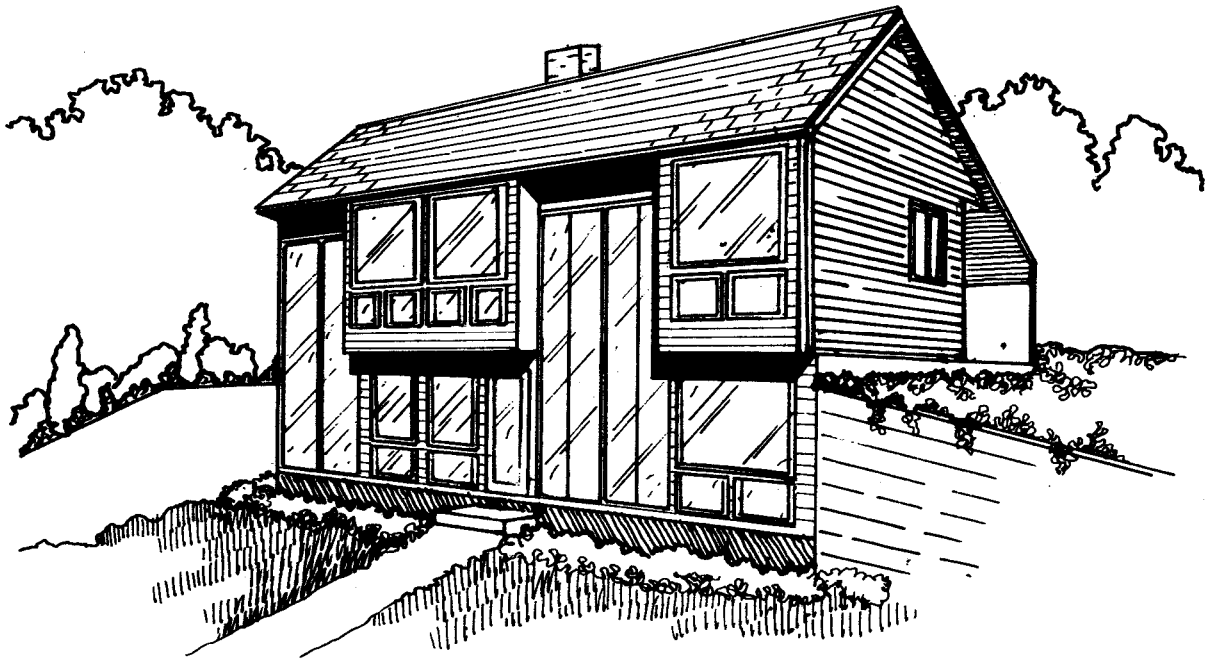
East Wilton, ME



Builder: Starbird Lumber Co., Strong, ME

Designer: Sunsystems, Dryden, ME Solar

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Price: $55,000 to $60,000

Net Heated Area: 1204 ft^2

Heat Load: 65.8 x 10^6 BTU / yr

Degree Days: 8675

Solar Fraction: 71 %

Auxiliary Heat: 1.82 BTU / DD/ ft^2,

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

Recognition Factors: Collector(s): Triple-glazed windows, double glazing over Trombe wall, 418 ft^2 Absorber(s): Trombe wall surface, concrete floor Storage: 8-inch concrete floor slab, concrete Trombe wall capacity: 37,617 BTU /F Distribution: Radiation, convection Controls: Vents, shutters; differential thermostat for forced-air system

Back-up: Wood furnace

Passive Cooling Type: Cross-ventilation, solar chimney through Trombe wall, mechanical cooling

This saltbox-style home, updated to make the most of solar energy, is located on a gentle south-southeast slope. A band of tall hardwood trees along the lot's western end protects the home from prevailing winter winds. The rest of the lot is covered with young red pine trees, except where they would shade passive collection.

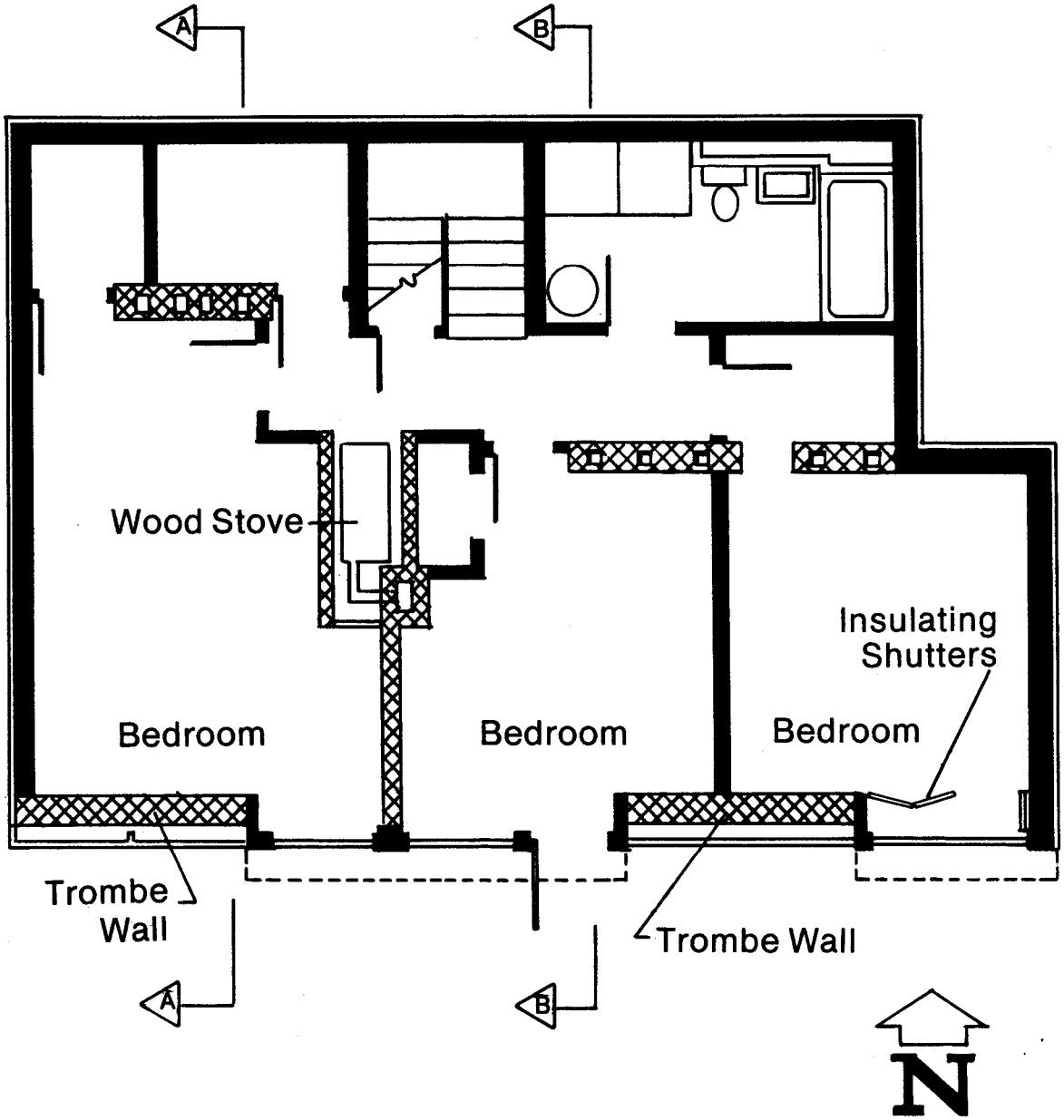
The compact saltbox layout allows the home to enclose a large amount of interior space with a minimum of exterior wall surface. This is an important part of the overall conservation package. There are 6 inches of fiberglass insulation in the walls and 12 inches in the ceiling. Closets and other low-use areas of the home are located along the north wall; the entryway is sheltered by a recess and by a vestibule.

Except for the south-facing solar collection wall, the entire lower floor of this home is buried. This moderates the inside temperature by exposing the outside surface of the lower-floor walls to the temperature of .the earth below the frost line, rather than the subfreezing temperatures of a Maine winter. During the summer, this helps cool the home because ground temperature stays well below summer air temperatures.

This home is heated by two types of passive solar energy collection: direct heating through windows and a Trombe wall system.

The direct collection relies on a total of 186 square feet of south-facing windows and 26 square feet total of east- and west-facing windows. All windows are triple glazed.

During the day, sunlight passes through tne windows and strikes the 4-inch concrete slab floor and the cored concrete block in-



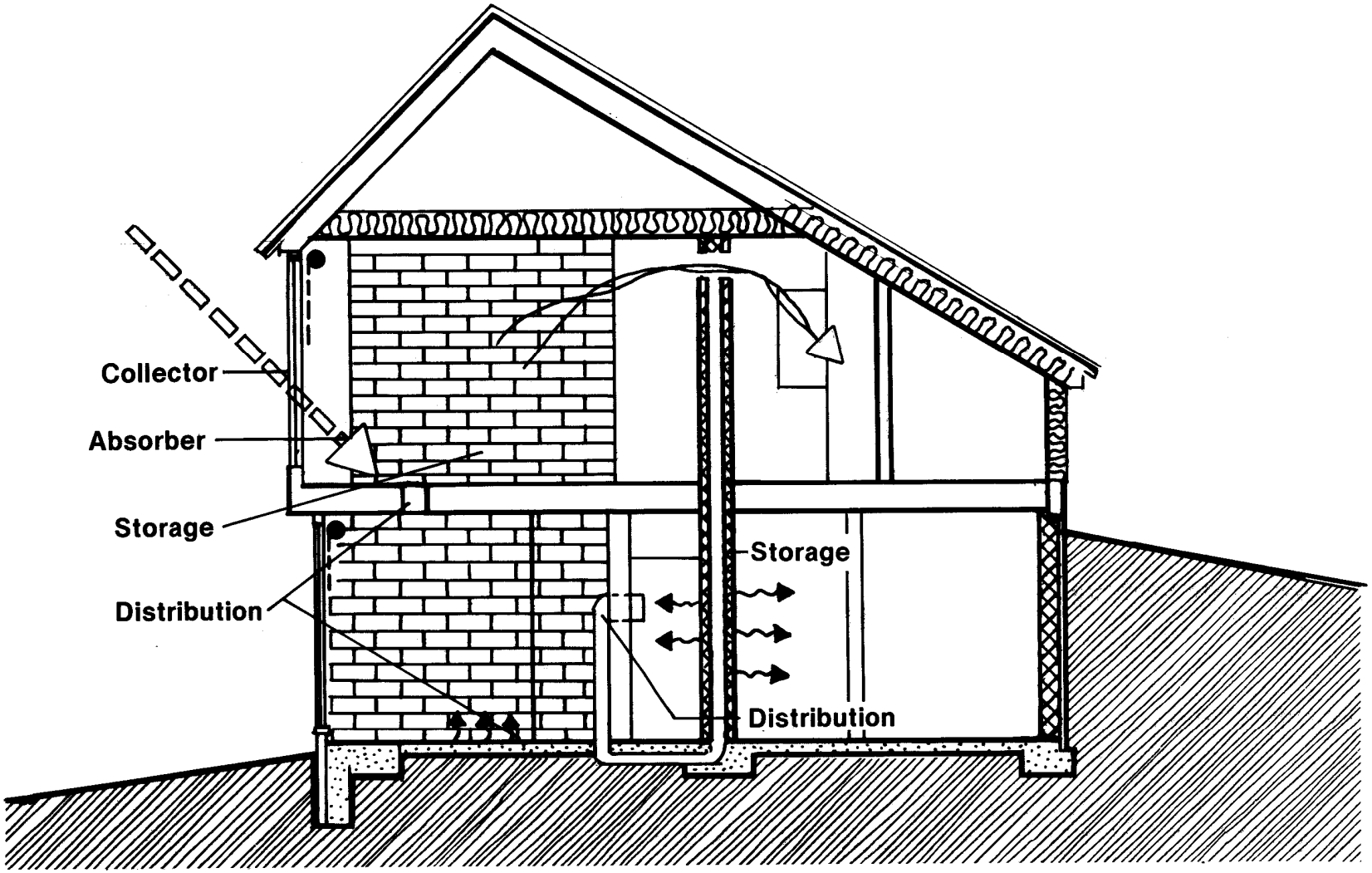
terior walls. These surfaces function as solar absorbers, turning the sunlight into heat. The heat is conducted into the interior mass of the floor and walls, where it is stored.

At night, when the air temperature in the living space drops below the temperature of the storage walls and floor, heat from the storage mass is distributed to the living space by radiation and convection.

The system has two types of controls. The insulating panels are used to cover the windows at night to reduce heat loss to the outside, and they are used on particularly sunny spring and fall days to limit heat gain. White shades are drawn over the windows during summer days to reflect direct sunlight.

If the upper-floor temperature is greater than the lower-floor temperature by a predetermined amount, the second control system is called upon. A differential thermostat turns on a small blower which forces the warmer air through a concrete block interior storage wall, and then out through floor vents on the lower level. This process evens out the temperature of the home by storing some of the upper floor's heat in the block wall, and by circulating the rest of it to the lower floor. The blower can be operated manually as well as automatically.

The Trombe wall consists of a concrete-filled block wall with a black painted exterior surface. A double-glazed window is attached 6 inches in front of the exterior surface. During the day, sunlight is collected as it passes through the glazing. It strikes the blacK. surface of the wall, where it is absorbed and then stored in the solid mass wall. It takes hours for the heat to pass through the wall, finally reaching the living space after sunset. This delay saves the sun's heat for distribution as radiant and convective heat from the wall at night.


Collector
Absorber
Storage
Distribution
Storage
Distribution

B-B

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.