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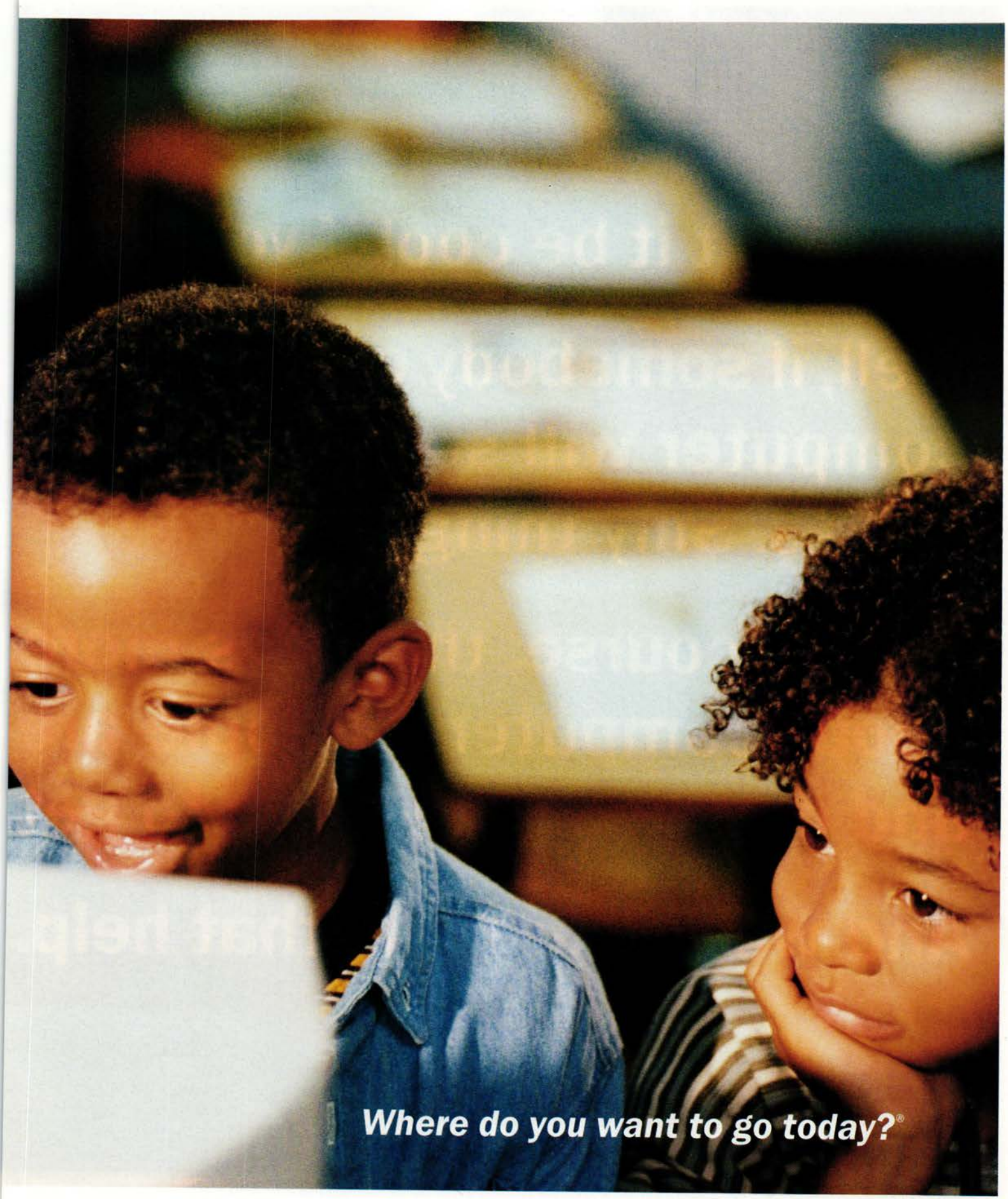
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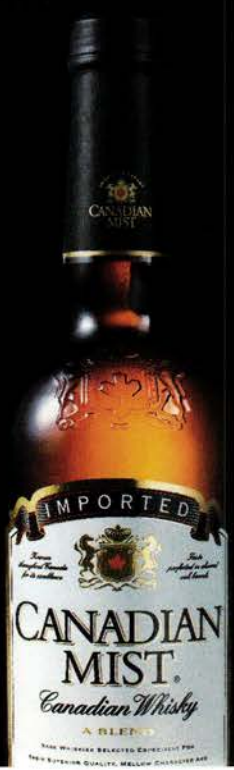

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COVER: TOM SILVA, FRONT, INSTALLS A RADIANT FLOOR HEATING SYSTEM AT *THIS OLD HOUSE*'S PROJECT IN MILTON, MASSACHUSETTS, WITH HELP FROM, COUNTERCLOCKWISE, STEVE THOMAS, NORM ABRAM AND RICHARD TRETHEWEY. PHOTOGRAPH BY KELLER & KELLER. SEE STORY, P. 110.

(Continued on page 8)

PHOTOS, FROM TOP: JONATHAN CARLSON; BERND AUERS; JOHN GRUEN; MICHAEL GRIMM.

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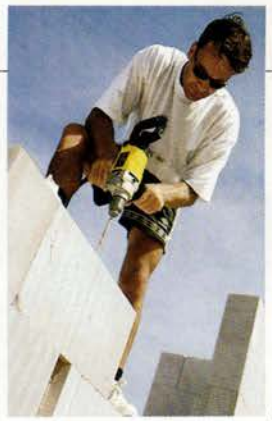

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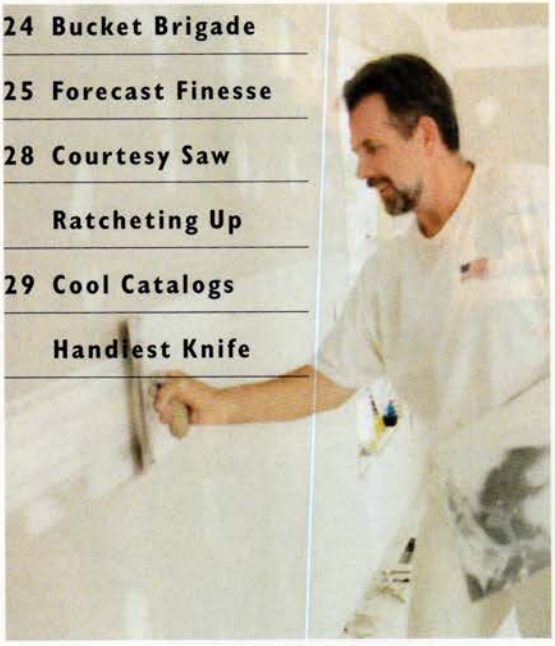

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On a recent visit to his brother in Tucson, Arizona, writer **JOSEPH D'AGNESE** ("When There's a Mouse in the House," page 116) stumbled—happily—upon an Arizona Pest Control Association conference. "The exterminators were thrilled to have someone from the press attend," says D'Agnese, who lives in Hoboken, New Jersey. "First, I learned all about scorpions. Then we had lunch and moved on to cockroaches and rodents." Back home, D'Agnese had his father test a new kind of electronic mousetrap. "He ultimately caught nine mice in his toolshed," says D'Agnese. "Of course, if he hadn't baited the trap with kibble, they might never have invaded in the first place."

"I think of him as a kid brother, and he thinks of me as an uncle," says finance expert and attorney **STEPHEN M. POLLAN,** 69, of his relationship with writer **MARK LEVINE,** 40. Since 1983, the two have collaborated on dozens of articles—the latest being "Buy Your Last House First" (page 67)—and 14 books about real estate, money management and home improvement. Their best-selling book *Die Broke* is now out in paperback, and their newest, *Live Rich,* is available in hardback (both from Harper Business). Levine lives in Ithaca, New York, with his wife, Deirdre. Pollan lives in New York City with his wife, Corky.

GREGORY NEMEC specializes in scratchboard drawing, etching pictures into a clay-coated surface covered with black ink. For "Take a Walk on the Warm Side" (page 110), Nemec used scratchboard to depict a bathroom with radiant floor heat. "It would have been nice to have such uniform heat when I was growing up in Iowa," he says. "In the wintertime, we would all gather around the baseboards to be near the hot-air vent." Now a resident of New York City, Nemec has contributed artwork to *Wired* and the *Wall Street Journal.*

Early in his career, **JOHN GRUEN** worked in fashion photography with Cindy Crawford and Naomi Campbell. Lately, however, his assignments have included shooting oxalis (a flowering plant) and calligraphy for *Martha Stewart Living.* For "Montpelier" (page 124), he captured the beauty of President James Madison's plantation in Virginia's piedmont region. "I think of that part of the state as the country club of the South," Gruen says. "It was interesting to learn about Madison's financial problems—and how his heirs ended up losing his house."

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PHOTOS: TOP, DIANA HAAS; SECOND FROM BOTTOM, WAYNE C. FOWLER.

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welcome home

They only needed grout for their fireplace, but Robert and Suzanne Grudem picked up something else when shopping at a local home-improvement store last spring in Bellevue, Washington. They bought a copy of the special "Milton Project" edition of *This Old House* magazine. Leafing through the issue, they soon realized they'd found their dream house—a 275-year-old Colonial renovated by the crew of public television's *This Old House*. A rash of impulsive acts soon followed: In early June, Robert and Suzanne flew across the country to visit the property. For Suzanne's 42nd birthday, in mid-June, Robert wrote a poem about the house. In early July, the couple's sealed bid arrived at WGBH-TV (which produces *T.O.H.*).

The house became a catalyst for a change in the Grudems' life: Robert, a software engineer for 11 years with Microsoft, and Suzanne, a nurse, wanted to take some time off to raise their three young children: Charles, 4; Victoria, 2½; and Anne Marie, 6 months. They couldn't imagine a better place. "I love Colonial houses," says Suzanne, who fondly remembers her grandmother's house in upstate New York. "I love timber-framed structures," says Robert, who spent three years of his youth in Massachusetts.

In August, Robert and Suzanne Grudem and their three children—from left, Charles, Victoria and Anne Marie—moved from Washington to the 1720s Colonial in Milton, Massachusetts, renovated by T.O.H. *last fall.*

The Grudems' offer of $1.55 million, the highest bid the selection committee at WGBH-TV received, and their request to close by July 27 sealed the deal. "We jumped up and down," says Suzanne. "And then the reality of a big move set in."

Showing a visitor through their new house on the day the 53-foot-long moving van arrived in mid-August, Suzanne dodged boxes, stepped around crib parts in the kitchen, and gently plucked the baby from the floor of the study where she'd been napping. Suddenly, the Milton house was filled with life and dreams and plans. Although neither Robert nor Suzanne is skilled at woodworking (time for a collective groan from readers who lusted over the tool-packed workshop wing of the barn), both intend to learn. "I'd love to build some bookcases for the study," says Suzanne, who admires the paneled bookcases *T.O.H.* master carpenter Norm Abram and contractor Tom Silva made for the media room. "And Bob wants to build a dollhouse version of this house for Victoria." Robert is awestruck by the 1850s barn: "I just like to go in and look up," he says. Suzanne loves the details—like the handpainted ladybugs on the kitchen wall—and the comfort of a sturdy house. "If the place has lasted for 275 years, it'll survive our children," she jokes. We suspect that it will survive their children and their children's children and . . . —*Jill Connors*

STORIES ABOUT THE MILTON HOUSE APPEARED IN ISSUES DATING FROM JULY/AUGUST 1997 TO MARCH/APRIL 1998 AS WELL AS IN THE SPRING 1998 "MILTON PROJECT" SPECIAL EDITION.

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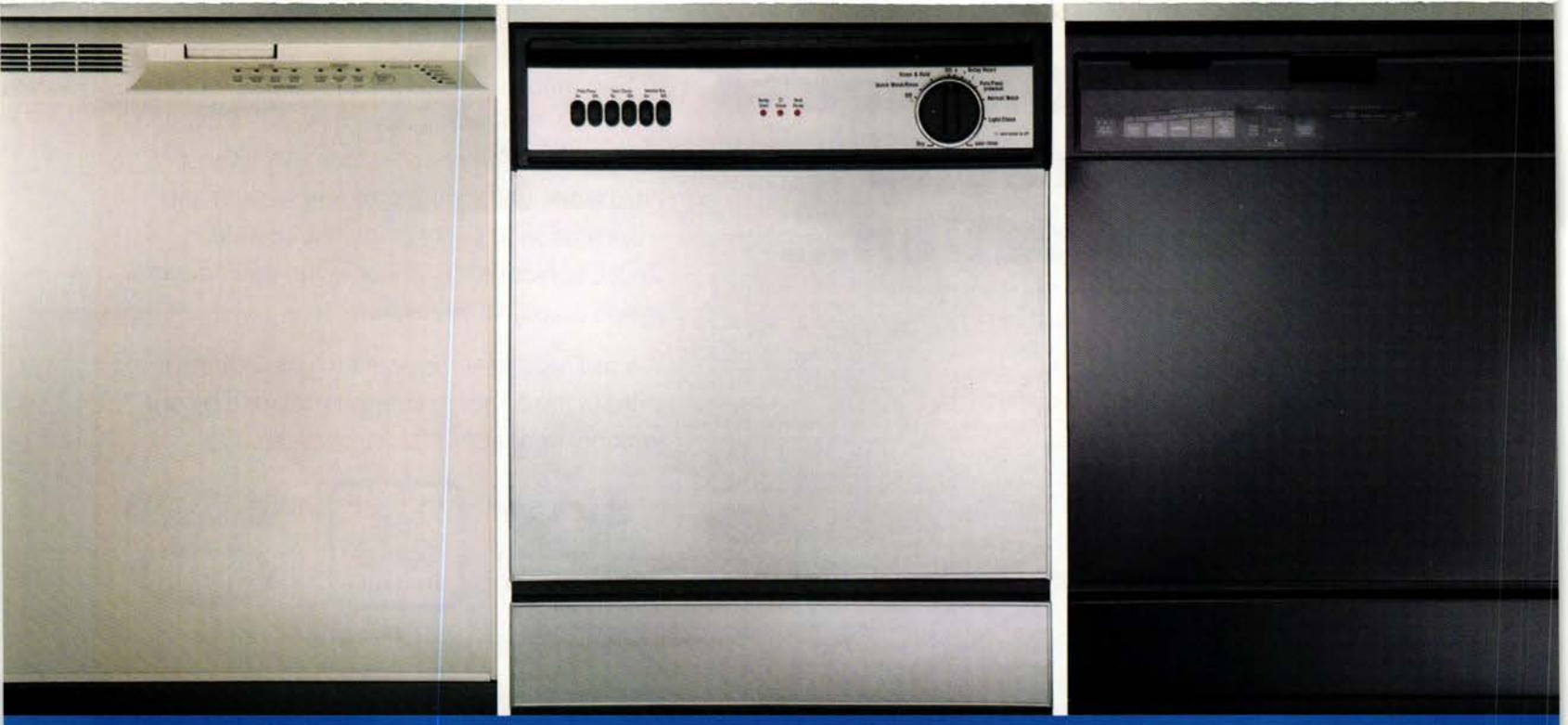

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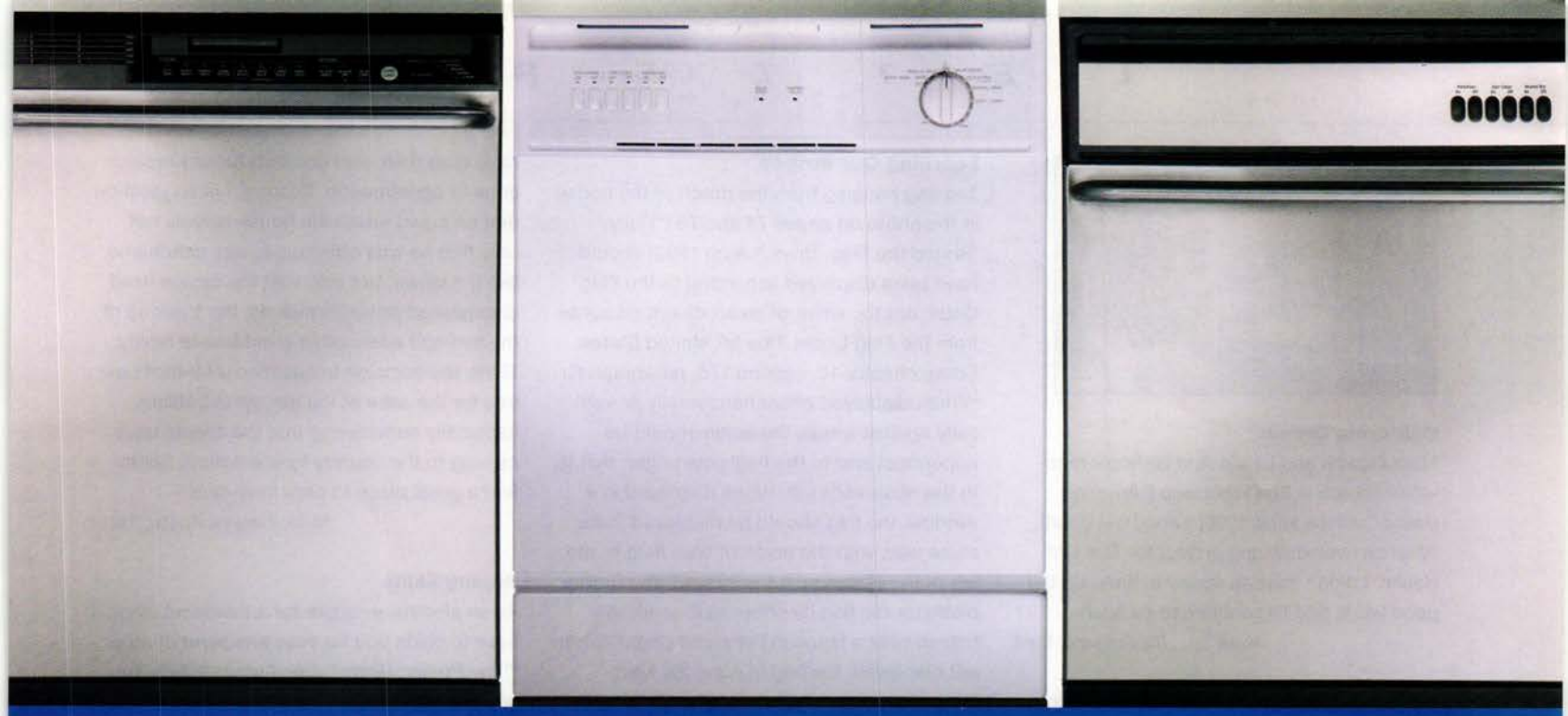

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Johns Manville

PHOTOS: DAVID PETERSON.

California Dream

Mark Dvorak and Laurie Ann Bishop's renovated church in San Francisco ["Amazing Grace," July/August 1998] turned out great! What an overwhelming project for *This Old House.* I didn't miss an episode. Keep up the good work, and I'll continue to be a fan.

ALISA TELL, *Sacramento, Calif.*

Bruce Irving took the words right out of my mouth. The San Francisco renovation was the "coolest, hippest project." Unlike the skeptical crew, I saw a masterpiece in the making from the first show. Congratulations to everyone involved, and best wishes to Mark and Laurie Ann.

NANCI TRAYNOR, *Toronto*

Learning Our Stripes

The flag hanging from the porch of the house in the photo on pages 74 and 75 ["Rally 'Round the Flag, Boys," June 1998] should have been displayed according to the Flag Code, not the whim of an art director. I quote from the Flag Code, Title 36, United States Code, chapter 10, section 175, paragraph (i): "When displayed either horizontally or vertically against a wall, the union should be uppermost and to the flag's own right; that is, to the observer's left. When displayed in a window, the flag should be displayed in the same way, with the union or blue field to the left of the observer in the street." You further dishonor the flag by showing it carelessly tossed over a fence in the same photo. When not displayed, the flag is correctly kept folded in a prescribed triangular form.

ALFRED ROBERTS, SERGEANT FIRST CLASS, *New Jersey Army National Guard*

Lack of Foresight

Mr. and Mrs. Borne's problems ["Land Rush," July/August 1998] began when they hired their architect. First, the architect should have read their land contract for any restrictions to construction. Second, his suggestion that he could rotate the house reveals not only that he was oblivious to site conditions like the views, but also that the design itself disregarded prevailing winds, the tracking of the sun and every other condition of reality. Third, the decision to sacrifice a 60-foot oak tree for the sake of the garage is baffling, especially considering that the clients were moving to the country to see nature, not to find a great place to park their cars.

MARK ZATOPEK, *Austin, Texas*

Roping Skills

As an electrician-rigger for a theatrical stage, I have to chide you for your treatment of rope ["The Poster: Rope," July/August 1998]. You gave the breaking strength of the ropes rather than the *safe* working load. Most ropes' breaking strength is three to four times higher than the working load. Working-load guidelines take into account that most loads are dynamic as opposed to static. A rope should never be used near its breaking strength.

BILL ATKINS, *Sarasota, Fla.*

Tub Tarps

As a general contractor in Chicago, I have a suggestion regarding Mr. Nelson's query about protecting tubs from dirt and damage during renovation projects ["Paint-on Protection," Letters, July/August 1998]. A piece of ¾-inch plywood cut to the size of the top of the tub and edged with duct tape—which keeps out dust and debris—acts as a fantastic protection barrier. Or two or three pieces of squared-off scrap ply can be screwed together to make a tub cover. To protect a freestanding claw-foot tub, one would need to build a complete cover. But it is well worth it; the end result is a protected tub, a happy general contractor and, most important, a happy home owner.

COLM TOLAND, *Chicago*

When I work on new houses, I cover the tub with the carton it came in or cut a piece of plasterboard or plywood to fit on top. I tape all around it so dirt can't get in. Then I don't have to worry about it.

ROSARIO RAIMONDO, *Red Hook, N.Y.*

All Hands on Deck

The article "Building a Safe Deck" [July/August 1998] correctly quotes me regarding the lack of prescriptive anchorage details for the attachment of a deck to a house in the Building Officials and Code Administrators (BOCA) National Building Code. You failed to include, however, that I also stated that the code includes performance requirements in the form of loading criteria that must be incorporated in the design of a deck to withstand the imposed loads. In other words, the code requires that the deck, including anchorage, be designed to withstand the loading criteria included in the code. The lack of prescriptive anchorage details (for example, 3-inch lag screws of ½-inch diameter that are spaced apart at 3 feet) should not be inferred to mean that the code is deficient but rather that a prescriptive cookbook approach is not always adequate, depending on the loading criteria.

MICHAEL J. PFEIFFER, *BUILDING OFFICIALS AND CODE ADMINISTRATORS, Country Club Hills, Ill.*

I am a construction consultant and believe that the Forest Products Laboratory's system for attaching a deck to a house (page 106) has some shortcomings from a framing standpoint. The top of the metal flashing is not properly lapped behind the building paper. This will cause the water—which is migrating between the building paper and the exterior finish (in this case, wood shingles)—to run down between the paper and flashing. In areas where the bolts attach the beam to the house, the water flow will encounter resistance because the connection here is tight.

Another problem: the call for caulking at bolt connections. Caulking can break down after a few years. The bolt connections are not easily accessible, making it hard to maintain caulking. A preferable option for behind the flashing would be a flexible polyethylene film and rubberized asphalt membrane (like the one used in Tom Silva's system, page 107) or a modified bituthene material. Compatible mastic should be used instead of caulking.

RAY FINKEL, *Bend, Ore.*

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OFF THE WALL

BY JEANNE MARIE LASKAS

THE GREAT BOOTY GRAB

Home shows are heaven for grown-ups who never got over trick-or-treating

The guy at the door to the Pittsburgh Home & Garden Show hands me a program and a yellow plastic bag. I'm not sure what the plastic bag is for. Neither is Alex, my husband. This is our first home show. Frankly, we think it's a little odd to pay $7.50 to get into a giant convention center full of salespeople peddling their wares—especially when you can just go to the mall for free—but we're game. We could use some kitchen floor tile ideas, some deck inspiration, a fresh approach to recessed lighting.

We follow the crowd and go riding the up escalator. We examine the faces of the people riding the down escalator, the people just completing their home show experience. They look...droopy. Definitely headed home for naps. I notice two things about these droopy people. 1. Their yellow plastic bags are bulging or, in some cases, breaking and have to be held like babies. 2. Most of them are carrying yardsticks. Not

ILLUSTRATION BY A.J. GARCES

just any yardsticks. Neon pink yardsticks with blue and gold measurement markings.

"I've got to get one of those yardsticks," I say to Alex.

"But we already have a yardstick," he says.

"But I think those yardsticks are free," I say.

We step off the escalator, walk round the corner and see a throng of happy people carrying mops. Actually, they have two mops apiece: one blue and one yellow, tied together with twine. "I must have one of those dual mop combos," I say.

"But we don't need two mops—or one," Alex says.

"Where did you get the mops?" I say to a man in a Superbowl XXX T-shirt. "Are they free?"

"Four bucks," he says, pointing in the direction of a hot-tub kiosk, a stain-resistant-carpeting booth and a piano-and-organ display. I don't see any mops. But I see a lot of other stuff I didn't even know I wanted. What is a home, I think, if not a place to put stuff? And a home show is a celebration of that stuff. A home show, I think, is an instant-gratification extravaganza.

"Magnets!" I say to Alex. "Don't look now, but that guy over there in the booth with the concrete pavers is giving out some pretty decent refrigerator magnets." I yank my husband over to the concrete-paver booth and go in for the kill. The magnets are in a basket just beyond my grasp, just an inch beyond this large man in the sport shirt whose aftershave is way too musky.

"Well, hello there, little lady!" the musk man says, spinning around and pounding a paver with his fist.

"Um," I say, feeling like a kid caught shoplifting, even though the magnets are, technically, free. "Yes, well, I think my husband here has some questions about your pavers." Alex looks at me. I can tell by the blank look on his face that he hasn't a paver question in his head. He could bust me right here and now. He could say, "She just wants one of your stupid magnets." Instead, he says, "Nice pavers. Are they durable?" Soon the man is telling us all about what happens to concrete when compressed in a mold under extreme pressure and compacted with high-frequency vibrators. I surreptitiously eye a mini-blind display with free licorice next door and beyond that an awning display, which seems to have free battery-operated fans.

"Well, thanks," I say to the concrete man. I open my bag. He reaches for a magnet and, clunk, drops one in. I recognize that noise. I remember this feeling. Alex holds out his bag. He wants a magnet too. Giggling, we skip away.

That's when I begin to understand the home show experience. It all goes back to trick-or-treating. The human urge to go from place to place and have perfect strangers smile at you and fill your bag with goodies. I wonder how many miles of concrete pavers, how many thousands of mini blinds, how many millions of mops have been sold, thanks to the lessons learned from Halloween. "A guy just told me that the tubular-skylight-system booth is giving out free digital-read outdoor thermometers," Alex says.

"Let's go," I say, and we're off on a mission without boundaries. We scoop up free pens, letter openers, spinning tops, candy, dehydrated scrambled-egg samples, hand cream, salsa, hard candy, sticky notepads, mugs, a key chain in the shape of a tooth. We giddily take free baby screwdrivers, baby wrenches, baby baseballs, gum, glue, birdseed, calendars, a key chain in the shape of Florida. In my haste to pluck a free helium balloon, I nearly knock over a kid. I grab the last handful of hard candy from the hot-tub kiosk, beating my own husband to the take.

We giddily take free baby screwdrivers, wrenches, baseballs. In my haste to pluck a helium balloon, I nearly knock over a kid.

"Would you please carry my bag?" I then have the nerve to say to Alex. "It's getting really heavy."

"No way," he says. "Not unless you share your hot-tub candy."

I trade him three jawbreakers for a gizmo that opens jars. We stand next to a life-insurance booth, munching our candy. Alex points out that we're not getting any kitchen floor tile ideas, deck inspiration or fresh approaches to recessed lighting.

"Yardsticks," I say, pointing. It's not a mirage. There before us sits a giant pile of neon pink yardsticks. A bank is giving them out. A guy trying to deliver a mortgage lecture keeps getting interrupted by people pestering him about yardsticks.

"Really, folks, I'm almost out," he says. But he must have 1,000 yardsticks. "Could we have two?" I ask, and he hands them over.

"Yes!" I say, holding my trophies in the air.

With that, our home show experience is complete. Well, Alex can't carry much else. Our backs ache. Our feet are blistered. The yardsticks, however, are too flimsy to use as walking sticks, as many people around us are trying to do. As we near the exit, we become mesmerized by some bright, colorful chairs hanging from poles. A guy from Australia is selling them, $150 a pop.

Although the chairs resemble medieval torture devices, they do have footrests and armrests, so people are rushing over and plopping down. I hop into a blue chair, and Alex takes over a red one. "*Ahhhhh!*" says the crowd. "*Wheeee!*" And "*Oooooh!*" About 15 of us, all strangers, are swinging in the chairs. A lot of home show bonding is going on. A lady shows me some of the stuff in her yellow bag.

"Did you get the bottle opener?" she says.

"Check," I say.

"How about the air fern?" she says.

"Got two," I say.

Several of us eventually stop swinging and get on the floor, pour out the contents of our bags and compare our respective hauls, like kids back home after the big night. There's no mention of the thousands of drawers that are about to be filled, thanks to the home show.

The man with the hanging chairs has no free stuff, only the chairs. So Alex and I buy two. ■


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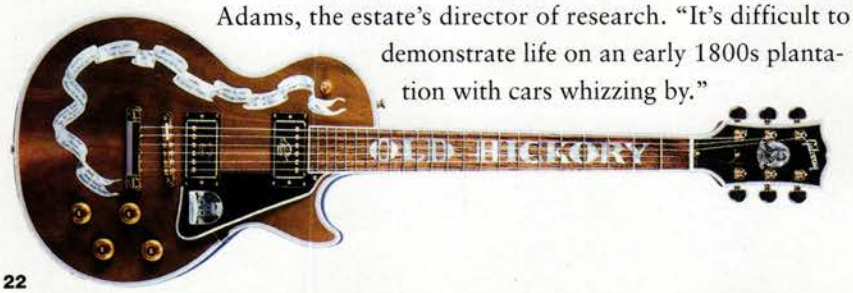
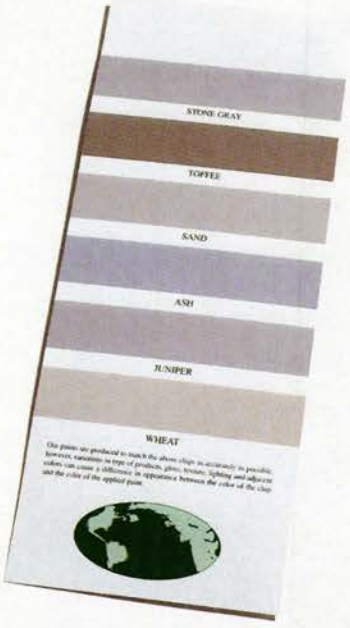
nov/98 (extras)

Timber Revival

Last April, a tornado ripped through Nashville, Tennessee, destroying 1,243 old-growth trees at the Hermitage, Andrew Jackson's plantation home. In the make-do spirit of Old Hickory himself, the plantation is salvaging the wood—which will soon help to pay the bills for landscape restoration. Certified by the Rain Forest Alliance as "rediscovered" wood, meaning it wasn't clear-cut or harvested irresponsibly, the timber is destined for custom millwork in new and renovated houses and commercial spaces. And Gibson Musical Instruments is turning the Hermitage's felled 280-year-old tulip poplar, the state's oldest, into 200 limited-edition Old Hickory guitars. Cleanup will proceed meticulously, without bulldozers, so workers can search the ground for artifacts. Then the first planting priority will be a zone of native Tennessee species to replace trees that had acted as a buffer between the 19th-century oasis and a 20th-century highway. "The replant is necessary for interpretive purposes," says Clare Adams, the estate's director of research. "It's difficult to demonstrate life on an early 1800s plantation with cars whizzing by."





Painting the Town Green

In the early '90s, manufacturers began processing paint collected from commercial contractors and hazardous-waste centers and using it for low-cost housing and graffiti cover-ups. Now, paint recycling programs have grown up, and home owners are discovering the benefits of painting a house with someone else's leftovers. As paint recycling has expanded across the country, companies have refined the process of sorting, filtering, testing and tinting reclaimed paint to improve the quality and range of colors. The latex paint now comes in whites, earth tones and custom hues as well as in flat and semigloss finishes for interiors and exteriors. And, to the delight of home owners, recycled paint not only is as good as new but also costs as little as $6 a gallon, about half the cost of comparable-quality virgin paint. "It took quite a while to convince my husband," says Judi Frantz, an education coordinator at the California Environmental Protection Agency. "But he said it was the nicest paint he'd ever used. And after six years, it's held up beautifully." To find the nearest distributor, call your local waste-management department or state environmental protection agency.

> *"The easiest way to increase the value of your house by $25,000 is to add a $50,000 kitchen to it."*
>
> —David Owen, *Around the House*

MANUFACTURERS · MATERIALS · PRODUCTS · RESOURCES – PAGE 135

PHOTOS: HERMITAGE, COURTESY OF THE HERMITAGE; PAINT CHART, MICHAEL GRIMM; EDIBLE TOOLS, JOHN BLAIS.

Sweet Tools

When a simple repair job turns into a Sisyphean nightmare and frustration builds until you're ready to bite the head off a hammer, go ahead and chomp away—these tools can take it. Cookie, gummy or chocolate, they can't turn a screw or saw wood worth a darn, but they can provide a sugar rush of inspiration. They don't taste half bad either. Sinking your teeth into a job has never been such a treat.

(extras)

WEB

Nitty-gritty and cold, hard facts about ceramics and stone in and around the house

www.ntc-stone.com

The National Training Center for Stone and Masonry Trades site provides links to numerous manufacturers, wholesalers and contractors, but its most useful feature is the "Ask Our Experts" bulletin board. This Q-and-A list is neither alphabetized nor indexed, which makes scrolling through many pages of inquiries tedious, but recent questions about repointing brick and getting a mineral-oil stain off a granite countertop got responses in one day. For stone or tile questions that the Web site can't answer, there's also a telephone hot line: 407-834-4800.

www.ceramic-tile.com

At this site, whose mission is to promote the ceramic tile industry, the Tile Man—Peter Collier, a manager for a wholesaler—provides advice, tips and product information. Although reluctant to endorse items by name, Collier offers thorough solutions to problems such as pool-tile efflorescence and will help you determine, say, whether thin-set mortar is appropriate for the tiles on a fireplace wall. To see great tiling in our time, click on pictures of completed projects. Recent submissions include a regal-looking floor in the recently restored New Zealand parliament building and a 9 ½-foot column covered in an artistic swirl of colorful mosaic tiles depicting denizens of a neighborhood in Silver Spring, Maryland.

LIFE AFTER DRYWALL

Unstack those empty 5-gallon buckets, and put them to good use.

Tree Lift

A rope and pulley hung over a branch turn a bucket into a dumbwaiter for a tree house, hoisting critical provisions and later lowering trash for cleanup.

Sturdy Carryall

A heavy-duty shoulder strap screws into a bucket's sides to make transporting fall's bounty a breeze. Come spring, use the bucket for window-washing gear.

Roller Derby

Hooked to a hose and a bucket, a cleaning chamber spins paint rollers clean and dry in 30 seconds. The bucket catches the waste water for easy disposal.

Worm Ranch

Wigglers, which compost kitchen waste odorlessly and can do greenhouse duty, thrive in a ventilated bucket of damp, shredded newspaper and peat moss.

King Can

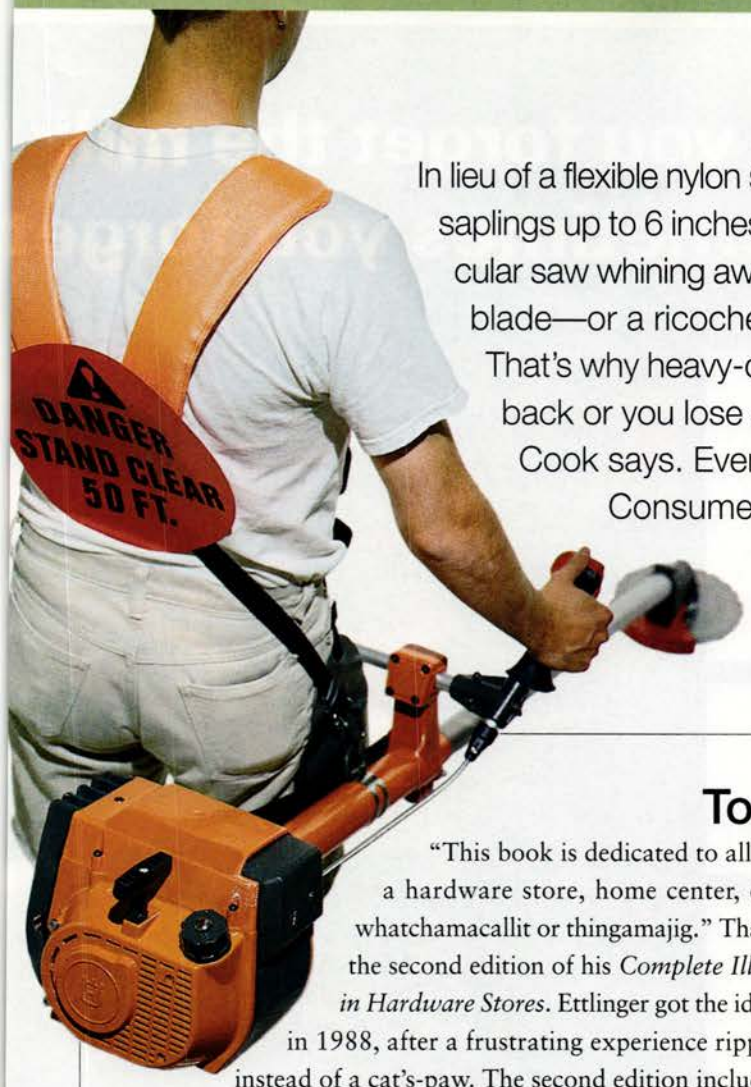
With a pocket for every gadget, a bucket tool-organizer operates as a mobile workshop. Roll it into place on a dolly, and add a seat for lunchtime comfort.

Deck Shoes

Sink a metal post-anchor into wet cement in a partly buried pail with the bottom removed. The bucket lifts when the cement sets, leaving a cylindrical deck pier.

PHOTOS: MICHAEL GRIMM.

Buckle Up



In lieu of a flexible nylon string, a brush cutter has a whirling steel blade that severs saplings up to 6 inches in diameter. Landscaper Roger Cook likens his to a "circular saw whining away at the end of a pole." Kickback—caused by a pinched blade—or a ricocheting blade can suddenly propel the tool out of control. That's why heavy-duty brush cutters come with a safety harness. "If it kicks back or you lose control, the blade is less likely to come looking for you," Cook says. Even a harness, however, can't protect everyone. The U.S. Consumer Product Safety Commission reports several cases in which blades nearly dismembered bystanders. So wear the harness, and keep everyone—pets too—at least 50 feet away from the action.

Tool Time

"This book is dedicated to all of us who have ever walked into a hardware store, home center, or lumberyard and asked for a whatchamacallit or thingamajig." That's how Steve Ettlinger introduces the second edition of his *Complete Illustrated Guide to Everything Sold in Hardware Stores*. Ettlinger got the idea for the book, originally published in 1988, after a frustrating experience ripping up floorboards, using a pry bar instead of a cat's-paw. The second edition includes entries on innovations such as the ultrasound devices that are replacing tape measures for determining room dimensions. The updated guide also has more illustrations and expanded entries, including 18 aliases for tongue-and-groove pliers alone. • Ettlinger is a just-the-facts man, while *This Old House* contributing writer Jeff Taylor takes the poetic route. In his latest book, *Tools of the Earth: The Practice and Pleasure of Gardening*, he gives each of the 24 short essays a gardening tool as title, then moves on from there. A harvest basket leads him to elementary arithmetic. An auger to flying saucers. A knife to his father's wartime experience. Reading the collection is a bit like dropping in on Taylor at home in Oregon and chatting while he hoes a row or picks a few tomatoes.

Foul-Weather Friend

Weather reports are the tarot cards of meteorology: They often call for sunny skies when in fact all hail is breaking loose. Most people live in microclimates far removed from the monitoring equipment that TV and radio stations use. But a computerized weather station gives amateurs a go at tracking conditions closer to home. After mounting several plastic devices such as rain and wind gauges outdoors, you click away on a small indoor console to monitor wind and precipitation. A sun or rain-cloud icon hints at weather to come, and gardeners can set a frost alarm. For accuracy of 12-hour forecasts, the system scored better than the Weather Channel during our weeklong tryout. One drawback: The wire connecting outdoor sensors to the indoor monitor has to be slipped through a window or a hole drilled in the side of the house. Drastic, perhaps. "But you'll do it if you're serious about the weather," says a company spokesman.

MANUFACTURERS · MATERIALS · PRODUCTS · RESOURCES – PAGE 135

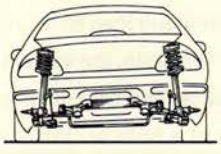
Sometimes you forget the milk.
Sometimes you forget

Whether you are going to the store, to work or the dry cleaners, every trip you take in a Concorde LXi inevitably

The Chrysler Concorde was respectfully ranked "Best Premium Midsize Car in Initial Quality" by J.D. Power and Associates.*

becomes a joyride. With every corner you become lost in the stability of its cab-forward architecture and low-speed traction control. As your thoughts begin to race, Chrysler Concorde LXi's smooth 4-speed automatic, a fully adaptive electronically controlled transaxle, actually begins to learn your driving style and tailors its internal shift patterns for you. Soon your fingers grip the leather-wrapped steering wheel and your mind hums along to the purring sounds of a 225 hp 24-valve V6. Now then, where are you going again? For more information about a test-drive you will never forget, call 1.800.CHRYSLER or visit www.chryslercars.com. Concorde LX starts at $22,060. LXi as shown, $25,785.**

Featuring MacPherson struts up front and a multi-link configuration with Chapman struts at the rear, the exacting geometry



of the Chrysler Concorde's precisely tuned suspension reduces rear end squat under acceleration and front end dive under braking.

*The Chrysler Concorde was the highest ranked premium midsize car in the J.D. Power and Associates 1998 Initial Quality Study 2.℠ Study is based on a total of 58,117 consumer responses indicating owner-

Sometimes you forget the bread.
the store altogether.

ENGINEERED TO BE GREAT CARS

CHRYSLER CONCORDE

reported problems during the first 90 days of ownership. **Base MSRPs include destination, exclude tax.

extras

CALENDAR

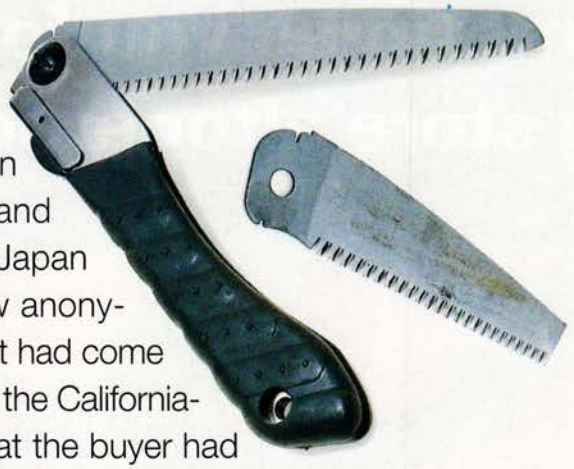
• **November 7 to 22**—Annual Chrysanthemum Show, Buffalo and Erie County Botanical Gardens, Buffalo, New York; for hours, call 716-696-3555.

• **November 12 to 22**—Southern Christmas Show, a holiday fair featuring an old-time village, a dollhouse competition, cooking classes and entertainment; Charlotte Merchandise Mart, Charlotte, North Carolina; 800-849-0248; weekdays 10 a.m. to 9:30 p.m., Sunday 10 a.m. to 6 p.m.; $6 in advance, $7 at the door.

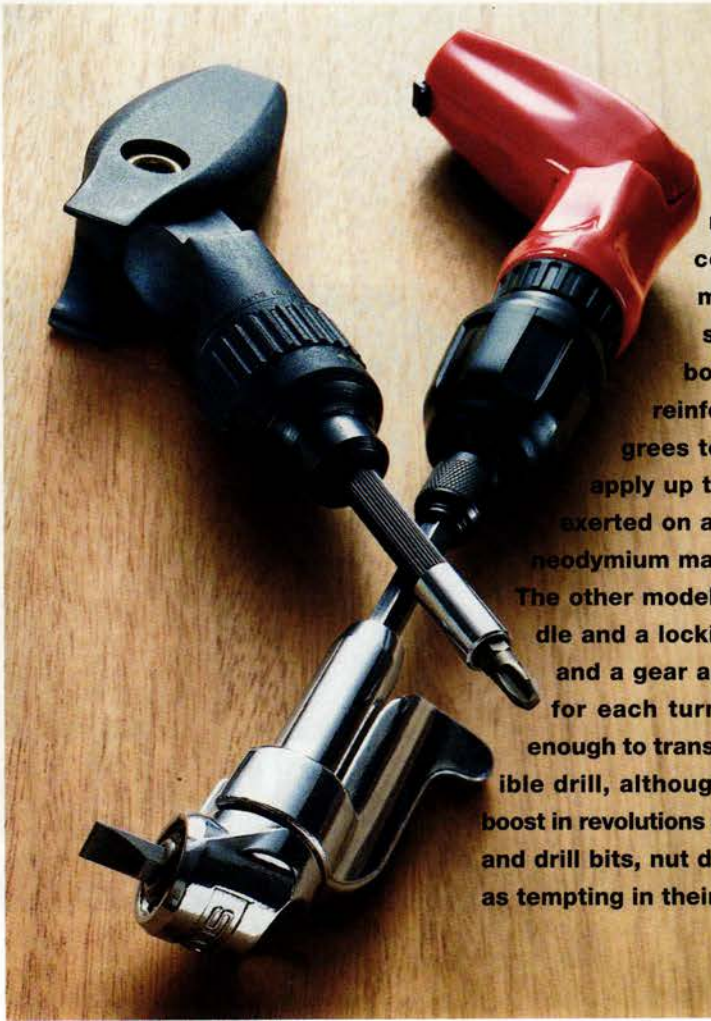
• **November 13 to 15 and 20 to 22**—San Francisco Harvest Festival with handmade arts and crafts plus in-the-aisle entertainment; Concourse Exhibition Center, San Francisco; 707-778-6300; Friday noon to 8 p.m., Saturday 10 a.m. to 7 p.m., Sunday 10 a.m. to 6 p.m.; $7 for adults, $6 for seniors and $4 for ages 6 to 12.

• **November 14 to 15**—Eighteenth annual Woodcarving Show and Sale, featuring a judged woodcarving show, live demonstrations, carving supplies, holiday ornaments and door prizes; Western Washington Fairgrounds Pavilion, Puyallup, Washington; 253-584-4569; Saturday 10 a.m. to 5 p.m., Sunday 10 a.m. to 4 p.m.; $5 a day, $7.50 for two days.

Hats Off



There's nothing like a little customer service to renew flagging faith. A member of our staff, who shall remain nameless, recently purchased and promptly broke a small saw from Japan Woodworker. We returned the saw anonymously—the company had no idea it had come from *This Old House*—and although the California-based firm's experts determined that the buyer had "abused" the blade, the company cheerfully and hastily sent a replacement. A folding saw with razor-sharp teeth, the tool is designed to cut on the pull rather than the push stroke, hence its instructions: "To avoid damage to the blade, let the saw do the work. Do not try to force it." Our staffer adamantly denies any wrongdoing, but we who know his enthusiasm have our doubts. The point is: Japan Woodworker stood behind its product—and with refreshing graciousness. If you've had an especially positive experience with a manufacturer, write to Extras, *This Old House* magazine, 1185 Avenue of the Americas, 27th floor, New York, NY 10036, or E-mail us at lkaiser@toh.timeinc.com.



Sidewinders

Pistollike handles on two new ratcheting screwdrivers nestle comfortably in the palm, which makes inserting and removing screws easy on the rest of the body. On one tool, the black fiber-reinforced nylon handle breaks 45 degrees to the side, making it possible to apply up to twice the leverage that can be exerted on a normal screwdriver. A powerful neodymium magnet secures bits to the driver. • The other model features bit storage in the handle and a locking collet to grip hex-shank bits, and a gear assist spins the chuck four times for each turn of the red handle. That's fast enough to transform the screwdriver into a credible drill, although it takes two hands to get this boost in revolutions per minute. The 41 assorted screw and drill bits, nut drivers and tiny screwdrivers look as tempting in their case as a Whitman's Sampler.

PHOTOS: MICHAEL GRIMM.

MAIL BONDING

Why stroll the aisles when you can flip the pages of a catalog?

Bridge City Tool Works; 800-253-3332; www.bridgecitytools.com
The place for pricey precision brass and wood tools such as a scratch awl that, one customer attests, "fits the hand like an extra finger." Numerous photo-laden sidebars explain how tools, especially arcane measuring devices, are used. If you care more about instant availability than you do about tool quality, you may be left frustrated.

Charley's Greenhouses and Indoor Growing Supplies; 800-322-4707; www.charleysgreenhouse.com
A selection of greenhouse gear as abundant as the tulips grown near Charley's headquarters in Washington State's Skagit Valley. Exclusive items designated by green diamonds include a heated seed-propagator from England and an automatic drip watering system from Denmark. Informative gardening advice sowed throughout.

Gempler's; 800-382-8473; www.gemplers.com
The handyman's fashion bible for those who think "shopping spree" at the mention of work bibs and rubber hip-boots. Gempler's boasts the largest assortment of Carhartt work-wear on the market, plus hard-to-find industrial and agricultural products and a vast line of automotive accessories including wheel assemblies, chains and tires.

Highland Hardware; 800-241-6748; www.highland-hardware.com
Originally a little hardware store in a dilapidated Atlanta neighborhood, now the Southeast's largest supplier of fine woodworking tools. "More than just some products at a price" is the Highland Hardware philosophy. Staff prides itself on making customers better woodworkers, and the company sponsors seminars led by experts.

Park Seed Flowers and Vegetables; 800-845-3369; www.parkseed.com
From artichokes to zinnias, more than 2,000 types of seeds, plants and gardening accessories. The company tests all seeds, growing them in a spring or fall trial before giving them the green light. Since 1868, the Park dynasty has been propagating seeds according to its creed: "Your success and pleasure are more to Park than your money."

Professional Equipment; 800-334-9291; www.professionalequipment.com
Despite catalog name, gadgets galore for amateurs. Most items deal with safety—detecting, monitoring and testing such pesky matters as gas leaks, termites and iffy fire alarms. Among the goodies: combination ladders, noncontact voltage detectors and circuit "pups" that are like bloodhounds sniffing out circuit-breaker trouble.

Restoration Hardware; 800-762-1005; www.restorationhardware.com
Founded in 1980 and now grown to almost 60 stores. The company recently introduced a catalog with high-quality repro furniture, hardware and lighting and the occasional cool tool. The catalog calls a bootjack a "man of lore, positioned at your door" while a mission-style lamp "speaks of early 1900s ruggedness and simplicity."

Tool Crib of the North; 800-884-9132; www.toolcribofthenorth.com
Offers to meet or beat prices of all other mail-order catalogs. Fifty years of rolled-up sleeves transformed what was once the Kuhlman family electric-motor repair shop in North Dakota into a woodworking and construction mecca. Catalog retains flavor of friendly lumberyard down the road. Color photos of power tools jump off the pages.

Woodworker's Supply; 800-645-9292
Reading material for folks who often spend their weekends enthralled by the charms of a router. The pages are packed with legions of specialized bits, blades, hand tools, machinery and shop accessories. Selections continually expand to accommodate technological advances. The text sticks to plain facts, keeping product hype to a minimum.

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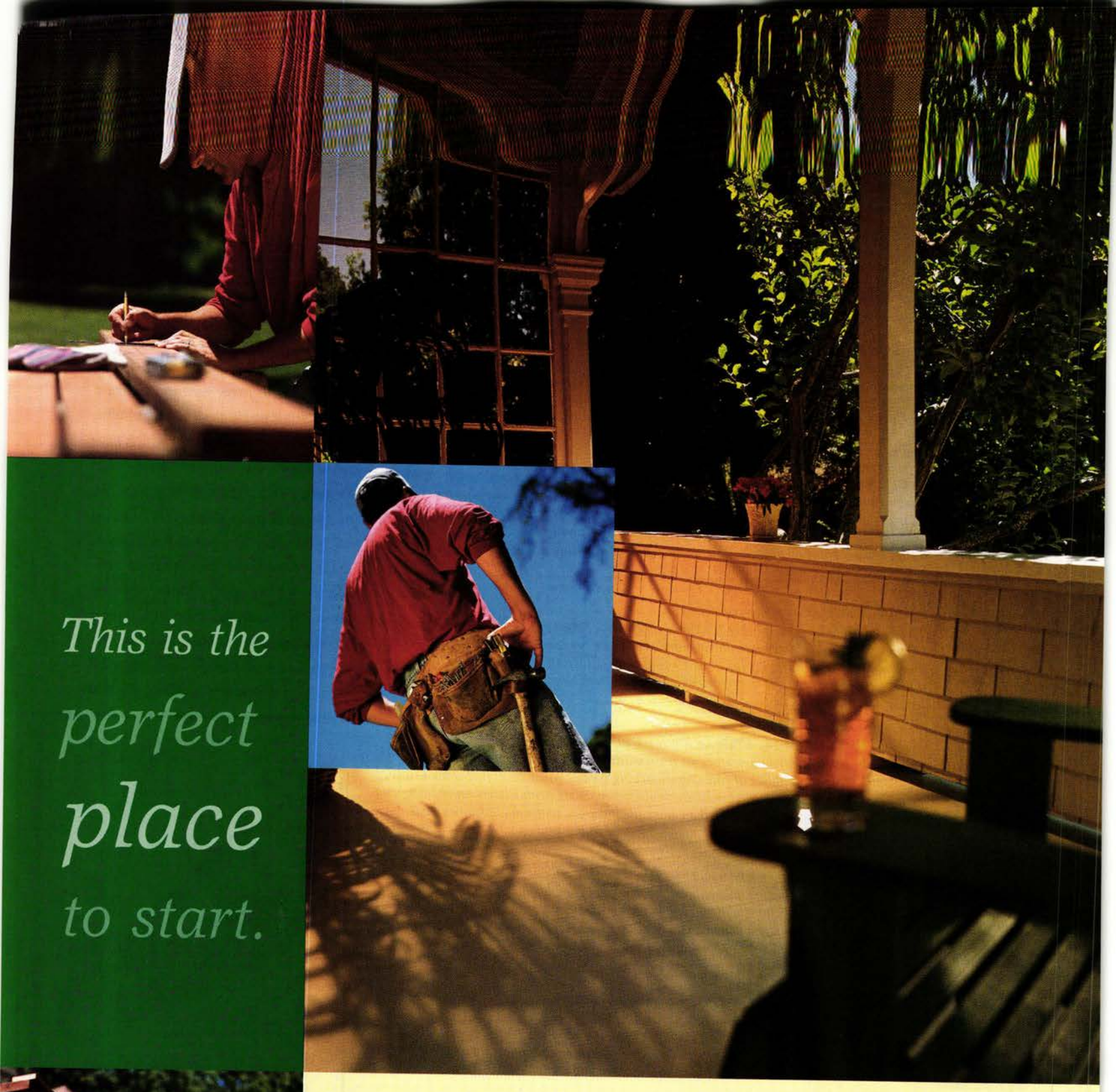
UNSUNG TOOL

The Handy Pocketknife

For stripping a wire, sharpening a carpenter's pencil or testing a windowsill for dry rot, nothing beats a two-bladed pocketknife. The blades fold safely into the handle, which protects blade edges—not to mention fingers—and the knife is always as handy as a front pocket. It used to be that every boy carried a barlow, whose stubby teardrop-shaped handle fits easily in the palm. Electricians, however, favor a knife with a more elongated profile, such as the vintage one pictured here, and with an end shackle for hanging from a tool belt. An electrician, in fact, gave this one to *This Old House* contributor Jeff Taylor. The locking blade, which has an indentation for stripping wires, began as a screwdriver head. But it had been severely munched, so Taylor ground it to a point, making a good probe for detecting rot. (Wood fails the toast test if the point sinks up to the fingernail groove.) The blade performs jobs such as reaming off hacksaw burrs on plastic pipe, cutting insulation batts and whittling door shims from a cedar bolt.



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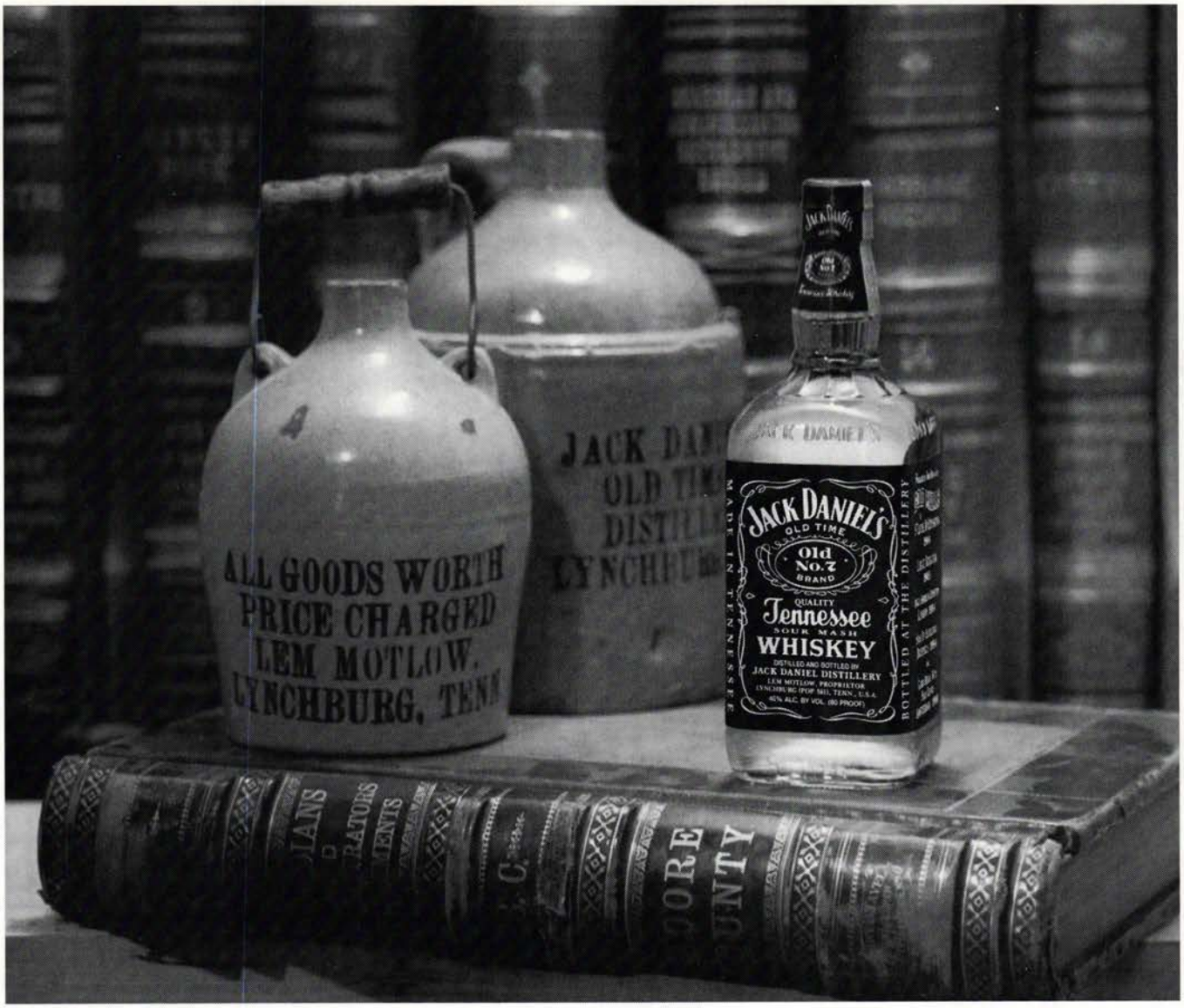

If you like our oldtime whiskey, drop us a line. We enjoy hearing from our friends.

SINCE 1866, there has been only one time we didn't make whiskey Mr. Jack Daniel's way. It was called Prohibition.

Of course, we couldn't make whiskey then. So Mr. Lem Motlow, who ran our distillery in those days, sold Tennessee mules. (For a time, Lynchburg was the mule capital of the South.) But once Prohibition was repealed, we went right back to making our Tennessee Whiskey the way Jack Daniel decreed. If you like the taste of Jack Daniel's, rest assured that as long as we can make it this way, we always will.

SMOOTH SIPPIN'
TENNESSEE WHISKEY

Your friends at Jack Daniel's remind you to drink responsibly.

Tennessee Whiskey • 40-43% alcohol by volume (80-86 proof) • Distilled and Bottled by
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PHOTO: KELLER & KELLER.

ASK NORM

"If a house has been settling for 108 years, jacking it back to plumb and level may blow out the plaster on the walls and cause timbers to fail."

BLOCK FLOORING

In our 1870 farmhouse, two dogs and one child add up to a need for durable but low-cost flooring. What do you think of the idea of using end-grain blocks laid as if they were tiles? We have an old barn beam we can cut up.

PATRICIA JOHNSTON, *Medford Lakes, N.J.*

My husband and I recently moved to this mountainous area, where the seasonal temperature ranges from the 30s to the 90s Fahrenheit. We've been considering options for a covered patio, and I like the idea of paving it in wooden cubes set side by side. I'd like to know how to do it, which wood I should use, and what maintenance is involved.

THERESA PETERMAN, *Caliente, Calif.*

End-grain blocks make terrific indoor flooring—they're beautiful and extremely durable. An old barn beam, assuming it's been kept dry, will yield excellent blocks because they'll be completely seasoned and won't shrink. Douglas fir and yellow pine are good choices, cut no less than 1½ inches thick, so you'll need to be sure you can raise your floor that much on a retrofit. The blocks should be cut accurately to avoid unnecessary sanding of end grain, a slow task. Let the blocks acclimatize before installation—just store them for five days in the room where they'll be used. Butt the blocks edge to edge in flexible bedding compound spread on ¾-inch plywood subfloor. You can use existing subfloor if it's sound, but be sure to renail it; and if it's boards, install ½-inch ply underlay. Flooring contractor Jeff Hosking recommends you protect the block flooring with tung oil or three coats of shellac, maintaining either finish with wax. Or you can use wax alone. Installing wood-block flooring outdoors, on the other hand, isn't a good idea. That patio you want to pave may be covered, but it's open on the sides, and wood ultimately fails when water collects on it. End grain is especially vulnerable. It just sucks the moisture right up.

STRIP JOINT

My windows have grooved sash that once accommodated spring-loaded locking mechanisms, which have since disappeared. Would it be safe to fill the grooves with pieces of poplar or alder and then apply the kind of nylon-pile weather strip you used at the project in Milton?

THOM NASH, *Roseberg, Ore.*

It's likely that your sash are replacements designed for a spring-balance system but installed in your friction-fit frames. In any case, the alteration you suggest is a good one. And, yes, the same weather strip will suit your doors.

LEAKY ROOF

I have a house with a slate roof, and one of the valleys seems to have gone bad. It's leaking. How do I repair it? Do I need to remove the entire valley, or can I just slip pieces of new sheet metal over the old valley?

MICHAEL TIMMER, *Akron, Ohio*

I dumped this in the lap of Joe Jenkins, a roofer for 30 years and the author of The Slate Roof Bible. ***He says slipping new metal over old is a slick trick but a bad plan and eventually will result in more leakage. A real repair involves taking off enough slates—about 18 inches on each side—so the old valley can be removed and a new one installed. This is a routine job, but it still requires a skilled roofer. Another trick some contractors use is simply to tar the valley and hope for the best. That's only a short-term solution. Your best bet is to find a qualified person to do a permanent job.***

ROOF SUPPORT

The front stoop of my Victorian is sheltered by a small canopy, which is supported by brackets and beginning to collapse. I remember a show when you installed steel posts and provided a finished look by splitting wooden columns and using them to conceal the posts. How do I go about doing the same thing?

ROSE LIGHTFOOT, *Brooklyn, N.Y.*

What you're looking for is that old favorite, the quick fix. My advice: Don't do it! First, your canopy is collapsing because of rot caused by leakage in the canopy where it's tied into the wall of your house. That's where the repair has to take place. Just propping up the canopy will only let things get worse. The rot could spread into the walls if it hasn't

already. And installing posts will result in a clumsy, belt-and-suspenders look unless you also remove the brackets. The right way to tackle this job is to repair the canopy so the brackets do the job they were designed for.

CHIMNEY FIX

I'm interested in a repair I saw on one of your shows. An inflatable tube was put down the chimney; then mortar was poured in around the inflated tube, forming a new flue liner.

DEBBIE HAYWARD, *Stephenson, Mich.*

This system works, but there are a few things you need to keep in mind. If you have an old chimney built with soft lime mortar, the new mortar for the lining should have the same expansion-contraction characteristics. If the chimney is weak, the weight of a concrete liner could cause a collapse, so have an expert assess the risk. This Old House *contractor Tom Silva recommends one-piece stainless-steel liners and says it's worth the cost to get a top-rated one. Any repair or repointing of the chimney itself will be a separate job.*

DUTCH MASTER

I've seen you and Tom Silva repair a porch post with what I believe is called a dutchman. I've never seen anything written about this type of repair. Can you give some more details?

ARLENE D. BELL, *Salem, Va.*

A dutchman is just a small wooden surface patch used for cosmetic purposes, like the oval "boats" used to fill flaws in construction-grade plywood. In the case of a porch post, a dutchman wouldn't provide the necessary strength, and what Tom and I would use instead is a lap joint, which is formed by placing one piece of wood partly over the other to provide strength in at least two directions.

DECK OPTIONS

We want to build a 12-by-36-foot deck on the shady north side of our house. Half of the deck will be a screened porch. What's your opinion of the attachment devices for decks that let you fasten planks from underneath without nailing through the top? We plan to use treated lumber. Can we leave it as is, or do we need to stain or seal it?

MARK D. CAMPBELL, *Lexington, Ky.*

We used hidden fasteners to install the deck at our project in Milton, Massachusetts, last year, but I have to say they really slowed us down because they had to be screwed in place from underneath. I don't recommend using them. Neither does Tom, who has developed his own approach to installing a deck. "What I'm doing these days is spreading construction adhesive on the joists and then fastening the planks with finishing nails. This is fast, and the planks won't come loose. Just don't put down too much adhesive at any one time. Otherwise it'll dry and get a skin on it, and it won't hold," Tom says. As for applying sealing products to treated lumber, it's smart to use them in spring and fall for the first couple of years and every fall thereafter.

SINKING SENSATION

Our 108-year-old home needs leveling. It sits on a slab made of limestone blocks (we think) and has settled considerably over the years. While we're at it, we'd like to add a small basement. Any advice on how we should proceed?

DEBORAH WOMACK, *Douglass, Kan.*

I certainly don't want to be beneath those blocks while you're digging out the basement. What you need is professional engineering help, because only an expert can tell you how to proceed safely and cost-effectively. He can also advise you on the leveling, which may not be necessary. After all, if a house has been settling for 108 years, suddenly jacking it back to plumb and level may blow out the plaster on the walls and cause timbers to fail. Unless there's structural damage, you may be better off leaving well enough alone.

SHINGLE MINDED

The original cedar shingles on my 1925 bungalow need repair and, in some cases, replacement. I want to do some of the work myself, but I'm just a novice, and the real problem is that I can't find a professional contractor or carpenter who is willing to take on the job. What do you suggest?

JOHN P. HUMPHREY, *Royal Oak, Mich.*

With the economy booming, lots of small jobs like yours are going begging. You could try to do the work yourself. It requires a special tool called a shingle ripper to yank the old ones out, plus a good deal of time, even for a pro and especially for a novice. I don't want to discourage you, but I don't want you to think it's a snap. You'll learn by your mistakes—that's for sure. Before you start, I suggest you study "Shingle Savvy" in the March/April 1997 issue of T.O.H. *Be sure you can match new shingles to your old ones and, when you add the new ones, be sure to space them to match the old. Too many first-time shinglers fail to make patches blend in.*

Send questions to Ask Norm, *This Old House* magazine, 1185 Avenue of the Americas, 27th floor, New York, NY 10036.
Include a complete address and daytime phone number. Letters may be edited for clarity and brevity.

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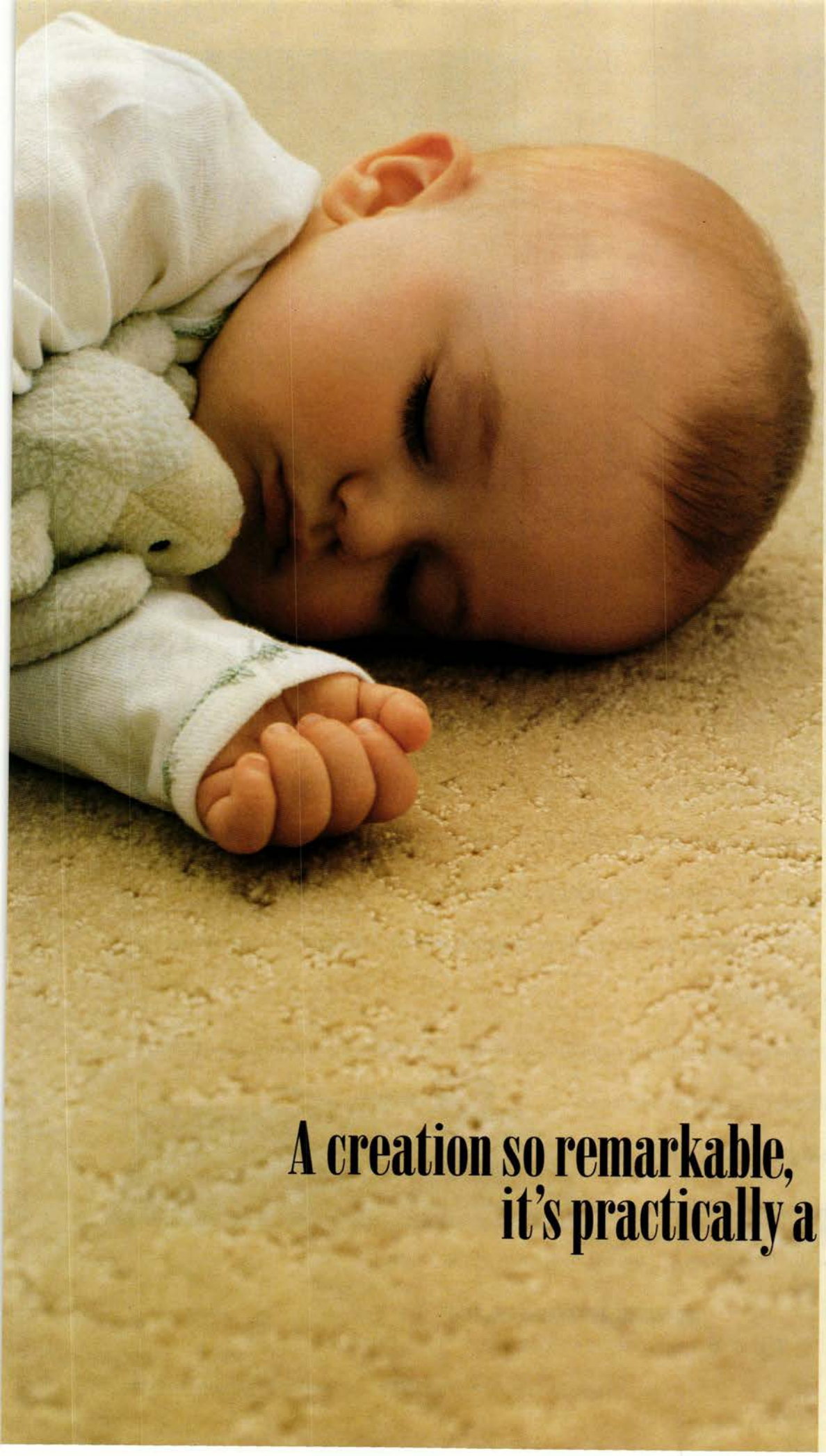

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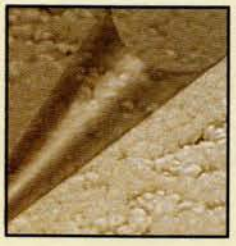

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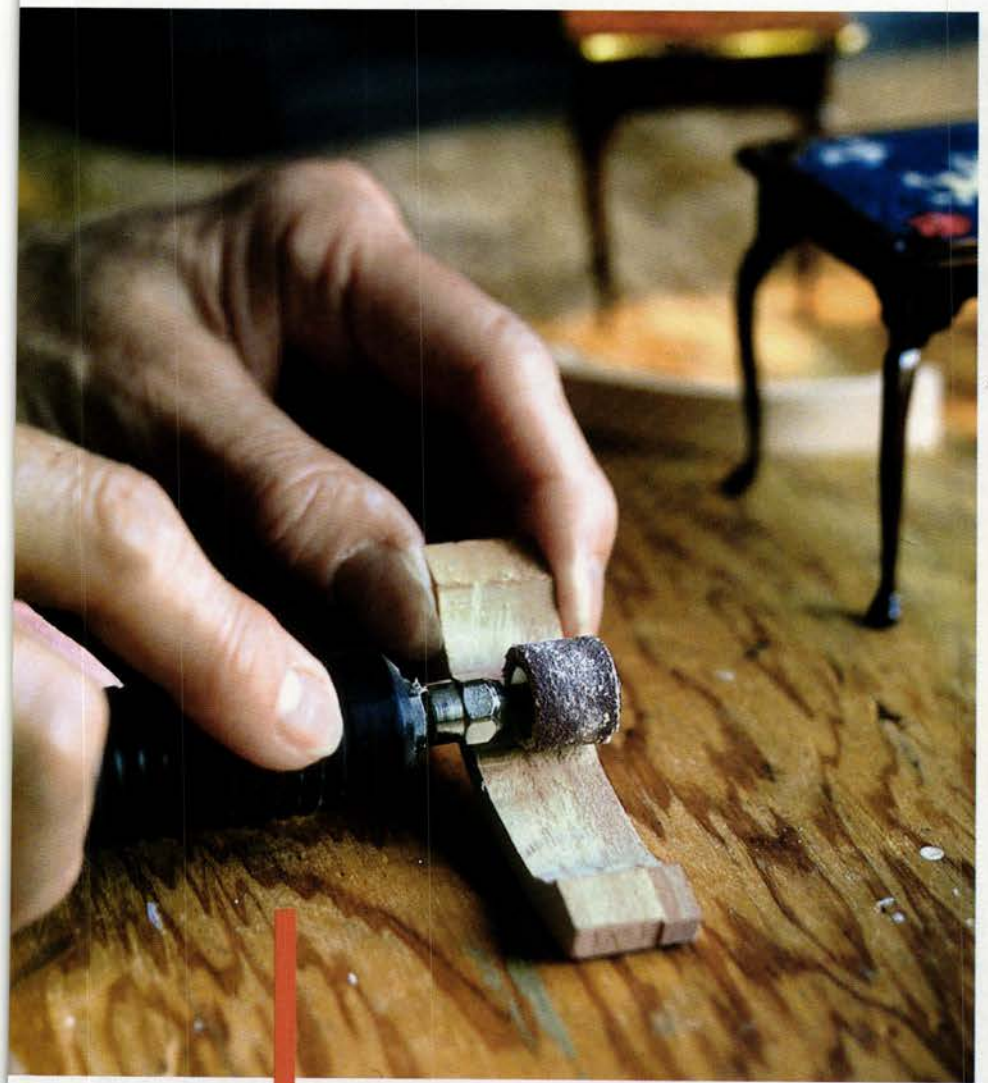
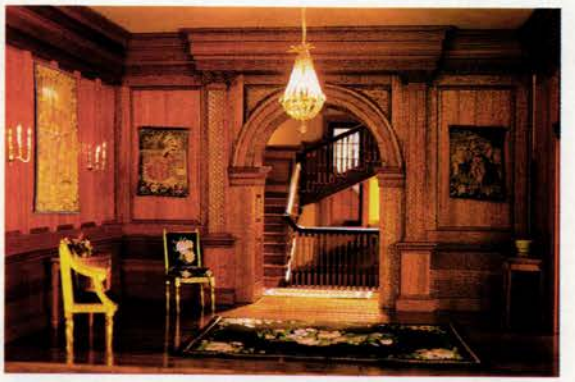
BY CURTIS RIST

SPIN DOCTORS

Rotary tools sand, carve, buff and grind. They just do it on a smaller scale.





Rotary tool in hand, Marinetta Stuhlman roughs out a drawer for a buffet table using a spinning cylinder of sandpaper on a flexible shaft, left. Her rotary tool helped fashion much of the woodwork in her mini-manor, top right, including the cigar-box-divider paneling in the upstairs drawing room, bottom.

Like any home owner presiding over a work-in-progress, Marinetta Stuhlman is delighted—yet somewhat vexed—by the decrepit splendor of her 11-room Georgian Colonial in Basking Ridge, New Jersey. The brick edifice has a winding staircase of burled walnut, a ballroom paneled to resemble a parlor at Mount Vernon and a third-floor master bedroom in a perpetual state of renovation. But as with any house, something always seems to need repair. Floor planks warp and pop out of place, pieces of slate slip from the roof and crash to the ground, or lightbulbs burn out, obliging her to rewire part of her house. Well, actually, her dollhouse.

Stuhlman's miniature mansion stands only 3½ feet tall on a 4-by-3-foot square base and sits on an old

PHOTOGRAPHS BY TIM RHOADES

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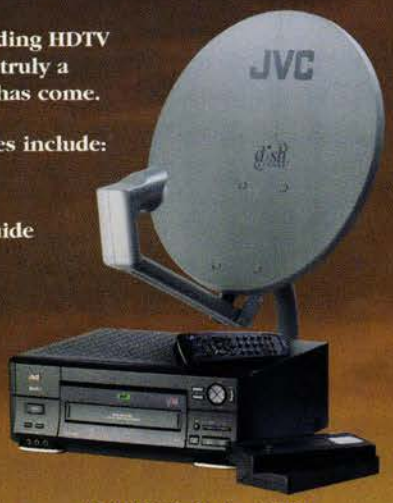

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kitchen table in the middle of her living room. She built it and all the furniture inside from scratch over the last decade, with help from a handheld rotary power tool. "When things go wrong, thank goodness for this," she says, reaching in with a tiny grinder to smooth out the latest domestic calamity, a jagged bit of molding.

As power tools go, a rotary tool is a simple device, basically an electric motor turning a spindle between 5,000 and 30,000 revolutions per minute. First used in machine shops and dental offices in the 1920s, they are now in the hands of hobbyists and home owners who use them to carve, drill, polish, grind, cut, sand, rout and burnish whatever their hearts desire.

Rotary tools come in a few interesting variations: the familiar handheld versions the size of a baby bottle; cordless models, useful around water or on the road; and heavy, high-ampere benchtop brutes rigged with foot-pedal controls and long, flexible shafts for doing fine detail work.

1. *All handheld rotary tools have a spindle-lock button near the tip, to secure the shaft when changing bits.* **2.** *The tools also have variable speeds. On the model above, the motor is controlled by two buttons, which ratchet speed up or down in 1,000-rpm increments.* **3.** *A unique LCD readout displays speeds from 5,000 to 30,000 rpm.*

But what makes rotary tools so versatile and so much fun to use is the huge array of bits, wheels, brushes and other diminutive attachments—more than 1,000 at last count—that can be mounted on them. Fitted, for instance, with a 1/16-inch-thick, 1¼-inch-diameter aluminum oxide cutting wheel that looks—and crumbles—just like a candy wafer, the tool can lop the head off a steel nail, cut into marble or slice through PVC pipe. An assortment of tips—diamond, carbide and high-speed steel—is available for engraving metal, etching glass or sharpening scissors. Likewise, there are polishing disks (popular among manicurists) as well as dental burrs (a staple among American hog farmers, who use them to trim boars' sharp teeth). Some cost-cutting dental clinics in the Third World have adapted the burrs and the tools for use on human teeth. "A man even used one on the David Letterman show to perform a root canal on himself," says Jim Bohn of Dremel Tools. He shudders at the recollection—a rotary tool spins at about half the rate of a typical dentist's drill. Bohn strongly warns against anyone's using the tool

GRIND & SAND

Long-lasting grinding attachments, top right, make tough jobs such as removing corroded metal, bottom, seem easy. **1.** *The grinding bits are made of two types of abrasive: aluminum oxide, a reddish mineral, and silicon carbide, a blue-green. Both sharpen and deburr metals, but the silicon carbide tips are better for stone, glass, ceramics and porcelain. To keep the bits clean, a rectangular dressing stone is included in most kits. "A lot of people don't realize what they're for and just throw them out," says Frank Lockhart, a rotary tool demonstrator.* **2.** *An aggressive carbide bit, used for sculpting wood, requires a benchtop tool with a flexible shaft and a ¼-inch collet capacity, middle right.* **3.** *For smaller tools, cloth-backed sandpaper cylinders are especially useful for smoothing wood and metal. "They're cheaper than grinding stones," says Lockhart. "When you've wrecked it, you just pop on another one."*

PHOTOS: ERIK RANK.

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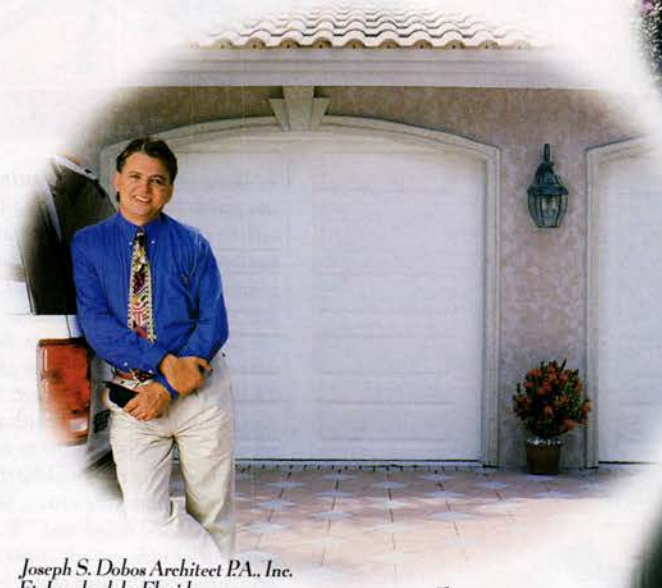

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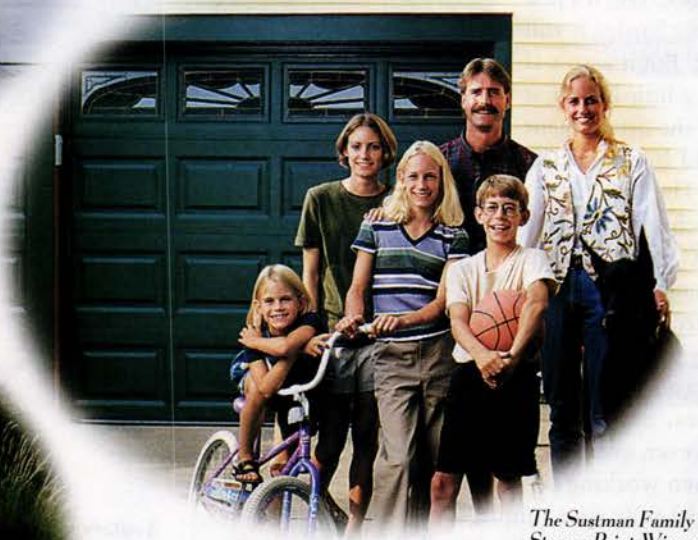

The Sustman Family
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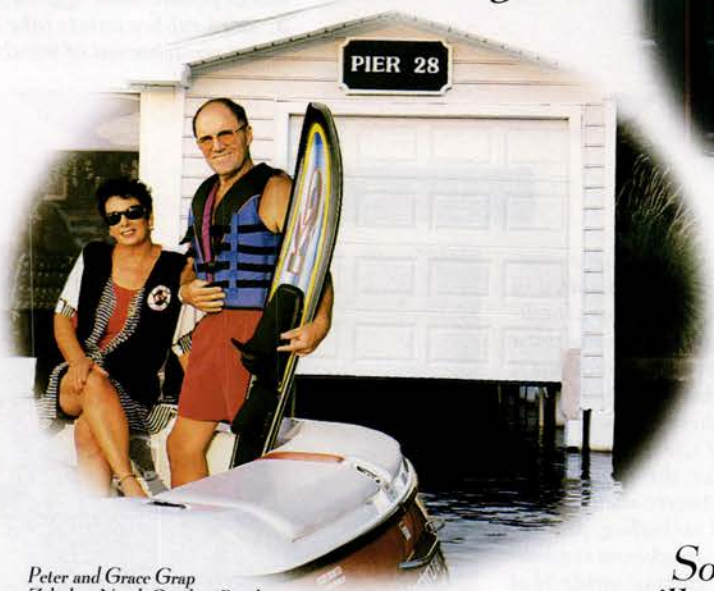

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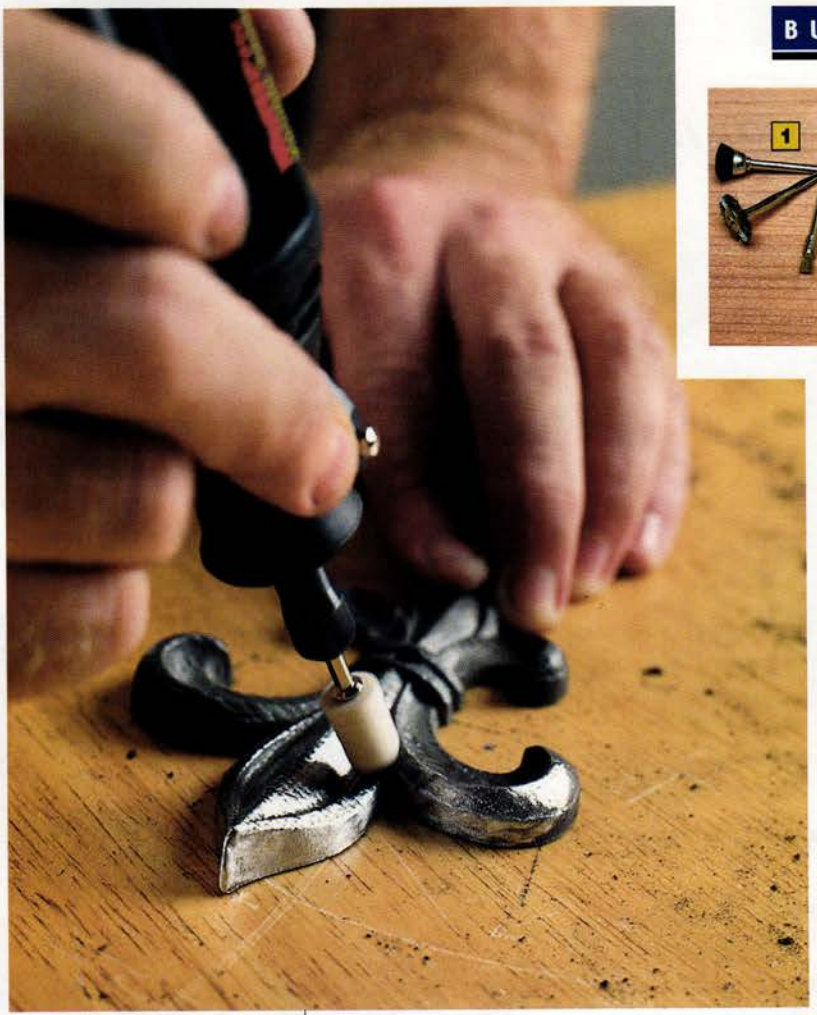
attachment about ⅛ inch from the collet's base to allow room for expansion.

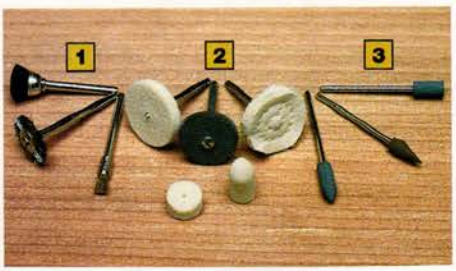
By far the most common mistake among rotary-tool users is to bear down too hard on the work. Unlike drills, which have internal gearing that makes them next to unstoppable, rotary tools are gearless; they rely on pure speed to get the job done. "You do best if you just touch the surface you're cutting or grinding or polishing," says Lockhart. "Everybody thinks, 'Oh, if I just push a little harder, it will cut better.' But it won't. If you push a little harder, it will ruin the attachment and could burn out the motor." The latest electronic technology helps maintain motor speed under changing loads but still requires a light hand.



Rotary tools are quiet, so you can skip the ear protectors. Safety goggles, however, are essential, as are dust masks, especially when working on stone, glass or metal. Even though 30,000 rpm might sound ferocious, the attachments for the smaller handheld models probably won't lop off a finger. (Dremel stopped selling a 1¼-inch circular saw after a number of injuries that required stitches.) Adults can teach children to handle the smaller tools safely, but kids should probably stick with the sanding, etching and buffing attachments rather than those with blades. Accidentally touching a buffer is more likely to cause a friction burn than a bleeding wound.

Back at the dollhouse, Marinetta Stuhlman fits her rotary tool with a cylinder of sandpaper, and with a flick of the switch, the room fills with a high-pitched, dentist's-office *whir.* She begins delicately sanding the back of a miniscule piece of curved basswood that will become the working drawer in a lilliputian-sized buffet. Thanks to her rotary tool, she's churning out enough furniture to rival Ethan Allen and longs to build a Georgian-style addition just to hold it all. "Pretty soon I'll be taking over the whole living room," she says, waving her flexible shaft like a wand. "Just don't tell my husband." ■

BUFF & POLISH



1. *Wire brushes, for cleaning of irregular surfaces, are made of either steel, which wipes away rust, or softer brass, which won't scratch copper-based alloys. Extra soft synthetic-bristle brushes polish silverware and jewelry. Brush attachments can't be run above 15,000 rpm; they'll fly apart. "The ends of the brushes are what do the job, so you just want to touch the surface," says Lockhart. "If you push down like crazy, you'll just flatten the brush out."* **2.** *Felt and cloth buffing pads covered in polishing compound shine hard-to-reach grooves, left. The dark-blue disc, an emery-impregnated rubber, polishes more aggressively.* **3.** *Solid rubber points take the tiniest scratches out of metal.*

DRILL & TRIM

A rotary tool becomes a mini-drill press when mounted in a special benchtop attachment, right. "It lets you put a hole right where you want it and makes sure they are all perpendicular," says Lockhart. Bit size is limited to ⅛ inch, but the tool can be mounted horizontally, which is useful for buffing. Another popular attachment is a bell-shaped cutting guide that provides a 2⅜-inch-diameter base at the end of the tool. With the right bit, the tool will trim ceramic wall tile or plunge-cut holes into drywall and cement board.

PHOTOS: ERIK RANK.

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BY JEFF TAYLOR

The file on a four-in-hand, far left, has shallow cutting edges. By contrast, a cabinet rasp, second from left, has hundreds of sharp protruding teeth arranged in parallel rows for aggressive wood removal. The smaller, randomly placed teeth of a patternmaker's rasp, second from right, make a slower, more easily controlled attack on wood. A toothless planing rasp, far right, has rows of tiny cutting blades punched out of a corrugated steel sheet.

THE RASP WALTZ

Give these pointy-toothed partners a whirl

For some time, our sauna door has been begging me to get rid of its schlocky ceramic handle. The door, and my hand, craved something wooden; lovely to the touch and pleasing to the eye. A laminated block of purpleheart and oak seemed a good starting point, but there's only one practical way to shape wood that hard: with a rasp.

I pull my cabinet rasp from its leather sheath, feeling its heft and the prick of its many metal teeth on my palm. The tang fits snugly into a rosewood handle, which in turn fits snugly into my hand. In time, I'll be holding the block in one hand and letting the tool flow over the wood, but right now I want to bear down with both hands. I clamp the block in a vise and begin rounding the corners. Each stroke makes a hollow *zoof, zoof*, and soon I relax into the familiar, mind-soothing rhythm and resonance. Fine dark shavings drift to the floor of my shop.

I have known rasps since childhood—I clearly remember my father accidentally rasping some meat off his thumb—but it wasn't until much later, when I was building log cabins, that I really had a good lesson in rasp work. The first cabin had round-notched corners, concavities shaped to perfectly match the upper log. Fashioning a few dozen

PHOTOGRAPHS BY JOHN LAWTON

such joints taught me to take long curving swipes with the tool's entire length, to check my work often and to stop when I'd taken off just enough stock. Then someone showed me the stronger dovetail notch. I rasped less and hewed more, but I missed making pleasing arcs out of straight lines.

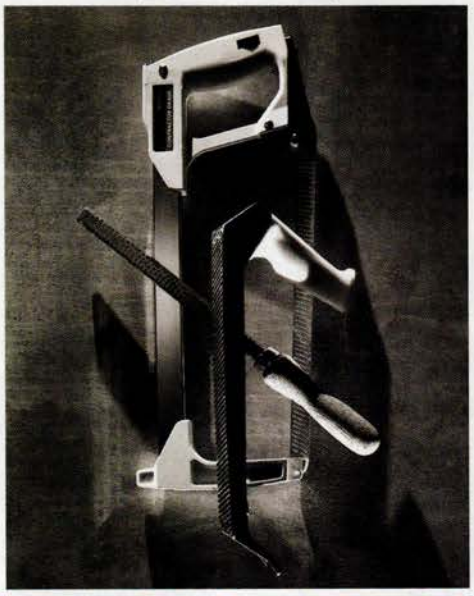
Although they resemble their metalworking cousins—the files—rasps feed exclusively on soft materials like wood, plaster and plastic, all of which will instantly clog a file's shallow ridges. The pointed teeth on a rasp's steel tongue give it the same natural cutting action as a cat sculpting a stick of butter. No other tool can so quickly and efficiently remove and shape with the same delicate touch. Somewhere in the toolboxes of the artisans who make custom doors, cabinets and furniture, you'll find a rasp or three.

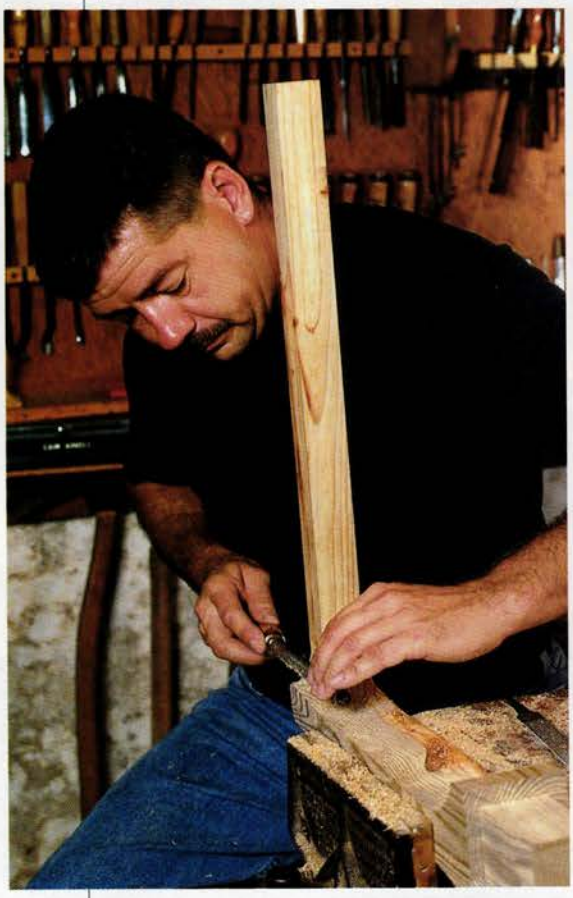
The long and noble lineage of the rasp may stretch back at least two millennia, which accounts in part for the variety of sizes and shapes and cuts of rasp available today. Woodcarvers shape the petals and umbos of ornamental rosettes with tiny double-curved rifflers; perfectionist trim-carpenters use the same rifflers to neatly excise the final bit of waste from a piece of coped crown. The big horse rasp—so called because farriers use them to give horses pedicures—can erase big splinters and bulging knots on the walls of log houses. For construction, I prefer the four-in-hand, once called the shoemaker's rasp. Its lack of a tang and handle allows it to ride in a long pocket of a carpenter's pouch and its four grades of roughness make it handy for rounding over a splintery cut or tickling just a 1/16 inch off shiplap siding.

Like farriers, rasps are less common today. Gone are the 4-foot-long, two-man rasps that wheelwrights and carriage makers used to marry wooden felloes to metal tires. The bread rasp, which once removed burnt crusts from loaf bottoms, vanished as baking technology improved. And no one trots out gimlet-rasps anymore to bore and enlarge keyholes; power tools produce faster, smoother results.

In addition to being slow, rasps eventually wear out, despite their indestructible

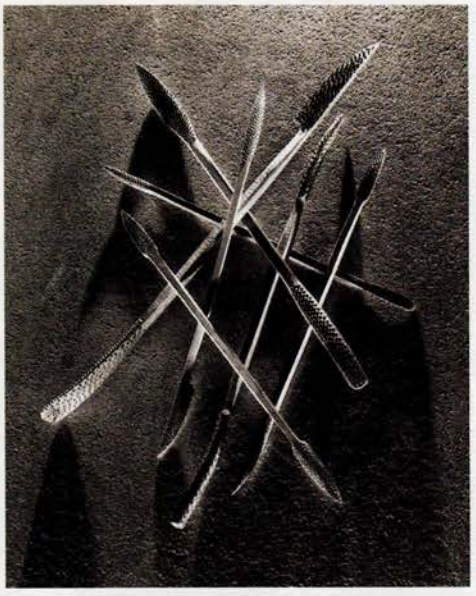
PLANING





The thin, graterlike blades of a planing rasp rarely clog, because the chips slide through the tiny openings. Planing rasps were first made with tempered high-carbon steel sheets tensioned onto light cast-metal handles, top (on top of stack). Stainless steel planing rasps can be attached to a hacksaw frame or bent into shapes such as the round one furniture-maker Perry Balog uses to smooth the joint of a chair arm, bottom.

RIFFLERS



Like a steel chopstick flattened at each end, a riffler has handmade teeth for working in areas with intricate detail, where it's important not to remove too much wood or leave gouges. The variety of spear and paddle shapes among these Italian-made rifflers, top, allows Balog to choose just the tool he needs to contour a violin's neck, bottom. "These allow me to push and roll the teeth to really control the wood removal," he says.

BOTTOM PHOTOS: ERIK RANK.

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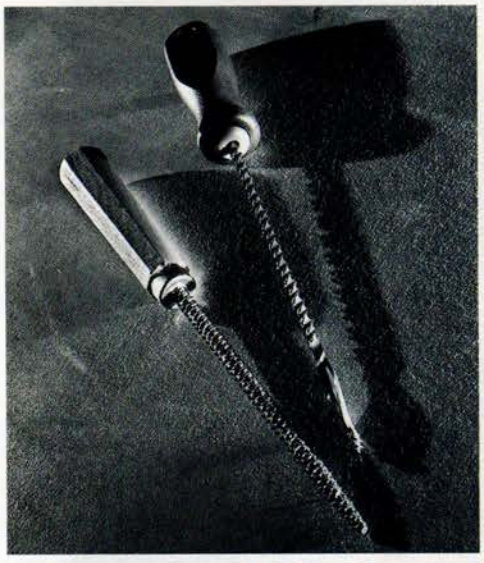
ROUND

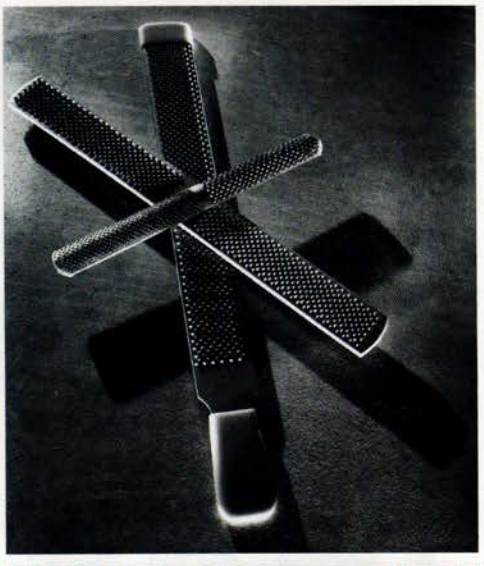


Most round rasps smooth and shape the inside of existing holes, although the drill-saw rasp, top (at right of photo), has a screw-thread tip and double-helix sawteeth for drilling and cutting holes to any diameter. Balog rolls a round rasp with both hands to remove wood on a curved edge, bottom.

FLAT AND HALF-ROUND

Holding any rasp becomes much easier if the tang—a rasp's tapered tail—is fitted with a handle, either a removable one made of wood or a permanently affixed one of soft rubber, top. Using the flat side of a half-round, Balog removes the corners of a square tenon on a chair arm, bottom.

HORSE AND COMBO



The teeth of the tangless combination rasp, top (on top of stack), change direction at the middle, so either end can be used. Thanks to its broad face and two-handed grip, a 14-inch horse rasp, bottom, can remove a lot of wood—or hoof—in a hurry. Plastic end caps make this tool easier to grip.

appearance. Once they've produced a few pickup-loads of sawdust, their teeth get dull and can't be resharpened. Leaving them in a toolbox to bang against other tools ruins them even faster. I keep mine wrapped in their own canvas or leather sheaths until they cease to bite; then I recycle them via a blacksmith, who hammers them into knives.

Having worn out several dozen rasps, I've started using planing rasps again. Not the original version, developed in England about 40 years ago. Those light, inexpensive tools, which consist of little more than a cast-zinc handle and a sheet of corrugated steel covered with tiny graterlike blades, are neither true planes nor true rasps—although they've always had a following among drywall rockers, who use them to smooth ragged cuts. The stainless planing rasps I use now do away with the corrugations and the cast handles and yet manage to chew through wood with blazing speed and without dulling as fast as the old-style graters. Although they lack the satisfying authority of a rasp cut from a thick slab of steel, these featherweight tools won't clog with chips (called pins by wood-carvers). This saves time, which otherwise must be spent brushing rasp teeth clean with a file card.

A file card has spring steel wires on one side to floss out the chunks caught in the rasp's teeth; the other side has soft nylon bristles to brush away loose dust.

I have to admit it: The shiny new planing rasps have me infatuated. But for the sauna door handle, I wanted a traditional steel rasp, if only to rekindle the feelings of my youth, when time meant little compared to the joy of using a brawny hunk of metal in the same way as the old masters.

As the hours pass uncounted, I am conscious only of the workpiece in my hand, the rasp and its soothing sound. The wood begins to take on a sensual, cumulous shape. After a few more hours of sanding, it seems to caress my hand properly, with one wisp curled over my finger. I rub it lovingly with tung oil and mount it on the door. My cloud-handle looks almost like a piece of driftwood, an artifact of nature sculpted by water and wind and time. A belt sander would have been faster no doubt but, with my rasp, the wood found its own shape. ■

PROCESS PHOTOS: ERIK RANK.

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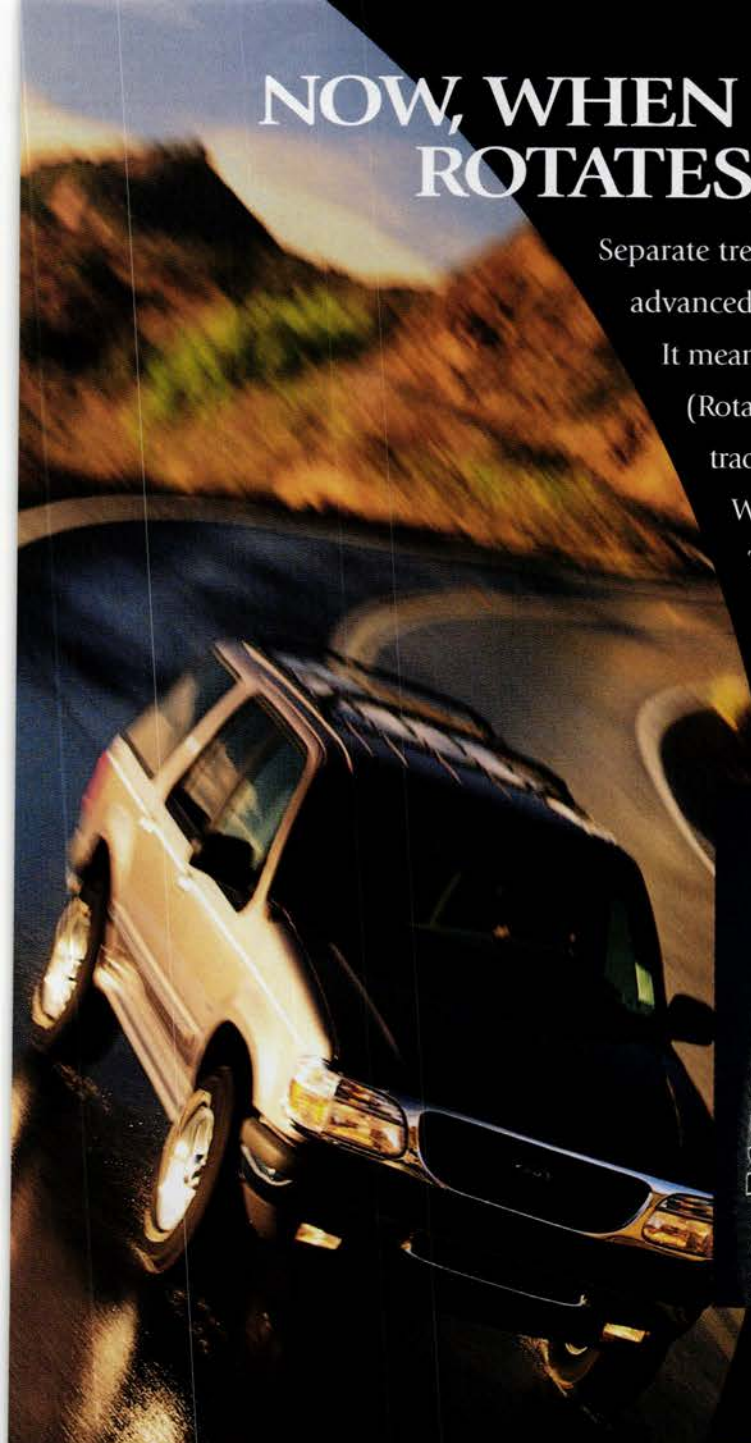

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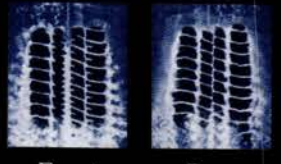

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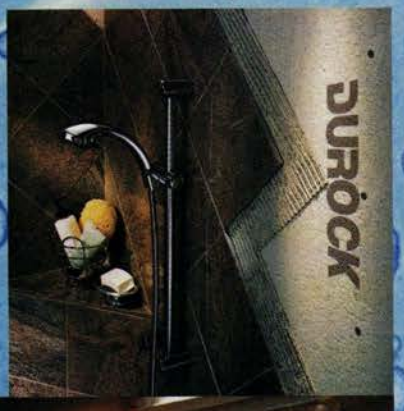
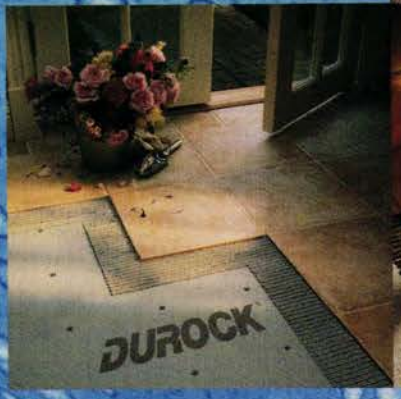
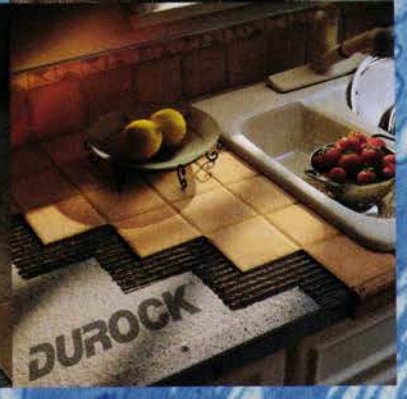




Floors

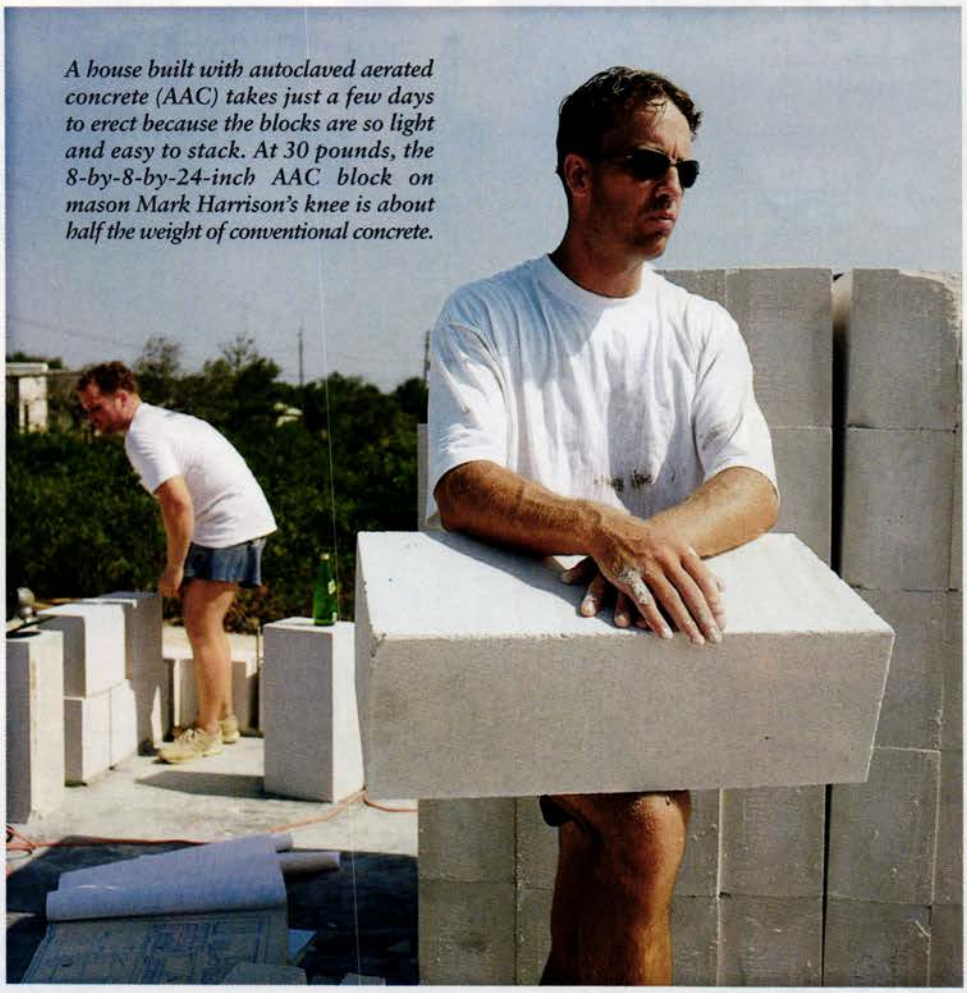


Countertops/Backsplashes

BY JACK McCLINTOCK

MIRACLE BLOCK

Why aren't all houses built with this stuff?



A house built with autoclaved aerated concrete (AAC) takes just a few days to erect because the blocks are so light and easy to stack. At 30 pounds, the 8-by-8-by-24-inch AAC block on mason Mark Harrison's knee is about half the weight of conventional concrete.

With a pop, Chris Poate lights a propane torch and moves the flame close to what looks like a double-thick slice of white bread. "Watch this," says the north Florida builder, his voice revealing his Australian roots. He toasts one side of the stuff—called autoclaved aerated concrete (AAC)—until it's cherry red and then offers the other side to a visitor. The toast is cool. And it's light—about half the weight of concrete, which it was invented to replace. "That's just the beginning," Poate says with a grin.

Some call AAC a near-perfect building material. Patented in 1924 by a Swedish architect, AAC is made of common ingredients: portland cement, lime, silica sand or fly ash, water and a dash of aluminum powder. The material is acoustically insulating, energy conserving, resistant to fire, decay and termites, and can be cut with a handsaw and sculpted into architectural details. Europeans have built a million houses and buildings with AAC, but attempts to introduce it here failed until recently, when energy concerns and high lumber prices started opening minds to its possibilities.

This Mediterranean-style AAC house in Niceville, Florida, is finished with stucco applied directly to the wall, no lath required.

Plaid Bermudas flapping around his tanned legs, Poate jumps out of his van at a house that his firm, Advanced Coastal Construction, is building from AAC. It's 92 degrees Fahrenheit in the shade along Florida's Choctawhatchee Bay, but when Poate walks into the unfinished house, the temperature is much cooler, and the construction noise from upstairs hardly penetrates the 10-inch-thick steel-reinforced AAC floor panels. The panels were made by Hebel, a German manufacturer that, in 1996, opened the first AAC factory in this country. (Ytong, a competitor, opened an AAC plant here in 1997.) The home owner, Richard Grenamyer, has wanted an AAC house for a long time. "I read about it years ago, but it wasn't available," he says. "A friend had Hebel block shipped from Germany to build his house in Tallahassee. I was excited when I saw the Hebel signs."

What slowed AAC's arrival in the United States was the reluctance of some masons to learn new work habits, says Bob Shuldes, a consulting engineer at the

PHOTOGRAPHS BY RICK OLIVIER

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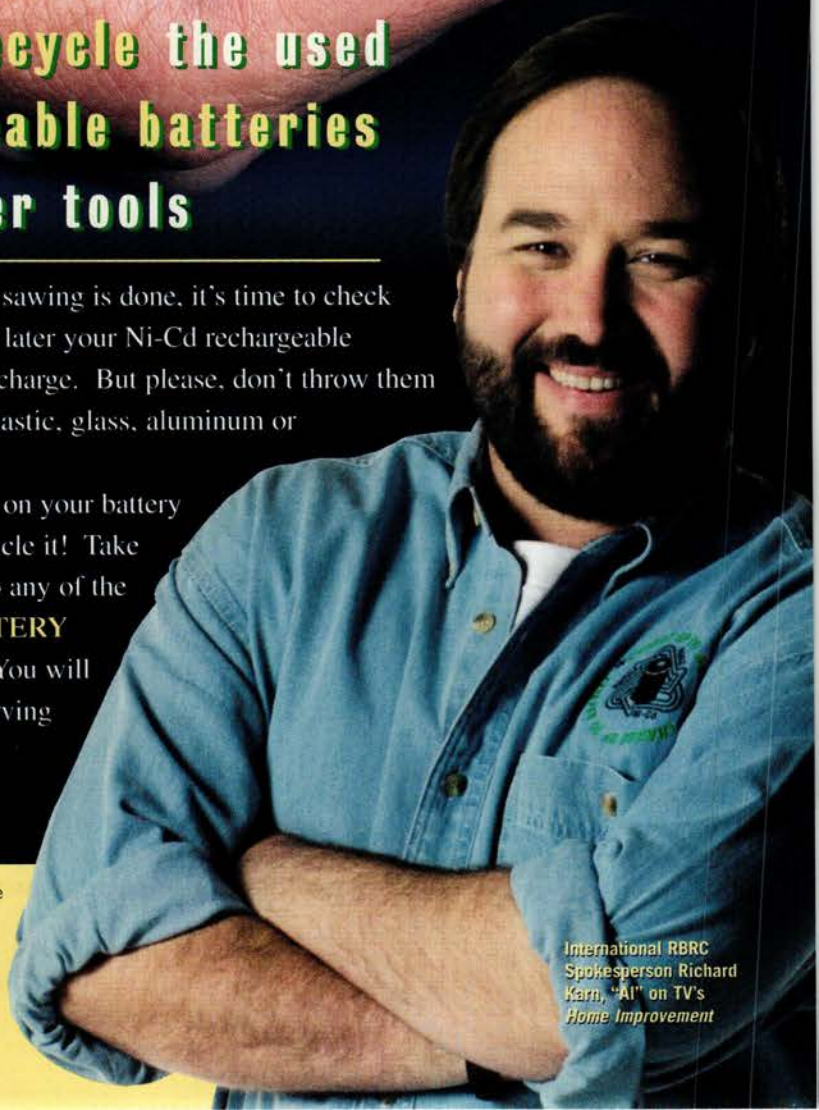

International RBRC Spokesperson Richard Karn, "Al" on TV's *Home Improvement*

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BUILDING COURSES

Builder Mike Havinkin runs an AAC block through a band saw, a woodworking tool. This particular block will be used in a leveling course, the first row of AAC on top of a foundation. But first, Havinkin cuts a notch to allow for a threaded-steel reinforcing rod.

Havinkin lays the leveling course of AAC on the concrete slab foundation. He aligns the block carefully against a horizontal string that is set around the entire foundation. For this course only, traditional mortar is used to bond the AAC to the slab.

After the leveling course is set, rows of AAC stack up like toy blocks. A joint of specially formulated thin-set mortar bonds the blocks; it must measure precisely 1/8 inch thick to keep each row level. Masons use a trowel designed to spread exactly the right amount of the mortar.

Harrison drills a hole in an AAC block to make a passage for the threaded rod that connects the rows, top to bottom—eventually tying slab to roof. Although AAC can be worked with hand tools, Poate's crew prefers power tools for ease and precision.

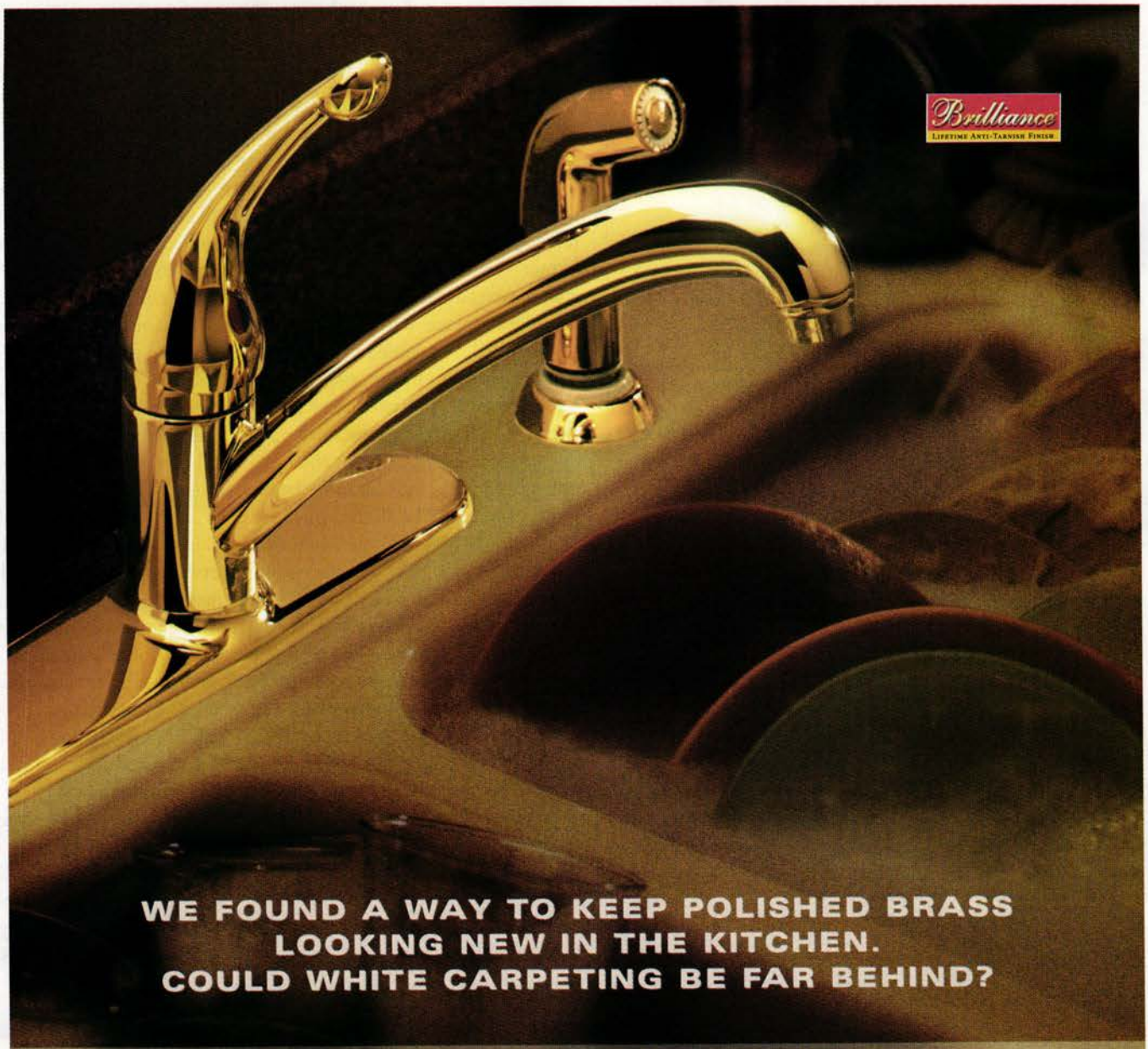
Portland Cement Association who has studied the material's history. But watch mason Mark Harrison at work, and it's hard to see why. "It's easy," he says, cutting a block to size on a big band saw and adding it to the waist-high wall at another house on Poate's tour. Harrison sets down his trowel to pick up one of the AAC blocks. At 24 inches long, it is larger than a typical concrete block and, at about 30 pounds, it is lighter—but because it is solid, Harrison has to use two hands. American masons are used to grabbing the web of a concrete block and hefting it into place with one hand. Harrison doesn't mind working two-handed, but some masons never get used to the difference.

AAC goes up more quickly than traditional concrete block. And once in place, it's sturdy, with enough strength in compression to support itself three or four stories high. With roof ties every 12 feet and at the corners, AAC meets the local wind-load requirements of 130 miles per hour, says Poate's partner Craig Cole. Greater wind-load requirements call only for thicker walls, says architect Giles Blunden, who designed a house built of AAC in Chapel Hill, North Carolina, this year: "We had one wall 14 feet high, so we consulted with an engineer and made it 10 inches thick instead of 8." Because AAC is still unfamiliar, Hebel and Ytong both offer engineering assistance to designers and builders. The companies also train tradesmen.

Blunden, who has a special interest in energy-efficient construction, says AAC's cellular spaces make for excellent insulation. Hebel's calculations indicate that an 8-inch AAC wall has an R-value of 11 but, because of reduced air infiltration and increased thermal mass, it outperforms a stud wall rated at R-30. "You get a flywheel effect from its mass—reduced temperature fluctuation, because it's slow to heat or cool," Blunden says. Hebel says its walls are two and a half times more airtight than standard wood frames or concrete blocks—so tight, in fact, says Craig Cole, that another problem arises: balancing the air-conditioning. "A 2,800-square-foot house will stay cool so long that humidity builds up before the air conditioner kicks on," Cole says. "So

He came, he saw, he built a house

When Ytong opened an AAC factory in Haines City, Florida, last year, construction estimator Norm Ellis stopped by for the grand-opening party. He was impressed. The next thing he knew, he had drawn up plans for a house, and a flatbed 18-wheeler was unloading Ytong block with a forklift. "They even sent two German builders, Hans and Karl, to give me pointers," says Ellis, who is one of the first Americans to build a do-it-yourself AAC house. "Hans and Karl really helped," Ellis says. They showed him how to miter the corner blocks with a band saw instead of stacking them block on block. He learned to route a channel from the floor to the bond-beam so he could install rebar every 6 feet—the distance suggested by an Ytong engineer. To install windows, Ellis routed a 1-inch mortise around each opening and stuccoed the window unit into place as he stuccoed the exterior. "It was easy," Ellis says. "With pigment in the stucco, I got stucco, waterproofing and paint in one coat." He plastered the interior walls with drywall compound. That, too, was easy and saved him money. The Ytong block cost more than concrete but, because mortar is included, and he didn't have to buy paint for the exterior or plasterboard for the interior, he says, "I saved a bundle." Do-it-yourself AAC houses are common in Europe. In this country, Ytong intends to move aggressively into the do-it-yourself market; Hebel, Ytong's competitor, plans to stick with contractor sales.



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WORKING WITH AAC


1


2


3


4

1. *After three days of construction, a new house takes shape with six rows of AAC block in place. When all the rows are stacked, the top one will be attached to a bond-beam.* **2.** *An interior AAC wall shows the channels for mechanical systems. Using a router to cut channels directly into the face of a block wall saves time but creates a labor quandary: Neither electricians nor masons traditionally use routers. Builder Chris Poate's solution: He simply hands the electrician a router.* **3.** *An exposed doorjamb shows a solid 8-inch AAC wall. "The thick walls mean the doors and windows get a good reveal," says Poate.* **4.** *Clapboard siding made of fiber cement board is applied to furring strips laid over the AAC exterior walls.*

we downsize the air-conditioning by a ton and add a humidistat, so either temperature or humidity kicks the unit on."

AAC's drawbacks come mostly from its novelty. While it can be screwed and nailed as easily as wood, the attachment is often not as strong—screws can strip out, and nails can twist. Plastic anchors help, and Hebel has designed special, large-headed, square-shank cut nails with better holding power. Tiny blemishes can be filled with thin-set mortar, but it drips and runs, so larger repairs require a stiffer mortar. Because water collects in the material's open pores, AAC can't be left unfinished for more than a few days.

Here in northern Florida, a one-story Hebel-walled house costs about 2.5 percent more than a comparable frame one with stuccoed 6-inch stud walls, Cole says. But energy savings repay the difference in less than five years, he says. AAC's higher cost keeps it out of the moderate-priced market, Poate says, because buyers are concerned about up-front costs. Buyers of more expensive houses ($200,000 and up, in this region) "understand the quick payback and are willing to make the investment," he says, parking the van back at his office in Destin.

AAC is already more popular than some predicted. The 80s' energy crisis revealed the need for an energy-efficient concrete product. When construction codes reflected that need, American builders started trying AAC. And now, says engineer Shuldes, "I'd say it's here to stay." ■

Classic Florida cottages have clapboard siding and wrap-around porches. This new house in Destin has those elements and more: Its AAC structure meets local wind-load requirements.

Comparing building blocks

	AUTOCLAVED AERATED CONCRETE	CONCRETE MASONRY UNIT
SIZE	8 by 8 by 24 inches	8 by 8 by 16 inches
WEIGHT	28 to 40 pounds per block (33 percent bigger than CMU)	25 to 40 pounds per block
INGREDIENTS	Sand, portland cement, lime, water, expanding agent	Stone, sand, cement, water
COMPRESSIVE STRENGTH	348 to 1,090 psi	2,000 to 2,500 psi
FIRE RATING	up to 8 hours	up to 4 hours
R-VALUE	R-9 to R-11 (Performs up to R-30)	R-2 to R-3
COST	$7.50 to $8 per square foot for finished wall (includes stucco)	$6.50 to $7.50 per square foot for finished wall (includes stucco, paint, R-13 insulation, interior wallboard)

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BY HOPE REEVES

ROCK 'N' ROLL

Drywalling a room takes strength, patience and a lot of practice

Walls insulated and ceiling strapped, the family room, above, is ready to rock. A coat of paint would highlight every bump and blister of a shoddy drywall job. But on this project, right, there's nothing but perfection.

As much as we appreciate the comfort and convenience that pipes, wires and the other mechanicals provide, we want them buried—out of sight, covered with a lining as smooth and hard as the inside of an oyster shell. Years ago, craftsmen blanketed houses in successive coats of thick, wet plaster. These days, most walls and ceilings are covered with drywall, a cheap, quick-to-install sandwich of gypsum and paper.

Drywall goes up fast, but hanging and taping "rock," as the pros call it, take an unlikely combination of grace, brawn and patience. A good job can make a room. A bad job can jar the senses. "If you don't do it right, you'll see every sheet and every screw hole on the wall," says *This Old House* contractor Tom Silva. "Getting a perfectly smooth, even surface is a lot harder than it looks."

To do just that, drywall contractor Gus Larsen, a longtime Silva Brothers subcontractor in Tewksbury, Massachusetts, recently unleashed his crew inside a box of naked studs and joists. The 24-by-18-foot family room, complete with coffin ceilings, half-round windows and a peaked dormer, might have daunted an unseasoned hanger. But with the studied nonchalance of veterans, Larsen's crew hauled in the 84-pound 4x12 sheets, strapped on tool belts and shrugged off any suggestion of challenge. Four days later, the hard work was over. The room's rough skeleton was sheathed in a seamless satiny skin that looked as if it had been molded in place. That's the goal, to be sure. But as Larsen observes with a hint of regret, "If a drywall job is good, people don't even notice it." (*continued on page 62*)

PHOTOGRAPHS BY KOLIN SMITH

HANGING

1. *Cutting drywall is a snap—literally. Mike Couillard flicks a chalk line, takes a utility knife to score the board, then folds it back, breaking its gypsum core. With a final knife cut, he severs the backing paper. Couillard trims pieces about ¼ inch short of the exact measure, so the boards don't have to be forced into place (which can crack and split the ends). "If the gap isn't greater than ½ inch, it can be covered with joint compound and tape," says Jeff Larsen.* **2.** *Using high-speed screw guns and sharp 1 ¼-inch screws, Couillard and Larsen team up to hang the ½-inch boards. On the walls, they lay the boards across the studs and drive a screw every 16 inches. On the ceiling, they plant screws every 12 inches into the ¾-inch-thick strapping, which is spaced a foot apart. (On ceilings without strapping,* This Old House *contractor Tom Silva recommends hanging ⅝-inch boards perpendicular to the joists.) Coarse-thread screws have almost universally replaced nails on drywall jobs because, Larsen says, the screws "grab the wood better and hold better." To avoid screw pop, the crew uses screws no longer than two and a half times the thickness of the board.* **3.** *For cutting openings in drywall, nothing is easier than a cutout tool operating at 30,000 revolutions per minute.* **4.** *On windows, Couillard uses a few screws to tack a board over the opening, then runs the tool clockwise around the inside of the window frame, letting the frame guide the spinning bit. When finished, he fastens the board completely. He cuts openings for outlet boxes in a similar way, except that he moves the tool counterclockwise around the outside of the metal box.*

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SMOOTHING

1. *Once the cutting and hanging are complete, the taping crew moves in to hide the seams and screwheads. Taping the boards' long seams is easy because the sloped edges form a swale for the taping knives to fill with joint compound. On the ends of the board, where the edges don't slope, taper Jim Smith creates his own valley. With a taping knife, he tears off the paper 2 or 3 inches from either side of the joint. After Smith preps the seams, he dips into a bucket of premixed joint compound, trowels on the bed coat, rolls paper tape onto the wet surface and lays the tape smooth with a 5-inch knife. He prefers paper tape because it is stronger than fiberglass mesh. He then works his way over the scores of screwheads until they, too, disappear into the gypsum canvas.* **2.** *After allowing the mud to dry overnight, Smith swishes and swipes the seams with a curved 12-inch trowel. He scoops dollops of compound from the center of his hawk and whacks them against the seams, dragging his trowel from the midpoint to the ends of each board. After a few passes, the seam is smooth and bubble-free. Then he goes back over each screwhead with another coat. The next day, with a 16-inch-wide knife, he spreads a water-thinned third coat over every seam and screwhead, covering all but minute imperfections. Applying a skim (fourth) coat over the entire surface is recommended if the room will be finished with high-gloss paint. The following morning, the room is ready to sand.* **3.** *Smith calls sanding the "ugliest part of the job." He straps on a respirator, which protects his lungs from the fine white dust that will rain down. Gripping a pole sander with 120-grit paper, he begins lightly rubbing the humps and bumps out of seams and fastener heads. On corners and other vulnerable areas, he smooths with a sanding sponge. Smith is always careful not to over-sand, which could remove his delicately applied layers of compound, rough up the drywall's paper skin and force him to start mudding and sanding all over again.* ■

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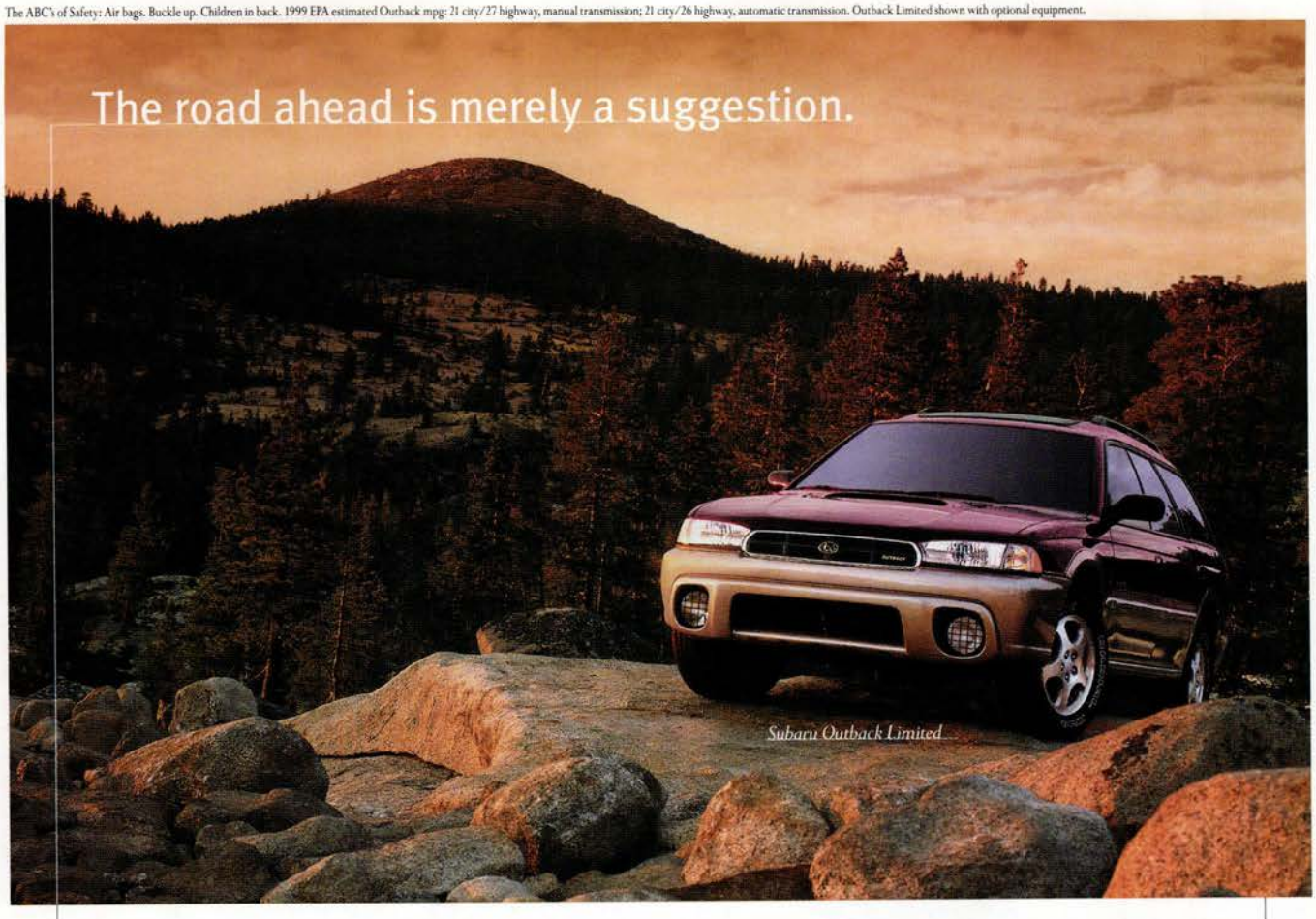

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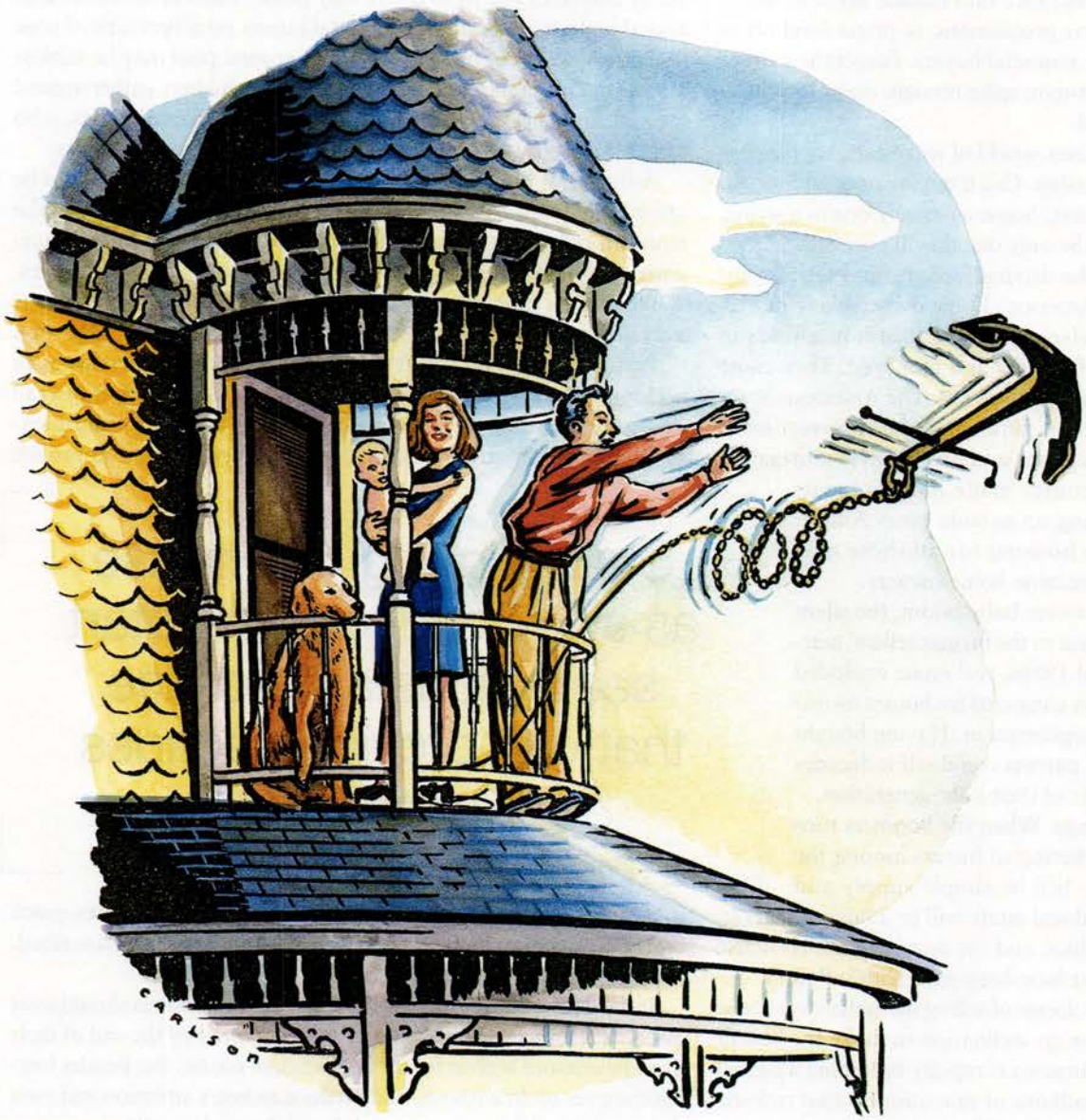

BUY YOUR LAST HOUSE FIRST

The rules of real estate are changing

The buying and selling of residential real estate has followed a familiar pattern for two generations. Call it serial ownership: Young couple stretches to buy their first house. In a few years, they sell for a tidy profit and buy a larger place to house more kids. When the children grow up and move out, they leave behind a house too big for two. Retirement-minded couple sells again—for another nice profit—and heads for a smaller house somewhere in the Sun Belt.

Serial ownership has worked for millions of families largely because the population bubble known as the baby-boom generation brought so many buyers into the real estate

BY STEPHEN M. POLLAN AND MARK LEVINE
ILLUSTRATION BY JONATHAN CARLSON

marketplace. But as boomers advance into middle age and retirement, serial buying will become problematic as prices level off in a market with fewer and fewer potential buyers. Forget the current surge in house prices: It's a short-term spike brought on by low interest rates, not a long-term trend.

To make the best of a brave new world of real estate, we propose a fresh formula for home ownership. Call it buying once and for all. Rather than seeing a first (or next) house as merely one in a string, home owners should make it the only one they'll ever buy.

Demographics have been the driving force behind serial ownership. Before World War II, America's home owners were mostly wealthy or rural. Everyone else—56 percent of households in 1940—rented. Suburbs were few, tiny and moneyed. Then came a once-in-a-millennium confluence of events. The American economy roared in a postwar boom, and the federal government rewarded GIs with cheap educations and low-interest mortgages. As the veterans and their spouses made babies, Levittown and its equivalents sprang up outside every American city, offering affordable housing for all those new families. A lot of Americans became home owners.

By siring America's greatest-ever baby boom, the silent generation subsequently gave rise to the biggest sellers' market in history. In the 1970s and 1980s, real estate exploded as more than 76 million boomers competed for houses owned by their parents' less populous generation. Having bought a postwar house for $15,000, parents could sell it decades later for $150,000 to a member of their kids' generation.

That trend is about to change. When the boomers turn around to sell, they'll be marketing to buyers among the much smaller Generation X. It'll be simple supply and demand: Long-term, residential real estate will be a buyers' market. The future is in the demographics, and the best hope is that house values will slightly exceed or at least keep pace with inflation.

For many home owners, the dream of selling up to the ideal house has already been supplanted by an inclination to make the best of what they have. Let's face it. America is rapidly becoming a nation of renovators, with so many millions of practitioners that redoing houses has become a lifestyle. In the 1990s, a rusty dumpster in the yard confers more status than a fancy car in the driveway.

Renovating one's way to the perfect house places an added importance on choosing the right house in the first place. Expandability and adaptability are key. The house lot and zoning should allow for growth and change. Houses that can be reconfigured to add an extra child's bedroom on the second floor, a parent's apartment on the ground floor, or an office in the attic or basement are more savvy buys than ones with limited possibilities.

Similarly, houses with several smaller rooms offer more options than those with fewer, larger ones. It's easier and cheaper to change the function of a small parlor, a sewing room or an extra bedroom than to divide a sunken living room or a great room. Because they typically have more discrete areas, traditional-style houses tend to fit this profile better than contemporary designs.

Planning to buy once also means waiting longer and saving more to be able to afford the house you'd want to live in for the rest of your life. It also frees you from doing only plain vanilla renovations that appeal to the widest range of potential buyers yet reflect little of your true tastes, wants or needs. Sure, an in-ground pool may be sunken money, but when the children, and then their children, gather around it every summer weekend for the next three or four decades, who cares? Wonderful memories will far outweigh any financial loss.

Although it may cost more, a once-and-for-all house should be affordable from day one. Increases in income will simply make renovations happen sooner. The house should also be located somewhere the home owners will be happy at every stage in their lives. While that's a subjective judgment, on some level it usually means a diverse community that caters to all types of families and age groups.

Perhaps the biggest shift in this approach to ownership is in no longer viewing a house as an investment and seeing it instead as a purchase that can provide decades of happiness and pleasure. Taking that attitude raises the possibility of a new approach to all personal financial decisions that, we believe, makes much more sense than what conventional wisdom has long prescribed. Call it living well and dying broke.

> Stop thinking of a house as an investment and start seeing it as a purchase that can provide decades of happiness.

Instead of stashing away swag for heirs, home owners should treat assets as resources to be exploited and exhausted by the end of their lives. Inheritance is great for the recipients, of course. But besides forcing the giver to do without, it can reduce an heir's ambition and even throw a financial monkey wrench into a love relationship.

Money should be spent on anything, or anyone, as long as it's spent, and real estate, or the profit from its sale, shouldn't end up as part of an estate. Instead, a home owner should borrow against his house for a child's college education, a new business, home renovations or even fun and travel. The house could also supply a portion of retirement income. By taking out a reverse mortgage on an ultimate house, owners get a tax free income yet stay in their residence for as long as they wish. Used in these ways, a once-and-for-all house can meet a lifetime's worth of emotional and financial needs.

In contrast, serial owners spend their lives in a moving van. No place ever truly becomes special, because it is never permanent. Making a long-term commitment to one house makes that house a special place that can expand and change with a family's needs and let the family place a personal stamp on it. As kids grow, parents can record their heights with a permanent marker. What the heck...they can go ahead and cut a notch in the door frame. ■

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THE REMODELING TRAP

Create a wonderful house, but don't lose your perspective

Like many addictions, Tish and Richard Costello's obsession with renovating their Cedar Hill, Texas, house began innocently enough. In 1992, the couple added a walk-in closet in their master bedroom and had the foundation reinforced after discovering several weak spots. Then they added a front porch, which caused them to widen the front door and the entry foyer. By this time, the Costellos had put about $120,000 in renovations into a house that in 1976 had cost them $52,500 to build on an $11,500 lot.

Today, the Costellos believe their property is worth $330,000, which would produce a nice profit if they sold. But the Costellos aren't finished. They've embarked on a $180,000 blowout that will quadruple the size of the kitchen, adding a breakfast space and a computer area, not to mention two ovens, three sinks and a pair of dishwashers.

The addition will extend over the driveway, which will necessitate building a carport to support the kitchen and keep it from sinking into the soft Texas clay. "Essentially, we'll be redoing the whole front to redo the kitchen," says Tish, who concedes the job won't add $180,000 to the house's resale value. "The rest of my home is perfect, so I want my kitchen to be perfect."

The Costellos' house will doubtlessly turn out great, but in realizing their dream, the couple will make a common renovation mistake: crossing the line between reasonable improvement and imprudent excess. "I see it a lot," says Arlington, Massachusetts, contractor Shawn McCadden. "It starts with wanting a larger house, then building the addition, then remodeling the rest of the house to keep up with the addition. Before you know it, the owner has a mansion in a neighborhood of ranches."

Most home owners would sympathize with the Costellos' expensive pursuit of perfection. "Renovations offer solutions to the things people find wrong with their homes, and everyone has at least one of those things," says Rebecca Williams, a real estate broker in Bethesda, Maryland. "Fixing them can make people happier, make the house easier to live in and add some value to it."

To be sure, many people buy houses in order to renovate at will, and no one should be a slave to resale value. But home owners who give in to the urge to over-improve often wreck their budgets, saddle themselves with heavy debt and don't recover their costs when they sell. Avoiding fiscal catastrophe on the way to a better house and garden means knowing which renovations really add value and which ones merely devour cash. The remodeling industry regularly issues optimistic guidelines touting high returns for all sorts of renovation investments, from kitchen and bath remodeling to adding a fireplace. The numbers, however, come from opinion-based research and aren't backed by solid statistics. "The amount an owner will recoup on a renovation is really specific to a given place," says McCadden.

The moral? When comparing renovation costs to resale values, there's no place like hometown. "Determine what's hot in your neighborhood," says Williams. She advises talking with local real estate agents and appraisers to learn how specific features or remodeling jobs have affected recent sales. It's also important to ask them about the most popular renovations as well as how much value they think various improvements will add. And before starting a renovation, keep in mind a few guidelines that hold true across almost any neighborhood or region:

- **Stay within the mold.** Renovations should be consistent with the house's style and with the neighborhood architecture. "Don't put an ultra-contemporary kitchen in a traditional house in a traditional neighborhood," says Dallas contractor Chris Miles.
- **Shun designs for the ultimate room.** The kitchen to die for or a sumptuous bathroom won't add maximum value if other rooms don't measure up. The contrast will make the rest of the house look that much worse. The better strategy, says Matthew Chamberlain, a real estate broker in South Portland, Maine, is to bring old

BY CLINT WILLIS ILLUSTRATION BY GARY BASEMAN

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[1] No fees or sales charges apply to benchmarks. Performance provided by Lipper Analytical Services, Inc.

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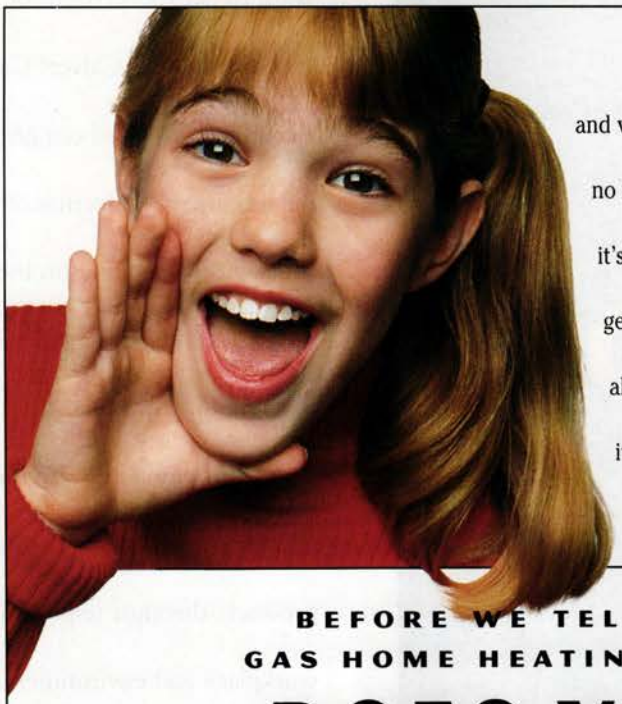

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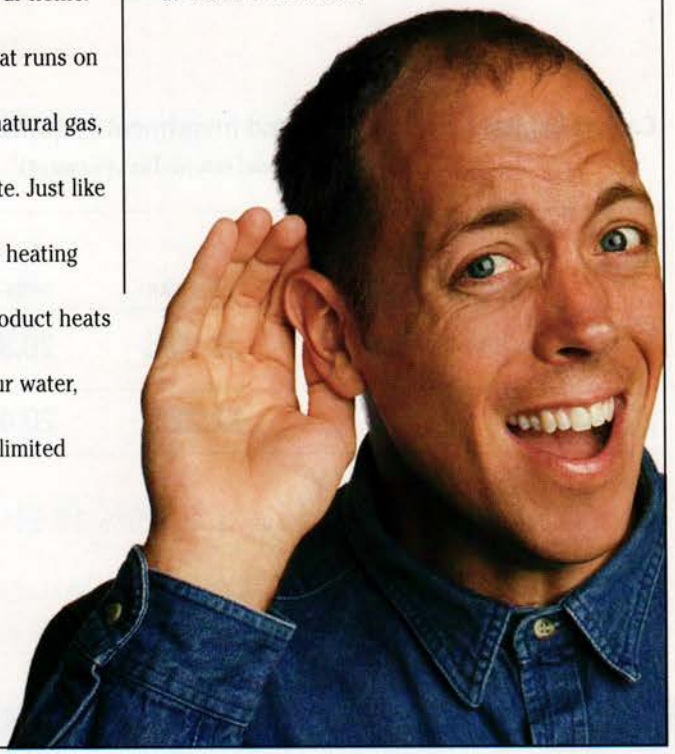

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rooms up to date. "If you buy a great house with a crummy kitchen, renovating it can add a lot of value."

• **Match the scale of the renovation to the neighborhood.** A $100,000 addition makes little financial sense in a neighborhood of $200,000 houses. Even if the house is the biggest and the best, few buyers will pay $300,000 for it.

• **Avoid putting high-end appliances in a modest house.** Don't expect to recover the cost of a $5,000 stove unless the house is equally upscale. Chamberlain recalls walking through a small bungalow replete with high-end details such as marble tile and cherry cabinets. "It was beautiful," he says, "but the owner could never expect to get his money back. A buyer who could afford those details would probably be looking for a larger house in a more expensive neighborhood."

• **Don't expect to be bailed out by the real estate market.** It's tempting to over-renovate in the belief that real estate prices will climb enough to cover the cost. That amounts to spending money you may never receive, a poor approach to financial planning.

• **Decide on a length of stay.** Investing more than a house's likely resale value only makes sense for home owners who intend to stick around to enjoy the results. Bret and Sue Young followed both sides of this rule. In 1986, they paid $180,000 for a house in San Jose, California, and over the next 11 years, spent $80,000 renovating it. Last year, the couple sold the house for $410,000 and netted a nice profit. Then they bought a place across town for $825,000 and plan to spend another $190,000 on a string of renovations. "We're going to live in this house until the kids are out of college," says Bret, "at least another 10 or 15 years."

• **Don't renovate the wrong house.** That's what Sarah Crowder and Bruce Buckley did. In 1982, they bought their Charlotte, North Carolina, house for $62,500. They started renovating in 1983 and ended up putting more than $100,000 into the kitchen, the downstairs bath and several bedrooms. Three months after the last project, Sarah walked into a house that was for sale two blocks away. She made an offer the same day, and a month later, the couple owned it. "Bruce is 6-foot-8, and our old house was never really big enough for him," says Sarah. "This one has 10-foot ceilings and big doorways. It's wonderful."

The Crowders deny any renovation obsession. Still, although they recovered all the money they spent on the first house—thanks to a rise in area real estate values—they would have saved themselves trouble by starting with a place that better suited their needs.

Now that they have the right house, Sarah has no immediate renovation plans. "I despise all the upheaval," she says. "Of course, there are a *few* cosmetic changes we want to make..." ■

FINDING A GOOD CONTRACTOR

Make like a detective, and you'll get your man

The home-improvement business has never been better. The National Association of Home Builders says Americans will spend a record $130 billion on remodeling and maintenance this year. Yet the good times also bring lots of new and untested players into the business and, with them, a few bad apples. The files of the Denver district attorney's economic crimes unit, for example, bulge with renovation nightmares:

• After hiring a contractor to build a small addition, a home owner gave in to a demand for advance payment of the full cost of the job. Soon after construction began, a building inspector happened to drive by the house and, after poking around a bit, issued a stopwork order because the contractor had no license. The contractor gathered his tools, left the jobsite and never returned. Further investigation revealed that he had recently fled prosecution in Kansas.

• In another case, a contractor was paid half of his $1,600 estimate for a deck. After setting just four posts, he asked for, and got, $200 more from the home owner. Then he disappeared. When the home owner called the police, he learned that the contractor had an outstanding arrest warrant (*continued on page 76*)

BY GARY BELSKY
ILLUSTRATION BY PETER HOEY

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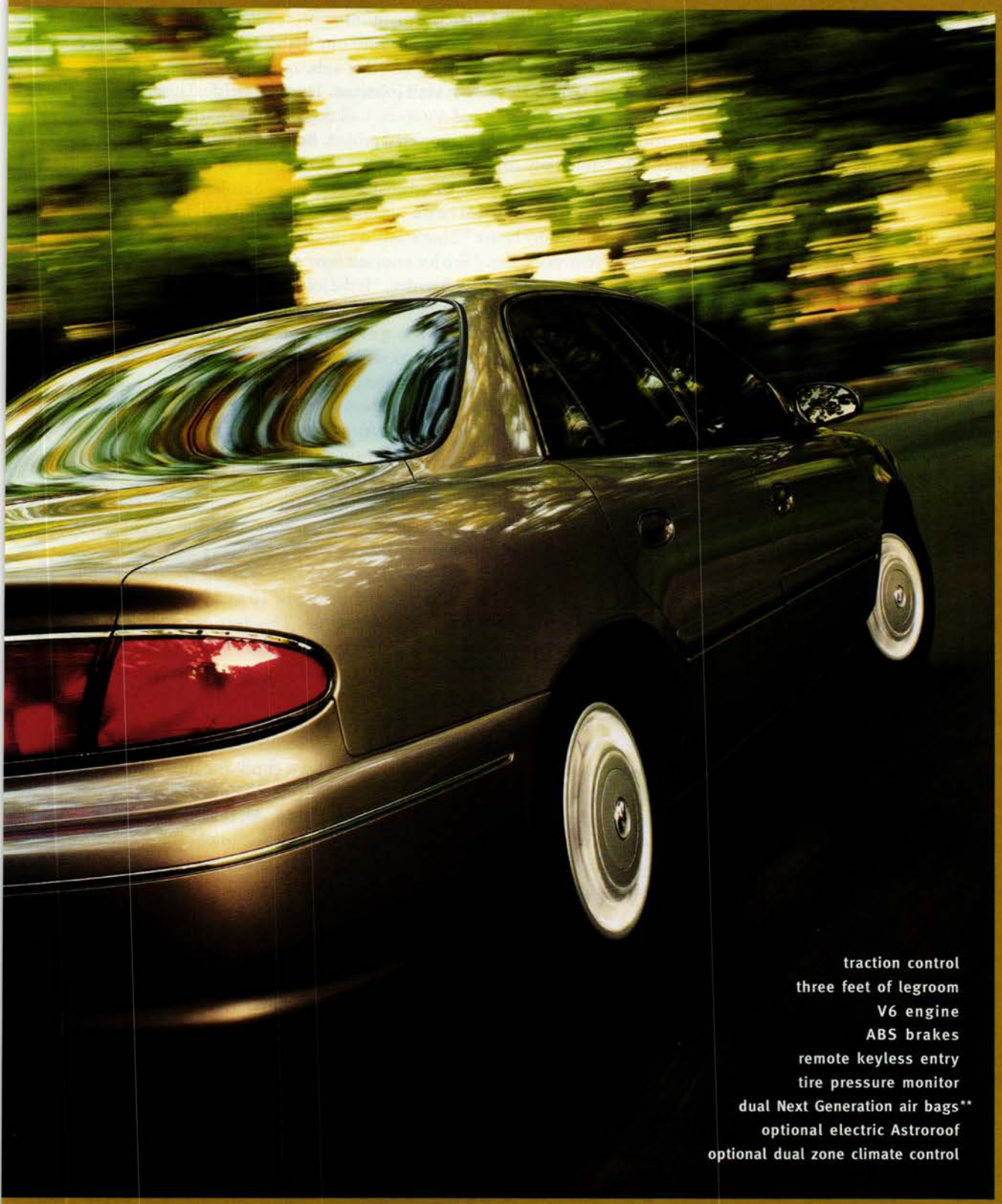

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(*continued from page 73*) for taking full payment to stucco a house but completing less than half the job.

These tales could have unfolded anywhere. "Home remodeling is probably the number one consumer fraud we prosecute today," says Denver district attorney Bill Ritter, whose office handles 20 to 30 such cases a year. Worse, incidents of poor workmanship, cost overruns and other noncriminal mishaps are far more common, yet most could be prevented if home owners spent more time checking out contractors they want to hire.

"Over the past 15 years, the number of contractors in the U.S. has more than doubled," says Kermit Baker, director of the Remodeling Futures Project at Harvard University's joint center for housing studies. "And in many states, you don't even need a license to operate. It's clear that home owners have to be highly selective."

What's not so clear is just how to go about choosing a qualified pro and not some remodeler wanna-be with a slick sales pitch. But instead of dusting off old advice about finding the best contractors, we asked some of the best in the business—more than a dozen builders and remodelers with strong reputations—how they would do it. All agreed that in today's red-hot marketplace no one should do any hiring without first doing a lot of homework.

"You wouldn't marry or start a business with someone without going over your choice with a fine-tooth comb," says *This Old House* contractor Tom Silva. "When you hire a contractor, you're doing both of those things, at least for a few weeks or months. So the decision has to be made carefully." The homework may seem excessive, but the more thorough the vetting, the better your chances of finding the person who fits not only the job but also your temperament.

Following these steps will help to ensure success and minimize unwelcome surprises along the way:

• **Get six to 10 recommendations.** Ask friends, family and colleagues about contractors they like, but don't stop there. Call the National Association of the Remodeling Industry for area members. Better yet, contact building inspectors and lumberyards. The former know whose work routinely meets code requirements, while the latter know who buys quality materials and pays bills on time. Neither will risk a lawsuit by identifying scofflaws or late payers, but they can and will recommend contractors who do good work.

• **Work the phone.** You can find out a lot in a 15-minute call to each name on your list. Does he take on projects of this size? A busy contractor may only take on bigger, more profitable jobs. Is he willing to provide financial references—say, from suppliers or a bank—as well as a list of previous clients? Hesitation to offer either should set off alarm bells. How many projects would he be managing at the same time? Too many, and your job may get short shrift. How long has he worked with his subcontractors? Long-term relationships can indicate a loyal, well-coordinated team.

• **Whittle the list.** Based on the phone interviews, pick three or four finalists, and schedule meetings for estimates and more conversation. Focus on those contractors who were able to answer your queries satisfactorily and—just as crucial—put you at ease. "You're trying to see if you'd be comfortable having this person in your home for long stretches of time," says Chicago remodeler Jack Philbin. On the other hand, don't let personal charm create a false sense of security. Call the state consumer-protection agency and the local Better Business Bureau to find out if any candidate has a history of disputes with clients or other subcontractors.

• **Grill references; visit jobsites.** Don't be satisfied just to get a list of client names and numbers. Call them up, discuss how the job went and ask to see the completed project. But even if the work looks good, don't rely solely on references. "Contractors are only going to give you their most satisfied customers," says San Jose contractor Jeff Winn. "They could be the only ones, or they could be clients who don't know any better." That's why it's just as important to check out a current work site. "See for yourself how someone works," says Houston contractor Dan Bawden. "Is the jobsite neat and safe? Are workers courteous and careful with the home owner's personal property?"

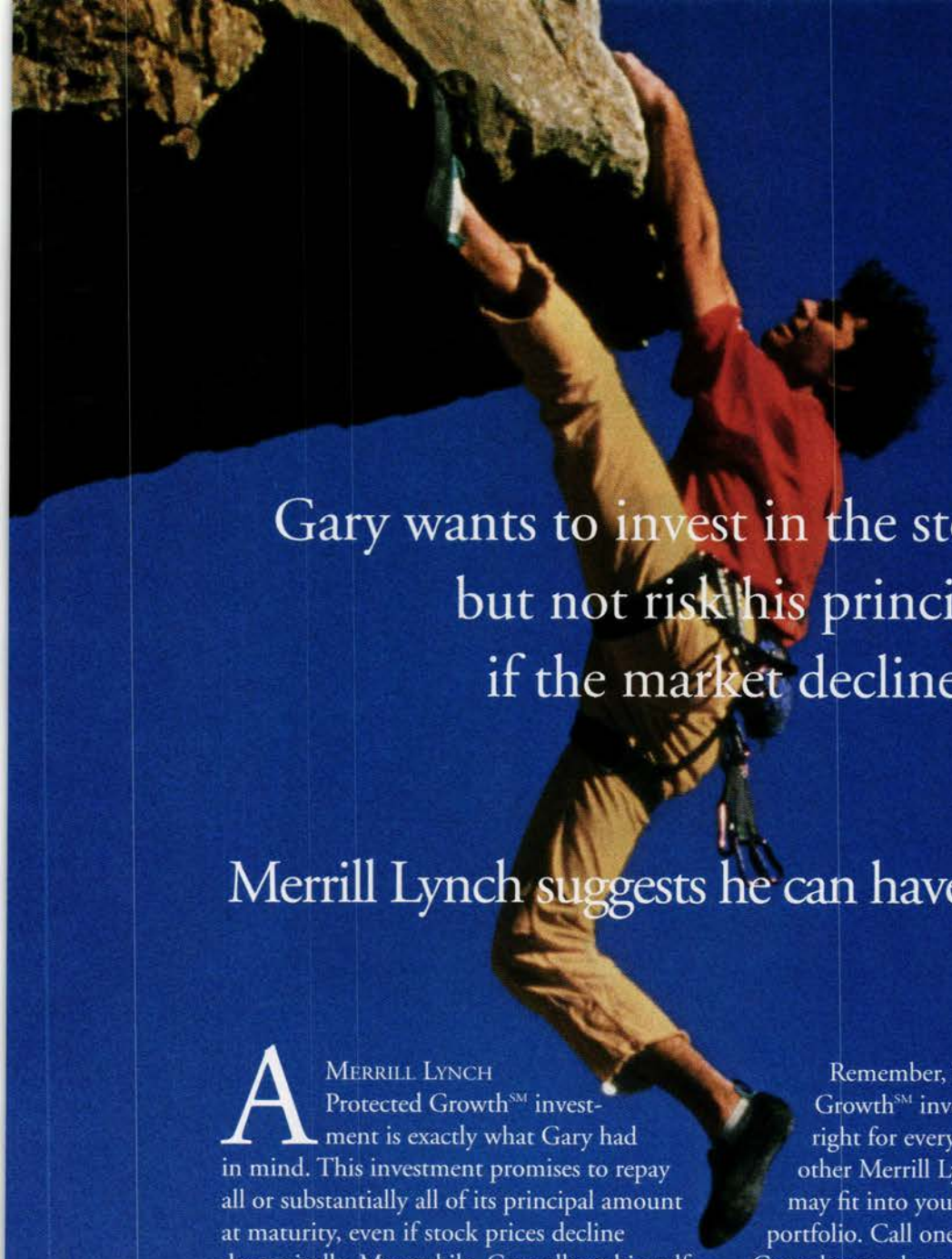
• **Give detailed plans; get detailed bids.** A contractor who aims to satisfy his clients will want more than a complete set of blueprints. "A good contractor will try to pull as much information as possible out of a prospective client before making a bid," says Fairfield, Connecticut, contractor George Christiansen. "I ask home owners to make lists of what they want in a project. Then I try to fit that into what they want to spend." To be able to compare one bid to another, ask everyone to break out specific costs, including materials, labor and profit margins. "A quality contractor isn't afraid to say how much profit he or she needs to make," says Winn. Generally, materials account for 40 percent of the total cost; the rest covers labor, overhead and the typical profit margin of 10 to 15 percent.

• **Ask about the payment schedule.** This, too, can say something about a contractor's financial status and work ethic. Someone who wants half the bid up front may have cash-flow problems or be worried that you might not pay the rest after seeing his work. For large projects, a typical schedule might start with 10 percent when the contract is signed, three payments of 25 percent each evenly spaced over the duration of the project, and a check for the final 15 percent once you feel that every nail has been hammered just right.

• **Don't let price alone be your guide.** All the pros agreed with Tom Silva's admonition to "throw out the lowball bid because he's probably cutting corners." It may also signal a contractor desperate for work, hardly an encouraging sign in today's environment. But besides price, say contractors, chemistry should have equal or even greater influence on your decision. "The single most important factor in choosing a contractor—beyond technical competence—is how well the two sides talk to each other," says Christiansen. "All things being equal, it's wiser to spend a little more to get someone you feel comfortable with."

• **Put everything in writing.** The last step in the selection process should be the completion of a contract that stipulates the project's every step. In addition to the payment schedule and proof of liability insurance and workmen's compensation payments, the contract should include a start date and an estimated completion date, specify the exact products and materials to be used and require that the contractor obtain lien releases, which protect you if he doesn't pay his bills, from every subcontractor and supplier. "Insisting on an ironclad contract isn't about a lack of trust," says contractor Bawden. "It's about removing as many obstacles as you can on the road to a successful renovation." ■

MANUFACTURERS · MATERIALS · PRODUCTS · RESOURCES – PAGE 135



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BY HOPE REEVES

REPLACING BALUSTERS

Yes, you can repair snaggletoothed staircase spindles

Despite appearances, the pillars between the treads and banister on a staircase are not there for support. Usually spaced about 4 inches apart, balusters protect people—mostly small people—from tumbling off the side of the staircase. A loose or broken baluster won't jeopardize the whole railing, but fixing it properly is a good idea for the sake of children and pets, not to mention aesthetics.

On a 1-to-10 scale of home-improvement challenges, baluster replacement rates about a 4. The first step is to remove a baluster that's intact and take it to a woodturner to copy. When it comes to demolition projects, pulling out the broken pieces of a baluster has to rank as one of the fastest and tidiest. A baluster is attached with little more than a mortise and tenon rig at the bottom and a couple of nails at the rail. (Don't be alarmed if you find as many as five nails—maybe your predecessors were slightly compulsive.) Getting a prototype out in one piece often requires you to remove the return on the end of the tread. To do this, rake a putty knife through the seam between the return and the tread to break any seal, then insert a small cat's-paw and wiggle the return loose. If the tenon is thicker than the mortise path, carefully chisel a

LEFT: Broken, missing or mismatched balusters make a staircase look like a hockey player's grin. RIGHT: Replacing bad balusters with newly turned ones restores a sense of elegance and makes the staircase safe.

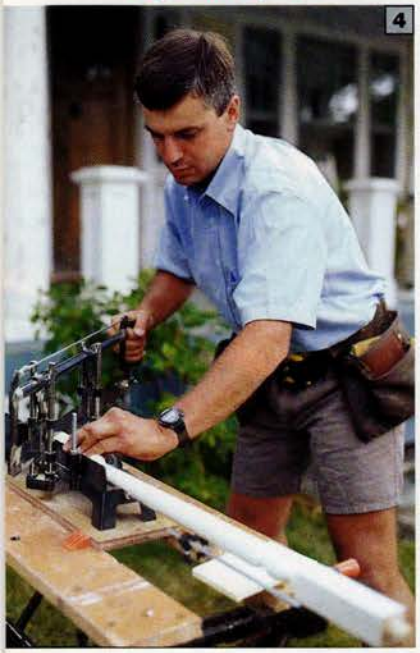
PHOTOGRAPHS BY KOLIN SMITH

Fixing It

1. Unlike a screwdriver or chisel, a small cat's-paw with a wide, fan-shaped blade is ideal for the delicate prying needed to remove a tread return.

2. Before trimming a baluster, carpenter David Raymond first measures the horizontal distance between neighboring spindles, splits the difference and marks the rail where the new baluster will go. He measures from that mark to the tread and transfers the measurement to the baluster.

3. To find the angle of the cut, he places a bevel gauge against the bottom side of the rail, aligns the arm and tightens the wing nut so the arm stays in place. He then lays the gauge against the baluster where he's marked the length and scribes the angle with a pencil.



4. Next, he sets the saw in the miter box to match the angle on the baluster and lops away. Raymond recommends cutting the baluster slightly on the waste side of the pencil line because, if you make a mistake, "you can't add wood."

5. He secures the top of the baluster to the rail by toenailing—using 2-inch hardwood trim nails—so more of the nail rests in the banister than in the baluster. For a tight lock, he makes sure that the nails actually cross each other. To avoid damaging the wood, he uses a nail punch and sets the heads just below the surface.

larger hole. A less taxing but potentially more damaging method is to simply whack the upper portion of the spindle with a dead-blow hammer to loosen the nails and then ease out the baluster. David Raymond, a carpenter who is based in Fairfield, Connecticut, suggests using a piece of scrap wood to reach narrowly spaced balusters, resting the wood against the spindle and then striking it with a mallet.

When you send the prototypes off to the turner, have extras made. You may need them later. As *This Old House* contractor Tom Silva half-jokingly points out, many things besides careening furniture and roughhousing kids can break a baluster: "an ax, a baseball bat, a saw...." When you go over the specifications with the turner, be sure to note the species of wood you want (the harder the better). There are usually two or three balusters per riser, each a different length, so send samples of the appropriate sizes. Also, request that the ends of spindles be left long. Although it makes more work, trimming balusters yourself reduces the chances of ending up with a misfit.

Depending on how long the turner takes to make the replacements, you may have a couple of weekends to clean up the wood around the baluster holes-in-waiting. Scrape off all gunk—old stain, dust and dirt—and sand around the tread for a tighter fit. The days apart may also present a good opportunity to refinish the treads. Then again, it's football season; isn't it time to catch the halftime show?

When your order arrives, sand and paint the balusters. Now comes the challenging part of the project: cutting the top ends to match the slope of the rail. This is why replacing a baluster rates a 4 instead of a 1. To determine where to cut, measure the length with a metal tape and the angle with a bevel gauge. Often in old houses the balusters are no longer plumb. Resist the temptation to reinstall the new ones plumb; they'll just make your staircase look like a mouth full of crooked teeth. Settle for making them parallel or evenly spaced, top and bottom. This is one of those cases where, if it looks right, it is right. "It's not an exact science," Raymond says. "Ultimately, it's about what the eye picks up."

Once you've cut the baluster, insert the tenon in the mortise, and then position the top end in the middle of the rail's underside. If the tenon is too big, rasp it down; if it's too small, Raymond suggests wrapping a piece of paper around it and gluing it in place. For a superstrong bond, apply carpenter's glue twice on the top of the baluster before securing it to the banister with two 2-inch nails. Raymond considers hardwood trim nails essential because they're thinner, harder and coated for split-free installation. Try predrilling the nail holes to prevent the wood, especially hardwood, from splitting. When the baluster is set, nail on the tread return with 2½-inch hardwood trim nails. Finally, cover the nailheads on the banister with putty and touch-up paint.

Voila: A clean column of balusters guarding the stairs in what the naked eye perceives as perfect symmetry. Ready to fix those squeaky treads? ■

MANUFACTURERS · MATERIALS · PRODUCTS · RESOURCES – PAGE 135

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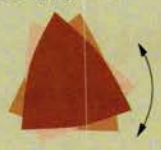

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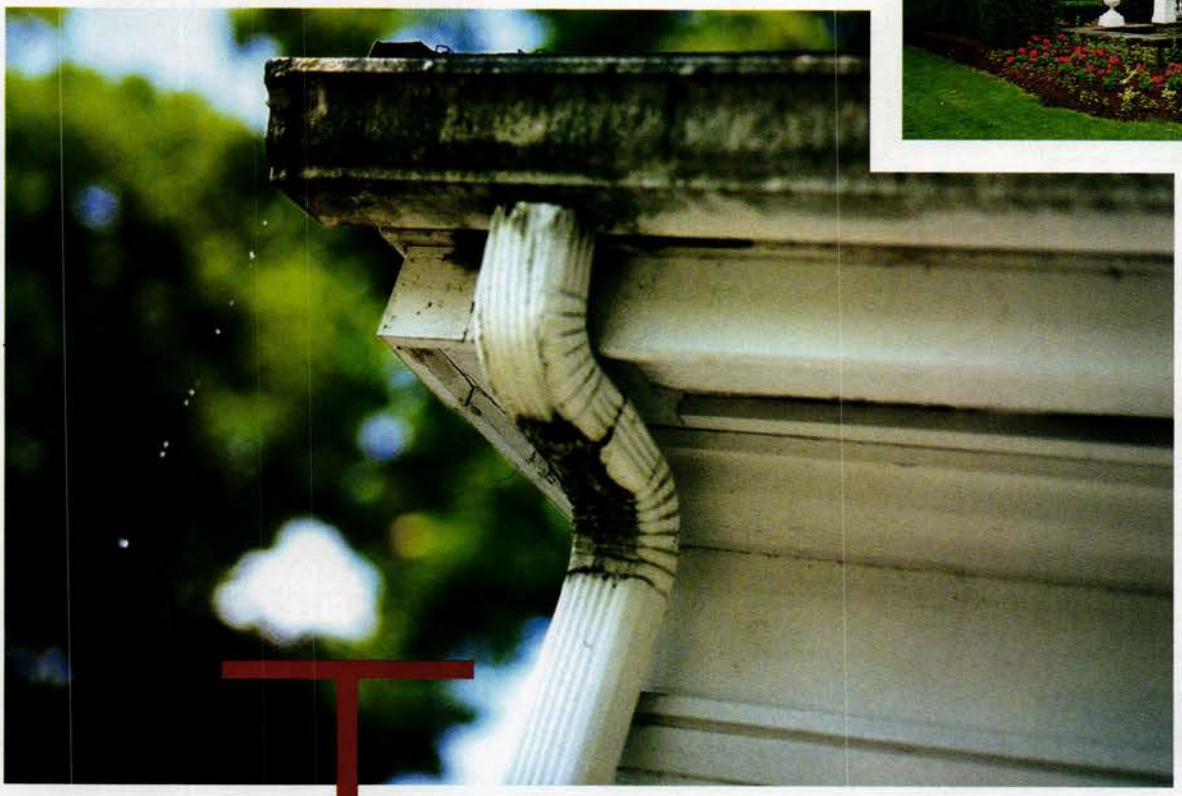

Smudged from overflowing dirty water, one of several decades-old galvanized-steel gutters at Farmstead, above, has rusted through at an elbow joint, left. Says Yates, "Every year, we spring a leak somewhere and discover a section of gutter that's buckled, bent and in rough shape."

They're called eaves, troughs, drainpipes and leaders—part of the endlessly fascinating vocabulary of the contractor, handyman and roofing specialist. I call them trouble. These fiendish sluiceways, intended to divert rooftop rainwater and melting snow from foundations and the heads of passersby, have been the source of repeated nightmares ever since we moved into Farmstead, our house in upstate New York, nearly two decades ago. Even now my wife, Pamela, and I await the arrival of a gutter expert to examine several dozen feet of hated aluminum channels that ice buckled last winter. We're anxious to get the gutters fixed before the snow flies again.

But I doubt that the repair, which I expect will involve replacing the damaged section, will bring anything but temporary relief. In the past, I've been flooded by all manner of gutter advice, some of which seems to have been devised only to advance my sense of frustration. Several years ago, an icy assault wrecked a different (*continued on page 88*)

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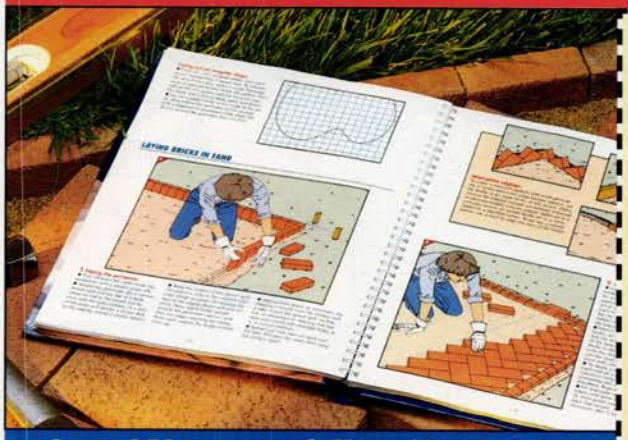

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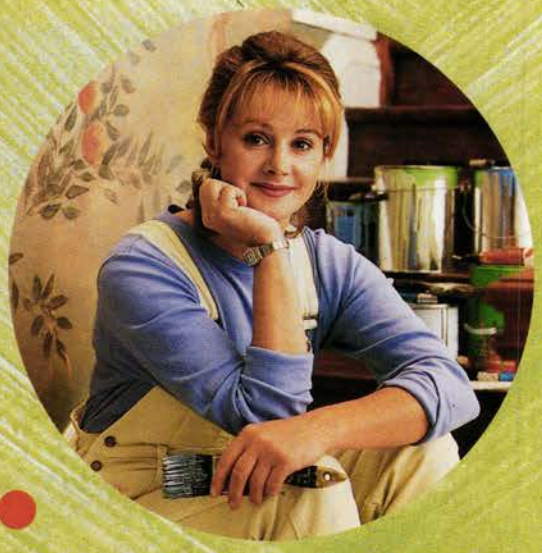

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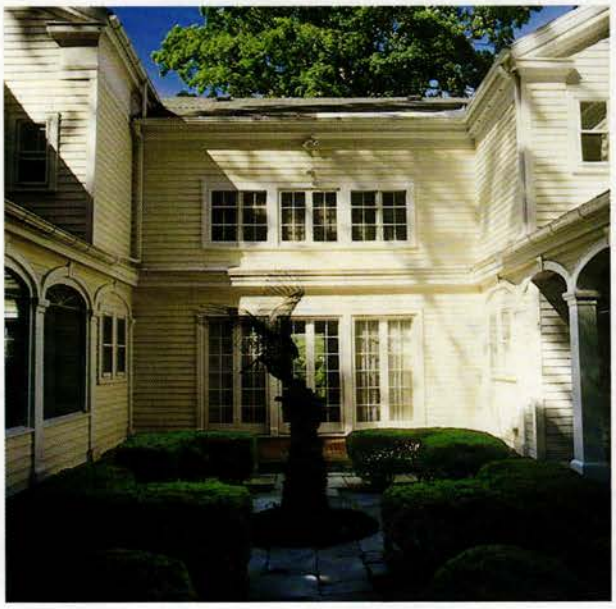
(*continued from page 83*) section of gutter, causing such interior water damage that an insurance agent was summoned to process a claim. "You have only one problem," he said. "Too many gutters. Gutters are useless. They jam up with leaves and pine needles and all sorts of stuff. Then they fill up with water and freeze. Eventually, they crack, spilling water into your house, or they collapse—or both. What I'm telling you is: Get rid of the gutters."

The agent seemed to make a certain amount of sense, and I removed the section he claimed was the source of the trouble. Another winter passed. More leaks appeared in the same location, caused this time by a large ice dam that formed in a valley of the gabled roof. Another insurance adjuster from the same underwriter came to assess the damage. "Where are your gutters?" he said. I explained that his associate had recommended that I remove them. "Are you nuts?" he said. "You can't have a house without gutters. Leave them off, and the water spills from the roof and soaks into the foundation. You want your house to sink? Get those gutters back up, or we may not continue to cover your house."

Up went the gutters. This time, I installed fiberglass netting over the channels, assuming that this would bar leaves and other effluvia from entry. In theory, the netting should have worked, except that the leaves drifting down from nearby maple and oak trees managed to get stuck in the orifices of the netting, creating a neat layer that repelled the water. Worse yet, wind and rain conspired to pry the netting loose, causing sections to dangle from the eaves like black garlands left over from a satanic celebration.

Farmstead is still equipped with gutters, both screened and unscreened. I know that some of the sections on the higher elevations are plugged. The gutters can't be reached by any ladder in my limited inventory, and I anticipate that the repairman will clean them—while making pithy observations about how my aluminum versions ought to be replaced by fiberglass. There seems to be an ongoing debate among the gutter professionals about the optimal material. The argument goes this way: "You've got aluminum gutters. That's your problem. Replace them with fiberglass, and your troubles are over." Or: "Fiberglass? Are you kidding? Get aluminum. It's the only way to go." On the subject of screens: "You've got fiberglass screens. They're junk. Get aluminum." Or: "Those aluminum screens are going to bend and break. Fiberglass is the answer." Or worse yet: "Screens? They jam up with leaves and let pine needles in anyway. Get rid of 'em." Or double worse yet: "Gutters, screens, downspouts, leaders—they're all useless. Tear 'em off the house."



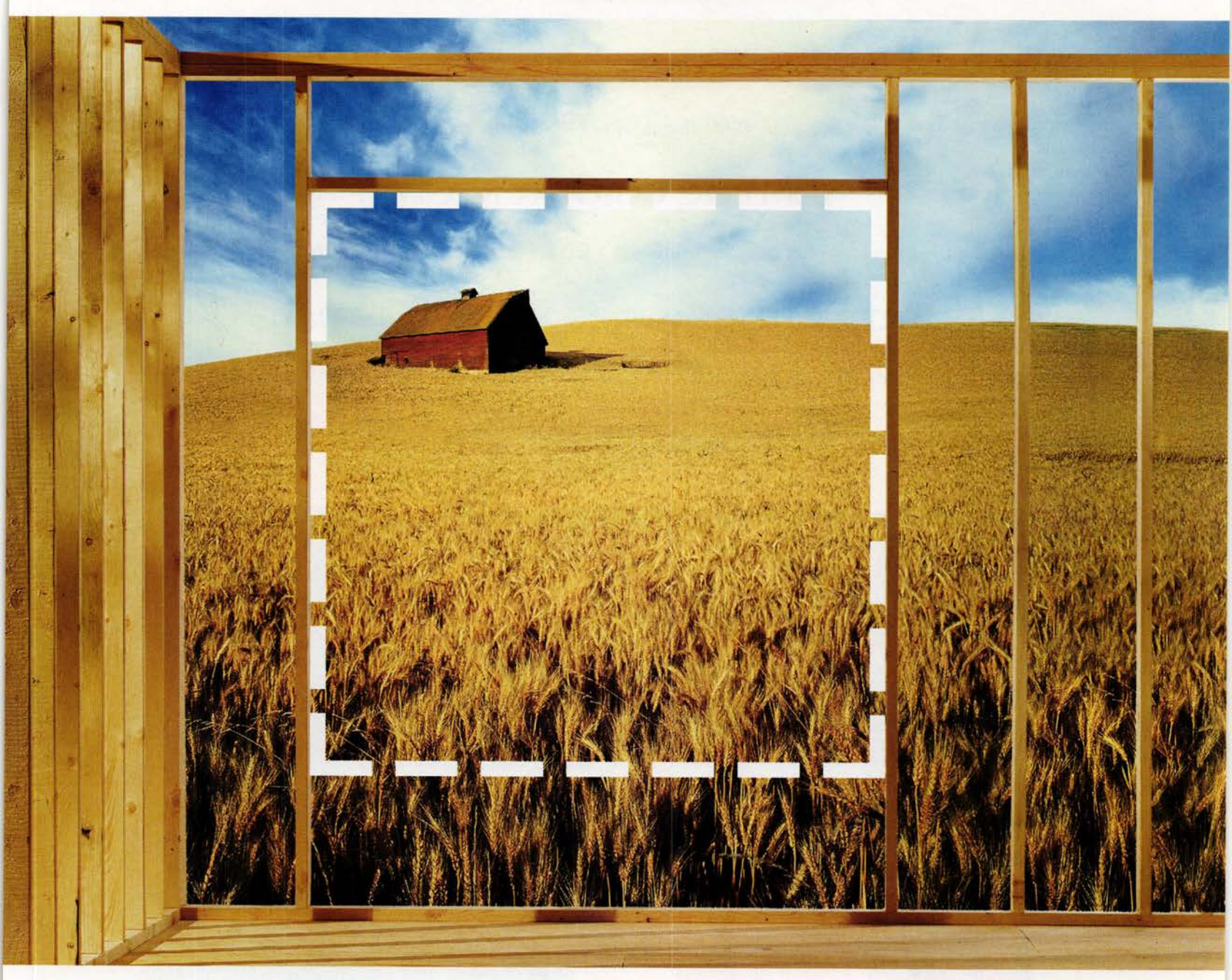
TOP: A galvanized-steel gutter atop Farmstead's facade recently failed because caulk dried out and left a seam vulnerable to corrosion. INSET: *Even after Yates installed aluminum replacements for a back courtyard's complicated array of steel gutters and downspouts, he was left with a perennial problem: "Cleaning gutters that are more than 20 feet high is a very tricky business."*

Our housepainter, a wise man named Bill Werth, tells me that years ago home owners simply accepted gutters as a necessary evil. "Our forefathers built channellike gutters along the edge of the roof or fabricated gutters out of wood," he says. "It was difficult and expensive to do it like that, but they worked as well or better than anything we have today." Regardless of the material employed, gutters are bound to fail sooner or later where they're weakest: at the joints. The sections are generally attached by rivets, and the seams are usually sealed with caulk. Over time, the rivets corrode and break. Temperature shifts dry out the caulk, causing leaks.

For now, I await the arrival of a man I know from a telephone conversation only as Bob. He claims he can solve my gutter problems, although I don't know which school he represents. Gutters or no gutters. Fiberglass, aluminum, copper or galvanized steel, the material used by an earlier owner of Farmstead. This I know: He will undoubtedly have strong opinions about gutters. Everyone does. I only wish that one of them made real sense. ■

MANUFACTURERS · MATERIALS · PRODUCTS · RESOURCES – PAGE 135

Think of the possibilities.



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LETTER From *This Old House*

A BIG STEP FORWARD

The afternoon was hot and humid, the dust from the day's plaster demolition still floating in the air. Tom had gone off to an appointment. Norm worked alone at the project house in Watertown, Massachusetts, methodically undoing with reciprocating saw and pry bar the meticulous work of the craftsman who had built the stair for the first owner, Orlendo Dimick, in about 1915. I went off to film a scene with the landscape architect, then circled back to lend Norm a hand. "Whoever built this really knew what he was doing," Norm said as I helped him lift the top run of railing and baluster clear of the treads. Cutting the structure free of the walls had unlocked a musty grandma's-attic smell, and memories started trickling back. When my family lived in Berkeley, California, in the 1950s, we had a staircase that creaked all the way up to the bedrooms of our tiny house. The staircase was almost doll-sized, a perfect spot for a kid to sit and daydream. I was drawn to the stair because it was a place apart, suspended between the first and second floors of the house, a secure vantage point on all the action.

The centerpiece of the *T.O.H.* project in Watertown will be what we have come to call the oak staircase. Built as part of the rear addition, the stair was tucked away between the side porch and the music room instead of showing itself off in the middle of the house. We decided to move this beauty from its obscure location to a prominent position in a new, spacious center hall. We have refurbished many old staircases and built some new staircases over the years, but we've never dismantled and relocated one. It's a task most renovators would avoid, simply because of the difficulty of taking old stairs apart, safely storing the parts during construction, duplicating any damaged or missing pieces and finally reerecting the whole in a newly framed opening. Starting from scratch is far more straightforward, sometimes even cheaper. But we would have had a tough time finding stock like that early 20th-century oak. We wanted to show viewers how to recycle the old, and we felt we owed it to the original stair builder. One by one, the railing and balusters came off, then stringers, risers, treads and newel posts—quartersawn oak, all beautifully crafted, as Norm had said. Carefully, we stacked each piece in the front parlor. We weren't really moving a staircase. We were moving memories. ***—Steve Thomas***

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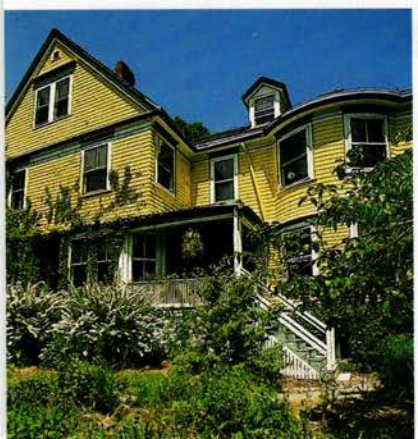
and the walls came tumbling down

Can the crew from *This Old House* come up with great solutions to classic old-house livability problems such as too many rooms, too many staircases, not enough bathrooms and a tiny kitchen? Does Norm have a sledgehammer?

Clomping through the project house in Watertown, Massachusetts, *This Old House* contractor Tom Silva looks slightly the worse for wear. Plaster dust from a demolished first-floor wall has settled in his hair, soot from a newly dismantled chimney covers his hands and, as he and his crew methodically tore a bathroom apart, a torrent of water came rushing out of an old pipe and soaked his work boots. But below the grime, Tom is beaming. "It's going really well," he says. "Already we've made a huge difference."

The proof is in the dust. As part of the ambitious six-month plan to turn this rambling 5,000-square-foot house—a mix of Queen Anne and Colonial Revival styles—from a cramped 16-room rabbit warren into an airy showplace for new owners



Plans call for this porch, on the south side of the Watertown house, to become a screened porch. The stairs will be removed, and access to the yard will be from a newly built deck at the back of the house.

BY CYNTHIA SANZ PHOTOGRAPHS BY KELLER & KELLER

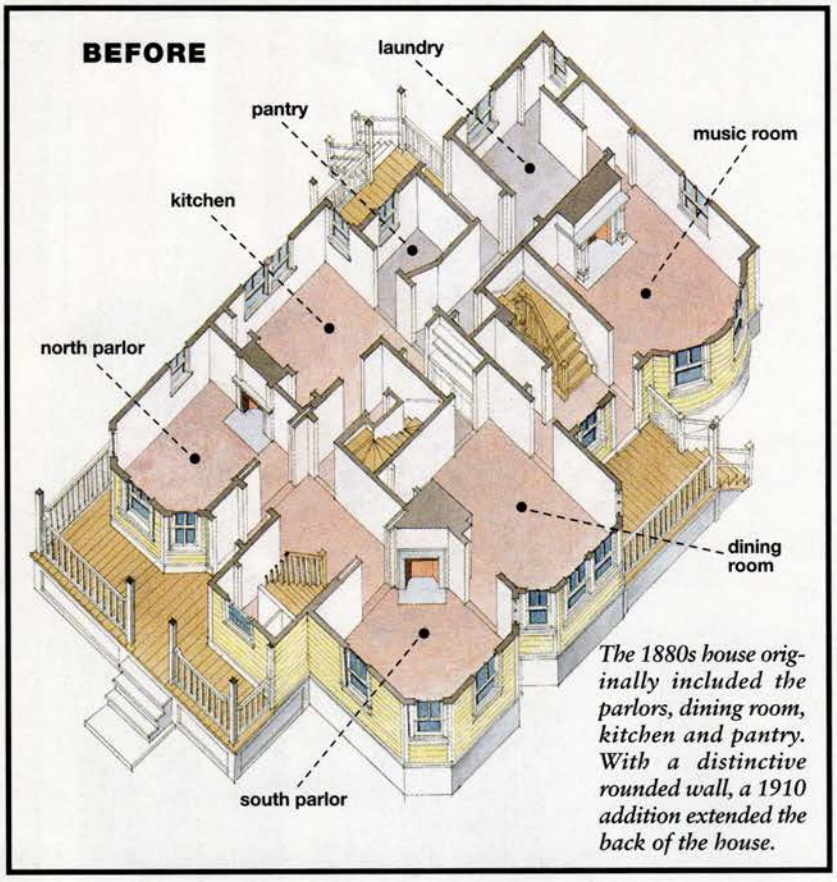
PHOTO, THIS PAGE: WILLIAM HUBER.

Early in the arduous process of rebuilding an oak stairway at the Watertown house, T.O.H. *master carpenter Norm Abram, foreground, and contractor Tom Silva, right, check that the first landing is level—with help from Louis Cimmino, left, and T.J. Silva, members of Tom's crew.*

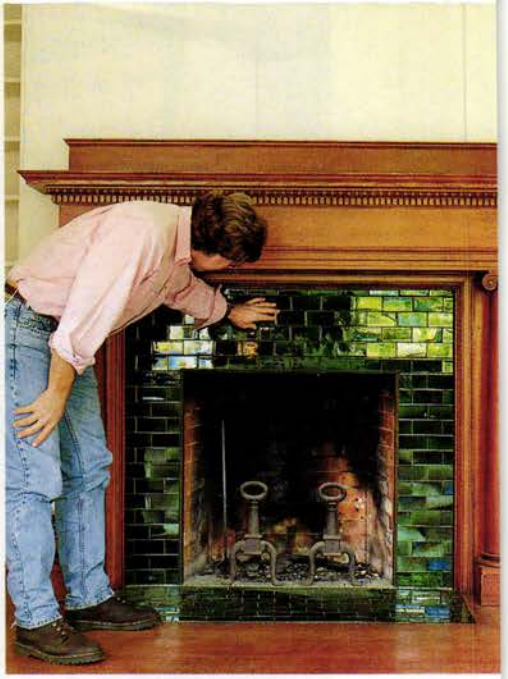
Sue Denny and Christian Nolen, Tom and the rest of the *T.O.H.* team have revved up their reciprocating saws and started working, ripping out 72 plaster walls, 18 ceilings, two fireplaces and three staircases as well as shifting several load-bearing walls to allow for larger rooms and to accommodate the location of a new, central staircase. "Some of those walls just had to come down," says Tom. "And who needs that many staircases in one house?"

Not Toby Fairbank, the architect based in Cambridge, Massachusetts, who with his partner and wife, Sandra, is charting the renovation. "It's a great old house, but it was divided into too many rooms," he says. "A house that size needs open spaces."

Besides the sheer number of rooms, the two-story house with finished attic also suffered from a labyrinthine layout, the result of more than a century's worth of haphazard renovations since being built in the 1880s. Thanks to the construction of a huge rear addition in about 1910, Denny and Nolen bought a house that had 10 to 14 bedrooms, depending on how loosely one applies the term. "It was really confusing," says Denny, who is a freelance software consultant. "Some of the rooms doubled as corridors so that you'd have to walk through a bedroom to get to the back of the house."



The 1880s house originally included the parlors, dining room, kitchen and pantry. With a distinctive rounded wall, a 1910 addition extended the back of the house.



T.O.H. *host Steve Thomas runs a hand over the tile surround of the fireplace in the former music room. To open up this part of the house, the fireplace was removed. Its oak mantel will be reused.*

Making matters even worse was the kitchen, which was inconveniently located smack in the middle of the house's north side. "It was small and dark," says Denny, who—like Nolen, a real-estate developer—is an avid chef. "And there was no easy way to get from there to the backyard if we wanted to entertain outside in the summer."

But the renovation aims to fix all that. The trick will be to organize and open up the oversized space on the first two floors—Denny and Nolen are leaving the attic floor untouched for now—while playing up such classic architectural features as the nearly 10-foot ceilings, the elegant, curved glass windows and a quartersawn oak staircase and mantel. "When you're taking out so much, you have to be careful you don't lose what makes the house special," says Toby Fairbank.

The new design features a spacious master suite overlooking a new garden at the rear of the house, three other bedrooms, three and a half baths, home offices for both Nolen and Denny—his on the first floor, hers on the second—a media-music room and a state-of-the-art gourmet kitchen. "The bulk of the money is going into the kitchen because that's where we spend all our time," says Nolen.

In the new plan, the kitchen takes over the entire rear of the house, where it can make good use of sunlight streaming through the curved south-facing windows and offer access to a new back deck. The L-shaped kitchen will be more than double the size of the old one, partly thanks to the addition of a sitting alcove complete with a fireplace across from the cooking area. "It's a place for guests to visit with us while we're cooking," says Nolen.

The old kitchen, on the house's north side, will become the music-media room, patterned after the one that Tom and *T.O.H.* master carpenter Norm Abram created last season for the house in Milton, Massachusetts. "I wasn't sure we needed a media room since we're not really TV people but, after seeing the one in Milton, we were impressed," says Denny. "They built it around the electronics, and yet we were really surprised at what a nice cozy space it was."

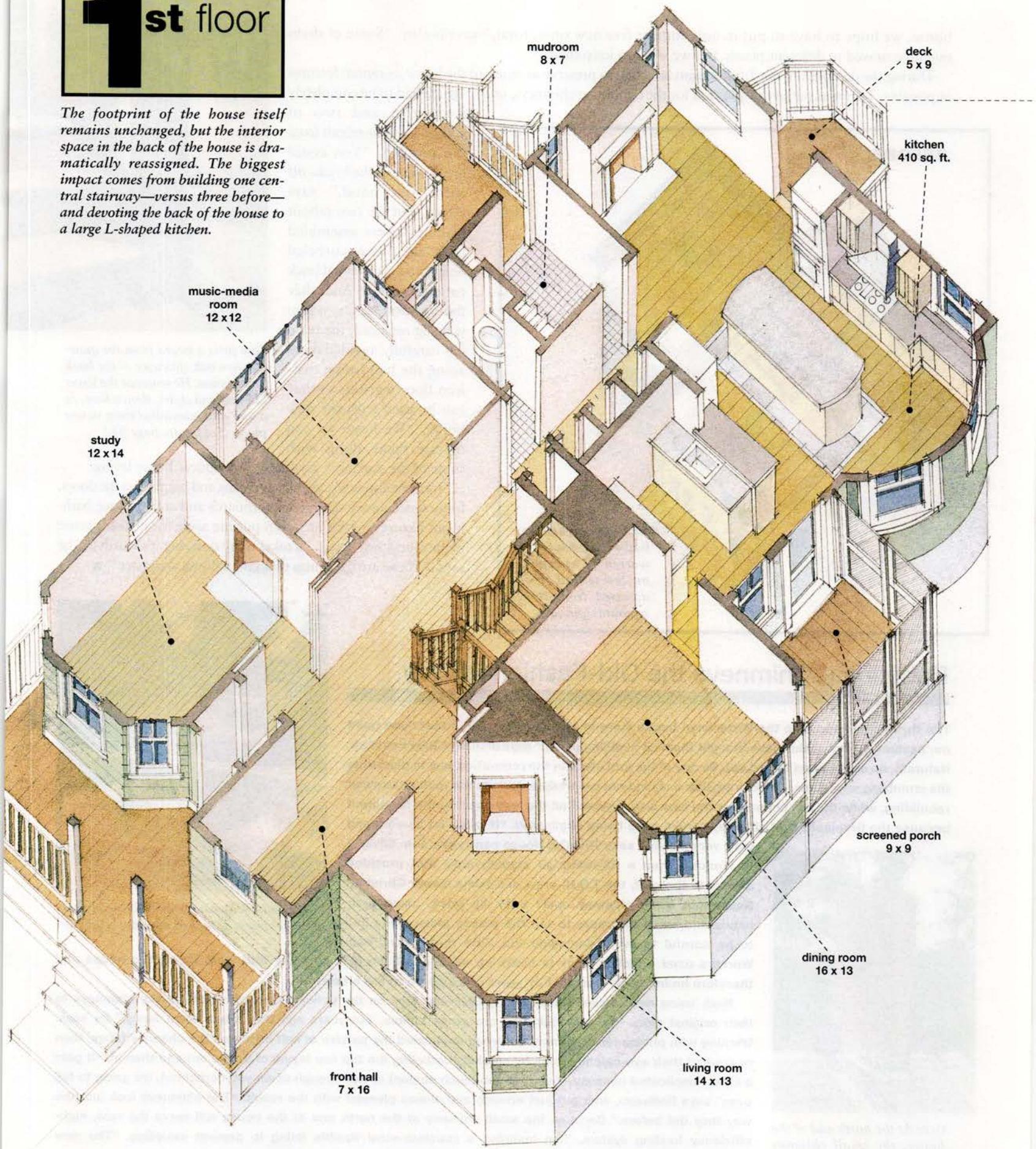
Also on the must-have list: speaker and cable wiring, run through the ceiling to other parts of the house, and high-speed phone lines. "We both have PCs. We both use the Internet," says Nolen. "We want the house to be 21st-century-ready."

Not everything will be new. Carefully dismantled by Tom and his crew, the stunning oak stairway from the back of the house has been reconstructed as the main stairway in the center. "We had to do some finagling to make it fit, but it looks fantastic," says Tom. "It's a beautiful piece." And the quartersawn oak mantel that once graced the fireplace in the music room is likely to be relocated to the new, zero-clearance fireplace in the kitchen. "Christian and I really like contemporary things, particularly in kitchens, but we didn't want a McMansion," says Denny. "We wanted to blend all the advantages of living in 1998 with the original character of the house."

To that end, instead of simply replacing the drafty old windows, the couple is rebuilding them. "Out of the 50 windows in the

NEW 1st floor

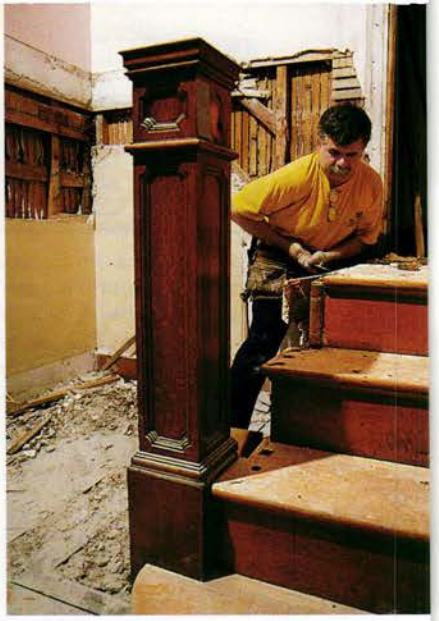
The footprint of the house itself remains unchanged, but the interior space in the back of the house is dramatically reassigned. The biggest impact comes from building one central stairway—versus three before—and devoting the back of the house to a large L-shaped kitchen.



ILLUSTRATIONS BY TIM SLATTERY

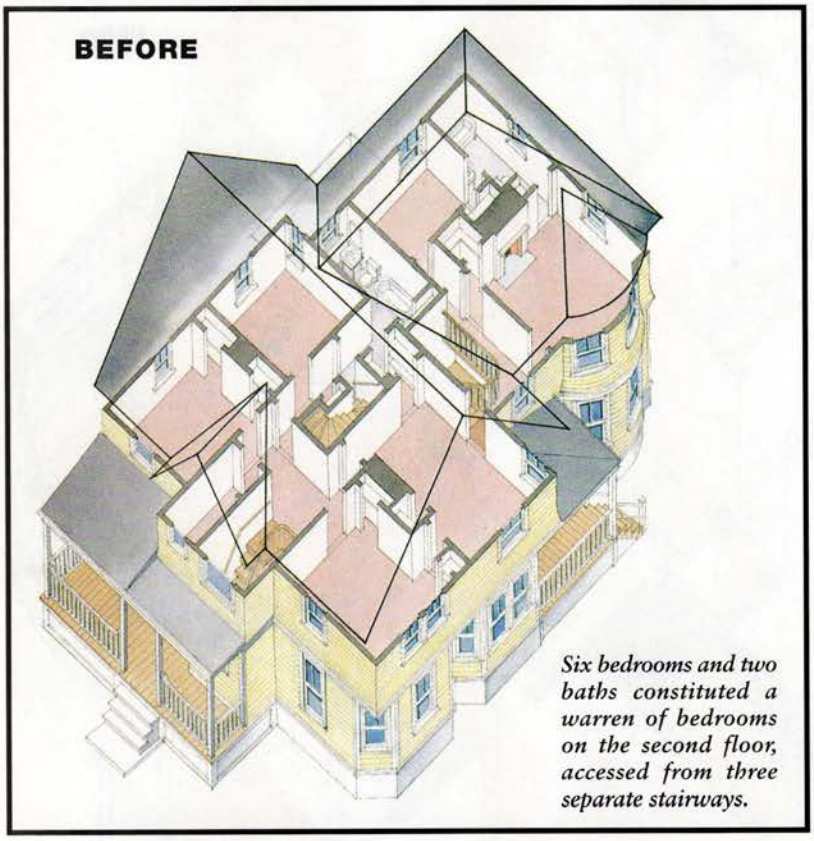
house, we hope to have to put in only four or five new ones, total," says Nolen. "Some of them might be moved to different places, but we want to keep them."

During the demolition, the *T.O.H.* team has tried to preserve as many of the house's original features as possible. That was out of the question for the crumbling chimneys, one of which had to be completely dismantled and two of which had to be rebuilt from the roof up. "You could break some of the bricks off with your hand," says Nolen. But the two rebuilt chimneys were assembled with the same corbeled design and ornamental brick pattern as before. And while the inefficient heating system is being replaced, the team has carefully avoided damaging the handsome cast-iron floor registers so they can be used with the new boiler. "We hope we can recycle them along with some of the ducting," says *T.O.H.* producer Bruce Irving.



Tom pries a board from the quartersawn oak stairway at the back of the house. He removed the lower landing and stairs, shown here, as a unit and reinstalled them in one piece. (See photo, page 95.)

Tom has also been carefully removing and numbering the doors, frames, decorative tiles, oak floorboards and even antique bathroom fixtures, which he's been putting aside for possible reuse in the redesigned house. "It takes more time, but it's worth it," he says. "Those are the things that give a house character." ■



Six bedrooms and two baths constituted a warren of bedrooms on the second floor, accessed from three separate stairways.

Rebuilding Chimneys the Old-Fashioned Way

The three chimneys atop the Watertown house were in such bad condition that "one good nor'easter would probably have brought them all tumbling down," says architect Toby Fairbank. Naturally, no one wanted to find out. So one of the first steps in the renovation was to dismantle the crumbling structures. The two smaller ones in front were taken down to the roofline to await rebuilding, while the tall chimney in the rear was removed all the way down to the basement because the fireplaces that chimney served were being eliminated. "It was a lot of work and very, very messy," says *This Old House* contractor Tom Silva.

OLD: *At the north end of the house, the small chimney was crumbling.*

Working from a 50-foot-high staging area that provided access to the roof, the *T.O.H.* crew and home owner Christian Nolen took each chimney apart brick by brick, using their hands and small hammers to tap the pieces loose. "You had to be careful to avoid damaging the slate roof," says Tom. Workers used a jackhammer to break up sections of the rear chimney that were inside the house and therefore hadn't been loosened by years of exposure to the elements.

NEW: *Lenny Belliveau brushes the newly corbeled chimney, patterned after the original.*

Next, using new bricks, mason Lenny Belliveau took on the delicate task of rebuilding the chimneys to their original glory. "Today's chimneys are pretty simple, but years ago they made them fancy," he says. Working with photos for reference, Belliveau duplicated the pattern of half bricks on the chimney faces, then re-created their eye-catching tops by carefully corbeling the top few layers of bricks out and then in. "It gets a little complicated because, if you put too much cement or not enough when you corbel out, it's going to fall over," says Belliveau, who put just enough and seems pleased with the result. "The chimneys look just the way they did before." Because the small chimney at the north end of the house will serve the new, high-efficiency heating system, Tom installed a stainless-steel flexible lining to prevent sweating. "The new systems force a lot of moisture up, and you don't want it leaching through the bricks, into the walls," he says.

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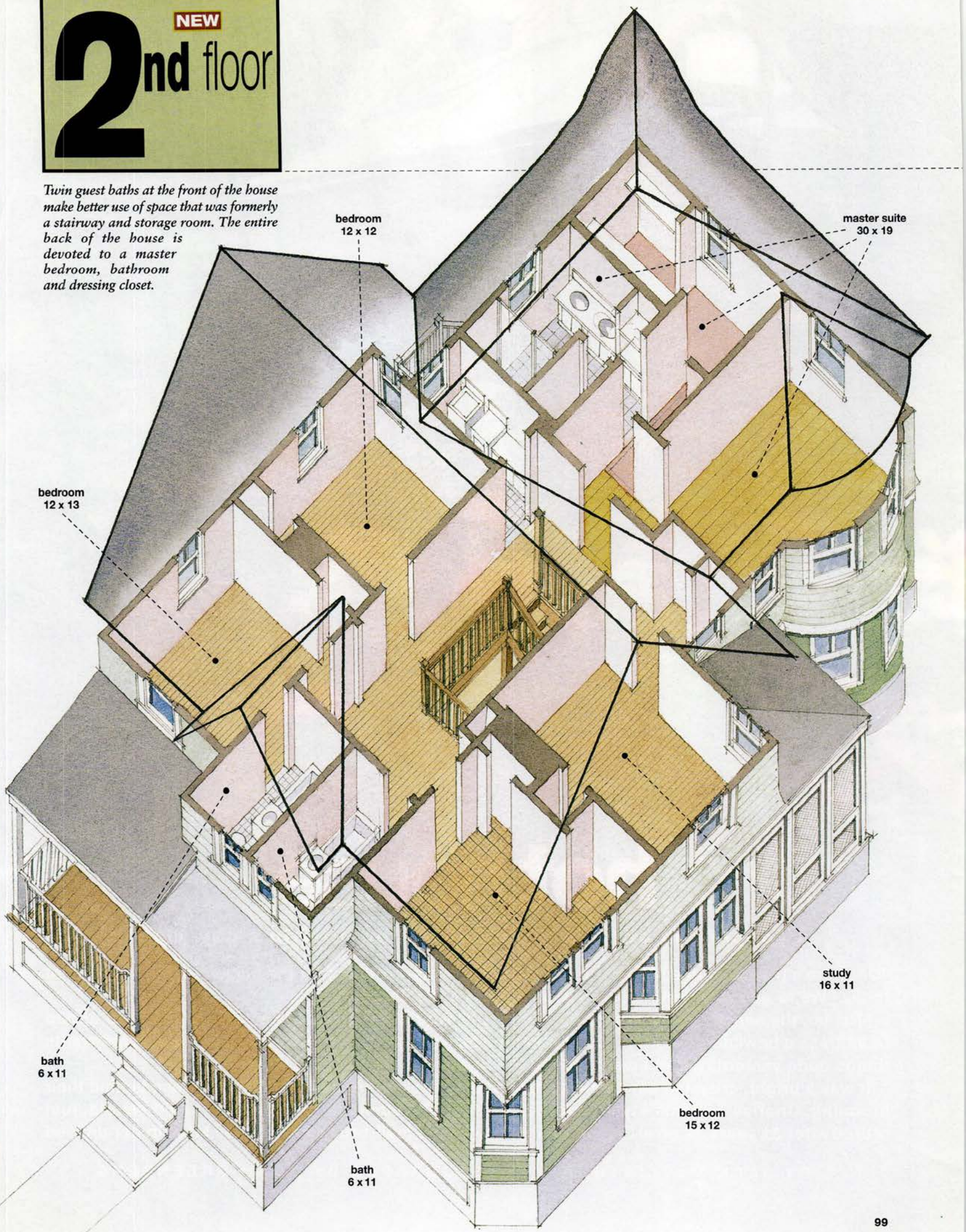
NEW 2nd floor

Twin guest baths at the front of the house make better use of space that was formerly a stairway and storage room. The entire back of the house is devoted to a master bedroom, bathroom and dressing closet.



hot house

A couple can put one of these kits together in a day, right?

"OK, here's the sequence," Stan Cutler said confidently, striding into the backyard, his arms full of tools. "We're gonna put the four walls up and then the doors..."

"No, no, the benches go in before the doors!" his wife, Valerie, said. Then she laughed and turned to address a bewildered visitor. "Don't mind the bickering—it's normal here," she said. "Stan wants things done yesterday, and I want them done right."

It was a bright, crisp fall day a year ago, and the Cutlers were building a greenhouse behind their brooding, Charles Addams-style Victorian house in Philadelphia. "I'm excited," said Valerie, just retired after 31 years as an art teacher. She bought the mail-order greenhouse kit with her unused

BY JACK McCLINTOCK PHOTOGRAPHS BY NOAH GREENBERG

Despite convoluted assembly instructions, leaky panels, heating problems and a few surprise expenses, Valerie and Stan Cutler are delighted with the greenhouse that they built from a kit.

Let the Sun Shine In

Early greenhouses were covered with oiled paper or, in ancient Rome, sheets of mica laid over a hole in the ground. Today's greenhouses can be glazed with glass or any of a dozen plastics including polycarbonate, acrylic, vinyl, fiberglass and polyethylene. All of the materials have their advantages and disadvantages. Ultraviolet rays, for example, break down some plastics. Glass is generally more durable, but it's vulnerable to hail, falling branches, golf balls and the like.

Double thickness or air spaces can increase energy efficiency, which is the appeal of double-walled polycarbonate. With its open edges taped, it's a fair insulator. A single sheet of clear glass, however, is not, but that's what *This Old House* executive producer Russ Morash has on his Massachusetts greenhouse. "And for real growth, you need light," he says.

Too little light makes for slow-growing, spindly, yellow or weak plants. Professionals often measure light in footcandles—the amount of light falling on a square foot of surface a foot away from a standard candle—but hobbyists usually just wing it. Most plants need between 1,000 and 2,300 footcandles. Vegetables and cut flowers need much more than houseplants. Overcast daylight is about 1,000. Direct sunlight is ten times that. Painting interior surfaces white can help by reflecting more light to the plants, and silver-foil reflectors can bounce light into shady spots.

Although research shows that plants grow best under glazes that diffuse the light, Morash says clear glass panes have served him well. The point, he says, is simply to have a greenhouse to extend the growing season. "I get a month-and-a-half head start on outside gardening."

sick pay. "I miss fresh herbs in the winter, and I always wanted to grow orchids. Nero Wolfe is my hero," she said, referring to the late mystery writer Rex Stout's portly detective who grew orchids in a Manhattan greenhouse.

The Cutlers, both in their early 50s, had already spent one weekend puzzling over the printed instructions and rummaging through plastic bags of screws, bolts, washers, brackets and corrugated fasteners. They sorted bundles of redwood boards and finally assembled the greenhouse walls, screwing clear sheets of double-walled polycarbonate to the redwood frames. "It took all day Saturday to put one panel together," Stan said. "But then we figured it out and did the other three Sunday."

From top, Stan Cutler assembles the greenhouse walls on the ground; then he and his wife, Valerie, puzzle over the louvered-Dutch-door instructions. Once the roof is on, they build benches for their orchids.

A contractor had already dug a trench and laid pipe for the water and electric lines, and leveled the ground. Stan laid down concrete pavers on which the greenhouse would sit. With winter in the air, the Cutlers were ready to assemble the structure—a 7-by-12-foot freestanding unit from a California-based greenhouse manufacturer. At one end was a Dutch door with ventilating louvers in the bottom half that flipped open when a thermostat-operated exhaust fan at the other end started up. The kit included a portable electric heater for winter warmth and a timer-operated misting system for the orchids and herbs, plus potting benches along each side. It was a complicated job, but having spent years renovating their big, rambling house, the couple was cheerfully confident—or at least Stan was. Valerie was nervously optimistic.

After coffee that Saturday morning, they trundled out the first prefab wall. Stan eagerly swung and bumped his end of the wall into place, jerking Valerie off balance. She stumbled. "See what I mean about no patience?" she remarked with a smile. Stan apologized.

They set the first two walls on the pavers, screwed the walls together at the corner, erected the other two and discovered that, because the pavers weren't quite level, the end wall was lower than the sidewall; the top corner where the walls met was misaligned. Stan held up some rafters to see if the misalignment would matter and discovered that he'd installed the rafter-support brackets upside down. Not only that, but he'd also mounted them before screwing the polycarbonate paneling down over them, so the brackets lay under the panels. He sighed. The wall corners had to be disassembled, the panels unscrewed, the brackets reversed, the pavers raised and leveled with sand from a bag in the basement, the panels reinstalled and the walls screwed together again at the corners. That was when Stan discovered he'd had the rafter-support brackets right the first time. He laughed and started over, shaking his head. It's the instructions' fault, he said. "They're incomprehensible."

"It's like a big puzzle," Valerie agreed. They got the walls up and raised the ridgepole, which slipped so neatly into the proper slots that neither of them thought to secure it with screws. Twenty minutes later it fell, nearly braining them both. By 11:04 a.m., one of Stan's knuckles was bleeding, and he was waving the instruction booklet in disgust.

Actually, the problem was partly Stan, who read too quickly and plunged in before digesting the material. On the other hand, the directions weren't always clear, and it wasn't surprising that a sentence such as "Free ends of bracket point in, up and to the rear of the greenhouse" didn't produce a clear image of how to mount the roof brackets. Exasperated, Stan called the company's 800 number. "They're very nice on the phone," he reported.

"OK, you build the whole roof panel on the ground and slide it in," he said, moving on

to the next phase. He and Valerie laid out the redwood frame, screwed it together with carriage bolts and then screwed on the double-walled polycarbonate panels. Before proceeding further, Valerie said, "You should drill through the plastic before you put up the roof panels—remember you had trouble before?" She said it sweetly.

"You're right, babe."

"I love it when you say that."

"You're *always* right," he said, grinning, and they hugged and broke for a late lunch.

The next morning, as the temperature turned chilly and rain began to fall, Stan enthusiastically installed the Dutch-door hinges backward, removed them and reinstalled them with equal zeal. When the doors were in place, he found he'd mounted them too far to the left to accommodate the latch. But he'd learned to improvise. "Babe, gonna have to do some other kind of latch."

He got the louvered panels in the door correctly—after three tries—and at last he stepped back to admire his work. "Looks nice, neat. Maybe I won't even put screws there in the bottom—what for?" he said cavalierly.

"To hold it so it doesn't rattle every time that the door closes," Valerie said quietly.

But Stan was shaking his head, scrutinizing the instructions. "They give you two pieces of wood to attach the fan to, but they don't tell you where the wood goes, so we have to intuit this," he said. "Let's go have some coffee."

The coffee helped, the fan got mounted and Stan was pleased. Not that they had finished. It would take them weeks to fine-tune their greenhouse.

"It's much more involved than you'd think," Valerie said months later. "And more expensive." They'd paid $2,600 for the kit, a splurge in itself. Hiring a contractor to run pipe for the misting system and a faucet—as well as to wire the overhead light, heater, fan, extra outlet and temperature alarm ("So we can rescue the orchids if it gets too hot or cold")—cost an additional $2,500. Then it rained, the greenhouse leaked and the lights shorted out. The Cutlers called the manufacturer, and he told them, "Mine leaks too."

The Hobby Greenhouse Association has about 2,000 members, and Valerie Cutler couldn't wait to join their ranks. Now her Philadelphia backyard contains a tropical oasis, where she grows orchids and herbs all year long.

"Some people expect their greenhouse to be watertight, but a greenhouse should breathe," says Robert West, the company's general manager, who grows orchids, palms and pineapples in his own ("you can't buy a decent fresh pineapple here"). "If you want, you can run a bead of caulk between modules or lay a trim board on top."

The Cutlers covered the greenhouse with plastic sheeting, which helped with the next worry, heat. A second electric heater brought the nighttime temperature up to 60 degrees Fahrenheit. "Even so," Valerie says, "it ran us $100 a month just to heat it. And it was a mild winter."

When spring came, Valerie carried armfuls of colorful orchids from the greenhouse and hung them in the trees. As they swayed in the breeze, their beauty seemed to justify everything, even the instructions. "Actually," her husband finally admitted. "They were always right. Just because we didn't understand them didn't mean they were wrong." ■

Climate Control

Depending on the species, plants grow best at between 50 and 85 degrees Fahrenheit, in humidity of 45 to 60 percent. But the numbers don't have to be precise, and even experts find it hard to devise foolproof formulas that work for various conditions—whether the greenhouse will be used year-round or just in the fall, for example. A ballpark method is to multiply the greenhouse's square footage by the temperature you want to maintain, add about 25 percent to the product and buy a heater rated at that number of Btus.

A lean-to greenhouse, built against the side of a house, is more energy-efficient than a freestanding one and easier to heat. Insulation, especially in the foundation and north wall, can stabilize temperature. Double-glazing, sealing and weather-stripping all the vents and creating an air-lock entry can keep a greenhouse warm in winter and minimize the need for artificial heat. Experimenting with a thermometer and a heater—sometimes two heaters—may be the only way to get it right.

Overheating in the summer is a common problem and is usually the result of poor design, says Shane Smith, author of *Greenhouse Gardener's Companion*. The answer, he says, is shade and better ventilation: large, well-insulated vents with tight louvers that open and shut automatically. Some of the niftiest are triggered by the sun's heat, which expands gas in a cylinder, moving a piston to push the vent open. A thermostat-operated exhaust fan will pull hot air outside. Calculate the greenhouse's volume in cubic feet, and be sure the fan (rated in cubic feet per minute) is powerful enough to remove all the air in two minutes.

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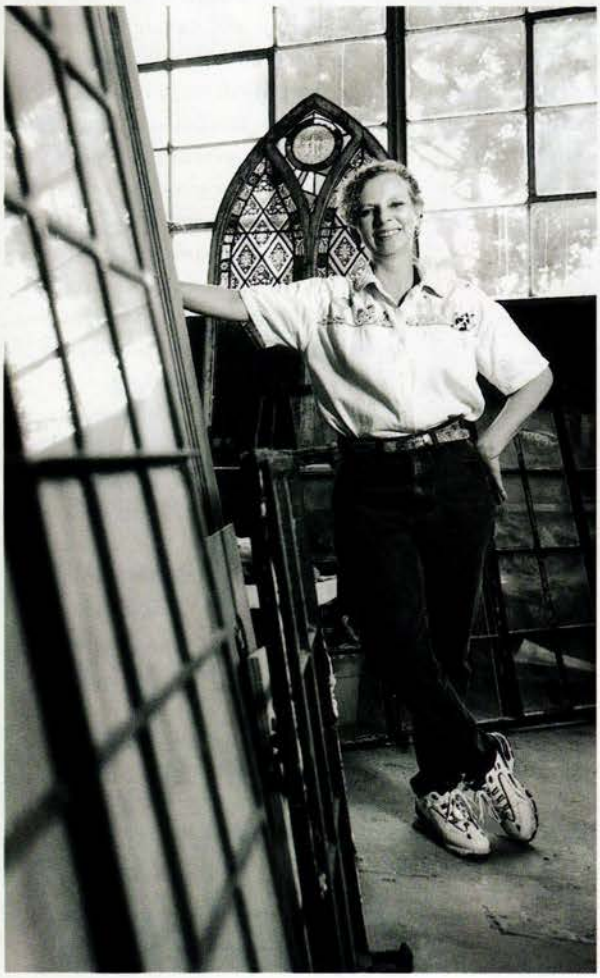
windowmaker

Patricia Vloeberghs scores and shapes fragile glass panes into exquisite designs stained with her blood, sweat and tears

THIRTY YEARS AGO, Patricia Vloeberghs was a professional dancer. It shows when she scores glass. Her weight on the ball of her left foot, the carbide-wheel glass cutter clutched in both hands, she swings her hips in a wide, precise arc to the right, keeping her arms straight. The hips pull the shoulders, which pull the arms, which pull the scoring tool in a neat, symmetrical curve—an eighth-scale replica of her hips' trajectory.



"Old-time craftsmanship wasn't always superior," says Vloeberghs. Of the half dozen repair jobs waiting in her studio's back room, she says, "A lot of this stuff wasn't built right."

The wheel goes *screeeeeeeeeeee*. Glass embedded in Vloeberghs's forearms—tiny, nearly invisible splinters, the detritus of previous cuts—glints under the fluorescent tubes overhead as she completes the score. By the time the etched line reaches the opposite side of the glass, she has shifted all of her 118 pounds over her right heel. She picks up the pane, positions a knuckle on each side of the score and with one quick motion snaps it, revealing an edge so precise it might have been inscribed by a compass.

"Yes!" she shouts. In her everyday working garb—including a vest festooned with Looney Tunes characters, a blouse embroidered with pink butterflies and three earrings in each of her ears—she does a quick two-step in celebration of the successful cut. Never mind that it's perhaps her millionth perfect glass-sundering. Never mind, because Vloeberghs loves her work. Crank up the verb: adores, treasures, cherishes, exalts, embraces, glorifies, idolizes. The alchemy of lead, glass and light imbues her with a religious fervor. Of her tenure in this cramped, hot Atlanta studio, she says, "I've been in heaven for 18 years."

Constantly talking, constantly moving, a font of crackling energy, Vloeberghs, 51, is among the country's best leaded-glass craftsmen, designing and assembling ovals, trapezoids, rhomboids, cabochons and one-of-a-kind flowing forms into domes, transoms, skylights, sidelights, doors, cabinet fronts and stand-alone art pieces for hundreds of fine houses, mostly in the Southeast. You can say she makes stained glass—most people do—and she sometimes says it herself, but she prefers the term leaded glass because most of her work consists of clear glass, with only the occasional touch of color.

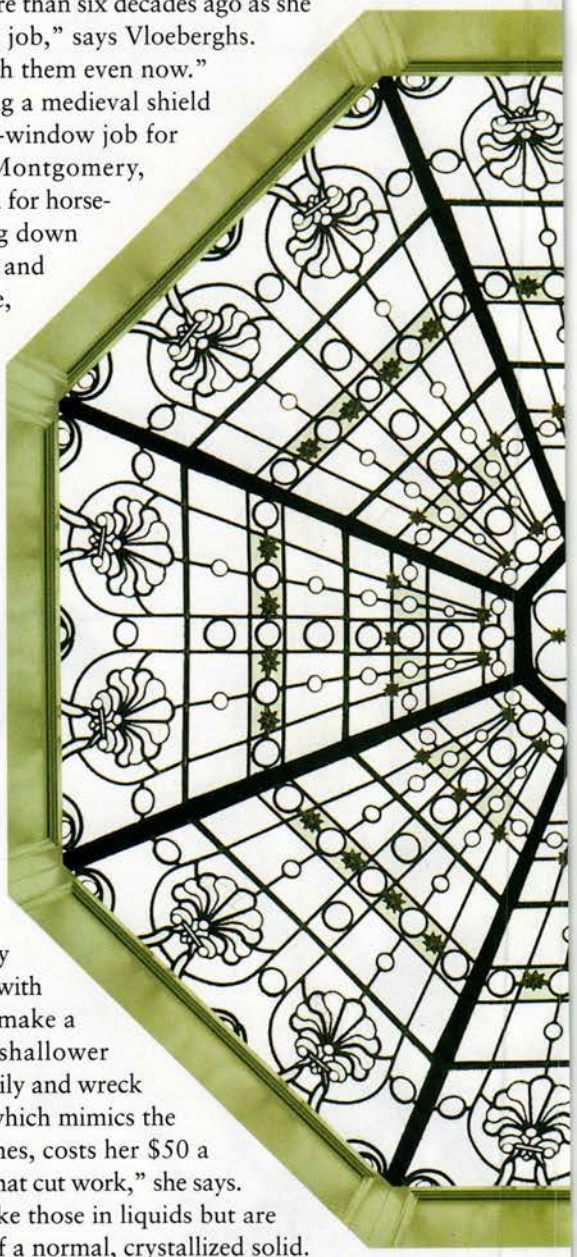
"I hate most stained glass," says Norman Askins, an Atlanta architect for whom Vloeberghs has created more than 200 pieces. "But Pat's windows go to another level." (*continued on page 106*)

BY BRAD LEMLEY PHOTOGRAPHS BY NOAH L. GREENBERG

Transforming a pattern into a finished 40-by-31-inch window for an Alabama theater will take Vloebergbs about three weeks. The horseshoe nails act like clamps, temporarily pinning the lead channels against the glass pieces as she builds from left to right. "Precision is everything," Vloebergbs says. "If my name goes on it, it will be the best window I can possibly do."

(*continued from page 104*)"Elegant, elegant, elegant," Vloeberghs says, waving a hand at the dozens of layout drawings taped to her studio's cinder-block walls. "I can do a bird of paradise, but most of what comes out of here is simple and clean. I can make something that works in any house: Jacobean, art nouveau, deco, Edwardian, Arts and Crafts, anything." She cites, in particular, the spare, precise geometry of the clear windows she made for the renovated Margaret Mitchell house in downtown Atlanta. Situated in the writer's alcove, they are exact reproductions of the windows Mitchell gazed through more than six decades ago as she wrote *Gone With the Wind*. "That was an ethereal job," says Vloeberghs. "I could feel her presence. I think she peeks through them even now."

On this sultry morning, Vloeberghs is assembling a medieval shield entwined with translucent ivy leaves—part of a 26-window job for the $21.5 million Carolyn Blount Theatre in Montgomery, Alabama. Dozens of 2-inch steel nails—the kind used for horseshoes—bristle out of the work, temporarily pinning down the lead channels that snake around the glass pieces and secure them. She uses the channels, known as came, the way a sketch artist uses charcoal. "The lines around the pieces bring them alive. I use ¼ inch, 3/16, ½ inch, all different widths. The line expands and contracts, ebbs and flows."



Like all of her work, this one began with a double-decker sandwich of graph and carbon paper. Bearing down with a number-four pencil on the top sheet, she simultaneously makes three drawings: the cutout pattern, the layout pattern and the building pattern. Watching Vloeberghs draw is unsettling. Without hesitation, her bold strokes flow from top to bottom as if she were tracing an invisible stencil. "People who watch me go nuts. I have this drawing in my mind, and I just project it on the paper and follow it. I don't know how I do it either."

With shears, she divides the cutout pattern into templates, lays each on a piece of glass and traces around it with a marking pen. She etches that outline with her glass cutter; the tool, the size of a fat pencil, has an oiled carbide wheel that plows a tiny groove in the glass surface. She breaks straight scores with one quick, confident snap. Curves are tougher. To make a deep concave cut, she must break off a series of shallower concave scores, any one of which might split off crazily and wreck the piece. She never forgets that restoration glass, which mimics the swirls and bubbles of 19th-century handblown panes, costs her $50 a square foot. "You've got serious motivation to make that cut work," she says.

Glass is odd stuff. Its molecules are disordered like those in liquids but are so rigidly bound that it has most of the properties of a normal, crystallized solid. Recent, careful observation of medieval stained glass has debunked the old myth that glass slowly flows, thinning at the top and thickening at the base. But Vloeberghs's practical experience does point to a strange, internal molecular dance: "If you score a piece, you have to break it right away. If you wait overnight, it won't break on the score. Its structure moves."

After cutting, she arranges the glass pieces on the layout pattern. "I could just put them in a box, but the layout pattern helps you keep track of what goes where," she says. Then she assembles them on the building pattern. Quality leaded-glass work demands obsessive, surgical precision—

TOP: Vloeberghs often talks to the glass as she scores it. "I say, 'Cooperate, please.' Sometimes it answers, 'No, I don't think so.'" BOTTOM: Toxic lead residue collects on Vloeberghs's fingers as she presses a piece of came (a slender grooved lead rod) around a glass pane, so she washes her hands as many as 30 times a day. "Some people who do this for a living have lead in their blood, but my doctor says I'm perfectly clean."

When Vloeberghs made this 2,000-piece dome for the mansion of an Atlanta developer six years ago, she charged $6,000; today, she would charge $13,000. Although the dome looks like a skylight, the glass is actually covered by a box in the house's attic. Timer-controlled fluorescent tubes mounted inside the box simulate sunrise, broad daylight and sunset.

without it, tiny measurement errors magnify until, as the work nears completion, the glass pieces can wander ¼ inch or more from the building lines. When craftsmen try to compensate by sneaking in off-sized pieces, the result is both asymmetrical and structurally weak. "Every bump that you don't smooth out creates a pressure point," she says. Under stress, such as wind or a paperboy's errant toss, "that's where it will blow out."

Contrarily, after Vloeberghs snaps out a single puzzle-piece of glass—and some of her works have more than 1,000 pieces—it's not unusual for her to traipse 10 times to the grozing machine to create the perfect fit. Similar to a woodworker's spindle sander, this gadget abrades glass edges with a 150-grit diamond-dust rotating head, removing about 1/32 inch at a time. Vloeberghs test-fits, then grozes, test-fits, grozes, test-fits, grozes—hour after hour, endlessly.

"I'm a perfectionist," she says.

Building leaded glass seems a genteel art—the soft *scritch* of scoring the panes, the rhythmic *tap-tap* of the horseshoe-nail hammer—but is actually freighted with danger. There is nothing sharper than broken or cut glass; literally a molecule wide, the edge can pass through flesh like a sword through smoke. On December 6, 1996, Vloeberghs's apprentice, Rebecca Owens, then 22, dropped a 30-by-7-inch freshly cut pane across her upturned left wrist. The glass severed an artery, two tendons and a nerve and chipped the bone. Vloeberghs threw Owens into her station wagon and roared to Piedmont Hospital in 10 minutes as the young woman's lap filled with blood. A person Owens's size—5 feet 10 inches and 118 pounds—normally has about 5 quarts of blood. Doctors estimated that, by the time she reached the hospital, she had lost nearly 3. Had they waited for an ambulance, Vloeberghs was told, Owens would have bled to death.

"All I wanted to do was sleep. They kept shouting at me, 'Don't close your eyes!'" says Owens, a shy counterpart to the extroverted Vloeberghs. Owens has recovered 95 percent mobility in the hand. Due to scarred muscle tissue, she still can't press her middle and ring fingers together when her palm is open.

"I sent a bouquet of balloons to her hospital room. One of them said, 'First prize for best cut!'" recalls Vloeberghs. She takes a deep drag on a cigarette—midway through the day's two packs—and grins wickedly. "Another said, 'Congratulations, you are now a stained-glass artist!' That shocked people but, hey, I've severed two tendons in my fingers. I took 30 stitches in my palm. It can bite you bad, but you can't let it scare you. You make a mistake, you go on. We don't do defeat around here."

Vloeberghs forged that attitude during her difficult childhood in Kalamazoo, Michigan. "I was a dyslexic, but I wasn't diagnosed until I was 21. I was considered stupid, but I just didn't see things. Even today, the letters turn and twist," she says. "I was also hyperactive. So while I couldn't do numbers and letters like the other kids, I was always looking for an outlet, some way to express

TOP: Windows delivered to a building site await installation. TOP CENTER: Vloeberghs applies 50-50 lead-tin solder evenly across joints. BOTTOM CENTER: She makes her own molds and pours decorative lead castings: wheat shafts, five-pointed stars, oval pearl flowers, rosette stars, arrowheads, bellflowers and laurel leaves. BOTTOM: Soldered to the window, the castings "give the work another dimension," she says.

A Quality Test

Well-built leaded-glass windows can last half a millennium. Bad ones can crack, bulge, sag, rot, leak or pop out chunks in two years. "You've got to know what to look for," says Patricia Vloeberghs. "There's a lot of junk out there."

Inspect the window to see that all glass edges are smooth. "A little chip creates a weak point," says Vloeberghs. "If you press the glass, it could break a line radiating from that chip." If possible, shake the window. If pieces rattle, it probably wasn't cemented properly. As a final step with her own windows, Vloeberghs uses a stiff-bristled brush to force into the lead channels a putty mix of glazing compound, boiled linseed oil, japan dryer, paint thinner and lampblack. "It waterproofs and solidifies the windows," she says. "Some people use just glazing compound, but it's too stiff—it doesn't allow for expansion, contraction and everyday vibration. Other people use nothing, which is worse."

Inspect the channels. Vloeberghs advises avoiding zinc channels, which are made from a flat sheet of metal folded to make the characteristic H profile: "Water can travel through the folds and corrode it." Solid lead channels, she says, will last for centuries. To test a channel, scratch with a fingernail—lead scoops out; zinc doesn't. Check to make sure channel joints are precisely soldered: "You don't want a tiny dot or a huge clump of solder. Solder should neatly cover the joint."

Leaded glass weighs up to 5 pounds per square foot and needs support both vertically and horizontally. Vloeberghs's rule: Reinforcing bar should snake around a piece so that no area larger than 22 square inches is unsupported.

When installed in a wooden frame, the leaded-glass window should have a ⅛-inch gap on the top and sides to allow for the wood's seasonal movement.

myself. I did ballet at 4, tap at 6, jazz dance into my teens." She earned the tuition for art school classes by working as a go-go dancer in Grand Rapids. "I did batik in Michigan, sculpture in California. I bounced in and out of everything in the art world."

Throughout, two memories percolated in her subconscious. One was her first recollection: staring, at age 2, at the glorious stained-glass windows at St. Luke's Episcopal Church in Kalamazoo. Vloeberghs was born with synesthesia, a rare perceptual condition that causes the senses to mix and mingle. For her, sunlight pouring through the windows literally made music. "Blue was a deep bass," she says. "With gold hues, the tones got higher. Greens were cool, soft, modulated tones. I just devoured those windows." The second memory was of the blissful days she spent as a child with her grandfather on the shores of Michigan's Gun Lake. "He began painting when he was in his 60s," she says. "He would wake me before sunrise and take me outside. We'd get down on our bellies and watch the sun coming up through the dewdrops on the grass. We would study the veins on leaves, how the moss climbed the trees." With his encouragement, she started painting in oils at 7; at 9, she sold landscapes at art shows. "He always told me, 'You can be anything if you work hard enough. Put one foot in front of the other and go.'"

In her early 20s, Vloeberghs settled in Atlanta with Bob Cozine, a champion slot-car racer, and one day poked her head into an antiques store that included a stained-glass workroom. Every passion she had ever pursued intersected, fused and glowed in that dingy, cluttered shop: color, light, sculpture, movement, dancing, drawing, building. "I knew, immediately, that this was what I had been working toward. I was born for this. I had to get my hands on that glass." Though the owner was a "nasty little English gentleman" heaping on assignments and paying nothing, she stayed three years, doing only repairs. "Taking so many things apart," she says, "you learn the best way to put new work together." Eventually, her dyslexia proved no hindrance. "On a tape measure, I learned to read spaces, not numbers. To me, there's no such thing as 36 7/16 inches. I say, 'Cut that 36 and one quarter plus an eighth plus a sixteenth.' Drives my husband nuts, but it works."

Two years ago, Vloeberghs's apprentice, Rebecca Owens, nearly bled to death as a result of a glass-shop accident. "Not once did I think about quitting," Owens says. "No matter what, I will always do this."

In 1979, she borrowed $1,000 from her mother, bought tools and rented a bay in a former Atlanta dairy. "I worked that first year on a pair of sawhorses. I kept grubbing, grabbing. I went to every antiques store in Atlanta, doing repairs on-site." And she cultivated architects, teaching them that there were choices beyond the stained-glass unicorns, daisies and rainbows slapped together by cellar hobbyists. Eschewing pattern books, she drew her layouts from scratch and vowed to each customer that she would never repeat a design.

One day in 1988, a client strolled into the studio with a 14-year-old daughter in tow. The girl's eyes widened as she took in the iridescent glass, the spiderweb-came tracery, the dancing light. "I want to do this," she declared. Vloeberghs, never one to dismiss ambition, wrote down all of the tasks the girl needed to accomplish before becoming an apprentice: attend college, major in art, study perspective, drawing, art history—a long list. "I forgot about it. Seven years later, this lady marches in with the list, all checked off," says Vloeberghs, clapping Owens on the back. They have been together four years. "She's a workaholic like me."

"She's making me into her clone," says Owens.

Their plan: Eventually, Owens will take over the business Vloeberghs has so painstakingly constructed. Vloeberghs hopes to teach college classes and finish a book she's writing on glass technique. But she'll never vacate the studio entirely. "I'll turn the heavy work over to Rebecca, but I see myself in here at 80 saying, 'Hey, baby girl, you didn't cut that right. Try again.'"

Thinking about the future, Vloeberghs's gaze becomes distant—to her, growing old in this studio is an image to savor. Sometimes, she tries to imagine what might have happened had she never stumbled across that crotchety Brit's workroom.

What if she had never found this work?

Her brain, so often her adversary, now becomes merciful—it stutters and stalls. "I'm not sure what I would be doing," she says softly. "I can't even think about it. It saved me." ■

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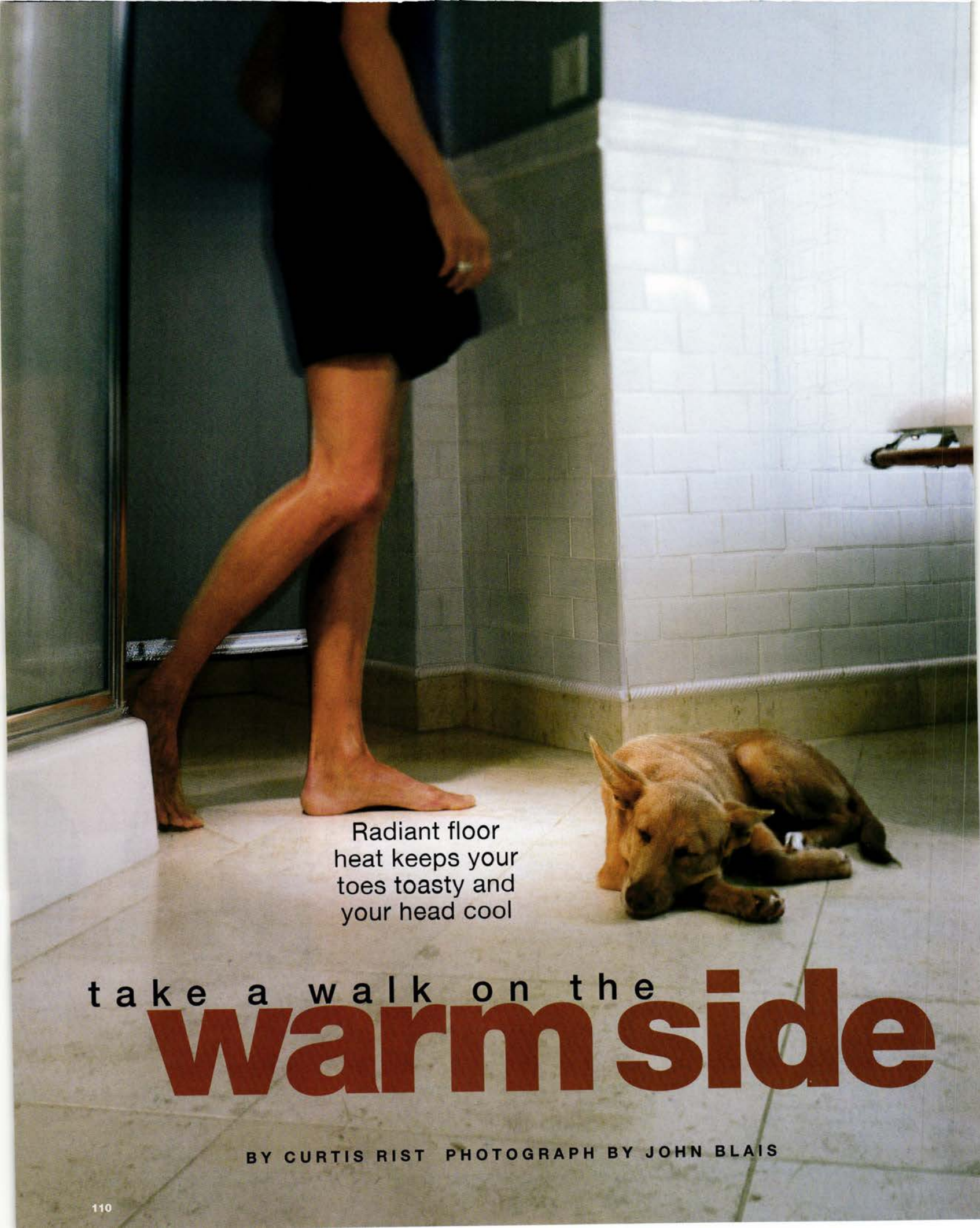
For the renovated Margaret Mitchell house in Atlanta, Vloeberghs rebuilt the windows in the writer's alcove. "They're beautiful, but they were a geometric nightmare to make," she says. "I saw that pattern in my sleep."



Radiant floor heat keeps your toes toasty and your head cool

take a walk on the warm side

BY CURTIS RIST PHOTOGRAPH BY JOHN BLAIS

WHEN TOM SILVA, CONTRACTOR FOR *THIS OLD HOUSE,* wanted to install radiant floor heat in a house he was building for an old friend in Lexington, Massachusetts, he met with the usual resistance. "I thought it would be too expensive," says the home owner, Richard Jenson, a math professor. "And I worried about what would happen if all those pipes buried under the floor ever started to leak." But Tom didn't take no for an answer—and installed the tubing anyway. Says Tom, "I told Jenson, 'Look, I'm so convinced you'll want this system—just call me when you want it hooked up, and pay me then.'"

Tom didn't even have to wait until moving day to collect. On a wintry morning during the construction phase, Tom wanted to make things a little warmer for his crew. So he heated up a 55-gallon drum of water and used a garden hose to run the water through the tubing beneath the basement's floor in the area where Jenson's home office would be. When Jenson stopped by that day, he was puzzled. "The house wasn't even insulated, but that part of the basement was comfortable," he says. Touching the floor, he discovered the reason. The floor felt warm, similar to the temperature of his own hand. On the spot, he told Tom to go ahead with the system. "I had no idea what a

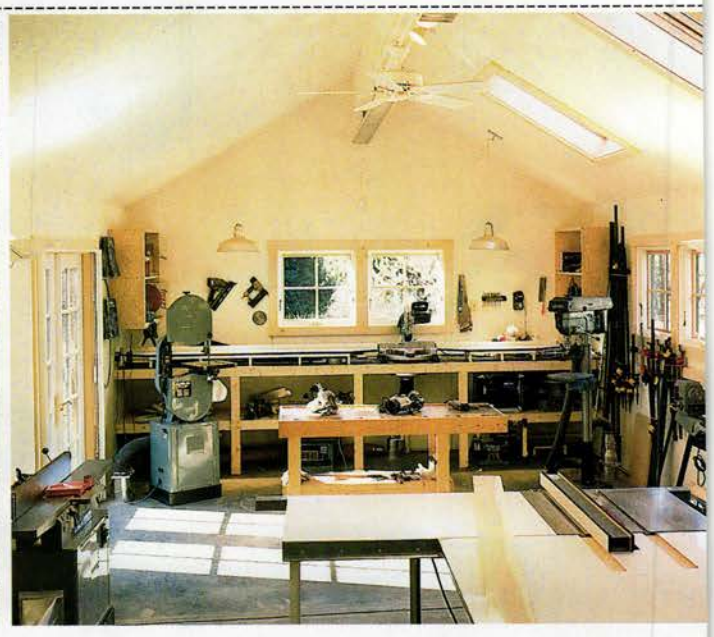
Without radiant floor heat, a barefoot stroll across a tile floor can be as enticing as an icy dip in the Arctic. But tubes installed in the master bathroom at the This Old House *project house in Milton, Massachusetts, right, carry hot water that turns the limestone floor into a radiator. In the finished room, left, the chill is long gone.*

PHOTOGRAPH RIGHT: KELLER & KELLER.

RADIANT FLOOR HEAT: FOUR WAYS

Concrete

At the *T.O.H.* project in Milton, radiant floor heat keeps the workshop's concrete floor, far right, comfortable in winter. After digging a hole for the foundation with a backhoe, layers supporting the floor were carefully built up, ensuring the heat radiates up. The *T.O.H.* crew poured in compacted gravel, covered it with a plastic vapor barrier and added 2 inches of sand and 2-inch-thick rigid foam. Next came 6-by-6-inch steel wire, then cross-linked polyethylene tubing fastened to the wire with cable ties. Finally, the concrete floor is poured, right.



Slate

The density of slate makes it an ideal surface for efficiently transferring and spreading heat. Under the slate floor of the new Milton mudroom addition, far right, the *T.O.H.* crew laid the same layers they had for the workshop: gravel, vapor barrier, sand, foam, reinforcement wire and cross-linked polyethylene tubing. Then came a layer of concrete, right, and finally the slate. When renovating an old house, pouring a concrete subfloor has an added advantage. "It gives you a chance to level the floors," says *T.O.H.* contractor Tom Silva.

difference the right heat could make," says Jenson.

Radiant floor heat (also known as radiant hydronic heat) is hardly new. Ancient Romans warded off the cold in palaces and public buildings by directing hot gases through channels beneath marble floors. In the early 20th century, radiant heat that relied on metal coils of hot water came into vogue. Frank Lloyd Wright favored this option because it enabled him to design vent-free rooms. Radiant heat even won a place in post-World War II boomtowns such as Levittown, New York. But these early systems possessed an Achilles' heel: Over time, the copper or iron piping laid beneath the concrete slabs corroded and sprang leaks. When that happened, little could be done but to scrap the setup entirely.

In the last 15 years, new materials and technology have made radiant floor heat a reliable option. Costing a full third more than standard heat to install, it's surely expensive. "But there's nothing home owners can invest in that will give them greater comfort for the rest of their lives," says Tom, who's planning to install radiant floor heat when he renovates his own house next year. Adds *T.O.H.* plumbing and heating contractor Richard Trethewey, who has been designing radiant floor heat systems since 1984, "I don't mind seeing people wince in pain once because they paid a little more up front and then thank me every winter for the rest of their lives."

Offsetting the installation cost is the likelihood that a house with radiant floor heat will use 20 to 30 percent less energy than one with conventional heat. "It's generally accepted by the engineering community that radiant systems are more efficient," Larry Drake of the Radiant Panel Association, a trade organization, says.

The remarkable thing about radiant floor heat is that it seems to defy one of the tenets of physics: Hot air rises. With conventional heating, such as hot-water baseboard and forced hot air, heat bil-

PHOTOS: KELLER & KELLER.

New Wood

For the new pine floor in the Milton dining room, Tom and plumber Ron Coldwell nail a ½-inch-thick plywood and aluminum system over the existing subfloor, near right. The cross-linked polyethylene tubing snaps into silicone-filled slots. This subfloor system holds two advantages. It is only ½-inch thick versus the 1¼ inches needed to embed tubing in concrete. Also, an installer can see the tubing when nailing boards. To finish the floor, *T.O.H.* master carpenter Norm Abram and flooring expert Jeff Hosking lay pine boards, far right.

Old Wood

To preserve the 200-year-old wide-plank pine floors in the parlor in Milton, far right, radiant tubing was installed from below by weaving it between the joist bays and attaching it to the underside of the subfloor. Aluminum plates nailed over the tubes, near right, increase the transfer of heat. Foil-faced insulation was also installed in the joist bays, foil facing up. "Without insulation, you get little or no heat transfer upstairs," says *T.O.H.* plumbing and heating contractor Richard Trethewey. "Everything would radiate down."

lows into a room at temperatures of 130 degrees or higher. Because hot air weighs less than cold, the hot air rises, making the occupant's head feel warm and his feet chilly—hardly a recipe for cozy living. With radiant floor heat, the floor warms up gradually to a maximum of 85 degrees Fahrenheit, then acts as a huge radiator that keeps the air warm down low. "With radiant floor heat, you find that, instead of hot air up at the highest point of a room, the room is actually 6 degrees cooler up at the top," says Richard. "Your head is cool, and your feet are warm, which is exactly what makes human beings comfortable."

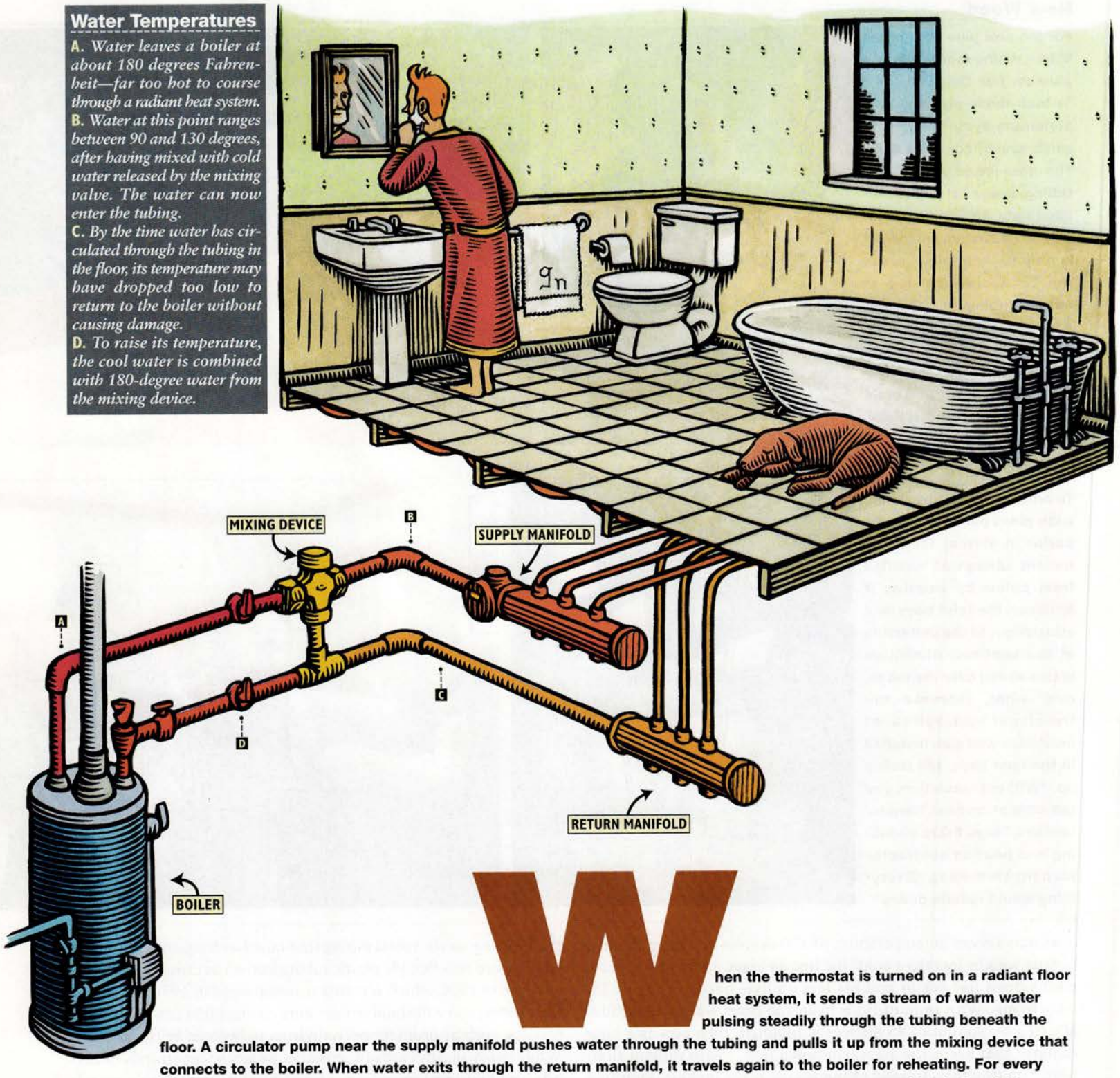
Such comfort is contagious: The amount of radiant floor piping installed in the United States jumped from 29.8 million feet in 1992 to 90 million feet last year—which represents an annual increase of 25 to 30 percent, according to the Radiant Panel Association.

The development of leak-resistant tubing is the reason. Rather than relying on the metal piping that failed so frequently, installers have turned to a flexible plastic tubing known as cross-linked polyethylene or PEX, which was first manufactured in 1970 in Europe. PEX tubing can withstand temperature changes that can cause other plastics, such as ordinary polyethylene, to become brittle and fail. While many plastics are composed of independent strands of carbon and hydrogen molecules, cross-linked polyethylene's strands are tied to one another. "Rather than a bunch of loose strings, you've woven them chemically into a net," says Joe Pauley of Wirsbo Co. of Sweden and Minnesota. (Wirsbo, along with the German company Stadler, introduced the product to this country in 1984.) "You get a lot more strength over a long period of time." PEX tubing now has a 28-year track record of good performance; nonetheless, some installers are turning to synthetic rubber alternatives, which are more flexible. They're also easier to install when work-

PHOTOS: KELLER & KELLER

Water Temperatures

A. Water leaves a boiler at about 180 degrees Fahrenheit—far too hot to course through a radiant heat system.
B. Water at this point ranges between 90 and 130 degrees, after having mixed with cold water released by the mixing valve. The water can now enter the tubing.
C. By the time water has circulated through the tubing in the floor, its temperature may have dropped too low to return to the boiler without causing damage.
D. To raise its temperature, the cool water is combined with 180-degree water from the mixing device.



When the thermostat is turned on in a radiant floor heat system, it sends a stream of warm water pulsing steadily through the tubing beneath the floor. A circulator pump near the supply manifold pushes water through the tubing and pulls it up from the mixing device that connects to the boiler. When water exits through the return manifold, it travels again to the boiler for reheating. For every ounce of water added to the tubing system from the boiler, an ounce must return. But cool water—anything below 130 degrees for gas boilers, 150 degrees for oil-fired ones—can damage a boiler from the temperature shock that cracks its cast-iron casing as well as from condensation that rusts out the insides. To prevent this, the cooler water must first be warmed up slightly with water making its way from the boiler through the mixing device. "If you had radiant floor heating in a little bathroom or kitchen, you wouldn't really have to worry, because the amount of cool water going back is too small to overpower the boiler," says Richard. "The greater percentage of your home you heat this way, the greater an issue it becomes."

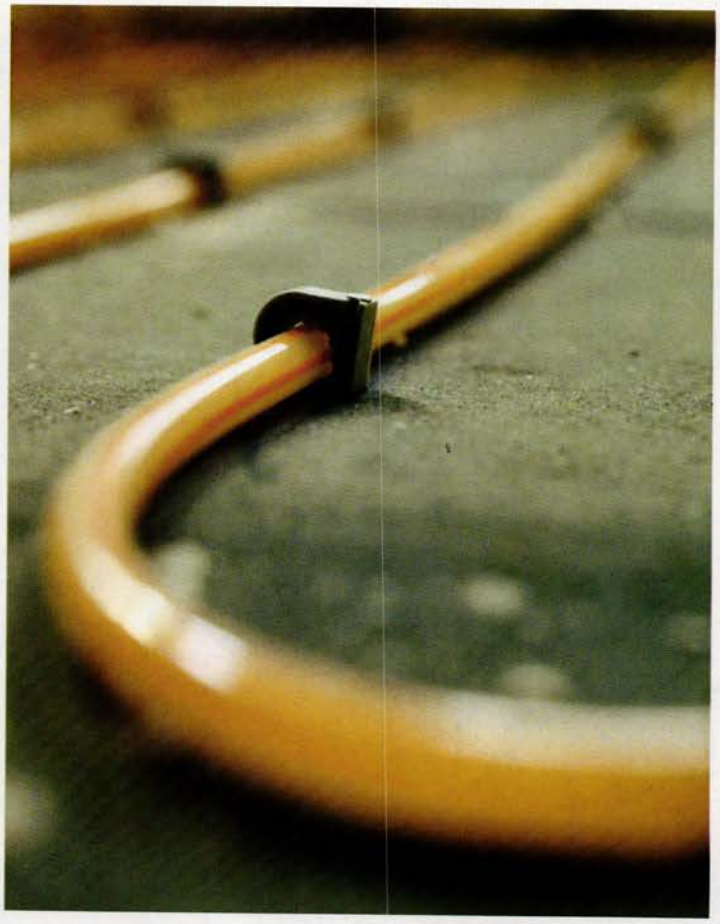
ILLUSTRATION BY GREGORY NEMEC

ing from below the floor, but Richard thinks that switching to the new products is a bad idea. "The first two generations of rubber weren't impressive," he says.

Controls that protect boilers have also been crucial to the dependability of radiant floor heat. With ordinary hot-water heating systems, water leaves the boiler at temperatures as high as 180 degrees Fahrenheit and returns after cooling only slightly below that. But the water running through radiant floor tubing needs to be only 90 to 130 degrees, which presents a problem for the boiler. If water returns below 150 degrees in oil-fired boilers or below 130 degrees in gas-fired ones, it causes condensation of not only water but also of corrosive acids inside the boiler. Left unchecked, it will "just beat the boiler to smithereens," says John Siegenthaler, an engineer in Utica, New York, and author of *Modern Hydronic Heating for Residential and Light Commercial Buildings*. Some European-made boilers have been designed specifically for radiant floor heat and utilize a corrosion-resistant heat exchanger made of a sandwich of cast iron and steel. But traditional boilers—such as those commonly used for baseboard heaters, for instance—can be part of a well-functioning radiant network if precautions are taken to protect them. What's required are mixing valves and manifolds that regulate the water temperature. The 180-degree water leaving the boiler automatically mixes with cooler water coming back from the floor; this brings the supply's temperature down to between 90 and 130 degrees, the temperature needed to heat a floor to 85 degrees at the surface. On the return, hot water is added to bring the water above the dew-point temperature before it reenters the boiler. "It used to be a big challenge to design these systems, but the new mixing valves and manifolds have made it easy," says Siegenthaler. When adding radiant floor heat to an existing kitchen or bathroom using an existing boiler, it gets easier still: Since the condensation problem is substantially smaller, the controls can be eliminated altogether.

Another important element in radiant floor heat's effectiveness is the flooring itself. Tile over a concrete slab embedded with radiant tubing is the ideal choice; the tiles conduct heat well, and water temperatures can be lower. Wood and carpeting are far trickier. Because they act as insulators, they cut down on the flow of heat and, in the worst cases, can block heat transmission altogether.

"I was called out to one house with a radiant floor system that just wasn't working," says Richard. Frustrated, the home owners kept cranking up the water temperature—enough to make the water in the tubing a scalding 170 degrees. Trethewey discovered that there were two levels of subfloor above the radiant tubing, plus a hardwood floor, with an area rug and pad on top of that. The heat simply couldn't travel through. Down in the basement, he discovered where the heat was going. "I felt the face of the joists beneath the floor, and they were smoking hot. Heat will always go to cold and will always take the path of least resistance. Rather than radiating up, the heat was radiating down." Richard corrected the problem by adding 2-inch-thick rigid insulating foam beneath the joists and removing the rug and pad to force the heat upward. But an even more efficient solution would have been to keep the insulating ability—known as the R-value—of the floor low. This doesn't rule out wood floors or thin commercial-grade carpeting. Still, Richard says, "Depending on where you live, you could be over the limit with wool plush or nylon shag with a pad, even over concrete. If you feel you have to have thick-carpeted floors, then radiant floor heat may not be for you."



Installed correctly, radiant floor heat can give a lifetime of trouble-free comfort. Richard pressurizes the system with air or water during construction. "If somebody hits a nail through a tube, you know it right away—rather than finding out after everything's embedded in concrete."

Although the equipment and the know-how exist to build a foolproof radiant floor heating network, things can go wrong. But Larry Drake says it's not really a big hassle to repair a leak. "There are a number of ways of finding the leak, including stethoscope-like instruments, so you can go right to the trouble spot, chip out a hole, put in a coupling and patch the floor." One of the biggest causes of leaks: other tradesmen accidentally drilling or hammering through the tubing. "But in that case, they've 'found' the leak for you," Drake says.

Ensuring the radiant heat tubing is installed properly in the first place is essential. "Quite simply, the market is growing faster than the number of people trained to do it," says Bill Wright, an engineer at Weil-McLain, a boiler manufacturer. "As a result, a lot of people are calling themselves installers, even though they have no idea what they're doing." Worst of all, he says, are the do-it-yourselfers, who might get the job done fast but not necessarily well: "You have guys who say all you have to do is pull the PEX tubing off a coil, staple it in place and hook it up to the boiler—what could be easier? These are the people who are getting into the problems." Richard agrees that radiant floor heat needs to be designed and installed as a network appropriate to each particular house. "It's taken us so long to get to the point where radiant floor heat is accepted," he says. "I'd sure hate to see a return of the ghost of Levittown." ■

PHOTO: KELLEH & KELLEH.

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NEIN

BY JOSEPH D'AGNESE
PHOTOGRAPHS BY MICHAEL GRIMM

The trap is set, the cheese is fresh and you're taking no prisoners. So why aren't the mice getting the message?

when there's **a mouse** in the house

One winter night, while home with his nanny, 4-year-old Sam Tydings ran into the mouse that lived in his house. The tiny creature emerged from under a chair in the living room, ambled across the kitchen floor and squeezed under the freezer. Unfazed by the presence of humans, the mouse appeared again, moseying back to the living room as if out for an evening stroll. "Look! It's a mouse!" Sam yelled, squatting down to get a closer view. "Ooooh, you're *funny.* I think I'll name you Tim."

Later that evening, Sam's mother, Frieda Tydings, was more exasperated than horrified to hear of the encounter. About a year earlier, mice had invaded the Tydings cupboard, tearing into foodstuffs and leaving piles of droppings. After hiring an exterminator, who placed nontoxic glue traps all over their house in Hopewell, New Jersey, the family tossed out the contaminated food, disinfected the pantry and began storing edibles in hard plastic containers. But now, a year later, their son was pals with a mouse. Sure, Tim seemed cute, but this wasn't the childhood companion his parents had in mind for their son. How could they get rid of the critter and his relatives?

Humans have struggled with that question for ages. The house mouse (*Mus musculus*) has followed man from the pyramids to the cul-de-sac. Rationally, we know that mice are vermin. But storytellers from Aesop to Disney have brainwashed us to accept them as clever, cuddly heroes of the animal kingdom. It hasn't exactly been a hard sell. With their dewy dark eyes, bugle ears and remarkably dexterous front paws, mice seem practically human. Indeed, on the DNA level, the genetic makeup of humans and mice is remarkably similar.

Unlike humans, a female mouse can, in a single year, have 5 to 10 litters of 7 to 9 pups each. Although that reproductive prowess pleases geneticists, who use mice to track gene mutations over many generations, it's disastrous for home owners. "If you have one or two mice, and you wait to take care of them, you'll have them everywhere in a matter of weeks," says Bobby Corrigan, an urban rodentologist who owns R.M.C. Pest Management Consulting in Richmond, Indiana.

ILLUSTRATIONS BY JASON SCHNEIDER

If at First You Don't Succeed

The endless quest for an effective mousetrap has produced gadgets galore. **1. Mousetrap Sample Case (1917):** Itinerant salesmen once wandered the countryside with their bags of Victor mice and rat traps and End o' Mice disposable traps. **2. Claw Trap (1876):** The only existing model of Daniel Conner's hanging trap. The mouse leaps to reach the cheese on the top hook—only to be hooked itself. **3. U-Neek Jar Trap (1909):** The mouse creeps through the hole in the lid and yanks on the bait, unwittingly slamming the door. Makes ships-in-a-bottle seem downright passé. **4. Buxton Impaler (1860):** At the touch of a paw, the spring-driven circle of spikes crashes down upon the tim'rous beastie. **5. D. Johnson Snap Trap (1847):** It could wipe out an entire family of mice in one nasty chomp, the inventor claimed. **6. Electrocuter (1947):** All that's needed is a dab of bait and an extension cord to make good the manufacturer's claim: "Kills hundreds of mice for a penny's worth of electricity." **7. Leg Trap (circa 1900):** A blacksmith meticulously forged this elegant "bear trap for mice." **8. Bing Crosby's Trap (1940):** Believe it or not—the famous crooner's company, the Crosby Research Foundation, backed the production of these aluminum snap traps. **9. Crusher (circa 1800):** Lured into the lower box, the mouse dislodges a stick and is smashed under a heavy wooden block.

We feel stigmatized when mice choose to share our abodes: *My house is clean—why me?* The truth is, house mice will lay siege to even the most pristine building if they can find a way in. And with them may come allergens, salmonella and parasites such as tapeworms. Another species, the deer mouse (*Peromyscus maniculatus*), sometimes carries a hantavirus that causes an often fatal respiratory disease. As of August, the Centers for Disease Control and Prevention had reported 190 cases including 84 fatalities, mostly concentrated in the desert Southwest.

Eliminating these threats involves more than setting out a mousetrap with a hunk of cheese. It means enacting a three-point plan: Cut off the food supply, seal mice out of the house and kill or remove any mice left inside.

Dave Walters, a technician with Cooper Pest Control in Lawrenceville, New Jersey, inspected the Tydings house not long after Sam met Tim. Cooper Pest Control is a company that finds environmentally sensitive solutions to pest problems, and Walters knows what relentless invaders mice can be. They can climb up brick, shingles or pipes and can even swim. Their ¼-inch-wide skulls can squeeze through holes as small as a dime. "If your pinkie can get in the hole," says Walters, "so can a mouse." And a mouse will widen a hole that happens to be a bit snug by chewing through wood, light plastic or wallboard. Once the animal gets inside, its scent attracts its friends. In truth, mice can survive a winter outdoors quite well. But given a choice between nibbling desiccated grass seeds in the snow or cereal in your pantry, most would gladly take up new digs.

Walters' hour-long inspection revealed that the builder of the Tydings house had neglected to plug openings around pipe, wire and utility-line entry points. To seal out critters, Walters shoves a wad of copper mesh into the space around the pipe or utility line, then squeezes in siliconized acrylic caulk. In spots hidden from view, such as the rafter and beam holes through which pipes and cables travel, he squeezes pressurized foam around the mesh. "Everyone always tells you to use to steel wool," Walters says. "The trouble is: People never use a grade that's coarse enough. They go with something that feels like a scouring pad. Mice can chew through that. And steel wool rusts. Sure, mice can chew through caulk and foam but, once they hit the copper, it stops them cold."

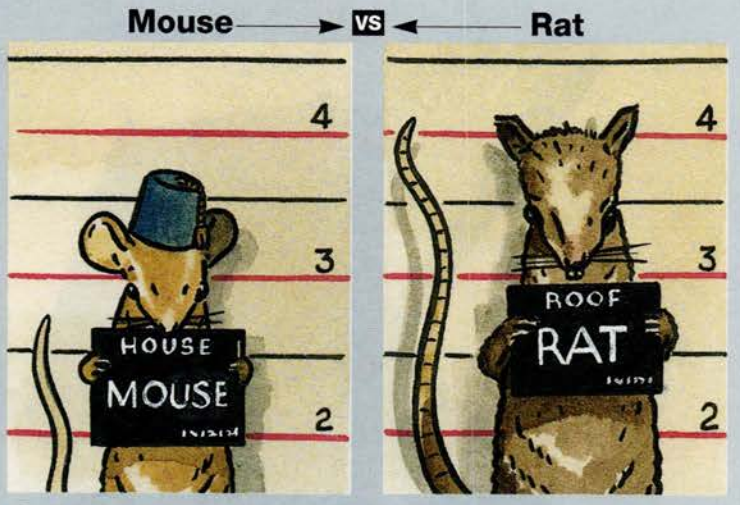
Holes larger than 3 inches in diameter require different treatment. Walters uses concrete to seal large foundation cracks. After removing gnawed wood siding, he fills holes with caulk or foam, then puts up new shingles or clapboards. To close up mouse entryways in garage walls, he patches the wallboard with construction adhesive and squares of aluminum siding or plywood.

Where drywall meets the foundation, as in basements and garages, Walters has detected gaps so large that he could poke his hand under the wallboard and up into the wall itself. Usually, he'll wedge a piece of lumber, perhaps a 2x3, into the space and seal it with construction adhesive and foam. Garages are always the toughest spots to mouse-proof because people leave their garage doors open for hours at a time. "Usually the garage attic leads right into the house," says Walters. "Which means you sometimes can't seal them up perfectly."

In crawl spaces, Walters glues sheets of fiberglass insect netting and 1/4-inch-square hardware cloth to the backs of all vents. For bathroom and kitchen exhausts, he installs molded plastic vents backed with screens to thwart birds and rodents. For dryer vents, he uses louvered covers that open when the dryer is running, allowing lint to blow past. He also makes sure that all doors to the house, including the garage door, have no gaps between the bottom and the sills. He installs weather strip or door sweeps if needed. For big gaps, he removes the door and extends it with a piece of wood or aluminum, then adds a door sweep.

Say you find one mouse and trap it, and no others show up. You can assume that your house is quite tightly sealed and that you can handle the exclusion work yourself. Don't overlook hard-to-reach spots under crawl spaces or basement sill plates. If you hire professionals, ask them over the phone to run down the spots they'll inspect. "You don't want a guy who's going to blow it off and say, 'I'm not going under there,'" says Corrigan. The entire job—inspection, exclusion and mouse removal—typically costs between $175 and $400.

Once you've blocked all possible entry points, it's time to nab



The light brown or gray house mouse has a small head with large ears and a pointy nose. Mouse feet are small and the tail as long as the body, which grows to 3 ½ inches long.

A roof rat has a large head and feet and a pointy nose. Eyes and ears are also large. The dark tail is longer than the shaggy slender body, which reaches up to 15 inches in length.

A rodent darts across your kitchen floor and out of sight, leaving you to wonder: What was it—mouse or rat? Actually, the interiors of most suburban houses are poor food sources for rats, which require water and about an ounce of food daily to survive. Mice consume a tenth of that and are less determined—and less vicious—in their pursuit of a meal. Rats can jump, crawl and swim long distances and gnaw on seemingly impossible materials including glass, asbestos and concrete. There are a few telltale signs that distinguish rats from mice. Rats live in outdoor burrows, attics, walls and trees, often chewing entrance holes 2 inches in diameter. Rat droppings range from ½ to ¾ inch in length, and greasy rat fur leaves black smudges on beams and rafters and in high-traffic spots. Wipe out rats as you would mice: Cut off the rats' food supply, trap them and seal them out. Because they are warier than mice, set out disarmed traps for a few days so the rats grow accustomed to the devices. Exclude rats with galvanized metal sheeting, hardware cloth and, if sealing foundation holes, mortar.

A Better Mousetrap?

Log Roll

Mice trot up the stairs and across the dowel. The cylindrical baiting device spins, turning the dowl and dumping the rodents into a vat of antifreeze, which has low surface-tension and prevents mice from swimming. Use wooden tongs to remove mice.

Shock Treatment

Mice wander into an aluminum tent, toward a panel that zaps intruders with 6,000 volts of electricity. Although costly, the device is one of the most effective on the market.

Snack Attack

Although good at picking off the occasional lost mouse, cats are not always the most reliable form of pest control, especially if mice are not their cup of tea. A mouse can wreak a lot of havoc before kitty takes an interest.

Tin Terror

Imagine going to your favorite restaurant and never being able to leave. The trap holds up to 30 squeakers and is usually used by professionals in food processing plants.

Teeter-Totter

As mice enter, their weight depresses a metal ramp, and they wind up in a holding pen. Up to four mice can drop in, so check daily to release them—far away—before they die.

Open Sesame

Hapless mice step on a trapdoor, triggering a spring-loaded paddle-wheel mechanism that sweeps them into the tin dungeon. A handy window lets you keep track of the tally.

Simple Snapper

Since 1894, the classic snap trap has reigned as the leading instrument of mouse mass destruction. The inexpensive traps are considered humane because of their quick action.

Sticky Business
Inexpensive, nontoxic and easily disposable, a glue trap can catch up to two mice. A dab of peanut butter attracts them. Once even a paw touches the glue, they're prisoners.

Super Snapper
As a mouse nudges the lid on a food tray, the powerful spring-loaded plastic trap slams down, crushing the animal's neck. Harder to trip than the classic hair-trigger snap trap, this Swedish design is safer for people.

Deadly Gangplank
Mice scramble up a ramp and onto a platform. When they reach the bait, the oversized diving board tips them into a pool of antifreeze. The trap resets, ready for the next victim.

the beasts themselves. Of the thousands of mousetraps invented over the aeons, the classic snap trap is perhaps the cheapest and most efficient. But time and again, people fail to catch mice with them. The biggest mistake: placing traps in the middle of a room. Mice prefer to keep their backs to the wall, so traps work best when perpendicular to a wall. Another mistake, Corrigan says: "People buy a little two-pack of traps and think they're going to catch all the mice. You need a lot of traps." Place about six traps everywhere mice have been sighted or left droppings: six traps in the kitchen, six in the garage and so on. Don't skimp. It pays to do the job quickly and efficiently. Every day that you delay, another litter could be born.

Innately curious, mice will investigate any food source. Some experts bait with a tiny smear of peanut butter, others with a sliver of raw bacon, which forces the mouse to tug at the trigger. But go easy on the bait. Too much food—and mice may nibble at it without tripping the trigger. To get mice to betray their location, Walters suggests putting down traps that are baited but not set. Wait a few days. The spots where mice have taken the bait are where you now want to move all the traps—baited and set this time. When you catch mice, remove all the traps and wait a week before trapping again. You'll stand a greater chance of nabbing those savvy mice who may have learned not to mess with a trap.

Snap traps' downside is the carcass. If that repulses you, set the trap in an open paper bag and later toss it—trap, mouse and all. Inexpensive for home owners, snap traps are no bargain for professional use. Pest-control companies bill every time a technician visits—even if just to check an empty trap. To limit costs, pros usually resort to bait stations: crush-proof plastic boxes containing grain food and rodenticide suspended in a block of paraffin.

The Kitchen Is Closed

Trapping and excluding mice is never enough. Unless you plan on running a quaint bed-and-breakfast for rodents, you must cut off their access to food and shelter. Here's where to start.

- **Clean areas under stoves, refrigerators and dishwashers.**
- **Store dry food (rice, pasta and grains), dry pet food and birdseed in metal, glass or hard plastic containers.**
- **Clean pet bowls each night. Place bird feeders with seed away from the house.**
- **Store lumber, firewood and compost piles away from the house. Elevate lumber and firewood on pallets.**
- **Use thick plastic or metal trash cans with tightly fitting lids.**
- **Rake, collect and remove fruit, nuts and other foods that have fallen from plants or trees.**

Poison is a quick way to get a nasty job done, but it can backfire in the long run as a population builds up resistance. In the 1970s, when rodents in some geographic areas became resistant to a poison called warfarin, scientists lobbed a new arsenal of rodenticides at them. Now, poison-resistant mice might be popping up again, mostly in New England. Poisons are also deadly to humans and pets. The best bait stations, made of heavy, gnaw-resistant plastic, are tamper-proof and can be screwed to a wall. Children and pets may theoretically be able to find the boxes but won't be able to open them. Professionals advise against using poison pellets packaged in small cardboard boxes. Mice can tear the box and scatter the candy-colored pellets. Another drawback: The poisoned rodent may die in your walls—if it doesn't stagger out and croak before your eyes. Corrigan himself once awoke to find a dead deer mouse in his bed.

There are other ways to catch mice, but each method involves a grisly trade-off. You can ensnare them with glue boards and glue trays. (Kids and pets may step in them, but the glue is harmless. It's the mice that face an agonizingly slow death.) Electrocute mice in battery-powered chambers. (Relatively humane but expensive.) Trap the animals live and release them. (Your prey will starve or dehydrate if you don't check traps daily, and you must release the mice as far as possible from home.) As for ultrasonic or ultrasound devices, Corrigan says, "Save your money." There's always a cat, but a kitten that hasn't been trained by its mother to be a good mouser will find the *grrrrr* of an electric can opener more intriguing than the pitter-patter of little mouse feet.

In Hopewell, two years have passed since Sam met Tim. A few months ago, some mischievous nibblers chewed the wires to the swimming pool heater, requiring another visit from the exterminator. But the house itself is impregnable. At night, Frieda Tydings and her family sleep easily knowing that, all through the house, not a creature is stirring, not even, well, you know. ■

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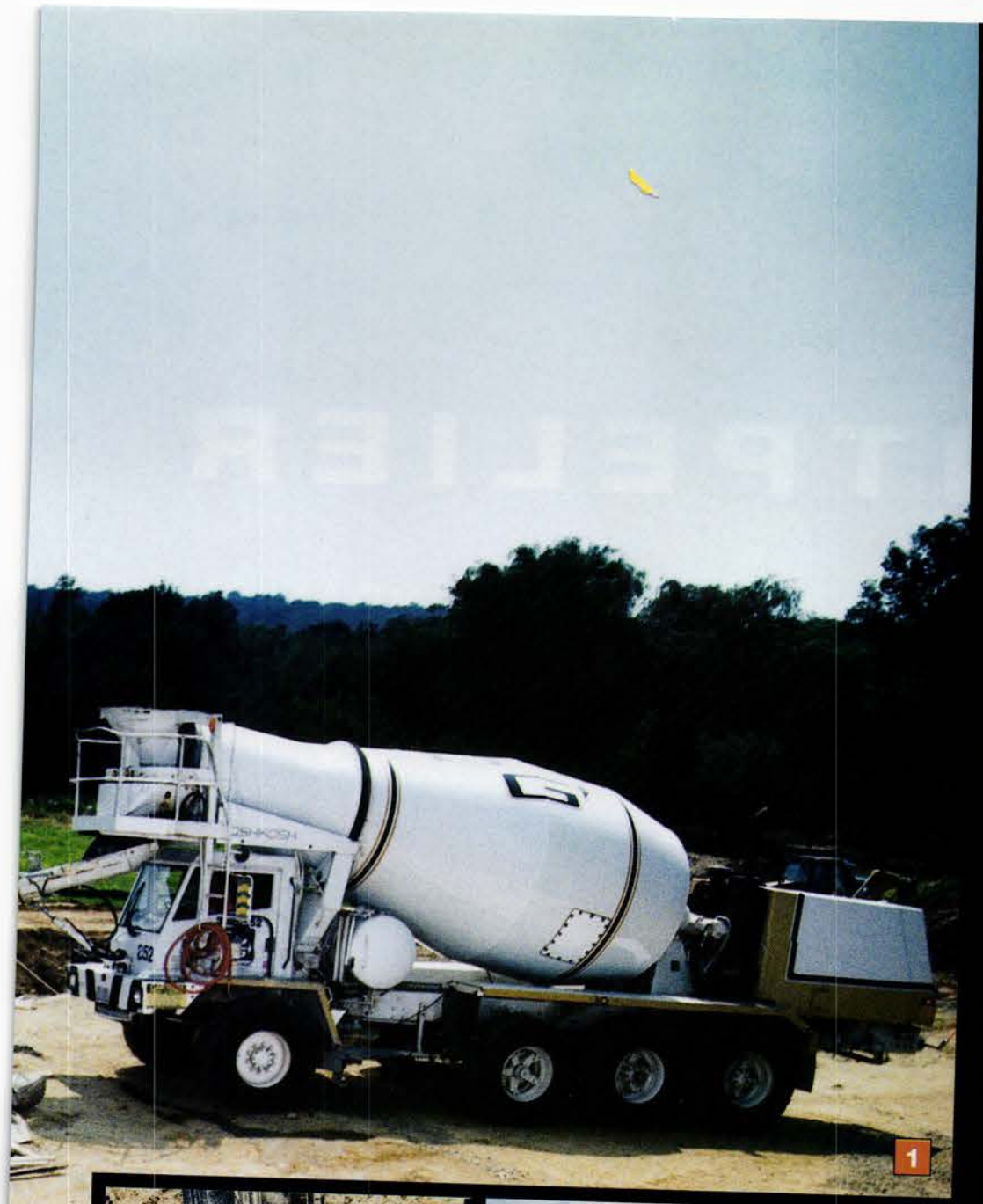
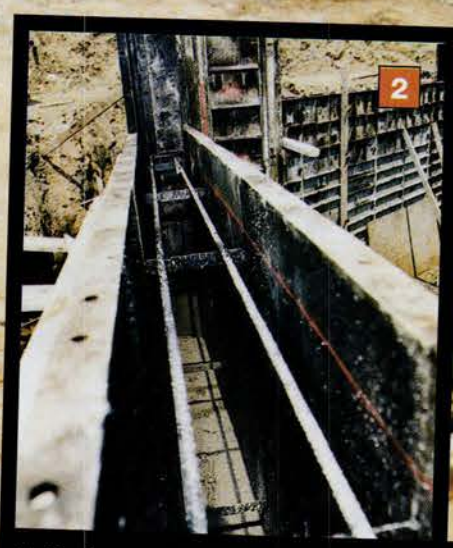
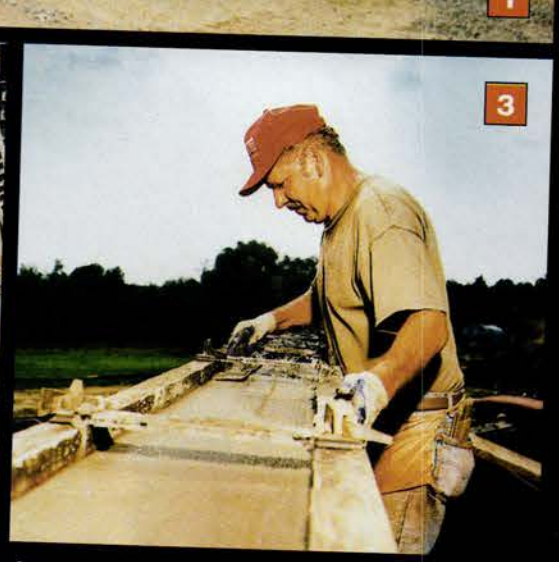
upon this rock

After a month of tedious prep and a ticktock-precise pour, the foundation for the Wilton project is ready to take on 200 tons of house

BY JACK McCLINTOCK PHOTOGRAPHS BY BERND AUERS







1. *Getting ready for a two-hour pour has taken nearly a month of digging and setup. Locked together with steel crossties and fitted with a top course of ⅝-inch rebar, the forms wait to receive their load.* **2.** *A coating of oil on the aluminum form panels keeps concrete from sticking. The red chalk line shows the wall's finished height.* **3.** *Frank Miller trowels the concrete level and smooth. After the forms are stripped, it will need a month to cure completely, but framing can begin the next day.*

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Perched on top of a narrow scaffold, Bobby Wilson drives in the pins and wedges that hold the foundation forms together at *This Old House* magazine's Dream House in Wilton, Connecticut. Down in the excavation, David Miller braces one of the empty walls with 2x4s while his father, foundation contractor Frank Miller, double-checks everything against the blueprints. The crew works quickly. The concrete trucks are coming at 1:30, and wet concrete won't wait.

Building a foundation is a down-and dirty enterprise, but few acts embody more hope and optimism. "It's my favorite stage of construction," says Dream House builder Walter Cromwell. Designed by Robert A.M. Stern, the hill-stepping Dream House has zigzags, jogs and many-sided bump-outs, all of which made the job especially challenging. "You need one of these every now and then," says Frank Miller, "so when you get an easy one you appreciate it."

The work demanded precision from the start. Four weeks before the final pour, bulldozers started chewing a deep hole, guided by an outline of the house that surveyor Larry Rizzo had plotted with a transit. Then he transferred the plan's dimensions, angles and depths to the bared ground. From those marks, Frank Miller's crew formed and poured the footing, a 2-foot-wide 1-foot-deep concrete beam that defines the house's perimeter and will ultimately bear more than 200 tons of walls, floors and roofs. Atop the footings, marked by a third set of survey points, the crew assembled a medieval-looking battlement, drearily gray and stinking of oil, that will contain the concrete for the basement walls.

"Look at that," says Cromwell, tapping his watch in amazement as a throaty diesel growl announces the arrival of the first concrete truck on the day of the pour. "That guy got here 10 seconds after 1:30!" One after another the trucks unload their wet cargo and, just two hours—and 53 yards of concrete—later, the fifth and last truck rumbles away.

The next morning, Bobby Wilson knocks out the pins and wedges and dismantles the forms, revealing smooth gray-green concrete. Cromwell looks contented as he runs a palm over the damp foundation walls and says, "We're on our way." ⌂

MONTPELIER

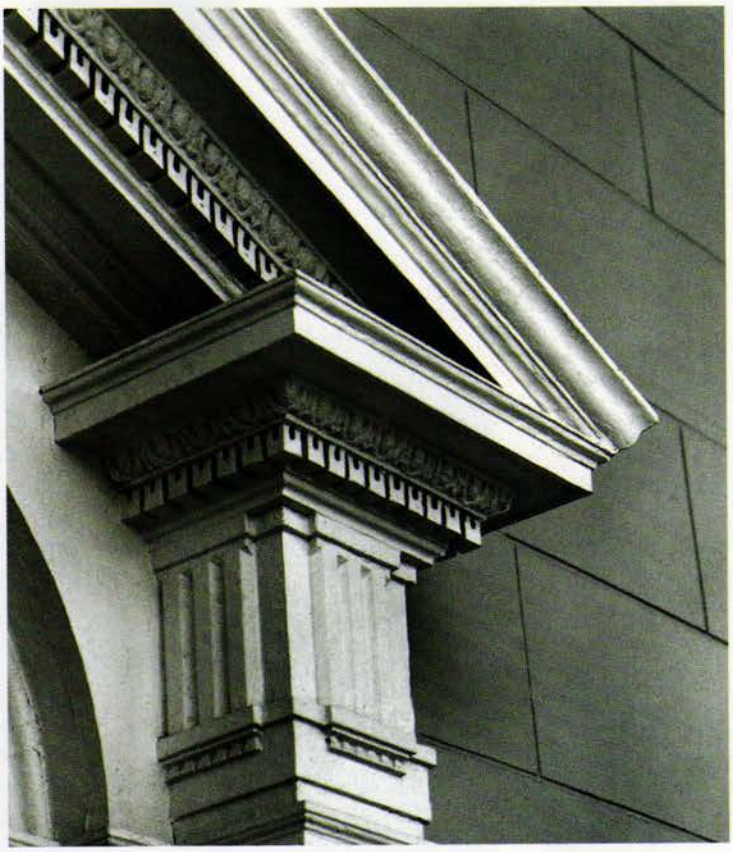
JAMES MADISON LAID THE FOUNDATION FOR A GOVERNMENT BASED ON FREEDOM AND EQUALITY WHILE HOLDING COURT IN A MANSION BUILT WITH SLAVE LABOR AND FIT FOR A KING

BY WALT HARRINGTON PHOTOGRAPHS BY JOHN GRUEN

OPPOSITE: *Located 90 miles southwest of Washington, D.C., Montpelier served as a tranquil retreat where James Madison, our fourth President, could escape the madding political crowd and, he wrote, find the "possession of my customary enjoyments, solitude and contemplation."* THIS PAGE: *A 36-inch-high bronze statue of a pensive Madison sits in Montpelier's dining room, where he and his wife, Dolley, feted visitors with lavish French cuisine.*

The President died in this room. He was feeble, nearly deaf, his fingers worthless with arthritis, his head bald, a horseshoe of gray hair dangling over his collar. James Madison, 85 years old, had just finished reading the manuscript of a new biography of his deceased friend Thomas Jefferson, who had lived only 28 miles from Madison's 4,675-acre Montpelier plantation in Virginia. To the last moment, his mind—which had molded the Constitution, muscled the Bill of Rights through Congress, launched the War of 1812 and both decried and defended slavery—stayed sharp. That summer day in 1836, Madison had trouble swallowing, and a niece asked what was wrong. "Nothing more than a change of mind, my dear," Madison said. Then he dropped his head and died. In this room. This empty room. In this house. This empty house.

Montpelier is a profoundly eerie place. The houses and grounds of Jefferson's Monticello and George Washington's Mount Vernon plantations are adorned with artifacts—desks and beds and chairs, slave quarters and workshops and outbuildings—creating the illusion that the great men might stroll in at any moment. Not Montpelier. There are a few Enlightenment books, First Lady Dolley Madison's engagement ring and snuffbox, a replica of one of her velvet gowns and displays telling in words the history of Montpelier. But no one can brush past President Madison's iron-post bed with its damask canopy, breathe the musty scent of his 4,000 books, sit at the mahogany gaming tables that Dolley scattered around the house for card-playing guests. After Madison's death, all of these artifacts were lost to the failing agricultural slave economy of piedmont Virginia and to the debauchery of his stepson.



During a renovation at Montpelier from 1809 to 1812, Thomas Jefferson sent carpenters from Monticello to build Madison a front-door pediment with carved egg-and-dart moldings and pierced dentils atop Doric pilasters.

Montpelier lives today as a shadow. In 1900, after six owners in 56 years, an heir to the DuPont fortune bought the estate with its 2,700 remaining acres. William duPont more than doubled the size of the house and encased what survived from Madison's era in today's towering baronial mansion. Madison's garden, avant-garde in the 19th century, is gone—replaced by the DuPonts' 20th-century country estate garden. The original stables, corncribs, smokehouses, slave shacks and privies are long gone.

But not everything was lost. Madison's neoclassic garden temple, among the earliest and finest of its kind in the United States, remains. So do the front portico's pediment, doors and transom and some of the house's windows, wooden floors, interior doors, molding, wainscot and fireplaces. The rooms in what was Madison's first floor are still divided in much the same way, and the vistas seen through the windows are still stunning. Archaeologists at Montpelier, which Marion duPont Scott willed to the National Trust for Historic Preservation in 1983, have dug into walls—revealing patches of original brickwork—and excavated the nearby ground to unearth the remains of the house of Madison's grandfather. Montpelier is a work in progress. But imagining James Madison from this place is still like imagining a painting by studying an empty frame.

And that's what makes Montpelier so intriguing. Its meaning in Madison's life and its meaning in our lives as Americans can't be discerned from bricks and mortar and artifacts but must be found in Madison's letters, in Dolley's record of household goods, in the recollections of visitors, family and slaves, in craftsmen's accounts, in biographies and in the analysis of architectural historians. Together, these sources paint a picture in the empty frame, illuminating the tension then and today between the ideal of equality and the reality of money and power, which makes some more equal than others. At Montpelier, Madison's highest ideals and lowest realities were revealed in the material choices of his lifetime—in plaster and plank, architecture and design, art and furnishings.

Madison was 9 years old in 1760 when his father moved the family into the new mansion house, then one of the largest brick dwellings in prosperous Orange County. The eight-room, two-story Virginia Georgian stood exactly where the giant Montpelier stands today, nestled among red-dirt fields of tobacco and grain, the long front porch facing west toward the Blue Ridge Mountains, which rise nearly 30 miles away amid a landscape of rolling meadows, lush forests and boundless skies.

Madison's father grew tobacco and operated a sawmill, gristmill, distillery and ironworks, all with the labor of some 100 enslaved African-Americans. Young Madison, shy and bookish, grew to only 5 foot 6 inches. He was educated by European tutors and then sent to Princeton, where he became imbued with the philosophy of John Locke and others who believed in the equality of man, the power of reason and the idea that government could reflect the will of the people. Madison also told a Princeton classmate that slavery disgusted him, a view he held all his life. A practical man who tried to find practical solutions, however, he believed that blacks and whites couldn't live together peacefully as equals. His plan for ending slavery was to have the government pay slaveholders $600 million and then ship all of the 700,000 former slaves back to Africa.

During the 25 years after Princeton, Madison visited Montpelier only occasionally. His father ran the plantation, which financed

A second-floor fireplace and mantel from the original 1760 house as well as a gilded wood looking glass from 1825 survived an early 20th-century renovation by William duPont and his family. But the DuPonts' rearrangement of the floor layout stranded the fireplace in a hallway.

Madison may have modeled a garden gazebo on the Temple of Venus at Versailles. Building the dome challenged Virginia craftsmen accustomed to straight roof construction.

Madison's founding of the nation. He encouraged his father to curtail tobacco planting in favor of the more profitable wheat. The crop appealed to Madison's practicality—it didn't deplete the soil. It also appealed to his conscience—it didn't demand so much slave labor. Anticipating that he'd someday run Montpelier, Madison kept a weather diary and studied new crop-rotation techniques and deep-furrow plowing methods. He once gave elaborate orders to Montpelier's overseers and laborers: Construct a hog shelter, build a plow, plant Irish potatoes in the corn rows, fence a meadow and plant 200 apple trees. In instructions that sound self-deluding today but were regarded as humane then, he told the overseers of his estate to "treat the Negroes with all the humanity & kindness consistent with their necessary subordination and work."

But Madison had more than Montpelier on his mind in those years. After a stint in the Virginia legislature and the Continental Congress, after leading the call for a new Constitutional Convention, he isolated himself at Montpelier for six months to ponder the shape a new American government should take. In the winter and spring of 1787, which Madison spent holed up at beautiful and benighted Montpelier, the nation we take for granted today was first imagined. Because if Jefferson, with his Declaration of Independence, was the poet of the American Revolution, Madison was its political scientist.

With his mild voice and powdered hair, black coat, stockings and buckled shoes, Madison hardly seemed to resemble the fellow Jefferson called the "greatest man in the world." But Madison presciently saw that the founding fathers' challenge was to create a government that could mediate between battling factions while working toward a vision of the public interest. Madison, who spoke to the convention more than 200 times, recognized the young republic's conflicting diversity in wealth, religion and business—the pluralism that had made the Baron de Montesquieu argue that democracy couldn't work in a giant nation. But Madison saw these sprawling, brawling factions not as a hindrance but as an asset. With so many competing interests, none could ever gain the upper hand. Then came the practical Madison's seminal contribution: He designed a Constitution that separated and dispersed federal power in legislative, executive and judicial branches and between state and federal governments—the American system of checks and balances.

By 1795, Madison had also brokered the Bill of Rights through Congress and was so famous that Jefferson believed that the Presidency was his for the asking. Instead, Madison left politics. He and Dolley shipped their belongings including their Louis XVI bed, Parisian carpets and Windsor chairs—not to mention 20 bundles of nails—to Montpelier. Madison, with the help of his friend Jefferson, was about to play architect on the mansion house.

He ordered a mountain of nails from Jefferson's plantation nailery: 50,000 fourpenny nails, 50,000 sixpenny, 20,000 tenpenny. Through Jefferson, Madison later purchased locks, door hinges and Bohemian windowpanes. Unlike Jefferson, Madison was no architectural savant. And there was nothing impulsive about him. He enlarged Montpelier by building a 30-foot mirror-image addition to the house and adding a centered front portico with four Tuscan columns. Montpelier's design was again practical—no fascinating Jeffersonian gadgets such as dumbwaiters or revolving-door passages that sent food to the dining room. In tune with Jefferson's tastes and the Classical Revival, Madison transformed the Georgian exterior of his father's mansion into the Federal style. Madison's portico columns, which he designed himself, weren't tall enough to stand in perfect classical proportion to Montpelier's height, but the porch did include classical touches popularized by Andrea Palladio and others: podium, plinths, columns, entablature and pediment. Hidden behind the elegant entrance to the practical Madison's new mansion was a simple duplex that allowed his mother and father to live there along with himself and Dolley and not drive one another crazy.

Madison's tastes were French, as were Jefferson's and those of other rabidly anti-British antimonarchists. But the results weren't egalitarian. After the French Revolution in 1789, Madison had bought furniture, curtains, silverware, wineglasses and even napkins from the beleaguered French nobility, making his purchases through James Monroe, a Virginia neighbor and future President, then a diplomat in Paris. At Montpelier, Madison hired a French gardener, who earned the then enormous salary of $700 a year. Dolley was a Parisian fashion plate, and Madison's palate ran toward Madeira, which handwritten invoices show was shipped to Montpelier as many as 20 cases at a time.

When she wed Madison in 1794, Dolley was a 26-year-old widow with an infant son. Ten years later, she posed in an elegant Empire gown for a portrait by Gilbert Stuart.

Madison was so caught up in his new life at Montpelier that he even refused Jefferson's request to write a series of anonymous newspaper assaults on their political archenemy Alexander Hamilton. "You must, my dear Sir, take up your pen," Jefferson wrote. Madison told Jefferson that he was shocked to learn of some of the governmental goings-on but then added that a terrible frost had killed his peach and cherry buds. A week later, Madison wrote again, politics still far from his mind: Could Jefferson please send along those locks and windowpanes?

But obligation and outrage got the best of Madison. After Jefferson became President in 1801, Madison left Montpelier and became Secretary of State to help battle what the two saw as Hamilton's oligarchic forces, which had shifted power from farmers to Eastern bankers and stock speculators. For 15 years, Madison and Dolley were again only occasional visitors to Montpelier. She became the first grande dame of Washington, D.C. He followed Jefferson as President and presided over the thumping of England in the War of 1812. Madison left office in 1817 with the nation's pride and his popularity supreme.

Home went the founding father—to a renovated Montpelier. During Madison's Presidency, workers had been busy recasting his house on a grander scale to reflect his new statesman-politician-philosopher status. He abandoned his amateur efforts at architecture and hired James Dinsmore, Jefferson's craftsman builder, who added two one-story wings, a rear colonnade and two indoor

The Montpelier in Your House

James Madison viewed his house as more than a grand showcase. Efficiency took priority over fancy for him as a home owner, and many of the functional elements he built into Montpelier prefigured those designed into modern houses.

CROSS VENTILATION: In an era when keeping a house cool was a monumental challenge, Montpelier featured an unobstructed passageway that stretched from front door to back windows. The passage has survived the house's many renovations.

PORCH: Madison and his wife, Dolley, helped make porches fashionable. The founding father kept a telescope under Montpelier's front portico to peer at the mountains or watch for travelers on the road. Dolley perched her pet parrot under the portico during the warm months.

FAMILY DUPLEX: When Madison added two wings to his house in the early 1800s, he also installed two kitchens: one for him and Dolley, the other for his widowed mother, Nelly. Two separate entrances to the mansion—in addition to the main entryway—allowed the two generations to keep their own hours and to maintain a semblance of privacy.

FACADE FACE-LIFT: Early expansion projects resulted in a facade with three different colors of brick. Madison covered the bricks with stucco to imitate the look of stone houses, which were in vogue during the early 1800s. *—Romy Pokorny*

ILLUSTRATION: ARCHIVE PHOTO

basement kitchens, one at either side of the house. The remodeled interior had large elegant rooms for the hordes of visitors Madison anticipated, while the privacy of Madison, Dolley and Madison's widowed mother was maintained in the rest of the house.

It was a huge project. The carpentry bill alone came to $4,229 at a time when it cost $25 a year to house, clothe and feed a slave. Dinsmore, two other craftsmen from Monticello and, no doubt, slaves from Montpelier worked for four years. New triple-hung European windows in the style Jefferson had popularized in this country caught the light, as did the fan and the Venetian doors. The renovation added egg-and-dart and ogee moldings, 600 feet of flooring and 95 feet of cornice. When Madison was done, the center of Montpelier rose 26 feet high and ran 88 feet long and 33 feet wide with a 35-by-22-foot one-story wing on each end. The portico spanned 49 feet.

On the north front lawn was a final touch, Madison's garden gazebo perhaps patterned on the Temple of Venus at Versailles. Beneath the structure, Madison dug an icehouse that provided his guests with ice cream and cool drinks all summer. Madison and Dolley knew how to throw a party. As many as 20 guests at a time stayed for days or weeks, all at Madison's expense. As the retired American equivalent of king and queen, they were beset by courtiers—family, friends, diplomats, politicians, power brokers and wanna-bes. Madison might talk of the government's duty to protect people holding unpopular beliefs, his commitment to freedom of the press or the imbecility of Southern secession from the Union. As one guest wrote in 1828, "Mr. Madison was the chief speaker."

In a shimmering 1812 wool on silk-satin needlepoint rendering of a newly renovated Montpelier, a fence bisects the lawn and suggests that passersby were kept a respectable distance from Madison's grand house.

Montpelier was a showplace. In line with Madison's belief that "art must teach," the house was adorned with 125 paintings—European landscapes and paintings of biblical scenes; Gilbert Stuart oil portraits of Washington, Jefferson, Madison and Dolley; portraits of the great explorers Cortez, Magellan, Columbus and Vespucci and sculptures of the classical deities Apollo and Venus. In Madison's 4-acre back garden, his French gardener tended pear, apple, peach, cherry, plum, fig and crab-apple trees that mingled with grape arbors, blueberry and strawberry patches, jonquils, daffodils, lilies, tulips, peonies, hollyhocks, roses and lilacs. Under his portico, Madison kept a telescope for surveying his domain, and he took daily rides on his horse Liberty.

Montpelier's architecture, artwork and gardens were meant to inspire a sense of the nobility of mankind—and, no doubt, to portray Madison as he wished to be seen. At Montpelier, Madison achieved the neoclassic ideal: He was the image of a Renaissance man living amid the serenity of natural and man-made beauty.

But with the opening of the West, the value of Virginia piedmont property dropped to nearly nothing. The U.S. banking system collapsed. Crop prices fell. Madison's neighbors including Jefferson and Monroe went bust. His stepson's boozing, womanizing and gambling cost Madison $40,000 in his lifetime. On top of that, he had more slaves than his worn-out land needed, and two thirds of them were too young, old or sick to work. The system that had financed his family for five generations was now costing him dearly. The French gardener retired to France.

Madison had hoped to free his slaves in his will, but he didn't. Black muscle, which could be sold to the deep South's cotton plantations, had become piedmont slaveholders' only liquid asset. Madison refused to breed slaves for the auction block but, to save Montpelier from ruin, he did sell slaves to masters the slaves had approved. He believed he had no choice.

But Madison's friend Edward Coles had freed his own slaves, taken them to Illinois and bought them land. He begged Madison to do likewise, saying the act would finally prove that he believed what the American Revolution had proclaimed 50 years earlier: All men are meant to be free. Madison refused. He feared that some of his slaves couldn't survive on their own. He feared for the financial security of Dolley, whose Virginian father had gone bankrupt after freeing his slaves and moving to the North. But maybe Madison also couldn't imagine living without artwork, lavish entertaining and fine Madeira. Guests to Montpelier reported that Madison was in despair over the "original sin of the African trade." But Montpelier kept its slaves.

In his last years, Madison was so broke that even the Bank of the United States, which he had rechartered as President, refused him a $6,000 loan. When Madison dropped his head and died in 1836, much of Montpelier was mortgaged. Soon, Dolley's son began hawking Madison's paintings, letters and furniture to pay his gambling debts. Dolley sold Montpelier, returned to Washington and lived in genteel poverty until she died. What happened to Madison's slaves? They were probably bought and sold for three more decades. Congress purchased Madison's Constitutional Convention notes and many of his papers. But nearly everything else at Montpelier was sold helter-skelter, artifacts lost to history. Eventually, William duPont buried Madison's house in his own grand creation. But without DuPont, Montpelier could easily be gone.

Today, the honchos at the National Trust are still wrestling with just how to position Montpelier on the founding-father historic-house circuit. They haven't tried to take Montpelier back to its look during Madison's era or to fill the house with replicas or art and furnishings from his day. The trust is trying instead to turn Montpelier's perceived weaknesses into advantages. Montpelier doesn't have tangible artifacts that will wow visitors. So tours delve into the mind of Madison and the generations of family privilege at Montpelier that created him. The guides talk unapologetically about the human and economic realities of slavery for slaves and owners. Montpelier will not be another museum of artifacts but a memorial to Madison's ideas, ideals and failings, which will remind us of the timeless and timely lessons of great reach and limited grasp.

So, is the story of Madison and Montpelier a triumph or tragedy? Both, no doubt. "If men were angels," Madison once wrote, "no government would be necessary." And if men were angels, no laws and institutions would be necessary to restrain their selfishness; no ideals would be necessary to inspire their selflessness. ■

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Original doors, sidelights and a fanlight—and one of Dolley's 1790 Windsor chairs—grace the Madisons' front portico, which faces west toward the Blue Ridge Mountains.

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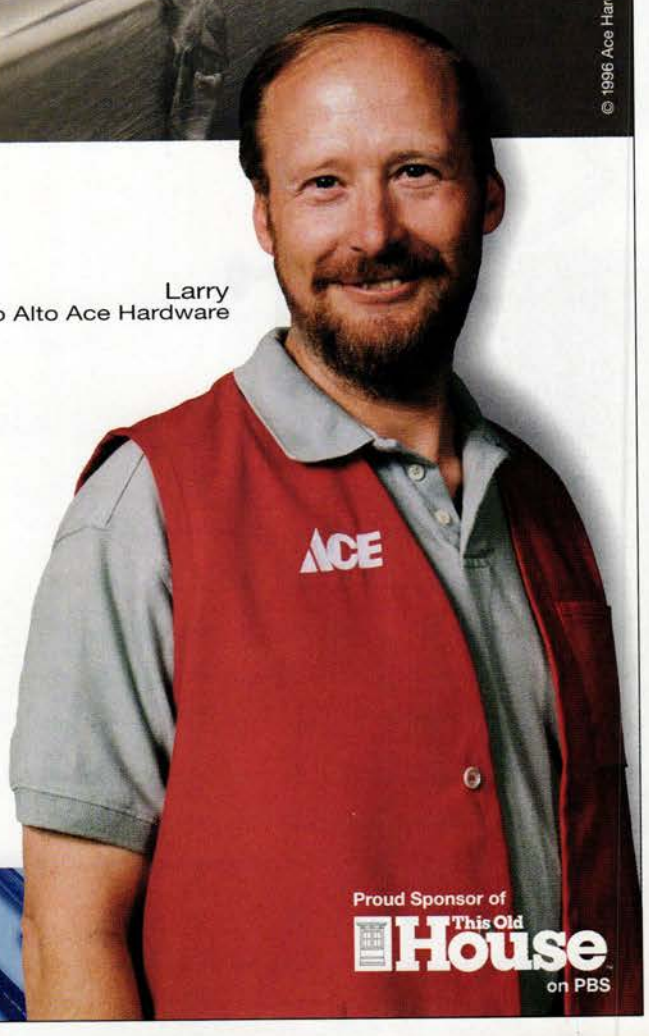

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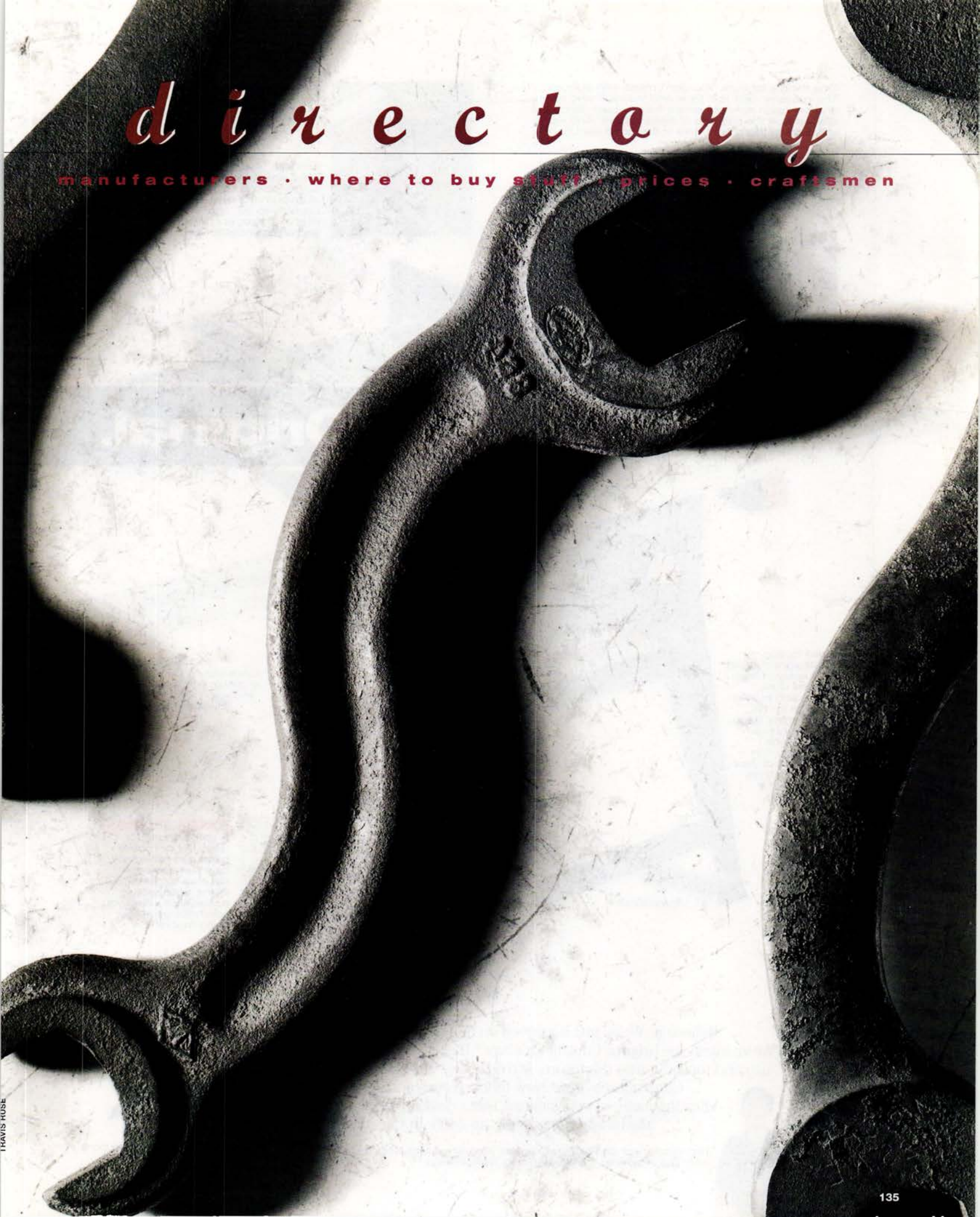

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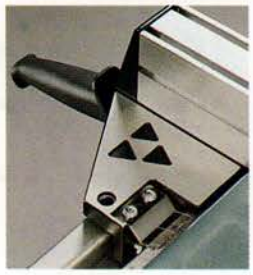

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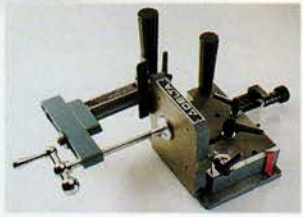

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Victorian Values

BY REBECCA REISNER

In a Boston suburb, the crew restores dignity to a house's misbegotten exterior

The "before": Asbestos siding, asphalt shingles and a stand of hemlock trees obscure the Belmont project house's elegant details—and size. "Chopping down the hemlocks in the side yard made that part of the house look twice as big," says Lauren Gallant.

Week 8 (November 7-8)

Taking a break from Lauren and Dean Gallant's 1907 Victorian-style house in Belmont, Massachusetts, Norm Abram travels to Wyoming's Shoshone National Forest to help preservation carpenters restore Anderson Lodge, a 1903 log cabin. Because authorities forbid the use of power tools in the forest, Norm and the Wyoming bunch use arm power to carve, chop and saw. ***Watch and learn:*** Notching a log.

Week 9 (November 14-15)

The crew continues renovating the project in Belmont, Massachusetts. With the exterior's offending asphalt shingles and asbestos siding removed, the home owners turn their attention to choosing appropriate colors. To assist, Steve Thomas travels to Wellesley, Massachusetts, where Andrea Gilmore of the Society for the Preservation of New England Antiquities explains how the historically correct colors of house paint were determined for an 1871 vacation cottage in the Shingle Style. Back in Belmont at the project house, Richard Trethewey and plumber Maura Russell clean and install fittings for the vents to the washing machine, the dryer and the drains. ***Watch and learn:*** Restoring exterior trim.

Resources: Latex stain and trim paint: Sherwin-Williams, 101 Prospect Ave., Cleveland, OH 44115; 216-566-2000. Pattern books: Richard Cheek, Belmont Historic District Commission, Belmont Town Hall, 455 Concord Ave., Belmont, MA 02478. Aerial lift: Shaughnessy Aerialifts, 346 D St., S. Boston, MA 02127; 617-268-3000. Plumbers: Maura Russell and Christine Ernst, Pipelines Inc., 1408-D Centre St., Roslyndale, MA 02131. PVC piping: Charlotte Pipe & Foundry Co., Box 35430, Charlotte, NC 28235; 800-438-6091.

The living room's quartersawn white-oak trim and paneling require only a wash and polish.

Week 10 (November 21-22)

To prepare to install a new back door in the kitchen hallway, Tom Silva begins building a stoop and stairs. Norm gives a lesson in replacing bottom shingles. Next, having supported the porch roof with a T brace and hydraulic jack, Norm removes the old, aesthetically unpleasing square columns and replaces them with tasteful, round columns. ***Watch and learn:*** Strengthening a stoop with biscuits and dadoes.

Resources: Tripolymer caulk and sealant: Pro-Flex, Geocel Corp., Box 398, Elkhart, Indiana 46515; 219-264-0645. Wood columns: Turncraft, Box 2429, White City, Oregon 97503; 800-423-3311. Fir decking: MacLeod & Moynihan Lumber Inc. (now F.D. Sterritt Lumber Co.), 110 Arlington Street, Watertown, Massachusetts 02172; 617-923-1480.

Week 11 (November 28-29)

With the trees outside the front door cut down, Steve and Norm enjoy an unobstructed view of the Belmont house. Out back, Norm answers the question "Why replace a roof that doesn't leak?" In preparation for the upcoming paint job, Lou DiSanto and his crew rid the house's exterior of dirt, mildew and fungus by first spraying on biodegradable cleaner, then pressure washing. ***Watch and learn:*** Installing wooden shingles.

Resources: Arborist: Matthew R. Foti Landscape & Tree Service, 30 Fairbanks Rd., Lexington, Massachusetts 02173; 781-861-0505. Replacement windows: J.B. Sash & Door Co., 280 Second St., Chelsea, Massachusetts 02150; 617-884-8940. Roof shingles: Western red cedar number one, 18-inch Perfections, Teal Cedar Products Ltd., 17897 Trigg Rd., Surrey, British Columbia V4N 4M8, Canada; 604-581-6161. Supplied by Furman Lumber Inc., Box 130, Nutting Lake, Massachusetts 01865; 978-670-3800. Wood roof information: Cedar Shake & Shingle Bureau, Box 1178, Sumas, Washington 98295; 604-462-8961. Roofing contractor: Normandin & Sons Steeplejacks, 3 Ham Road, Raymond, New Hampshire 03077; 978-454-6712. Copper flashing, roll-out ridge vent (Roll-Vent) and three-dimensional nylon mesh (Cedar Breather) for cedar roof: Benjamin Obdyke Inc., John Fitch Industrial Park, Warminster, Pennsylvania 18974; 800-523-5261. Painting contractor: DiSanto Painting and Finishes, 40 Perkins St., Wenham, MA 01984; 978-468-2724.

The Gallants plan to rip out the kitchen's 1950s red-and-white tiles to reveal the hard pine underneath.

PHOTOS: RICHARD HOWARD, COURTESY OF WGBH-TV

Tom Silva, Steve Thomas, Norm Abram and Richard Trethewey take a break beneath a 200-year-old white oak tree in the front yard.

In a Wyoming forest, Norm travels four hours by horseback—and 90 years back in time—to Anderson Lodge, an electricity-prohibited jobsite.

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WBIQ, Thu. 8:30 p.m., Sat. 8 p.m.
● WCFT, Sun. 6 a.m.

DEMOPOLIS
WIIQ, Thu. 8:30 p.m., Sat. 8 p.m.

DOZIER
WDIQ, Thu. 8:30 p.m., Sat. 8 p.m.

FLORENCE
WFIQ, Thu. 8:30 p.m., Sat. 8 p.m.

HUNTSVILLE
WHIQ, Thu. 8:30 p.m., Sat. 8 p.m.
● WZDX, Sun. 8:30 a.m.

LOUISVILLE
WGIQ, Thu. 8:30 p.m., Sat. 8:30 p.m.

MOBILE
WALA, Sat. 5 a.m.
WEIQ, Thu. 8:30 p.m., Sat. 8 p.m.

MONTGOMERY
WAIQ, Thu. 8:30 p.m., Sat. 8 p.m.

MOUNT CHEAHA
WCIQ, Thu. 8:30 p.m., Sat. 8 p.m.

ALASKA

ANCHORAGE
KAKM, Mon. 6 p.m., Thu. 8:30 p.m., Sat. 8:30 a.m.
● KIMO, Sun. 3 p.m.

FAIRBANKS
KUAC, Fri. 8 p.m., Sat. 8 a.m.
● KATN, Sun. 3 p.m.

JUNEAU
KTOO, Fri. 8 p.m., Sat. 8 a.m.
● KJUD, Sun. 3 p.m.

ARIZONA

PHOENIX
KAET, Thu. 2 p.m., 7:30 p.m., Sat. 10 a.m. and 5 p.m.
● KNXV, Sun. 10 a.m.

TUCSON
KUAS, Sat. 11 a.m., 6:30 p.m.
KUAT, Sat. 11 a.m., 6:30 p.m.
● KTTU, Sat. 9 a.m.

ARKANSAS

ARKADELPHIA
KETG, Sat. 12:30 p.m.

FAYETTEVILLE
KAFT, Sat. 12:30 p.m.

JONESBORO
KTEJ, Sat. 12:30 p.m.

LITTLE ROCK
KETS, Sat. 12:30 p.m.
● KTHV, Sat. 11 a.m.

MOUNTAIN VIEW
KEMV, Sat. 12:30 p.m.

CALIFORNIA

CHICO
● KRCR, Sun. 5 p.m.

EUREKA
KEET, Wed. 7:30 p.m., Sat. 10:30 a.m.
● KAEF, Sun. 5 p.m.

FRESNO
KVPT, Sat. 9:30 a.m., Sun. 7 p.m.

HUNTINGTON BEACH
KOCE, Sat. 4:30 p.m., Tues. 8 p.m.

LOS ANGELES
KCET, Sat. 5:30 p.m.
● KABC, Sun. 6 a.m.

REDDING
KIXE, Sat. 10:30 a.m.

ROHNERT PARK
KRCB, Sun. 7:30 p.m., Wed. noon

SACRAMENTO
KVIE, Thu. 8 p.m., Sat. 8:30 a.m.

SAN BERNARDINO
KVCR, Thu. 7 p.m.

SAN DIEGO
KPBS, Sat. 11:30 a.m.
● KGTV, Sun. 4 p.m.

SAN FRANCISCO
KQED, Sat. 5 p.m.
● KPIX, Sun. 10 a.m.

SAN JOSE
KTEH, Sat. 3 p.m., Sun. 4:30 p.m.

SAN MATEO
KCSM, Tues. 6:30 p.m., Sun. 10 a.m.

SANTA BARBARA
● KSBY, Sun. 6 a.m.

COLORADO

BOULDER
KBDI, Wed. 3:30 a.m. and 5:30 p.m., Sat. 5:30 p.m., Sun. 4 p.m.

COLORADO SPRINGS
● KRDO, Sat. 1 p.m.

DENVER
KRMA, Sat. 2 p.m., Sun. 5:30 p.m.
● KCNC, Sun. midnight

GRAND JUNCTION
● KJCT, Sat. 1 p.m.

PUEBLO
KTSC, Thu. 7:30 p.m., Sat. 2:30 p.m.

CONNECTICUT

FAIRFIELD
WEDW, Thu. 11:30 p.m., Fri. noon, Sat. 7 p.m., Sun. 10:30 a.m.

HARTFORD
WEDH, Thu. 11:30 p.m., Fri. noon, Sat. 7 p.m., Sun. 10:30 a.m.
● WFSB, Sat. 9:30 a.m.

NEW HAVEN
WEDY, Thu. 11:30 p.m., Fri. noon, Sat. 7 p.m., Sun. 10:30 a.m.

NORWICH
WEDN, Thu. 11:30 p.m., Fri. noon, Sat. 7 p.m., Sun. 10:30 a.m.

DISTRICT OF COLUMBIA

WETA, Sat. 9:30 a.m.
● WRC, Sat. 5:30 a.m.

FLORIDA

BONITA SPRINGS
● WGCU, Sat. 12 p.m., 12:30 p.m., Sat. 1:30 p.m., Sun. 5 p.m.

DAYTONA BEACH
WCEU, Tue. 8 p.m., Sat. 5:30 p.m.

FORT MYERS
● WTVK, Sat. 5:30 a.m.

GAINESVILLE
WUFT, Sat. 9:30 a.m., 1:30 p.m.
● WCJB, Sat. 2 p.m.

JACKSONVILLE
WJCT, Sat. noon

MIAMI
WLRN, Sun. 10 a.m.
WPBT, Sat. 11 a.m.
● WPLG, Sun. 8 a.m.

ORLANDO
WMFE, Sat. 9 a.m. and 1 p.m., Sun. 9 a.m.

PENSACOLA
WSRE, Sat. 12:30 p.m. and 6 p.m.

SARASOTA
● WWSB, Sun. 11:30 a.m.

TALLAHASSEE
WFSU, Sat. 1:30 p.m. and 6 p.m.

TAMPA
WEDU, Sat. 11:30 a.m.
WUSF, Wed. 9 p.m., Sun. 5:30 p.m.
● WTVT, Sun. 10 a.m.

WEST PALM BEACH
● WPTV, Sun. 6 a.m., noon

GEORGIA

ALBANY
● WGVP, Sun. 9 a.m.

ATLANTA
WGTV, Thu. 8:30 p.m., Sat. 5:30 p.m., Sun. 7 p.m.
WPBA, Mon. 8 p.m., Wed. 2 p.m., Sat. 6 p.m.
● WXIA, Sat. 5 a.m.

CHATSWORTH
WCLP, Thu. 8:30 p.m., Sat. 5:30 p.m., Sun. 7 p.m.

COCHRAN
WDCO, Thu. 8:30 p.m., Sat. 5:30 p.m., Sun. 7 p.m.

COLUMBUS
WJSP, Thu. 8:30 p.m., Sat. 5:30 p.m., Sun. 7 p.m.

DAWSON
WACS, Thu. 8:30 p.m., Sat. 5:30 p.m., Sun. 7 p.m.

MACON
● WMAZ, Sat. 1 p.m.

PELHAM
WABW, Thu. 8:30 p.m., Sat. 5:30 p.m., Sun. 8 p.m.

SAVANNAH
WVAN, Thu. 8:30 p.m., Sat. 5:30 p.m., Sun. 7 p.m.
● WTOC, Sun. 1 p.m.

WAYCROSS
WXGA, Thu. 8:30 p.m., Sat. 5:30 p.m., Sun. 7 p.m.

WRENS
WCES, Thu. 8:30 p.m., Sat. 5:30 p.m., Sun. 7 p.m.

HAWAII

HONOLULU
KHET, Sat. 7:30 a.m.
● KHNL, Sun. 3 p.m.

WAILUKU
KMEB, Sat. 7:30 a.m.

IDAHO

BOISE
KAID, Sun. 4:30 p.m.
● KTRV, Sun. 10:30 a.m.

COEUR D'ALENE
KCDT, Sun. 3:30 p.m.

MOSCOW
KUID, Sun. 3:30 p.m.

POCATELLO
KISU, Sun. 4:30 p.m.

TWIN FALLS
KIPT, Sun. 4:30 p.m.

ILLINOIS

CARBONDALE
WSIU, Thu. 7 p.m., Fri. 12:30 p.m., Sat. 12:30 p.m.

CHAMPAIGN/URBANA
● WAND, Sat. 5:30 a.m.
WILL, Thu. 7:30 p.m., Sun. 3:30 p.m.

CHARLESTON
WEIU, Sat. 8:30 p.m.

CHICAGO
WTTW, Tue. 7:30 p.m., Thu. 1:30 a.m.
● WFLD, Sun. 11 a.m., 11:30 a.m.

JACKSONVILLE
WSEC, Thu. 10 p.m., Sun. 1:30 p.m.

MACOMB
WMEC, Thu. 10 p.m., Sun. 1:30 p.m.

MOLINE
WQPT, Tue. 7 p.m., Sat. 5:30 p.m.

OLNEY
WUSI, Thu. 7 p.m., Fri. 12:30 p.m., Sat. 12:30 p.m.

PEORIA
WTVP, Sat. 12:30 p.m., Thu. 10 p.m.
● WHOI, Sat. 5:30 p.m.

QUINCY
WQEC, Thu. 10 p.m., Sun. 1:30 p.m.

ROCKFORD
● WTVO, Sat. 6:30 p.m.

SPRINGFIELD
● WICS, Sat. 7:30 a.m.

INDIANA

BLOOMINGTON
WTIU, Thu. 11 p.m., Sat. 12:30 p.m.

EVANSVILLE
WNIN, Sat. 12:30 p.m. and 6 p.m.
● WFIE, Sun. 6 a.m.

FORT WAYNE
WFWA, Sat. 10 a.m.

INDIANAPOLIS
WFYI, Sat. 10 a.m., Sun. 6 p.m.
● WTHR, Sun. 6:30 a.m.

MERRILLVILLE
WYIN, Thu. 7 p.m., Sun. 3:30 p.m.

MUNCIE
WIPB, Sun. 4:30 p.m.

SOUTH BEND
WNIT, Wed. 7 p.m., Sat. 2 p.m.

TERRE HAUTE
● WTWO, Sun. 6 a.m.

VINCENNES
WVUT, Sat. 12:30 p.m.

IOWA

CEDAR RAPIDS
● KWWL, Sat. 5:30 a.m.

COUNCIL BLUFFS
KBIN, Fri. 6:30 p.m., Sat. 1:30 p.m.

DAVENPORT
KQCT, Tue. 7 p.m., Sat. 5:30 p.m.
● WQAD, Sun. 11 a.m.

DES MOINES
KDIN, Fri. 6:30 p.m., Sat. 1:30 p.m.

FORT DODGE
KTIN, Fri. 6:30 p.m., Sat. 1:30 p.m.

IOWA CITY
KIIN, Fri. 6:30 p.m., Sat. 1:30 p.m.

MASON CITY
KYIN, Fri. 6:30 p.m., Sat. 1:30 p.m.

RED OAK
KHIN, Fri. 6:30 p.m., Sat. 1:30 p.m.

SIOUX CITY
KSIN, Fri. 6:30 p.m., Sat. 1:30 p.m.

WATERLOO
KRIN, Fri. 6:30 p.m., Sat. 1:30 p.m.

KANSAS

BUNKER HILL
KOOD, Thu. 7 p.m., Sat. 12:30 p.m.

LAKIN
KSWK, Thu. 7 p.m., Sat. 12:30 p.m.

TOPEKA
KTWU, Sat. 9:30 a.m.

WICHITA
KPTS, Sat. 10 a.m., Sun. 10 a.m.
● KSNW, Sun. 6:30 a.m.

KENTUCKY

ASHLAND
WKAS, Sun. 5 p.m.

BOWLING GREEN
WKGB, Sun. 4 p.m.
WKYU, Tue. 1 p.m. and 6:30 p.m.
● WBKO, Sun. 6:30 a.m.

COVINGTON
WCVN, Sun. 5 p.m.

ELIZABETHTOWN
WKZT, Sun. 5 p.m.

HAZARD
WKHA, Sun. 5 p.m.

LEXINGTON
WKLE, Sun 5 p.m.
● WTVQ, Sat. 6 a.m.

LOUISVILLE
WKMJ, Fri. 7:30 p.m.
WKPC, Sun. 5 p.m.
● WAVE, Sat. 6:30 a.m.

MADISONVILLE
WKMA, Sun. 5 p.m.

MOREHEAD
WKMR, Sun. 5 p.m.

MURRAY
WKMU, Sun. 5 p.m.

OWENSBORO
WKOH, Sun. 4 p.m.

OWENTON
WKON, Sun. 5 p.m.

PADUCAH
WKPD, Sun. 5 p.m.
● WDKA, Sun. 11 a.m.

PIKEVILLE
WKPI, Sun. 5 p.m.

SOMERSET
WKSO, Sun. 5 p.m.

LOUISIANA

ALEXANDRIA
KLPA, Sun. 10 a.m.

BATON ROUGE
KLPB, Sun. 10 a.m.
● KWBJ, Sun. 12:30 p.m.

LAFAYETTE
KLPB, Sun. 10 a.m.

LAKE CHARLES
KLTL, Sun. 10 a.m.

MONROE
KLTM, Sun. 10 a.m.

NEW ORLEANS
WYES, Sat. 8:30 a.m.
● WVUE, Sat. 6 a.m.

SHREVEPORT
KLTS, Sun. 10 a.m.
● KTBS, Sun. 6 a.m.

MAINE

BANGOR
WMEB, Sat. 1:30 p.m.

CALAIS
WMED, Sat. 1:30 p.m.

LEWISTON
WCBB, Sat. 1:30 p.m.

PORTLAND
WMEA, Sat. 1:30 p.m.
● WPXT, Sun. 8 a.m.

PRESQUE ISLE
WMEM, Sat. 1:30 p.m.

MARYLAND

ANNAPOLIS
WMPT, Sat. 4:30 p.m., Sun. 6:30 p.m.

BALTIMORE
WMPB, Sat. 4:30 p.m., Sun. 6:30 p.m.
● WMAR, Sat. 11:30 a.m.

FREDERICK
WFPT, Sat. 4:30 p.m., Sun. 6:30 p.m.

HAGERSTOWN
WWPB, Sat. 4:30 p.m., Sun. 6:30 p.m.

OAKLAND
WGPT, Sat. 4:30 p.m., Sun. 6:30 p.m.

SALISBURY
WCPB, Sat. 4:30 p.m., Sun. 6:30 p.m.

MASSACHUSETTS

BOSTON
WGBH, Thu. 8 p.m., Sat. 5:30 p.m.
WGBX, Sun. 9 a.m.
● WFXT, Sun. 9:30 a.m.

SPRINGFIELD
WGBY, Thu. 8 p.m., Sat. 5:30 p.m.

MICHIGAN

ALPENA
WCML, Sat. 2:30 p.m.

BAD AXE
WUCX, Tue. 12:30 p.m., Sun. 5 p.m.

CADILLAC
WCMV, Sat. 2:30 p.m.
● WWTV/WWUP, Sun. 10:30 a.m.

DETROIT
WTVS, Thu. 8:30 p.m., Fri. 1 a.m., Sat. 10 a.m.
● WDIV, Sat. 6:30 a.m.

EAST LANSING
WKAR, Thu. 9 p.m., Sat. 1:30 p.m., Sun. 5 p.m.

FLINT
WFUM, Thu. 9:30 p.m., Sat. 1:30 p.m.
● WEYI, Sun. 10:30 a.m.

GRAND RAPIDS
WGVU, Thu. 8:30 p.m., Sat. 10 a.m.
● WOOD/WOTV, Sun. 11 a.m.

KALAMAZOO
WGVK, Thu. 8:30 p.m., Sat. 10 a.m.

LANSING
● WILX, Sun. 6 a.m.

MANISTEE
WCMW, Sat. 2:30 p.m.

MARQUETTE
WNMU, Sat. 1:30 p.m.

MOUNT PLEASANT
WCMU, Sat. 2:30 p.m.

UNIVERSITY CENTER
WUCM, Tue. 12:30 p.m., Sun. 5 p.m.

MINNESOTA

APPLETON
KSMN, Sat. 12:30 p.m., Thu. 8 p.m.
KWCM, Sat. 12:30 p.m., Thu. 8 p.m.

AUSTIN
KSMQ, Thu. 7 p.m., Sat. 12:30 p.m.

BEMIDJI
KAWE, Thu. 7:30 p.m., Sat. 12:30 p.m.

BRAINERD
KAWB, Thu. 7:30 p.m., Sat. 12:30 p.m.

DULUTH
WDSE, Sat. 6:30 p.m., Sun. 9:30 a.m.

ROCHESTER
● KAAL, Sun. 7:30 a.m.

ST. PAUL/MINNEAPOLIS
KTCA, Wed. 7:30 p.m., Sat. 6:30 p.m.
● KSTP, Sun. 11:30 a.m.

MISSISSIPPI

BILOXI
WMAH, Sat. 6:30 p.m.

BOONEVILLE
WMAE, Sat. 6:30 p.m.

BUDE
WMAU, Sat. 6:30 p.m.

GREENWOOD
WMAO, Sat. 6:30 p.m.

JACKSON
WMPN, Sat. 6:30 p.m.

MERIDIAN
WMAW, Sat. 6:30 p.m.

MISSISSIPPI STATE
WMAB, Sat. 6:30 p.m.

OXFORD
WMAV, Sat. 6:30 p.m.

MISSOURI

COLUMBIA
● KRCG, Sun. 5 a.m.

JOPLIN
● KOAM, Sat. 5 a.m.
KOZJ, Sat. 12:30 p.m.

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KANSAS CITY
KCPT, Thu. 7 p.m., Sat. 12:30 p.m.
● KMBC, Sat. 6:30 a.m.

ST. LOUIS
KETC, Wed. 12:30 p.m., Sat. 6:30 p.m.
● KTVI, Sun. 10 a.m.

SEDALIA
KMOS, Sat. 12:30 p.m.

SPRINGFIELD
KOZK, Sat. 12:30 p.m.
● KSPR, Sun. 11 a.m.

MONTANA

BOZEMAN
KUSM, Wed. 11:30 p.m., Sat. 11:30 a.m.

MISSOULA
KUFM, Wed. 11:30 p.m., Sat. 11:30 a.m.

NEBRASKA

ALLIANCE
NETV, Sat. 10 a.m. and 5:30 p.m.

BASSETT
NETV, Sat. 10 a.m. and 5:30 p.m.

HASTINGS
NETV, Sat. 10 a.m. and 5:30 p.m.

LEXINGTON
KLNE, Sat. 10 a.m. and 5:30 p.m.

LINCOLN
NETV, Sat. 10 a.m. and 5:30 p.m.
● KHAS, Sat. 5 p.m.

MERRIMAN
NETV, Sat. 10 a.m. and 5:30 p.m.

NORFOLK
NETV, Sat. 10 a.m. and 5:30 p.m.

NORTH PLATTE
NETV, Sat. 10 a.m. and 5:30 p.m.

OMAHA
NETV, Sat. 10 a.m. and 5:30 p.m.

NEVADA

LAS VEGAS
KLVX, Sat. 9 a.m. and 12:30 p.m., Sun. 7 p.m.
● KTNV, Sun. 8:30 a.m.

RENO
KNPB, Sat. 10:30 a.m., Sun. 5 p.m.
● KAME, Sat. 11:30 a.m.

NEW HAMPSHIRE

DURHAM
WENH, Thu. 8:30 p.m., Sun. 10 a.m.

KEENE
WEKW, Thu. 8:30 p.m., Sun. 10 a.m.

LITTLETON
WLED, Thu. 8:30 p.m., Sun. 10 a.m.

MANCHESTER
● WMUR, Sat. 6 a.m.

NEW JERSEY

CAMDEN
WNJS, Thu. 8 p.m., Sat. 8 p.m., Sun. 5:30 p.m.

MONTCLAIR
WNJN, Thu. 8 p.m., Sat. 8 p.m., Sun. 5:30 p.m.

NEW BRUNSWICK
WNJB, Thu. 8 p.m., Sat. 8 p.m., Sun. 5:30 p.m.

TRENTON
WNJT, Thu. 8 p.m., Sat. 8 p.m., Sun. 5:30 p.m.

NEW MEXICO

ALBUQUERQUE
KNME, Sun. 7 a.m. and 10 a.m., Thu. 7 p.m.

LAS CRUCES
KRWG, Sat. 11:30 a.m.

PORTALES
KENW, Wed. 10:30 p.m., Sat. 4 p.m.

NEW YORK

ALBANY
● WXXA, Sun. 10 a.m.

BINGHAMTON
WSKG, Sat. 8 a.m., Sun. 7 p.m.
● WBNG, Sat. 6:30 a.m.

BUFFALO
WNED, Sat. 6:30 p.m.
WNEQ, Sun. 7 p.m.
● WIVB, Sun. 10:30 a.m.

ELMIRA
● WYDC*

LONG ISLAND
WLIW, Sat. 10:30 a.m., Sun. 8 p.m.

NEW YORK CITY
WNET, Sat. 5:30 p.m.
● WCBS, Sun. 7:30 a.m.

NORWOOD
WNPI, Sat. 10:30 a.m.

PLATTSBURGH
WCFE, Sun. 11:30 a.m.

ROCHESTER
WXXI, Sat. 10:30 a.m., Sun. 5:30 p.m.
● WHEC, Sun. 6 a.m.

SCHENECTADY
WMHT, Sat. 10:30 a.m.
WMHQ, Sun. 9:30 a.m.

SYRACUSE
WCNY, Sat. 10:30 a.m.
● WSTM, Sun. 8:30 a.m.

WATERTOWN
WNPE, Sat. 10:30 a.m.

NORTH CAROLINA

ASHEVILLE
WUNF, Sat. 5:30 p.m., Sun. 9 a.m.

CHAPEL HILL
WUNC, Sat. 5:30 p.m., Sun. 9 a.m.

CHARLOTTE
WTVI, Thu. 8 p.m., Sat. 5 p.m., Sun. 11 a.m.
WUNG, Sat. 5:30 p.m., Sun. 9 a.m.
● WSOC, Sat. 6:30 a.m.

COLUMBIA
WUND, Sat. 5:30 p.m., Thu. 8 p.m.

GREENSBORO
● WGHP, Sat. 6:30 a.m., Sun. noon

GREENVILLE
WUNK, Sat. 5:30 p.m., Sun. 9 a.m.
● WLOS/WFBC, Sat. 7 a.m.

JACKSONVILLE
WUNM, Sat. 5:30 p.m., Sun. 9 a.m.

LINVILLE
WUNE, Sat. 5:30 p.m., Sun. 9 a.m.

LUMBERTON
WUNU, Sat. 5:30 p.m., Sun. 9 a.m.

RALEIGH
● WTVD, Sun. 6:30 a.m.

ROANOKE RAPIDS
WUNP, Sat. 5:30 p.m., Sun. 9 a.m.

WILMINGTON
WUNJ, Sat. 5:30 p.m., Sun. 9 a.m.

WINSTON-SALEM
WUNL, Sat. 5:30 p.m., Sun. 9 a.m.

NORTH DAKOTA

BISMARCK
KBME, Thu. 7 p.m., Sat. 6 p.m.

DICKINSON
KDSE, Thu. 7 p.m., Sat. 6 p.m.

ELLENDALE
KJRE, Thu. 7 p.m., Sat. 6 p.m.

FARGO
KFME, Thu. 7 p.m., Sat. 6 p.m.

GRAND FORKS
KGFE, Thu. 7 p.m., Sat. 6 p.m.

MINOT
KSRE, Thu. 7 p.m., Sat. 6 p.m.

WILLISTON
KWSE, Thu. 7 p.m., Sat. 6 p.m.

OHIO

AKRON
WEAO, Sat. 10:30 a.m. and 5 p.m., Sun. 4 p.m.

ATHENS
WOUB, Sat. 5 p.m.

BOWLING GREEN
WBGU, Sat. 1:30 p.m., Mon. 3 p.m.

CAMBRIDGE
WOUC, Sat. 5 p.m.

CINCINNATI
WCET, Thu. 8 p.m., Sat. 9 a.m. and 6 p.m.
● WCPO, Sun. 6 a.m.

CLEVELAND
WVIZ, Sat. 1 p.m., Sun. 12:30 p.m.
● WEWS, Sun. 6 a.m.

COLUMBUS
WOSU, Thu. 8 p.m., Sat. 4:30 p.m.
● WSYX, Sun. 9:30 a.m.

DAYTON
WPTD, Thu. 8 p.m., Sat. 9:30 a.m.
● WRGT, Sun. 10 a.m.

OXFORD
WPTO, Mon. 7:30 p.m. Sun. 12:30 p.m.

PORTSMOUTH
WPBO, Thu. 8 p.m., Sat. 4:30 p.m.

TOLEDO
WGTE, Thu. 8 p.m., Sat. 1 p.m., Sun. 1 p.m.
● WTVG, Sun. 9:30 a.m.

WHEELING
● WTRF*

YOUNGSTOWN
WNEO, Sat. 10:30 a.m. and 5 p.m., Sun. 4 p.m.
● WFMJ, Sun. 10 a.m.

OKLAHOMA

CHEYENNE
KWET, Sat. 9:30 a.m. and 12:30 p.m.

EUFAULA
KOET, Sat. 9:30 a.m. and 12:30 p.m.

OKLAHOMA CITY
KETA, Sat. 9:30 a.m. and 12:30 p.m.
● KOCO, Sun. noon

TULSA
KOED, Sat. 9:30 a.m. and 12:30 p.m.
● KTUL, Sun. 12:30 p.m.

OREGON

BEND
KOAB, Thu. 8 p.m., Sat. 5 p.m.

CORVALLIS
KOAC, Thu. 8 p.m., Sat. 5 p.m.

EUGENE
KEPB, Thu. 8 p.m., Sat. 5 p.m.
● KEZI, Sun. 12:30 p.m.

KLAMATH FALLS
KFTS, Thu. 8 p.m., Sat. 10:30 a.m.

LA GRANDE
KTVR, Thu. 8 p.m., Sat. 5 p.m.

MEDFORD
KSYS, Thu. 8 p.m., Sat. 10:30 a.m.
● KOBI/KOTI, Sun. 4 p.m.

PORTLAND
KOPB, Thu. 8 p.m., Sat. 5 p.m.
● KATU, Sat. 5:30 a.m.

PENNSYLVANIA

ALLENTOWN
WLVT, Fri. 7:30 p.m., Sat. 12:30 p.m.

ERIE
WQLN, Sat. 6:30 p.m.
● WJET, Sat. 6:30 a.m.

HARRISBURG
WITF, Thu. 8 p.m., Sat. 9 a.m. and 6 p.m.
● WGAL, Sun. 11 a.m.

JOHNSTOWN
● WWCP/WATM, Sun. 9 a.m.

PHILADELPHIA
WHYY, Sat. 11 a.m. and 6 p.m., Sun. 7 p.m.
● WTXF, Sun., 8:30 a.m.

PITTSBURGH
WQED, Sat. 5 p.m.
WQEX, Sat. 5 p.m.

PITTSTON
WVIA, Thu. 8 p.m., Sat. 5 p.m. and 5:30 p.m.

UNIVERSITY PARK
WPSX, Sat. 9 a.m. and 5:30 p.m., Sun. 4:30 p.m.

WILKES-BARRE
● WYOU, Sun. 11:30 a.m.

RHODE ISLAND

PROVIDENCE
WSBE, Tue. 8:30 p.m., Sun. 6 p.m.
● WLNE, Sun. 1:30 a.m.

SOUTH CAROLINA

ALLENDALE
WEBA, Sat. 4 p.m.

BEAUFORT
WJWJ, Sat. 4 p.m.

CHARLESTON
● WCSC, Sun. 5:30 a.m.
WITV, Sat. 4 p.m.

COLUMBIA
● WLTX, Sun. 6 a.m.
WRLK, Sat. 4 p.m.

CONWAY
WHMC, Sat. 4 p.m.

FLORENCE
WJPM, Sat. 4 p.m.

GREENVILLE
WNTV, Sat. 4 p.m.

GREENWOOD
WNEH, Sat. 4 p.m.

ROCK HILL
WNSC, Sat. 4 p.m.

SPARTANBURG
WRET, Sat. 4 p.m.

SUMTER
WRJA, Sat. 4 p.m.

SOUTH DAKOTA

ABERDEEN
KDSD, Sat. 4 p.m.

BROOKINGS
KESD, Sat. 4 p.m.

EAGLE BUTTE
KPSD, Sat. 4 p.m.

LOWRY
KQSD, Sat. 4 p.m.

MARTIN
KZSD, Sat. 4 p.m.

PIERRE
KTSD, Sat. 4 p.m.

RAPID CITY
KBHE, Sat. 4 p.m.
● KCLO, Sat. 4 p.m.

SIOUX FALLS
KCSD, Sat. 4 p.m.
● KELO, Sat. 5 p.m.

VERMILLION
KUSD, Sat. 4 p.m.

TENNESSEE

CHATTANOOGA
WTCI, Sat. 1:30 p.m.

COOKEVILLE
WCTE, Sat. 12:30 p.m.

KNOXVILLE
WKOP, Sat. 1:30 p.m.
WSJK, Sat. 1:30 p.m.
● WATE, Sun. 5:30 a.m.

LEXINGTON-MARTIN
WLJT, Thu. 9:30 p.m., Sat. 12:30 p.m.

MEMPHIS
WKNO, Thu. 7 p.m., Sat. 9:30 a.m.

NASHVILLE
WDCN, Sat. 4:30 p.m.
● WKRN, Sat. 6:30 a.m.

TRI-CITIES
● WKPT/WAPK, Sat. 10:30 a.m.

TEXAS

AMARILLO
KACV, Sat. 12:30 p.m.
● KFDA, Sat. 5 p.m.

AUSTIN
KLRU, Sat. 5 p.m.
● KTBC, Sat. 7:30 a.m.

BEAUMONT
● KBMT, Sat. 5:30 a.m.

COLLEGE STATION
KAMU, Sat. 12:30 p.m., Mon. 10 p.m., Wed. 2 p.m.

CORPUS CHRISTI
KEDT, Sat. 12:30 p.m. and 10 p.m.
● KRIS/KDF*

DALLAS/FORT WORTH
KERA, Sat. 9 a.m., 6:30 p.m.
● KXAS/KXTX, Sat. 12:30 p.m.

EL PASO
KCOS, Sat. 5 p.m.

HARLINGEN
KMBH, Sat. 12:30 p.m.
● KVEO, Sun. 6 a.m.

HOUSTON
KUHT, Sun. 11:30 a.m.
● KTRK, Sun. 11 a.m.

KILLEEN
KNCT, Sat. 12:30 p.m., Sun. 9:30 a.m.

LUBBOCK
KTXT, Thu. noon, Sat. 12:30 p.m.
● KLBK, Sun. 5 p.m.

ODESSA
KOCV, Sun. 12:30 p.m.

SAN ANTONIO
KLRN, Sat. 1:30 p.m.

TYLER
● KLPN, Sat. 10 a.m.

WACO
KCTF, Mon. 12:30 p.m. Sat. 6:30 p.m.
● KXXV, Sun. 11 a.m.

UTAH

PROVO
KBYU, Sat. 9:30 a.m., Wed. 11 p.m.

SALT LAKE CITY
KUED, Sat. 8 a.m. and 5 p.m.
● KTVX, Sun. 11 a.m.

VERMONT

BURLINGTON
WETK, Thu. 8 p.m., Sat. 11 a.m.
● WCAX, Sun. 8:30 a.m.

RUTLAND
WVER, Thu. 8 p.m., Sat. 11 a.m.

ST. JOHNSBURY
WVTB, Thu. 8 p.m., Sat. 11 a.m.

WINDSOR
WVTA, Thu. 8 p.m., Sat. 11 a.m.

VIRGINIA

CHARLOTTESVILLE
WHTJ, Sat. 8:30 a.m.

FALLS CHURCH
WNVT, Sat. 2:30 p.m.

HARRISONBURG
WVPT, Sat. 1:30 p.m.
WVPY, Sat. 1:30 p.m.

MARION
WMSY, Fri. 11 p.m., Sat. 1:30 p.m.

NORFOLK
WHRO, Sat. 8:30 a.m. and 2 p.m.

NORTON
WSBN, Fri. 11 p.m., Sat. 1:30 p.m.

RICHMOND
WCVE, Sat. 8:30 a.m.
WCVW, Fri. 8:30 p.m.
● WAWB, Sun. 6 a.m.

ROANOKE
WBRA, Fri. 11 p.m., Sat. 1:30 p.m.
● WSLS, Sun. 6:30 a.m.

WASHINGTON

CENTRALIA
KCKA, Thu. 7 p.m., Sat. 12:30 p.m. and 5:30 p.m.

PULLMAN
KWSU, Mon. 7:30 p.m., Wed. 7:30 a.m., Sat. 2 p.m.

RICHLAND
KTNW, Thu. 7 p.m. Sat. 2 p.m., Sun. 4:30 p.m.

SEATTLE
KCTS, Sun. 5 p.m.
● KIRO, Sun. 10 a.m.

SPOKANE
KSPS, Sat. 9:30 a.m., Sun. 5:30 p.m.
● KXLY, Sun. 9:30 a.m.

TACOMA
KBTC, Thu. 7 p.m., Sat. 12:30 p.m. and 5:30 p.m.

YAKIMA
KYVE, Sun. 5 p.m.

WEST VIRGINIA

BECKLEY
WSWP, Sat. 1:30 p.m.

BLUEFIELD
● WOAY*

CHARLESTON
● WCHS, Sun. 6 a.m.

HUNTINGTON
WPBY, Sat. 1:30 p.m.

MORGANTOWN
WNPB, Sat. 1:30 p.m.

WHEELING
● WTRF*

WISCONSIN

GREEN BAY
WPNE, Wed. 7:30 p.m., Sun. 4 p.m.
● WGBA, Sat. 1:30 a.m.

LA CROSSE
WHLA, Wed. 7:30 p.m., Sun. 4 p.m.
● WEAU, Sun. 9 a.m.

MADISON
WHA, Wed. 7:30 p.m., Sun. 4 p.m.
● WMTV, Sun. 1:30 p.m.

MENOMONIE
WHWC, Wed. 7:30 p.m., Sun. 4 p.m.

MILWAUKEE
WMVS, Thu. 7:30 p.m., Sat. 8:30 a.m.
● WTMJ, Sun. 6 a.m.

PARK FALLS
WLEF, Wed. 7:30 p.m., Sun. 4 p.m.

WAUSAU
WHRM, Wed. 7:30 p.m., Sun. 4 p.m.
● WJFW, Sun. 12:30 p.m.

WYOMING

RIVERTON
KCWC, Sat. 5 p.m.

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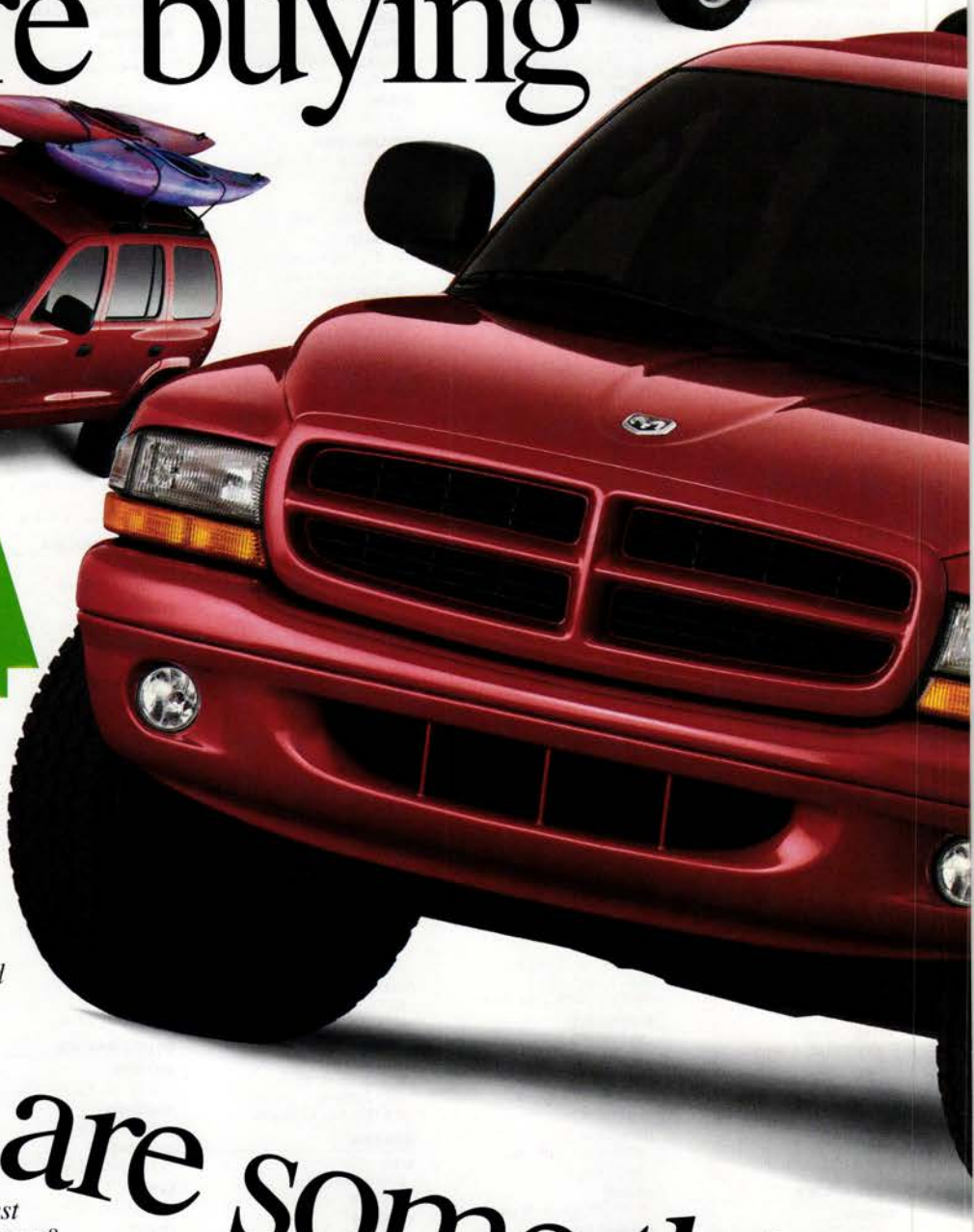
V8 MAGNUM

Nobody else gives you the capability of Dodge Magnum® engines — or a choice of two V-8s. There's the 5.2 liter, 230-horsepower Magnum and a massive 5.9 liter, 245-horsepower Magnum. Either gives you more power than anybody else. There's a brawny, 175-horsepower V-6, too.*

Before buying

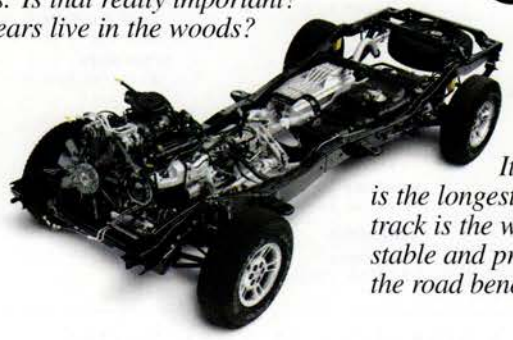
With up to 88 cubic feet of room, Durango's cargo capacity is best-in-class. How do you top that? With a standard roof rack, of course.*

Opt for a part-time or full-time four-wheel-drive system. Either way, you can take your show off the road with confidence.



there are some things

Durango's frame is the strongest in its class. Is that really important? Hey, do bears live in the woods?*



Its wheelbase is the longest in its class. And, its track is the widest. So the going is stable and predictable. Even when the road beneath you isn't.

With Durango, even when you're a million miles away from the civilized world, the closest convenience is right at your fingertips.

a sport utility,

Durango offers you a lot of conveniences. Not the least of which is the option of being able to tow a class-leading 7,400 pounds.*

With Durango's standard five-passenger seating configuration, you get the most standard passenger room in the class. Fold the rear seats down, and you've got the most standard cargo room. There's even a class-exclusive, eight-passenger seating option which gives you a third row.

you should run over.

Durango The New Dodge

1-800-4-A-DODGE or www.4adodge.com

*All comparisons are vs. domestic compact SUV class, excluding other Chrysler Corp. vehicles, and are based on data available at time of printing. Always use seat belts. Remember a backseat is the safest place for children.

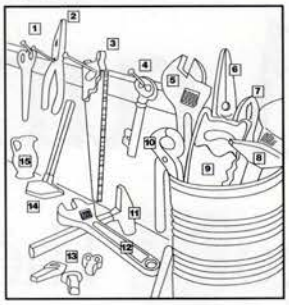
DIRECTORY

EXTRAS
pp. 22-29

Timber Revival: The Hermitage, 4580 Rachel's Lane, Hermitage, TN 37076-1344; 615-889-2941; open seven days a week 9 a.m. to 5 p.m. Admission: adults $9.50; seniors $8.50; children 6-12 $4.50. *Reported by Meghan Anderson.*

Painting the Town Green: E-coat flat and semi-gloss latex, 60 percent recycled, $8.50 per gallon, Recycled Paint Products, division of Kelly Moore Paint Co., 5101 Raley Blvd., Sacramento, CA 95838; 800-874-4436. Flat, eggshell, satin and semi-gloss, 70 percent to 100 percent recycled, $6 to $11.50 per gallon, Eco Paint Co., Box 12316, Orange, CA 92859; 714-289-7070. Flat, satin and semi-gloss, 100percent recycled (except semi-gloss), $7-$13 per gallon, Paint Solutions Inc., Box 2707. St. Louis, MO 63116; 314-776-0071. Eco Paint satin, 100% recycled, $8 per gallon, Atlantic County Utilities Authority, 6700 Delilah Rd., Egg Harbor, NJ 08234; 609-646-5500. Eggshell or flat, 60%-90% recycled, $7-$20 per gallon, Passonno Paints, 500 Broadway, Watervilet, NY 12189; 518-273-3822. *Reported by Kate Brauman.*

Quotes: "The easiest way....": "Resale Values," *Around the House* by David Owen, $21, 198 pages, Villard, New York, 1998.



Sweet Tools: *5, 6, 7*: Dark and milk chocolate, $18.50 per lb. or $4 each, Varsano's Chocolates, New York, NY; 212-352-1171. *2, 3, 8,10,11,12,14*: Dark or milk chocolate, $20; Fifth Avenue Chocolatiere, New York, NY; 212-935-5454. *1, 4, 15*: Bittersweet chocolate, set of 14 (5 1/2 ounces) $19.50 ; Teuscher Chocolates of Switzerland, New York, NY; 212-246-4416; 800-554-0924. *13*: Fruit-flavored gummies, $8 per lb.- container; E.A.T. Gifts, New York, NY; 212-861-2544. *9*: Sugar cookies. Eleni's Cookies, $4 each; Chelsea Market, New York, NY; 212-255-7990. *Reported by Victoria C. Rowan.*

Life After Drywall: Super Static 1/2-inch-diameter rope in safety orange, 23 cents per foot, Sterling Rope Co., Scarborough, ME; 800-788-7673. Shoulder strap, $9.99, Bucket Boss Portable Products, 5200 Quincy St., St. Paul, MN 55112-1426; 800-688-2677; www.fiskars.com/bucketboss. Roller-Chamber Roller-Saver, $24.95, Roller-Saver pail lid adapter, $8.95, Wall Tech Inc., 429 Lindbergh St., Charleston, SC 29412; 888-762-4583. Redworms, 1/2 pound for $8.95, Kazarie Worm Farm, 7370 S.E. 56th Terrace, Trenton, FL 32693-9719; 352-463-7823,

www.afn.org/~kazarie. Bucket Boss 56 tool organizer, $24.99, bucket seat, $4.99, Bucket Boss Portable Products. Five-gallon pail dolly, 8B-9080, $27.55; Lab Safety Supply, Box 1368, Janesville, WI 53547; 800-356-0783. Sure-Mix concrete mix, 60 pounds for $1.79, Bonsal, Box 241148, Charlotte, NC 28224-1148; 800-738-1621. *Reported by Kate Brauman.*

Buckle Up: Husqvarna 265RX 65-cc two-cycle gas engine, weight 18 lbs., $950, Husqvarna Forest & Garden Co., 9006 Perimeter Woods Dr., Charlotte, NC 28216; 800-438-7297. For more information on string trimmers and brush cutters, see *This Old House,* May 1998; U.S. Consumer Product Safety Commission, Document 5005 available on www.cpsc.gov. Telephone hotline 800-638-2772. *Reported by Mark Feirer.*

Tool Time: *The Complete Illustrated Guide to Everything Sold in Hardware Stores* by Steve Ettlinger, $18.95, Macmillan Books, New York, Rev. ed., 1998. *Tools of the Earth: The Practice and Pleasure of Gardening* by Jeff Taylor, $25, Chronicle Books, San Francisco, 1998. *Reported by Elena Kornbluth.*

Foul-Weather Friend: Complete home weather station: $399.99; Oregon Scientific Inc., 18383 S.W. Boones Ferry Rd., Portland, OR 97224; 503-639-8883. *Reported by Curtis Rist.*

Hats Off: Ever Lucky folding saw, $21.95; the Japan Woodworker Trading Co.; 501-521-1810. *Reported by Hope Reeves.*

Sidewinders: Black Grip Driver, 12 pieces including plastic carrying case, 47455, $29.99 , Sears Craftsman Catalog, 800-377-7414, www.sears.com/craftsman. Red Spec 2000 kit, SPK 8000,48 pieces, $69.95, Spec Tools, 4 Bert Dr., W. Bridgewater, MA 02379; 800-775-7732. *Reported by Tom Baker.*

Catalogs: *Reported by Meghan Anderson.*

Unsung Tool: Dura-Tool barlow carbon steel pocket knife, 551, $11.95 (stainless steel $18.50), electrician's pocketknife, 229, $14.50 (stainless $18.95); Camillus Cutlery Co., 54 Main St., Camillus, NY 13031; 800-344-0456. Queen Steel barlow pocketknife, 22, $19.95, electrician's pocketknife TL 29, $22.95; Queen Cutlery Co., 26 Empire St., Box 145, Franklinville, NY 14737; 800-222-5233. *Reported by Jeff Taylor.*

SPIN DOCTORS
p. 37-44

Rotary tools: The five manufacturers of rotary tools are: Black&Decker, 800-544-6986, www.blackanddecker.com; Dremel, 800-437-3635, www.dremel.com; Foredom, 203-792-8622; Pfingst, 908-561-6400; Ryobi, 800-525-2579. All accessories except carbide grinder available from Ryobi, Black & Decker, Dremel. Carbide Grinder, Foredom. Page 39: Pro-

fessional tool with LCD readout, model 398, Dremel; Benchtop tool, Model HM, $300, Foredom; Tool grinding metal fixture, Wizard RT550M, $77.14. Black & Decker. Page 42: Tool used in router base, model 395, $94.10, Dremel; router base, $36.50, Dremel. Page 44: (top) model 395, Dremel; drill press, $58.70, Dremel; tool in press, corded model HT20VS, $94.00 Ryobi.
For a copy of "175 + Uses," call Dremel customer service at 800-437-3635.
Our thanks to: Marinetta Stuhlman and Frank Lockhart.

THE RASP WALTZ
p. 47-50

Page 47 (left to right): Four-in-hand rasp, Simonds File Company, Box 500, Intervale Road, Fitchburg, MA 01420; 800-541-6224. Cabinet rasp, Nicholson, Cooper Tools, Box 728, Apex, NC 27502; 800-423-6175. Patternmakers, Nicholson; Surform, Stanley, 1000 Stanley Drive, New Britain, CT 06053; 860-225-5111.
Page 48 (front to back):
Planing: Surform plane, Stanley Tools.
Square planing rasp: Microplane, Grace Manufacturing Inc., 614 SR 247, Russellville, AK 72802; 501-968-5455. Rigid Microplane blade (in a Stanley hacksaw), 30001, Grace Manufacturing Inc.
Rifflers: Italian handmade rifflers, Sculpture House Casting, 155 W. 26th., St. New York, NY 10001; 888-374-8665.
Page 50 (left to right):
Round Rasps: Round rasp, Sculpture House Casting. Drillsaw, Jurgen Heinrich, Burger Str. 62, 42859 Remscheid, Germany, (02191) 32945.
Flat and half-round (top): Half-round rasp, Sandvik Saws and Tools Co., Box 2036, Scranton, PA 18501; 800-828-9893. Flat wood Rasp, $13, Simonds.
Horse and Hobby (top to bottom): Combination rasp, Sculpture House Casting. Horse Rasp, Nicholson, $14. Plastic-capped horse rasp, $17, Simonds. File card with brush, $8, Simonds.

MIRACLE BLOCK
p. 53-58

Thanks to Chris Poate, Hebel House, 155 Crystal Beach Drive, Suite 101, Destin, FL 32541; 850-650-5571; hebelhouse.com. Hebel USA, 2408 Mount Vernon Road, Atlanta, GA 30338; 800-354-3235; http://www.hebel.com.
Ytong Florida Ltd., Box 2550, Haines City, FL 33845; 941-421-7703.
Giles Blumden, Chapel Hill, NC; 919-942-8331. Bob Schuldes, Portland Cement Association; 847-966-6200

ROCK 'N' ROLL
p. 61-64

Drywall: Gus Larsen, Larco Wallboard Inc., 477 Trull Road, Tewksbury, MA 01876; 508-851-6440.

SMART RENOVATION STRATEGIES
p. 67-76

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published in November, 1998, Harper Business, $25. *Die Broke*, Pollan and Levine, 1997, Harper Business, $25.

The Remodeling Trap:

Contractors: Shawn McCadden, Custom Contracting Inc., 1267 A, Massachusetts Ave., Arlington, MA 02476; 781-648-2835. Chris Miles, Miles Company Remodelers and Builders, 10606 Shady Trail, Suite 106, Dallas, TX 75220; 214-744-1508.

Realtors: Rebecca Williams, certified residential specialist, Bethesda, MD, 301-983-2828. Matthew Chamberlain, South Portland, ME, 800-698-8361.

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Associations: American Homeowners Association, 888-470-2242; www.aha-home.com. National Association of the Remodeling Industry, 703-575-1100; http://nari.org. National Association of Home Builders, 800-368-6242; www.nahb.com. Remodeling Futures Project at Harvard University's joint center for housing studies: 79 JFK St., Cambridge, MA 02138

REPLACING BALUSTERS
p.79-80

Carpenter: David Raymond, Custom Cabinetry and Millwork, 66 Robson Place, Fairfield, CT 06430; 203-256-1246.

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AND THE WALLS CAME TUMBLING DOWN
p. 94-99

Architectural design: Fairbank Design, Cambridge, MA; 617-497-0693. Brick mason: Lenny's Masonry Contracting, Stow, MA; 978-897-6256.

HOT HOUSE
p. 100-103

Greenhouses: Santa Barbara Greenhouse, 721 Richmond Ave., Oxnard CA 93030; 800-544-5276. Jacobs Greenhouses, 371 Talbot Road, Delhi, Ontario N4B2A1, Canada; 519-582-2880.

Association: Hobby Greenhouse Association, 8 Glen Terrace, Bedford, MA 01730-2048; 781-275-0377.

Further reading: *Greenhouse Gardener's Companion* by Shane Smith, Fulcrum Publishing, Golden, CO 80401-5093.

WINDOWMAKER
p. 104-109

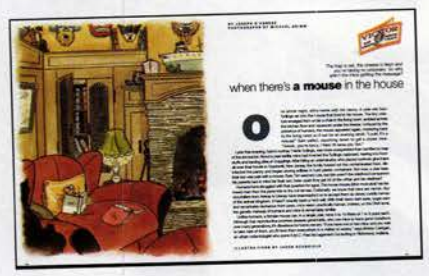
American Craftsman: Vloeberghs Stained Glass Studio Inc., Stained Glass Repair

and Custom Design, 2711 Piedmont Rd., Atlanta, GA 30305; 404-261-3073; www.vloeberghs.com.

TAKE A WALK ON THE WARM SIDE
p. 110-115

For information on radiant floor heating and names of qualified installers, contact: Radiant Panel Association, 800-660-7187; www.rpa-info.com. John Siegenthaler, consulting engineer, Appropriate Designs, 9568 Steuben Valley Rd., Holland Patent, NY 13354; E-mail johnsiegen@aol.com. To get a copy of the booklet, "Installing Hardwood Floors Over Radiant Heating," contact the Hardwood Council, Box 525, Oakmont, PA 15139; 412-281-4980. To order a copy of the installation manual, *Modern Hydronic Heating for Residential and Light Commercial Buildings* by John Siegenthaler, $57.95, call Delmar Publishers, 800-347-7707.

WHEN THERE'S A MOUSE
p. 116-121



Traps and bait stations: Victor-Havahart Traps, Woodstream Corp., Lititz, PA; 215-626-2125. Bell Labs; 608-241-0202. Agrizap, Ventura, CA, 888-332-3728.
Pest-control companies: Cooper Pest Control, Lawrence Station Rd., Lawrenceville, NJ; 609-799-1300. Northwest Exterminating, 5170 N. Cholla Blvd., Tucson, AZ 85705-1257; 520-888-5779.
Dryer vent cover: Bird Barrier America; 800-503-5444; www.birdbarrier.com.
Regarding hantavirus: In hantavirus hot spots such as the desert Southwest, every rodent carcass must be sprayed with a 10 percent solution of water and bleach until the carcass is soaked. Experts put a sealable bag over their hands, pick up the trap and rodent, spray the bag, insert it in a second bag and incinerate the whole thing.
Our thanks to: Bobby Corrigan, R.M.C. Pest Management Consulting, Richmond, IN; 765-939-2829; rcorr22@aol.com. Tom Parr and Steve Langert, North American Trap Collectors Assn., Box 94, Galloway, OH 43119-0094; 614-878-6011. Cisse W Spragins, Bell Labs, Madison, WI. David Drummond, Dorking, Surrey, England.
Further reading: *Common-sense Pest Control: Least-toxic solutions for your home, garden, pets and community* by William Olkowski, Sheila Daar, Helga Olkowski, $39.95, The Taunton Press, 1991.

directory

son: a Biography by Ralph Ketcham, $19.50, University of Virginia Press, 1990. *James Madison: The Founding Father* by Robert Allen Rutland, $19.95, University of Missouri Press, 1997. *Dolley and the "Great Little Madison"* by Conover Hunt-Jones, American Institute of Architects Foundation, 1977 (out of print); *If Men Were Angels: James Madison and the Heartless Empire of Reason (American Political Thought)* by Richard K. Matthews, $14.95, University Press of Kansas, 1997. Montpelier's "Historic Structure Report" by Ann L. Miller, prepared for the National Trust for Historic Preservation. *Development of the Mansion Grounds of Montpelier, Home of James Madison* by Julianne Ruth Berckman, a University of Connecticut master of science thesis. For information on visiting Montpelier, call 540-672-2728.

Our thanks to: historians Ralph Ketcham, Robert Allen Rutland, Lance Banning, Richard K. Matthews, John Schlotterbeck, Robert C. Watson and Edward Chappell and to Montpelier staff members Lynne Lewis, Tamarra Castillo-Parker, Randy Huwa, Scott Parker, Kathleen Stiso Mullins and Sandy Mudrinich.

UPON THIS ROCK
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Foundation contractor: Connecticut Foundation Corp., 94 Sand Pit Rd., Danbury, CT; 203-794-1147. **Builder:** Country Club Homes Inc., New Canaan, CT; 203-966-5550. **Architect:** Robert A.M. Stern Architects, New York, NY; 212-967-5100.

MONTPELIER
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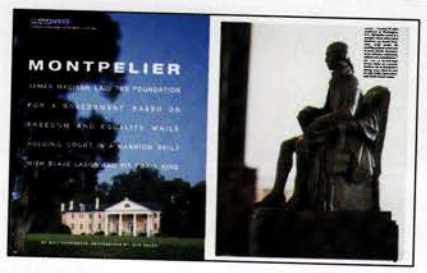

Montpelier: Further reading: *James Madi-*

SWITCHES
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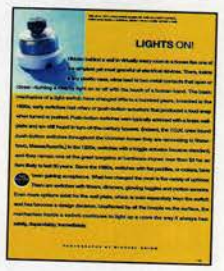

Cutaway: 3-way toggle switch, 1453-4, $4, Leviton Manufacturing Co., 718-229-4040. **Vintage rotary:** courtesy of Vintage Lighting, Peterborough, Ontario, 705-742-8078; www.vintagelighting.com. **Glowing:** Decora pilot-light quiet toggle 3031PLR, $7. **Combination:** quiet toggle and outlet 5225, $5. **Touch:** Decora dimmer 6606, $20. **Basic:** single pole quiet toggle 1451, $5. **Rotary:** push on-off dimmer 6603, $3. **Paddle:** Decora 5601, $3. **Slider:** Decora illuminated dimmer 6631, $14. **Side by side:** Decora double quiet toggles 5212, $11. **Three rockers:** Decora

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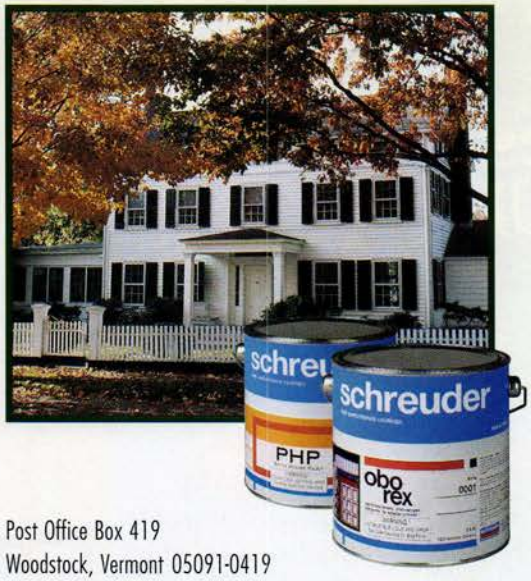

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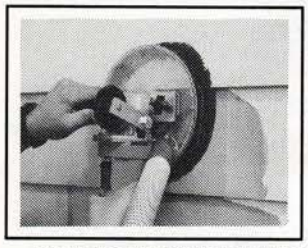

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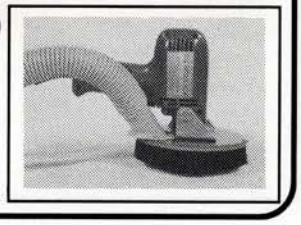

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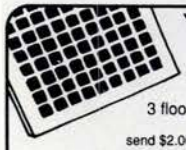

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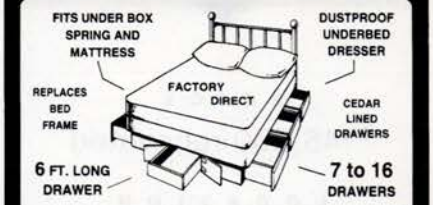

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Since 1994, the Macon Heritage Foundation has purchased 15 rickety rental units in historic Huguenin Heights for an average of $33,000 each. So far, the foundation has rehabilitated 12 as single-family homes and sold them for as little as $96,000, depending on the size of the house and amount of rebuilding involved. The program suits bargain hunters who want to save a fixer-upper but prefer a hands-off approach to renovation. Prospective buyers meet with foundation members to discuss floor plans and construction details. Then the organization oversees the entire project, getting estimates from contractors and making sure the work complies with historic codes.

Edward D. Huguenin, a treasurer of the Mercer University board of trustees, developed Huguenin Heights in the 1870s, after the school moved to Macon from Penfield, 82 miles away. In the 1960s, the neighborhood suffered from neglect but, under the foundation's program, the Heights has bloomed into a stable, mixed-income neighborhood.

This two-story Victorian features a double-decker back porch overlooking a vast backyard ready for landscaping. It sits two blocks from Tatnall Square Park—a 17-acre oasis of tennis courts and trees—and is walking distance from one of Georgia's top elementary magnet schools.

CONTACT

Maryel Battin
Macon Heritage Foundation
Box 6092
Macon, GA 31208
912-742-5084

Built in 1905, the 2,400-square-foot house, top, has two ornate fireplaces, left, four bathrooms, three bedrooms, a living room, a dining room, a two-story back porch, a 3,000-square-foot backyard, central heating and air-conditioning and recently updated electrical systems. A similar house next door, bottom right, shows what the Victorian might look like after the Macon Heritage Foundation renovates it.

PHOTOS: DEBORAH WHITLAW

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