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The Old-House Journal

Special Energy Issue

Coming Next Month

SAVING PLASTER CEILINGS

Restoration and Maintenance Techniques For The Antique House

The Energy-Efficient Old House

By Ron DiDonno
DiDonno Associates, Architects

NEW HOUSES are sometimes designed with an eye to climate--how long is the winter, how hot is the summer, how can the design take advantage of the sun, where do the strong winds come from? If a new building were to be in Louisiana, the designer's principal environmental concern would be with cooling...keeping out the sun's heat and permitting breezes to flow through the house.

The new house would probably have large windows, high ceilings, and projecting eaves for shading.

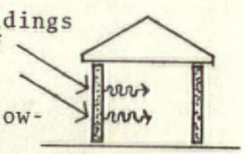
IF THE DESIGN were for cold, damp New England, the house would more likely be compact, built around a central source of heat, and oriented away from the harsh northern winds.

IT IS NO ACCIDENT that these "new" designs resemble old regional architecture. Most old house forms evolved in response to limited energy. Only in the last generation or two have we had hermetically sealed, climate controlled buildings that relied solely on cheap fossil fuels to keep inside temperature at an artificially constant 72° year-round.

IF YOUR HOUSE consumes an inordinate amount of energy, it could be a result of outdated maintenance of the building, and not an inherent design flaw.

With a variety of adjustments, which are detailed in this issue, the old house can be made remarkably energy efficient. This judgement is based on objective observation of old houses:

■ THERMAL MASS: Many old buildings were constructed with a lot of masonry (floor slabs, walls). Masonry heats up slowly, retains heat, and gives it up slowly. As outside temperatures rise and fall, masonry holds interior spaces at a more even temperature.



■ BUILDING SHAPE: Old houses in the North are compact two- and three-storey houses, or urban row housing. (The proportion of exposed exterior wall area has a direct bearing on the amount of heat loss.) Conversely, old buildings in hot, humid climates are usually airy, high-ceilinged structures with porches--allowing for ventilation and cooling.

■ DESIGN DETAILS: Old houses have a wealth of built-in energy-conserving features. Skylights allow natural lighting and ventilation. Wood shutters reduce winter drafts and block unwanted solar gain in summer. Porches are really passive solar devices: They allow the winter sun to

(Continued on page 117)

I Like Woolly Sweaters

THIS IS A SPECIAL ISSUE. For the first time, the whole Journal is devoted to a single theme: Energy Efficiency. We even added extra pages.

ALTHOUGH MUCH energy-related information exists, a lot of it is in confusing charts and graphs; or it focuses on new houses and future possibilities. We decided to write about energy just for old-house folks.

I CONFESS that at first I thought of this as a "conscience issue"--something we had to do. But as it turns out, this issue isn't merely about saving money on fuel costs. Talking endlessly about conserving energy...here at the Journal office and with our consultants and contributors...we all realized that energy conservation is largely a matter of attitude and habits. What energy conservation in the old house is all about is learning what the building has to offer, then making the most of its inherent climate-control system. So, more than anything, this issue outlines an approach to old-house living.

OLD-HOUSE PEOPLE have more sensible expectations than most. Maybe it's because we are more intimately involved with our dwellings. We know there is no magic R-value or gizmo; no miracle fuel. And we know we can't expect the house to do it all. Yes, the house can be brought up to better efficiency; but then we have to change our habits accordingly. It's a shared responsibility.

HABITS ONCE CHANGED become new habits...just as automatic as the old ones were. We are restoring the sensible habits of past generations, along with their buildings. And day-to-day habits count. In fact, a Princeton University study concluded that the way we use a house as an energy-consuming unit can have as great an effect on conservation as all the mechanical improvements usually considered. Easy things like closing the fireplace damper, lowering the thermostat, and using an outside door that's protected from the wind were found to have an equal or greater effect than weatherstripping and insulating.

WHAT I DON'T understand is why no one ever mentions the ADVANTAGES of these rediscovered habits. Using the house differently isn't punishment. I like being aware that it's colder in the winter and warmer in the summer. I like being able to wear a cozy sweater, without sweating all day in an overheated room. Operating transoms and skylights every day makes me feel as if I'm working with the house. New habits have affected my lifestyle. But I believe now it's a more responsible lifestyle.

The Old-House Journal®

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KEEPING WARM always costs something--ask anybody who chops his own wood. Whether you want to pay more for those few extra degrees is up to you...not up to the house.

THOSE OF US who live in old houses already know about adapting lifestyle. More than the average person, we understand how a building and its inhabitants affect one another. Changing energy habits fits right in with that awareness.

I THINK old-house people are at the leading edge of an inevitable social change. The long-term answer to the energy problem isn't going to be a switch back to coal, or living underground. Instead, our expectations are going to have to be more conservative. It's a change in our attitude--and our day-to-day habits--that will count.

--Patricia Poore

No 'Hi-Tech' Gimmicks In This Energy-Conserving 1808 House

By Frank Spain

Ed. Note: The author has had a major hand in writing energy-conservation manuals for the U.S. government. So we thought it would be interesting to see what "the man who wrote the book" has done to his own house.

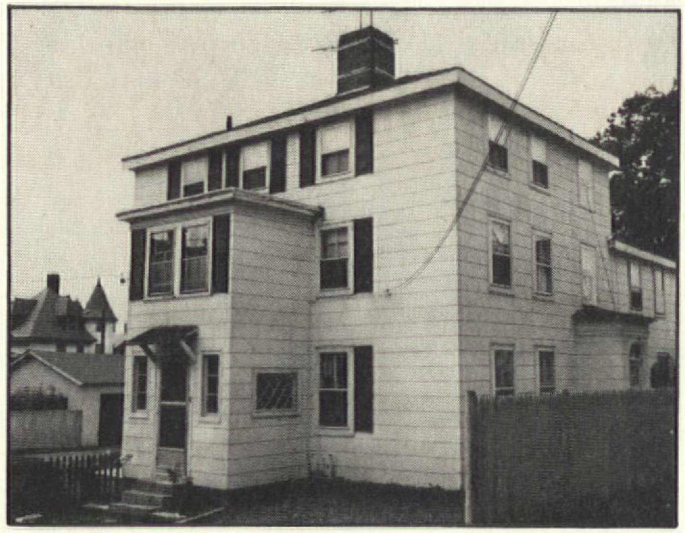
MY HOME comprises the major portion of a pre-1808, three-storey, wood frame house in Gloucester, Mass. The house has a stone foundation, an unheated basement, gas-fired forced-air heating, storm windows and doors, and no wall or floor insulation. When my wife and I moved in in 1978, it was hardly the epitome of energy efficiency.

MY FIRST EFFORTS involved tightening up the building envelope; sealing all the nooks and crannies through which heat energy could flow out during winter. On the exterior, window and door frames, storm sash, utility penetrations, and other surface joints were filled with caulk. Inside, all doors and windows were weather-stripped or caulked shut if they were not to be used at all. Also inside, all window and exterior door frames were caulked where necessary, as were floor, wall and ceiling joints. Even the flooring itself, above the unheated basement, had to be caulked in places.

FOAM GASKETS were installed behind the face-plates of electrical outlets and switches on exterior walls. All of the fireplaces had removable plywood plugs installed in the flue to prevent escape of warm room air up the chimney in winter.

A WATER-SAVING showerhead was installed, as were flow restrictors on all the other faucets. When we moved in, an 80-gal. heater supplied our hot water. It was replaced in mid-1979 with a 30-gal., gas-fired heater which supplies plenty of hot water. It should pay for itself in less than two years. The water temperature is kept at a more-than-sufficient 120^{o}.

THE GAS-FIRED, forced-air furnace, though relatively new when we moved in, nonetheless required some attention. All of the heating ducts in the basement were taped at the seams with duct tape and then insulated with vinyl-backed fiberglass insulation. The return air filter is changed monthly during the heating season, and the fan motor is lubricated as required.



WE CHOSE NOT TO INSTALL a clock thermostat, since we want control over the temperature. We set it at 65^{o} during the day when someone is at home, and 60^{o} at night and when no one is home. The upstairs bedrooms are not directly heated in the winter, but they nonetheless remain at a comfortable sleeping temperature. Since the furnace does not have electronic ignition, we totally shut down the furnace and turn out the pilot light in summer.

ENERGY-CONSCIOUSNESS has become part of our lifestyle. For example, our home (like many old houses) has some rooms that are warmer in winter and cooler in summer than others. We spend a great deal of our leisure time in the living room which happens to be both warmest in winter and coolest in summer.

ALSO, most of the windows in our house have interior sliding "pocket" shutters. We use these shutters to keep heat in at night in winter, and out during hot summer days. And, needless to say, wearing a light sweater around the house in winter is a lot less expensive--and just as comfortable--as turning up the thermostat.

ALL OF THE MEASURES discussed above have generated substantial energy and dollar savings. Our actual fuel consumption in the 79/80 heating season declined about 13% over the previous year. And our energy bill declined about 4%--despite rising fuel prices.

THESE SAVINGS have been achieved without resorting to uncomfortable, expensive, "hi-tech" or aesthetically inappropriate measures. It shows that simple application of repair, maintenance, behavior and small investment strategies can improve enormously the energy-efficiency of older homes.

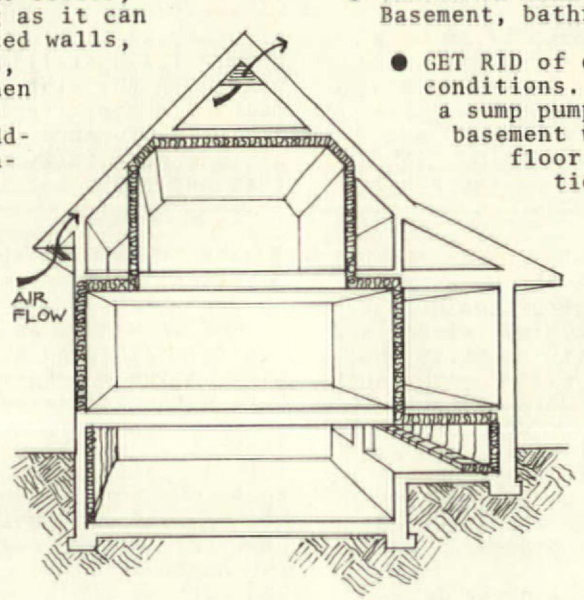
FRANK SPAIN works with Technology + Economics, Inc., the Cambridge, MA research and consulting firm that wrote both "In The Bank...Or Up The Chimney?" and "The Energy-Wise Home Buyer." He is an ardent supporter of appropriate technology and cost-effective energy conservation methods.

When You Insulate, Ventilate
(And Other Hints)

By Patricia Poore

ATTIC AND WALL INSULATION are big energy savers. Unfortunately, they have the potential to be the biggest retrofitting threat to the old house. Rather than explain insulation concepts yet again, or show every installation technique, we'll focus here on the common complications. To a great extent, these complications are caused by the problem of condensation.

A LOT OF WATER VAPOR is generated inside the house. During the cold season, this warm, humid air migrates towards the cooler, dryer outside air. As long as it can dissipate through uninsulated walls, cracks, crevices, and vents, there's no problem. But when you've caulked and weatherstripped the house, then added insulation, the water vapor can't flow out unimpeded. Should it come in contact with a COLD surface while still in the wall, attic, or ceiling, it will condense into water. This could mean damp, less efficient insulation; and in some parts of the country, a wet, rotting wood frame.



ONE SOLUTION is the use of vapor barriers. A vapor barrier is whatever convenient material will block the passage of water vapor--like polyethylene sheets, metal foil, treated paper, and vinyl. The vapor barrier is placed toward the lived-in warm inside surface.

YOU CAN ALSO BLOCK water vapor with a barrier on the inside wall or ceiling surface. Two coats of aluminum paint (under the finish coat), low-permeability paints (such as glossy oil-based paints, or better yet, Glidden's Insul-Aid), and vinyl wallcovering all block the passage of vapor into the wall. Fortunately, the very rooms that often need a vapor block because of high humidity--kitchen, bath, laundry--are the rooms where glossy paint and vinyl are least offensive.

A VAPOR BARRIER should be installed at the same time as the insulation. Some insulating materials--fiberglass blankets, for example--come with the vapor barrier already attached. In other cases, a separate polyethylene (plastic) sheet is used.

THERE'S MUCH LITERATURE devoted to proper installation of vapor barriers. But keeping the vapor out of the walls is only one part of the answer. Common sense suggests two other ways: (1) Cut down on the sources of water vapor inside the house; and (2) Ventilate the walls, attic, and crawlspaces so that moisture--which WILL inevitably get in--can get out again.

TO CUT DOWN on water vapor inside the house, you should:

- VENTILATE well any particularly damp areas: Basement, bathroom, kitchen.
- GET RID of obvious basement moisture conditions. Fix masonry cracks; put in a sump pump. If it's an unfinished basement with a clay floor, lay a new floor surface. Also, put a plastic sheet over the exposed ground in a crawlspace.
- WATCH your humidifier. Relative humidity shouldn't be allowed to go over 35%. If there are signs of condensation--on windows, for instance--turn off the humidifier.
- DON'T DRY laundry anywhere inside the house.
- KEEP fewer houseplants.

ENSURING adequate ventilation isn't a major problem in most old houses. But be careful not to block vents with insulation. And don't encase the house...that is, don't insulate from the exterior; don't put the vapor barrier on the outside of the insulation; and don't install aluminum or vinyl siding.

"What Should I Use?"

WE CAN'T POINT to one material, or one method, for every application. Typical methods for insulating the most common old-house situations are shown on page 111. If the principles of insulating are understood, the homeowner shouldn't have trouble making a choice among materials--new regulations have ensured that most of the insulators on the market are safe and relatively effective. Some jobs, of course, will have to be done by a contractor. (For instance, blown-in mineral wool insulation of a finished attic.)

NEVERTHELESS, here are our recommendations for the best and the worst in insulating materials:

THE BEST: FIBERGLASS. At present, fiberglass is the "safest" insulator to buy. First, it is the most effective insulating material for the price. Second, its health hazard is limited to installation...you don't want to get it all over your skin, or breathe the fibers while you're working with it, but once it's installed it won't give off noxious fumes, or burn. Third, it has no bad reputation for inconsistency of quality, or deterioration after installation. Fourth, it is versatile. Glass fiber is available as loose fill for pouring and "blowing in," in batts and blankets with or without an attached vapor barrier, as pipe insulation, and in boards for new or add-on construction.

THE WORST: FOAM. Foamed-in-place plastics are not recommended. ALL of them have prevalent installation difficulties because the individual contractor has to mix it up on site--the manufacturing process isn't completed under quality-controlled factory conditions. There is no way to regulate the mixing of the material, or to know whether the contractor has put in the required amount. (With loose fill, you can always count the empty bags.)

ALL FOAMS are about 70% water when installed. When this water is dissipated, the house's stable, dry old wood frame may be adversely affected. And all foams have unresolved problems with shrinkage producing reduced R-value.

UREA-FORMALDEHYDE FOAM is especially to be avoided. The formaldehyde vapors continue to dissipate for months, causing an extremely unpleasant odor in some cases. Allergy to this stuff is not uncommon, and there are more than a few cases on record of people having to leave their houses and even being hospitalized. After a long search, you may find a contractor who guarantees he will remove the foam if noxious odors persist beyond a reasonable time. Be aware that he has in mind removing your interior walls to do so. [Note: U/F foam has been banned in several states and may soon be off the market.]

Insulation Requirements

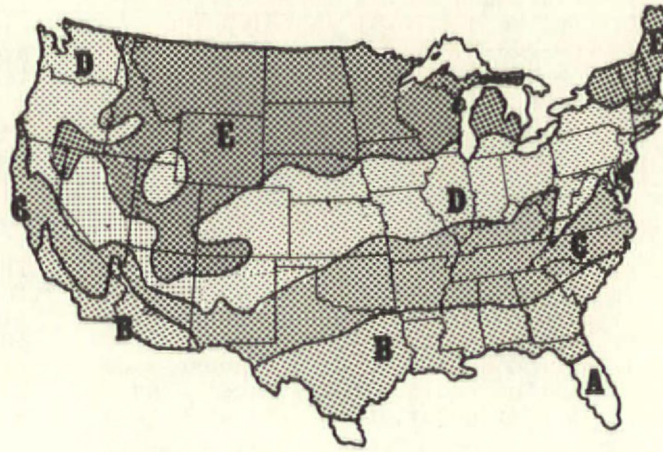


Table 1. For oil heat, gas heat, or heat pump

		Climate Zone A	B	C	D	E
Ceilings	*minimum*	R-3†	R-3†	R-6†	R-9	R-9
	recommended	R-19	R-19	R-19	R-30	R-38
Frame walls	*minimum*	none	none	none	none	none
	recommended	none	fill cavity		fill cavity	
Walls of heated basements and crawl spaces	*minimum*	none	none	none	none	none
	recommended	none	none	R-3	R-11	R-11
Floors over unheated spaces	*minimum*	none	none	R-6	R-6	R-6
	recommended	none	none	R-11	R-11	R-19

Table 2. For electric resistance heat

		Climate Zone A	B	C	D	E
Ceilings	*minimum*	R-6†	R-6†	R-9	R-9	R-11
	recommended	R-19	R-22	R-30	R-30	R-38
Frame walls	*minimum*	none	none	none	R-3	R-3
	recommended	none	fill cavity		fill cavity	
Walls of heated basements and crawl spaces	*minimum*	none	none	none	none	none
	recommended	none	none	R-6	R-11	R-11
Floors over unheated spaces	*minimum*	none	R-6	R-6	R-6	R-6
	recommended	none	R-11	R-19	R-19	R-19

†R-9 if the home has central air conditioning.

Note: The numbers in the tables such as R-6, R-11, R-30, etc., refer to the "R-values" of insulation. The "R-value" measures the effectiveness of a layer of insulation: the higher the R-value, the better the insulation. Existing insulation may be assumed to have an R-value of approximately 3.0 per inch. Thus, three inches of existing insulation has an R-value of approximately 9.

(Information in this chart came from "In the Bank. . .Or Up the Chimney?," produced by Technology + Economics, Cambridge, MA, for HUD.)

The Walls

INSULATING THE WALLS of a house is a major step in saving energy. It is extremely cost effective if done early in your retrofitting schedule and if there are no complications. It should be included in new construction or in retrofitting an old house IN WHICH THE WALLS ARE OPEN FOR OTHER WORK. (Use fiberglass blankets and a vapor barrier, or stiff foam boards according to fire regulations.)

HOWEVER, if you have to consider blown-in wall insulation, this step takes low priority. Foam is out for the reasons stated above. Cellulosic and glass fiber insulation, while fine in an attic, tend to pack down over time in vertical wall spaces. Quality control of the job is very difficult...actually, to know that the recommended amount of insulation went into every cranny and cavity, you'd have to have an infra-red heat scan of the house made after installation--an additional cost. Early buildings, in particular, have lots of diagonal bracing, pieces of framing, and debris in the wall cavities--so you can't get total insulation coverage without removing the inside or outside wall to expose the cavity.

INSULATION IS BLOWN IN through holes drilled in the exterior sheathing every 16 inches top and bottom as well as wherever there are firebreaks and other interruptions. There's potential for a real visual mess here. And obviously, there's no way to install a vapor barrier when blowing it in. The insulation fills the cavity, allowing no ventilation. Many OLD-HOUSE JOURNAL members have reported exterior paint peeling after installing insulation in their walls.

IF THERE IS ANY INSULATION in the wall at all, forget about adding more, because (1) It's almost never cost-efficient; and (2) It's virtually impossible to retrofit. Also, if the wall has been back-plastered and less than a 2-inch cavity exists, there's really no good way to place insulation.

About Ventilation

Crawlspaces

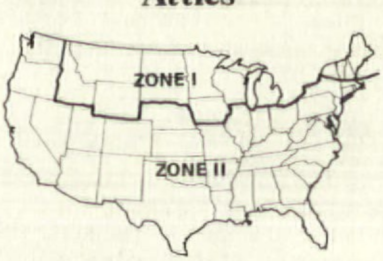
THE AIR IN A CRAWLSPACE is damp--even with the vapor barrier on the ground. Wet insulation is useless and can even lead to wood rot. So here's how to ventilate:

(1) If you have forced-air heating and warmed air moves through the crawlspace, go ahead and seal it as tightly as possible. It will have enough air movement in winter, and in the summer you can run the blower on the furnace every three weeks or so to keep the air from getting too damp. Or, if there are vents in your heated crawlspace, close them during the winter and open them in the summer.

(2) All other crawlspaces must have vents in them...preferably operable to be opened wide in summer and closed in winter. Try closing the vents all the way in winter and see if you have dampness problems. If you have a vapor barrier up against the subflooring, and polyethylene on the ground, you should be able to seal the crawlspace in winter and get full value of your insulation. The theoretical problem is that there may be some vapor penetration into the space from the room above, because the vapor barrier isn't continuous in a retrofit job. (See next page.) So watch it closely the first winter, and open vents as necessary.

GENERALLY, without a vapor barrier you need 1 sq.ft. of vent to 150 sq.ft. of floor area, year-round, and at least 4 vents. With a vapor barrier, it's 1:1500, and at least 2 vents. Increase the net vent area by 2 or 3 times if the vents have louvers which reduce the opening.

Attics



ZONE 1

INSTALL a vapor barrier whenever possible. If signs of condensation show up after the first heating season (after retrofitting insulation), or if you have no vapor barrier, increase ventilation to 1 sq.ft. per 300 sq.ft. of attic floor area.

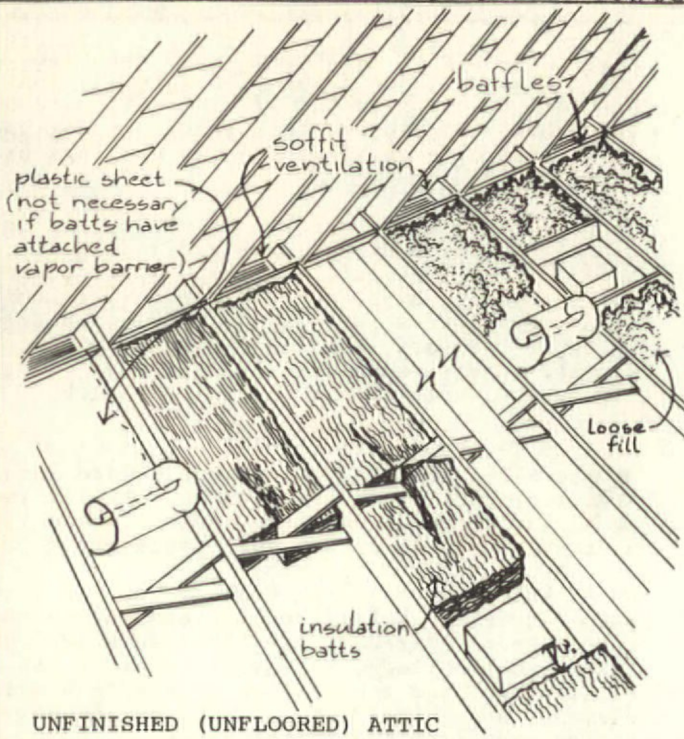
ZONE 2

IF YOU HAVE NO air conditioning, use a vapor barrier if it's a finished attic. (Vapor barrier is optional for an unfinished attic.) Add ventilation equivalent to 1:300 if condensation appears.

IF YOU DO have air conditioning, again use a vapor barrier in a finished attic--otherwise it is optional. But ventilation should be 1:150 regardless.

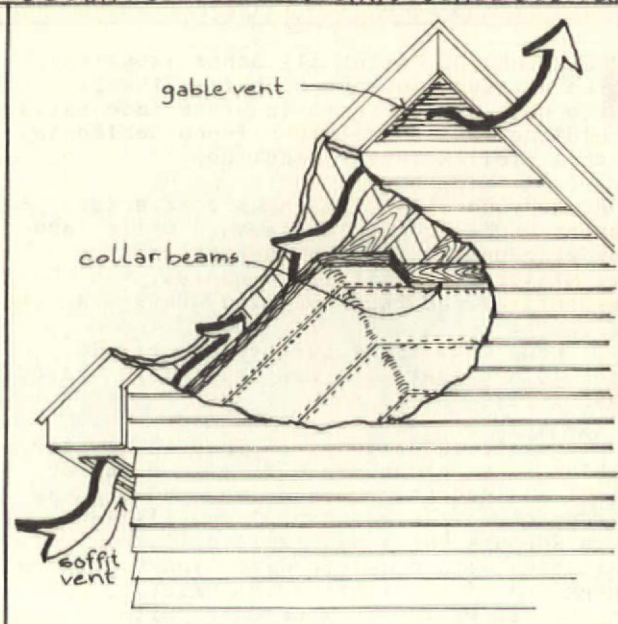
SOURCE FOR AUTOMATIC CRAWLSPACE VENTS

Witten Automatic Vent Co.
P.O.Box 2244
310 E. Long Ave.
Gastonia, NC 28052
(704) 866-8796



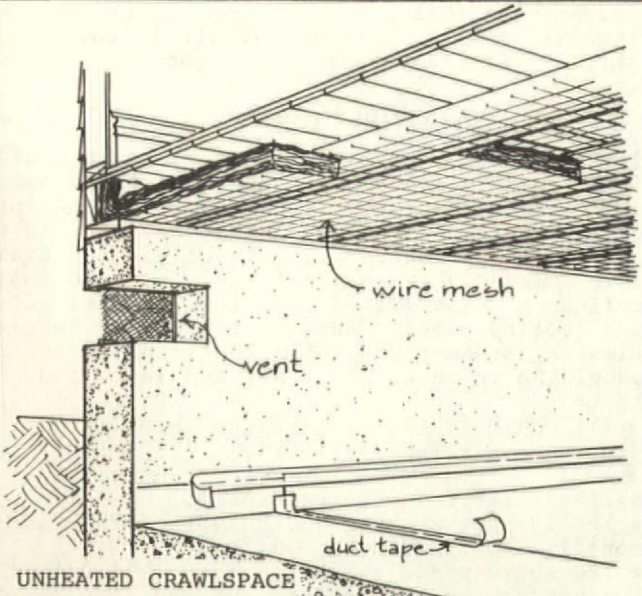
UNFINISHED (UNFLOORED) ATTIC

When possible, attic space should be insulated between joists. Left above: Fiberglass or rock wool insulation batts. Right: Loose fill (mineral wool or cellulose) poured over 6 mil polyethylene sheeting.



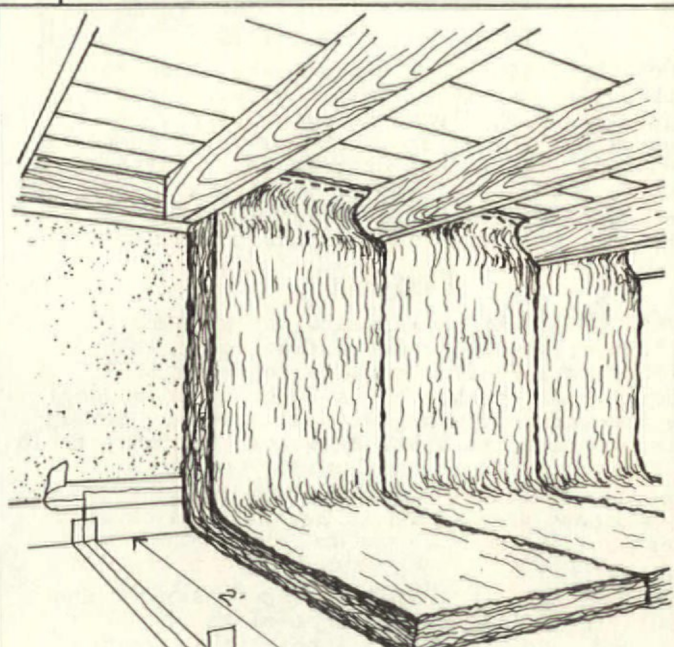
FLOORED ATTIC

Insulate between roof rafters only when there is no access between joists. Ventilation between insulation and exterior sheathing is all-important. Vapor barrier goes toward inside. Flanges stapled to rafters and collar beams as pictured provides a nearly continuous vapor barrier.



UNHEATED CRAWLSPACE

Place polyethylene (plastic) on ground; tape seams with duct tape or overlap 6 in. Vapor barrier faces heated room above. Shown--suspended blankets are not in direct contact with subflooring; be sure to block ends to prevent vapor from entering space between insulation and subflooring. Some manuals advise no air space, but in retrofitting some vapor penetration and convection is inevitable either way.



HEATED CRAWLSPACE

This insulation method is not recommended if the crawl space is wet, or in areas of extreme cold such as Alaska and northern Minnesota (foundation heaving could result). Again, place continuous vapor barrier over floor.

NEVERTHELESS, after all other steps have been taken, in some climates it will still be cost-effective to insulate side walls by blowing in loose fill. If you decide to do this, follow these guidelines:

• Be very careful choosing a contractor. Find someone who's been in business a while, and seek recommendations from neighbors, the historical society, utility companies, the HUD field office, and any one else who gives advice.

• If your contractor insists on cellulose, check to see that it's new, federally okayed, Class 1 fire-rated.

• Ventilate the exterior. This is usually no problem in an old house with clapboards or shingles. Wedges can be driven under clapboards to provide additional ventilation. Sears Roebuck has a side-wall drilling tool that comes with complete directions. It does a neat job of ventilating the exterior of clapboarded walls, in most cases without penetrating the sheathing. Little plastic vents that you insert are virtually invisible, unlike the larger metal louvers used in extreme cases.

• DON'T insulate exterior walls of kitchen, bath, or laundry unless the rooms are entirely tiled, or unless they have special ventilating equipment and are somewhat vapor-impermeable. (Such as a room with a dehumidifier or exhaust fan and low-permeability paint or vinyl wall-covering.)

DANGEROUS LITTLE FIBERS

DO-IT-YOURSELF insulating means close contact with unfriendly materials...wear a surgical mask (from the drug store), goggles, gloves, and loose clothing when handling fiberglass or rock wool. After work, take a cool shower right away, and wash work clothes separately.

Flat Roofs

THE USUAL WAY to insulate the plenum, or low crawlspace under a flat roof, is by having a contractor blow in loose fill. Mineral wool (either glass fiber or rock wool) are recommended, along with cellulose. Avoid foam; besides its other drawbacks, it's unstable in high temperature and humidity conditions. Mineral wool can also be pushed into the space from access areas such as hatches and skylight openings.

THERE'S NO WAY to install a vapor barrier when insulating a flat roof, short of taking off the roof. So it's extra-important to ventilate the space between the insulation and the roof. If there are ventilated skylights, you've probably got all you need. Otherwise, install roof ventilators.

ANOTHER METHOD is useful if you intend to replace the upper floor ceilings. Polystyrene board insulation can be glued against the existing ceiling, then covered with Class 1 fire-rated gypsum wallboard. You can also buy a flat urethane insulation material that has foil on one side and 1/2-in. wallboard on the other. Of course, this method is not useful if you have original plaster ceilings or cornice mouldings.

WE DON'T RECOMMEND that you insulate your roof from the outside by adding rigid insulation, a fire-rated material, building paper, and new finish roofing over the old roof. This builds up so many layers, with questionable placement of vapor barriers, that it should only be considered in very special circumstances. Imagine trying to locate a leak in that sandwich!

Water Heaters

NEW WATER HEATERS come with adequate insulation, but it usually pays to retrofit insulation to an existing heater, since it's an inexpensive do-it-yourself procedure.

ON AN ELECTRIC hot-water heater, you can just wrap fiberglass batts (or blankets cut to the circumference) around it. The insulation can extend to the floor, and an extra piece can be cut to cover the top. Allow access to heating elements and thermostat, as well as the discharge pipe from the relief valve.

INSULATING A GAS heater is trickier. You can't cover the top or extend the insulation to the floor. Keep flammable material, including foam insulation, away from the flue pipe;don't block combustion air to the burner. For safety, it's recommended that you use a gas-heater retrofit insulating kit. Kits are available for electric heaters too--Sears has a good fiberglass one.

And Finally...

DON'T FORGET pipes and ducts when insulating. The payback period is very short and savings can run 5-10%. Heating pipes and cooling ducts should be insulated when they pass through unconditioned space. Pipe insulation is available commercially as pre-formed, easy to install cylinders. Use closed-cell foam for hot water and cooling pipes. But use fiberglass insulation for steam pipes. Air conditioning ducts should be taped at all seams and insulated.

IT'S WORTH IT to insulate the interior of outside basement walls if:

• It's a lived-in, heated space.
• The average above-grade height of the basement is 2 feet or more; OR
• The above-grade height is less than 2 feet but you can do it yourself and you live in the northern half of the country.
• You don't live in Alaska, Minnesota, or northern Maine. (Insulating basement walls in the following way may cause foundation heaving in coldest parts of the country.)

THE PROCEDURE is relatively simple--you put fiberglass blankets, vapor barrier toward living area, in between an added framework of 2x4 studs. Then the insulated wall can be finished with wallboard, etc.

Talk About Caulk

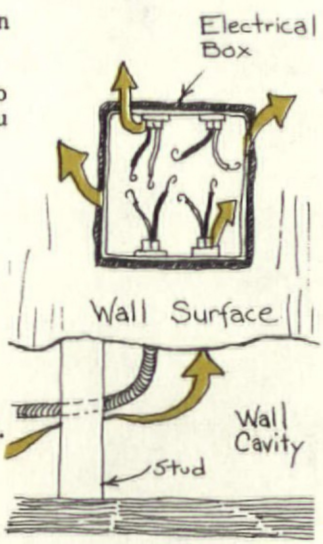
By Clem Labine

CAULKING is not a very glamorous or exciting topic. Yet there is probably no other single step that a homeowner can take that is more cost-effective than caulking. The cost of a few dozen tubes of caulk is negligible compared with the energy savings. And the process of caulking can be mastered by just about any do-it-yourselfer.

THE PURPOSE OF CAULK is to stop up cracks and crevices to eliminate air infiltration. This reduces heat loss in winter and heat gain in summer. If the area of all the cracks in a typical old house were all combined into a single opening, it could total 9 sq.ft. or more. And you can quickly visualize how much heat would escape through a hole 3 ft. x 3 ft. in the side of your house. About 50% of the average fuel bill goes to make up losses caused by air infiltration!

Inside—Caulk For Air Leaks

MUCH ATTENTION has been given to the need to caulk a house's exterior. This can lead to serious problems: As you make the outer skin of the house more vapor-tight, there is less opportunity for water vapor from inside the house to escape. Trapped water vapor can lead to condensation inside the walls of wood frame houses during freezing weather. Condensation leads to peeling paint and possibly rotten wood.



Cold air in walls easily infiltrates uncaulked interiors.

MORE EMPHASIS should be placed on the need to caulk INSIDE the house. Gaps around electrical boxes, baseboards, door and window frames all allow cold air to infiltrate a room. (To see how bad your infiltration problem is, perform the smoke trail test on a cold windy day. See pg. 128.) These same gaps also permit moist air from the interior to penetrate the walls--especially in bathrooms, kitchens and laundries.

THE ANSWER is to seal around baseboards, door and window frames with acrylic caulk. And seal around electrical boxes with rope caulk, tape, and acrylic caulk. If your electrical boxes are flush with the wall, you may also have luck sealing them with foam gasketing that fits right under the plate cover. This inexpensive material is sold at many hardware stores.

YOUR GOAL is to make the inside walls of your house MORE VAPOR-TIGHT than the exterior walls. NOTE: You'll want to pay special attention to caulking the interior on the side of the house facing prevailing winter winds. This is the side that allows the bulk of the cold air infiltration.

OTHER INTERIOR SPOTS that should get attention are any openings in the cellar that allow cold air to circulate up inside wall partitions. Examples: Pipe chases and routes followed by electrical wiring. Also, certain types of balloon framing allow cold air to flow directly up into walls. One solution is to stuff loose fiberglass insulation into these cellar openings.

CAUTION: Beware of cutting off all heat flow to plumbing lines that pass through exterior walls or unheated crawl spaces. You may find yourself with frozen pipes on very cold days!

Outside—Caulk For Water Leaks

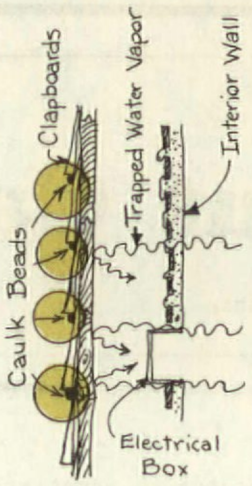
WHEN CAULKING THE EXTERIOR, your primary goal is to exclude rain water--NOT to make it vapor-tight. For example, you would never go to the extreme of caulking under each clapboard. Nor would you caulk underneath window sills. Rain can't penetrate at these points, and the small amount of air infiltration you get there helps to carry off any water vapor that gets inside the wall.

THE BEST WAY TO DECIDE which places to caulk on the outside is to visualize a sheet of water running down the side of the building. Anywhere this water could penetrate the structure is a place that should be caulked!

PRIMARY ATTENTION on the exterior goes to such places as construction joints and joints between dissimilar materials--such as where wood siding butts up against a masonry chimney. (See caulking diagram below.)

THE HARDEST PART about caulking is reaching some of the high-up places--such as the cornice--that require attention. Ladders are usually needed, so be sure to observe proper ladder safety!

THE BOTHER of reaching these high places is the best argument for using the longest-lasting sealant you can buy. You don't want to repeat these aerial acrobatics any more often than necessary. A high-performance sealant should last 15-20 years, whereas cheap oil-based caulks may need replacing within two years.



Don't Caulk This Tight!

BEST TIME TO CAULK is during the painting process--preferably just after the priming coat has dried thoroughly. You have to do a lot of scraping and cleaning of joints to ensure maximum bonding of new caulk. So it's best when all of the scraping marks can be covered with fresh paint.

CAULK WHEN it's warm...preferably above 50°. Below that temperature, caulk is hard to work and won't adhere well. If you absolutely must caulk on a chilly day, try to keep your cartridges warm.

CONVERSELY, on really hot days the caulk may be too runny to adhere. If it's essential to get on with the job, then cool the cartridges for an hour or so in your refrigerator to firm them up.

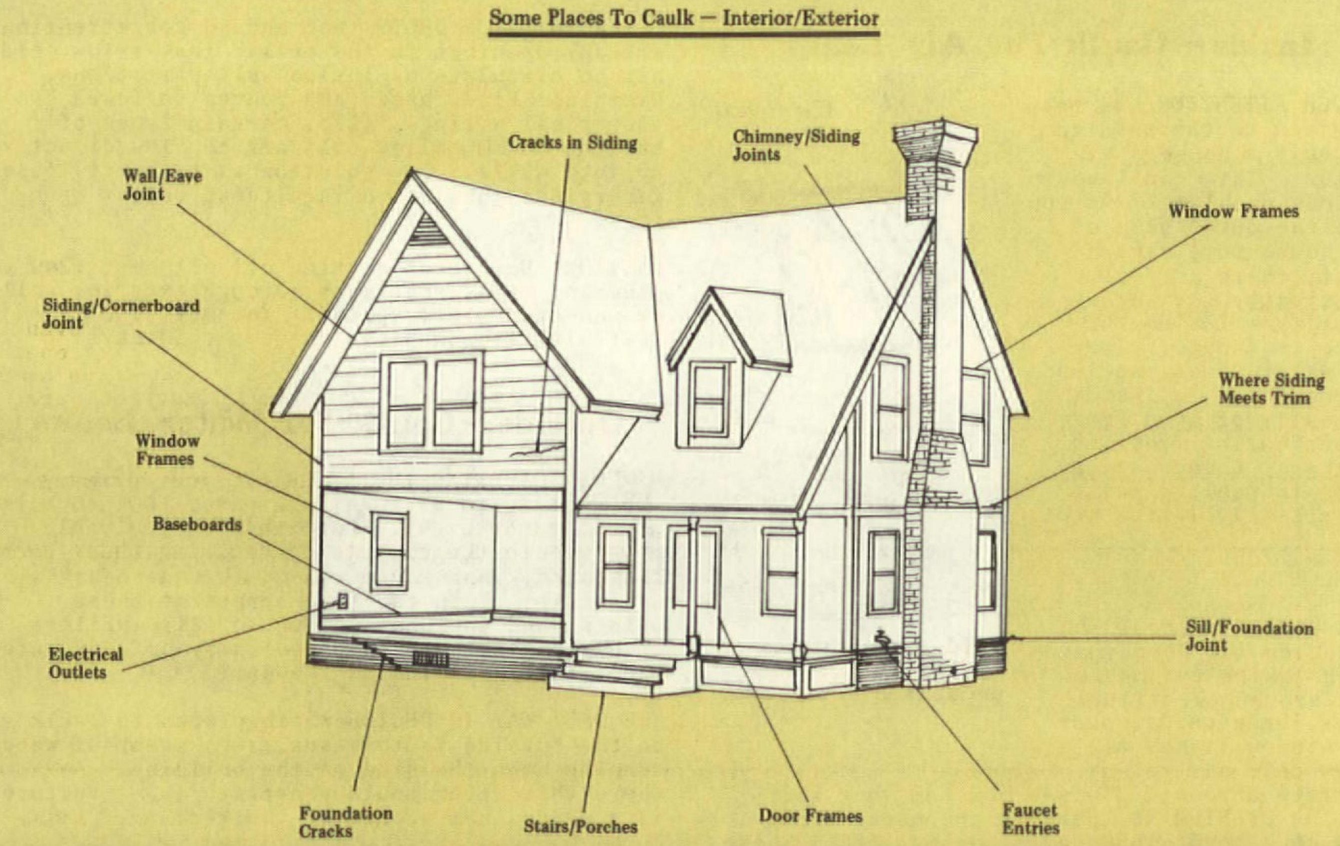
How To Caulk

FOR THIS DISCUSSION, we're going to stick with the standard caulking gun and cartridge system. Caulk also comes in bulk containers--but that is too inconvenient for all but the professionals.

CAULKING SEEMS VERY EASY when you are watching a pro run a smooth bead in a couple of seconds. As with most things, it's not quite as simple as it seems. If you've never caulked before, practice on some inconspicuous cellar windows until you get the hang of it.

THE TRICK is to maintain even pressure in the cartridge as you are running it along the seam at an even smooth rate. But--before you reach the end of the crevice being sealed--you must begin to relieve the pressure in the cartridge. You do this by disengaging the plunger rod on the gun. If you don't do this, caulk will continue to squirt out...either making a blob at the end of your caulk bead, or else dribbling all over your house. As you practice this

Some Places To Caulk — Interior/Exterior



pressure-relieving maneuver, be sure to carry a rag with you to wipe any excess caulk from the nozzle.

CAULK WILL NOT BOND well to dirty surfaces. Be sure to scrape off all loose paint, old sealant and dirt. A putty knife and old screwdriver work well for scraping and digging out debris. A greasy surface should be cleaned with mineral spirits.

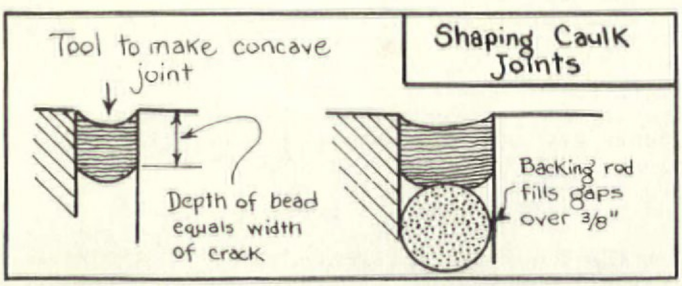
CAULK USAGE

One cartridge of caulk will seal approximately:

2 door frames
--or--
2 window frames
--or--
50 ft. crevice

WHEN YOU ARE READY to caulk, cut the plastic nozzle of the cartridge at a 45° angle. The closer to the tip you cut, the narrower the bead you'll make. Start with a thin bead, and re-cut the nozzle as required until you find the bead that's right for the crack you are filling.

A PERFECT BEAD fills the crack to a depth equal to the width of the crack. If you are confronted with a gap wider than 3/8 in. and deeper than 1/2 in., you'll have to use a backing material. Oakum (a tar-impregnated rope) is the traditional backing. Its disadvantage is that it can leave a greasy film on adjacent surfaces which can (1) interfere with the caulk bond; (2) interfere with paint adhesion. There are plastic foam backing rods (e.g., Ethafoam) available from weatherproofing supply houses (see box). When using plastic foam backing rods, you purchase a size that's just a bit bigger than the crack you're filling; friction holds it in place. In a pinch, you could also stuff large cracks with scrap fiberglass insulation, then form the sealant bead over that.



Where To Get The Good Stuff

MOST HARDWARE STORES don't carry high-performance sealants like polyurethane. To get them, you'll have to locate a dealer that sells to contractors. You'll find them in the Yellow Pages under "Waterproofing Materials." Most of these dealers won't want to break open a case and sell odd lots of caulk cartridges. So if you don't think you can use a full case (24 cartridges), you might want to split one with a neighbor.

ONE SOURCE OF Vulkem polyurethane sealant is: Kenseal Products Corp., 34-10 Borden Ave., Long Island City, N.Y. 11101. Phone (212) 937-5490. They only sell Vulkem in case lots; price per case is about $66 + shipping. Cost works out to about $2.75 per cartridge, which is cheaper than many hardware store butyls that don't perform as well as polyurethane. Kenseal will ship to all parts of the U.S. via UPS--COD.

KENSEAL also sells Ethafoam backing rod in sizes from 1/4 in. to 1-1/2 in. Minimum order is 100 ft. Cost of 100 ft. of 1/2-in. Ethafoam is only $2, so you can see why a dealer wouldn't be too thrilled with an order for only backing rod.

BE SURE THAT the caulk is forced into the joint to the proper depth (see sketch). If you can't get sufficient penetration with the gun alone, you'll have to "tool" the joint. Most common way is to run your finger over the bead. Or you can use a tool like the bowl of an old spoon. If the caulk adheres to the tool, keep it moistened by dipping it in the proper solvent (see below) or soapy water.

THE FIRST CHOICE for all-around exterior caulking is urethane sealant, such as Vulkem. Urethane bonds to just about any surface without priming. It works easily, has little shrinkage, weathers superbly and can be painted if desired. It's the caulk most pros prefer. A good-quality butyl would be our second choice. See recommendations below.

FOR INTERIOR nonweathering joints, acrylic latex caulks are fine. They offer the advantage of simple clean-up with water. The operative word is "acrylic" latex. There are other types of latex caulks on the market that are of lower quality than the acrylic material.

	Recommended Sealant	Life Expectancy	Typical Cost/ Cartridge	Cleanup Solvent	Typical Brand Name and Manufacturer
Exterior Applications	Polyurethane	15-20 yr.	$3-6	Paint Thinner	Vulkem — Mameco, Int., Cleveland, OH 44128 Sikaflex — Sika Chemical, Lyndhurst, N.J. 07070
Exterior Applications	Butyl	7-10 yr.	$2-3	Paint Thinner	DAP Butyl Flex — DAP Inc., Dayton, OH 45401 Tiger Grip Butyl Rubber Caulk — Sherwin Williams, St. Louis, MO 63144
Interior	Acrylic Latex	5-10 yr.	$2	Water	UGL Acrylic Latex Caulk — United Gilsonite Laboratories, Scranton, PA 18501 DAP Acrylic Latex Caulk — DAP Inc., Dayton, OH 45401

PRIORITIES

IF YOU BELIEVED every manufacturer's claim... "Saves 30% on your heating bill!"; "Pays for itself in energy savings in just one year!"...the utility company would owe you money every month. That is, if you were to add up the promised savings on your new furnace, insulation, weatherstripping, storm windows, and insulated shades, it could easily come to 150% of your heating bill.

NOT THAT the manufacturers are lying. Each claim is based on your applying THAT product FIRST to an average un-retrofitted house. Those percentage-savings numbers should be taken as relative savings, not actual savings. Each step you take to make your house more energy-efficient increases the payback period, and decreases the actual percentage saved, of each SUBSEQUENT step.

CONSIDER THE IMPLICATIONS. Obviously, anything you put at the bottom of your priority list will result in negligible savings by the time you finally get to it. So something you're unsure of--like insulating your walls--can be avoided without great sacrifice.

OF COURSE, there are priorities. Some things have a faster payback than others. Certainly, any change that costs little or nothing to make will pay for itself pretty fast. As discussed in these pages, there are many energy-saving steps you can take that don't involve expensive retrofits. Changes in habits are cheap, and generally, so are most do-it-yourself jobs.

First Things First

YOU CAN HAVE an energy audit (the computer kind) performed on your house to determine where you're losing the most energy. But in most cases, common sense can tell you all you really need to know to make up a priority list.

- CHECK INFILTRATION. Not only is it a major source of heat loss in most old houses--its solution is simple: Caulk and weatherstrip.

- INSULATE THE ATTIC/ROOF. Whether you do it yourself or hire a contractor, this retrofit always saves money and carries a low risk. (If you have the minimum amount of insulation already, adding more won't be the most cost-efficient improvement you can make. But it will save some money to insulate up to the recommended R-value. See chart on p. 109.)

- DO SOMETHING ABOUT WINDOWS. Even after they've been weatherstripped, night insulation and/or storm windows save money.

Envelope Or Furnace ?

THE COMMON old-house problem of the too-big furnace is exacerbated by improvements in the building envelope. Let's say that you have a large old furnace which nonetheless is sized accurately for your leaky old house. If you tighten up the envelope and insulate, that same furnace is now 40% oversized. At the very least, you must cut back on the nozzle or burner size...or you'll gain only about half the benefit of the other improvements, due to the inefficiency of the heating plant.

SO, WHILE the single most cost-effective, energy-saving improvement you can make is to upgrade an inefficient heating plant, the size of your furnace will be determined in part by the condition of the building envelope. This means you should make any major improvements to floors, walls, roof, and windows BEFORE you invest in a new furnace. Or, tell the person who is sizing your new heating plant about any improvements you intend to make.

Proceed With Sanity & Taste

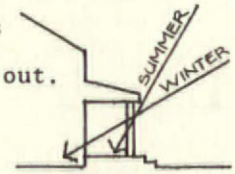
KEEP IN MIND that there are three types of energy-related improvements you can make to an old house: (1) A change in the way the inhabitants use the house as an energy-consuming unit; (2) A mechanical improvement that reduces energy use without affecting the integrity of the structure; and (3) An improvement that will reduce the bills, but threatens the house structurally or aesthetically.

CHANGES IN HABITS that reduce the energy bills should be made no matter what else you try. Mechanical improvements that don't threaten the structure should be made until they no longer pay for themselves in energy saved within a reasonable amount of time. From a strictly economic standpoint, this usually means that if the payback is more than 11 years you shouldn't bother with it. But if the improvement makes an uncomfortable or unusable part of the house comfortable or usable, it's worth a slower payback.

IF THE IMPROVEMENT threatens the structure--either by hastening deterioration or presenting the possibility of trauma such as fire--DON'T DO IT. And don't do anything that doesn't meet state electrical, heating, or plumbing codes in an effort to save money. For advice, you can call the fire department, the building commissioner, or the state energy officer.

WHEN THE CHANGE might do aesthetic harm, the choice is more subjective. Ask yourself, Have I done everything else to save energy first? Even with all previous improvements, will this change save money over the long term? Can the building be returned to its original form should an unpredictable condition arise? If the answers are "yes", then accept your action as a necessary 20th century accretion, and make it tasteful.

pass through into the house, while blocking the high summer sun. An entrance vestibule is an air lock, which insulates the house, blocks infiltration of outside air, and prevents loss of the conditioned inside air every time someone goes in or out.



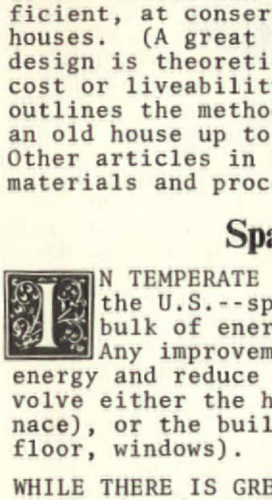
■ SITING: This includes orientation--toward the sun, and away from winds--as well as existing landscape features. Evergreens on the property in the direction of the prevailing winds act as a windscreen. Deciduous trees planted nearer the house block the summer sun with their leaves, while allowing passage of the winter sun through bare branches.

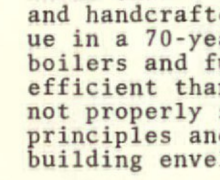
LET'S BEGIN with the premise that the majority of old houses can be as efficient, or more efficient, at conserving energy than newer houses. (A great deal of super-efficient new design is theoretical and presents problems of cost or liveability, besides.) This article outlines the methods that can be used to bring an old house up to that level of efficiency. Other articles in the issue further explain materials and procedures.

Space Heating

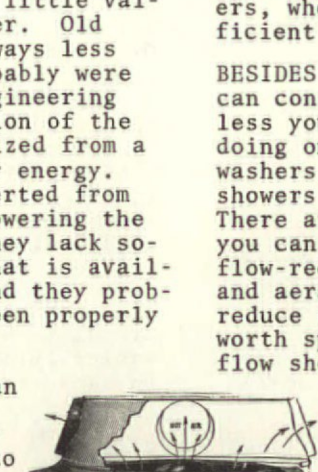
IN TEMPERATE AND COLD CLIMATES--most of the U.S.--space heating accounts for the bulk of energy consumption and cost. Any improvements you make to conserve energy and reduce the heating bill will involve either the heating plant (boiler or furnace), or the building envelope (walls, roof, floor, windows).

WHILE THERE IS GREAT CHARM in plaster detail and handcrafted woodwork, there is little value in a 70-year-old converted boiler. Old boilers and furnaces are almost always less efficient than new ones. They probably were not properly sized according to engineering principles and the physical condition of the building envelope. Most are oversized from a time of cheaper energy. Many were converted from coal to oil, lowering the efficiency. They lack sophistication that is available today. And they probably haven't been properly maintained.



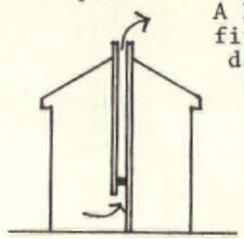


NEW HEATING PLANTS can be 75-85% efficient. Old boilers and furnaces rarely come up to the minimally acceptable 65%, and more than a few operate as low as 35% before cleaning and simple maintenance. Request an efficiency test after cleaning. You can get one from your utility or private oil company for a low fee. (Or you will be able to soon--it's the law.)



IF THE HEATING PLANT doesn't test too badly, you might be able to modify the system with a smaller nozzle, electronic ignition (instead of a pilot light), and burner adjustment. ANY heating plant benefits from an annual tune-up (at least every two years for gas). The flue should be cleaned, the air screen replaced, and burner adjustments made. Compare the cost efficiency: A tune-up costs \$50 and can improve the burning efficiency by 10%. Having a contractor insulate your walls costs over \$1000 and reduces the heating bill 10-15% (before other envelope improvements).

OTHERWISE, consider replacing the heating plant. A new furnace or boiler will be more efficient by virtue of smaller size, and features like heat exchangers, vent dampers, and electronic spark ignition. It can also be sized more accurately by an expert according to improvements you may be making in the building's envelope.

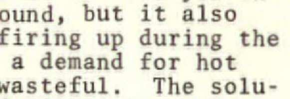


A RELATED IMPROVEMENT: Install a fireplace flue damper. An open damper exceeds an open window in in heat loss--the convection is greater because of the updraft. If you don't depend on this for summer cooling, seal up any unused flues permanently. Or put in a temporary plug for the winter.

Hot Water

MANY TIMES that same inefficient old boiler is heating water for domestic use. Not only will it do this job inefficiently year-round, but it also means that the boiler is firing up during the summer every time there's a demand for hot water. This is terribly wasteful. The solution, regardless of your decision to replace or modify the boiler, should be to install a separate hot water heater. New hot water heaters, whether electric or gas, are generally efficient and self-insulated.

BESIDES UPGRADING your hot water system, you can conserve water. The less you use, the less you have to heat. Obvious means include doing only full loads in clothes- and dishwashers, fixing leaky faucets, taking short showers instead of full-to-the-brim baths. There are two other things you can do too: Install flow-reducing showerheads and aerating faucets; and reduce the temperature of your hot water. It's worth spending a little extra for the reduced-flow showerheads, because the cheaper ones aren't very well designed and make you feel like you're not getting clean (or wet). Turning down the temperature of the water is sensible--why pay to heat the water up to 140° or more when you just have to dilute it with plenty of cold water to make it usable? In most cases, 110-120° is adequate. [Ed.'s note: Water doesn't sterilize at 140° any more than at 120°, so many people are turning down the temperature even though they use a dishwasher. If cleaning power seems slightly reduced, try scraping dishes before loading, and using a pre-soak on soiled laundry.]

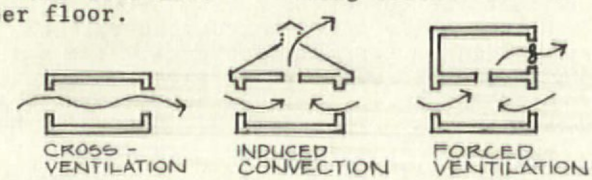


SINCE THE AVERAGE FAMILY needs hot water only four hours a day, it makes sense to shut down the heater part of the day. It saves money without inconvenience if you have an electric heater. A remote switch can be run to the kitchen, or you can retrofit an automatic timer.

Space Cooling

IF NOT AS CRITICAL as space heating in most of this country, space cooling is indeed an important consideration in much of the U.S. Improvements to the envelope will help cut cooling bills as well as heating bills. Insulation keeps warm air outside in the summer. Sealing cracks with caulk and weatherstripping will keep conditioned air inside during hot weather. Window insulation (shutters or shades) can be used to block sunlight in summer as well as keep warmed room air from passing through cold glass in winter.

IN HUMID CLIMATES, cross ventilation is essential to permit evaporation of water vapor and perspiration. The whole-house fan (sometimes called an attic fan) is effective in most of the country where there's a significant difference between day and night temperatures. The whole-house fan exhausts hot, stale air out of the house, creating an updraft that brings in cooler night air through lower-storey windows. It also lowers the attic temperature (which often stays at 105° all night) to as low as the outside air. A true attic fan, by the way, is one which simply replaces air in the attic, and this does have a cooling effect for the upper floor.

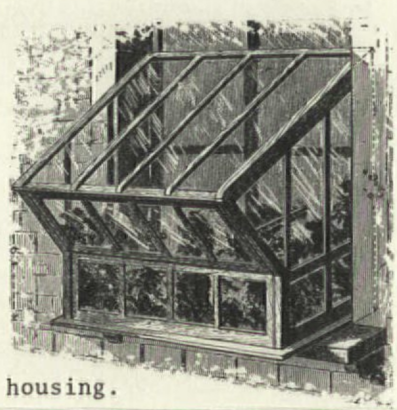


SOME OLD-HOUSE FEATURES such as cupolas and belvederes create the same updraft without mechanical assistance--and in fact you can buy cupolas with attic fans in them, for period-style maximum ventilation.

GENERALLY, window air-conditioners should be used only in special circumstances. It is preferable to install central air-conditioning that is adjustable room by room, than to put a separate unit in each bedroom and in the kitchen. Unit air-conditioners are great gobblers of electricity. Central systems are more efficient if extensive cooling is necessary; a central system can often be tied in to existing duct work.

Passive Solar

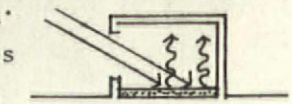
ENERGY FROM THE SUN holds big promise. But its use requires an understanding of the amount of energy available, and of which method would work best for each individual situation. Solar energy for space heating can cost from a few dollars to tens of thousands of dollars. <u>Passive</u> solar techniques are the <u>least</u> expensive and most cost-effective--especially for owners of existing housing.

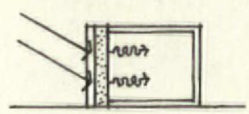


RESIDENTIAL ENERGY USE (U.S.)

Heating and cooling	70%
Hot water	20%
Lighting, cooking, appliances	10%

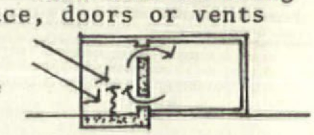
PASSIVE SOLAR refers to methods which utilize the sun's energy for heating without using external sources of energy--say, for electrically powered fans, pumps, etc. The most applicable kind of solar methods for old houses use DIRECT GAIN. This involves south-facing windows adjacent to the space to be heated. The sun's high-intensity energy passes through the window and is absorbed by masonry walls and floors. These surfaces then re-radiate low intensity energy to objects in the space or directly to the air. The amount of energy admitted is directly proportional to the size of the opening.





A THERMAL STORAGE WALL is usually a masonry wall with a glass curtain wall on the outside. It works in a similar manner to direct gain: The sun's energy penetrates the glass, is absorbed by the masonry (sometimes barrels of water are used), and re-radiated to the space. This method is best suited to south-facing rear masonry walls, in the case of old houses.

ATTACHED SUNSPACES--greenhouses--are another way of capturing the sun's energy in thermal storage (floors, walls). When heat is being re-radiated into the space, doors or vents are opened to convect air into the room. Other parts of the house can be warmed this way.



IT SHOULD BE NOTED that standard purchased "greenhouses" are not the most efficient shape. Glass should be either vertical or slightly inclined to the south. This permits maximum winter gain and minimum summer gain. The ready-built greenhouse has a glass roof which creates problems in either season.

WHEN FANS are used to induce ventilation or circulate warmed air through the house, the basically passive system is called hybrid. In many cases, the small amount of electricity it takes to power the fans is more than made up for in energy savings and the ambiance of the sunlit space.

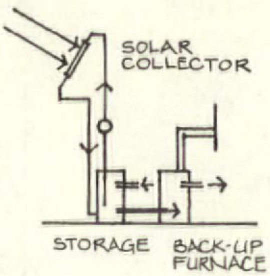
LARGE EXPANSES OF south-facing glass must be equipped with night insulation to keep what was gained from being lost. They also require shading in summer. If you think you may be able to benefit from a south-facing rooftop greenhouse or other solar device, you should read some of the books that explain orientation and other basic principles. (See p. 127)

EVEN WITH PASSIVE and hybrid solar systems, caution is advised when dealing with vintage houses. Urban and suburban old houses are oriented to the street, not to the sun. A south-facing front yard on a busy street is normally not the best place for a greenhouse. Also, some of these passive solar devices and additions are simply not compatible with certain house types.

Active Solar

RETROFITTING AN EXISTING HOUSE for active solar space heating is not cost-effective yet. (Active solar involves collecting the sun's energy at one point--on the roof for example--and pumping it elsewhere for possible further heating, storage, and use.) Old-house owners should investigate active solar options for heating or preheating domestic hot water only.

A TWO-PERSON HOUSEHOLD rarely benefits from solar heated hot water. It is the big, heavy-use household in an area of high utility costs that should consider installing an active solar domestic hot water system.

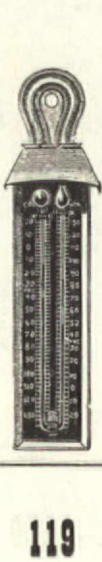


The Envelope

ATTENTION to the building envelope is just as important as attention to upgrading the heating/cooling system. In an old house, roof/attic insulation is an easy AND cost-efficient way to improve the envelope. When the attic is accessible, fiberglass batt or blanket insulation with attached vapor barrier is the easiest material to use. If loose fill needs to be poured or blown in to a plenum or finished floor, fiberglass or rock wool is good.

BLOCKING INFILTRATION with caulk and weatherstripping is a little more time-consuming, especially if the house is large or multistoried. It is usually the <u>most</u> cost-effective solution in leaky old houses. Most of the work can be done by the homeowner. Keep in mind that the best weatherstripping for doors and windows is the recessed, carpenter installed variety. Some of the less expensive ones may need yearly renewal or be obtrusive--and some of the really cheap "no-fuss" stuff is a waste of time.

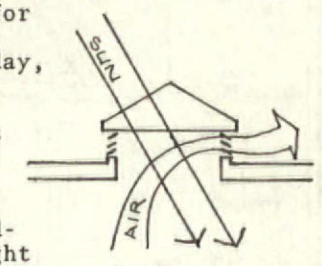
WHAT TO DO about windows is more complex. One layer of glass presents virtually no barrier to heat being conducted through it. Old sash which has seen little maintenance is loose, allowing infiltration of cold air and escape of conditioned inside air. Night insulation and storm windows are both very effective. For specific types, see p. 124.



TRYING TO INSULATE the walls of an old house is difficult and can create more problems than it solves. All types of blown-in and foamed-in insulation have problems either with the material or the installation procedure or both. In cold parts of the country, moisture condensation problems, produced by insulation that doesn't have the benefit of a vapor barrier, are much worse than the heat loss through the walls.

THE ONLY TIME it makes sense to insulate the walls of an old house is when you have access to the inside of the cavity because of work being done on the interior finish or the exterior sheathing. If you're ripping out plaster or replacing wood siding anyway, that's the time to insulate the right way: With fiberglass blankets in every crevice and cavity, along with a continuous polyethylene vapor barrier toward the warm side. Leave an air space for ventilation on the outside of the insulation.

THE BEST WAY to save energy in an old house is to become familiar with the climate-control system as it was designed. You have to learn to maximize what the house has going for it. Beyond that, tightening the envelope and maintaining the heating/cooling plant for maximum efficiency are most important. Some day, new houses will be old, too--and it's doubtful they'll lend themselves to upgrading, retrofitting, and renewing the way today's old houses do. While few OHJ readers would say they bought their old house for its energy efficiency, the potential is there. Old houses can be efficient!



SKYLIGHT

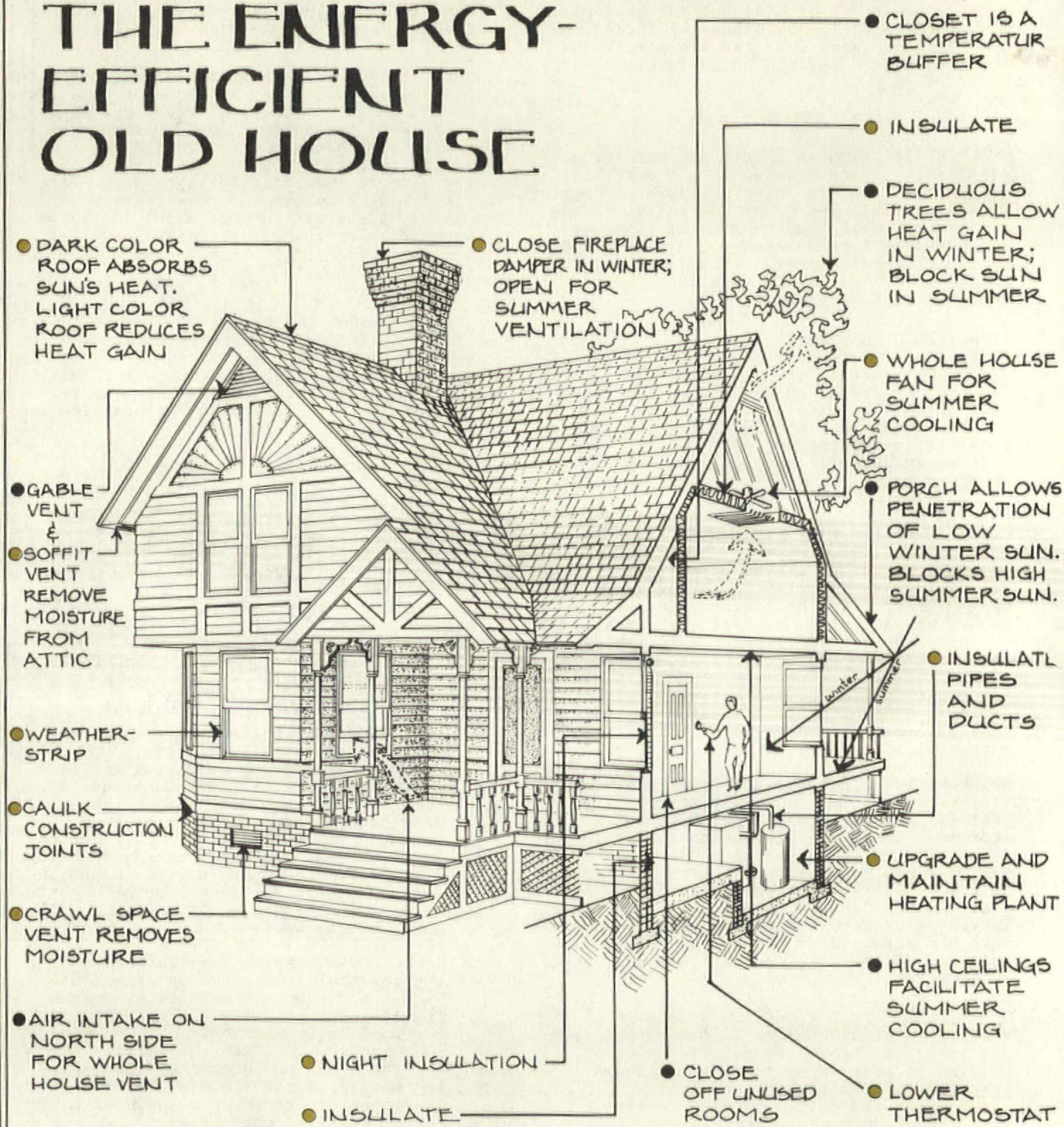
Our Energy Consultant

RON DIDONNO is a licensed architect in private practice in Brooklyn. He's also Associate Professor of Design and Life-Support Systems at Pratt Institute School of Architecture. Ron has just completed a major study on energy conservation in new multi-family housing, and right now he's working on several energy-conscious retrofits...including passive solar additions to his own townhouse.

CALCULATIONS on heat loss were made for the frame house and row house pictured on the next page. Calculations were based on uninsulated buildings, with original doors, windows, and exterior walls. The row house would use half as much energy as the frame building because of its lower exposed exterior wall and roof area.

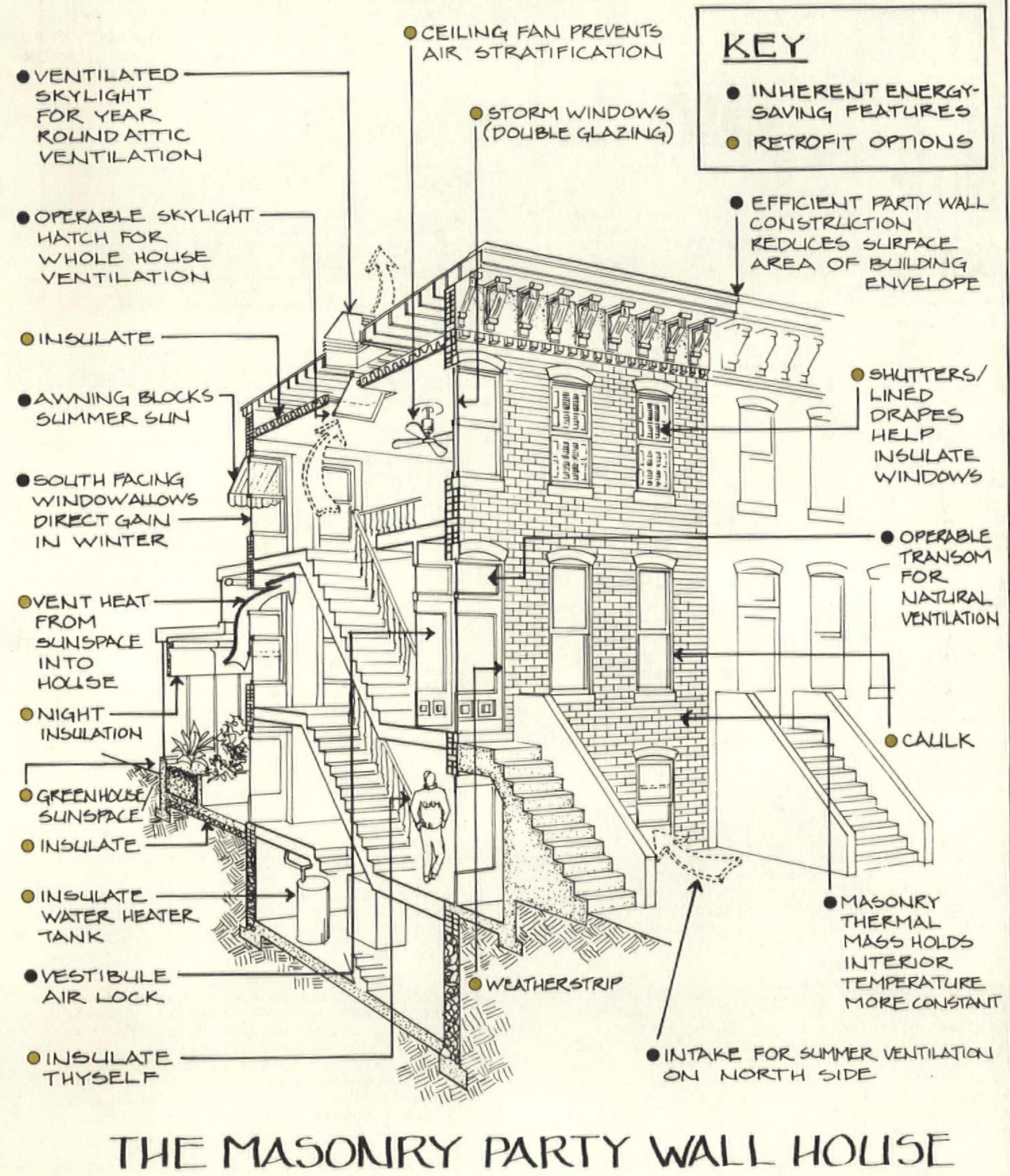
	Frame House 1800 sq.ft.	Row House 2400 sq.ft.
ROOF	18%	18%
WALLS	39%	16%
WINDOWS	15%	22%
DOORS	1%	2%
INFILTRATION	27%	42%

THE ENERGY-EFFICIENT OLD HOUSE

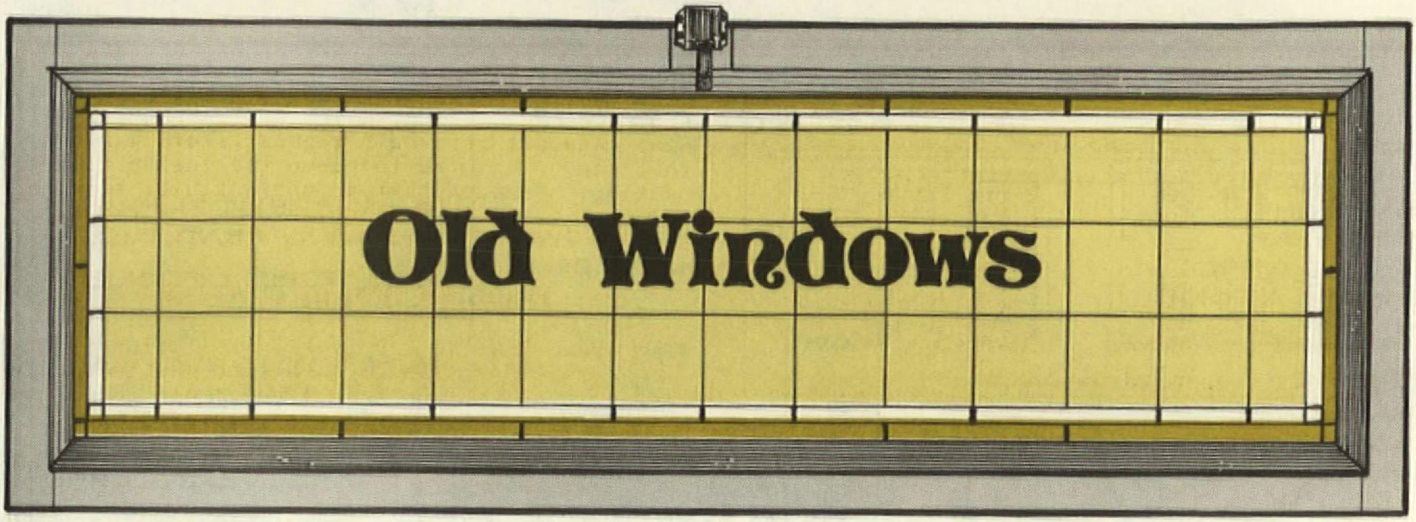


THE DETACHED FRAME HOUSE

Restoration Design File #4



THE MASONRY PARTY WALL HOUSE



By Patricia Poore

IT'S TRUE that windows are a major source of heat loss from a building, and that unmaintained old windows offer plenty of room for improvement. But we're not going to do away with windows in an effort to save money. They have too many other advantages.

AN OLD, single-glazed, loose-fitting, uncaulked, unweatherstripped window is "leaking" in several different ways. It's no wonder many people are confused about where to begin, and about whether it's even possible to rehabilitate the old window.

FIRST, windows lose winter heat, gain summer heat, and admit winter cold through INFILTRATION. Air flows through cracks around the frame, around the sash, and around the glass. If you have a loose, single-glazed window, this is probably your worst problem. Fortunately, fixing the problem is simple: Plug the cracks. Caulk between frame and wall--inside and out. Weatherstrip between sash and frame, and where the meeting rails of upper and lower sash come together. Reglaze the window (that is, renew the putty or glazing compound that holds the glass in).

SECOND, windows lose heat through CONDUCTION. This is the ability of solid objects to transmit heat...and glass is a great conductor. You can solve this problem by blocking off the glass from the warmed room air--by the use of interior shutters, shades, fabric; or by adding another layer of glass--which creates an air space between the layers. (Still air is a very poor conductor.)

THIRD, windows cool the heated room air by setting up CONVECTION currents. Warm air contacts the cold window glass, where it cools and drops; more warm air closes in to be cooled by contact, and so on until you have convection currents throughout the room and, perhaps, throughout the house. ("I feel a draft.") Most of the solutions to conduction losses also help convection losses.

FOURTH, the movement of heat through space, called RADIATION, plays more of a part in heat gain than in heat loss. Radiant heat comes through south-facing windows in winter, and that's good. But too much radiant heat creates a cooling problem in summer. Storm windows and related solutions don't help much here. Instead you must block or opaque the window by using awnings, reflective window shades, aluminized film, etc.

OLD WINDOWS, often considered the worst offenders in heat loss, have certain advantages. Counter-weighted wood windows are almost indefinitely fixable. Old windows are operable, allowing ventilation in summer. Wood frames are significantly better insulators than metal; a metal frame conducts heat away as well as the glass. Many old windows have built-in soft-technology energy devices, such as interior shutter-blinds, awnings, and transoms.

Moderate Options First

GENERALLY, the order of priorities for dealing with old windows is as follows:

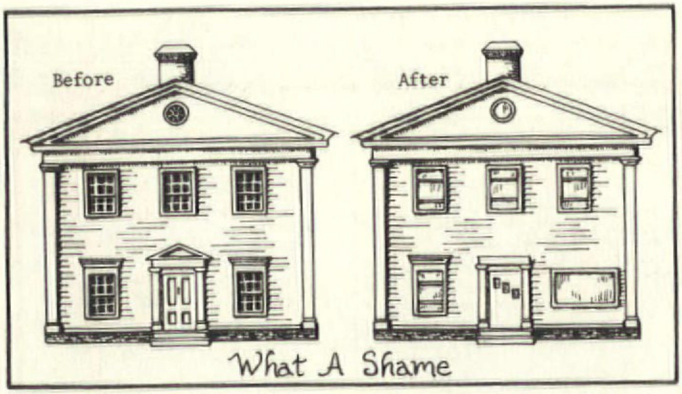
(1) Caulk and weatherstrip to cut infiltration.

(2) Use night insulation to at least block conduction losses during the cold, dark night.

(3) Upgrade the existing windows.
   a. Install storm windows outside or inside.
   b. Repair or replace (with custom-made wood duplicates) loose, rotted, or broken sash. Reglaze the windows.
   c. If the trouble lies with the casing, consider keeping the sash but replacing the channels (called "balances").

(4) Get new replacement windows.
   a. Preferably made-to-order wood sash and frames that copy the original. (Incorporating modern energy-saving features like hidden weatherstripping.)
   b. The other option is semi-custom wood or insulated-aluminum replacement windows, made to size for you of standard stock. Replace double-hung with double-hung, casement with casement, and so on.

UNDER NO CIRCUMSTANCES buy replacement windows that come one-size-fits-all. The money you save with this inexpensive variety will be more than spent modifying your wall opening to get the new bargain window to fit. And it looks terrible to change the fenestration this way.



Storm Windows

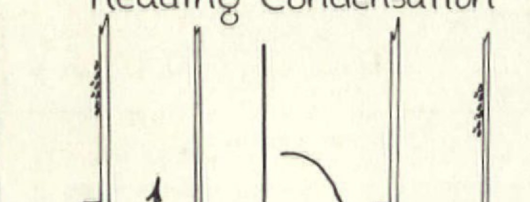
WE'LL EXAMINE THE MERITS of storm windows first. On the sheltered side of the house, storm windows cut conduction heat loss, as heat will not readily pass through the still air between panes of glass. On the exposed side, they also check any infiltration leakage due to wind. If storm windows are installed on every window on a particular level of the house, they will decrease drafts and cold spots from convection and therefore make the house feel warmer.

STORM WINDOWS are an awfully expensive substitute for caulk and weatherstripping. Every step should be taken to reduce infiltration first; then storms should be considered primarily in the context of their conduction heat-loss savings. However, with a 3-7 year payback, properly-fitted storm windows are a high-priority retrofit under usual circumstances. They are even more effective for casement windows and metal-framed windows than for the wooden double-hung type.

TODAY, looks are less of a problem because storm windows are available with a baked-on enamel finish. Raw aluminum is unappealing, but now you can buy white, black, and brown frames. (Very expensive brands have more colors.) In addition, you can always paint the enamel finish to match your house trim.

SOME HISTORIC DISTRICTS allow outside storm windows on the principle that they are not permanent alterations. Others allow only interior storms.

Reading Condensation



CONDENSATION on prime (inside) window: Cold air is leaking around storm window.

CONDENSATION on inside of storm: Warm, moist air is leaking around prime window.

These can range from plastic sheeting stapled to a pine frame, up to expensive glass or Lexan windows in a finished wood frame. The disadvantage of interior storm windows is that they must be taken down and stored each summer. Some manufacturers make regular storm windows that can be adapted to go on the inside. One caution: Be sure that an unbreakable, screwed-in acrylic window won't block your quickest exit in case of fire.

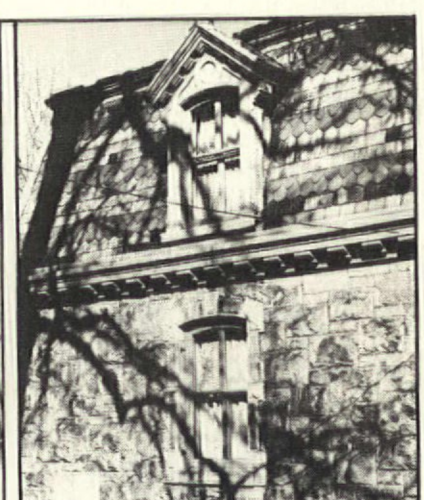
Double & Triple Glazing

DOUBLE-GLAZING involves installation of replacement window sash that has two panes of glass set in it. A new replacement window, properly installed, is going to be tighter than the old window; and a double layer of glass will provide an air space. So of course this is effective. The problem is finding suitable, affordable replacement windows--single OR double-glazed.

ESTIMATES for the payback on triple glazing (adding storms to double-glazed windows, or installing sash with three panes) run about 20 years. Triple-glazing on the south side does NOT pay back: Reduction in heat loss is not as great as the reduction in solar gain during the heating season. There is one case when triple glazing might be sensible: On the side of the house facing prevailing winter winds. There, adding inside storm windows to old prime sash that already has exterior storms can help reduce infiltration of cold air.

Window Insulators

A LOWLY ROLLER SHADE can be a great energy saver for a remarkably low investment. The trick is to install it inside the window frame, with the roller as close to the top as possible, and long enough that when it's pulled down it sits on the sill. Down in the summer, it reflects radiant heat from the sun, especially if you add aluminized

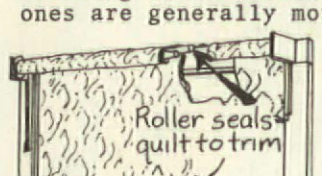


DON'T DISCOUNT custom-made storm windows, such as these made by The National Trust's Restoration Workshop. These were tricky because of rounded tops. But a carpenter could make ordinary ones at competitive prices in your style and finish.

Mylar plastic film to the outside of the shade. On cloudy days and at night in the winter, you should pull down the shade to reduce conduction loss. By cutting down on the amount of warm air contacting the glass, furthermore, it will cut down on convection currents.

EVEN WITHOUT channels to run in, the payback for a roller shade is 1-2 years. If your house is air-conditioned, opaque white shades will save you more on summer energy bills than winter. You can easily cut down existing shades to fit inside the window casing. Effectiveness is increased if you create channels for the shades to run in. You can add narrow moulding in front of the stop moulding, or refer to an article in the Jan.'80 issue of Popular Science.

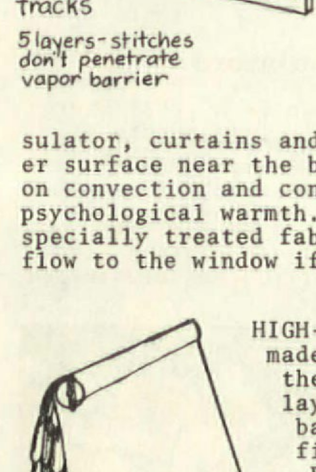
THE SAME PRINCIPLES apply to other window insulating devices...except the more expensive ones are generally more efficient. Any device that fits in tracks all around the window is more efficient. These insulating window shades (also called blankets or quilts) should have a vapor barrier incorporated in them. Anything that has a vinyl face or layer provides a vapor barrier. This keeps condensation off the glass. When fitted well, these multi-layer cloth insulators can be more effective than storms.



5 layers-stitches don't penetrate vapor barrier

WHILE FABRIC alone is almost useless as an insulator, curtains and drapes do present a warmer surface near the body, cutting down a little on convection and conduction, and offering psychological warmth. Lined with vinyl or specially treated fabric, they will reduce air flow to the window if there aren't gaps.

HIGH-R SHADES are roller shades made of layers of Mylar; when the shade is pulled down, the layers separate, creating air baffles. They require modification of the window frame. But they are extremely effective, and might be worth considering for picture windows and sliding glass doors.



High-R Shade

VENETIAN BLINDS have little value. Wooden ones, when well-fitted and kept closed, offer the same slight protection and mental benefits of drapes.

SHUTTERS CUT DOWN on conduction and convection by creating an air space. You can capitalize on this when having new or reproduction interior shutters made. If you build in insulation with a vapor barrier, you can use veneer wood to finish the shutter. The shutter will be more useful at insulating the window, and it'll probably cost less to build.

WINDOWS- - Prime & Storm

AIR-FLO WINDOW CONTRACTING CORP.
21 E. 9th St., Dept. OHJ
New York, NY 10003 (212) 254-0315
- New York City only--all jobs measured and installed on site.
- Wood or metal storm and prime windows in 10 colors. Double-hung or casements. Follows landmark commission standards. Double-glazed, Lexan, Solar-Cool, single pane available. Other cities have similar companies. Not cheap.

CUSCO
128 Addison Rd., Dept. OHJ
Glastonbury, CT 06033 (203) 633-4759
- Mail-order around country; free flyer.
- Combination storm/screen wood-frame windows. Double-hung, picture windows, oriel-style. Storm/screen inserts are interchangeable. Sized to order. Reasonable price.

DRUMS SASH & DOOR CO., INC.
Box 207, Dept. OHJ
Drums, PA 18222 (717) 788-1145
- Mail-order source: literature $1.00.
- Double-hung, counter-weighted pine sash. Custom-sized with their own milled stock parts: Custom milling available. 1/1, cellar and barn sash. ALSO—Entire window units. Fit to size of your opening.

PERKASIE INDUSTRIES
Dept. OHJ
Perkasie, PA 18944 (215) 257-6581
- No national distribution for residential products yet; but all inquiries will be answered. Free product literature.
- Makes "Thermatrol" acrylic interior storm windows. (Plexiglass in a molded acrylic frame.) Has done retrofits for Landmark government buildings. Industrial/commercial and residential capabilities. 35 stock sizes. Clipped to frame--easy to remove.

SEASON-ALL INDUSTRIES, INC.
Dept. OHJ
Indiana, PA 15701 (412) 349-4600
- Available through distributors; specify your needs, and they'll send free literature.
- Storm windows: Custom-sized, finished in aluminum, anodized, brown and white enamel. 5 types of double-hung, plus picture windows, horizontal sliding, 1-4 light. Can be adapted to go inside. NuPrime Windows: Custom-fit to opening. In most cases window frame and moulding can remain. Thermalized aluminum frames; also Round and Gothic top.

INSULATING DEVICES

APPROPRIATE TECHNOLOGY CORP.
Box 975, Dept. OHJ
Brattleboro, VT 05301 (802) 257-1773
- Available by mail or through distributors. Please call--no literature.
- Manufactures Window Quilt, 5-layer insulated roller shade with vapor barrier. Relatively unobtrusive plastic tracks. Useful and attractive. About $4.25/sq. ft., all inclusive.

INSULATING SHADE CO.
Box 406, Dept. OHJ
Guilford, CT 06437
- Distribution not yet wide. Send for color brochure, $1.00.
- "High-R Shade" is like a bulky roller shade, but 5 layers of aluminized Mylar sheets separate to form air baffles, reducing internal convection. Special frame must be built for it--obtrusive. R-17 if your windows are tight, caulked, and weatherstripped. Could be the answer for large glass and sliding doors. About $3.00/sq. ft. plus tracks, hardware, & shipping.

Complications

OR

Nothing Is Risk-Free

ROUTINE MAINTENANCE and changes in energy habits will rarely cause unforeseen problems. But some improvements to old-house efficiency can only be made by retrofitting parts of systems and new materials--and retrofits are tricky. Unexpected complications are not uncommon.

FOR THE PURPOSE of these cautionary notes, we'll call anything that threatens the structure or affects the health and safety of the inhabitants a HAZARD. Any other vexing, damaging, or sad consequence, we'll label a MISFORTUNE.

Hazards

1 THE TOO-TIGHT HOUSE: Some air exchange is necessary for respiration and combustion. In fact, the recommended number of air changes per hour is 1.2 (more in the South). A drafty room has 3-4 per hour. Over-zealous homeowners have actually given themselves respiratory troubles tightening up their houses TOO much. This is hard to do in an old house, but you should be aware of the possibility. Forget the myth of the zero-heat-loss house--you've got to breathe.

2 WOOD ROT: Severe moisture condensation problems stemming from retrofitted insulation, improper use of vapor barriers, and inadequate ventilation can lead to fungus deterioration of the structural framing. Follow the guidelines suggested in the Insulation article.

3 FIREPLACE CONVERSIONS: Late nineteenth century houses often had gas-burning fireplaces that are currently being converted to wood-burning. Leaving aside the fact that a fireplace is an inefficient heater, the real danger here is the possibility of fire in the flue or wood framing members of the fireplace wall. Be sure your firebox and flue are up to code and have been thoroughly inspected. Especially check that no wood members are tied in to the chimney.

4 UREA/FORMALDEHYDE FOAM: As discussed elsewhere in this issue, U/F foam continues to give off formaldehyde vapors after installation. Besides occasionally producing a foul smell, it has caused some people to get very sick.

5 AUTOMATIC FLUE DAMPERS: There's danger in retrofitting an automatic furnace-flue damper to an existing system, because it alters the designed-in way of venting combustion products. Although these dampers have merit when engineered into a <u>new</u> system, installing one as a retrofit may <u>void</u> any warranty you have on your furnace. The warning goes for draft hoods and other retrofits that alter the combustion process--the possibility of human installation error or mechanical failure has too fateful a consequence. Hazards include buildup of noxious gases in the house.

6 FIRE: Heat can build up if insulation is placed too close to sources of ignition. Keep insulation material at least 3 inches from recessed fixtures, transformers, electric pumps, and fan motors in the attic.

Misfortunes

1 TECHNOLOGICAL TRASHING: Conspicuous display of gadgetry is an unfortunate by-product of the public obsession with energy efficiency. It's a shame when untried hardware of questionable merit obscures--or irrevocably alters--the authenticity of old architecture. (See OHJ, May 1980) Besides recommending good taste and sound judgement, all we can do is stress the importance of doing everything else first.

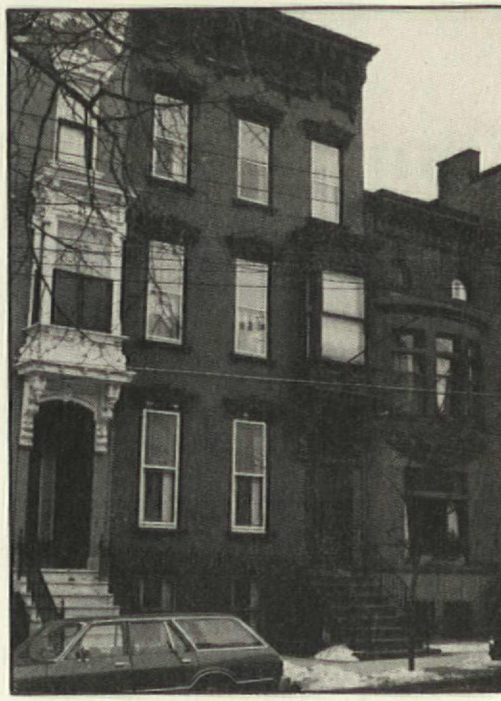
2 PEELING PAINT: On the exterior, this could be from moisture buildup in insulated walls. Sometimes it's merely an annoyance--but other times it's the first sign of a serious vapor condensation problem that could lead to wood rot.

3 PIPES FREEZING: Before insulating pipe chases, crawlspaces, and cellar spaces, be sure to consider first what affect it will have on utilities, duct work, and pipes. You may have to do without insulation here and there, or make other provisions for keeping the plumbing nice and warm.

4 WASTING MONEY: Obviously, overpriced gadgets that don't deliver as promised are a waste of money. But it's also possible to do too much in some areas, because there are diminishing returns beyond a certain point. At some point, for instance, adding another inch of insulation simply won't pay back. Installing a new heating plant just to switch to a cheaper fuel isn't wise, because the fuel costs eventually equalize in most cases. In parts of the country, people who converted to wood heat are learning that lesson. You won't waste money if you base your energy savings on conservation. Stick to a list of priorities where the cost-effectiveness of each step is evaluated according to all the improvements that came before.

SOME OF THE METHODS and materials that have caused the most trouble were hailed as "the answer" when they first appeared. The moral is: Be skeptical of new-and-improved ideas until the experts agree on their worth. Safety and an established track record should be two attributes of any improvement you make to an old house.

Solar Greenhouse For Urban Townhouse



By Shirley & Rudy Nelson

IN 1977 WE PURCHASED and moved into a 100-year old Italianate rowhouse in downtown Albany, N.Y.--expecting to have it restored within a year. We immediately repaired the roof, insulated the attic crawl space and installed storm windows. We decided to stick with the existing furnace for the first winter, although it was apparent we'd need a new one soon. The monster in the cellar--a coal to oil conversion--providing us with gravity-fed hot air, was inefficient and unsafe. But every change in heating plant that we investigated seemed shockingly expensive.

ADDING A SMALL, HOME-BUILT GREENHOUSE at the south-facing rear wall of the house was part of our ultimate plan. We thought it would be a nice way to grow vegetables in the winter. When it came to our attention that there was such a thing as a greenhouse that could also be part of the heating system, we got very excited. In less than a month we were at a Passive Solar Conference in Marlboro, Vermont, where we received a short and inspiring education. Even among all those solar experts no one seemed to know anyone who had retrofitted a solar greenhouse to an urban rowhouse. But we were convinced that it ought to be tried and that we should take the risk.

IT MEANT SETTING ASIDE all other work on the house until the greenhouse was installed. For a while, we feared it was actually going to be the end of any other renovation! But now we can say that though the greenhouse has taken longer and cost more than we'd hoped, it's been successful enough to guarantee that if we were to invest in another house, we would do nothing else until we had in some way added a solar greenhouse.

Starting Out

IN DESCRIBING OUR PROJECT, it should be understood that decisions were made on the basis of our particular circumstances--and might not meet the full approval of the experts, nor be an exact model for anyone else. The dimensions of our house are 42 ft. deep by 20 ft. wide by 48 ft. high. Walls are brick and two walls are shared with neighbors. Open walls face north and south.

THE DIMENSIONS OF THE GREENHOUSE are 20 ft. wide, 8 ft. deep and 24 ft. at the peak. It encloses the lower three storeys of the house, with a wooden deck at the parlor level.

WE DESIGNED THE GREENHOUSE ourselves, based on the books of Bruce Anderson and Bill Yanda (see box). Robert Mitchell of Solar Systems Design, Inc., of Selkirk, N.Y., helped us with the technical details, drew up the blueprints, ordered some of the materials, and guided us through much of the process. The heavy structural work was done by local carpenters.

THE DESIRE TO CATCH as much sunlight as possible dictated the height of the greenhouse. The city code then required a poured footing, four feet down, below frost line. Also required by the city was an asbestos fire wall flush against a neighbor's wooden porch on the east. On the west, our neighbors agreed to our use of their brick extension for that wall.

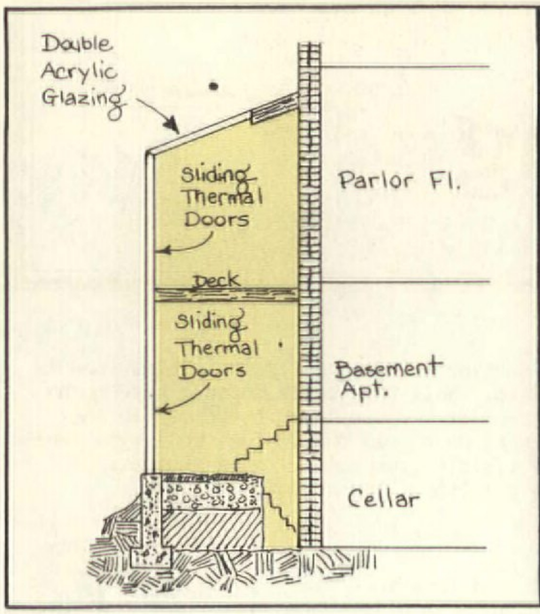
The Fudge Factor

THE BACK WALL of the greenhouse is, of course, the rear of our house. This south-facing brick wall acts as a "Trombe wall," absorbing the heat of the sun and giving it back to the greenhouse after the sun goes down. The vertical south wall of the greenhouse is, of course, glass. We chose to use six sliding thermal doors--three at ground level and three on the deck. These doors are also windows for the greenhouse and proved an efficient way to solve two problems at once: A closed thermal area in winter and an open screened area in summer. This has eliminated the need for a vent at the peak to release heat in warm weather.

OUR EAST WALL (firewall) is insulated with fiberglass at an R factor of 11. It should be higher, perhaps, but the wall is protected by the enclosed porch on the other side of it. The insulation is double that amount in the solid 3-ft. overhang at the peak.

OUR SLANTED GLAZING is angled at 70^{o}. It ought to be 60^{o} in our part of the country. We fudged on that to make room for the use of the deck level. (The placement of the deck was dictated by other inflexible matters.) Whatever efficiency we've lost by this decision is not serious to us. We have as much sun as we can handle. The slanted glazing is double acrylic...as is the glazing in the stationary windows in the upper portion of the first level.

WE HAVE NOT MADE SPECIAL PROVISION for additional heat storage in our plans. Our heat-absorbing mass is the



CONSTRUCTION PHOTO shows wooden frame of greenhouse being attached to the south-facing rear brick wall of the Nelson house. Warm air from greenhouse is admitted to house merely by opening windows and doors in rear wall.

thick brick wall of the house (about 550 cu. ft.), as well as the floor (which we are still preparing). The floor is brick and Helderberg bluestone slabs found in our yard. These are being set on sand and gravel 10 in. deep. The perimeter of this floor is insulated to below frost line. We are not insulating under the sand, but are laying a double thickness of heavy plastic sheeting.

WE CAN ALWAYS supplement our heat storage capacity with drums of water. And once we fill the greenhouse with plants, the wet potting soil itself will act as heat storage. Plants will also provide humidity.

Happy Outcome

BY CONSERVATIVE ESTIMATE, the greenhouse gives us--even unfinished--30% of our heat. This past winter on sunny days, from mid morning to late afternoon, we have kept the house at 65°--with NO help from the furnace--simply by opening the doors and windows that lead to the greenhouse. Our back-up heat is still hot air, now forced. The old oil burner has been replaced with a gas unit. We've kept the original hot air ducts, though they were pronounced unsuitable by several engineers. It's true that when we are dependent on the furnace for long stretches of time (cloudy weather), the house heats unevenly, with pockets of chill. We may gradually improve the cold air return.

THERE IS OTHER WORK to be done. We have not been able to keep plants in the greenhouse because of the wide variation in temperatures over a 24-hr. period. By early morning of the coldest period last winter, the temperature in the greenhouse might drop to 30°. Then it could rise quickly when the sun hit and be over 100° by noon. We are correcting this in two ways. One is with thermal drapes, which will cut nocturnal loss by at least 50%. The second is the use of a low-velocity fan at the peak of the greenhouse, which will speed transfer of excess hot air into the house.

THE TOTAL COST of the project has not been much more than an entirely new heating system would have cost us. We figure on a payback period of 7 to 10 years, depending on the price of natural gas. Meanwhile, we have an indoor garden, a solarium, a summer porch, and an efficient and economical heating and humidifying package.

Books About Passive Solar

Solar Age Magazine — The professional's choice for solar publications and up-to-date technology. They also publish resource books and buyers' guides (see below). The magazine is $18/yr. for 12 monthly issues. Send order to: Solar Age Magazine, Box 4934, Dept. OHJ, Manchester, N.H. 03108.

Solar Age Resource Book — Contains 16 articles on a variety of solar topics....including solar greenhouses. Of greatest interest are the manufacturers' listings, product directories and buyers' guide at the back of the book. $9.95 postpaid from Solar Age Magazine at address above.

Solar Home Book — By Bruce Anderson & M. Riordan — An excellent overview of current solar technology as applied to domestic architecture written by the Editor of Solar Age Magazine. $9.50 + $1 postage and handling. Order from: Brickhouse Publishing Co., 3 Main St., Dept. OHJ, Andover, Mass. 01810.

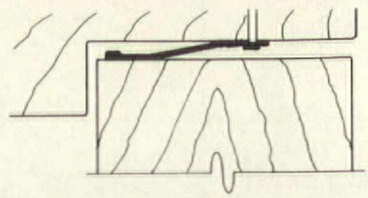
The Food And Heat Producing Greenhouse — By Bill Yanda and Rick Fisher — This excellent and helpful volume has gone through numerous printings, and is now coming out in a revised and updated edition. This is one of the books that the Nelsons found useful on their project. $9.00 (including postage) from: John Muir Publications, P.O. Box 613, Dept. OHJ, Santa Fe, N.M. 87501.

The Solar Greenhouse Book — By James McCullagh — The Rodale books tend to be of a uniformly high quality, and this solar greenhouse book is no exception. It's down-to-earth and quite helpful. Available in two editions: Hardbound at $12.95 and softbound at $9.95. Prices include postage. Order from: Rodale Press, 33 E. Minor St., Dept. OHJ, Emmaus, PA 18049.

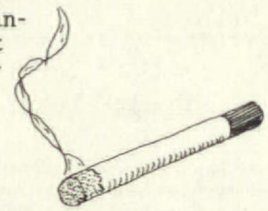
The Passive Solar Energy Book — By Ed Mazria — This is an excellent basic work that reviews passive solar from broad basic principles. Covers new design and whole houses more than retrofits. A valuable reference for the serious homeowner. Comes in two editions: One at $14.95 for the general public; one at $24.95 for professionals. The professional edition contains additional solar tables and printed see-through acetate sheets that aid in siting. Order from: Rodale Press, 33 E. Minor St. Dept. OHJ, Emmaus, PA 18049.

A Golden Thread: 2500 Years of Solar Architecture and Technology — By Ken Butti and John Perlin — This is not a how-to book, but rather an enlightening history of man's use of solar heat through the centuries. It shows how solar design was an integral part of Roman architecture, and that the passive solar greenhouse for heat production was actually invented in the early 19th century. Hardbound. $15.95 + $2 postage. Order from: Van Nostrand Reinhold, 135 W. 50th St.—Dept. OHJ, New York, N.Y. 10020.

Weatherstripping



WEATHERSTRIPPING is a less satisfying topic than caulking. That's because it's easier for the homeowner to do a good caulking job than a good weatherstripping job. Nonetheless, weatherstripping is very important. Weatherstripping is used to block air infiltration through cracks in the operating parts of the house...especially doors and windows. Weatherstripping is mainly a matter of mechanics: Selecting the best material for your various applications...and then seeing that it is installed properly.

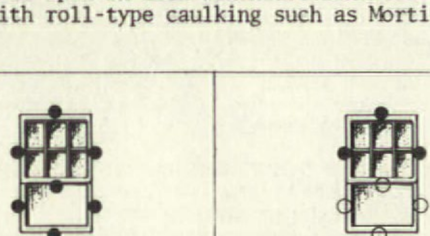


TO DETERMINE which doors and windows need attention--or to test the effectiveness of a weatherstripping job--use this sensitive smoke-trail test. Light a cigarette or stick of incense and hold it at various locations on your doors and windows on a windy winter day. The path that the curling smoke takes will quickly pinpoint the source of any drafts. Or if the idea of a using a gauge based on combustion bothers you, here's another way to make a draft tester. Take a clothers hanger and tape a sheet of thin plastic film to it (the kind of film that is used for garment bags that come from the cleaners). Any movement of the plastic film betrays the presence of an air leak--when used on a cold windy day.

Windows

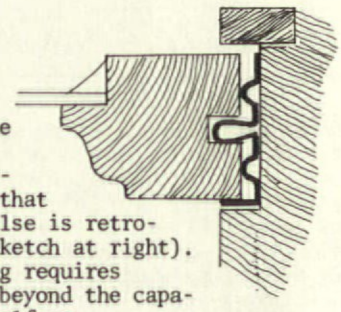
WINDOWS present special weatherstripping problems... which is why you should consider caulking rather than weatherstripping whenever possible. Any sash that you don't normally open during the year (and this would include most top sash) are candidates for caulking from the outside. Caulking is faster, cheaper and more effective than weatherstripping--for those sash where the substitution is possible.

FOR SASH that you wish to open in warm weather...but don't need to open in cold weather...consider temporary caulking with roll-type caulking such as Mortite. When done from the outside it's virtually invisible...and is easily reversible. Roll-type caulk doesn't have much adhesive power, so it is quite easy to remove in the spring. Even when done from the inside, roll-type caulk isn't terribly visible...especially when shutters or drapery hide a portion of the window.



Case #1: Window never opens. Caulk at ●

Case #2: Bottom only needs to open. Caulk at ● ; weatherstrip at ○



FOR WINDOWS that have to move up and down in all seasons, weatherstripping is the only answer. The most effective, durable and least visible window weatherstripping is the metal type that either comes installed, or else is retrofitted by a carpenter (see sketch at right). This type of weatherstripping requires grooves in the sash--and is beyond the capabilities of most do-it-yourselfers.

THE LONGEST-LASTING and most effective homeowner installed weatherstrip is spring metal. This can be used for sides, top, bottom and meeting rail. The only problem with spring metal is that it has to be nailed in place. And sometimes the side channels of old window frames are so loose you can't nail into them without knocking the frame apart. In that case, the next best choice is plastic "V" stock--which operates on the same principle as spring metal.

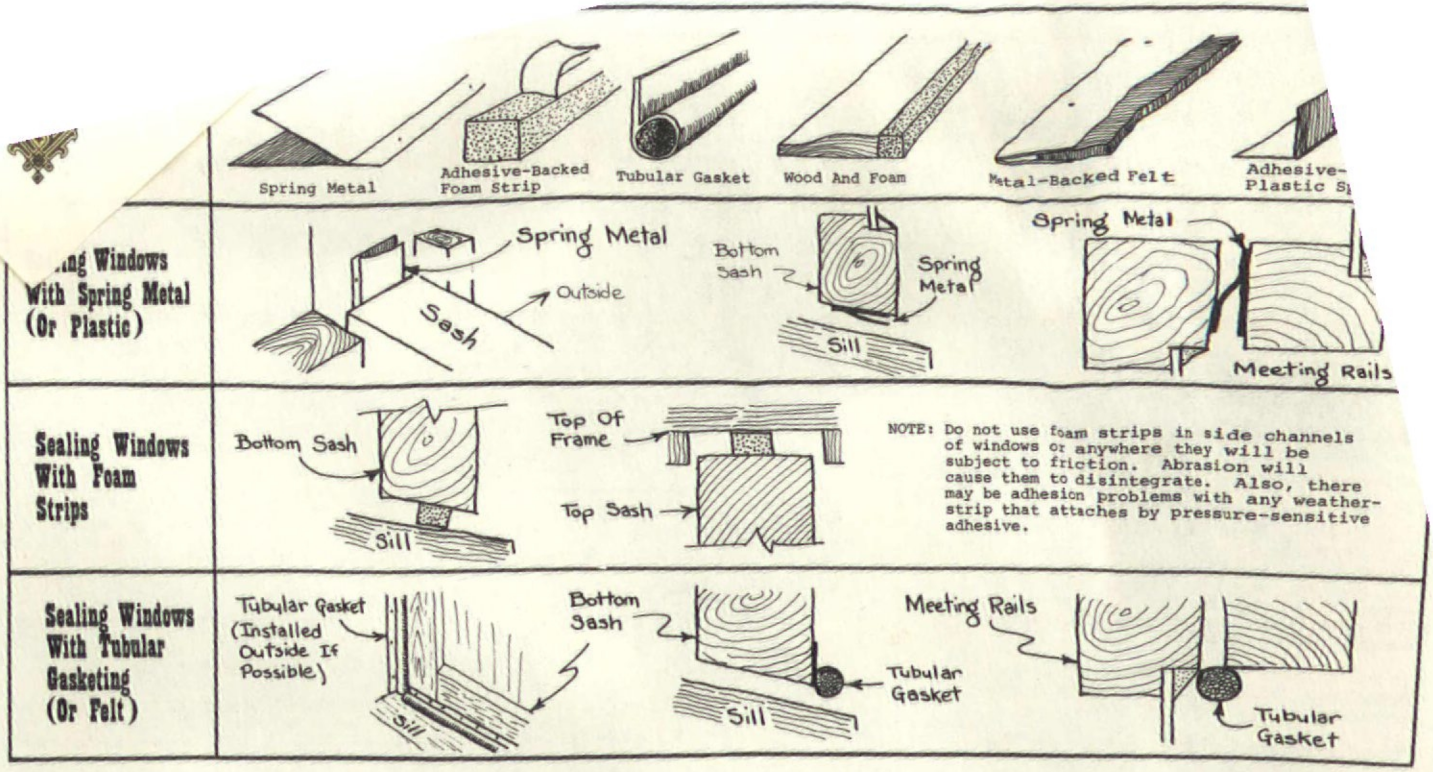
PLASTIC "V" STOCK (such as 3M Weatherstrip Type #2743) can be used on all window edges--just like spring metal. The advantage is that the plastic material attaches with a pressure-sensitive adhesive rather than nails. The disadvantages are: (1) The adhesive won't stick to dirty surfaces; (2) The plastic won't last as long as metal.

TUBULAR GASKET can also seal windows. The disadvantage of this material is that it can't be hidden the way that metal and plastic springs can. It's effective but ugly! It has its place when weatherstripping inconspicuous places like cellar doors, the outside of windows, etc.

THERE ARE also "T" shaped plastic strips that can be used as temporary weatherstripping on windows--wedged into cracks and held in place by friction. Because of the cost of this material and its visibility, we don't recommend it as a first choice.

Doors

DOORS ARE MORE PRONE to air leaks than windows because of their construction. The first thing to do in weatherstripping a door is to make sure it hangs correctly so that there is a relatively uniform space between the door and its casing on all four sides. The



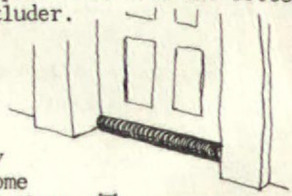
two sides and the top of a door can usually be sealed with the same material. Most permanent and effective are interlocking metal strips. But these are tricky to install; it's beyond most do-it-yourselfers. And certain types are subject to damage and misalignment.

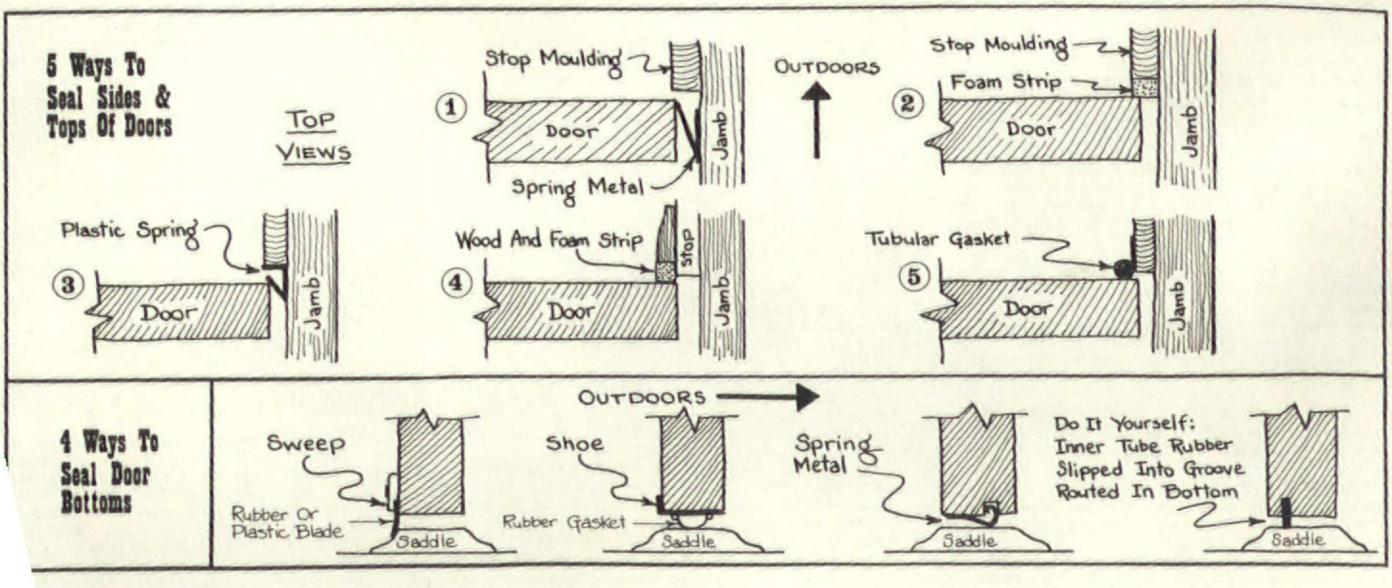
NEXT MOST PERMANENT and effective solution is spring metal. This is the best all-round choice for homeowner installation when there is a fairly even gap all around the door. Plastic spring-type strips with adhesive backing are easier to install but: (1) You may have trouble getting the adhesive to stick; (2) The plastic won't last as long as the metal.

ADHESIVE-BACKED FOAM STRIPS can be mounted in the jamb as shown in the diagram. Foam should not be used on the sides of the jamb where it will be subject to rubbing; it will wear out rapidly. Tubular gasket can be effective; but it has to be surface-mounted and thus is highly visible.

FOR BOTTOMS OF DOORS, the externally mounted sweep-type seal has the advantage of being fairly easy to install. It will also adapt to an uneven saddle fairly well. It is quite visible, however, which could be a drawback in highly formal settings. To get an invisible seal at the bottom of the door, some sort of commercial shoe fitting can be used. This means taking the door off...perhaps cutting a bit of the bottom of the door off...and maybe installing a new saddle.

FOR SELDOM-USED DOORS, the simplest seal for the bottom is the old-fashioned draft-excluder. This is essentially just a long sausage-shaped tube filled with sand. It is simply pushed up against the crack at the bottom of the door. A draft excluder is a relatively easy item to make at home. Some mail-order companies also sell them.





The Old-House EMPORIUM

FREE ADS FOR MEMBERS

Classified ads are FREE for current members. The ads are subject to editorial selection and space availability. They are limited to one-of-a-kind opportunities and small-lot sales. Standard commercial products are NOT eligible.

Photos of items for sale are also printed—space permitting. Just submit a clear black & white photograph along with your ad copy.

Examples of types of ads eligible for free insertion: 1) Interesting old houses for sale; 2) Architectural salvage & old house parts for sale; 3) Restoration positions wanted and vacant; 4) Hard-to-find items that you are looking for; 5) Trades and swaps; 6) Restoration and old house services; 7) Meetings and events.

Free ads are limited to a maximum of 50 words. The only payment required is your current OHJ mailing label to verify your membership status.

Deadline will be on the 5th, 2 months before the issue. For example, ads for the December issue are due by October 5th.

Write: Emporium Editor, Old-House Journal, 69A Seventh Avenue, Brooklyn, NY 11217.

BOOKS AND PUBLICATIONS

RESOURCES IN HOUSING REHABILITATION: a clearinghouse for literature on housing rehabilitation—books, guides, manuals on financial techniques, program implementation and forms used in the rehabilitation process. S. Best, Resources in Housing Rehabilitation. P.O. Box 16028, Phila., PA, 19114. (215)637-6596, evenings.

FOR SALE

OLD BARN about 40ft x 70ft high, for lumber and beams. Also hogpen, corncrib. Marjorie Orban, 511 N. Summit St., Morenci, MI 49256. (517) 458-2351.

VICTORIAN KITCHEN SINK—Cast iron enamelled one piece apron sink with double drainboard. Excellent condition. Photo on request. Overall size 60in x 22in. David, P.O. Box 321 Aylmer, Quebec J9H5E1.

PAIR OF "LANES"—1892 panelled pine parlor doors. 5 horizontal panels per door, each door measures 28in x 78in. Stripped and sanded. Complete sliding mechanism included with 10ft overhead track and 2 pairs of adjustable wheels per door. $165. D. Cameron, 104 Capitol Hill, Manitou Springs, CO 80829. (303)685-9473.

BEAMS, PLANKS, PANELLING, DOORS, from old house, circa 1820. Call W. Weaver (212)682-4992, days; (201)499-7504, evenings.

VICTORIAN OAK & chestnut mantels, armoires, doors, mouldings and other salvaged accessories available at very reasonable prices, in Phila. area. After 6 pm.: (609)667-0425.

FINE & LARGE COLLECTION of architectural antiques comprising over 12,000 sq. ft. of stock. Includes stained glass (over 1000 pieces), fine exterior Victorian doors, ornate cast iron mantelpieces and hardware. The stock will be sold as one lot. Asking price: $270,000. Ted de Clerq, 410 St. Pierre St., Montreal, PQ (514)849-3344.

VICTORIAN BAR, circa 1855, 18ft long. From Village Inn, Englishtown NJ. NHS. Bar was in use in the tavern from 1855 to 1973. BHS, Box 1776, Tennent, NJ 07763.

1894 CHICERKING 7ft grand piano, ebony, ornate, with orig. wood carpet pads and Eastlake style piano bench. Photos available. $500. plus shipping. L. Hollman, 723 Church, Eudora, KS 66025. (Kansas City area) (913)542-3637.

WALNUT ENTRYWAY & STAIRCASE, circa 1885. Complete two-flight staircase. Entryway doors with cut-glass panels and transom window. 8 matching doors with ornate framing. Complete brass hardware. Parquet flooring, crown moulding baseboards. Near-mint condition. Gregg Gauger, 153 N. Fremont St., Whitewater, WI 53190.

SMALL LEADED GLASS PANELS—12, 6-3/4 x 11-3/8 diamond pattern, clean dbl strength glass, interior lead, frame of zinc. 50 to 60 yrs old, good production quality and never cemented. Trade, or will take $15. ea. Don Robertson, 539 S. Baltimore, Hastings, NB 68901.

TRADES AND SWAPS

DOORKNOBS—Serious collector has large selection of ornate Victorian knobs for trading. Photos available. Especially interested in rarer old cast knobs by Mallory-Wheeler, Russel-Erwin, Corbin, etc., 1870-1890. Len Blumin, 382 Throckmorton Ave., Mill Valley, CA 94941. (415)388-4990.

OLD VICTORIAN CRAZY QUILTS, tops and blocks wanted to buy or to swap for calico or woolen fabrics. Quilt appraisals. M. Bowne, 88 Lincklaen St., Cazenovia, NY 13035.

3 CLASSICAL WOODEN MANTELS for sale or swap, mid 1700's, in excellent condition. Also about 2000 bricks, most cleaned, from the same fireplace with bee-hive oven dismantled. Best offer. Brom Builders, P.O. Box 35, Glasgo, CT 06337.

POSITION WANTED

INTERIOR DESIGNER specializing in historic interiors and architecture—Kathy Black, a senior at CA Polytechnic State U. seeks position in Restoration field. Write K. Black, 1703 Santa Barbara St., San Luis Obispo, CA 93401.

POSITION OFFERED

PRESERVATION ARCHITECT to act as staff architectural consultant for Tax Act projects, environmental review, and grants: to prepare nominations to the National Register; and to provide technical advice to the public. Starting: $12,500 -14,500. Preference and higher salary to applicant with architectural degree, 1 year graduate study in architectural preservation and/or 2 years preservation project experience. Write: Lawerence Oaks, Alabama Historical Commission. 725 Monroe St., Montgomery, AL 36130.

REAL ESTATE

RESTORED COLONIAL HOME, frame with stone wing, dating from 1760's. Secluded on 5¼ acres in center of small N.J. town 35 min. from downtown Phila. Features brick porch, boxwood gardens, modern kitchen, 4 brs, 2½ baths, 5 original fireplaces and mantels. $170,000. Robert Talley (609)423-4542.

HAMPTON CT—One of the 50 oldest houses in New England! Cape stone-ender built by John Cates, first settler in the "Windham Wilderness" in the 1690's on Joshua's Will land. Authentically restored on 6 or more acres. Additional 7rm cottage. Call Margo Hallett (203)455-0469.

LOUISVILLE KY metropolitan area. 100 yr. old home. Built for a Riverboat Captain. 14 rms Unique in design and workmanship. Original bra and crystal chandeliers, hardwood floors, 9 fi places. Situated on 1.83 acres overlooking t Ohio River. George Buehler, 3209 Utica Pi Jeffersonville, IN 47130. (812)282-3916.

COMSTOCK HISTORICAL DISTRICT—painstakinly rehabilitated Victorian, 1870's. 2/3 bdrms, 2 baths, parlor dining rm, warming-room-kitchen, solarium; with such special features as oak floors, oak spiral staircase, tin ceilings, marble fireplace, stained glass. 3 car garage/workshop, over 1/3 acre, completely landscaped. $150,000. Box 701, Virginia City, NV 89440. (702)847-0615.

3½ STOREY BRICK TOWNHOUSE—south facing bay windows, stained glass—6 marble fireplaces, skylight over center stairway, downtown Albany, NY. Easy transporation, ready for reconstruction, professionally gutted; Federal Rehabilitation money available—high rent potential. $19,500. Mr. Thomas Julien, 43 Bonheim St., Albany, NY 12204. (518) 463-0427.

UNIQUE HOUSE—200 yr. old Georgian/Federal with Ballroom! The Ballroom: one-of-a-kind antique gem with high coved ceiling, hand-carved elegant detailing. 15 acres, highway frontage, outbuildings, additional features. Nominated National Register. Photos, historic survey upon request. $169,000. Avery, Fair Haven, VT 05743. (802) 265-4492.

1811 CENTER CHIMNEY HOUSE beautifully restored, 3 fireplaces. Kitchen has brick floor, exposed beams signed by original owner. New barn. 5½ acres. Verona, NY. $89,900. (315)363-0213.

HISTORIC LANDMARK in Galena, IL. 1905—3 storey brick school with 6 storey bell tower & 3 faced clock—scenic views. 42,000. sq. ft. convertible to lodging or living units. Fact sheet available. Galena Unit District 120, Galena, IL 61036. (815)777-0917.

ON NATIONAL REGISTER: Edwardsville IL. 25 min. from St. Louis. 2 storey Federal brick, built 1820, 8 rms, 4 fireplaces, 2 modern baths, verandah. Natural gas hot water heat, insulated, excellent condition, kitchen modern, trees. Photo, details available. (618)692-3246.

1060 HUMBOLDT ST. Denver Co. Elegant in-town living situated in the prestigious Humboldt Isle National Historic District. Spectacular stained glass windows and woodwork. Totally restored with fully modern kitchen and bathrooms and incredible master bedroom suite. $700,000. Norman Kirkpatrick, (303)455-9139 or (303)422-2555.

THE MILL, NEWFIELD Me. Unusual late 1800 converted mill overlooking waterfall, pond & trout stream on 3 acres. Post-and-Beam const. w/orig. floors, walls & ceilings. 4 bedrms, lg. liv, rm., Din., bath and shower. Studio on lower level opens to gardens. Lg. screened porch. Furniture, complete kitchen included. 100 miles from Boston. By appt. only. (617)598-4671.

BRICK TOWNHOUSE—1851 Federal style. 6-over-6 windows, 8 fireplaces, in terrible condition. Located in small city 50 miles southeast of Pittsburgh. We're looking for dedicated neighbors. $15,000. (412)438-8957, evenings.

SHENANDOAH COUNTY, Virginia. Large limestone house (1700's) 5 fireplaces, stone spring house, spring fed lake for swimming or fishing. New barn, well & septic system. Well located on 62 acres. Will consider financing $165,000. (703) 465-8166 evenings.

WANTED

ANTEBELLUM HOME, Kentucky, Tennessee, Alabama area: Prefer country location with some elbow room. L.G. Ahlgrim, 1 Madrid Dr., DeMotte, IN 46310. (219)987-4543.

OLD PORCELAIN PEDESTAL LAVATORY SINK with fluted columnar or fancy base. David Cooney, 4998 Battery Lane, Bethesda, MD 20014. (301)656-0294, evenings.

PINTLES TO MOUNT EXTERIOR house shutters; must be surface-mount or lag screw type with 3/8in diameter post; need between 28-68 pieces; Call (215)754-6146 after 5 pm or write Ken Lawrence, RD 1, Box 527, Perkiomenville, PA 18074. Include price.

VICTORIAN ARCHITECTURAL ELEMENTS: Individual items or entire buildings—staircases, doors, mouldings, mantels, stained glass, lighting fixtures, etc. No item too big or too small. P.O. Box 26, New London, CT 06320. (203)443-1864.

LARGE VICTORIAN URN or other Victorian piece appropriate as a centerpiece for a small park. Please include a description, dimensions, and a photo. Victorian Melrose Society, c/o Schneider, 40 Upland Rd., Melrose, MA 02176.

A THATCHER to install roof on historic building. Ste. Genevieve, MO. Also materials & sources. M. Wilhauk, 4601 Valmeyer Dr., St. Louis, MO 63128. (314)487-1861.

OWNERS OF RESIDENCES designed by RALPH ADAMS CRAM in order to exchange information and perhaps form a Cram Preservation Society. Marc L. Cooper, 165 Winthrop Rd., Brookline, MA 02146. (617)726-8785.

RESTORATION SERVICES

DETAILED, handbuilt 1/8in=1ft. scale models made of your house or building. CAN DO ANY STYLE from photographs or architectural plans (these returned with finished model). Terry Warner, 5317 1st Ave. South, Minneapolis, MN 55419. (612) 825-0331.

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ANTIQUE HOUSE CONSULTANTS for those who would like some personal help with: historic research, paint analysis, choosing appropriate interior and exterior finishes and furnishings, diagnosing problems, setting priorities, or finding craftsmen, architects. M.C. Taylor, 242 Dalmeny Rd., Briarcliff Manor, NY 10510. (914)762-4858.

REAL ESTATE APPRAISER. Expert, knows historical properties. (914)356-0660.

LIMITED EDITION PRINTS that may be used by historic societies and others wishing to raise funds for preservation. An edition of only 600 or 700, selling at a reasonable price, could net $10,000. Write: Dale Michels, 1126 Avery St., Parkersburg, WV 26101.) (304)422-1147.

COMPREHENSIVE SITE & building analysis to preserve/restore old property. Plantings and construction for outside as well as inside the house. Free initial consultation, references & portfolios upon request. Ecosystems Assoc., 118 S. Bedford, Madison, WI 53703. (608)251-4200.

AUTHENTIC REPRODUCTION textiles for old homes and historic sites—17th, 18th, 19th, and 20th c. These textiles are appropriately selected for floors, windows, furniture and walls. Mrs. Hunt, High Tide Studio, 49 Iris St., Mahtomedi, MN 55115. (612)429-9623.

CUSTOM-MADE ARCHITECTURAL ornamentation/artwork available in light-weight, pre-engineered polymers for antique structures—mouldings, ceiling medallions, overdoor pieces, recessed domes, etc. Hallie Bromley, Special Services, Focal Point Inc., 2005 Marietta Rd. N.E., Atlanta, GA 30318. (404) 351-0820.

CUSTOM MILLING of doors, windows and storm window kits. For restoration of authentic Victorian designs, please send a detailed drawing or sample for your moulding specifications. Free estimates. Silverton Victorian Mill Works, Box 523, Silverton CO 81433. (303)387-5716.

WORKING (CONSTRUCTION) DRAWINGS to scale of any house. Set consists of all plans and elevations necessary to secure permits. Also remodelling, restoration and addition services for your building. Don Bramlett, 19619 Normandale Ave., Artesia, CA 90701. (213)860-1070.

INTERIOR DESIGNER specializing in old-house restoration and renovation. Provides help coordinating textures, colors, and patterns—problem solving. Can locate specialty furnishings. Free consultation. Linteriors, Pueblo,CO 81004. (303) 545-8073.

UPHOLSTERING & FURNITURE REFURBISHing. Specializing in antique restoration, •In Brooklyn. (212)693-4230.

RESTORATION OF OLD PHOTOGRAPHS. Write: Fotowerks, 40 Middleton, Rutledge Hill, Nashville, TN 37210. (615)254-3284, by appt. only.

CUSTOM MADE VICTORIAN & EDWARDIAN clothing, by the Tailor to the Old-House Journal. Nelson Arriaga, 418 Grand Ave., Brooklyn, NY 11238. (212)783-1221.

MEETINGS & EVENTS

"HISTORIC HOUSE PRESERVATION: how-to"—The Smithsonian Institution offers this outstanding program the week of October 19-24. James C. Massey, Dir., Historic House Association of America; R.A. Clem Labine, Ed., THE OLD-HOUSE JOURNAL. Walking tours. Write: Selected Studies, A & I 1190A, Smithsonian Institution, Washington D.C. 20560. (202)381-6434,

OREGON HISTORIC DISTRICT SOCIETY house tour, Dayton Ohio. Sunday, October 5, 1980. 12 houses will be open to the public from 12 noon to 6 pm. Robert D. Yunag, (513)228-3352.

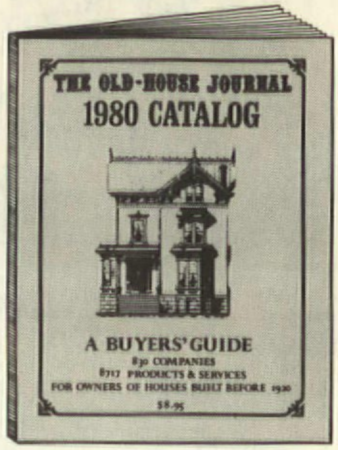
"THE OLD HOUSE REVIVAL", a seminar with workshop sessions on antique appraisal, moving the old house, space utilization, wood construction and restoration, rot and what to do about it,1850-1920 ornamental decoration. Clem Labine, Ed., THE OLD-HOUSE JOURNAL, Dr. Roger Moss, Dir., Athenaeum of Phila., Whitman Ball, Ball & Ball Hardware. Sept. 19-21. (205)832-6621.

ANN ARBOR, MI—8th Annual Old West Side Homes Tour and Neighborhood Celebration. Noon to 5pm. September 14, (313)761-3961.

CRAFTSPEOPLE, BUILDING SUPPLIERS, Contractors, etc., specializing in services, products or ideas for older buildings: Come exhibit at the OLD HOUSE FAIR—Oct. 18, Gloucester, MA. Write: Old House Fair, GAPP, Gloucester Development Team, Inc., 159 Main St., Gloucester, MA 01930. (617)283-2135.

How-To-Do-It

PUBLISHED MONTHLY, The Old-House Journal newsletter gives you the latest authoritative information on pre-1920 houses: Practical how-to articles on maintaining, restoring and decorating in period styles.



Where-To-Find-It

PUBLISHED ANNUALLY, The Old-House Journal CATALOG is the most complete and up-to-date directory of old-house suppliers. Tells who sells what; 830 companies supplying 8,717 products and services. Extensively indexed.

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Fight The Scourge Of Aluminum Siding

THE ARTICLE in the April issue of Old-House Journal detailed the many problems that are being encountered with aluminum and vinyl siding.

MANY READERS have asked for reprints of that article to use as a "consciousness raising" tool around their neighborhoods. Their hope is to get neighbors who are thinking about aluminum or vinyl siding to reconsider.

AS A RESULT of these requests, the Old-House Journal has made a separate 4-page reprint of the article "The Case Against Substitute Siding." Price is 10¢ each in quantities of 50 or more. (Price includes all shipping and handling charges.)

ADDRESS REQUESTS to: Reprint Dept., Old-House Journal, 69A Seventh Ave., Brooklyn, N.Y. 11217.

The Old-House Journal

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*FOR FULL DETAILS and order forms, write on your letterhead and tell us about your organization. Contact:

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  The Old-House Journal
  69A Seventh Avenue
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MORE THAN 4,000 IN USE BY OLD-HOUSE JOURNAL SUBSCRIBERS

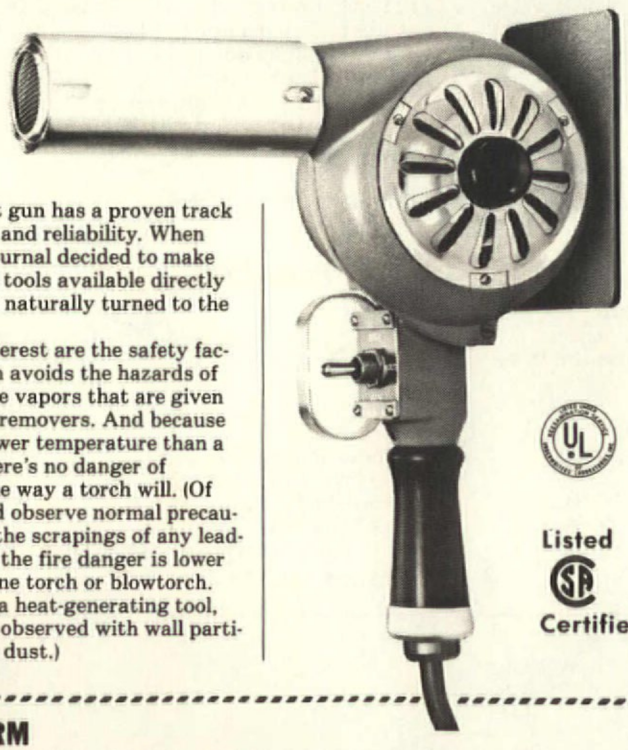
There's no PLEASANT way to remove paint. But if you have a large amount of paint to strip, the fastest, safest and most economical way is with the Master Appliance electric heat gun.

The Master heat gun has been collecting raves from readers ever since Patricia and Wilkie Talbert's original letter in the April 1976 issue of The Old-House Journal. Since then, more than 4,000 OHJ subscribers have purchased heat guns. And the raves are still coming in.

Master Appliance is the #1 maker of heat guns in the U.S.; they sell more because their heat gun has a proven track record of long life and reliability. When The Old-House Journal decided to make these hard-to-find tools available directly to our readers, we naturally turned to the #1 heat gun.

Of special interest are the safety factors. The heat gun avoids the hazards of methylene chloride vapors that are given off by most paint removers. And because it operates at a lower temperature than a propane torch, there's no danger of vaporizing lead the way a torch will. (Of course, you should observe normal precautions in handling the scrapings of any lead-based paint.) Too, the fire danger is lower than with a propane torch or blowtorch. (But because it is a heat-generating tool, caution should be observed with wall partitions that contain dust.)

The heat gun is ideal for stripping paint from interior woodwork where a clear finish is going to be applied. There's none of the scorching such as you get with a propane torch. Use the heat gun for stripping paint from such places as: (1) Doors; (2) Wainscotting; (3) Window and door frames; (4) Exterior doors; (5) Porch columns and woodwork; (6) Baseboards; (7) Shutters; (8) Panelling. In addition, the heat gun can be used for such purposes as thawing pipes in winter, loosening synthetic resin linoleum paste, and softening old putty when replacing window glass.



Listed

Certified

The heat gun is NOT recommended for: (1) Removing shellac and varnish; (2) Stripping paint on window muntins (possible cracking of the glass from heat); (3) Stripping the entire exterior of a house (too slow); (4) Stripping Early American milk paint (only ammonia will do that).

The electric heat gun softens paint in a uniform way so that it can be scraped off with a knife. Some clean-up with chemical remover is required, but the heat gun will remove about 98% of the paint—vastly reducing the amount of chemical needed and the consequent mess. See article in the November 1979 OHJ for additional details on operation.

Because it is a high-quality industrial tool, the Master heat gun isn't cheap. But with paint remover around $12 per gallon, the gun only costs as much as 5-6 gallons of remover. In some communities, groups of neighbors are buying a heat gun to share.

Price of $64.95 includes: (1) Pedestal stand worth $6.75; (2) Same-day shipping via United Parcel Service; (3) The Old-House Journal replacement guarantee. Telephone orders also accepted on VISA or via COD (there's a $2 charge for COD).

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- **8-ft. 3-wire oil-resistant grounded cord with moulded plug**
- **Pistol-grip handle; 3-position fingertip switch with guard for added safety**
- **No asbestos used in construction**
- **Rubber-backed stand swivels 90°; contains keyhole for hanging**
- **Heavy-duty industrial construction for long life**
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Good Books On Energy

Books and Booklets

▶ The Complete Book of Insulating, by Larry Gay. Stephen Greene Press, 1980. The most complete book--how to insulate everything. $7.95, (for ordering, see below).

▶ In The Bank...Or Up The Chimney?, Technology + Economics, HUD. U.S. Gov't Printing Office, 1977. Best-selling consumer's handbook that takes you through basic energy-saving home improvements. Explains where money is going, then how-to-do-it information on simple retrofits. Also helps you compute cost-effectiveness of different improvements. Very basic; but price is right. $1.80 (see below).

▶ "Condensation Problems in Your House: Prevention and Solution." Agriculture Bulletin #373, U.S. Gov't Printing Office, 1974. A concise discussion of moisture problems and condensation. $2.00 (see below).

▶ "Conserving Energy in Historic Buildings" by Baird Smith. Preservation Brief #3. Heritage Conservation & Recreation Service, April 1978. 75¢ (see below).

▶ Insulating The Old House, Sally Nielsen, ed. Greater Portland Landmarks, 1977. A good insulating guide for old houses with an historic/aesthetic perspective. $1.95. (see below)

These 5 books are available from:
Preservation Resource Group
5619 Southampton Dr.--Dept. OHJ
Springfield, Va. 22151
(703)323-1407.
Postage: $1.00 for the first book and 30¢ for each additional book. If only Preservation Brief #3 is ordered, postage is free.

If the following 2 books are not in your local bookstores, you can order them from the publishers:

▶ From The Walls In, by Charles Wing. Little, Brown & Co., 1979. A more sophisticated retrofitting guide for old buildings. Excellent. $9.95 plus $1.50 postage. Order from: Little, Brown Co.; 200 West St.; Waltham Ma. 02154.

▶ Low-Cost, Energy-Efficient Shelter, Eugene Eccli, ed. Rodale Press, 1976. A very common-sense approach to traditional and alternate housing. Not big on old houses, but full of usable practical information & good basic principles. $8.95, no postage if pre-paid. Order from: Rodale Press; 33 East Minor St.; Dept. OHJ, Emmaus, Pa. 18049.

▶ The Energy-Wise Home Buyer, Technology + Economics. HUD. U.S. Gov't Printing Office, 1979 Although this is a guide to selecting an energy-efficient house, it also provides a good, basic checklist for pinpointing areas that need upgrading. Section 1 is for new houses; Section 2 is for older ones. $2.00. Order from: Consumer Information Center; Pueblo Co. 81009. Postage is included in the price.

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