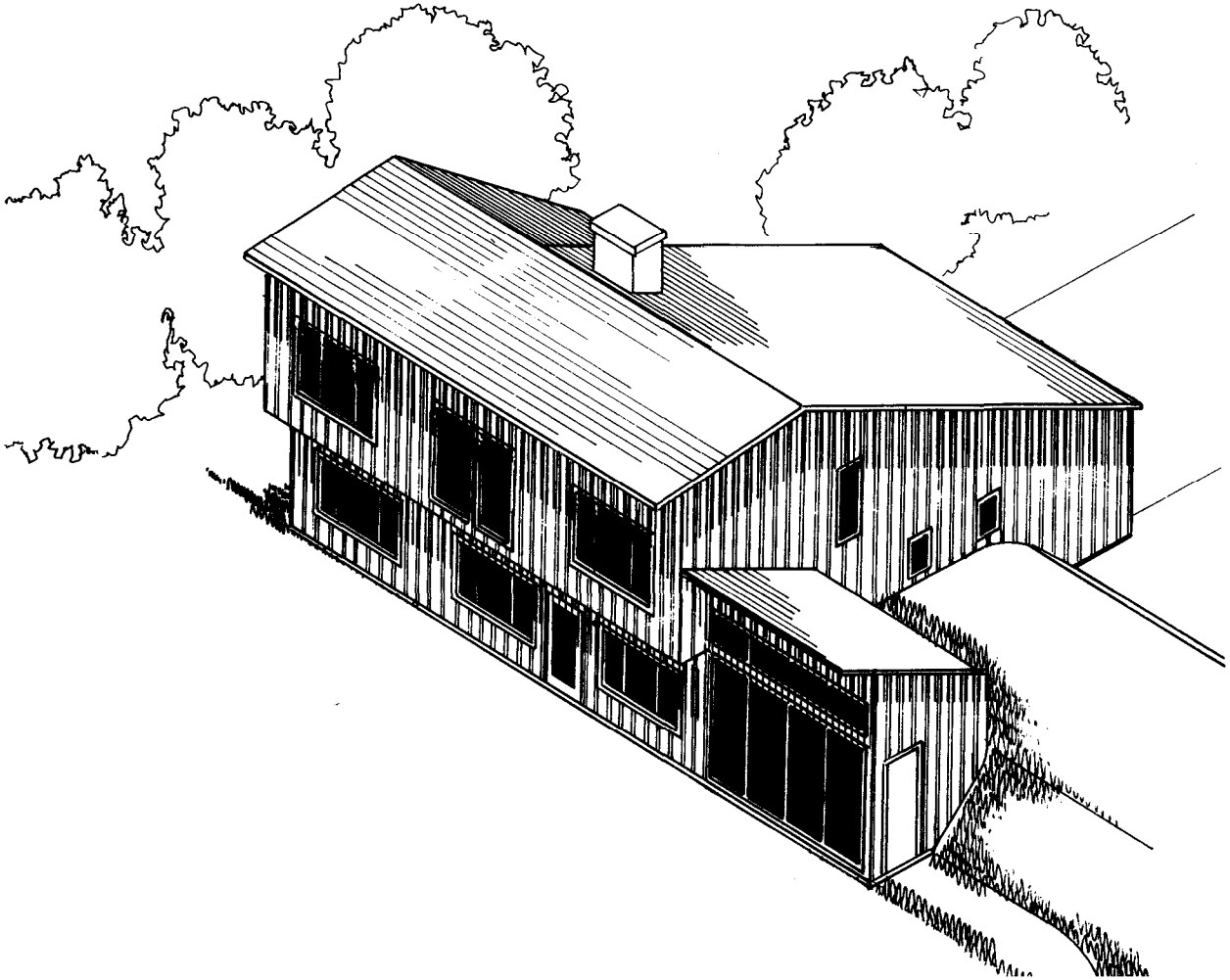
Durham, NH



Builder: Walter W. Cheney, Inc., New Market, NH

Designer: Walter W. Cheney

Solar Designer: Walter W. Cheney

Price: $89,900

Net Heated Area: 1472 ft^2

Heat Load:72.0x10^6 BTU/yr

Degree Days: 7383

Solar Fraction: 63%

Auxiliary Heat: 2.99 BTU/DD/ft^2

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

Recognition Factors: **Collector(s):** South-facing glazing, 429 ft^2 **Absorber(s):** 55-gallon steel drum surfaces, stone surface of concrete slab **Storage:** Water in steel drums, concrete slab, stone mass wall- **capacity:** 15,434 BTU*I* F **Distribution:** Radiation, natural and forced convection **Controls:** Roof overhang, vents, insulated window quilts, sliding doors

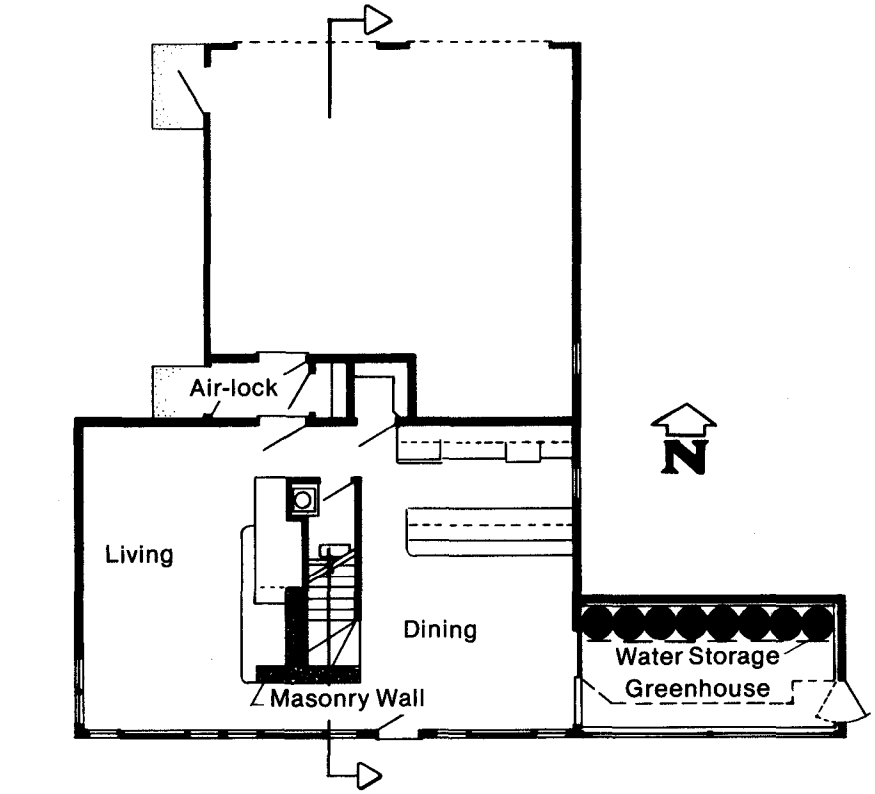
Back-up: Electric baseboard heat (34,000 BTU *I* H), wood stove (35,000 BTU *I* H)

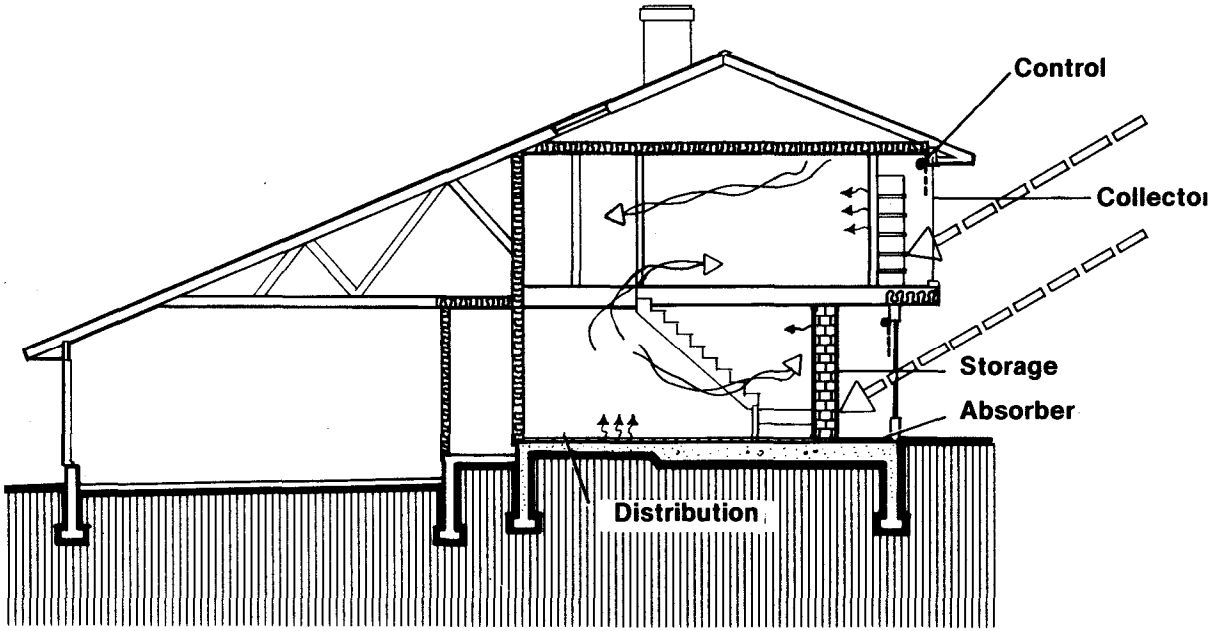
Located on a 31/2-acre site in a cold climate, this house is part of a proposed 12-unit, all passive solar development. A pine and hardwood forest on the north end of the lot shields the house from the northwest wind. The traditional saltbox roof also deflects winds, and the garage, located on the north side of the house, acts as a buffer zone.

There are a few windows on the east and west elevations and none at all on the north, but glazing is extensive along the south wall. Solar energy is collected through second-floor windows, directly warming two bedrooms during the day.

Through other second-floor windows, the sun is absorbed and stored by six 55-gallon drums located in alcoves off of the bedrooms. On the first floor, there are 120 square teet of collecting windows, through which the sun strikes a 9-inch concrete floor slab, finished with natural stone, that absorbs and stores heat for later distribution.

A 12-inch thick x 7-foot long stone mass wall that is located 3 feet inside the south wall also stores heat. Both the wood stove and the stairs to the second floor are 10catea behind the mass wall. Finally,





there is a first-floor greenhouse-adjacent to the dining room-with 120 square feet of south wall glazing. The greenhouse has 16 water-filled 55-gallon drums inside its bermprotected north wall. All of these systems contribute to heating and cooling the house.

During a winter day, the sun charges the first-floor slab and the water drums. Due to the open plan, heat is easily distributed from the south wall via circulation to all other parts of the house. If necessary, the sliding doors between the greenhouse and dining room can be opened, allowing heat to pass into the house. At night, insulating blankets are pulled down over the double glazed house and greenhouse windows to **control** heat loss (combined R-5). The concrete floor slab and stone mass wall radiate heat on the first floor while heat radiates from the drums on the second floor. A register in the living room ceiling allows heat to be **distributed** by convection up to the second floor. Warm air also flows through vents from the greenhouse into the master bedroom.

The roof overhangs the second floor, which in turn overhangs the first floor, so that all southern windows are shaded from May to August. Most windows are kept open to allow ventilation, but insulating shades are pulled down over the windows in front of the second-floor water drums. The drums are allowed to absorb heat from the bedrooms, just as the concrete slab and stone wall absorb heat from the first-floor spaces. At night, the insulating shades are raised, and heat from the mass wall, the slab, and the water drums radiates to the cool night air. The operable skylight is also opened to allow heat to escape by convection. The various passive features are aided by wellinsulated walls (6-inch batts, total R-20) and roof (12-inch batts, total R-38).

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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