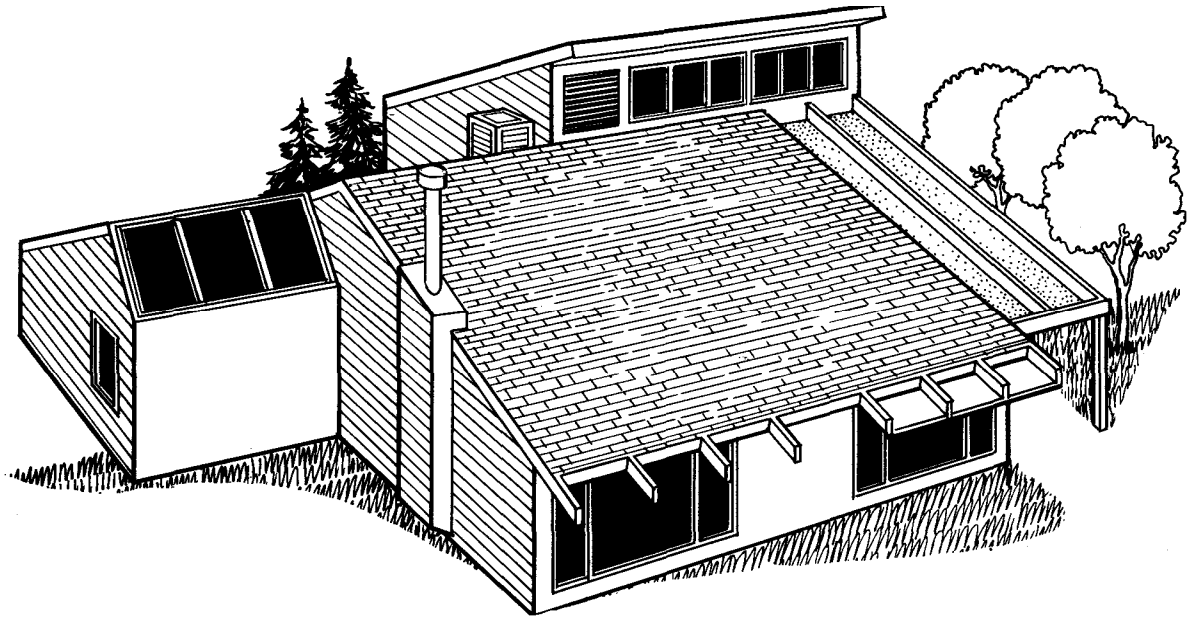
Grand Junction, CO



Builder: Holling & Associates, Inc., Grand Junction, CO

Designer: Crowther Architects Group, Denver, CO

Solar Designer: Crowther Architects Group

Price: $89,000

Net Heated Area: 2076 ft²

Heat Load: 81.9 x 10⁶ BTU/yr

Degree Days: 5605

Solar Fraction: 39%

Auxiliary Heat: 4.26 BTU/DD/ft²

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

Recognition Factors: Collector(s): South-facing glazing, clerestory windows, 170 ft² **Absorber(s):** Quarry tile floor, water tubes, concrete mass **Storage:** Water tubes, concrete and brick mass—**capacity:** 7980 BTU/°F **Distribution:** Radiation, forced and natural convection **Controls:** Thermostat, moveable insulating shutters and blinds, adjustable awnings, overhangs, and louvers

Back-up: Gas boiler (42,000 BTU/H)

Domestic Hot Water: 40,000 BTU/H DHW heater with 80-gallon storage

This tri-level, 3-bedroom western design features earth-bermed lower-story bedrooms and an upper-level family room with a clerestory. High R-value ceiling and wall insulation, coniferous trees on the north, and a sloped roof with a low north wall minimize winter wind infiltration. Additional protection is provided by an air-lock entry, foam caulking, and minimal north glazing. Low-activity areas form a buffer zone along the north wall; high-activity spaces are adjacent to south-facing glazing. The windows on the south are single glazed and are fitted with sliding insulation panels. All other windows are double glazed. On the main-floor level, sunlight collected through south-facing windows is absorbed and stored by the quarry tile floor in the dining room, and by water-filled tubes located directly behind the glazing in the living room. A 2-story masonry wall absorbs and stores direct radiation entering the upper-level family room through clerestory windows. The heat stored in the mass wall and floor is later re-radiated for distribution into the living, dining, family, and bedrooms. At night, sliding insulation panels on the living side of the main-level south windows are closed to control heat loss. The clerestory windows are protected by closing pulley-operated, insulating shutters.

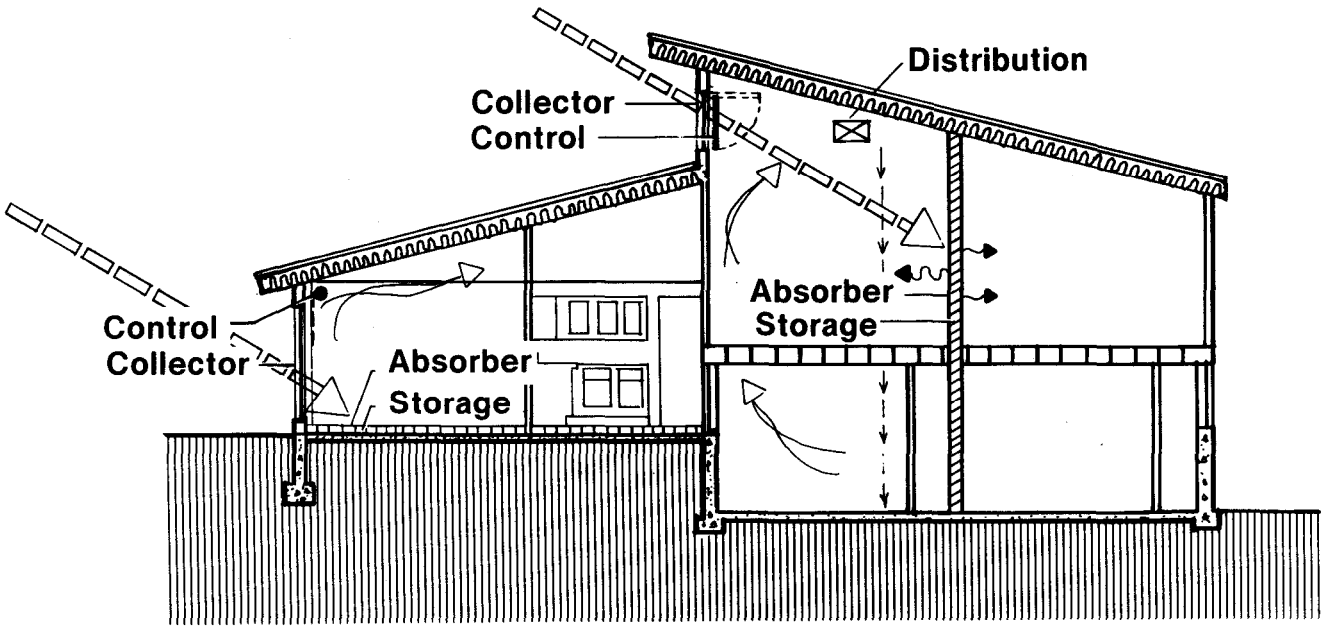
In the family room, the 3-foot high southfacing divider wall is open to the kitchen below. Solar heat that has been collected and stored in the ground-level living spaces is carried by natural convection through this opening up to the peak of the family room,

where air warmed by the clerestory windows also accumulates. An air intake grille located near the family room ridge admits the warm air to a duct that leads to a discharge grille located in the lower-level utility room wall. When the temperature at the ceiling peak reaches 85°F, a differential thermostat mounted near the intake grille activates the fan and heated air is pulled through the duct and into the utility room. When the lower-level doors are open, this solar-heated air warms the rooms. When the family room ceiling temperature drops to 72°F, the fan is automatically shut off, and distribution of solar air ceases.

During the summer, south-facing glass is shaded by fixed moveable overhangs, and by seasonally adjusted awnings. All windows are equipped with manually operated pull-down shades or blinds. The high space near the clerestory has a manually operated, dampered louver that is opened at sunset along with main- and lower-level windows to provide convective cooling of the house.

Cooling is provided by an evaporative cooler. The garage on the western side of the house has eliminated west-facing windows that would overheat the house on summer afternoons.

A domestic water preheat system uses collectors mounted on the south-facing garage roof, and a preheat tank with an immersed fin-tube heat exchanger in the utility room.



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.