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DAVID BAINBRIDGE:

JON HAMMOND: ANOTHER QUIET SOLAR ENERGY PIONEER

The big corporations and government agencies get the headlines every time they announce another improbable mega-buck "solution" to the "energy crisis" . . . but, so far, it's the little guys who've been building the hardware that works.

Little guys such as Steve Baer and Harold Hay, both of whom have shown that a house can be quite satisfactorily solar heated in the winter and solar cooled during the summer . . . with nothing more than drums or "beds" of water and a few movable, insulated wall or roof panels.

And now there's a third little guy out in Winters, California who's quietly using Baer's and Hay's ideas to push back alternative energy frontiers of his own.

Jon Hammond was born 31 years ago in Richmond, California and–a couple or three years back–found himself with a bachelor's degree in landscape architecture, a master's in ecology . . . and working as a teaching fellow at the University of California at Davis. It was then, thanks to his degrees and his experience in his chosen fields, that the city of Davis asked Jon to help prepare an official energy conservation policy for the town.

Hammond–along with Marshall Hunt, Lauren Neubauer, and Dick Cramer–set to work on the project with a clean sheet of paper and a right good will. And eventually, after much soul searching and exhaustive research, they brought forth a milestone study entitled *A Strategy for Energy Conservation: Proposed Energy Conservation and Solar Utilization Ordinance.*

Much of the report dealt with simple "we can do it now" ideas that the residents of Davis could use immediately to make their homes, their neighborhoods, their whole town more pleasant and more energy efficient. That part of the study alone was more than worth the effort which went into it. Still, in many readers' opinion, the real zinger in the new Davis ordinance is the chapter on solar energy prepared (at Hammond's request) by Steve Baer.

Jon had met Steve a few years before while filming a movie about the "alternative architecture" which was then springing up all over New Mexico. Since Baer at that time was deeply involved in the Albuquerque area with the design and construction of domes (and his own zomes) from such unlikely materials as junked car tops, it was inevitable that Hammond would become acquainted with Steve's work.

Baer's super-simple experiments with solar energy ("put something black out in the sun and it'll get hot") particularly fascinated Hammond. So much so, in fact, that–once the city of Davis had assigned him the job of drawing up the new energy ordinance–he immediately asked Steve to contribute his ideas about harnessing the sun for household heating and cooling.

Steve Baer's chapter in the report explored three relatively simple and low-cost solar systems that, in his opinion, were especially suited to the Davis area: [1] the "drum wall" heating/air conditioning design that Baer had installed in his own Corrales, New Mexico home (see MOTHER NO. 22), [2] a modified version of the Harold Hay "water bed on the roof" heater/cooler, and [3] a "rock loop" setup.

And that, finally, was the undoing of Jon Hammond. Because, after reading Baer's chapter, Jon knew he just *had* to start building some solar heating/cooling systems of his own.

Hammond began with the old farmhouse that he and his wife lived in. "We completely renovated the place" he says. "Re-sided, reroofed, and insulated it. We put insulated shutters on the windows too. And then we replaced the whole south side of the building with a drum wall."

All in all, the Hammonds spent approximately $10,000 remodeling the frame house. Only a small portion of that amount was directly paid out for the solar heating system, however, since one of the main components of the setup–the barrels–was obtained free.

Jon estimates that his renovated dwelling now derives about 80 to 90% of its winter heat from the sun. "We haven't run any really controlled tests on the place," he says, "but I can tell you this: Two winters ago–before the conversion–we kept both a gas heater and a Franklin fireplace stoked up to maximum output all the time, and we never were comfortable. We just couldn't keep warm. Last winter, though–after the remodeling and without the gas heater at all–we were always warm . . . and we only burned one-third of a cord of wood in

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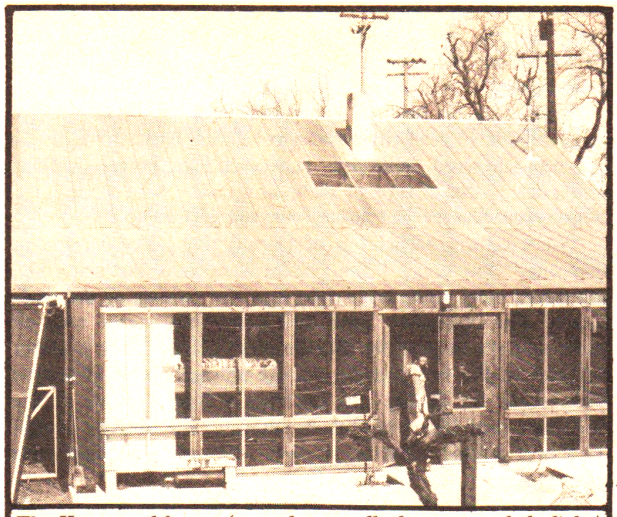
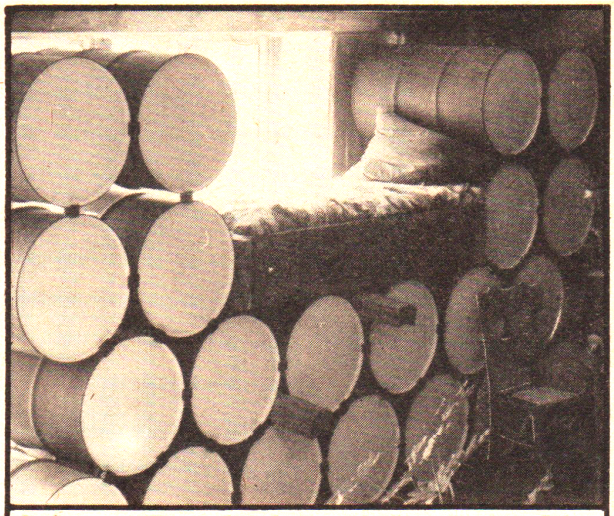
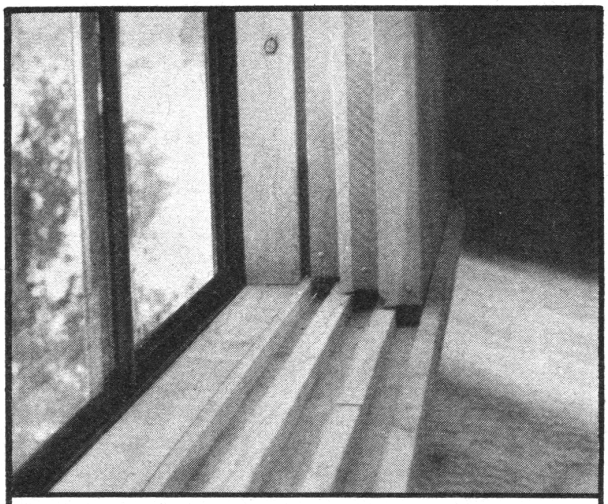


The Hammond house (note drum wall, shutters, and skylight).



Jon's waterbed, snuggled in among the heat-absorbing drums.

Another view of the Hammond house, showing the solar water heater attached to the home's south wall (in foreground).



Insulated shutters, a highly effective temperature control.

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the Franklin. We hardly used the fireplace except for December and January and the last blaze we needed at all was on February 6!"

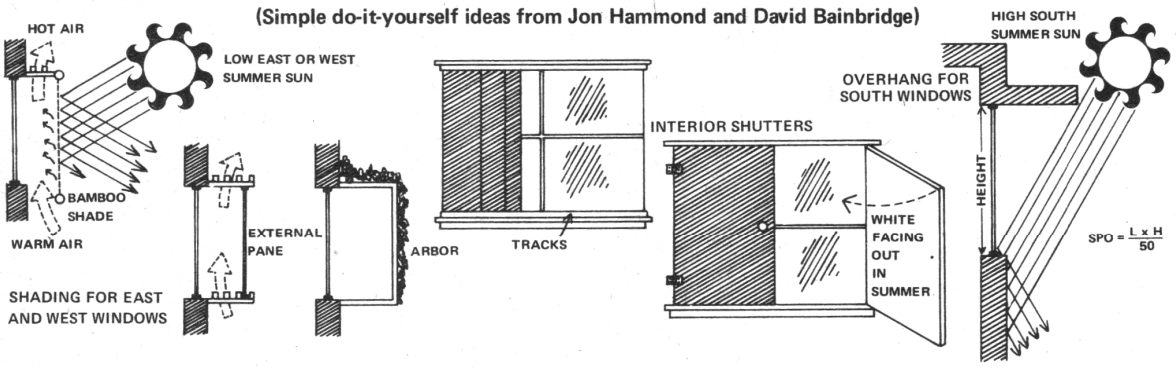
Inspired by his success, Hammond let it be known that he was available to plan and/or construct other energy-conserving and sun-tempered buildings. It wasn't long before a Davis professor of the history of technology asked him to design a solar-heated and -cooled house from the ground up.

"We used a modification of Harold Hay's Sky Therm on that one," Jon says. "The system is nothing but some big, galvanized steel tanks built right into the ceilings of the main rooms. The containers hold 300 cubic feet—seven tons—of water and are covered by thin sheets of plastic. They're either exposed to the sun and the outside atmosphere or protected from them by raising and lowering a large section of the building's roof like a big lid. In addition, the bottom of that lid acts as a huge reflector, to direct even more sunlight onto the water when the roof is up."

How well the Sky Therm radiates warmth into the rooms below during cold weather remains to be seen (Jon figures the

SOLAR HEATING AND COOLING GUIDELINES FOR WINDOWS

(Simple do-it-yourself ideas from Jon Hammond and David Bainbridge)



The windows on an average house here in the United States are responsible for about 50% of the building's heat gain during the summer and 50% of its loss in the winter. Anyone interested in solar heating and/or cooling a residence, then, would be wise to pay particular attention to making the windows on his or her home do exactly what he or she wants them to do. Luckily, some rather minor changes can be made to windows to markedly improve their thermal performance.

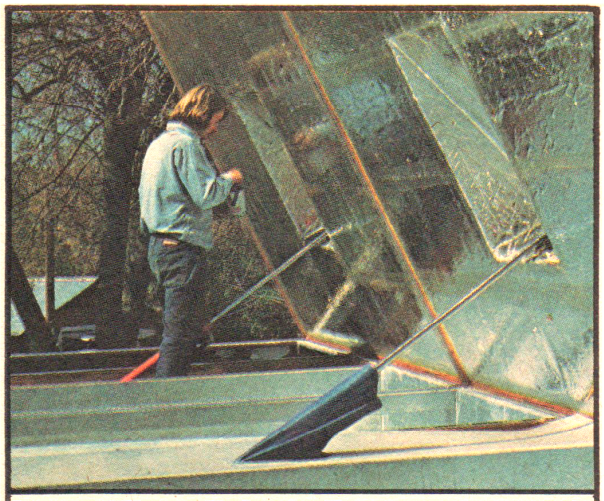
A great deal of a building's summer heat gain comes in through its east and west windows. You can control this temperature buildup to a large extent by putting a screen of vegetation, a bamboo shade, a *bris-de-soleil*, or an extra pane of glass right over (but a little distance from) the glass already in the opening. This can, of course, become somewhat expensive if you have a large number of windows to cover . . . since the necessary trellises and/or framing must be built strongly enough to withstand wind, rain, etc.

For this reason, you may find it easier and less costly to fit your east/west windows *on the inside* with insulated shutters made of either fiberglass or urethane foam. That's *shutters*, not drapes. Interior drapes are less effective and can even increase heat gain within a house unless they're well-sealed around their edges and across the top and bottom.

South windows are a different story. If properly protected by an overhang, they can be shaded from the high summer sun *and* allowed to admit Ole Sol's warming rays when the sun is low in the winter sky. You can calculate just how far such a projection should extend out over any window by multiplying the height (in inches, feet, meters, or any other unit of measurement) of the opening to be protected by your home's latitude and then dividing by fifty. The overhang can then be constructed of either solid material or slotted . . . or covered with vegetation.

The colder the climate in which you live, the fewer north windows your house should have. Cover the ones you don't need—inside and out—with insulation and board them over. Or fit them with insulated internal and/or external shutters which can be opened during the summer but tightly fastened against frigid January winds.

North, south, east, or west (but *especially* east or west) . . . *any* window will admit less heat during the summer if it's protected by one or more large trees. Direct shade accounts for much of the saving, but the evapo-transpiration of the foliage (which most people completely overlook) is quite important too. The microscopic mist of water that a large tree expels into the air on a hot summer day can cool the surrounding atmosphere as much as a multi-ton air conditioner.



Hammond at work on the lid of the solar house's roof unit.

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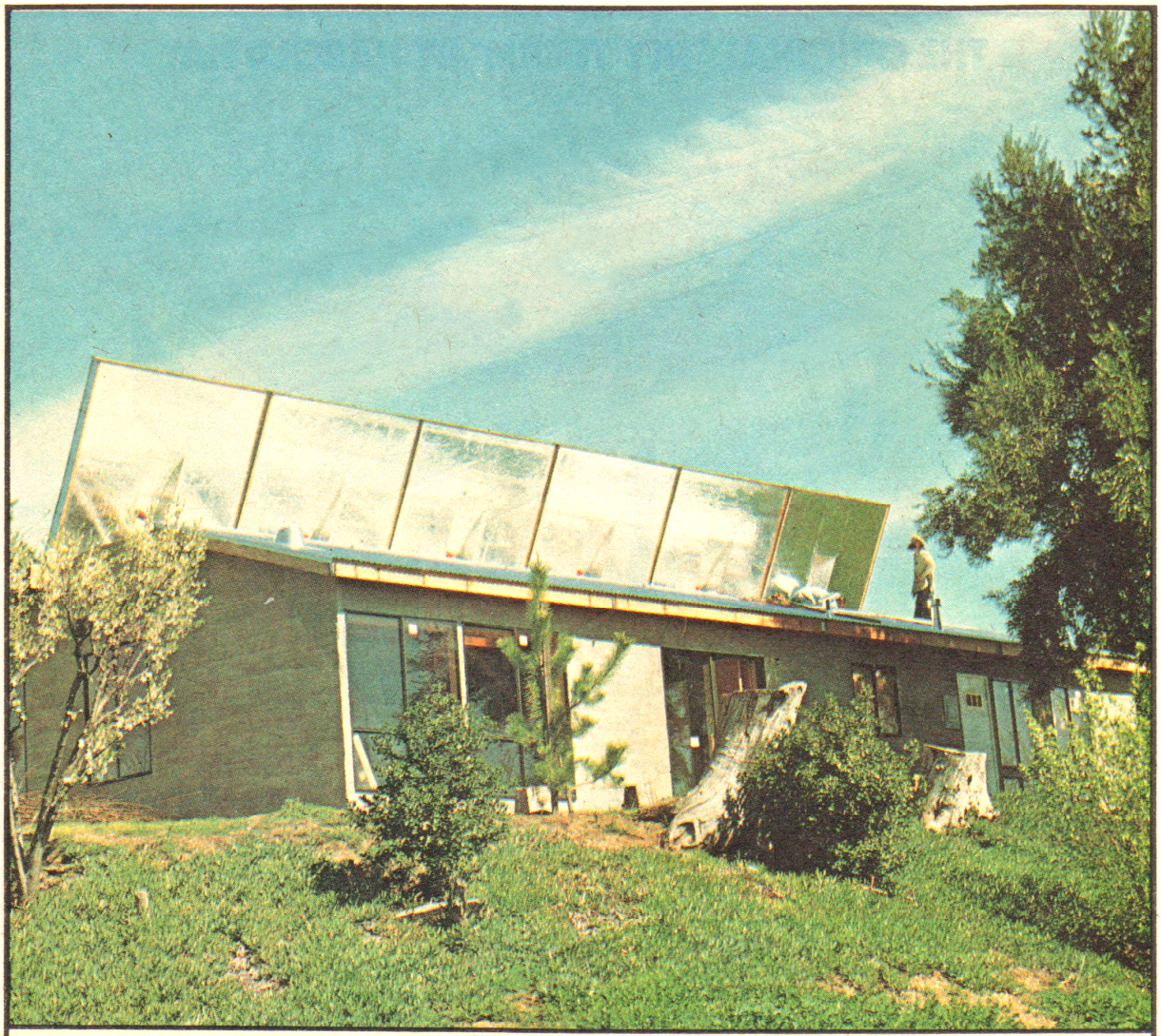
energy conserving" homes that eventually will be erected in Davis. ("We're gonna make 'em *more* than energy conserving," says Jon. "We're gonna solar heat 'em too.") And, during its spare time, Living Systems is doodling up a "partly underground, solar-heated" workshop for itself.

In addition to all these specific projects, Hammond's consulting firm still finds time to handle the larger analyses that got Jon into the house designing business in the first place. Living Systems has been retained to do a version of the Davis ordinance for both Indio and Chico, California . . . and the company recently completed a most interesting study of a proposed nuclear installation for the city of Sacramento.

"They want to spend one billion dollars putting that nuclear plant in," says Jon, "and they claim that they've just got to have it. Yet our analysis shows that if we spend $2,000 on every residence in Sacramento to make the town more energy conserving, we can save as much power as that plant will ever generate . . . *at a total cost of only half a billion*! We've got to quit thinking that the answer is always *more*."

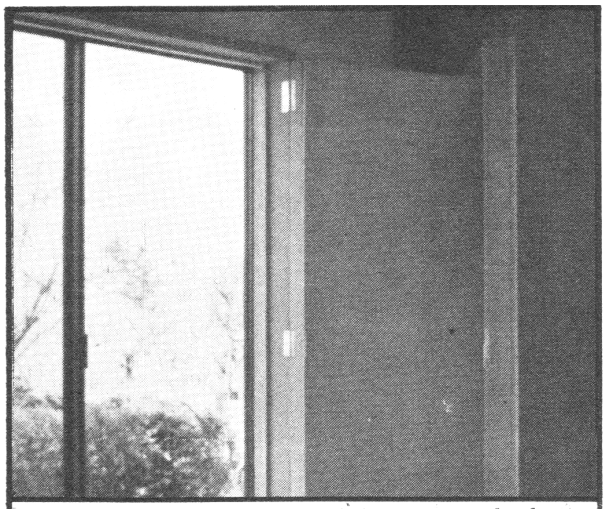
After two and half years of grappling with energy problems



On sunny winter days, the tanks' cover is raised–as in the photo above–to allow the black water containers to absorb energy.

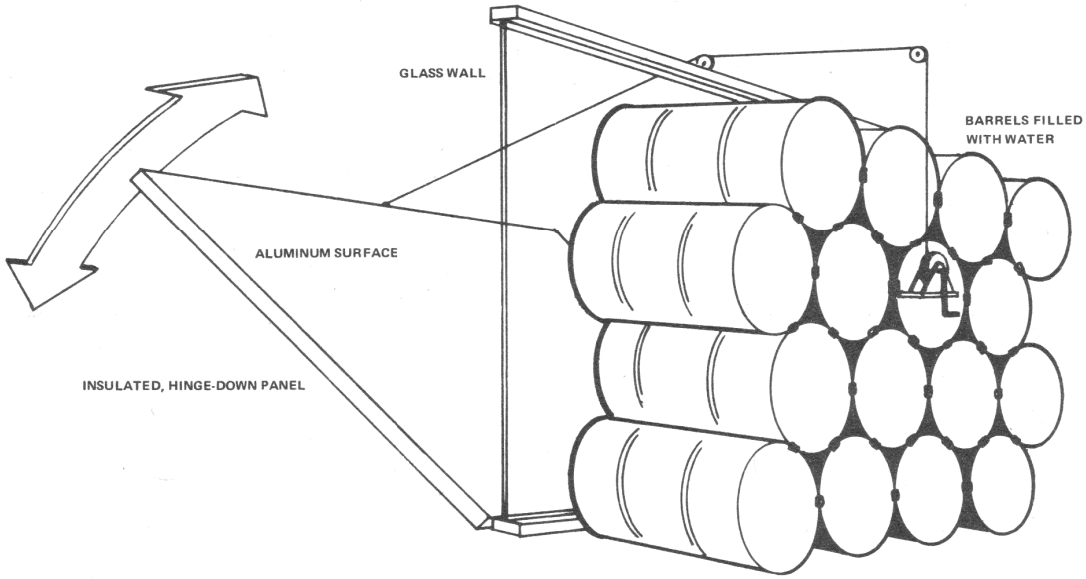
on both a general and a very specific scale, Jon Hammond now firmly believes that we can run our homes on no more than 10 to 20% of the power they now consume. "And that's only the beginning. We can make our towns and our cities resource- and energy-efficient too. We can rebuild them to a human scale, fine-tune them to local climates and resources, and make them self-sufficient . . . at least on a regional basis. And in the process, as painful and difficult as it will be, we may even discover ourselves." ⬭

If you'd like more of Jon Hammond's thoughts, you can order a copy of A Strategy for Energy Conservation *for $6.00 from Living Systems, Rt. 1, Box 170, Winters, California 95654. Jon will also be happy to discuss the possibility of acting as a consultant in the design of energy conserving buildings and solar systems. Remember, however, that he's a Good Guy operating on limited resources out of an office in his home. Any letters of inquiry to either Jon or Living Systems should include a buck or two for return postage and the privilege of an answer.*



Folding insulated shutters, ideal for use in solar homes.

STEVE BAER'S ORIGINAL "DRUM WALL"



The construction and operation of Steve Baer's original "drum wall" solar heating/cooling system is very easy to understand. The whole setup—complete—contains no expensive valves, pumps, plumbing, exotic fluids, eutectic salts, specialized plastic membranes, or space age photovoltaic cells. Nothing but 55-gallon metal drums (available free-for-the-hauling in most parts of the country) stacked up behind a wall of glass windows (recycled are OK) that can be covered and uncovered by a hinge-down, insulated panel operated by a small hand winch.

To fine-tune the system, face the let-down panel with aluminum (so that it becomes a giant reflector). You can also paint the drums black on their out-ends (so they'll absorb solar energy better) and white on the ends that point into the house (to improve their radiation characteristics and their appearance). That's it.

In the winter, the insulated panel is cranked down on bright days to allow the sun to shine directly through the glass and warm the water in the drums. Additional heat is directed at the barrels at this time as the aluminized surface of the panel reflects much of the solar-fall it receives through the full-length window too.

During winter nights and on cloudy days, of course, the hinged panel is kept up. This prevents the warmth stored in the drums from radiating back out through the glass . . . and allows it to heat the living space behind the containers.

That's all very obvious. What's frequently forgotten, however, is that the above process can work just as well in reverse. The water in the barrels, if desired, can also be used to absorb excess heat *from* the house for eventual radiation out through the glass. This is accomplished in the summer merely by leaving the insulated panel up during long, hot days . . . and then cranking it down at night.