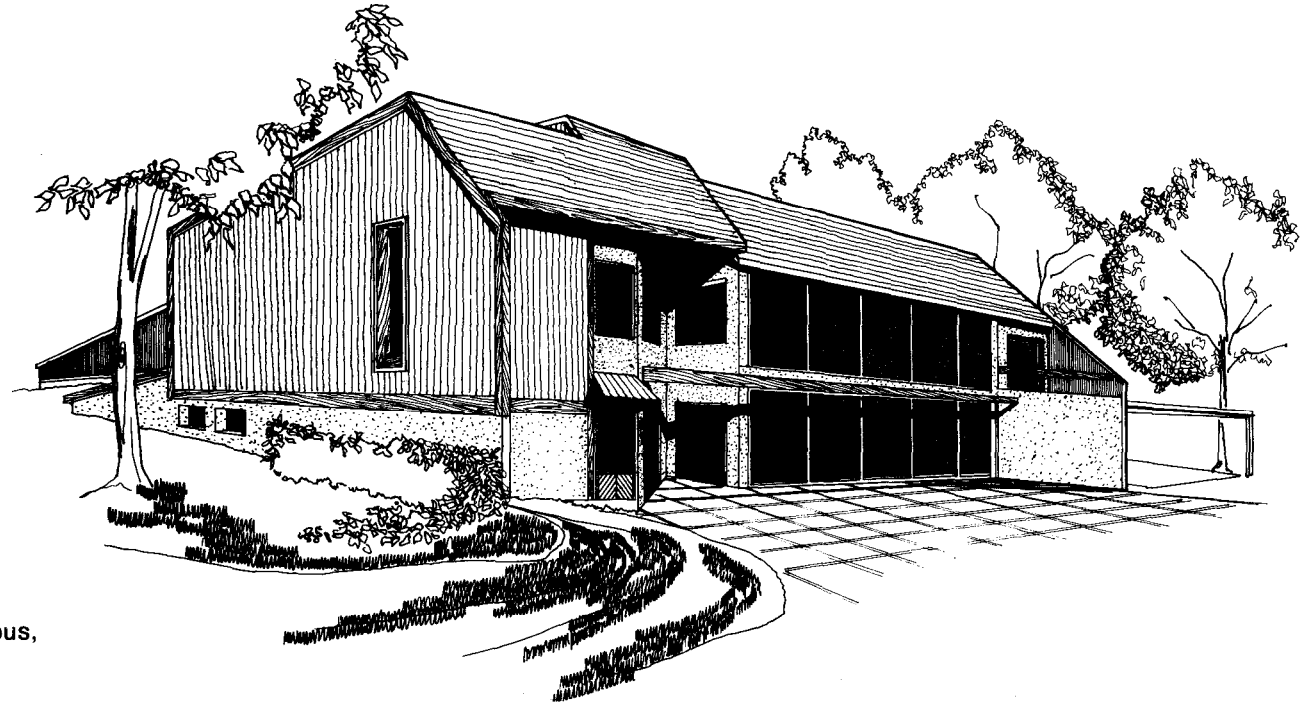
Dublin, OH



Builder: Solartherm Building Systems, Columbus, OH

Designer: Joseph Kawecki, Columbus, OH

Solar Designer: Joseph Kawecki

Price: $90,000

Net Heated Area: 1828 ft²

Heat Load: 64.7 x 10⁶BTU/yr

Degree Days: 5702

Solar Fraction: 41%

Auxiliary Heat: 3.64 BTU/DD/ft²

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

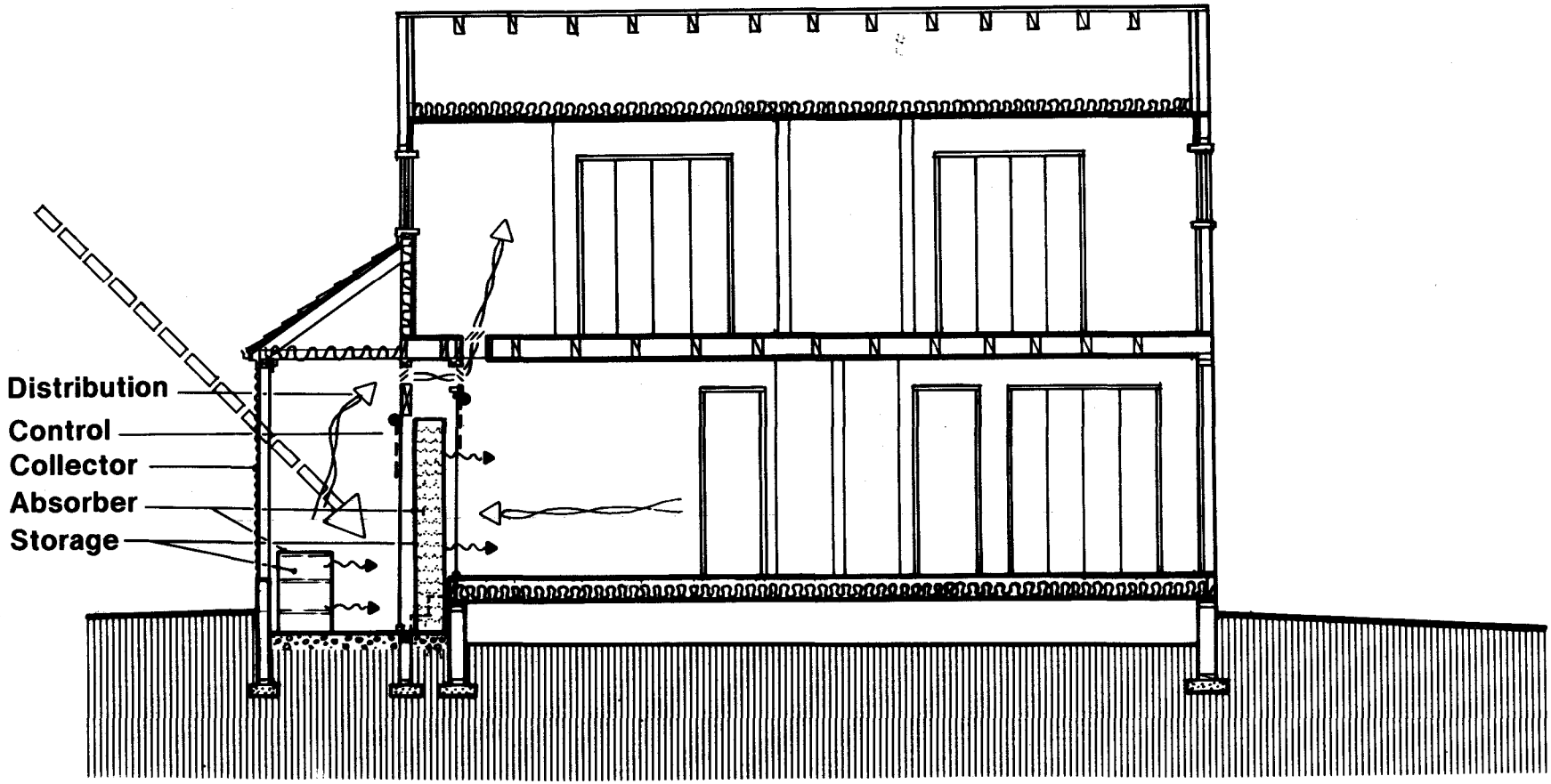
Recognition Factors: Collector(s): Double-glazed panels, sliding glass doors, greenhouse glazing, 524 ft² **Absorber(s):** Greenhouse masonry wall, tile-covered concrete floor slab **Storage:** Masonry wall, concrete floors—**capacity:** 13,416 BTU/°F **Distribution:** Radiation, natural and forced convection **Controls:** Thermostats, insulated blinds and shutters, overhangs

Back-up: Electric resistance heater (20,000 BTU/H), woodburning stove

The primary solar **collector** for this modern 3-bedroom home is the 2-story atrium. Its facade has 10 double-glazed acrylic panels facing due south and a pair of sliding glass doors, with windows above them, that face southwest. U pper- and lower-level rooms to the west of the greenhouse **collect** solar heat directly through their windows. In the great room on the lower level, sandwiched double-glazed sliding windows, with a 6inch air cavity, face south, and a pair of sliding glass doors face southeast. The two bedrooms above the great room have tripleglazed windows facing south and sandwiched double-glazed slider windows-with an 8-inch cavity-facing southeast. The master bedroom to the east of the greenhouse on the upper level receives sun through operable windows that face onto the greenhouse and double-glazed sliding doors leading onto a wooden sundeck. The workroom below the master bedroom and the room adjacent to it are connected to the greenhouse by sliding doors and receive some radiation through them.

Absorption and **storage** of heat within the greenhouse is in a 2-story high, 12-inch thick masonry wall, and a tile covered, 4inch concrete slab floor. Heat is **absorbed** and **stored** in the "alternate" room by a similar flooring, and in the workroom by a bare concrete slab. There is no thermal storage capacity in the great room or any of the bedrooms.

Heat is **distributed** by radiation from the storage masses, and by natural and forced



glass glazing. Just inside the greenhouse are 11 water-filled 55-gallon drums to **absorb** and **store** the solar energy. Five feet away is the living room water wall that consists of a row of 10 open water-filled fiberglass tubes that also **absorb** and **store** the sun's heat. To each side of the water wall is an open 3-foot wide set of stairs up the living room that also allows a flow of heated air to be **distributed** from the greenhouse. Four sliding glass door panels enclose the water wall. They can be arranged so that the tubes are closed off from the living room or from the greenhouse, or from both (or the open wall is closed off). Each panel is equipped with a roll-down insulating shade, and above each set of sliding panels and glass tubes there are operable through wall vents. All of these arrangements make it possible to carefully **control** the amount of heat passing from the greenhouse to storage and to the living area.

Additional **controls** consist of an attic fan, six operable floor vents in the upper floor (three of which are fan-assisted), four operable floor vents on the lower floor, and six operable vents between the crawl space and the greenhouse.

In the winter, sun is collected in the green-house, heating the water in the drums and the tubes. The sliding panels are adjusted by day to **control** the amount of convection from the greenhouse and convection induced by the tubes. Vents to the upper floor are open or closed as necessary to heat
the upper floor. At night, the insulating shades are lowered to cover the greenhouse glazing and the water wall, while the water wall panels are positioned to isolate the tubes from the greenhouse if necessary. The tubes radiate stored heat to the interior and also induce convection to heat the second floor.

In the summer cooling mode, the floor vents to the crawl space are opened during warm water as part of the cooling mode. Two air intakes located at the northwest corner of the lot are connected to the crawl space by PVC pipes that are buried 4 feet deep. During the day, the sliding panels (with insulating shades down) are moved to isolate the water tubes from the greenhouse. Heat radiates from the first floor living spaces to warm the water in the tubes. At the same time, the attic fan can be activated to draw air from outside through the crawl space and up to the attic where it is exhausted. The air is cooled by its 55-foot underground run into the crawl space. At night the panels are reversed so that the tubes are is01ated from the living room and opened to the greenhouse.

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.