The Microhouse: A Small Home You Can Build

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Author Rev. Bill Kaysing began applying principles of "microhousing" to help end the suffering of the growing population of homeless people.

Until recently, we, who live in the industrialized societies have felt and believed that ours is a world in progress – confronted by what we term “problems” but overcoming them, one by one. But during, say, the past 20 years, we have seen the problems no longer diminishing but becoming worse – much worse. Getting a decent place to live and bring up our children was simply something that everybody did in the course of one’s life, but now this seems possible for only a quite affluent few, even in supposedly prosperous America. As for the rest of the world, the matter of housing is rapidly turning into a disaster.

The Stanford Research Institute has predicted that by the year 2000, there will be 19 million homeless Americans. Why so many in this, the richest of countries? We have plenty of wood, cement, and labor. Why can’t affordable homes be built? During World War II, housing was constructed in a matter of days. I recall that the barracks that housed our ship’s company was erected in one week. While on leave, I saw similar structures for war workers built practically overnight. In one area, the military used church property, where they constructed dormitories that housed hundreds of men. In many parts of the country, the military also established trailer parks filled with small but comfortable homes on wheels.

People might argue that there was an emergency then, the war. But my reply would be: “There is an emergency now!” The solutions are all around us, however.

In 1940, I was 18 and my best friend was Jack Keefe. During a visit to his home he showed me a most unusual small dwelling. It seems that his parents became incompatible but rather than seek a divorce, Jack’s father converted a 6-by-12-foot, backyard, garden toolshed into a comfortable and quite lovable home. It featured a miniature kitchen, a convertible sofa bed, and a complete. though tiny, bathroom. With Momma in the big house and Poppa in the backyard, Jack and his sister were able to enjoy the company of both parents instead of having to cope with the problems of divorce.

I never forgot this intelligent solution to a common problem, so in 1985, with the help of a friend, I was motivated to recreate the backyard house to see what might develop. As cofounder of the Holy Terra Church in Aptos, Calif., which was started to help the sick and homeless, I began applying principles of microhousing to help end the suffering of a growing population of homeless people; and we’ve been putting up little houses ever since — not just in backyards, but wherever we can get away with it.

What's a Microhouse?

A microhouse is an affordable shelter for full- or part-time use by anyone for any rational purpose. The basic size is 8 feet by 12 feet, or 96 square feet, but they can be built to any desired dimensions. Two or more can be linked with a breezeway and effectively form a two- (or several) room home.

What materials do I need?

Plywood, chipboard, 2-by-4s plus nails, windows, doors, roofing, and miscellaneous items. That's all.

How much will it cost?

As of this writing, between $800 and $900 plus labor and space. See the charts in the Image Gallery for a full breakdown of costs.

Do I need much building experience?

Anyone who can pound a nail and use a saw and read simple plans is more than capable. For the experienced builder, one day is enough to complete construction. For the inexperienced, not over two days with a helper.

100 square feet! Are you kidding?

Millions of Americans already live in one small room. Others live in RVs and boats. Countless people will attest that a small space, easy to clean, heat, and cool, is more than livable. And if you are constructing a larger home and would like to live “on site,” no solution is cheaper and more practical than the construction of a microhouse.

By adding a rug, curtains, a small wood heater, loft bed, sink, multiflush portable toilet, a sun-heated shower plus a low-voltage lighting system, table/desk, and chairs, the microhouses become as livable as many larger shelters.

Are they legal?

Structures under 120 square feet are exempt from Uniform Building Code permits. Under the Mello Act, in California, a secondary house under 640 square feet and housing at least one person over 60 is legal. All people have a right to protect themselves from the elements, so any conflict with the health department might be resolved on a one-on-one basis.

Materials for Construction

The homes are built of simple, straightforward materials: plywood, 2-by-4s, standard nails, hardware, and windows. Of course there are many possible variations

that will be considered with respect to economy and availability.

It is always surprising to me how quickly a microhouse can be built. Going from what is initially just a bare platform to a cozy, enclosed, fresh-wood-fragrant shelter is always an exciting miracle. The standard 4-foot-by-8-foot sheets of plywood used for the project are strong, light, and beautiful with their rich, Douglas fir grain, and the finished home requires only 16 sheets of this ordinary (really extraordinary) wood. Less expensive chipboard can also be considered as it is similar to plywood in many ways.

Framing for the ply is usually 2-by-4s of Douglas fir since these standard sizes lend themselves to all the finish items such as doors and windows. While it's true you could save a little money by using 2-by-2s, it is hardly worth it since many things just wouldn't fit. Also, you would have less space in which to place insulation, a most important consideration in cold climates.

Metal supports are an extra expense but can save time and make for a much sturdier structure. They are now used extensively in standard home construction and are thus appropriate for their smaller brothers and sisters. A common item is the hanger, that allows floor joists to be placed at the same level as the main supports, the massive 4-inch-by-6-inch rails which are the foundation

or keel for the microhouse. Another metal item of great utility is the patch plate, which can bond two wood items together with minimum nailing or splitting.

Nails have become more useful and durable with various coatings of plastics or other rust proofing. There is also the possibility of using bolts rather than nails so that the microhouse can be easily disassembled. Hinges and door hardware should be rustproof and of high quality to protect contents against theft.

Windows and doors can be new or recycled. The latter are now available in many communities through used lumber outlets. Also, one can sometimes find houses being upgraded where older windows and doors can be obtained free or at little expense. These two items can be expensive when purchased new so that buying them secondhand can comprise a significant saving. During our construction phases, we were almost always able to find used sashes and doors, but when they were not suitable we simply built our own from ply and glass.

Much produce and foodstuffs are now shipped in plastic-coated cardboard. If one needs to cut costs radically, it is possible to sheath a microhouse frame in this material, cut to fit and stapled or nailed on. If done neatly, it can provide a virtually free exterior that will last for a long time. It can also be replaced when necessary as

discarded boxes are available constantly. To make this expedient more acceptable, you can use battens to simulate a board and batt effect. Battens are thin pieces of light wood usually a half-inch thick and 2 or 3 inches wide.

Free Materials

Here's a great idea for making your microhouse warm and cozy and saving heating fuel in the process. Visit or phone local motorcycle shops and ask the owner to save the Styrofoam in which new motorcycles are packed. You can easily cut the large slabs with a knife or saw and place them between the 2-by-4 studs. No cost to you and you've saved the cycle shop the expense of discarding the foam.

Incidentally, as you build your microhouse(s), you'll find yourself looking at the discards of consumer culture with a new view. You'll see lots of items you can use to build or improve a microhouse. Extending this, it's possible that a person could build a microhouse using nothing but recycled materials. Not far from where I live, there is a house built almost exclusively of old window sash that the builder obtained free.

Cement and plaster technology continues its evolution toward very lightweight and highly durable coatings. It is possible to sheath the frames of a microhouse with

almost any recycled material (cardboard, for example), cover that with ordinary chicken wire, and then trowel on a mixture of light plaster. The “sand” for this mixture can consist of vermiculite or volcanic ash, tiny manufactured glass balls, or other virtually weightless additions. These, coupled with polymer-modified cement can provide a fireproof, well-insulated outer layer. Overall costs can be less than with wood, especially when you realize the long fife of plasters and cement. And no need for painting ... colors can be added to the mixture.

For interior finish, nothing can replace reliable old Sheetrock, compressed gypsum with a paper sheathing. It’s very cheap and it comes in large 4-by-8 sheets; so it would take hardly any time to make your microhouse interior clean, smooth, and livable. Sheetrock is fireproof, adds a layer of insulation, and lends itself to the addition of wallpaper, fabrics, and paint.

There are lots of materials out there that can be adapted for microhouse use. Just keep your eyes open as you toddle about, and you'll be amazed at how much money you can save by being just a little creative.

Tools to Build Your Microhouse

The yard that sells you the lumber can do most of the sawing for you. Lumberyards often do this as a service,

and even if there is a modest charge, you'll be assured of accurate cuts and lots of your time and energy will be saved. This is especially true for large sheets of plywood that need to be shortened.

Here are some recommended tools for your microhouse project. I suggest you try a flea market first, as they often sell quality used tools at bargain prices. Better a good used hammer than a poor new one.

- Cross-cut handsaw
- Ripsaw
- Key-holesaw
- Claw hammer
- Level
- Plumb line
- Measuring tape
- One-quarter-inch chisel
- One-inch chisel
- Square
- Shovel

Note that you don't need any power tools, eliminating much expense and hazard.

Microhouse Design

There's no question that a shed roof microhouse is easier to build than one with a gable roof. There are no difficult

cuts, no erection of a ridge pole, no need to notch rafters, and so forth, and that is why it's the best model for the amateur builder. Here are the plans and everything else you need to know to proceed.

Shed Roof Microhouse Assembly Instruction

1. Determine a suitable location with front to face south if this is an option.
2. Place pier blocks and adjust using a garden hose. Attach one end to the master block. Fill the hose with water and adjust the block position by watching the water level.
3. Place 4-inch-by-6-inch-by-14-foot skids on the 6 blocks and install F-24 hangers in 20 places (16 - inch centers) using 8d nails. Place and nail floor joists and cover with T and G plywood flooring using screw drive nails. Check for squareness.
4. Fabricate front wall frame and nail F-24 hangers to the top. Erect and position with 16d nails. You may use a temporary support.
5. Fabricate back and side frames affixing hangers to the former. Erect and nail securely with 16d nails. Level and check for squareness; then nail all frames together at the corners. Recheck for squareness.
6. Install rafters into hangers and nail with 8d nails.
7. Install plywood roof panels allowing a 6-inch overhang on the front. Use screw drive nails. Cut

and install two of three panels on the rear wall and all the side and front sheathing.
8. Pilot drill all the cutouts and connect the holes with pencil. Cut out all window and door openings. Now you can install that last rear panel.
9. Install interior moldings, caulk, and install three fixed windows at the front. Install sliding windows and all exterior trim with 6d nails. Assemble and install door and door hardware. Seal exterior trim.
10. Affix drip edge flashing and roofing. Use lap cement on 24-inch overlaps.
11. Celebrate ... you have finished!

A good way to approach this work is to think of a small house as simply a large box. Also, if you need advice and counsel, phone the local carpenter's union to see if a retired member would supervise your first microhouse.

Gable Roof Microhouse

With the experience you gained from studying and/or building the shed roof model, you are probably well equipped to tackle the gable model. More conventional, sophisticated, and attractive, it is not difficult to build as long as you follow the plans carefully.

Assembly Instructions

1. Determine a suitable location with front face to the south if this is an option.
2. Place pier blocks and level using a garden hose. Attach one end to the master block. Fill the hose with water and adjust the block position by watching the water level.
3. Position foundation skids on the pier blocks and recheck level. Nail treated sills to skids. Then nail floor joists on 24-foot centers to sills using 16d nails diagonally (toenailing).
4. Nail 4-by-8 flooring to joists with screw drive nails (to make sure floor does not squeak). T and G joints meet in center of joists.
5. Nail all framing according to plans shown, using 16d nails, and erect beginning with back. Nail securely to flooring with 16d nails.
6. Connect all frames with 16d nails and install headers. Use a carpenter's level to check rigidity and levelness. Make sure your structure is square.
7. Toenail roof ties with 16d nails. Position ridge pole with temporary supports. Then install rafters after cutting "bird's mouth" to fit headers.
8. Sheath and roof entire frame using 8d nails. Nail on all trim including fascia boards and drip edge or flashing. Install roofing paper or shingles. Cut window openings and install them. Add shutters and window box.

9. Build door per plan above, attach hinges, and install. Drill and install lock set and striker plate.
10. Congratulate yourself and move in!

Microhouse Interiors

Fortunately, most of what you will need for the interior of your microhouse has been well developed by two industries: boats and recreational vehicles. Both specialize in getting maximum use from every cubic inch of space while providing every possible human convenience. If you have the budget for it, you can buy what you need from their retail or catalog stores.

However, most of a microhouse interior can be built from scratch using ingenuity rather than cash. Here are some ideas.

At the end, opposite the door, you can build a semiloft, foam or futon bed, below which you can put a combination workbench and desk. Around the perimeter of both loft bed and work area, you can build shelves. You can use the storage area below the desk for word processors and other income-earning equipment.

On the right side of the microhouse, you can build a compact kitchen using a Formica-topped piece of 3/4-inch ply. By cutting a round hole in it and placing a large plastic bowl therein, you can create a low cost sink. You

can suspend a water storage tank for gravity flow service. The type that holds 2 1/2 gallons of purified water is ideal. The sink drains into a bucket or collection tank for disposal in the garden area. A single- or double-burner portable camp stove takes care of the cooking department. Drawers and shelves above and below the sink area accommodate your dishes, silverware, cooking utensils, and storable food. If you need one, there are a variety of miniature refrigerators that operate on 12 volts.

Now, so far we've only used about half the microhouse, yet we've taken care of sleeping, working, earning a living, plus cooking and eating. Not bad for about 50 square feet!

The balance of the space may be devoted to items related to your hobby, professions, or trade such as ceramics, painting, music (there's room for a small keyboard,) or whatever makes you happy or makes some money or both.

With wall space in modest abundance, lighten up your living room with a few plants, curtains, art, or lighting fixtures. A corner may be enclosed for your "portable potty" or other waste disposal fixture.

In a space as small as a microhouse, it takes very little heat to make it comfortable. One of those miniature

potbelly stoves would be delightful. A low-wattage electric heater would be ideal; there would be no need for ventilation as with any combustion type of heat. Lighting can be almost free if you use a photo-voltaic panel, storage battery, and 12-volt bulbs. While initial costs are fairly substantial, the energy of the sun is gratis indefinitely!
So that's how you can make your interior livable on a peanut budget.

Microhouses and the Law

Let's say you build yourself a microhouse in your backyard. That is completely legal since the Uniform Building Code specifies that any structure of less than 125 square feet and no permanent foundation needs no permit. I am sure they made this ruling to avoid having to issue permits for the millions upon millions of small sheds that abound in the United States. Also, once a permit is issued, the building inspectors are obligated to give approvals and this would certainly be super boring.

Now what happens next depends on what you do with the shed/microhouse. If you fill it with firewood, no one will ever bother you. However, if you put in a hideabed and allow your sweet and lovable old granny to sleep in it overnight, you could be violating some bureaucratic regulations. These are most likely related to the health department. Certain aspects of the residential code relate

to ventilation, heating, disposal of human waste, and other health parameters. These laws make sense in that they did eliminate ghastly slums and flophouses that existed in the past in even greater numbers than at present. However, there is a world of difference between an urban slum in a teeming city and a calm and peaceful, totally clean and new microhouse in your backyard. Especially when there is need for a restful and comfortable shelter for lovable Granny.

In California, it's perfectly legal for Granny to sleep out in the microhouse as long as she's over 60. California State Senator Henry Mello is a kindly and thoughtful person who labored for years to obtain the legislation that created the famous Granny House. This may be defined as a second unit built on a residential lot already having one house. The major stipulations are that it must be occupied by at least one person over 60 and be less than 640 square feet. Other than that, any Californian who owns an R-1 lot can proceed as though the lot were zoned R-2. This greatly expands the living space potential in the Golden State and this generous social philosophy could, no doubt, be adopted in the other 49 states. (Anyone interested in working toward this goal is invited to write to me through *Mother*, and I'll see to it that the latest data are provided.)

If your microhouse is intended for hu man habitation and you don't live in California, or even in California if you want to house someone younger than 60, you will find yourself in violation of the Universal Building Code, which includes rules pertaining to adequate heating, minimal space and sanitary facilities. Local health departments are charged with maintaining these healthful conditions. All of these requirements are based on the need to protect both the individual and society. Well and good, we say.

However, let us examine a hypothetical situation. Your aged aunt has no income, no place to go, and no other relatives than you, her beloved niece or nephew. You have a full house with your spouse and three children. But, you also have a large backyard with trees and shrubs. With this vegetation, an 8-foot-by-12-foot "shed" is hardly noticed. So you hammer a microhouse into completion, insulate it, furnish it with a comfortable bed, a multifiush toilet, a small heater, lights, books, stereo, and TV. You provide meals for your aunt in your home but on occasion she enjoys having her dinner in her microhouse with one of your children as a guest.

The problem has found a viable solution. However, a neighbor notes the aunt's backyard home and reports it. You receive a visit from a health department inspector, but she finds that the only real defect is that the microhouse is smaller than the minimum specified for

human habitation. She also notes, however, that there are two windows that can be opened for ventilation and in addition, a generous Dutch door.

You sit down with the inspector and explain the predicament of your aunt and how just the thought of being banished to an old folk's home could cause no end of discomfort to all the concerned parties. All things considered, the inspector rules that no damage is being done. Furthermore, there is a very humane and generous service being rendered. He tears up the complaint, drops it in the wastebasket, shakes your hand, and says that as far as he is concerned the matter is closed. Is this perhaps too rosy a suggestion of events in a world as litigious as our own? Maybe, but compromises aren't really all that uncommon. I think you'll be surprised to discover that inspectors share the view that we live in difficult times and that ways of evaluating situations must evolve if we are to retain our compassion and humanity, individual and collective.

We can hope, anyway.

Microhouse Tips and Pointers

- A Carmel, Calif., contractor used bolts to assemble his 4-foot-by-8-foot micro-office panels, and the whole structure could then be moved in a pickup truck to construction locations. It only takes two people to move the office. If you are not sure about the permanence of your chosen location, try this method.
- To avoid hassles, one creative woman built her microhouse inside of an old barn, thus assuring herself of permanent privy. All she lacked was a view, and that could be provided by painting a few murals opposite windows.
- A group in Topanga, Calif., would assemble a microhouse in a matter of hours and drape it with vines to make it appear it had been there for years. This must have fooled a platoon of building inspectors!
- Wooden sash replaced by aluminum has become common in the United States, creating a huge inventory of virtually unsalable windows. Why not build a timber frame structure and fill in the walls with these (often free) glass panes. Then you would only need drapes for privacy. I once saw a

home built exclusively of old windows. It looked great and the views were terrific.

- We once built two for a honey moon couple; one to live in, the other to store all their many, wedding gifts. Obviously if one microhouse won't accommodate all possessions, add one more. That's a great advantage of this design; you can create only what you really need. Naturally, they can be connected directly or with a breezeway. Just think of microhouses as modular units and proceed accordingly.
- Thousands of homes have been lost in recent years to hurricanes, earthquakes, and other natural disasters. People in danger zones might want to consider building the panels of the model we have shown and then keep them stored flat in a safe place. Then, if the main house is destroyed, a microhouse can be quickly asserrr bled for emergency shelter.
- Many flea markets have grown so large they permit semipermanent buildings for vendors. A microhouse is ideal in this application, as vendors could store merchandise inside between weekends and structurally modify ft to display goodies.
- Hot Springs resorts have increased in number and accoromodations in recent years, making them customers for inexpensive housing. There is a directory of western hot springs, 1700 in all,

available from HTC Books, PO 832, Soquel, CA 95073. $15.

- Churches and religous/charitabte orders often own large parcels of land. Homeless and near homeless can approach these entities with a proposal for installing microhouses in exchange for work. When not in use, they could provide housing for church conventions.

For those readers interested in building their own version of Bill Kaysing's Microhouse, Mother *has assembled a plan package for both the shed- and gable-roofed versions. To order yours for only $15 plus $4 shipping and handling, send for plan #MEP049 from* Mother Earth News*, Dept 149A, P. O.Box 10941, Des Moines, IA 50340, or call 1-800-888-9098 to order by credit card. You can write to Reverend Bill c/o Holy Terra Church, P.O. Box 832, Soquel, CA 95073.*

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