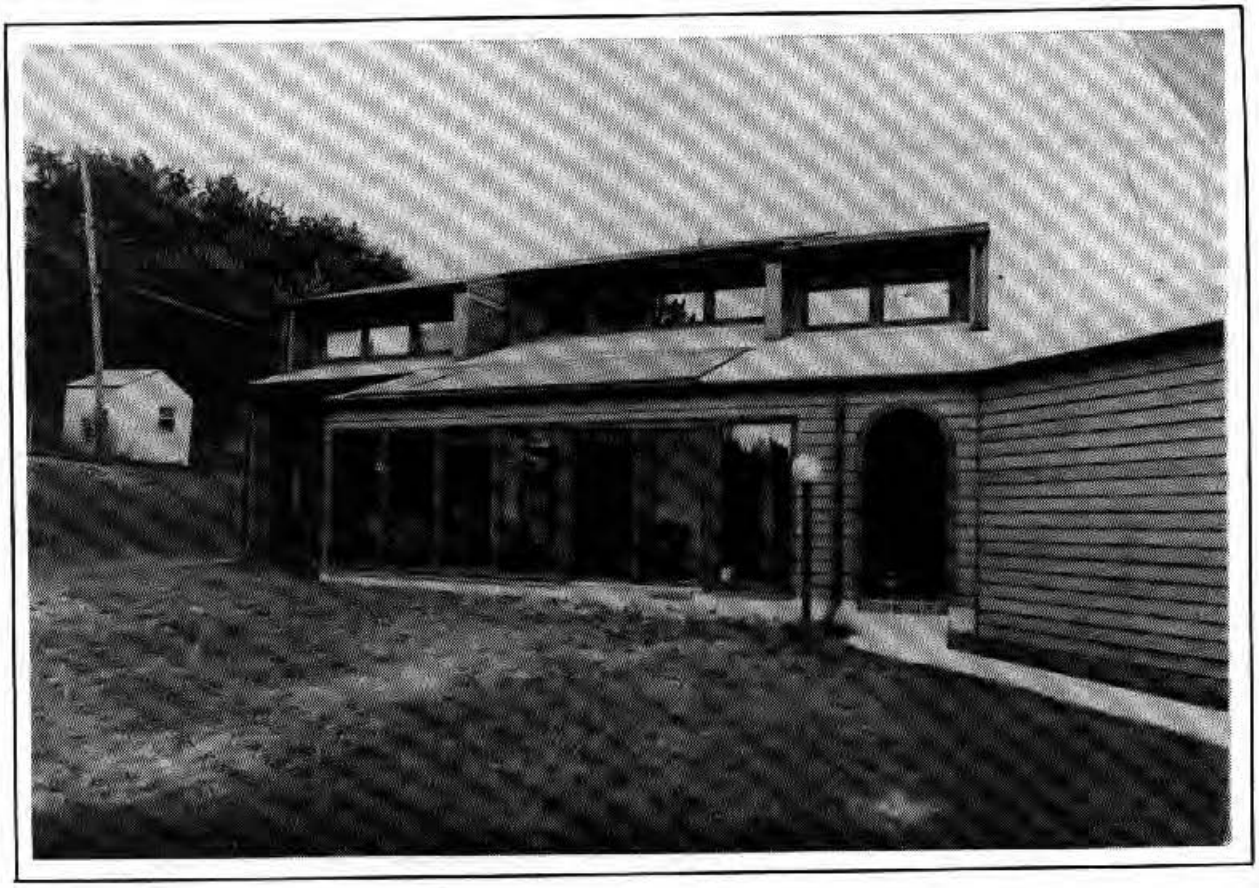
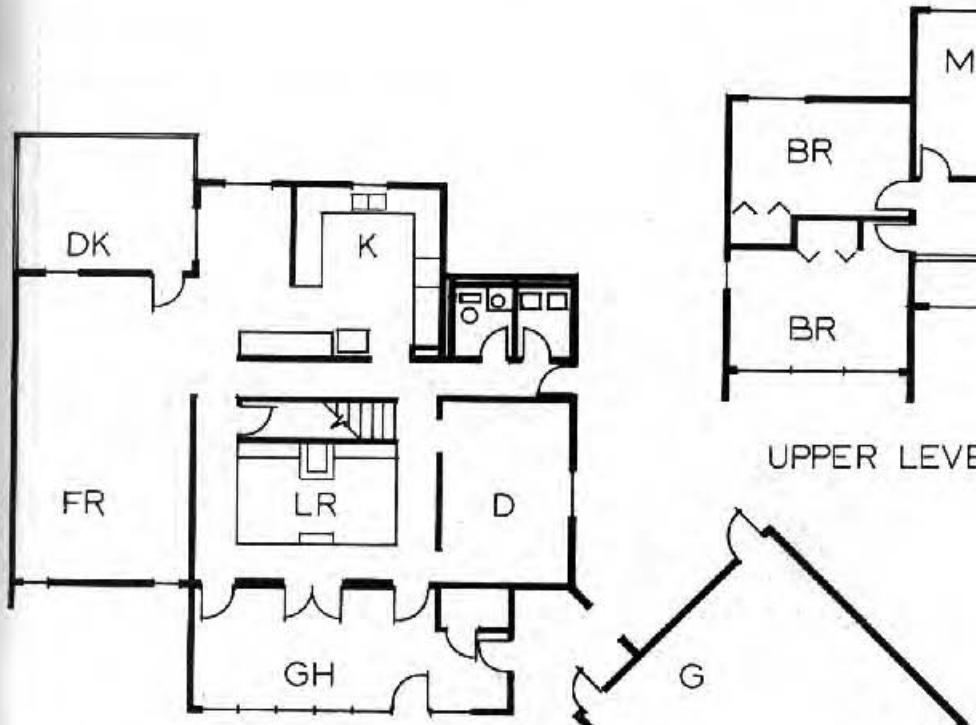


The Coren residence was designed by Robert Youngberg, director of the University of Nebraska-Lincoln Solar Resource Development Office. The four bedroom, two-story frame house with basement has 2800 sq ft of living space. It is primarily a direct gain and greenhouse design, although it also utilizes a Trombe wall. Backup heat is supplied by a groundwater source heat pump.

The 90 sq ft of direct gain glazing in the Coren house includes the clerestory windows which provide light to the upper level bedrooms as well as to the hallway that is open to the living room below. The living room also receives sunlight through the glazing that separates the greenhouse from the living room. Another 90 sq ft of glazing is located in front of a vented Trombe wall in the family room (opposite left).

The majority of solar glazing -- a total of 200 sq ft of vertical and sloped glazing -- is in the attached sunspace/greenhouse which is connected directly to a vestibule that functions as an airlock entry (opposite right). A thermostatically controlled fan charges a rockbed beneath the sunspace with solar warmed air. Unfortunately, when it is extremely cold outdoors, heat losses from the sunspace are substantial. Heat stored in the rockbed is lost to the sunspace, and, therefore, is unable to be used for heating the house.

The Coren home was monitored under a special program by the Solar Energy Research Institute (SERI) which is headquartered in Golden, Colorado. For a test period from 1981 to 1982, the calculated passive solar contribution ranged from 10% to 41%. The building is, however, very tightly constructed -- the air infiltration rate was measured to be 0.39 air changes per hour. Based on SERI data, the TIF for the Coren house is calculated to be slightly over 2.0.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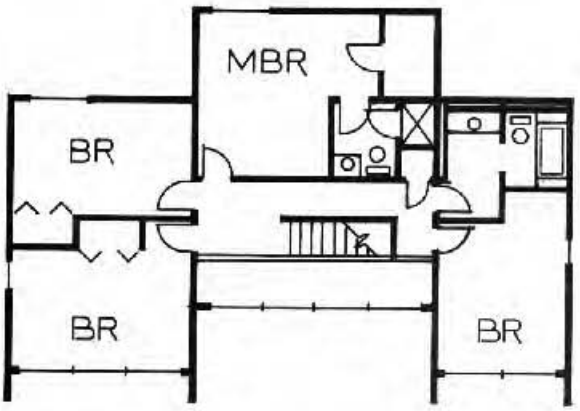
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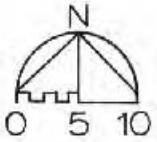
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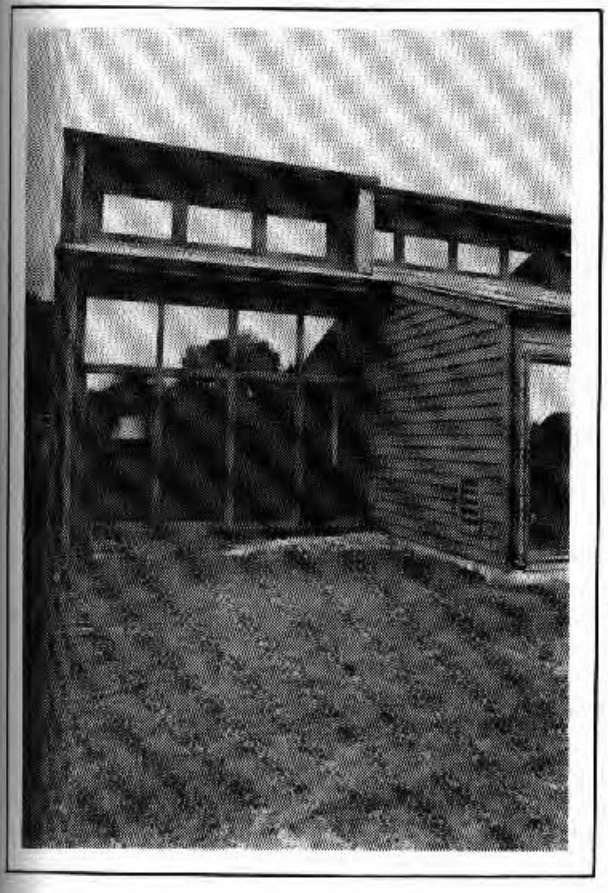

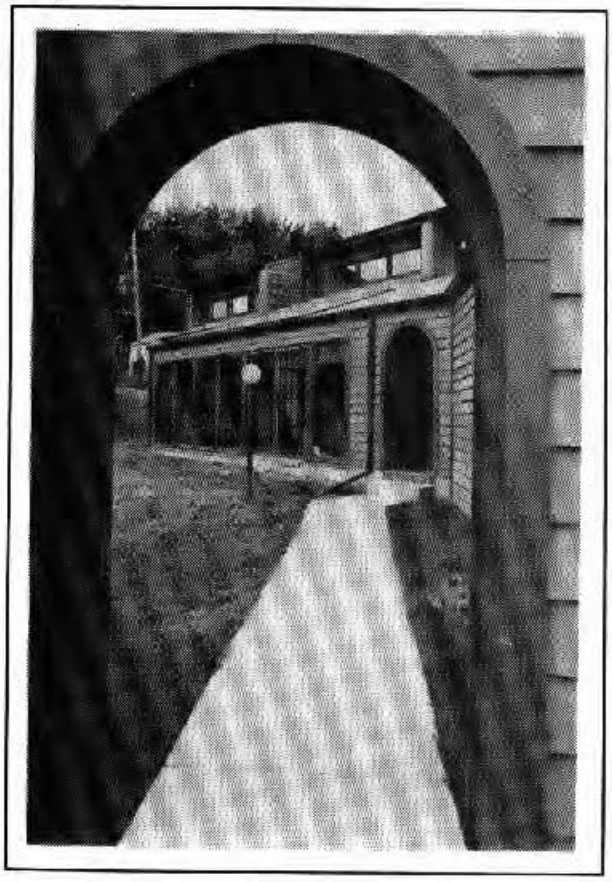

R. JOHNSON

OMAHA

DIRECT GAIN-GREENHOUSE

The Johnson home, designed and built by the owner in 1979, is a compact dwelling with slightly less than 1100 sq ft of floor space. The house combines energy conservation strategies with direct gain and greenhouse passive solar approaches so effectively that the only backup heating system, a Vermont Castings wood burning stove (opposite left) is only needed occasionally during the winter.

Energy conservation strategies in the Johnson house include earth bermed against three sides of the house, an airlock entry, R-27 east and north walls, an R-31 west wall, and 5" of Thermax rigid insulation in the roof.

160 sq ft of Andersen triple glazed windows in the living room admit for direct solar gain. Solar heat is absorbed by the brick living room floor. Warm air from the room is used to heat a rock bin containing 40 tons of thermal mass. Unfortunately, the rock bin storage is not working to the owner's satisfaction. Warm air within the house is prevented from escaping through windows by the use of Window Quilts in the winter. During the summer, warm air is vented through the operable windows above the fixed glazing in the living room (opposite left).

The greenhouse, the other major passive solar heating system in the Johnson house, provides the owner with fresh vegetables throughout the year. The greenhouse is insulated to a level of R-35, although night insulation is not used on the 130 sq ft of quadruple paned glass. Overhangs and hanging plants (opposite right), like Passion Flower, as used for summer sun control.

A Sunworks active solar water heating system over the greenhouse (opposite right) provides hot water for domestic use as well as to a hot tub located just behind the greenhouse. The closed loop antifreeze system is pump-driven.

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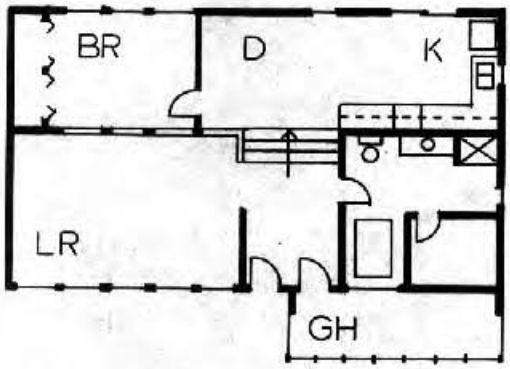

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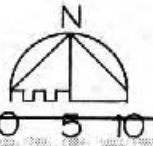
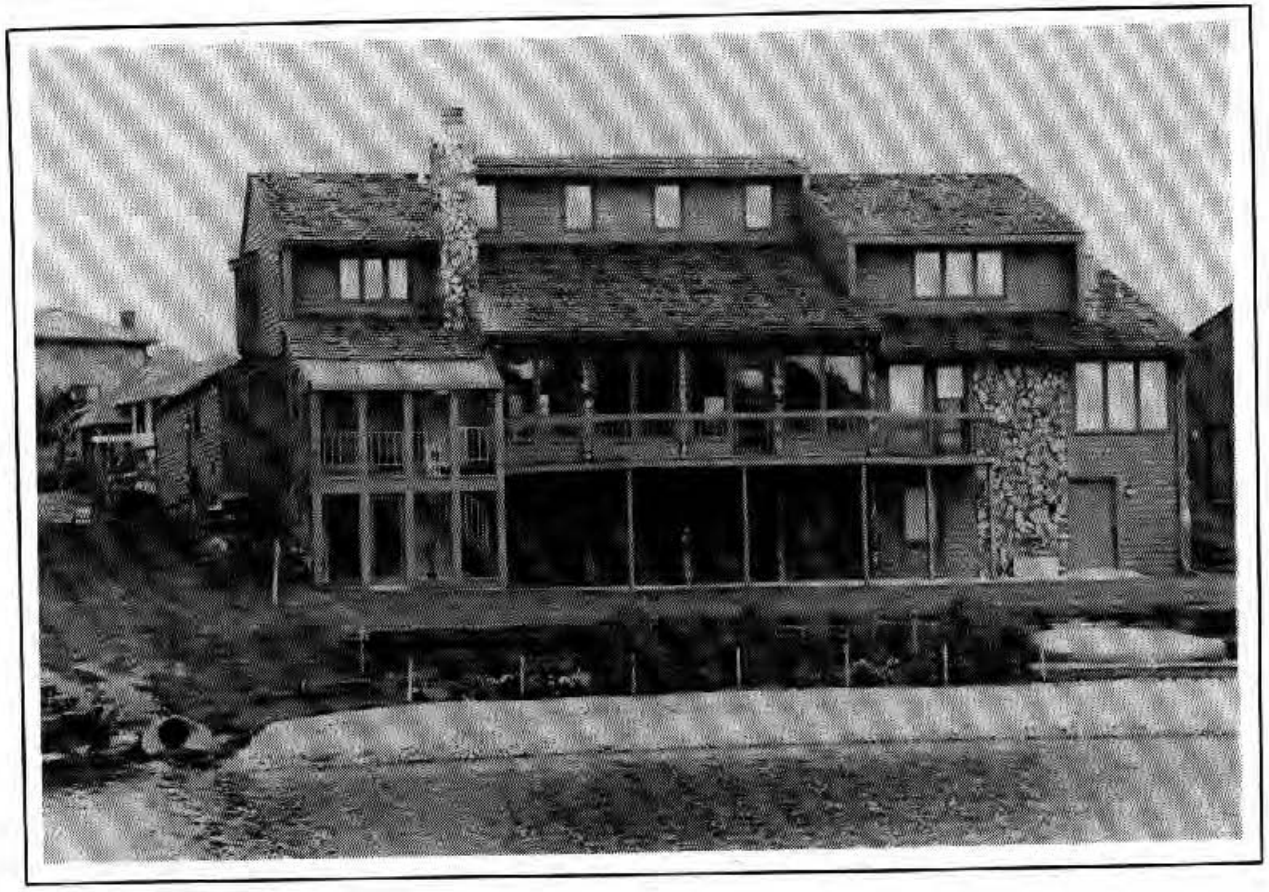


O'DONOHUE

OMAHA

DIRECT GAIN-GREENHOUSE



The O'Donohues have lived in their spacious 5300 sq ft home overlooking west Omaha's Lake Candlewood to the south since September of 1982. The five bedroom two-story house, with a family room and storage located in the basement, was designed by Norm Reece of Design Associates of Omaha. Solar consulting was provided by Solar Energy Associates, also of Omaha.

The O'Donohue house combines direct gain and greenhouse passive solar heating strategies. The house has approximately 500 sq ft of Pella windows — mostly vertical and facing south to provide direct gain passive solar heating. The clerestory windows (opposite right) allow sunlight to reach the upper level rooms as well as the hallway which, open to the great room below, provides an excellent view of the massive stone fireplace along the west wall. Ceiling fans located throughout the house are used to circulate air and prevent air stratification in the high ceilinged rooms.

A two-story attached sunspace with vertical and sloped glazing is located just off the kitchen area. The sloped glazing makes it necessary to vent the space in summer. A spiral staircase located in the greenhouse connects the kitchen area to the lower level and provides access to the outdoors. A deck with a beautiful view of the lake (opposite left) is accessible from the greenhouse as well as the great room.

Two heat pumps and two gas furnaces provide for supplemental heating and cooling. Despite the absence of night insulation for the direct gain windows which would improve thermal performance, this large home has a computed TIF of just over 3.0.

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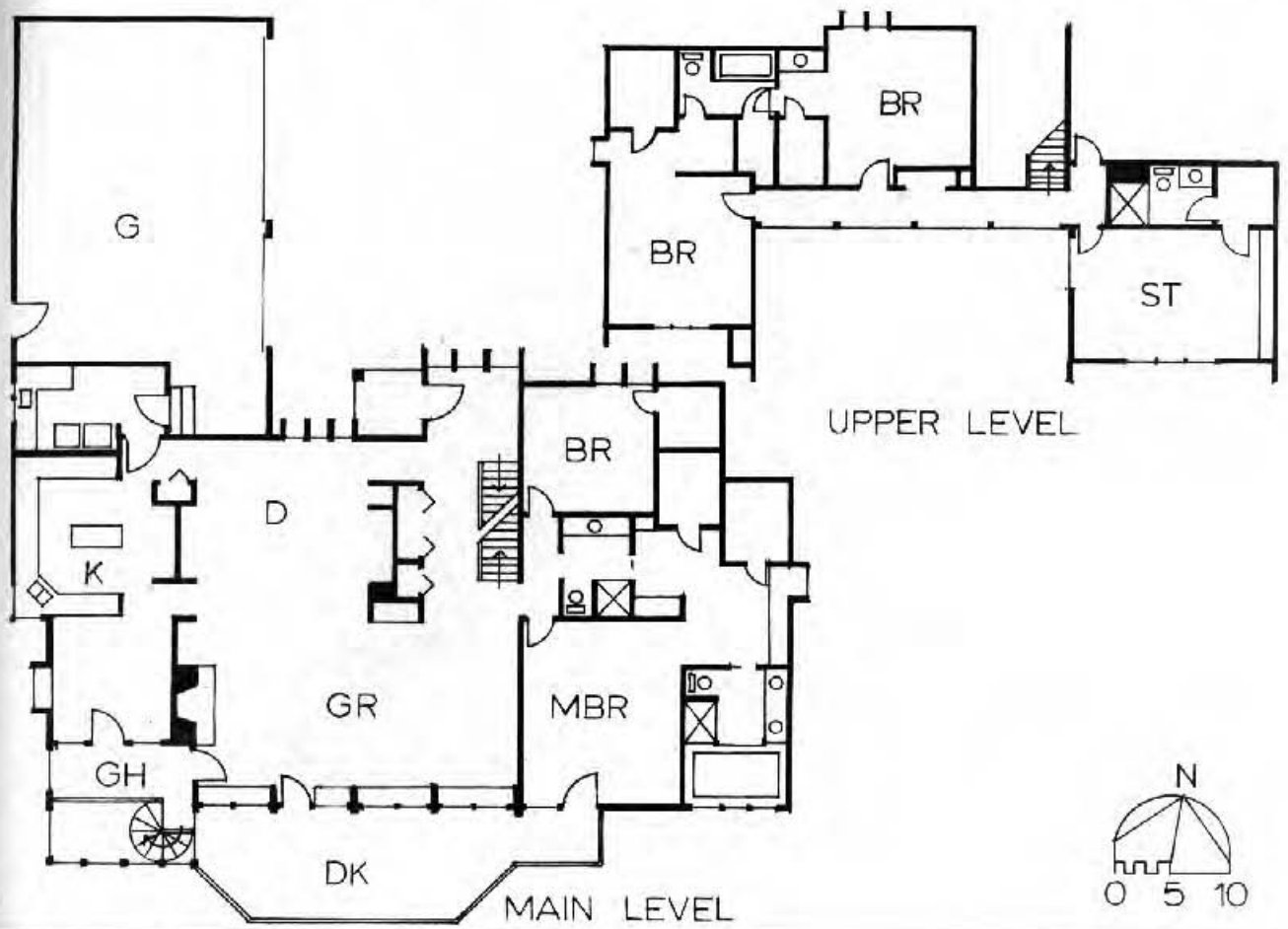

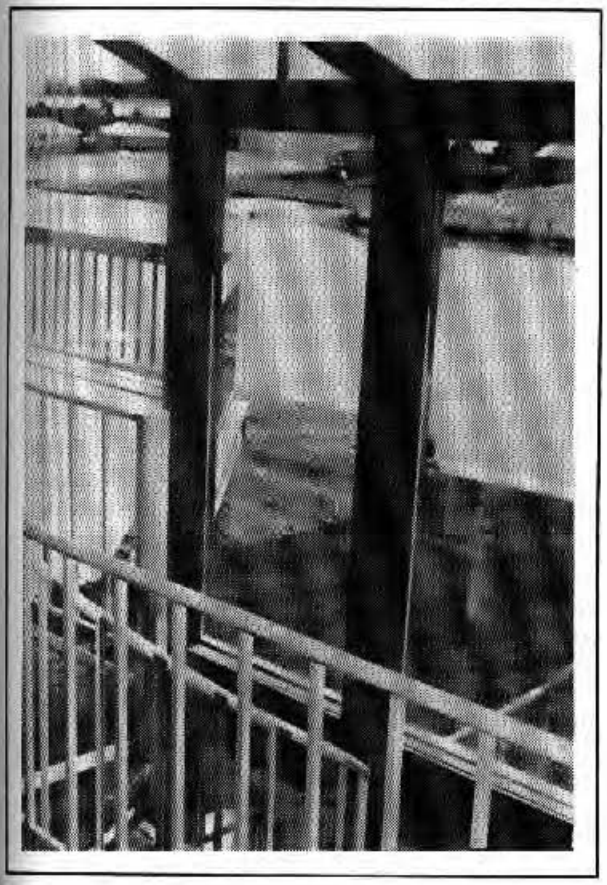

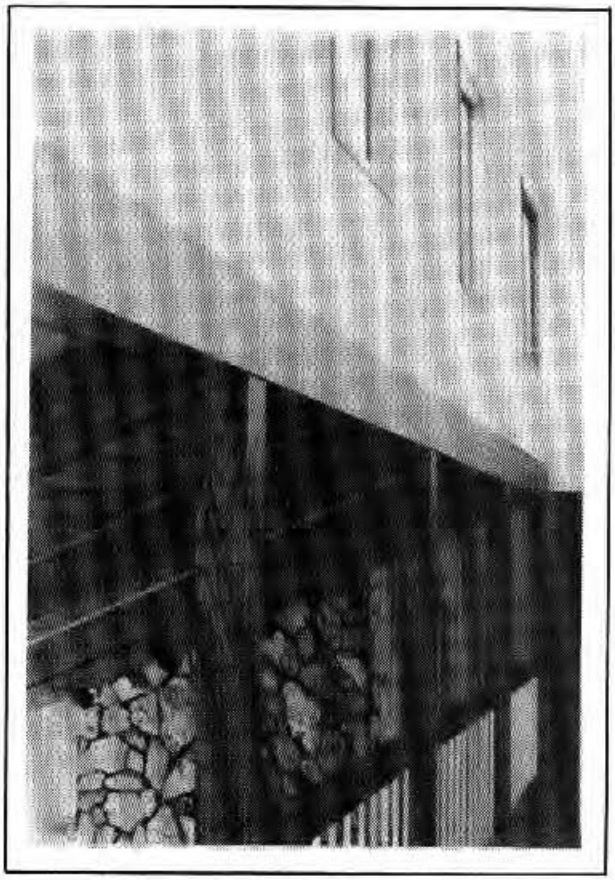

The Moran home, designed by the owner -- with solar consulting assistance provided by Solar Energy Associates of Omaha -- and built by the owner, is an energy conserving home that relies on a combination of direct gain and greenhouse passive solar space heating techniques. It is also an excellent example of economic space design. In fact, a delegation of solar experts from the Peoples Republic of China touring solar projects in Nebraska felt that, of the houses they visited, the Moran house most clearly exemplified their ethic of using resources and space wisely.

The three bedroom house has 1100 sq ft of living space divided between a main level for daytime activities and a lower level for sleeping. Although the house is compact, the main level seems spacious because of its open floor plan -- which includes a loft in the vertical space above the kitchen (opposite left), because of its vaulted ceilings, and because considerable light is admitted through the clerestory windows and the windows to the greenhouse. As recommended in passive solar houses with rooms with vaulted ceilings, the bedrooms are located in the lower level where minimal air stratification will occur because the rooms have ceilings of conventional height.

Energy conserving features such as a double door main entry and no windows on the north side of the house help minimize the heating loads. Although some solar heat is generated through the direct gain clerestory windows, most of the solar heat is provided by the greenhouse with its 320 sq ft of economical translucent filon glazing. Because the greenhouse is accessible from the bedrooms (opposite right), sun warmed air from the two-story, 239 sq ft sunspace that spans the entire front of the house can be used to heat the lower level.

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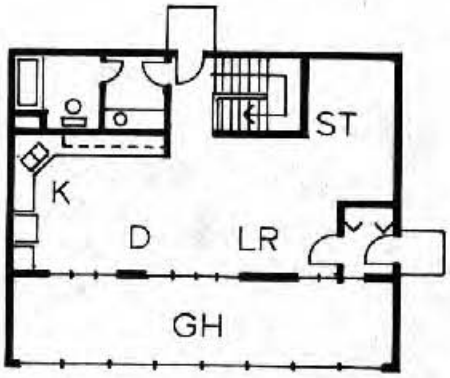
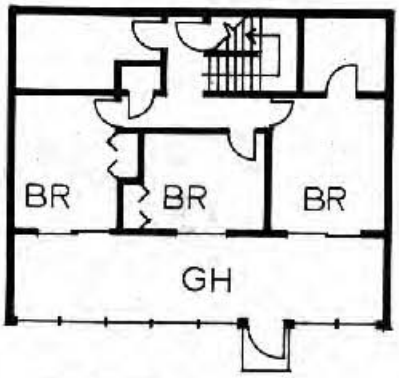


MAIN LEVEL



LOWER LEVEL