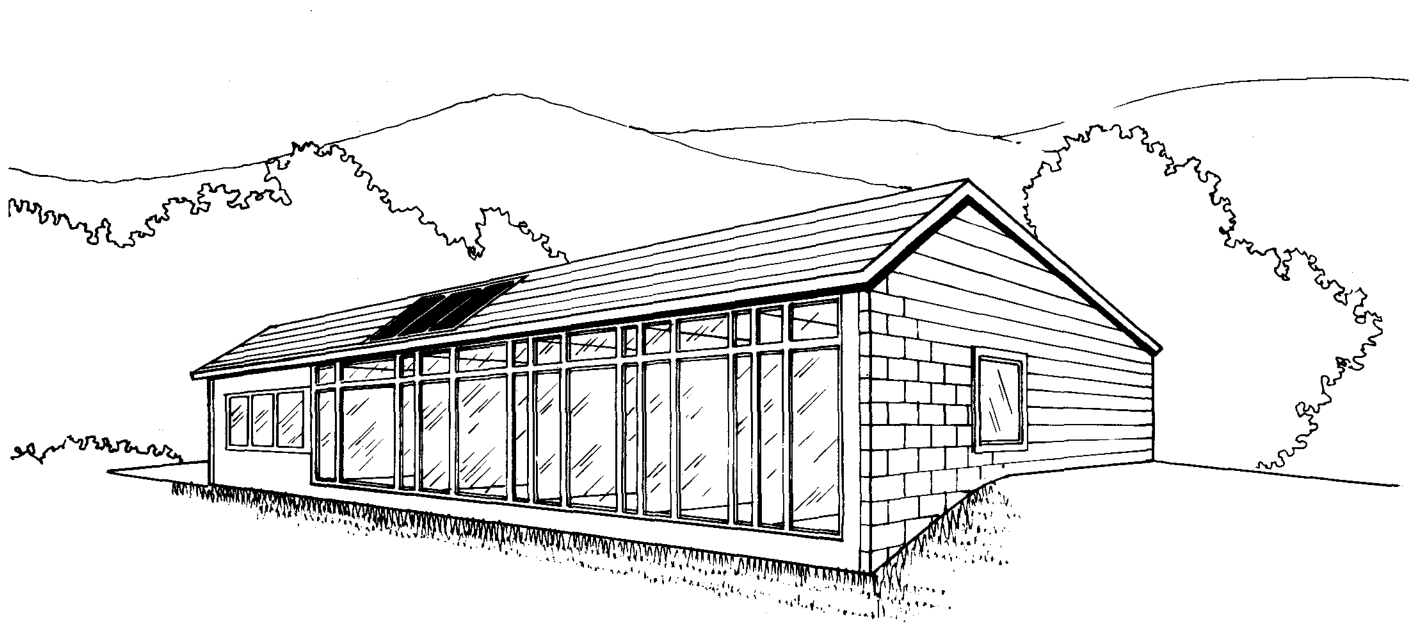
Putnam Valley, NY



Builder: Robert Brown Butler, Katonah, NY

Designer: Robert Brown Butler

Price: $60,000 (plus land)

Net Heated Area: 1473 ft^2

Heat Load: 42.0 x 10· BTU /yr

Degree Days: 5732

Solar Fraction: 90%

Auxiliary Heat: 0.54 BTU / DD /ft^2

Passive Heating System(s): Direct gain Recognition

Factors: **Collector(s):** South-facing glazing, clerestory windows, 368 ft^2 **Absorber(s):** Ceramic tile floors, masonry walls and floors **Storage:** Ceramic tile floors, masonry walls and floor-**capacity:** 24,583 BTU / °F **Distribution:** Natural and forced convection Controls: Garage type thermal shutters, overhang, thermostats

Back-up: Wood burning stove, electric resistance heaters

Domestic Hot Water: Three-panel active DHW system (84ft^2)

Scattered deciduous trees surround this small rectangular ranch house on a 1-acre lot in an old orchard under development in Putnam Valley, New York. The house sits on a slight slope facing south and fits naturally into the protective 4-foot berming on the east, west, and north sides. Low shrubs planted on these three sides provide additional protection from the wind.

Although it is one of the few single-story houses in the neighborhood, this passive solar house conforms to the larger, more conservative houses by reason of its conventional cedar siding and window size and arrangement.

Ceiling to floor thermopane™ glass takes up the entire south wall and acts as a collector for the passive solar heating system. Narrow panels divided into upper and lower casement windows alternate with wide panels of fixed glass giving uninterrupted southern exposure to the south-facing living room, four bedrooms, and playroom.

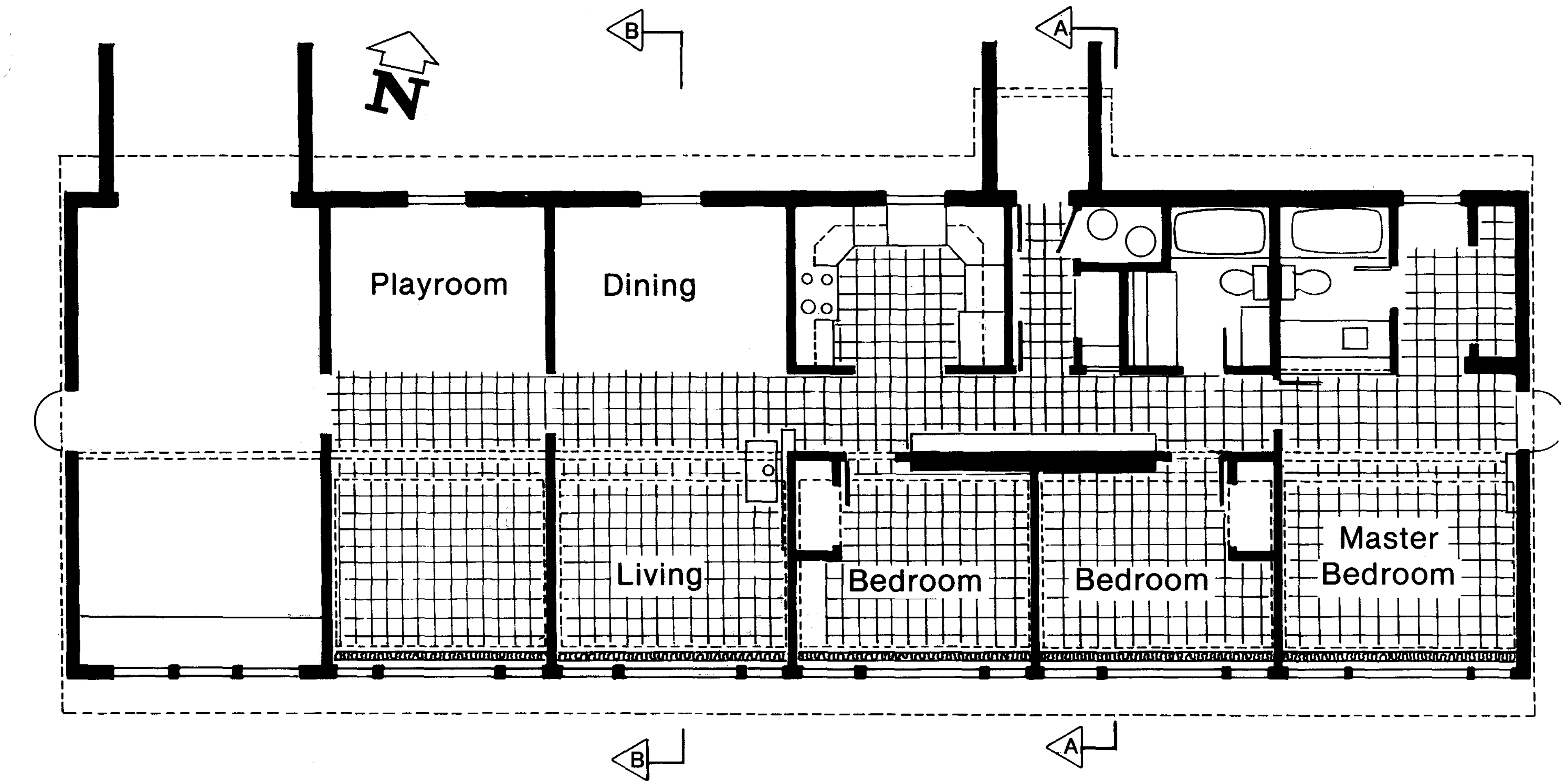
Heat is absorbed and stored in the masonry and ceramic tile floors of all these rooms which range in a uniform pattern with rear doors opening onto a long, narrow hallway. This hallway separates the southern rooms from those on the north.

Additional solar heat is absorbed and stored in 7-foot, 4-inch high, 10-inch thick masonry walls in all rooms. Clerestory windows top these walls and have been planned to allow natural light to pass through to the north side of the house.

All north rooms receive heat distributed by natural convection made possible by opening doors from the south rooms to allow heat to be drawn to the cooler north side. East and west ends of the house have as their only glazing two bubble windows that collect heat in the morning and afternoon. On the building's north face, where dressing room, bathrooms with skylights, entrance, closets, kitchen, and dining room are located, there are few windows.

The innovative feature of this house, designed to **control** heat loss, is a series of overhead garage-door-type thermal shutters. Standard commercial garage door hardware has been used to install these shutters inside the glass of each room on the south side. Each shutter has five 20inch panels filled with 6-inch thick translu- cent insulation. Operation is by individual room switches.

The shutters function to keep heat in on cloudy winter days and winter nights. In summer they drop behind the glass facade to keep heat out. At that time the casement windows, every 10 to 12 feet along the



south side, are opened to expel heat which may have accumulated between windows and shutters. An overhang along the south side partially shades the collector during summer and permits upper awning windows to remain open in rainy weather.

From spring to autumn, removable screens are placed over the windows to help reduce incident radiation. Berming around the house helps lower temperature extremes at the base of the exposed sections. Further cooling in summer comes from the 6-inch concrete slab on polyethylene vapor barrier base that lies under the entire house.

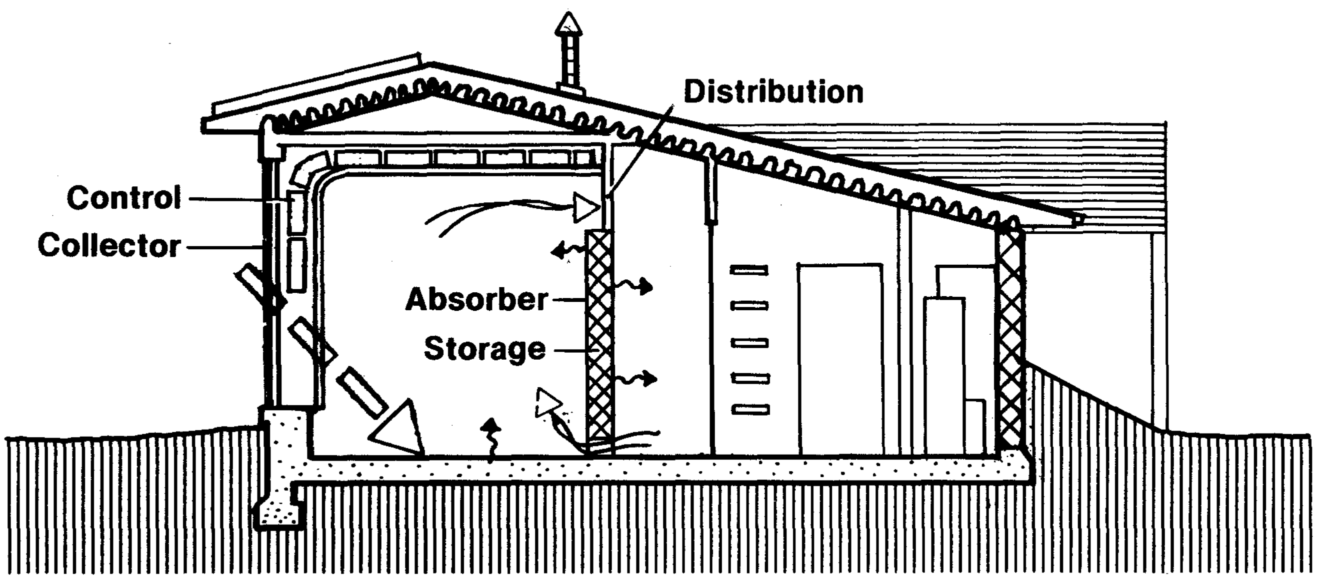
The roof (R-33) and exterior walls (R-26) are heavily insulated. During extremely hot weather, perforated ducting, with vent fans at each end under the ridge of the roof, removes excess heat. The small north windows are caulked at the seams and fitted snugly with translucent thermal interior shutters letting natural light in even when closed. Bathroom skylights are filled with 10-inch translucent insulation.

The builder expects an average of 6 inches of snow coverage from December to March to provide extra insulation on the roof and around the base of the house, with a high percentage of the radiation striking the snow being reflected into the house.

Back-up heat is supplied by a thermostatically controlled, cast-iron wood burning stove set between kitchen and playroom in a central part of the house fairly equidistant from all rooms.

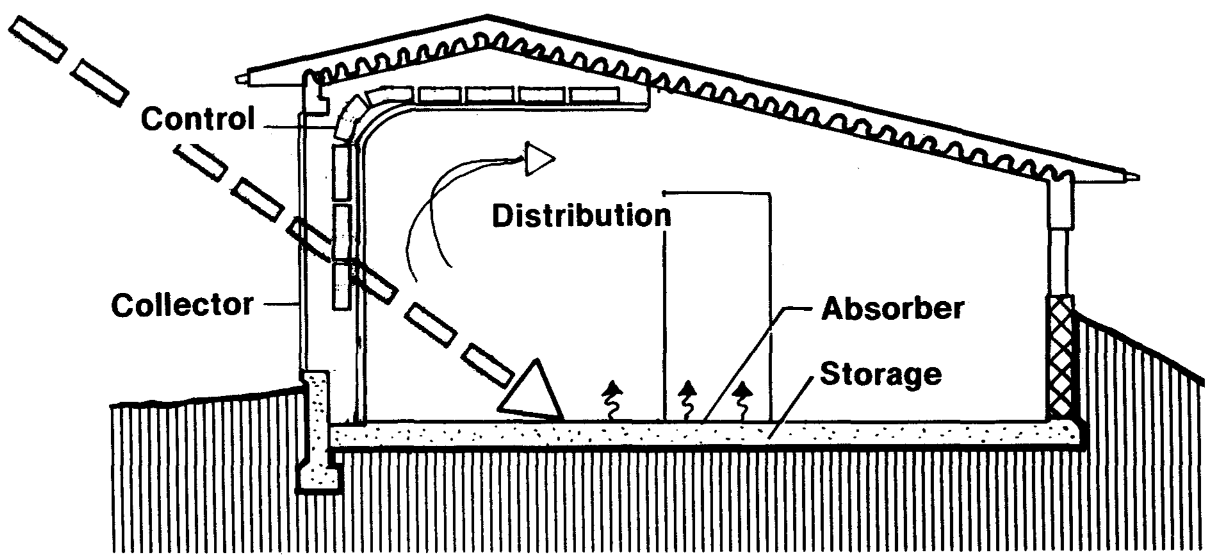
Electric resistance heaters, controlled by thermostats, are mounted on the hall side of the interior masonry walls. Combined with the stove these provide the back-up heating system for the whole house.

Domestic hot water is provided by a roof-mounted, three-panel active solar collector (84 square feet).



A-A

The passive solar system in this house is expected to satisfy a large part of the annual heating demands. Consequently, use of mechanical equipment has been kept to a minimum. The designer/builder believes such equipment not only raises initial construction costs and requires constant maintenance but also decreases the owner's appreciation of the climate control inherent in the design.



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.

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