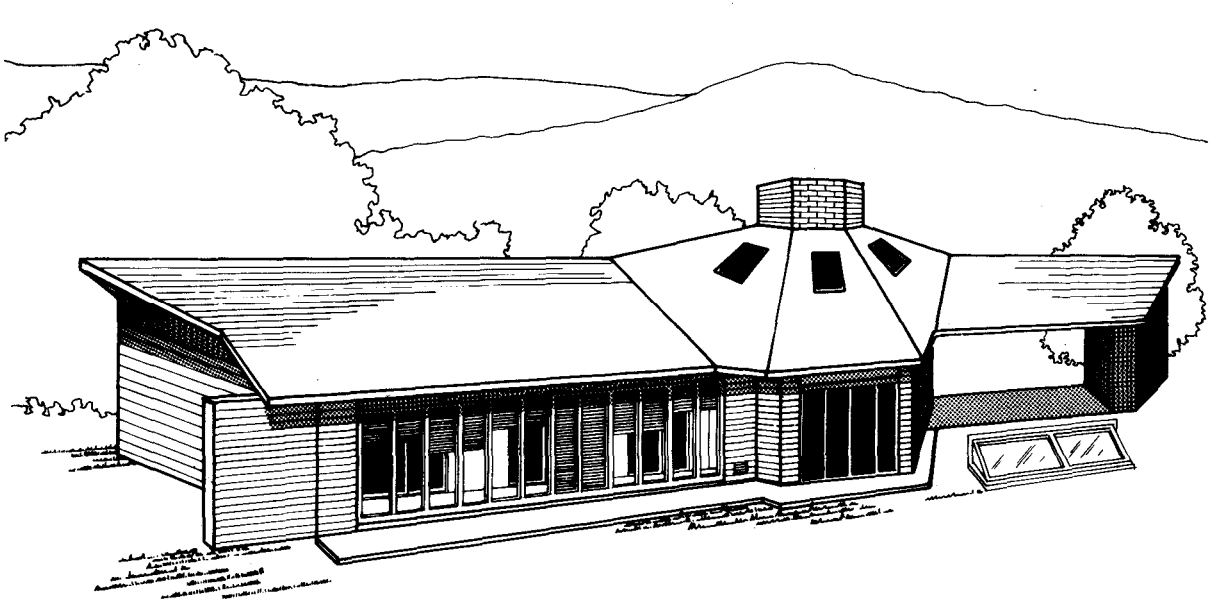
Tucson, AZ



Builder: William L. Pritchett & Son, Inc., Tucson, AZ

Designer: William Lester Pritchett & Son, Inc.

Solar Designer: William Lester Pritchett & Son, Inc.

Price: $167,000

Net Heated Area: 2632 ft²

Heat Load: 71.4 x 10⁶ BTU/yr

Degree Days: 1800

Solar Fraction: 70%

Auxiliary Heat: 4.49 BTU/DD/ft²

Passive Heating System(s): Direct gain

Recognition Factors: Collector(s): South-facing sliding glass doors, skylights, 324 ft² **Absorber(s):** Ceramic tile-covered concrete slab floor, rock chimney wall, masonry wall **Storage:** Concrete slab floor, rock chimney wall, masonry wall—**capacity:** 32,000 BTU/°F **Distribution:** Radiation, natural and forced convection **Controls:** Venetian blinds, skylight shutters, fixed overhangs

Back-up: Electric resistance heaters

Domestic Hot Water: Ground-level flat-plate collectors (26 ft²)

Passive Cooling Type: Natural and induced ventilation

This contemporary 3-bedroom home uses nine sets of sliding glass doors to collect solar radiation on its south face. Six of these, located along the bedroom corridor, are sandwiched sets of single-glazed units with venetian blinds in the air space. The other sets-one on the southeast wall of the dining room and two in the living room-are all double glazed with venetian blinds and drapes on the interior side of the units. Three skylights in the roof above the main living area also act as passive collectors. Active collection for domestic water heating is achieved by a pair of groundmounted flat-plate collectors.

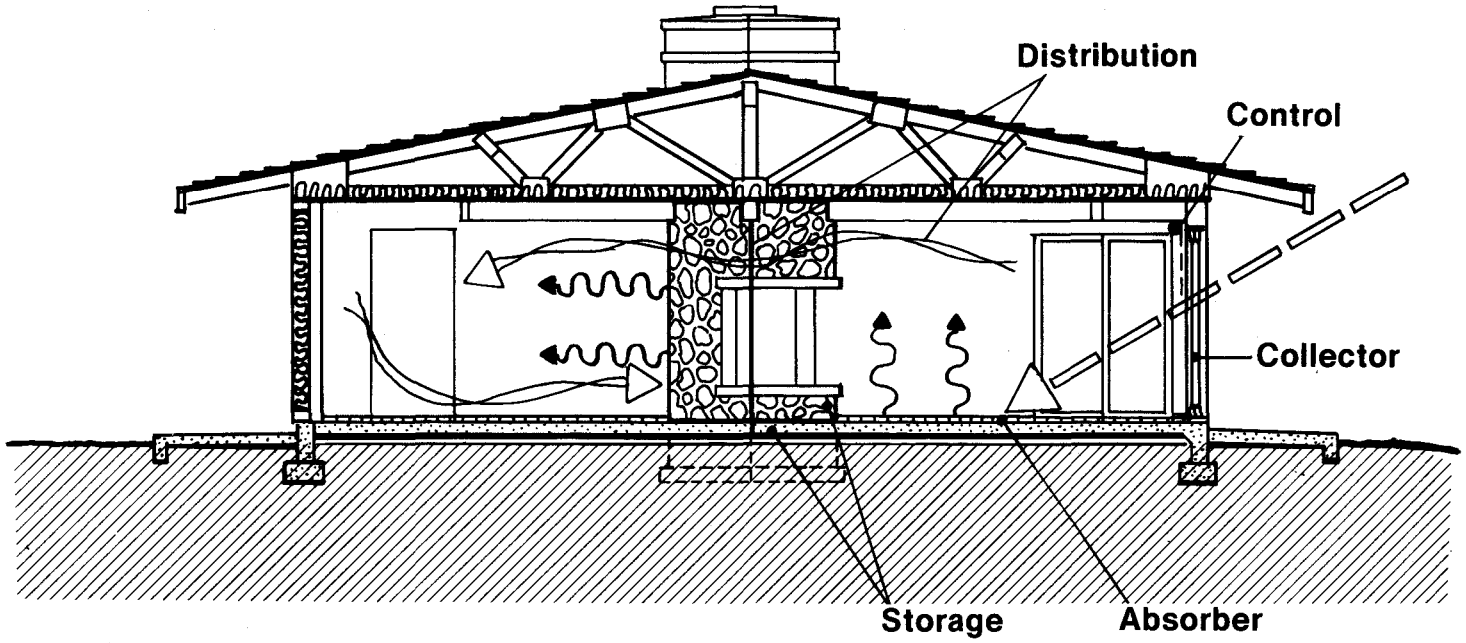
Absorption and storage of solar heat in the living and dining room are by a ceramic tile-covered 5-inch thick concrete slab floor, and by the rock chimney wall at the center of the octagonally shaped main living area. A tiled slab floor is also used for absorption and storage along the entire length of the corridor; there is also a 16-inch masonry thermal storage wall opposite the collectors.

Heat that is re-radiated from the storage elements into this closed corridor is distributed either by natural convection by opening sliding glass bedroom doors or the end door to the living area-or by being drawn into a ceiling plenum by the furnace blower, then ducted throughout the house. During the night, heat will radiate naturally from the masonry wall into the bedrooms. Radiation from storage masses and natural convection are used to distribute heat to the octagonal living areas. Back-up heat is available from the fireplace and from electric resistance elements in the furnace.

Cooling in summer is by ventilation and ceiling exhaust fans (two in the living room). For peak summer cooling there are two evaporative coolers that use the furnace duct system for distribution. Heat gain is controlled by venetian blinds on all glass, skylight shutters, and fixed overhangs.

The energy-conservation aspects of this home include a recessed north entry (away from prevailing southwest winds); use of

the garage as a winter wind buffer, and insulation values of R-30 for the roof and R-20 in the walls. Extensive caulking and weather-stripping are used throughout.



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.

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