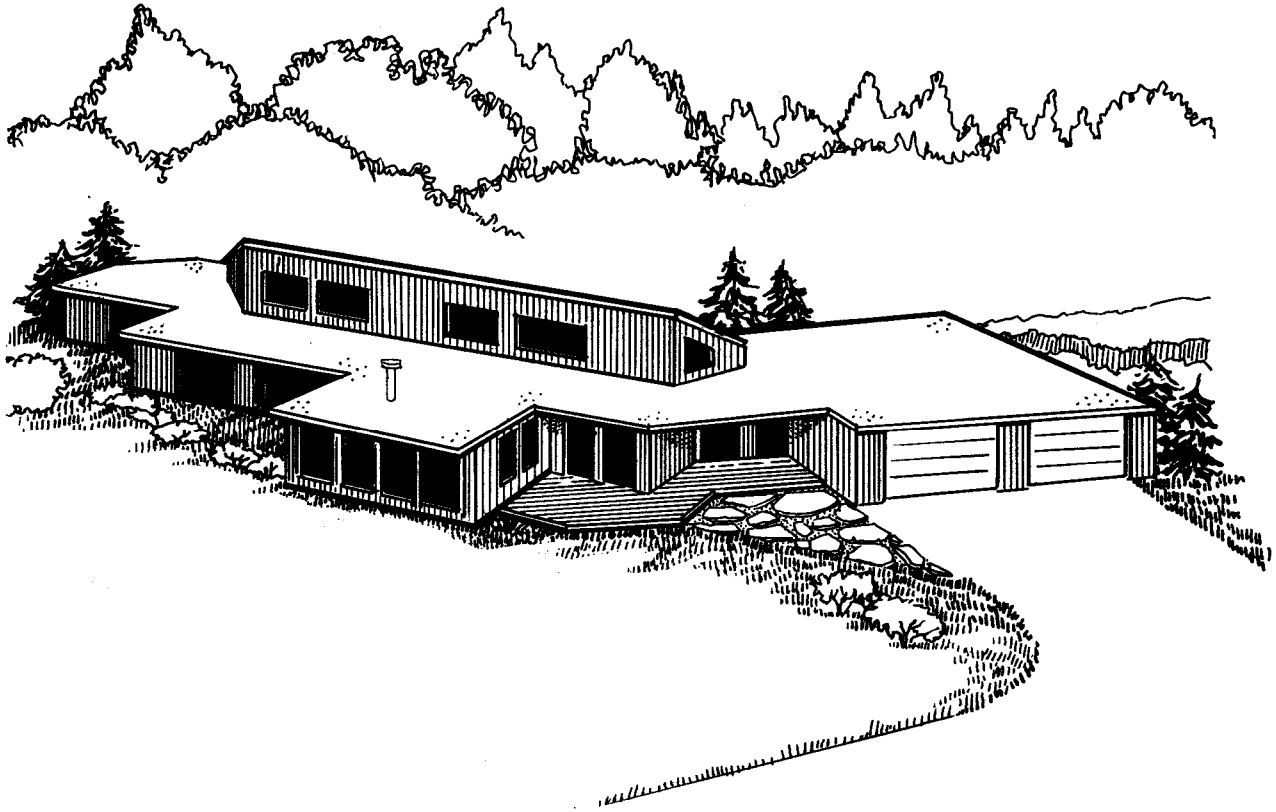
Colorado Springs, CO



Builder: Energy Techniques, Colorado Springs, CO

Designer: Design Group Architects, Colorado Springs, CO

Solar Designer: Design Group Architects

Price: $85,000

Net Heated Area: 1558 ft²

Heat Load: 75.1 x 10⁶ BTU/yr

Degree Days: 6423

Solar Fraction: 48%

Auxiliary Heat: 3.93 BTU/DD/ft²

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

Recognition Factors: Collector(s): Double-glazed windows and glass sliding doors, triple-glazed clerestory windows, 309 ft² **Absorber(s):** Brick pavers over concrete slab floor, concrete walls **Storage:** Concrete slab floor, concrete walls—**capacity:** 8804 BTU/°F **Distribution:** Natural and forced convection, radiation **Controls:** Thermostatically controlled fans, vents

Back-up: Natural gas forced-air furnace (39,500 BTU/H), airtight woodburning stove

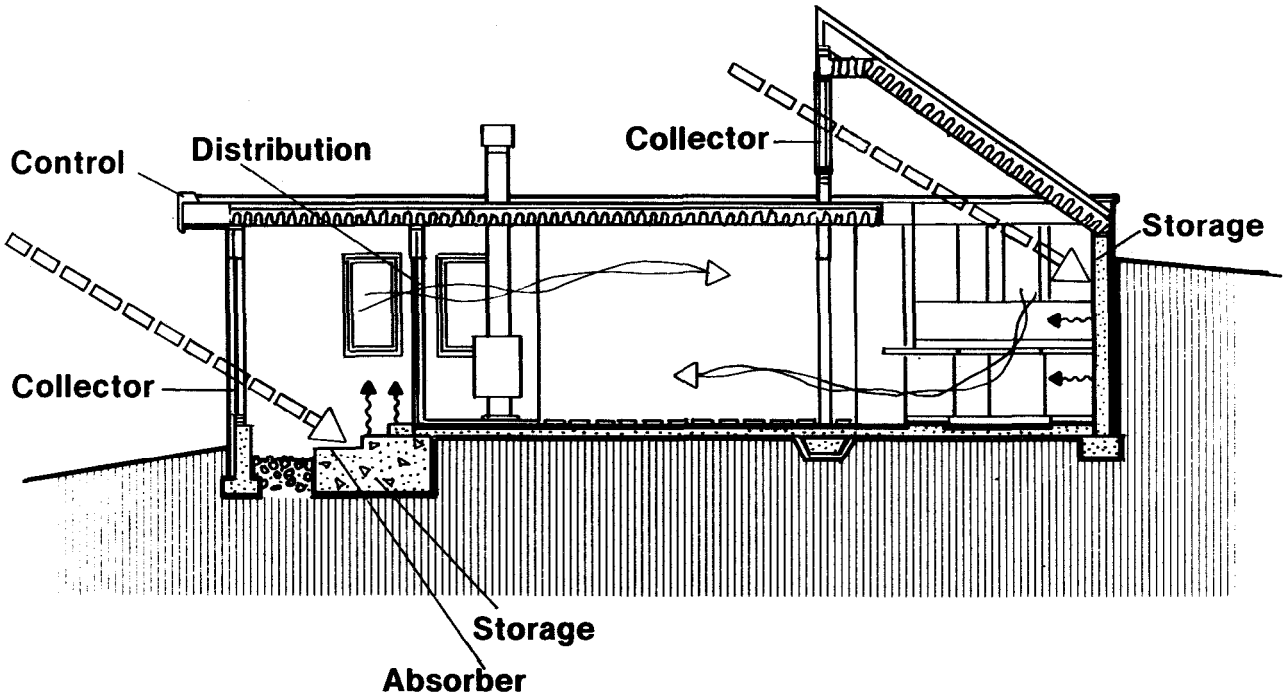
This contemporary design is to be located in a large urban subdivision that includes other passive solar homes. The design specifies a highly insulated, high~mass structure for protection against the extremes of the Colorado climate. The lowprofile house is bermed on the north, east, and west, and has air-lock entries that further reduce infiltration. The main living areas have been incorporated into an open "great room" that has access to an attached greenhouse.

On sunny winter days, solar heat is **collected** through greenhouse glazing and is **absorbed** and **stored** in the mass floor, a 4-inch concrete slab surfaced with brick pavers. **Stored** heat is later re-radiated to be **distributed** to the living area by opening the sliding glass doors that open to the great room. At night,greenhouse doors are closed to **control** heat loss from the living area.

A high clerestory allows solar heat to be **collected** through fixed, triple-glazed windows. Heat is **absorbed** and stored in the concrete mass walls and floors of the kitchen and utility room below, and is **distributed** radiantly at night when the house temperatures drop. Sunlight penetrates directly into the bedrooms and the dining room through south-facing sliding doors. Solar heat is **stored,** however, only in the dining room tile floor; the bedrooms have no storage mass. Winter **distribution** of solar heat can also take place through the air-handling system associated with the

back-up gas-fired furnace. When the thermostat in the great room calls for heat, a fan in the furnace is automatically activated. If the temperature of solar-heated air accumulating at the top of the clerestory is above a predetermined point, the air is drawn down the return air duct, and is circulated to rooms through tubes embedded under and in the concrete slab floors. If the solar-heated air is not warm enough to contribute to house heating, the gas furnace is automatically activated.

During the summer, protection from unwanted heat gain through south-facing glazing is provided by overhangs. Opening windows and sliding doors throughout the house allows natural cross-ventilation, and thermostatically controlled fans can be activated to provide additional air movement.



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.