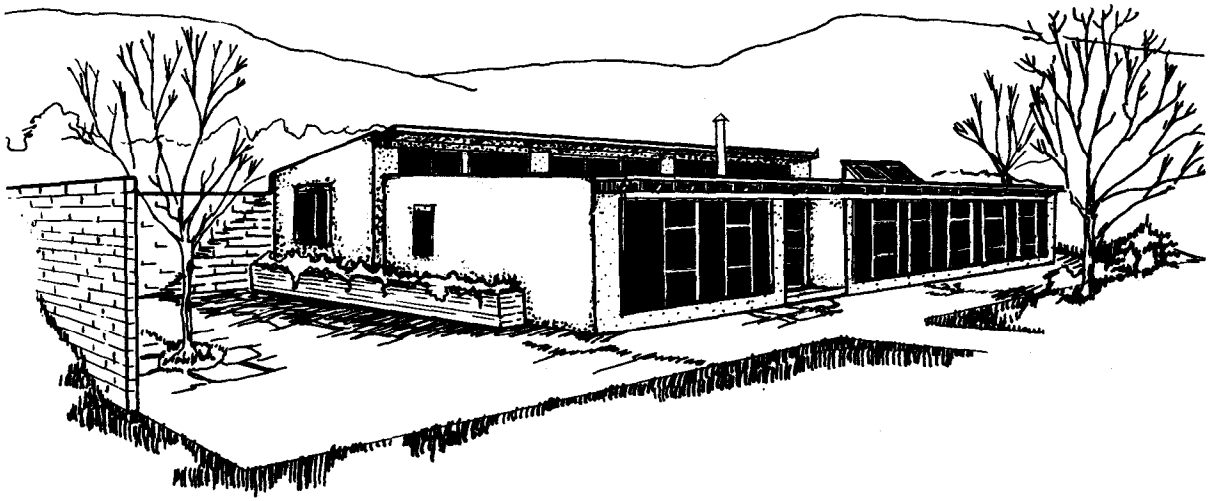
Manzono Springs, NM



Builder: Enecon, Inc., Sante Fe, NM

Designer: Clark-Germanas Architects, Sante Fe, NM

Solar Designer: Barkmann Engineering, Sante Fe, NM

Price: $75,000 to $80,000

Net Heated Area: 1500 ft²

Heat Load: 52.2 x 10⁶ BTU/yr

Degree Days: 5780

Solar Fraction: 75%

Auxiliary Heat: 1.55 BTU/DD/ft²

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

Recognition Factors: Collector(s): Double-glazed windows, double-glazed clerestory windows, 255 ft² **Absorber(s):** Water tubes, brick floor over concrete slab **Storage:** Water tubes, concrete slab—**capacity:** 13,917 BTU/°F **Distribution:** Radiation, natural convection **Controls:** Insulated venetian blinds, shutters and curtains, fixed overhangs and earth berming

Back-up: Woodburning stove, electric resistance mats

Domestic Hot Water: Active DHW collector

Passive Cooling Type: Natural ventilation

Part of a large development, this traditional pueblo house is consistent with the style of neighboring homes. Its exposed beams and plastered masonry walls help to keep this highly functional design aesthetically pleasing as well. Protection from prevailing winds is provided by pine trees to the northwest and partial earth-berming of the north wall. There is also a north retaining wall that extends beyond both ends of the house. Both of these extensions turn 90°F towards the front of the house to enclose terraces on the east and west sides and to provide wind protection.

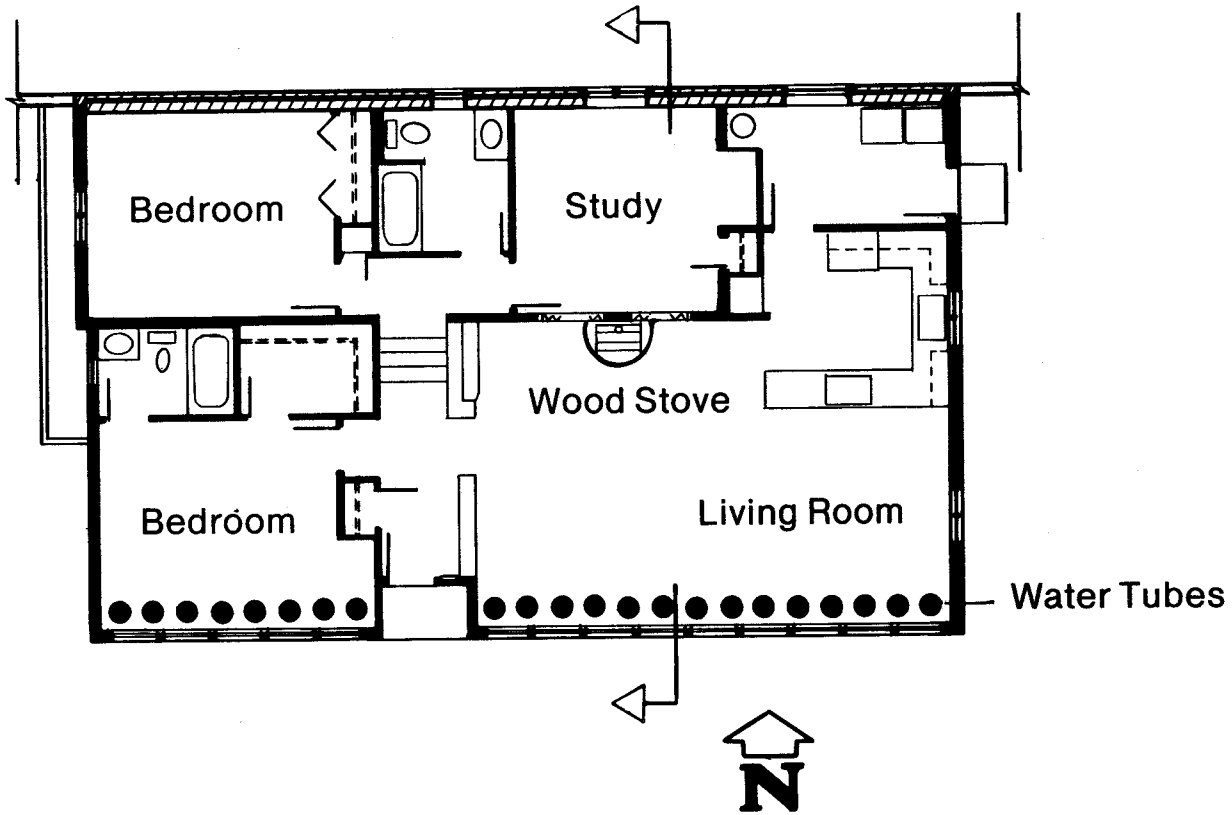
Passive **collection** is accomplished at two south-facing sources: floor-to-ceiling windows for the lower level of the split-level plan, and clerestory windows for the rear raised level; aU windows are double glazed. A roof-mounted active collector located above the utility room is used for preheating domestic hot water.

Sunlight entering the lower-level windows is **absorbed** and **stored** by a series of 19 darkened fiberglass water tubes. These are located directly inside the windows and are 8 feet high and 12 inches in diameter. The tops are left uncovered for humidification and easy refilling. The tubes are spaced with 12-inch gaps that also allow direct radiation into the rooms to be **absorbed** and **stored** by brick flooring laid down over a 4-inch concrete slab. Sunlight **collected** through clerestory windows is absorbed by the darkened surface of a dense concrete masonry north wall with rigid exterior insulation.

Heat is **distributed** by radiation from the storage masses and by natural convection. Convective loops are set up within each room, using the shaded center wall to cool heated air that moves toward it. Some convection occurs between the living room and study through shuttered apertures.

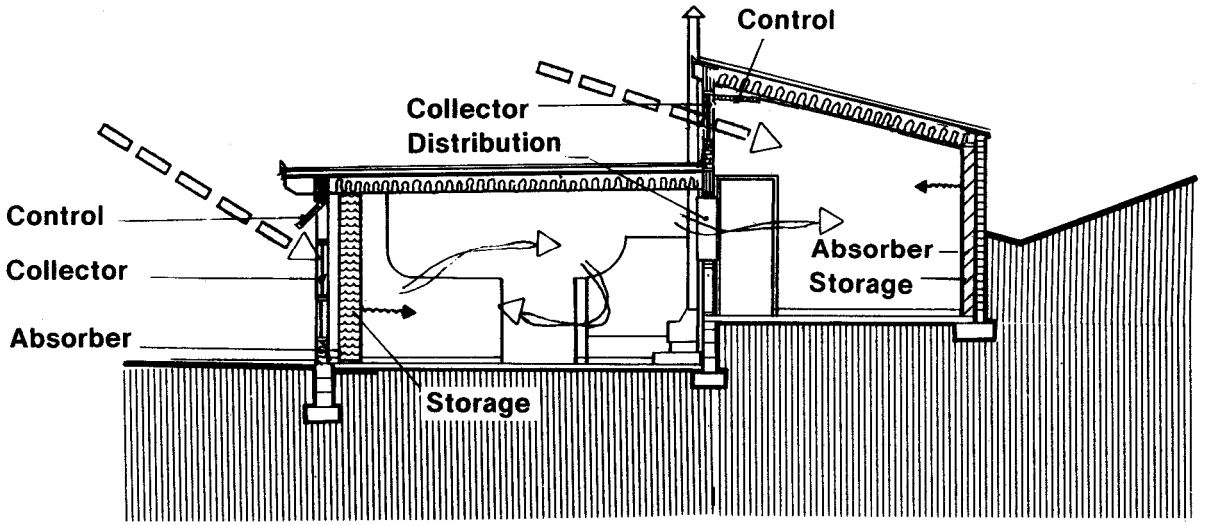
Night heat loss through lower-level windows is **controlled** by insulated venetian blinds on vertical tracks. Manually operated polystyrene insulating shutters serve the same purpose on clerestory windows. The R-30 insulation in the roof and R-20 in the walls are also instrumental in creating a strong energy-conserving envelope.

In extreme cold, radiation from storage masses is supplemented by thermostatically controlled electric resistance mats embedded in all floor slabs. The mats are designed to turn on automatically when the



heat from these storage masses has been discharged. The rate of this discharge can be reduced by using the woodburning stove located on the north wall of the living room. Wall vents distribute some stove heat to rear-level rooms where the concrete floors have only minimal exposure to direct radiation.

During summer days, overhangs shade both collectors from direct radiation. Blinds and shutters are used as needed for additional control of solar energy. Daytime cooling is augmented if, during the night, windows are kept open so that night air can cool storage masses. If the main-level windows are closed during the day, heat rises and escapes through open clerestory windows.



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.