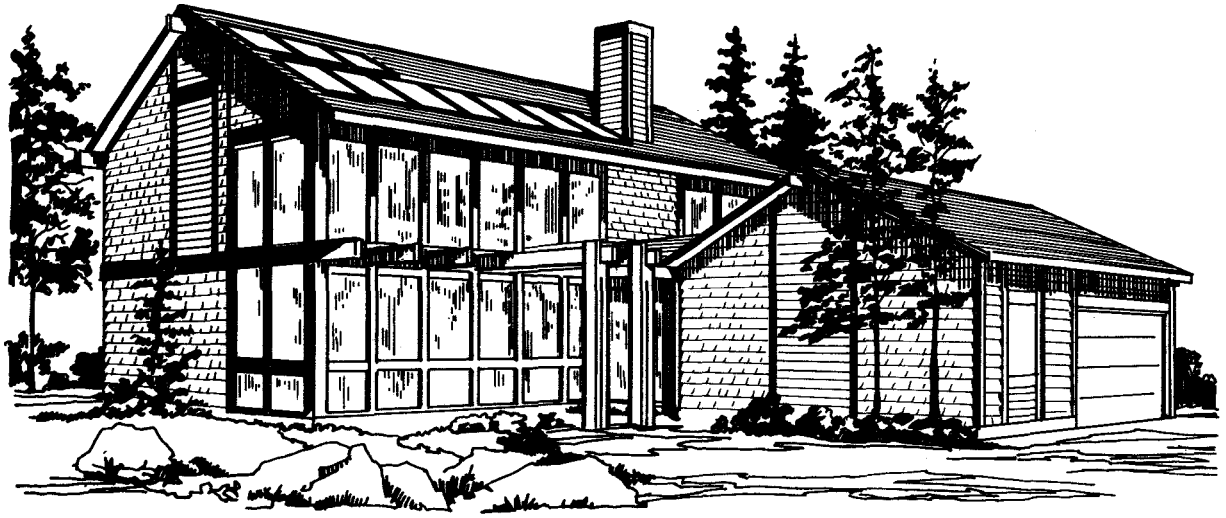
# Colorado Springs, CO



**Builder:** Colorado Homes, Inc., Colorado Springs, CO

**Designer:** Colorado Homes, Inc.

**Solar Designer:** Rick A. Cowlishaw

**Price:** $85,000

**Net Heated Area:** 1840 ft²

**Heat Load:** 37.9 x 10⁶ BTU/yr

**Degree Days:** 6432

**Solar Fraction:** 82%

**Auxiliary Heat:** 0.58 BTU/DD/ft²

**Passive Heating System(s):** Direct gain, isolated gain

**Recognition Factors: Collector(s):** Greenhouse glazing, south-facing windows, 658 ft² **Absorber(s):** Brick pavers over concrete floor, surface of concrete walls, hot tub **Storage:** Concrete floor and walls, hot tub—**capacity:** 96,000 BTU/°F **Distribution:** Radiation, natural and forced convection **Controls:** Vents, blinds, overhangs

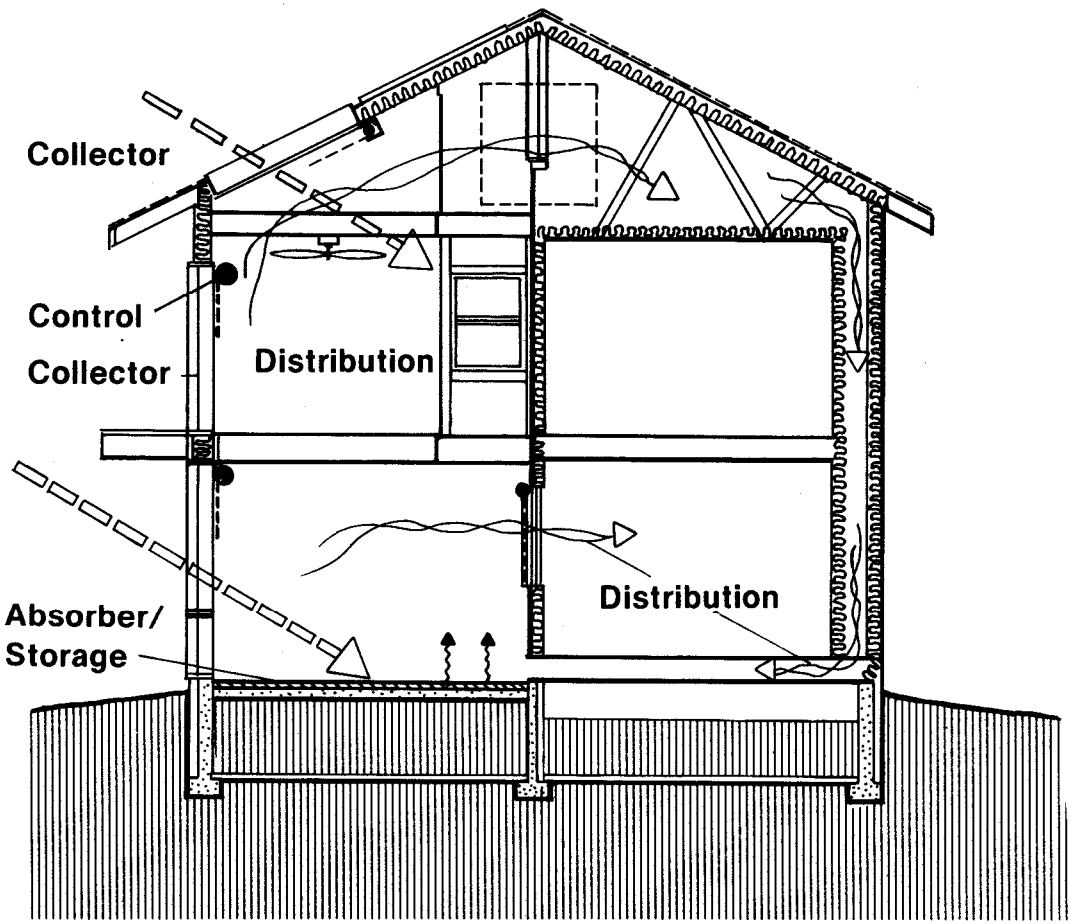
**Back-up:** Electric resistance baseboard heaters

**Domestic Hot Water:** Passive "bread-box" preheat, 40-gallon storage

This "Colorado Rustic" design with earth tone colors and cedar shake shingles features a 2-story greenhouse as part of a passive solar heating system based on the "envelope" concept. The house consists of two shells, one within the other. The living and sleeping spaces are located in the inner shell; the surrounding shell, or envelope, consists of the greenhouse, attic, north wall plenum, and crawl space. The envelope construction protects the living space from winter infiltration, and both shells are, in addition, well-insulated. Total insulation R-value is 38 in the east and west walls and the roof, and 40 in the north and south walls. An air-lock entry, a north wall buffer zone, and a limited number of nonsouth windows are additional energy-conserving features.

After solar heat is **collected** by the greenhouse windows, it is **absorbed** and **stored** in the concrete and brick paved floor and in a 415-gallon hot tub. The concrete foundation walls also serve as remote **storage** elements. During the day, solar-heated air rises to the top of the greenhouse and is circulated through the envelope space by a ceiling fan. This circulation heats the foundation wall and the earth fill beneath the crawl space. At night, air temperature at the uninsulated greenhouse glazing is lower than in the north plenum. The heat that is radiated from the storage elements creates a reverse thermosiphon-f1ow in the envelope. The air flow carries the heat that is radiated back into the envelope from the storage elements. Because the living space within the inner shell is surrounded by the solar-heated "atmosphere" of the outer shell, the demand on the back-up electric resistance heating system is reduced. Greenhouse heat is **distributed** directly to the living space by a manually activated reversible fan in the interior wall between the living room and the greenhouse.

During the summer, opening the lower greenhouse windows, attic vent, and north windows induces ventilation of the envelope. Blinds (Ievelors) on the sloping greenhouse glass are closed during the day to **control** heat gain. They are opened at night to allow heat to radiate back to the outside.



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.