TOOL TIME

All Rovers, male and female, young or old, get called upon at one time or another to do fix-it jobs. Sometimes as a Crew project, sometimes as a home repair project, and sometimes to help a friend. We're going to try to bring you tips to make some of these jobs easier.

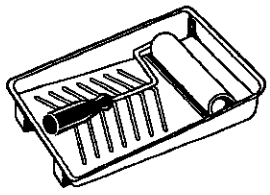
HOW TO PREVENT PROBLEMS WITH PAINT JOBS

By Popular Mechanics.....Special to The Associated Press

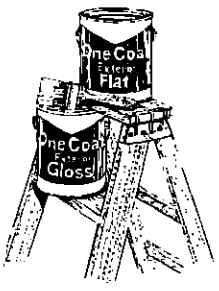
Usually it's the paint itself that gets the blame for paint problems on your home's exterior. But in most cases, the cause lies elsewhere. Here are some common problems and ways to prevent them:

☞ **Blistering** is the earliest stage of peeling. It is usually caused by moisture trapped under the new paint coat or by poor surface preparation. If it occurs within the first few weeks, it's probably caused by trapped moisture. Although latex paint usually can be applied to damp surfaces without my problem, alkyd and other oil-based paints form a moisture barrier skin that traps the water inside. The water then turns to vapor and forms blisters. To avoid this, never paint with alkyds after a rainstorm; when the relative humidity is more than, 85 percent; while dew is on the siding, or too soon after you've washed the old surface. Also, never paint when the temperature Is more than 90 degrees. If the blisters appear after a month or so, the problem is probably poor surface preparation. If you washed the surface down with detergents, did you take the time to rinse completely? Unless such films are removed before painting, they can cause blistering. Also, glossy surfaces must be given a lot sanding, so the new paint will grip well.

☞ **Peeling** is the curling of large pieces of dried paint. It is merely a later manifestation of blistering. Severe peeling may also indicate the use of a poor primer or a heavy film of dirt, grease or dust. Prevention involves sanding or wiping the old finish with a deglossing liquid. Then follow the manufacturer's directions as to what primer may be required before applying the top coat of paint.



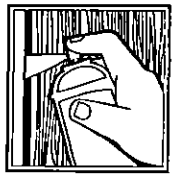
☞ **Alligatoring** is a cracking and flaking of the paint in a square pattern. It can result from applying paint over a previous coat that had a high gloss finish that was not sanded; use of the wrong primer; or use of old paint that's been stored in an unheated space and allowed to freeze. To repair the condition, sand the surface smooth and apply the proper primer before applying a new top coat.



☞ **Checking** is a series of long lines, with shorter checkmarks crossing between, usually caused by the wood underneath expanding and contracting. This can be a problem with exposed plywood siding regardless of the kind of paint used. Sanding and then applying a new coat of wood primer usually will solve the problem. But if the new paint shows signs of coming loose, complete removal of the old paint is required.

☞ **Wrinkling** results in a crinkled surface that is caused by interfering with required drying time. Contributing factors are too-thick finish coat; building up of too many layers; an undercoat that was not completely dry; wrong solvent or improperly stirred paint. Repair by sanding smooth and applying proper primer before painting the top coat.

☞ **Chalking** or powdering characteristics are designed into some paints to keep the surface looking new. Chalking of old paint can interfere with proper bonding of a new coat, so scrub off as much as possible beforehand. In severe cases you may have to apply a bonding primer or sealer.



TOOL TIME

BECOME MASTER OF THE HOUSE, FROM FLUE TO FURNACE FILTER

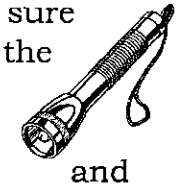
By SUSAN MARTIN Buffalo News Staff Reporter

Do you know where the main water valves are to your home and how to close them? If the power goes off one evening during a thunderstorm, will you remember where you stashed the flashlight? And what about the chimney? Do you know whether it has a gizmo on top to keep out wildlife? It should.

You don't have to be a member of the Fix-It Family to own, or rent a home, but you should know these and other basics. Too often, people realize too late how little they know - especially neophyte homeowners or individuals who suddenly find themselves without the spouse, parent or housemate who used to take care of such things.

With that in mind, here's a starter list of things to know in the event of a household emergency - or just to keep things running smoothly. Master this list and before long - who knows? - you may even be tinkering with that leaking faucet in the bathroom.

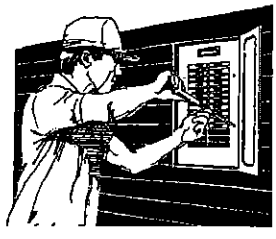
Where to find a flashlight: Sounds simple, right? It's in the junk drawer in the kitchen. Or, wait, didn't little Timmy pack it for his last Boy Scout camping trip? The idea here is to make sure you have several flashlights in the house in case an emergency arises and to plant then in all the rights places. The kitchen and basement are key spots. So are bedrooms. Once you have them, check them often and change batteries when necessary.



How to reset a circuit breaker: You'll need to knew how to do this if you overload a circuit and trip one of the breakers. Lost already? First off, know that your home's main electrical service panel is usually found in the basement, laundry room, garage, or somewhere near where the power line comes into your house.

This panel divvies up the power coming into your home to the various "circuits," which, in turn, provide power to a series of outlets and light fixtures in the house - or to major appliances. For safety purposes, the panel also contains switches that automatically interrupt or "break" the electrical flow to each circuit.

If you were to get a short on a circuit - or an overload situation, such as too many appliances going at once in the kitchen - it should shut itself off. That's when you need to reset it (after remedying the situation, such as unplugging a few of the things drawing power at the same time from the same circuit, that is).



Here's how: "With the more modern cir-

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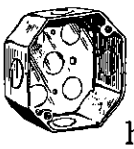
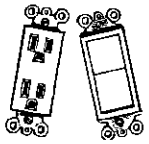
cuit box, in many cases those circuit breakers will pop themselves to an 'off' position. That is an indication that they are working properly. You should push that lever completely to the 'off' position and then push it completely in the opposite direction. That should reset it" said Stephen Brady, public affairs manager for Niagara Mohawk Power Corp.



Something not seem right? You may need an expert. "Our caution always is, if you are not sure, call a professional", he added. And of course, never, ever touch the electrical box if the floor or the box is wet. Call the utility company instead.

Also remember that if you - or anyone else - does any sort of installation work or changing of plugs or light switches, "the power to that circuit should be turned off completely before beginning the installation," Brady added.



As for the electric meter - know where if is so you can quickly direct the utility company or electrician there in an emergency. But don't touch. Not only is the meter the property of the Power Company, it's also where the power comes into your house at its maximum, so there are safety concerns. For information, consumers can call their local Power Company and ask for an electrical safety brochure.

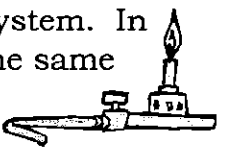
Here's how to shut off the water: Most likely there is a shut-off valve near where the water supply enters your house - usually in the basement, if you have one. Once you find it, label it for future use.

To shut off water to the house: Turn clockwise, if it's a round-handled valve. If it's lever-handled, turn it cross-wise to the pipe. Individual valves can also be on pipes near toilets, water heaters and sinks.

How to shut off the water to outdoor faucets: With our winters, many people do this to prevent pipes from freezing. Here's how John Warde, former home improvement columnist for the New York Times, suggests taking care of this outdoor faucet business.

"First, close the shut-off valves on the pipes supplying them. The valves are located indoors, usually in the basement, about three feet from the outside wall. Next, open the faucets, letting any water in the pipes run out, and leave them open until the water supply is turned on again in the Spring. That way, any water remaining in the pipes can expand if it freezes without creating damaging pressure," he writes in his home maintenance book.

How to maintain your heating system: The experts at National Fuel recommend that before cold weather moves in, hire a qualified contractor to conduct an inspection of your heating system. In many cases, this could be the same expert who checks your home for carbon monoxide.



The contractor should: check for cracks, rust and corrosion; clean and check flue, pipes; clean or replace all furnace filters; inspect chimneys and vents for any obstacles; check and adjust pilots (if any) and burners; check that your gas appliances produce a sharp, blue flame,

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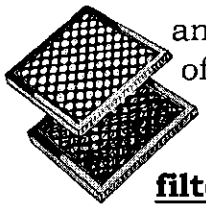

and check that the proper level of fuel pressure is supplying your furnace.

When to change furnace filters: You do change your furnace filter, don't you? To devise a schedule suited to your warm air-heating system, install a new filter and then check it every four weeks for dirt accumulation by holding it up to a bare light bulb. "When the light shining through the filter is diffused, it's time for a new filter," recommend the authors of "Household Hints & Handy Tips" (Reader's Digest, $15).

How to keep wildlife out of your chimney: Unless you have a special screen or cap designed for such purposes animals such as squirrels. raccoons, birds and owls, may crawl, jump or fall into your chimney and become trapped. Often they die. Sometimes they get into the house and wreak havoc. An animal trapped in a chimney - either dead or alive - will have to be removed by a wildlife rehabilitator or another person specializing in the capture and removal of wild life. All this can be prevented, of course, if you have a good chimney cap or screen installed that cuts off entrance to the chimney. Leave the chimney scene to the jolly guy in the red suit.

How to detect potentially dangerous gases: Gas leaks and carbon monoxide poisoning are two dangers every homeowner or renter should know about, according to Julie A. Coppola, director of public relations for National Fuel. While natural gas is colorless and odorless, National Fuel adds an odorant that produces a "gas smell" so that leaks are easier to detect. If you detect a faint gas smell, check to see if you simply have a pilot light out or a burner that is not completely off, recommend the experts at National Fuel, in a consumer pamphlet.

If you smell a strong gas odor, the utility company offers the following instructions:

*Don't switch lights on or off.
*Don't light any matches.
*DO open door and windows to ventilate.
*DO leave the premises.
*DO call your gas company's 24-hour, gas emergency number from another location.

How to be alert to carbon monoxide poisoning: You can't see it or detect it with your nose, but carbon, monoxide can cause unconsciousness, brain damage and death if inhaled in large quantities for a prolonged period of time. The national Centers for Disease Control and Prevention has called carbon monoxide "the single largest cause of poisoning." Symptoms include fatigue, headache, dizziness, nausea, coughing, irregular breathing overall paleness and cherry-red lips and ears. If you notice the symptoms, immediately open windows and doors to ventilate your home. Then call 911 or your local fire department and get outside into fresh air.

How to check for and prevent carbon monoxide poisoning: National Fuel advises hiring a qualified heating contractor to conduct thorough inspections of your home and appliances. Homeowners can also take the following preventive steps: Have your chimney and flue cleaned every year; make sure all home appliances have adequate ventilation; be sure burner flames are blue, not orange; never use a gas range for space heating;

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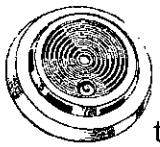
properly insulate and weatherize your home to allow sufficient appliance ventilation; never run an automobile or gasoline engine in an enclosed space; never use a charcoal grill indoors; and don't rely solely on carbon monoxide detectors as a substitute for maintaining appliances, furnaces or chimneys.



How to maintain your smoke detectors: First off, make sure you have them. At the very least, you should have battery-operated smoke detectors outside of each bedroom or sleeping area. In addition to installing smoke detectors, be sure to test them once a month by pushing the test button; clean them out once a year by vacuuming out dust; replace the batteries twice a year when you change your clocks, in the fall and spring.

How to escape in case of fire: Coming up with an escape plan is one of the best things you can do in case of fire. And once you have devised an exit plan, practice it. Everybody should know at least two ways out of every part of the house. In planning your escape, sit down with members of the family and draw an outline of your home.

Draw and label each bedroom and such details as stairs, hallways and roofs that could be used to escape a fire. Then draw in arrows - black to show the normal way out, such as down the stairs or hallway, and colored for alternative emergency exits. Use escape ladders if necessary. Children should knew that if the stairs are blocked, they should open a window and climb to the garage roof, for example. Check windows to make sure they can be opened easily by a child and are large enough to fit through.

When people do get out of the house, be sure to have a meeting place where everyone meets - a big tree in front of the house, perhaps, or across the street or next door. Teach children to sleep with bedroom doors closed (this keeps heat and smoke out for a short hurt time) and, in the case of a fire, to roll out of bed and stay low. If fire breaks out in the house they also should know to feel the door.

If the door or doorknob is hot, don't open it but rather exit through the second escape route. Also, children should be taught not to waste time getting dressed or looking for toys or pets. And that once everyone is out of the house, they must stay out.

How to work a fire extinguisher: Owning one or two of them in handy locations is not enough. You have to know how to work a fire extinguisher. Don't wait to read the instructions on your fire extinguisher until a fire is burning.

To operate an extinguisher, think **PASS**: **P**ull the pin. **A**im nozzle at base of fire. **S**queeze the handle. **S**weep nozzle from side in side. Those are the basics, but be sure to check the detailed instructions on your own extinguisher. Remember, too that there are different types of fire extinguishers (class A, B and C); not all extinguishers work on all types of fires.

In addition to having the right extinguisher for what's burning and knowing how to operate it, fire experts also advise homeowners not to fight a fire unless:

1. they call the fire department first;
2. they can get out the house quickly and
3. the fire is small and not spreading.

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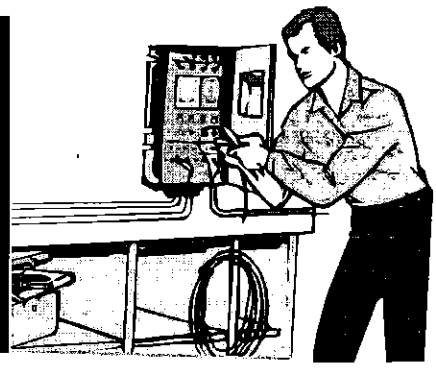

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SHOCK STOPPER

By RICHARD DAY

From May 1988 Popular Science

Each year, according to the National Safety Council, more than 300 People are electrocuted at home. Amazingly the small amount it takes to light a seven-watt Christmas-tree bulb, can kill an adult. Think your home is safe? Not if it has older non-grounding electrical outlets. These have only two slots, instead of three, and with such outlets the risk of being severely shocked by a ground fault while using plug-in electrical tools and appliances is only a an insulation's thickness away .

To protect yourself and your family against all-to-common, ground fault shock hazards of two-slot receptacles, your home electrical system may need updating. If you are familiar with electrical wiring, you can tackle this update yourself. Otherwise, hire a licensed electrician .

Just what is a ground fault?

It's a line-to-ground short circuit. When ground-seeking electrons in the insulated hot side of a circuit find a pathway to ground, a ground fault occurs-usually through an insulation failure. For example, if the insulation on a live wire inside a power tool wears through and the bare wire contacts the metal tool body, the tool would take on a 120V potential to ground. Holding such a tool would be like having a hand clasped around a bare live wire. If you're standing on a concrete floor or damp earth, your body would complete the circuit to ground.

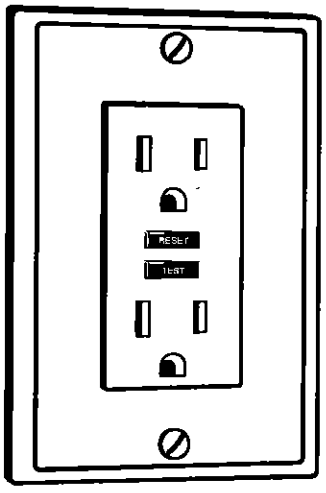
Having electrical tools and appliances propre grounded-plugged into a three-slot outlet - offers protection against ground faults. This is "equipment grounding " and the NEC requires it in new construction. Wayword electrons find it much easier to travel through a good conductor (grounding wires) than through a poor one (your body).

Plug-in grounding adapters with a pigtail lead offer no protection unless they themselves are well grounded. Attaching the pigtail lead to the center screw of a two-slot outlet doesn't ground the adapter unless grounding has been supplied to that outlet.

The National Electrical Code (NEC) lists three options for replacing a two-slot outlet: replace with another two-slot outlet (no help with ground faults); replace with a three-slot outlet that is truly grounded; replace with a recep-

tacle-type ground-fault circuit interrupter (GFCI). The method you may use depends on your house wiring.

If your house wiring provides some means of grounding a replacement outlet within the outlet box, a two-slot outlet ***must*** be replaced only with a three-slot grounding outlet NEC Section 210-7[d]). Some of these sell for a little as 40 cents apiece. (Grounded receptacle GFCI. may be used, too.)



The required means of grounding consists of a bare or green-insulated wire in a nonmetallic-cable wiring system or the continuous metal covering of an armored-cable or conduit system.

To find out whether grounding is available at your house's outlets, cut the power to an outlet's circuit at the main service panel. The outlet should be electrically dead. Test it by plugging in a known-to-be-working light or appliance.

Or plug in a neon tester (available at any electrical supplier). Be sure to test ***both outlets*** of a duplex receptacle. Once you're sure that the circuit is dead, remove the screw and wall plate. Next, to make sure that no electricity is present inside, apply the neon tester across the exposed lighter-colored terminals on one side of the outlet and the darker-colored terminals on the other side. If the lamp, doesn't light, remove the two long No. 10-32 retaining screws that hold the receptacle to its outlet box. Without touching any bare wires (it pays, to be cautious around electricity), stretch the receptacle out of the box on its wiring. Pull it far enough to enable you to peer inside the outlet box with a flashlight. You are looking for (1) a bare or green-insulated wire or wires or (2) a metal outlet box served by armored cable or metal conduit. If you find either, a means of grounding is available within the box.

As a double-check, bring a grounded jumper wire near the dead outlet—a car battery jumper cable attached to a continuous metal piping system will do fine. Using a multitester set on "R x 1 Ohms" clamp one end of the jumper to one test lead while touching the other lead to the metal box. If the tester reads zero-ohms resistance, the box is grounded. If any resistance is indicated, however, the box is not grounded.

In all receptacle hookups use standard Code-approved outlet-box make-up procedures. (If your house has aluminum wiring, not copper, special wiring procedures apply.) In any case, every three-slot outlet's hex-head green grounding terminal ***must*** be connected to a ground. These receptacles may not be installed at any location without grounding.

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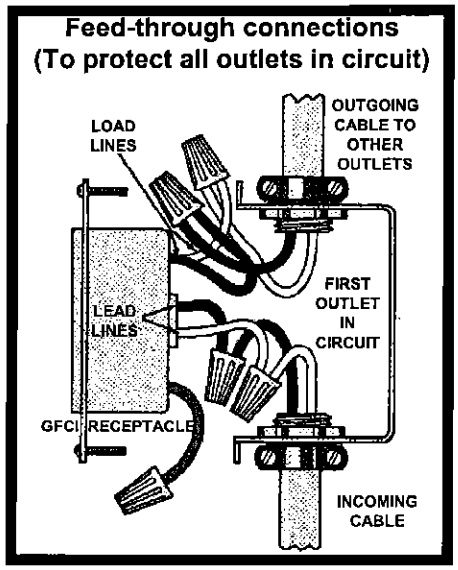
The common nonmetallic-sheathed-cable house wiring with white-, black-, and red-insulated wires—but no bare or green-insulated wires—provides no means of grounding. If you find such cable entering the box, you may replace a two-slot outlet ***only*** with another two-slot outlet or with a receptacle GFCI.

Replacement with a receptacle GFCI solves the ground-fault shock-hazard problem. NEC Section 210-7(d) Exception recognizes that an ungrounded GFCI receptacle does offer a degree of shock protection, even though a tool or appliance plugged into it is not actually grounded. The GFCI receptacle thus protects where the old two-slot receptacle does not. Receptacle GFCIs in a number of brands are widely sold for $11 to $20. Naturally, the receptacle GFCI you purchase should be listed by Underwriters Laboratories and bear the familiar "UL" designation ("CSA" in Canada).



A GFCI works by monitoring current flow in and out. As long as both are equal, though opposite, nothing happens. But when some current leaks to ground—even as little as six milliapere—the in-out current becomes unbalanced. This triggers it to cut off the power within a few milliseconds. GFCIs protect only against line-to-ground shocks, not line-to-line or line-to-neutral shocks. Fortunately, the latter are not nearly as common as ground faults.

Feed-through protection

Most receptacle GFCIs are designed to feed through their protection to other outlets. Two of the five leads or terminal blocks are labeled "line" and two are labeled "load," with the fifth for grounding. *(See first wiring pictorial.)* Use of a GFCI in first receptacle position will protect an entire branch circuit, except the wiring between the service panel and the first receptacle. Instructions with the GFCI tell how to locate the first outlet in a circuit and how to find the house line and load wires. With a GFCI wired for a feed through, you change this first outlet only. All outlets beyond it in the circuit must be left as two slot. Furthermore, a grounding conductor must not be connected between the receptacle GFCI and any outlet supplied from it.

A GFCI may be used in a non-feed-through installation by leaving its load terminals empty or placing wire nuts on the ends of its load leads, as in the second pictorial.

In connecting a receptacle GFCI, be sure to follow the instructions

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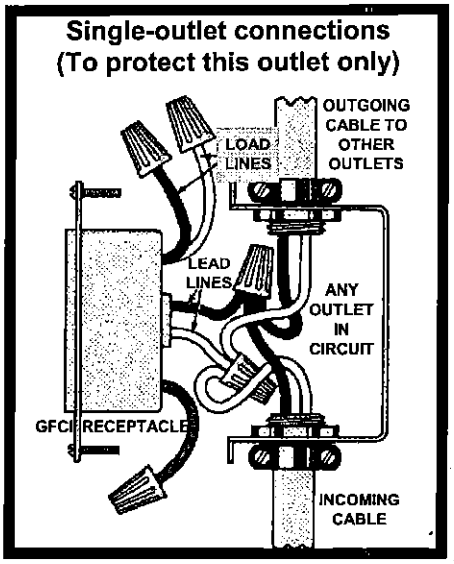
that come with it, though these do not generally cover its specialized use as a replacement for two-slot outlets. For home safety you not only want correct polarity at each GFCI, you want any two-slot outlets served by a feed-through GFCI wired with correct polarity ("How to Check for Wrong-Way Polarity", July '85). Check them to be sure. The narrow receptacle slots should be hot and the wide slots should be at ground potential (dead) when the circuit is turned on. Reversed polarity does not affect the operation of a GFCI, however.



Since the outlet box is not grounded, the Code does at require bonding of the receptacle GFCI's grounding lead to the box. This means that the grounding lead or terminal is left vacant. Being ungrounded has no effect on the GFCI's function, however. Care must be taken to be sure that it does not contact any uninsulated live parts inside the outlet box. If it's a lead, thread a wire nut on it; if a terminal, run the empty hex,-head binding screw down tightly. And when mounting the receptacle to the box, be certain that any live wires are kept way.

To work property, receptacle GFCIs need a "ground reference". In a properly wired house, this is provided by the service panel's neutral busbar, which is bonded-electrically connected-to the main panel enclosure and through this to the house grounding-electrode system. Most often, the grounding electrode is a buried water pipe.

If spare capacity is available, a circuit with grounding may be extended by adding additional wiring and outlets. An ungrounded circuit, whether it has GFCI or not, may act be extended. New outlets must be served by equipment-grounding conductors.

Remember to test all your GFCIs periodically as is directed in the instructions.

While your GFCI update does not provide grounding, it does give extremely sensitive, fast-acting groundfault protection that can save someone's life. Still, halving ground-fault protection is no reason for careless handling of electrical tools and appliances when you are wet or grounded. Using good electrical sense is still your best protection.

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***Please Note**: this article was written in 1988. Prices quoted are no longer valid.*

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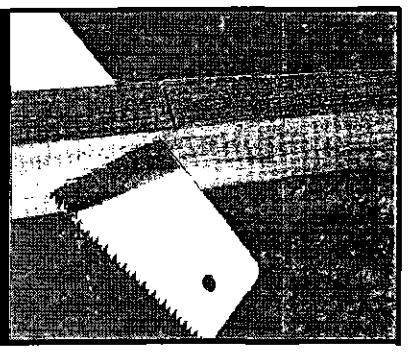

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HANDSAW BASICS

With a little practice, a well-tuned handsaw holds its own on any job.

By ROSARIO CAPOTOSTO

From March 1998 Popular Mechanics

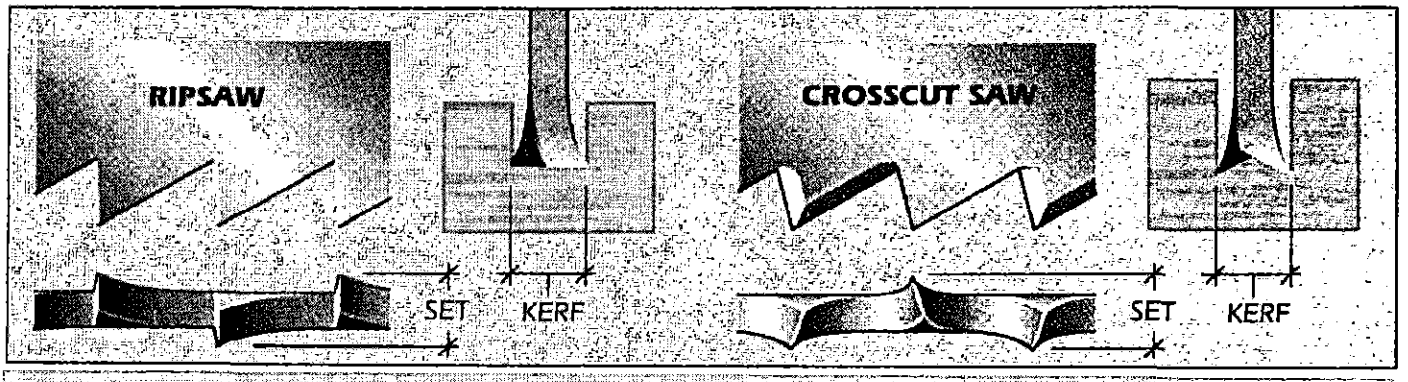
It's easy to think that the only way to cut wood is with a power saw. After all, You want it done fast and you want it accurate. For many jobs, though, it may be nearly as fast to do the work by hand — and with accuracy that any circular saw user would envy.

Woodworking handsaws come in different varieties, but there are two that will handle most of your carpentry chores — a crosscut saw and a ripsaw. Both are similar in appearance, but differ in the shape of the teeth.

Saws designed for cutting across the grain have beveled teeth filed to knifelike points that sever the wood fibers. Ripping or cutting with the grain, requires a different tooth shape. The ripsaw has teeth that are filed straight across. Each tooth acts as a small chisel that plows away particles of wood.

In addition to tooth design, conventional saws vary in terms of length and tooth size. Typical blade lengths range from 15 to 26 inches, the shorter blades being suitable for light work and confined spaces.

Tooth size is designated by the number of points per inch (ppi, or points). The lower this number, the larger the teeth — and the faster and rougher the cut. Ripsaws are available in 4½, 5½, 6 and 7 points, while crosscut saws are found in 8, 9, 10 and 12 points. For general work, a good choice would be a 5½-point ripsaw and an 8-point crosscut saw.



Ripsaws are designed for cutting parallel to the grain and have chisel-like teeth that plow through the wood. Crosscut teeth are pointed to sever wood fibers. Both types of teeth are bent out, or set, to create a kerf that's wider than the blade.

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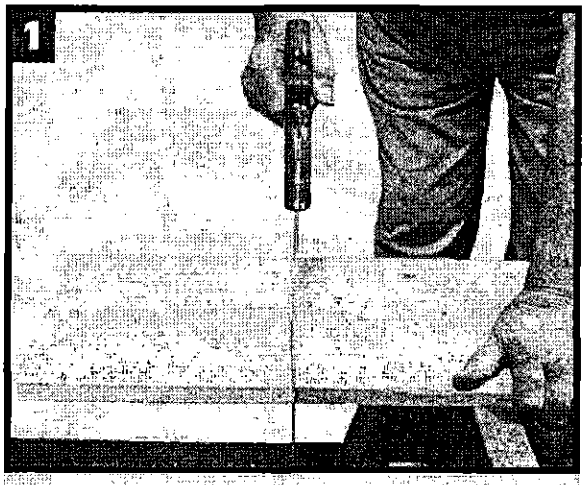
Another feature common to both ripsaws and crosscut saws is tooth set. Set refers to the amount that each tooth is bent away from the blade. By bending each tooth alternately left and right, the saw kerf is made wider than the thickness of the blade and the blade moves freely through the cut. Without set, the blade body would bind in the cut.

A great deal of set produces a rough cut. High-quality blades are often taper ground — thinner at the back edge than along the tooth edge — so that the set can be minimized for a finer cut.

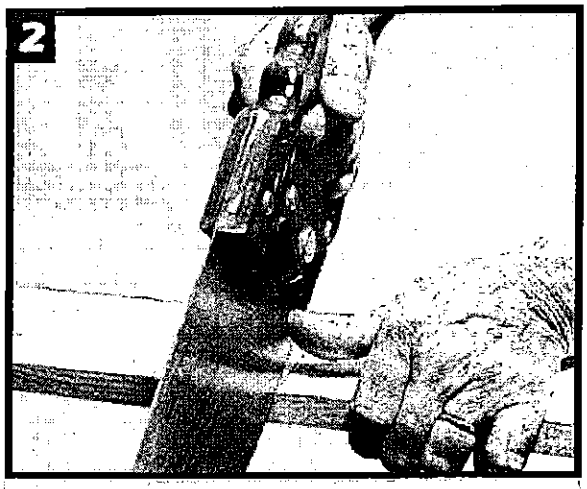
Using the saw

To saw accurately and safely, you must support and hold the work securely. If possible, hold the work with clamps or in a vise. Otherwise, use a pair of stable sawhorses at a height that provides a comfortable stance ever the work (Photo 1).



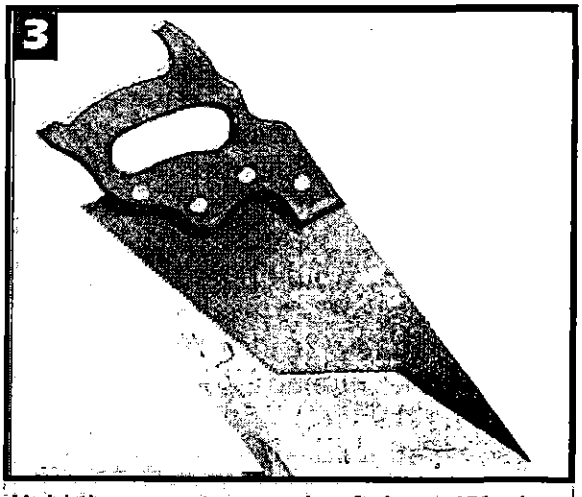
For accurate and safe cutting, support the work securely and use a stable and comfortable stance.

Mark a clean cutting line. Start the cut by placing the heel of the blade (the teeth near the handle) on the edge of the wood on the waste side of the cutting line. Steady the blade against your thumb, then slowly draw the saw back once or twice to start the kerf (Photo 2). As soon as the cut has been started, move your hand away from the blade and make long, steady strokes. Keep your forearm and shoulder in line with the saw and cut.



Use your thumb on the side of the blade to steady it when starting a cut. Make short pull strokes on the waste side of the line.

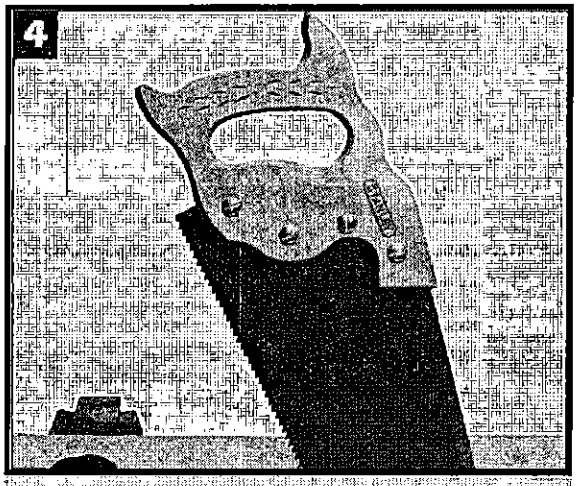
When crosscutting, hold the saw at 45° to the work surface (photo 3). When you near the end of the cut slow down and shorten the length of the stroke. Grasp the waste piece with your free hand and finish the cut with short, light strokes.



Hold the saw at an angle of about 45° when crosscutting. As cut nears end, shorten strokes and hold waste piece.

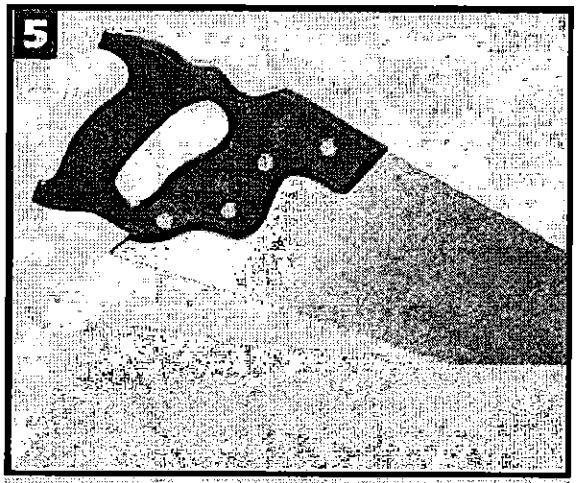
TOOL TIME

Ripping demands a steeper 60° angle (Photo 4). For fine work, leave more space between the cut and marked line to allow for the coarser cut that must be planed smooth.



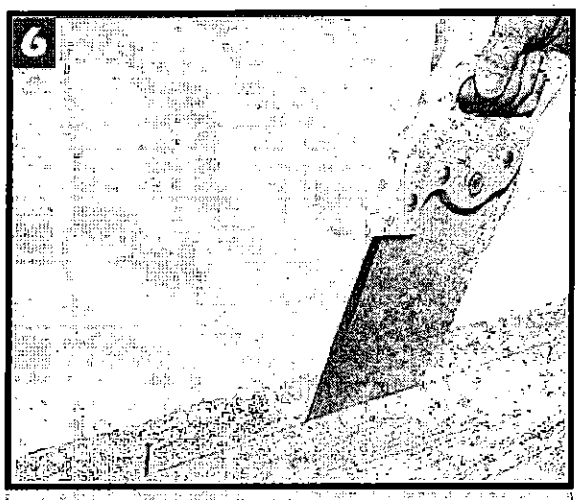
Coarse ripsaw works best at steep 60° angle. Leave space between cut and line to smooth sawn surface.

Use a crosscut saw to cut plywood, but lower the angle to about 20° to minimize splintering (Photo 5).

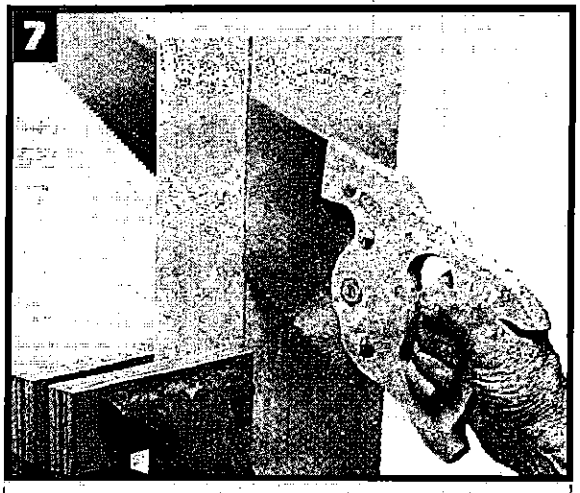


Ten-point crosscut saw handles plywood. Keep saw at shallow 20° angle to reduce splintering.

If you find that the kerf closes behind the cut when ripping a long board, use a nail to keep the kerf open (Photo 6). Short work is best held in a vise for ripping. Reposition the work as the cut progresses so the cut is near the vise (Photo 7).



Internal stresses in wood can cause it to bind on long rips. Insert a nail in the saw kerf to open space for blade.

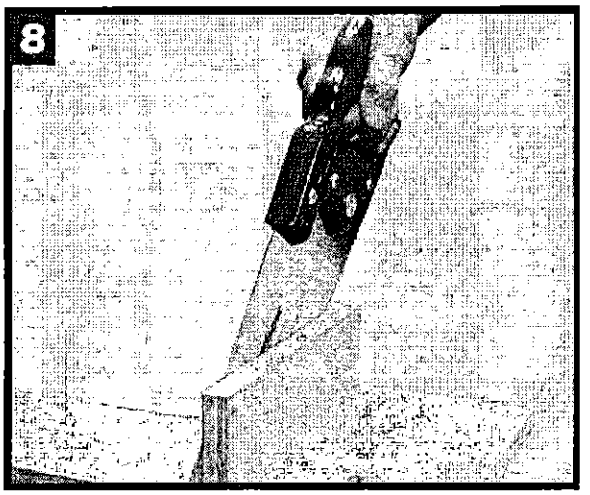


Hold small work in vise for safe and accurate cuts. Reposition work so cutting takes place near vise.

While the handsaw is a freehand tool, you can uses guides to help improve accuracy. For consistent crosscutting, glue and screw together an L-shaped fence and clamp it to the work at the cutline (Photo 8).

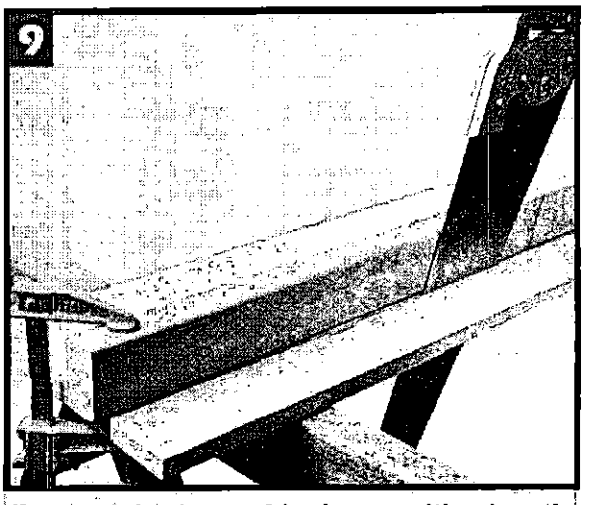
TOOL TIME

Adding a lip underneath that's square to the fence edge helps the guide ensure square cuts.



Use a simple guide to ensure accurate crosscutting. Clamp guide to workpiece and follow fence with blade.

For guided rip cuts, use a straight length of 2 x 3 lumber. Clamp it in place next to the cutline (Photo 9).



For straight rips, guide ripsaw with a length of 2 x 3 stock. Align guide with cutline and clamp in place.

The Slowest and Weakest

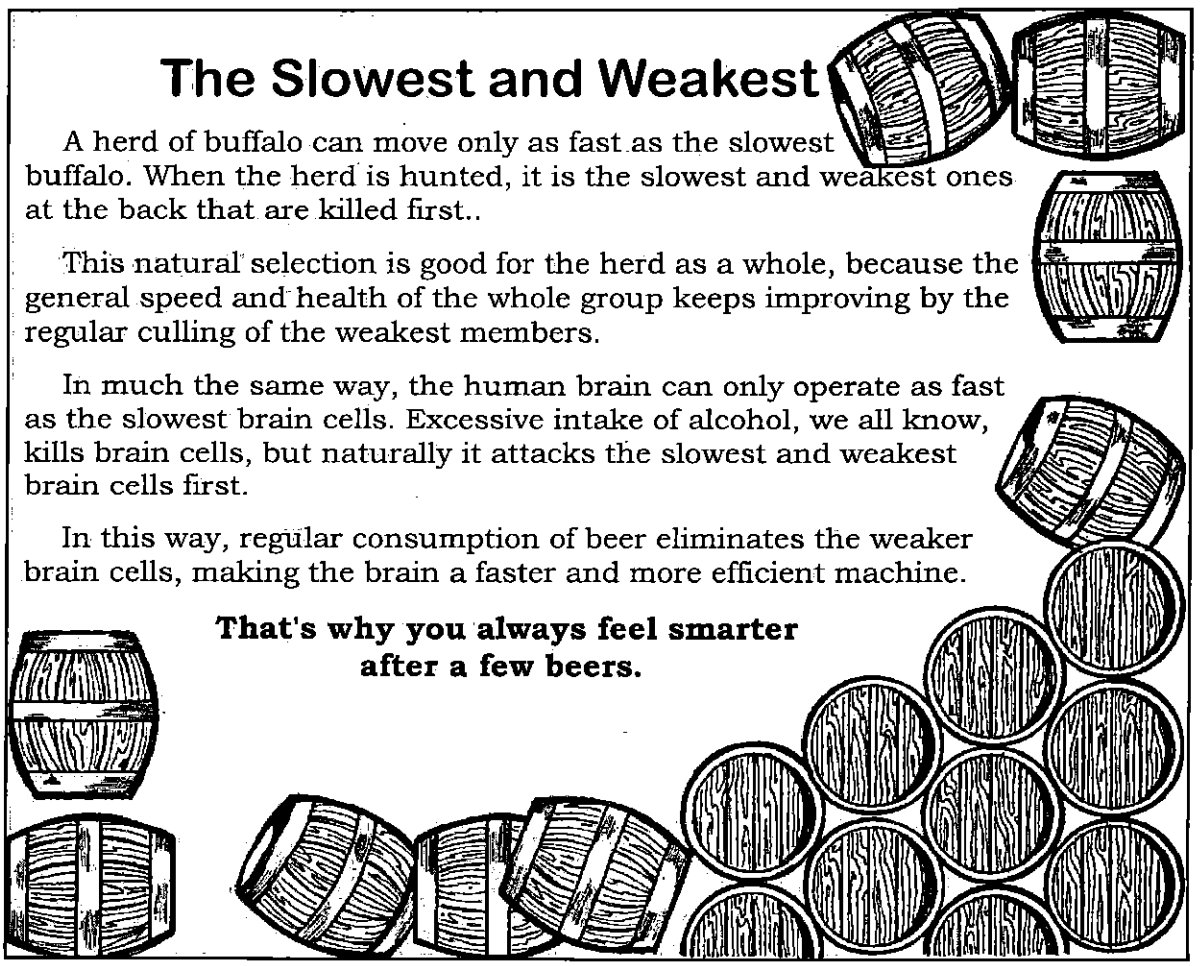
A herd of buffalo can move only as fast as the slowest buffalo. When the herd is hunted, it is the slowest and weakest ones at the back that are killed first..

This natural selection is good for the herd as a whole, because the general speed and health of the whole group keeps improving by the regular culling of the weakest members.

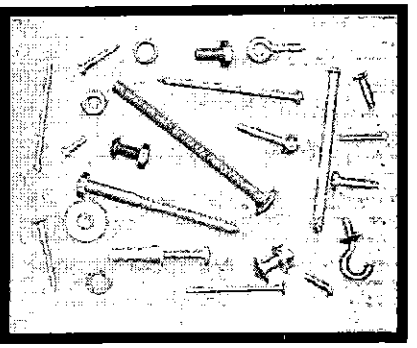
In much the same way, the human brain can only operate as fast as the slowest brain cells. Excessive intake of alcohol, we all know, kills brain cells, but naturally it attacks the slowest and weakest brain cells first.

In this way, regular consumption of beer eliminates the weaker brain cells, making the brain a faster and more efficient machine.

That's why you always feel smarter after a few beers.



TOOL TIME



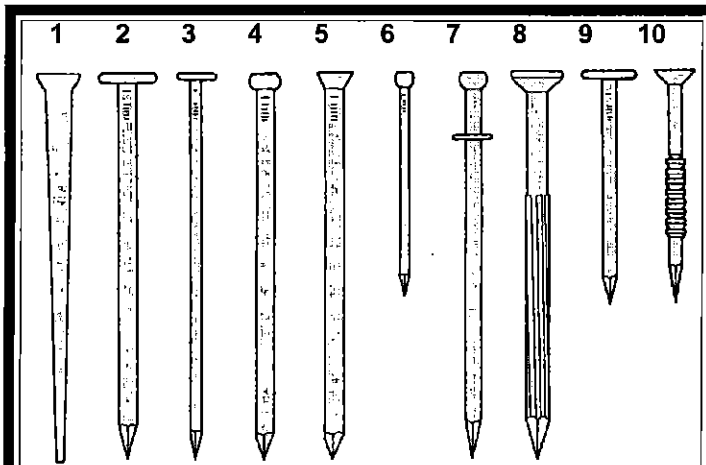
All Rovers, male and female, young or old, get called upon at one time or another to do fix-it jobs. Sometimes as a Crew project, sometimes as a home repair project, and sometimes to help a friend. In this column, we're going to try to bring you tips to make some of these jobs easier.

FASTENERS

From: 'The How-To Booklet Nails & Screws' #105 by Creative Homeowner Press, and 1963 Mechanix Illustrated 'The How-To Book Of Carpentry' (Book #549) by Fawcett Publications

Nothing is deader than a door nail, the saying goes, and that's probably why nails (and screws, too) get no respect at all for the job both do-such as keeping houses from failing apart, shelving on walls, decks sturdy, railings in place, windows in openings.

Regardless of the project that you undertake, nails and screws probably will be on the materials list, and that's why it's important to know what's available in these fasteners and what each one does specifically. Read on.



Different Nail Types

1. Cut
2. Common
3. Box
4. Finishing
5. Casing
6. Brad
7. Double Head or Duplex-Head or Scaffolding
8. Masonry
9. Roofing
10. Drywall

Some nails (not shown) are especially designed to fit electric nail guns. Aluminum spikes (7" long) are used it install roof guttering. Also available are decorative nails for upholstery and fine cabinet projects.

NAILS, BRADS, AND SPIKES

Nails are the most primitive and least sophisticated fastening device. They are also the most widely used, especially in structural carpentry, because they can be quickly driven into place to form a sturdy joint. The holding power of a nail is achieved by the pressure of wood fibers, displaced by the nail entering the wood, trying to return to their original positions.

A **common nail** has a large, flat head and is used for most rough work. A **box nail** is thinner and is also used for rough work. A **finishing nail** has a small head-only slightly larger than the shank of the nail-with a depression so that a nailset can be used to conceal the head below the surface.

A **casing nail** is similar to a finishing nail, but the head is tapered and has no depression; it is often used for exterior trim work and may be driven either flush with the surface or set below ft. **Brads** are small, lightweight nails with practically no head at

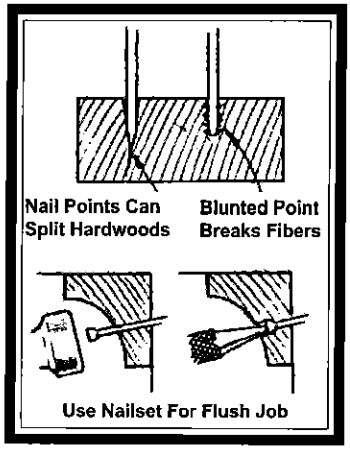
TOOL TIME

all. They are used for light finishing work and are usually concealed beneath the surface.

A **double-headed nail** has two heads. One is above the other. These we used for scaffolding or concrete forms-work that must be disassembled later. The nail is driven only to the lower head. The upper head remains above the surface so that it can be grasped by a claw hammer for easy removal.

There are specially nails. **Masonry nails** may be either cut steel or specially hardened wire. Rust-proof **aluminum nails** are used for exterior applications, such as on certain types of siding. **Galvanized steel nails** are used for the same purpose. **Hot-dipped galvanized nails** are more rust-proof than their plain cousins.

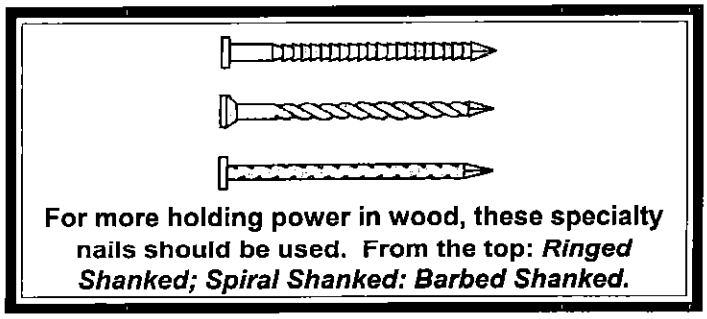
Roofing nails have large heads to hold soft asphalt shingles. **Drywall nails**, with slightly smaller heads, are used to install gypsum wallboard (drywall).



In addition of variations in head shapes and sizes, nail points also vary. In general, the sharper the point, the greater the holding power of the nail. However, a sharp point Is more likely to split the wood than a dull one.

The shanks of some nails are ringed, spiraled or barbed to increase holding power. Others may be coated with resin or cement. These nails are not recommended for use where they may have to be removed.

The "penny" system for sizing nails originated in England. The letter "d' was the designation for the English penny. In the



For more holding power in wood, these specialty nails should be used. From the top: *Ringed Shanked; Spiral Shanked: Barbed Shanked.*

early days, the same abbreviation was used to indicate a pound in weight. Nails were weighed by the thousand, so if 1,000 nails totaled 12 pounds, they were 12d, or 12-penny nails. The penny system has endured, although today it refers only to nail length. For example, a 2d nail is 1 in. long; the length increases 1/4-in. for each higher number up to 10d. Then the penny system gets more complicated (see chart).

Spikes are larger, thicker versions of common nails, overlapping some penny sizes-generally from 30d to 60d. Spikes longer than 6 in. are described by their actual length, ranging up to 12 ins.

Most nails are sold by the pound, and, of course, the larger the nail, the fewer nails per pound. The type of nail also makes a difference in weight.

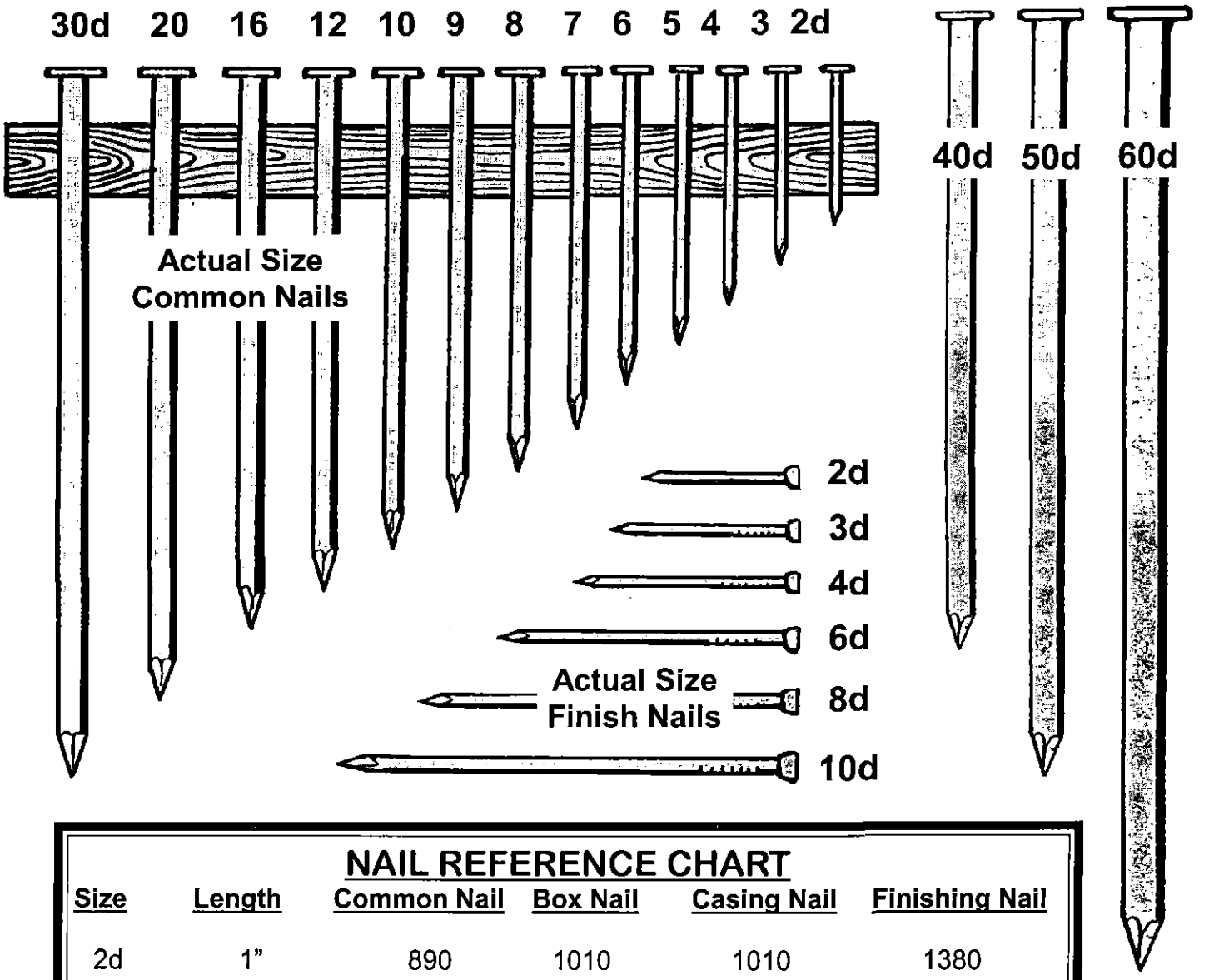
THE NAIL DRIVERS

For do-it-yourselfers, a 16-ounce claw hammer is recommended to drive most nail fasteners, with the exception of brads. Use a tack hammer (or 10- to 12-ounce claw hammer) to drive brads-and tacks, of course.

A 20-ounce hammer is a professional tool and it takes lots and lots of muscle to swing it. However, it will drive nails faster than a 16-ouncer.

A ripping hammer differs from a claw hammer in that the claws are more in a straight line than curve. This design provides a "crowbar" action for ripping apart assembled framing.

TOOL TIME

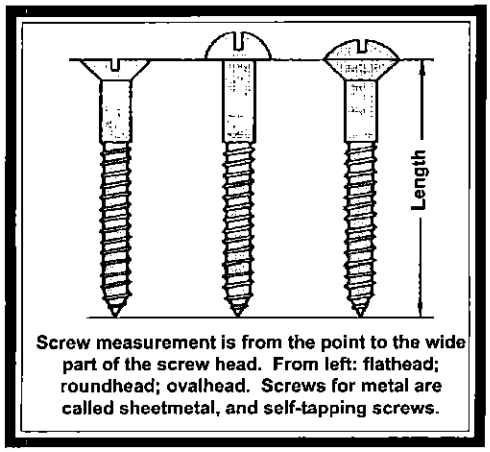


NAIL REFERENCE CHART

Size	Length	Common Nail	Box Nail	Casing Nail	Finishing Nail
2d	1"	890	1010	1010	1380
3d	1 ¼"	590	640	640	895
4d	1 ½"	318	440	440	605
5d	1 ¾"	275	410	410	530
6d	2"	190	240	240	322
7d	2 ¼"	165	210	210	270
8d	2 ½"	106	145	145	200
9d	2 ¾"	95	135	135	176
10d	3"	72	95	95	130
12d	3 ¼"	64	88	88	118
16d	3 ½"	48	72	72	92
20d	4"	32	52	52	

Approximate Number of Nails per Pound
Based on average counts.
Actual numbers may vary.

TOOL TIME

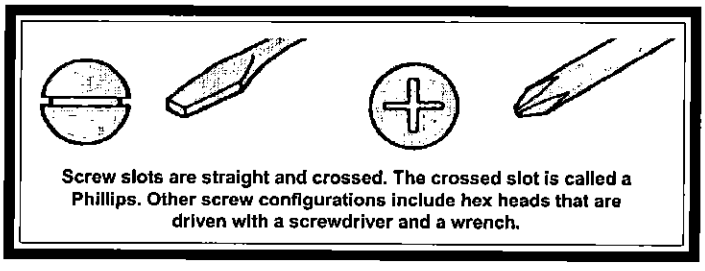


Screw measurement is from the point to the wide part of the screw head. From left: flathead; roundhead; ovalhead. Screws for metal are called sheetmetal, and self-tapping screws.

THE SCREW SELECTION

For pure holding power, screws are better than nails and if you want this added feature, always use screws at wood joints when you can. Wood screws, however, are seldom used in structural carpentry.

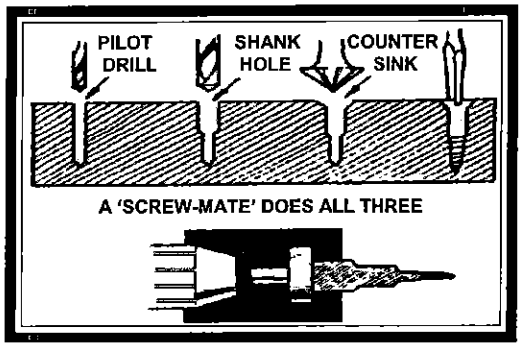
Common wood screws are made of steel or brass. The screw shank is threaded from the point up, about 2/3rds of its length. The upper third is smooth to the head. **Flat head screws** are used where the screw must be flush with the surface of the work. **Round head screws** protrude above the surface, making them easier to withdraw. **Oval head screws** combine features of flatheads and roundheads: they are partly countersunk in the work, and they


Screw slots are straight and crossed. The crossed slot is called a Phillips. Other screw configurations include hex heads that are driven with a screwdriver and a wrench.

protrude slightly above the surface.

Most screw heads have either a single slot across the entire width or a recessed, X-shaped slot called a Phillips head. Wood screw length is measured from the point to the widest part of the head, see illustrations. Lengths range from 1/4-in. to 6 ins. and are graduated by eighths of an inch to I in. Screws also vary in body diameter, expressed as a gauge number from 0 (about 1/16 in.) to 24 (about 3/8 in.).

Lower-numbered (thinner) screws are for fastening thin wood or where there is a danger of splitting. High-numbered screws are used where greater strength is required.



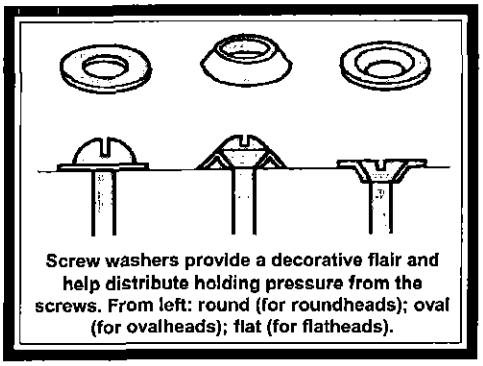
To drive screws easier, pre-drill pilot holes for them about the same diameter as the threads of the screw. If you are countersinking, pre-drill the pilot hole then countersink it. You can also slide the screw threads over soap or beeswax to make them easier to drive—especially in hardwoods. You can buy countersinks for portable electric drills and stationary drills that, at one time, drill the pilot hole, shank the hole, and countersink the hole.

Heavy-duty fasteners should be used on big jobs such as workbench legs; lag screws, carriage bolts, etc., are best here.

Lag bolts are thick and heavy for heavy fastening. Lengths range from 1 to 12 ins. The round head of the **carriage bolt** sits on a partially square shank. This square area bites into the wood and keeps the head from turning when you secure the nut. A machine bolt must be held at both ends. With a machine bolt use a washer under both the head and the nut. A carriage bolt requires a washer under the nut only.

Dowel screws are threaded on both ends and are used to join wood in butt joints-like dowel pins would be used. These

TOOL TIME

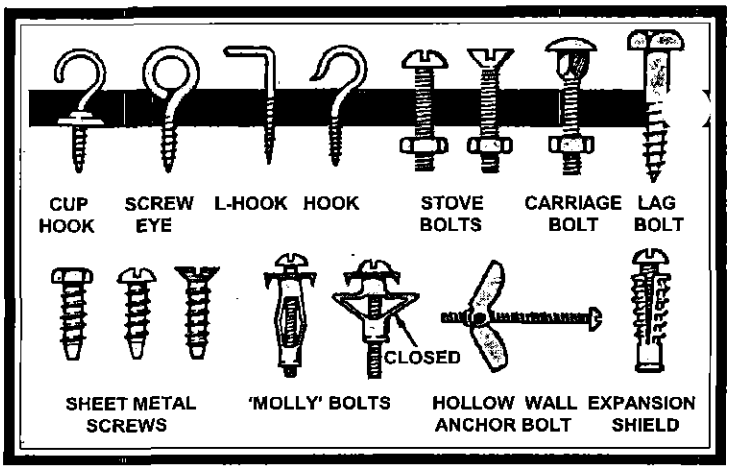


Screw washers provide a decorative flair and help distribute holding pressure from the screws. From left: round (for roundheads); oval (for ovalheads); flat (for flatheads).

fasteners are driven with pliers and wrenches after pilot holes are drilled.

Washers can be plain or of the locking type. The latter is best used when the fastener will be subject to loosening by vibration or hard use.

To secure to a masonry wall you can insert expansion sleeves in holes drilled with a carbide-tipped bit. Inserting the screw expands the shield to grip tightly against the walls of the hole. For hollow walls, choose fasteners which expand against the inside of the wall. Usually these are installed by first drilling a hole and then inserting the device and taking up on the screw. This opens and spreads the "wings" of the fastener inside the wall. Then you remove the screw and place whatever you are hanging before re-driving the screw. Similar items are available for attaching things to hollow-core doors.



WOOD SCREW CHART

Gauge Size	Length	Drill Sizes: Pilot Holes, Hardwood	Drill Sizes: Pilot Holes, Softwood	Drill Sizes: Shank Clearance Holes
0	1/4	66	75	52
1	1/4 - 3/8	57	71	47
2	1/4 - 1/2	54	65	42
3	1/4 - 5/8	53	58	37
4	3/8 - 3/4	51	55	32
5	3/8 - 3/4	47	53	30
6	3/8 - 1 1/2	44	52	27
7	3/8 - 1 1/2	39	51	22
8	1/2 - 2	35	48	18
9	5/8 - 2 1/4	33	45	14
10	5/8 - 2 1/2	31	43	10
11	3/4 - 3	29	40	4
12	7/8 - 3 1/2	25	38	2
14	1 - 4 1/2	14	32	1/4"
16	1 1/4 - 5 1/2	10	29	17/64"
18	1 1/2 - 6	6	26	19/64"
20	1 3/4 - 6	3	19	21/64"
24	3 1/2 - 6	1/4"	15	3/8"

Screws are designated by both length and diameter. Length is designated in inches. Diameter is designated by a gauge number. Lengths available run from 1/4 inch to 6 inches. Gauges available are 0 (1/16 inch) to 24 (3/8 inch). The label on the box of screws might read 1x6, meaning the box contains 1-inch screws of No. 6 gauge. Most stores carry all standard lengths of screws in appropriate gauges. Most common gauges are Nos. 2 through 16. The heavier the work required of the screw, the larger the gauge should be.

TOOL TIME

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HOME SECURITY

From: "The How-To Booklet Safe & Secure" #57 by Creative Homeowner Press

No matter where you live, whether in the city, suburbs or country, we all like to feel that our homes are our castles, with an invisible moat protecting us from the rest of the world. Unfortunately, as attested to by the many reports in the media, that isn't the case anymore. Crime doesn't respect any boundaries, and home break-ins occur anywhere. More and more people find that someone "visited" their homes and made off with their valued possessions.

There probably is no security system ever devised that can't somehow be compromised. Although home security systems have seen vast improvements over the last decade, there is not one that you can buy and install that is burglar-proof. Either the burglar will break through the hardware or, more likely, bypass it. However, the purpose of security hardware is to discourage burglars. It takes time to break and enter, and a burglar doesn't have this time. It's easier for the burglar to find another home with easier access. If a burglar wants to get into your home, he/she will do it even if it takes a chainsaw to cut through the roof (there are records of this type of caper).

Basic security hardware and its installation is detailed in this article. Most of the hardware can be readily purchased at many home center, hardware, and building material outlets. The tools needed to install it also are very basic.

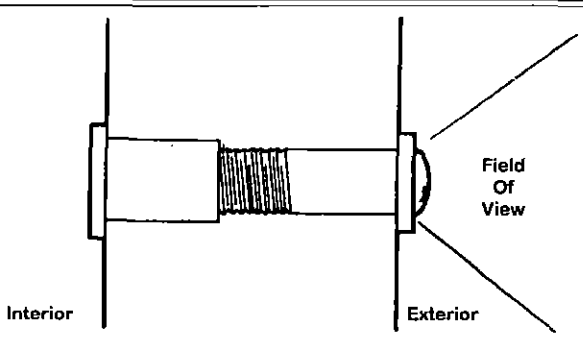
DEADBOLTS

A deadbolt on entrance doors outshines most any other type of lock, except a surface-mounted vertical deadbolt. Both are inexpensive to buy and fairly easy to install with a minimum of tools. Some basics:

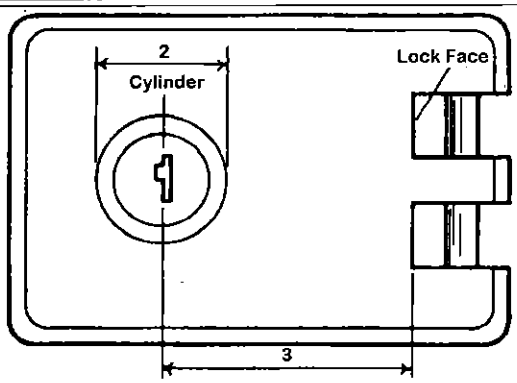
- The screws used to mount the locks should reach half-way through a solid core door.
- Coat the screws, which should be the 1-way type so they can be driven but not drawn, with glue before driving them into the wood.
- Install any surface type lock about 10 ins. above the door lockset.

COMPLETE SECURITY DOORS

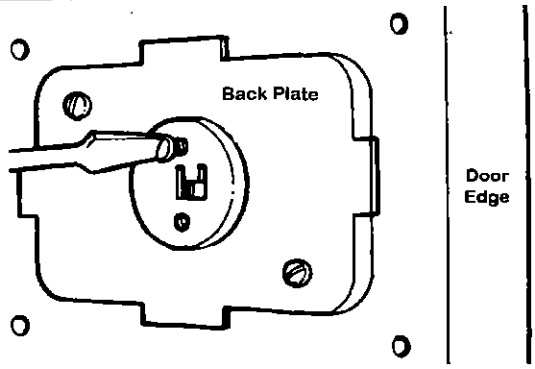
You can buy doors with iron bars on them for installation outside regular exterior doors. Some of the designs are pleasing and the styles include doors that open as a door unit and those that fold open in an accordion fashion. Both types operate on hinges that are installed inside the doors similar to pin hinges on an exterior solid core door. Most styles are secured with a tamper-proof padlock through a metal hasp installed on the inside-sometimes outside-of the door. These doors probably are the "ultimate" in door security.



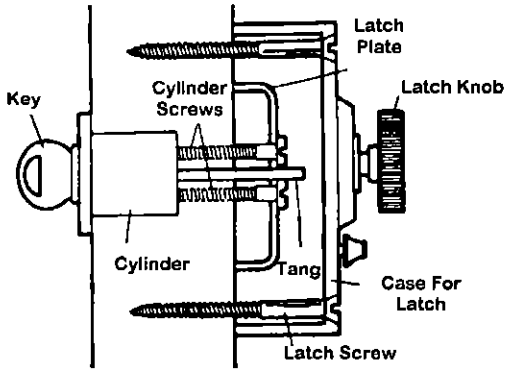
A peeper is a common security measure. It is a look-through glass with a wide angle range. You simply look through it to see who's knocking at the door. Installation in a solid core door is little more than a hole drilled in the center of the door at eyeball height. The outside section of the peeper is inserted through the hole from the outside and screwed into the inside section.



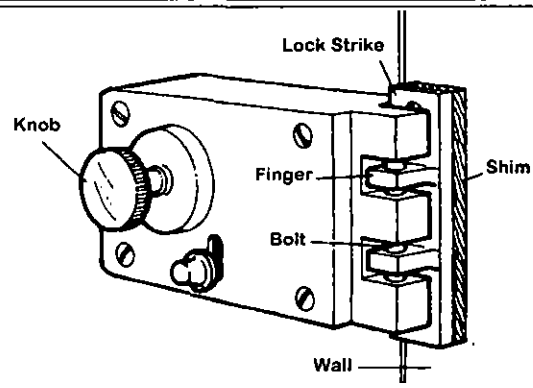
1. Surface-mounted vertical deadbolt is one of the best locks you can buy. To locate cylinder hole, hold lock to door and (1) add the dimension to half (2) the diameter of cylinder. Both measurements combined (3), is distance to place the lock in from the edge of the door.



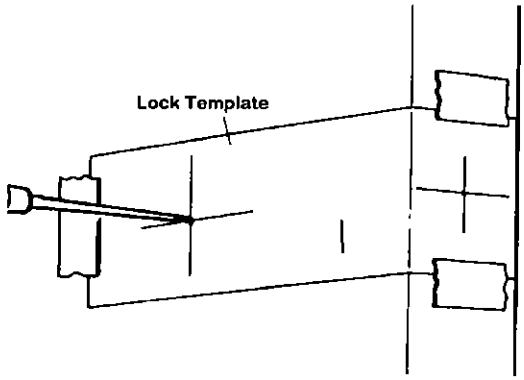
2. Mark dimensions on door. Then position and screw on the back plate. Drill the hole for the cylinder partly through the door with another hole for the tang of the cylinder. Insert the cylinder and tang into the hole and then into the backplate, as illustration shows.



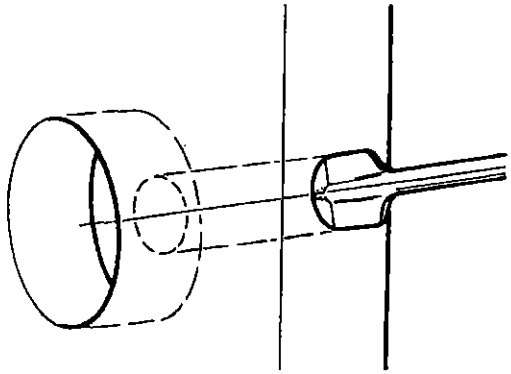
3. Anatomy of a surface-mounted deadbolt shows how the cylinder and tang fits through the door and into the backplate and lock. The cylinder is secured in the door by the tang and the backplate, plus two screws driven through the backplate into the back of the cylinder.



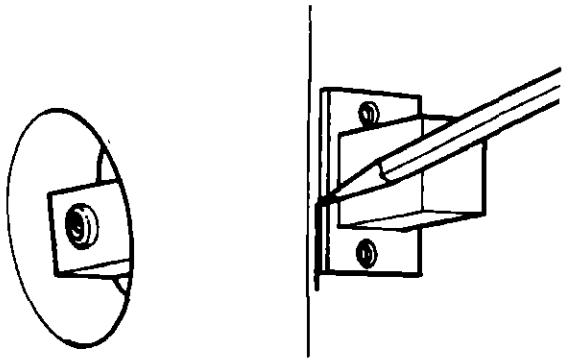
4. Install the latch case, securing it to the door with screws. The cylinder and tang should fit perfectly. Next, install the lock strike to the jamb of the door. You may have to shim it so the lock fingers meet the bolt. Try the lock to be sure it operates, then tighten all screws.



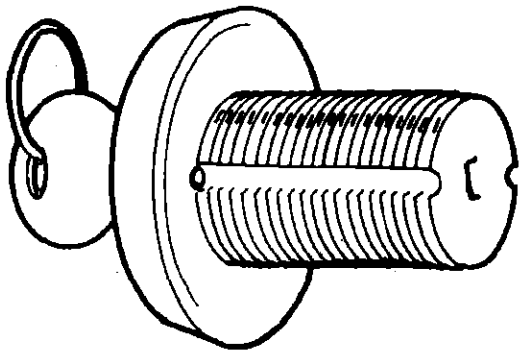
1. To install a deadbolt, use the manufacturer's template to locate the hole positions. Tape the template to the door about 10 ins. above the lockset.- use a square to make sure that it is square on the door. Before buying, measure door thickness; locks vary.



2. With a hole saw or expansive bit, drill the hole for the lock first. Then drill the hole for the bolt so both holes form a "unit". The trick is to keep the holes square to the door surface; use a square as you drill for extra accuracy. Deadbolt locks are made for solid core doors.



3. Measure and mark for the latch bolt, which has to be mortised into the door with a butt chisel. The depth of the mortise is the thickness of the latch plate. Go easy with the chisel, taking small cuts; latch can be shimmed if you make the cut a tad too deep.

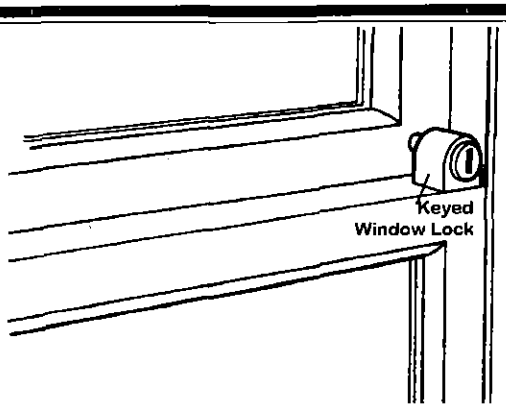


4. Screw in the cylinder from the exterior of the door. Special set screws will hold it in position so it can't be removed by a burglar. Then install the strike plate on the doorjamb for the latch bolt. Sometimes, this lock requires only a drilled hole in the jamb to accept the bolt.

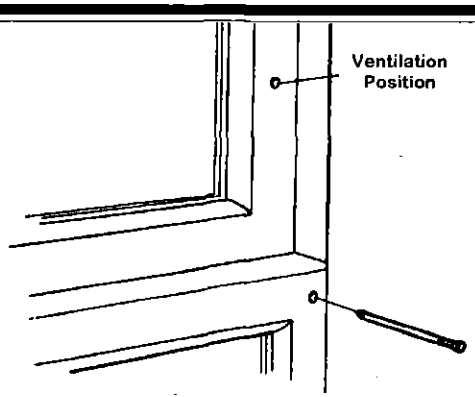
WINDOW SECURITY

Windows are difficult to secure because the burglar can always break the glass and enter, or, even easier, break the glass and disengage the lock. The good news is that burglars don't like to break-and-enter through windows, according to police. You probably can save money securing windows by securing those at ground level, since entrance through second-story windows by a burglar is doubtful. It is too time consuming for a burglar to raise a ladder to a second story. By the time the ladder is set and the window is jimmied, the police could be on their way to the scene.

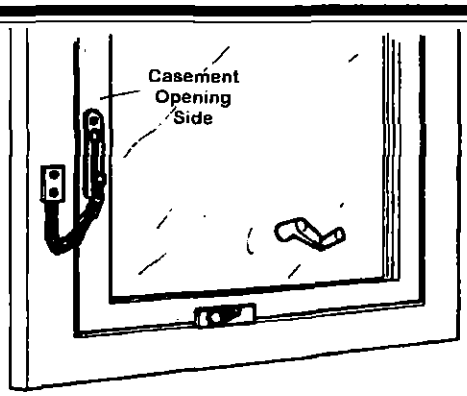
In this sequence, you'll find several different ways to secure windows with hardware readily found in home center, hardware, and building supply stores.



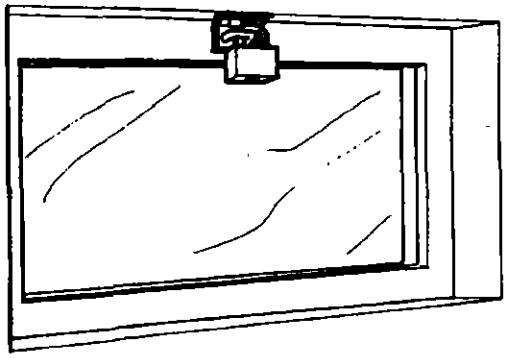
Win- dow key lock is best lock type, since the burglar can't open the lock and would have to break the glass and the window mullions in order to get into the house. Some key locks are adjustable so you can crack the window for ventilation without activating the lock.



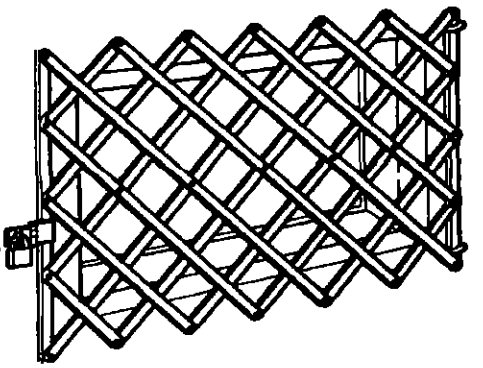
For double-hung windows, you can improvise a nail or bolt lock by simply drilling holes through the bottom frame of the window and into the top frame. The nail or bolt is inserted flush into the hole(s). You can space the holes so you can crack the window for air.



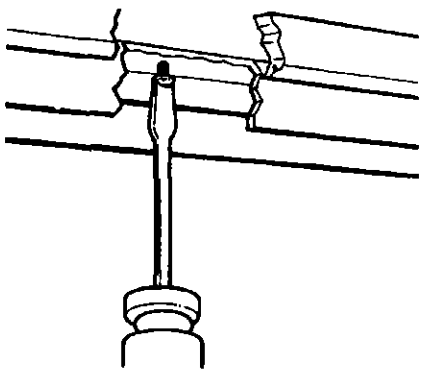
For casement windows, use a sliding door lock. This is better than a door chain, because many models can be padlocked. You also can secure a casement window by simply removing the crank that turns the window operator. It is almost impossible to open a window without it.



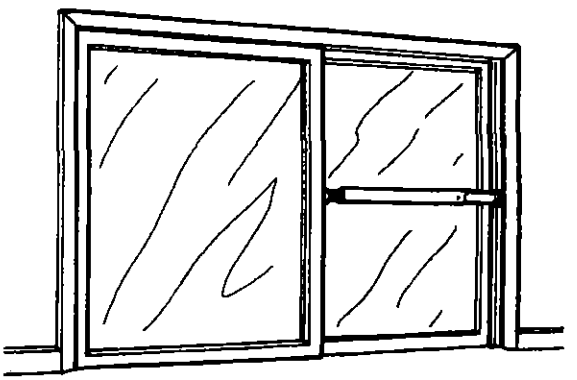
Basement windows (hopper type) that open from the top can be secured with a hasp and padlock, as illustrated. Use one-way screws to attach the hasp; this way there is no chance a burglar can break the glass and remove the hasp, if the hasp screws are exposed.



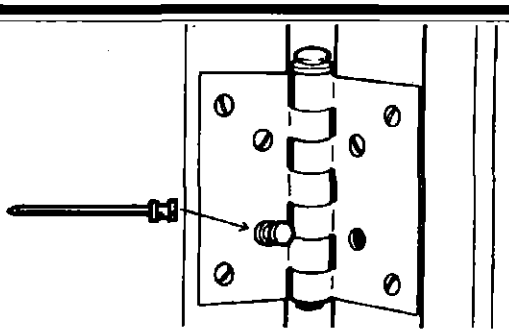
An accordion gate offers maximum protection for basement windows, yet is fairly easy to open from the inside in the event of an emergency. The gate is padlocked with a hasp. You also can buy burglar bars or grills that are set into the jambs of the windows.



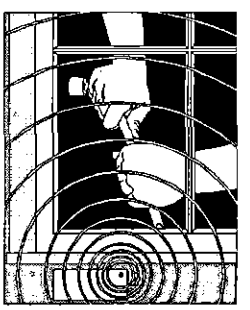
Patio doors are easy to jimmy from the outside. Just lift them up and out of the track. The job is more difficult for a burglar to do, if you drive a screw up into the top center of both upper tracks. Let the screw project downward so the door just bypasses the screw.



A burglar bar on patio windows is deterrent, but a burglar can still force the lock and jimmy the door. Use a burglar bar in combination with the screw trick shown above, plus a window lock. The burglar bar is hinged on one end; there is a width adjustment on the other end.

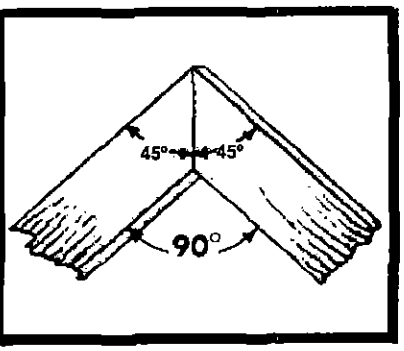


Exterior hinge pins are easy for a burglar to tap out and remove the door from the hinges. if you don't want to reset the hinges, you can use the nail gimmick: Remove opposite screws from the hinges. Drive a double-headed or scaffolding nail in one screw hole; drill out the opposite hole so the projecting head of the nail fits this hole. The burglar can remove the pins but the door can't be jimmied off barrels of the hinge or pried off from the exterior side.



Electronic alarm systems for windows and doors can be purchased and installed. They usually are expensive but worth the price if your security is threatened. Some are for do-it-yourself hook-ups. If you're really worried about security, it would pay to contract with a firm that installs and monitors your system, and provides a link to the local police.

TOOL TIME



All Rovers, male and female, young or old, get called upon at one time or another to do fix-it jobs. Sometimes as a Crew project, sometimes as a home repair project, and sometimes to help a friend. In this column, we're going to try to bring you tips to make some of these jobs easier.

WOOD JOINTS

From: "The How-To Booklet Wood Joints" #98 by Creative Homeowner Press and other sources

BUILD ALMOST ANYTHING—from buildings to bookshelves—and the project will call for some kind of wood joinery technique. There are countless ways to make wood joints, and there are countless variations on these ways. You probably will even invent some of your own wood joints as you experiment with the basic joints and splices shown here.

BUTT JOINTS

A *butt joint is the easiest and simplest of all wood joints* **(Fig. 1)**. Widely used in construction carpentry and production cabinetry, butt joints are rarely used in fine woodworking. A butt joint is inherently weak, depending almost totally on the strength of the glue and fasteners used (nails, staples, or screws). To greatly increase the strength of butt joints, you can reinforce the connection with metal angles, dowels, or plates (biscuits).

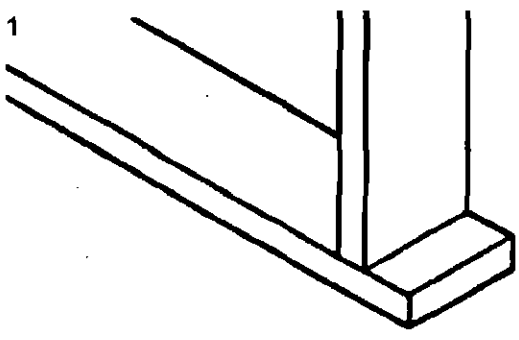
Making a Butt Joint:

[1] Using a square, make sure the end of the wood being butted against the surface of the adjoining piece is perfectly square.

[2] Use the square to mark the surface to be joined so that the two pieces will be at perfect right angles to one another.

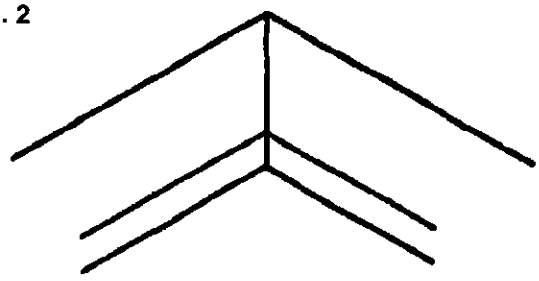
[3] Join the wood with glue and mechanical fasteners (or use dowels or plates).

Fig. 1



Butt Joint is simply the edge or end faces of two boards fastened together; joint is weak.

Fig. 2



Miter Joint can be any angle, but it usually is 45 degrees. The most accurate miter cut is made with a miter saw or in a quality miter box.

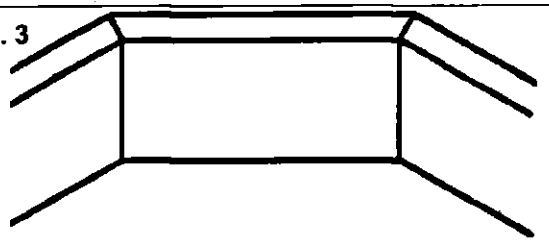
MITER JOINTS

Miter joints hide the end grain of adjoining boards and are commonly used for picture frames, door and window trim, and around openings. Miter joints are weak joints-probably weaker than butt joints. In fact, a miter joint is a form of buff joint, with the angle at the corner halved (bisected) between the two pieces being joined. Just like butt joints, miter joints can be strengthened with dowels, splines, or plates (biscuits).

Perhaps the quickest and most accurate way to make a miter joint is with a power miter saw (chop saw). You can also use a quality miter box and backsaw - or a combination saw that has eight or more teeth to the inch.

The most common miter joints are cut at 45 degree angles and joined for 90-degree corners **(Fig. 2)**. However, you can vary the angle to fit the project. A hexagonal (six-sided) box, for example, requires you to make 30-degree cuts **(Fig. 3)**

Fig. 3



Hexagon miters are cut at 30 degrees. Cut on a power saw, the blade is angled over to 30-degree angle and the wood is pushed through the blade with a miter gauge. With a miter box, the cuts are made from edge to edge in a tall box.

Using a Miter Box. Cutting miters using a miter box and backsaw is easy. Before you make the final cuts in good wood, practice a few times. Here are the steps to follow:

[1] Set the miter box at the correct angle. In all cases, the number of degrees you set should be exactly half of the total corner angle, The instructions that come with an adjustable miter box will show you how to set the angles. If you have a simple wooden miter box, you may be limited to 45 and 90-degree cuts - although you can create kerf guides for other angles by sawing through the sides of the miter box.

[2] Position the first piece of wood firmly in the box and cleanly cut the angle on the end.
Note: Protect the bottom of the miter box from saw cuts by placing scrap wood on the bottom of the box.

[3] Establish the angle and mark the cut on the adjoining piece of wood. The angle should be the same as for the first piece; however, it is not unusual to make minor adjustments for the best fit. There are three good ways to do that:

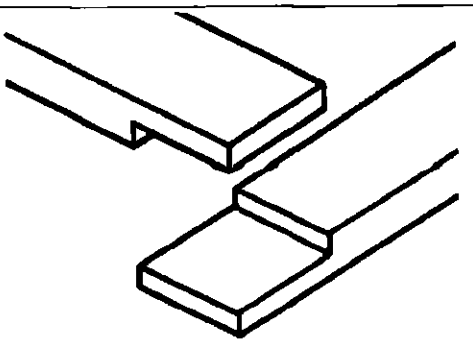
- Cut a scrap piece to the same angle as the first piece and see how it fits. If necessary, adjust the angle and try again until the fit is right. Then cut the second piece.
- If your second piece is long enough, cut the end to the same angle as the first piece and try the fit. If it's sloppy, adjust the angle and cut again.
- Directly mark the cut angle on the second piece by using the first piece as a guide. Align the two pieces in their proper position (and at the correct angle), with the cut piece on top of the uncut piece. Using a very sharp pencil, trace the angle of the top piece onto the bottom piece. Adjust the miter box to the marked angle. Carefully position the wood so the saw blade cuts through the center of the pencil line.

[4] Cut the other joints the same way as the first one.
Note: If you end up cuffing a miter slightly long (but not long enough to easily trim with a handsaw), you can care fully trim it with a sharp block plane, abrasive, or a table saw. It is better to cut too long than too short. If you cut the stock too short you have to start over again.

[5] When all the pieces are cut, apply glue to all mitered ends and lock them together with finish nails driven through pilot holes slightly smaller than the diameter of the nails. Wipe off excess glue completely with a damp rag.

[6] Drive the nailheads below the surface with a nail set. Fill the holes with wood filler or putty that matches the wood.

Fig. 4



End-laps are strong joints and can be compared with wide rabbet joints. Glue joint.

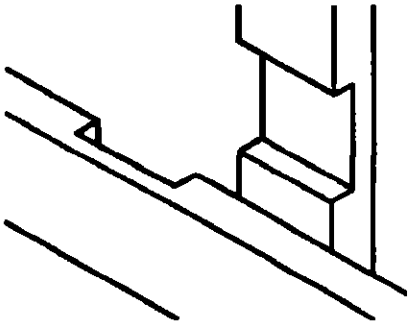
LAP JOINTS

Lap joints are most commonly used in furniture construction, kitchen cabinet frames, and similar projects. Full laps are used when boards of different thicknesses are to be joined, for example, a 1x4 to a 2x4. The 2x4 is notched 3/4 inch (the thickness of a 1x4) to receive the thinner member.

Half laps are generally used when joining two pieces of the same thickness. Each piece is notched half its thickness to complete the joint.

The most common lap joints are the end or corner lap **(Fig. 4)**, the cross lap **(Fig. 5)**, and the middle lap **(Fig. 6)**. A variation is the dovetail lap where the joined pieces are locked together, resulting in an extremely strong joint **(Fig. 7)**.

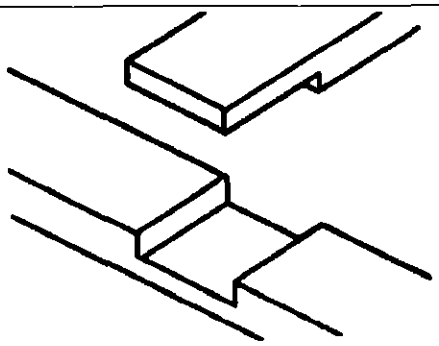
Fig. 5



Cross-lap has dado-like cuts across the face of wood. Cuts are half the thickness of the wood.

Making a Corner Half Lap. Using a table saw is an efficient way to make a half lap.
Caution: When using a table saw, keep your fingers and clothing clear of the blade, wear safety glasses, and use hearing protection.

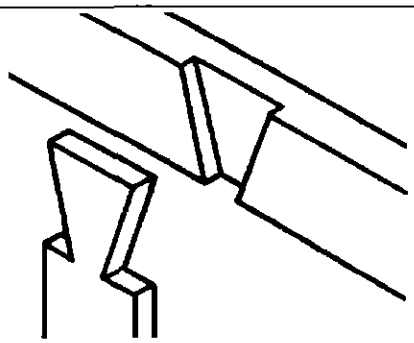
Fig. 6



Middle-laps goes across the end of one piece of wood and through the face of the joining piece.

[1] Mark the overlap by measuring in from the end of each board by the width of the stock. Square the line across both boards.
[2] Set the height of the saw blade to half the thickness of a board.
[3] Align and cut across both boards in one pass.
[4] Make repeated cross-cut passes across the waste area of each board, until you have removed all of the waste. Clean up the laps with a sharp chisel.
[5] Lap the pieces and check the fit. Use a sharp block plane or abrasive to shave protruding ends flush.
[6] Glue and clamp the two pieces together. Reinforce with screws or nails, if desired.

Fig. 7

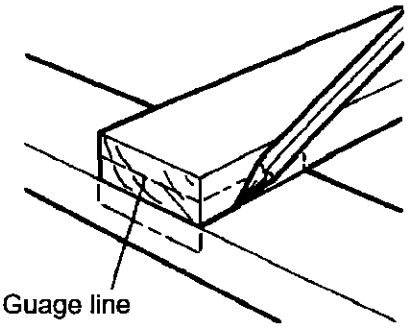


Dovetail-lap is a fancy joint where appearance is important. Cut it by hand or with a power saw.

Handsawing a Middle Lap:

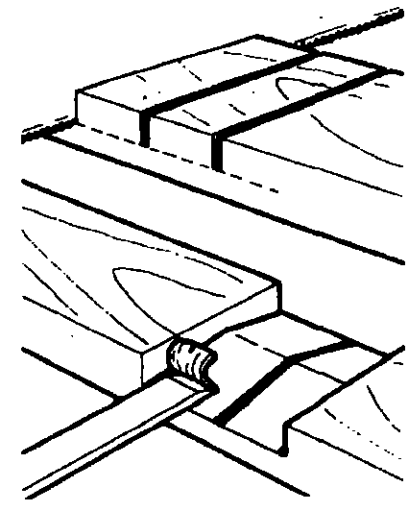
[1] Make sure the pieces are square, then carefully mark the width of the crosspiece on the receiving piece **(Fig. 8)**. Use a sharp pencil that makes a fine line. Mark gauge lines on both pieces indicating the depth of cut.
[2] Clamp the receiving piece to the workbench and carefully cut along the inner edges of the pencil lines down to the proper depth. Make an additional cut in the middle.
[3] Chisel away waste wood, working from either end toward the center **(Fig. 9)**.
[4] Clamp the crosspiece securely and cut along the gauge line just to the mark indicating the required depth **(Fig. 10)**. Then cut across the shoulder line and remove the waste wood.
[5] Glue and clamp the two pieces together. Reinforce with screws or nails, if desired.

Fig. 8



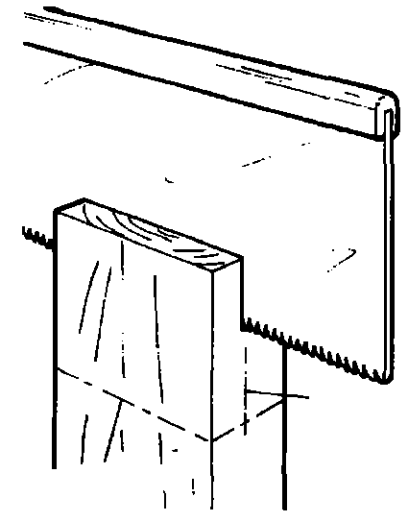
Mark wood to guide saw for lap joint and then make cut. Or use dado blade in power saw.

Fig. 9



With a sharp chisel, remove the access wood between the saw cuts, as illustrated. Smooth the bottom of the cut with a rasp.

Fig. 10



To cut a rabbet joint by hand, use a backsaw guided along penciled cut-off lines. The width of the cut is half the wood's thickness.

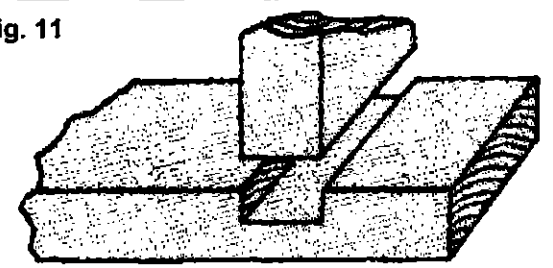
RABBET JOINTS

Rabbet joints are frequently used for drawers, bookcases, cabinets, and similar projects.

The joint is formed by cutting a recess (rabbet) in the end of one piece to accommodate the thickness of a second piece. **(See Figs. 4 & 10)**

[1] Mark the width of the rabbet directly by placing one board on edge flush with the end of the other piece.
[2] Set the height of the table saw blade (half the thickness of the wood is standard).
[3] Make a face cut to the waste side of the line you drew to mark the width of the rabbet.
[4] Make repeated cross-cut passes across the waste area of the board until you have removed all the waste. Clean up the rabbet with a sharp chisel.
[5] Join the pieces with glue and fasteners.

Fig. 11

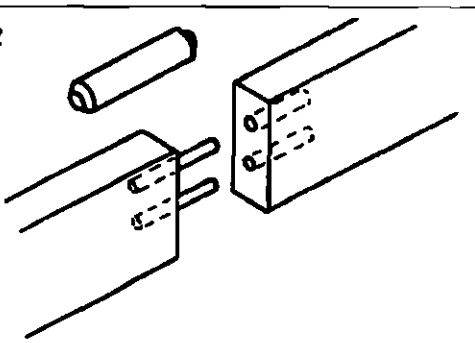


Dado Joint is used for joining shelves, boxes and drawers. It's stronger than a butt joint. The dado joint has limited application in rough construction.

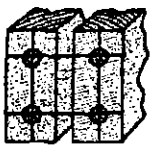
DADO JOINTS

Dadoes are channels cut across the grain of a board into which a second piece of wood is fitted. Variations include a stopped or grain dado, a stopped housed dado, and a dovetail dado. Dado cuts can be made with power or hand tools.

Fig. 12



Dowels strengthen butt joints. You must use a stationary drill press or inexpensive doweling jig for this job. You can buy precut dowels with beveled edges and fluted sides which allow trapped glue to escape. End-to-end doweling is called a "splice". About half of the dowel is inserted in each end of the board, but leave room at the bottom of the holes you drilled for excess glue "well".



Dowel Pinning—Provides a concealed form of fastening, one of the strongest methods of joining woods. A dowel joint has a cylindrical piece of wood recessed into holes and glued fast, often used in combination with other joints. Alignment must be precise.

DOWEL JOINTS

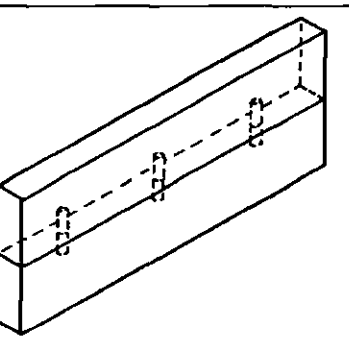
Butt joints reinforced by dowels are very strong. Holes for dowels must be perfectly aligned and you can do this with a doweling jig. Also, the edges of the boards to be joined must be square **(Figs. 12 & 13)**

Dowel Grooving

Grooved **Wedged** **Spiral**

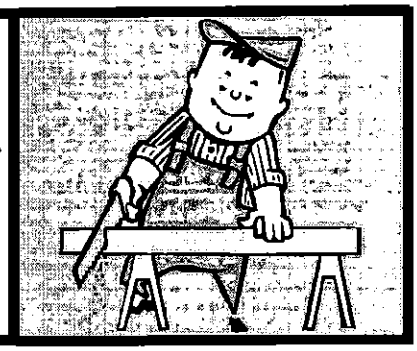
[1] Clamp the boards together. Use a pencil and combination square to draw a straight line across both pieces at the point where they will be doweled. Remove the clamp.
[2] Align the jig. Put the doweling jig on the first piece, clamping the jig in place after sighting the penciled line. Markings on the jig will help the alignment.
[3] Insert the drill bit into the jig guide and drill a hole that is slightly deeper than half the length of the dowel pin (use a piece of tape on the drill bit as a depth gauge). Repeat on the other piece of wood. Most joints have 2 or 3 dowels.
[4] Coat each dowel pin with glue and insert the dowels into the holes in one of the pieces. Apply glue to the mating area of the other piece, align the dowels with the holes, and fit the two pieces together.
[5] Clamp the pieces together. Wipe off excess adhesive. Sand and finish.

Fig. 13



Edges of board must be perfectly square for perfect dowel joints. Apply glue to one end of dowels, then insert dowels into one board. Apply glue to the dowels and adjoining board and tap both pieces together. Clamp.

TOOL TIME



ALL ABOUT WOOD

Wood will be the building staple in almost every project you undertake. Make a point of finding out as much about lumber as you can–beginning with the basics presented here.

The lumber you're most likely to need for your projects is softwood, a term that refers to the wood's conifer-tree origin and not its strength. Hardwoods, which come from deciduous trees, are more expensive and not as readily available; they're best used for finer furniture carpentry.

Your choices of naturally decay-resistant types of wood for outdoor projects include: redwood, cedar, and cypress. A practical, less expensive option is pressure-treated wood, which contains chemical preservatives that retard rot. For layout batterboards, temporary braces, and concrete forms, you'll require different sizes of untreated lumber–a ready supply of 2x2s, 1x4s, 2x4s, and 2x6s will come in most handy. Get 4x8-foot panels of exterior-grade plywood for sheathing: $^{5}/_{8}$-inch for a subfloor or roof, $^{3}/_{8}$-inch for walls. T1-11, a textured siding-rated plywood, can be fastened directly to the studs of walls, eliminating the need for sheathing.

SOFTWOOD LUMBER SIZES

Actual (inches)	Nominal (inches)	
	Surfaced dry	Surfaced green
1x2	¾ x 1 ½	$^{25}/_{32}$ x 1 $^{9}/_{16}$
1x3	¾ x 2 ½	$^{25}/_{32}$ x 2 $^{9}/_{16}$
1x4	¾ x 3 ½	$^{25}/_{32}$ x 3 $^{9}/_{16}$
1x6	¾ x 5 ½	$^{25}/_{32}$ x 5 $^{5}/_{8}$
1x8	¾ x 7 ¼	$^{25}/_{32}$ x 7 ½
1x10	¾ x 9 ¼	$^{25}/_{32}$ x 9 ½
1x12	¾ x 11 ¼	$^{25}/_{32}$ x 11 ½
2x2	1 ½ x 1 ½	1 $^{9}/_{16}$ x 1 $^{9}/_{16}$
2x3	1 ½ x 2 ½	1 $^{9}/_{16}$ x 2 $^{9}/_{16}$
2x4	1 ½ x 3 ½	1 $^{9}/_{16}$ x 3 $^{9}/_{16}$
2x6	1 ½ x 5 ½	1 $^{9}/_{16}$ x 5 $^{5}/_{8}$
2x8	1 ½ x 7 ¼	1 $^{9}/_{16}$ x 7 ½
2x10	1 ½ x 9 ¼	1 $^{9}/_{16}$ x 9 ½
2x12	1 ½ x 11 ¼	1 $^{9}/_{16}$ x 11 ½
4x4	3 ½ x 3 ½	3 $^{9}/_{16}$ x 3 $^{9}/_{16}$
4x6	3 ½ x 5 ½	3 $^{9}/_{16}$ x 5 $^{5}/_{8}$
6x6	5 ½ x 5 ½	5 $^{5}/_{8}$ x 5 $^{5}/_{8}$

SIZING WOOD

The lumber dimensions that are most commonly used refer to its nominal size-its size when it was cut from the log. By the time the wood is available for you to buy, it usually has been dried and planed (surfaced dry), reducing it to its actual size. Wood that has been planed with a moisture content of more than 19 percent (surfaced green) will tend to shrink, making its dimensions less accurate. Most of the lumber you'll come across has been surfaced on four sides, designated S4S. Some lumber is sold rough, or without being surfaced, so its actual dimensions are closer to its nominal dimensions.

WORK SMARTER

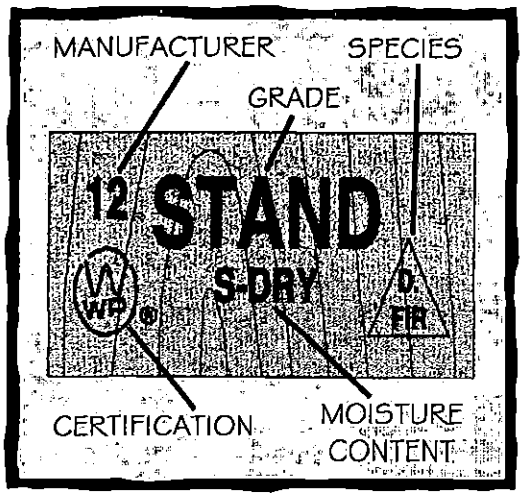
As a rule, softwoods are available in lengths of 6 to 16 feet, typically in 2-foot increments. You usually can order wood by the lineal foot, which refers only to a board's length-for instance, you might specify "14 2x8s, 10 feet long." Hardwood usually is sold by the board foot, which refers to all the dimensions of a board. To calculate board feet, multiply nominal thickness in inches by nominal width in inches and divide by 12 to convert the total to feet, then multiply this result by length in feet. For example, a 2x4 8 feet long is 5 $^{1}/_{3}$ board feet.

GRADING WOOD

Lumber is grouped by grade at the sawmill, then it is stamped–a typical stamp is shown below–or inventoried by species, grade name, and moisture content. Look for a grading stamp on the edge or back of lumber, or ask for assistance at your local lumberyard or home improvement center.

Categories of lumber are based on size. Dimensional lumber, which is meant for structural applications, is from 2 to 4 inches in thickness and at least 2 inches in width. Heavy structural lumber 5 inches or more in thickness is called timber. Boards, not as strong as dimensional lumber and intended for nonstructural use, typically are less than 2 inches in thickness and from 4 to 12 inches in width. Both dimensional lumber and timbers are graded for strength. Boards are graded for appearance.

Softwood plywood suitable for outdoor applications is graded by a system of letter designations that describe the quality of the face, the back, and the inner plies. The most commonly available panels range from ¼ to ¾-inch in thickness.



This representative grading stamp indicates standard grade dimension lumber of the species Douglas fir with a moisture content less than 20 percent. A mill's number, as shown here, or its name or symbol identifies the manufacturer. The certification symbol of the Western Wood Products Association means its grading guidelines were used.

WORKING WITH PRESSURE-TREATED WOOD

Pressure treatment involves forcing chemical preservatives into wood under high pressure to protect it from rot, insects, and other sources of decay. The most common preservatives used in pressure treatment are inorganic arsenicals, such as chromated copper arsenate (CCA) and ammoniacal copper arsenate (ACA), which also are known as water-borne preservatives.

Pressure-treated wood is rated by the concentration of chemical preservatives it contains. Lumber with a rating of .25 pcf (pounds of preservative per cubic foot) is suitable for general aboveground applications. Get .40 pressure treated wood for ground-contact applications, .60 pressure-treated wood for in-ground applications.

Wear impermeable gloves and long sleeves whenever handling pressure-treated wood. To cut the lumber, work outdoors and wear a dust mask and safety goggles. Wash yourself well as soon as you complete your work and launder your work clothes separately from other clothing.

Pressure treatment doesn't reach the interior of the lumber uniformly, so you'll need to brush a sealer-preservative onto cut ends and drilled openings. Don't burn the pieces of scrap; bury them or include them with your other trash. Finish furniture that is made out of pressure-treated wood with a urethane, shellac, or epoxy sealer.

LUMBER GRADES

Dimensional lumber (2 to 4 inches thick)	
No. 1 (construction)	Few defects; no knots larger than 1 1/2 inches, no checks, splits or warps
No. 2 (standard)	More defects than No. 1; may have knots larger than 2 inches, or checks, no splits or warps
No. 3 (utility studs)	More defects than No. 2; may have checks, splits, or warps
Joists and planks	Free of defects that affect strength or ridigity
Boards (less than 2 inches thick)	
Select B and BTR	Highest quality, virtually free of defects or blemishes; expensive and not always available
Select C (choice)	High quality; few defects or blemishes
Select D (quality)	Quality; some defects and blemishes
No. 1 common (colonial)	Small, minor defects and blemishes; limited size ranges and not always available
No. 2 common (sterling)	More defects and blemishes than No. 1 common; may have knots up to 4 inches
No. 3 common (standard)	Larger, coarser defects and blemishes than No. 2 common; may have small knotholes
No. 4 common (utility)	Larger, coarser defects and blemishes than No. 3 common; may have large knotholes
Exterior plywood	
A-B	Grade A face, Grade B back, Grade C inner plies; few face defects or blemishes
A-C	Grade A face, Grade C back and inner plies; some back defects or blemishes
T1-11 (rated siding)	Grade C face, back, and inner plies; some face and back defects and blemishes

Shopping For Wood

•Write up a materials list before you head off to your lumberyard or home improvement center. Write a description of each piece required and the quantity, as well as specifics on the type, thickness, width, and length of the wood.

•Choose the lumber yourself rather than ordering by phone. Wood can vary from board to board in both its strength and appearance. Check each piece of lumber for defects. Be practical; buying top-of-the-line isn't always best. Splurge on cedar or redwood for decking boards, but buy less expensive pressure-treated lumber for the understructure – which no one will ever see once the deck has been built.

•Order 5 to 10 percent extra to account for waste. Not every bit of every 2-by or 4x8-foot panel will end up being useful. Getting a little more than the minimum at the outset will spare you the hassle of having to do it halfway through your project.

AVOIDING WOOD DEFECTS

KNOT 	A dark whorl of varying size, from less than ½ inch (pin knot) to 1 ½ inches wide; weakens wood if larger than ¾ inch
GUM 	An accumulation of resin; doesn't weaken wood, but makes surface tacky and bleeds through finish
CHECK 	Small cracks across growth rings; doesn't weaken wood, but may mar its appearance
BOW 	End-to-end curve along board face; suitable for horizontal load-bearing applications (joists) if positioned convex side up
CUP 	Edge-to-edge curve across board face; suitable for nonload-bearing applications (decking, fencing) if positioned convex side up or out
CROOK 	End-to-end curve along board edge; suitable for horizontal load-bearing applications (joists) if positioned convex side up
TWIST 	Uneven or irregular warping; weakens wood, but may be used in nonload-bearing applications (blocking)

WOODY'S WORDS OF WISDOM

I thought I was so smart and well prepared I hand-picked every board and had all the wood delivered well before I needed it. But by the time I got around to building, a lot of boards were warped. Now I know to stack lumber on blocks so it's off the ground and cover it with a sheet of plastic to keep it dry.

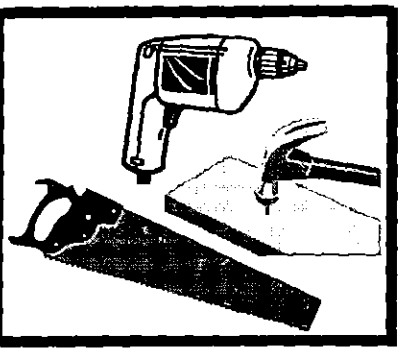
A re"QUEST" for Service

CJ'01 Needs You!!, The YLT (Youth Leadership Team) Committee is requesting volunteers (14 to 26 years old) to act as staff for CJ 2001 in PEI. Specialized teams with 6-10 members will be formed to coordinate and instruct in activities such as hiking, canoeing, life guarding, computer programming, etc at the camp. Each member is expected to have completed their FOCUS Youth Leadership Training before camp begins. For more information contact: the YTL Committee at: E-mail **ylt2001@scouts.ca** , visit **www.scouts.ca** web site or call Arnold Smith at (613) 829-1358.

For a year round listing of Service Projects in the Greater Toronto Region contact Harry Bruce at: Telephone (416) 490-6364 or FAX (416) 490-6911. Harry is the Coordinator of Special Services and recruits volunteers for such events as: Scout Booth at the Sportmen's Show, the Ride for Heart with the Heart and Stroke Foundation, the Walk for the Cure with the Juvenile Diabetes Foundation, the United Way Walk-a-thon, etc.

A re"QUEST" for Service is a promotional feature for regional, provincial and national programmes and activities that require volunteers. Please submit your request for service with four months of lead-time to allow for publication by this magazine and for response time by our readers.

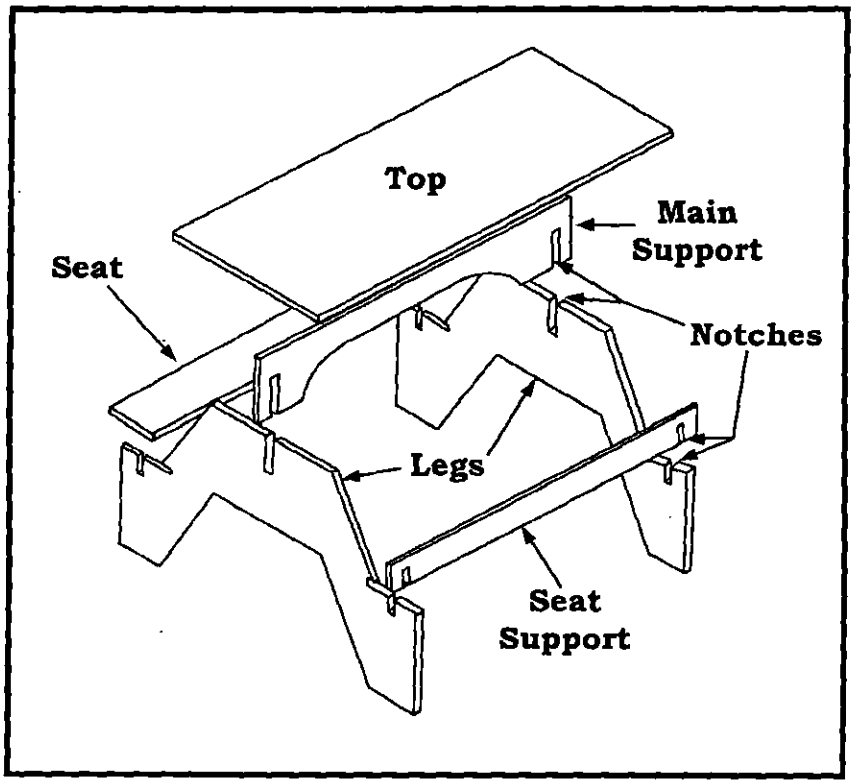
TOOL TIME



OK! In previous editions, this column has brought you various tips about working with wood, including how to select it, how to cut it, etc. We thought you might enjoy a practical application for some of these tips with a project that can be utilized when you go to camp – a knock-down easy to transport table/bench set up.

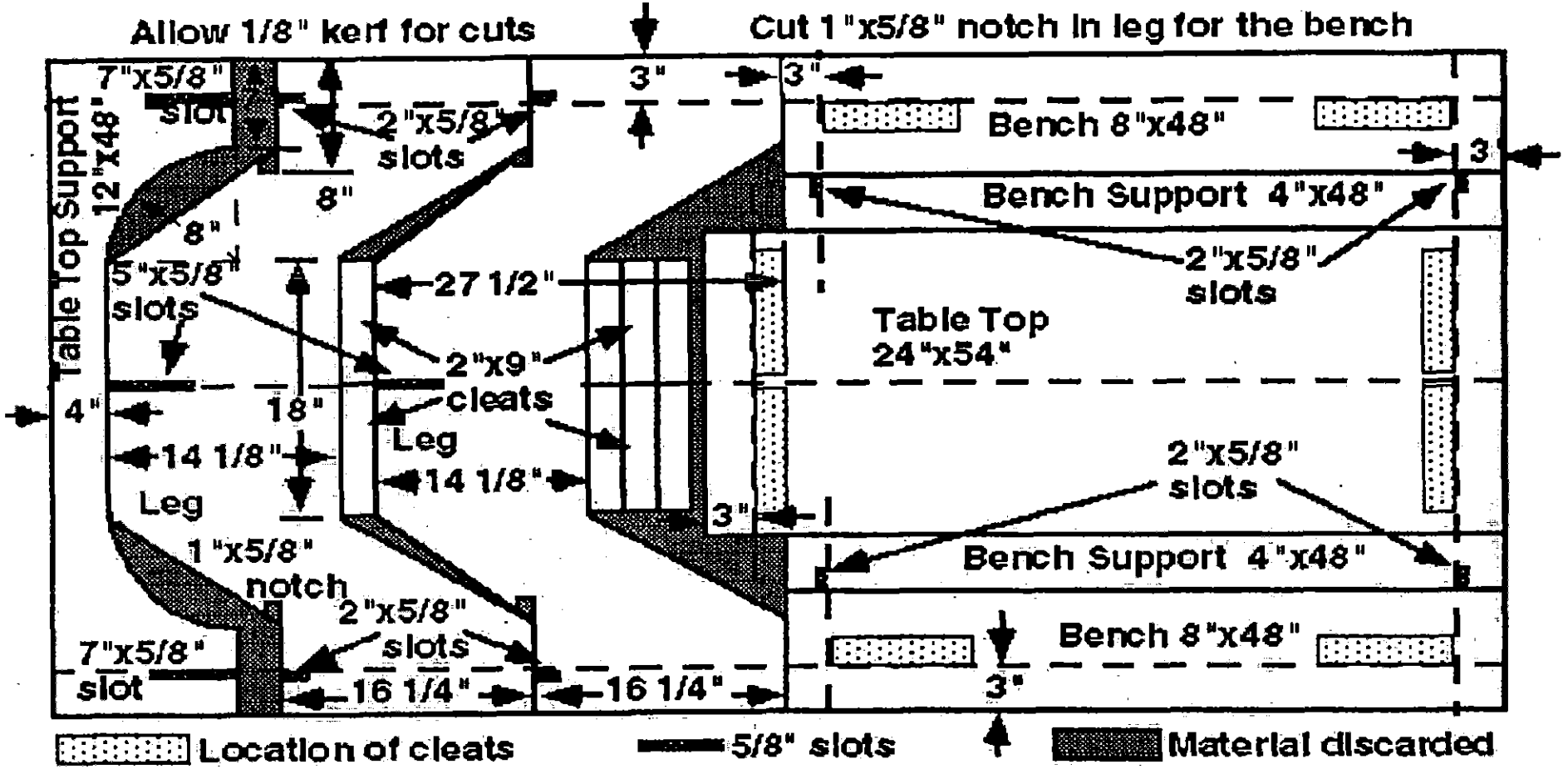
CAMP TABLE

Materials:
4'x8' sheet of exterior plywood with one smooth sanded surface
Exterior penetrating finish
Rust resistant screws
Waterproof glue

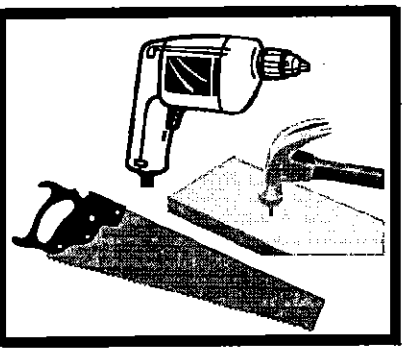


Material Notes:
The cutting diagram shows how to cut all of the pieces out of one 4'x 8' sheet of 5/8 plywood. The plywood should be exterior grade with one smooth sanded surface. All cut edges need to be sanded. The cleats should be fastened with waterproof glue and rust resistant screws. A good penetrating oil finish (A "MINWAX" type stain/sealer is a good choice) will further prevent splinters and improve the life of the table. Paint will not seal deep enough and will show scratches faster.

Cutting Notes:
When cutting top support you may use an 8 inch radius for the curved section.
Bench Supports have a 2 $^{5}/_{8}$" slot for legs centered 2 $^{11}/_{16}$" from each end.
Legs have a 2 x $^{5}/_{8}$" slot for bench supports centered 2 $^{11}/_{16}$" from each end.
Legs have a 5 x $^{5}/_{8}$" slot for the top support centered in top.
Top support has 7 x $^{5}/_{8}$" slot for legs centered 2 $^{11}/_{16}$" from each end.
Legs have a 1 x $^{5}/_{8}$" notches to lock the benches in place.
The cleats are positioned to keep benches and top from sliding.
Fasten the cleats in place with rust-resistant screws and water-proof glue.
Finish with a nontoxic penetrating exterior finish.

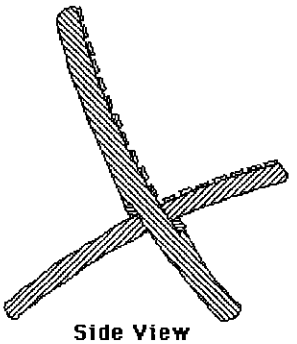

Allow 1/8" kerf for cuts
Cut 1"x5/8" notch in leg for the bench
Table Top Support 12"x48"
7"x5/8" slot
2"x5/8" slots
8"
8"
5"x5/8" slots
27 1/2"
2"x9" cleats
4"
18"
14 1/8"
Leg
Leg
14 1/8"
1"x5/8" notch
2"x5/8" slots
7"x5/8" slot
16 1/4"
16 1/4"
3"
3"
3"
Bench 8"x48"
Bench Support 4"x48"
2"x5/8" slots
Table Top 24"x54"
2"x5/8" slots
Bench Support 4"x48"
Bench 8"x48"
3"
Location of cleats
5/8" slots
Material discarded

TOOL TIME



In looking for an interesting, but useful, project for you to sink your teeth into, we came across this handy-dandy little item to make your time around the campfire (or visiting your friends at the next campsite) at Moots or Crew camps a lot more comfortable. The hardest part of this job is doing the layout work prior to cutting the legs.

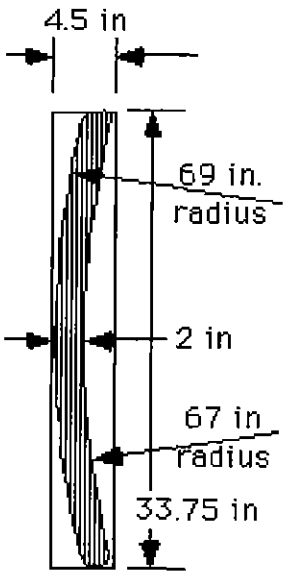
CAMP CHAIR



Side View

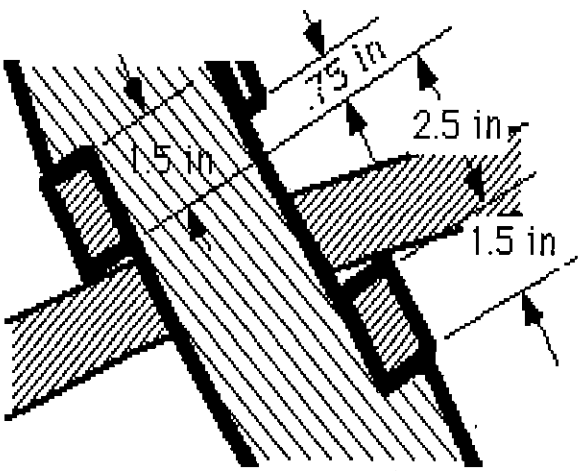
These plans are based upon several designs used by scouts. Some people call this a scissors chair. The chair is composed to two pieces: the seat and the back. The two pieces slip together and require no fasteners when used. When carried the seat stows between the sides of the back for a very compact package.

Note: the legs are cut out of larger pieces so they can be curved.

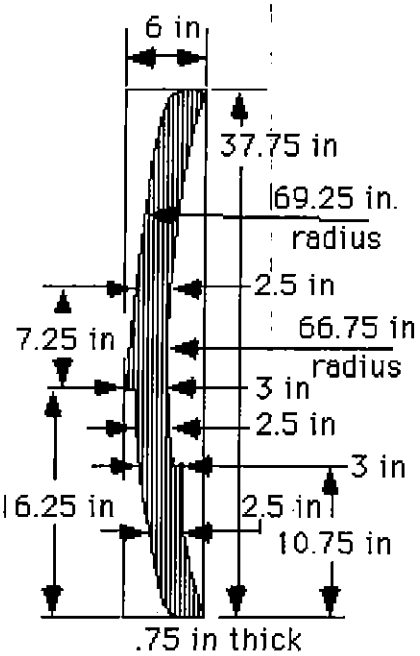


.75 in thick

Seat Leg
Side View

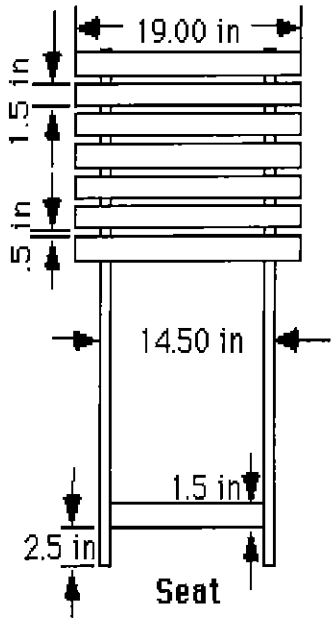


Detail of Seat Supports



.75 in thick

Back Leg
Side View



All pieces are cut from a strong hardwood like oak. The Seat Legs and Back Legs are cut from these pieces to formed curved pieces. The Seat Leg is 2" wide. The Back Legs are 2.5" wide except for regions that taper to 3" wide to form 1/2" backstops for seat supports. See the seat support detail.

If a softwood or plywood is used it is best to increase thickness of the legs from .75" to 1" and increase the thickness of the slats from 3/8" to 1/2". All parts are glued with water-proof glue and fastened with 4d galvanized finish nails or rust resistant screws.

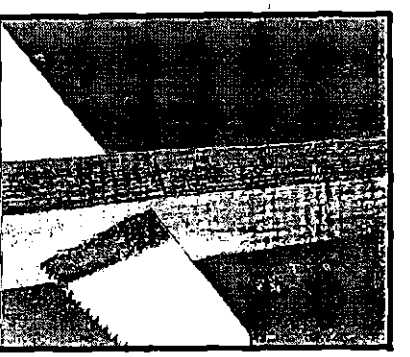
Chair nested for carrying.

Assembly Notes:

1. Choose strong pieces of wood for the chair.
2. The slats for the back and seat are 3/8" (actual dimension) material mounted on 2" centers.
3. The other pieces are 3/4" (actual dimension) material.
4. The back has 1/2 inch notches as shown in seat support detail to back up the two seat supports.
5. Sand all pieces to prevent splinters.
6. Use rust-resistant screws and water-proof glue.
7. Use water-proof glue and screws to fasten the seat supports and spreaders to the legs.
8. Use water-proof glue and 4d galvanized finish nails to fasten the slats in place.
9. Finish with a nontoxic penetrating exterior finish.
10. For the light version:

Item	Quantity	Dimension	Notes
Seat Legs	2	$^3/_4$" x $4^1/_2$" x $33^3/_4$"	10.5" apart on outside to outside
Back Legs	2	$^3/_4$" x 6" x $37^3/_4$"	11" apart inside to inside
Back Slats	11	$^3/_8$" x $1^1/_4$" x 15"	spaced on 2" centers
Seat Slats	7	$^3/_8$" x $1^1/_2$" x 15"	spaced on 2" centers
Seat Support	2	$^3/_4$" x $1^1/_2$" x 14"	
Seat Spreader	1	$^3/_4$" x $1^1/_2$" x 9	
Back Spreader	1	$^3/_4$" x $1^1/_2$" x11"	

TOOL TIME



All Rovers, male and female, young or old, will find themselves working with wood at some time in their lives. The author of the following article shares with us some of the problems.....and the solutions.....he's come across as a master carpenter. This column is going to try to make some of your woodworking jobs easier.

LESSONS FROM WOOD

By Duane Johnson

From "The Family Handyman" magazine, February, 1999

Experience is a good woodworking teacher-in fact, some of the lessons it ingrains are unforgettable. I learned the most memorable lessons the hard way, by making mistakes!

I knew even as a rookie carpenter that wood can be stubborn, fickle and ornery. It'll warp when you want it straight, shed finishes like skin off a snake, crack open at joints, split as it dries, and rot when it gets wet. At times you wonder whether wood is a blessing or a curse!

In this article, I'll tell you about several occasions when wood fooled me but in the process taught me valuable and unforgettable lessons about its character.

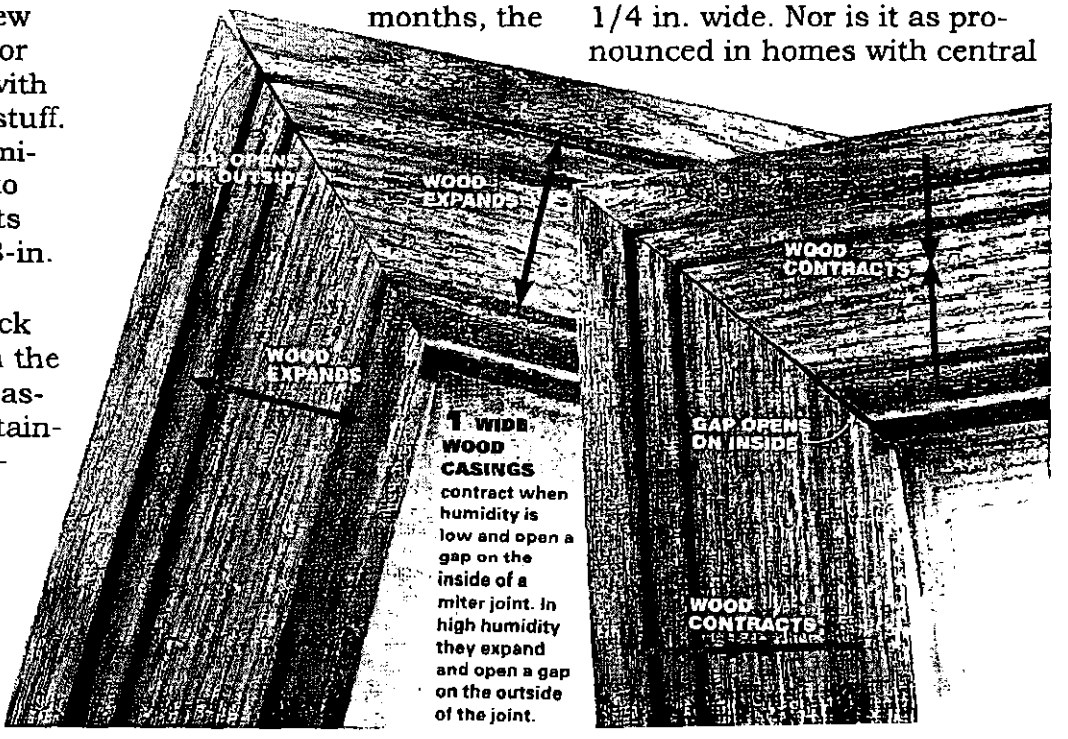
WOOD MOVES, JOINTS OPEN

As a finish carpenter, I was well aware that changing humidity makes wood expand and contract. But I never understood how badly it could affect woodwork until my crew installed some new oak door casings, about 4 in. wide with a nice pattern. Expensive stuff. We cut precise 45-degree miters on the corners. Then to make doubly sure the joints remained tight, we cut 1/8-in. slots in each mitered end, added biscuits (1/8-in. thick wood wafers) to strengthen the joint, and glued the entire assembly with epoxy. After staining and varnishing, the mitered joints looked great: clean, tight and smooth.

Three months later, about midwinter, I was shocked to see that the inner corner of every joint had parted, leaving a glaring, unsightly gap (Photo 1). Six months later, about midsummer, that gap had disappeared, but a new one appeared at the outer edge of the miter (Photo 1).

The problem was caused by extreme seasonal changes in relative humidity in Minnesota, where this job was located. During the dry winter months, the wood dried out and shrank enough to open the gap on the inside of the miter. Then during the humid summer, the wood absorbed moisture and swelled, opening a gap on the outside of the miter. The movement is powerful; even epoxy and nails can't stop it.

This movement isn't as noticeable in modern door casings, which are only about 2-1/4 in. wide. Nor is it as pronounced in homes with central



air conditioning, because the indoor relative humidity stays within a narrower range.

In retrospect, we should have varnished all sides of the trim, not just the visible sides, before we installed it. The sealer would have slowed moisture changes in the wood and reduced the movement. Or we could have followed the practices of old-time carpenters and simply avoided those miter joints in wide casing. We could have used butt joints (which have squared-off ends) or corner blocks, two methods that make the wood movement less obvious.

WOOD EXPANDS AND CONTRACTS LENGTHWISE, TOO

Normally, carpenters and woodworkers don't have to worry about length changes in a board, because they're small compared with the shrinkage and swelling in width and thickness. But a deck project proved to be an exception. The 2x6 decking had high moisture content. You could see and feel wet sawdust when you cut the boards with a circular saw. No problem, we thought. We simply spaced the boards closer together to allow for the eventual shrinkage in width. And we butted the ends tightly over the joists.

Six months later, in the middle of the hot, dry California summer, we were called back to deal with a severe case of "gap-itis." It was an ugly sight indeed. Many of the butt joints had opened up a full half-inch!

We had expected wood shrinkage, but nothing like this. In California, redwood typically shrinks about 3 to 5 percent in width and thickness between the rainy winter season and the dry summer. That's substantial, but since you already have a gap between deck boards, you won't notice it. In contrast, the change in length amounts to only about one-tenth to one-fifth of a percent.

But two factors made our deck unique. First, it was unusually long, about 60 ft. at its longest point. And second, many of our deck boards were unusually long too - 20 to 22 ft. We happily nailed them down, end to end, figuring that fewer joints meant a better-looking deck. What we didn't expect was that even that tiny 0.2 percent shrinkage would amount to about 1/2-in. shrinkage in a 20-ft. board. That made our tightly fit butt joints open up in ugly chasms. In this case, longer was not better.

Annual coats of water repellent might help reduce wood movement in some regions, but probably not in California, where long wet periods follow equally long spells of dry weather. Our solution was to patch in shorter deck boards. The overall expansion and contraction rates stay the same but the movement is divided up among more joints, making each gap smaller. (Incidentally, before we made this repair, the wet season came, causing every gap to swell closed again!)

MILLING WOOD YOURSELF DOESN'T ALWAYS SAVE

To save a few dollars, I once bought some bargain-priced random-width 3/4-in. oak boards to make trim for a family room. I figured I could easily cut them down to size on my table saw and not waste much wood.

I didn't save a nickel, The boards were straight when I bought them, but practically every piece bowed badly when I ripped it (Photo 2). And although you can usually straighten light pine trim when you install it, you can't straighten 3/4-in. oak!

Seasoned woodworkers have since told me that drying lumber so that it's stable when cut and shaped is tricky. Boards start out straight when they're cut from the log. However, as they dry, internal tensions among the wood fibers come into play. Most boards would warp if they were allowed to dry unconfined, so they're stacked or bundled to keep them straight. But the internal tensions often persist. So when you cut into a board, especially hardwood, those tensions often release and the board bends.

In addition, a poorly controlled drying process can actually create internal tensions in wood, causing a batch to consistently bow inward (as was the case with the oak I bought) or outward when sawn.

Experienced woodworkers have regular suppliers and know the quality of the wood they're getting. Here are two solutions for the rest of us

1. If time allows, precondition the wood you intend to use for finish work. Buy your wood two weeks to a month in advance and stack it neatly (with spacers to allow good air

circulation) where you plan to use it. This allows its moisture content to adjust to existing conditions.

2. Use standard-sized boards for trim whenever possible. They may cost a bit more, but you can buy them at any lumberyard. The advantage is that you can select straight boards that you won't have to rip to size. If you need odd widths, you can order them cut to the exact width. Again, it'll cost a little more, but then the lumberyard will be responsible for making sure the boards come out straight.

SUNLIGHT DESTROYS CLEAR WOOD FINISHES

One of my clients wanted a nicely varnished top railing on his deck, so I naively bought about 50 ft. of clear, kiln-dried redwood (expensive, premium material) and screwed it to the top of the posts. To make the railing more handsome and almost furniture quality, I mitered the corners and glued redwood plugs into the screw holes. Then I covered the whole project with three coats of polyurethane to preserve the color and make the wood watertight.

It was a disaster. After only one year the finish had begun to crack and blister. By the second year it was flaking off, leaving the wood vulnerable to soaking rains, which streaked it black and gray. Eventually I had to sand the finish off and start over.

I learned the hard way that clear finishes on wood won't survive long outdoors. High-energy UV (ultraviolet) rays in sunlight break down both resins and the wood fiber itself. Once the resin film cracks, moisture from humidity and rain seeps into the wood, causes further wood movement, and increases the peeling and flaking already taking place. The deteriorating wood fibers break the finish-to-wood bond as well. Even worse, you can't easily renew the finish. The weathering process causes most wood to turn gray, and once discoloration begins, you have to sand off the entire finish to restore the natural wood appearance.

Even now, some 20 years after this incident, the best new tough, flexible clear finishes still break down after a few years. The best compromise is to apply a semi-transparent oil stain that mimics the natural color of the wood. The trans-

2 RIPPING DRY BOARDS often upsets the balance of internal tensions, causing the cut sections to warp and pinch the saw blade.

CAUTION: GUARD REMOVED FOR PHOTO—USE YOURS!

parency allows the grain to show. Pigments help block the sun and slow graying, and the oils stabilize the wood. Although an oil stain might last only a few years, it won't form a solid film, so it's easy to renew.

HEAVY TIMBERS CRACK

I learned a more subtle lesson about the character of wood after building a cathedral ceiling with 4 x 10 rafters. Because these heavy timbers were a prominent decorative feature, as well as roof support, we carefully cleaned and sanded them before we put them up.

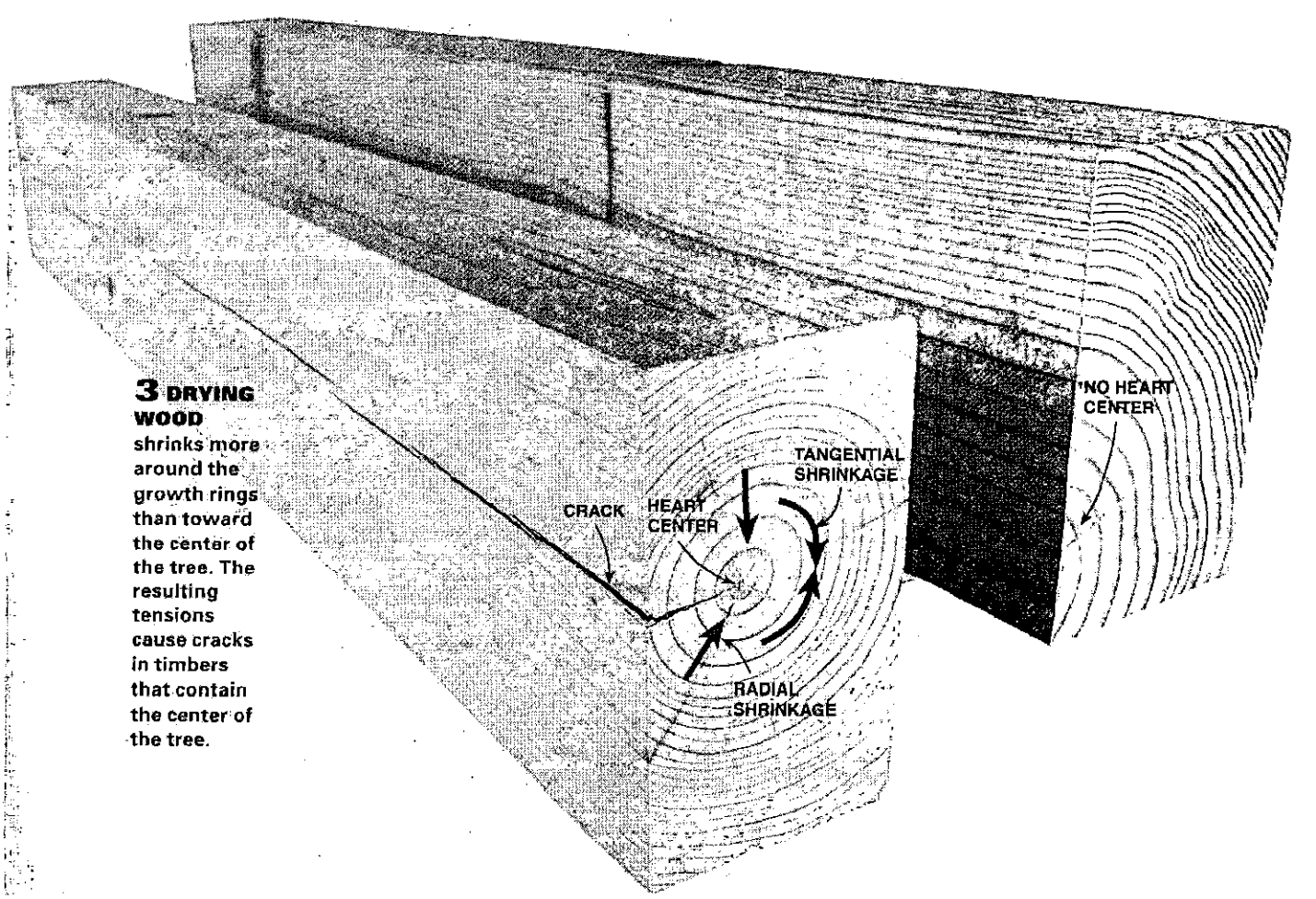
Within a year, large, ugly cracks had appeared, running the full length of almost every rafter (Photo 3). You don't notice them in smaller-dimension material like 2 x 4s, but the cracks, technically called "checks," stand out like major flaws in thicker lumber.

Checks occur because wood doesn't shrink evenly when it dries. If you examine a cross-section of a log, the shrinkage along the concentric growth rings (tangential) is typically about twice the shrinkage toward the center of the tree (radial). So when a log dries, it develops a wedge-shaped crack from the center outward (Photo 3). Sawn timbers dry the same way. You can bet that timbers that contain the center of the tree will crack.

Checks won't significantly weaken the timber and may even add a pleasing rustic touch to some projects. But if you don't want that crack, order or select timbers that don't include the tree center (Photo 3). Or try this old carpenter's trick to control the crack. Before the timber dries, saw a 3/4-in. deep kerf the full length of one side. Then install the timber with that side out of sight. The crack usually occurs at the saw cut when the timber dries.

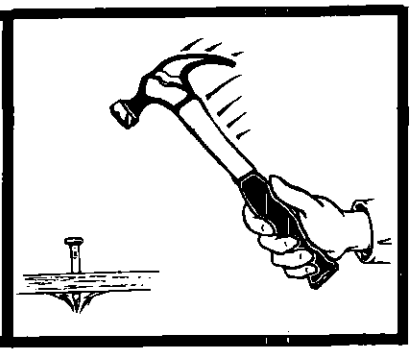
A LAST CONFESSION

Experience has taught me well, so feel free to learn from my mistakes. I've made others, too, but I think I'll keep them to myself. I may want to send them in to Great Goofs someday.



3 DRYING WOOD shrinks more around the growth rings than toward the center of the tree. The resulting tensions cause cracks in timbers that contain the center of the tree.

TOOL TIME



All Rovers, male and female, young or old, get called upon at one time or another to do fix-it jobs. Sometimes as a Crew project, sometimes as a home repair project, and sometimes to help a friend. In this column, we're going to try to bring you tips to make some of these jobs easier.

Don't be a BOOB when buying a hammer

TOOL GIRL

by Mag Ruffman

Buying your first hammer is like buying your first bra. You're likely to choose something bigger than what you actually need. This makes other people laugh and point, but there is fierce pride in strapping on that pristine-white badge of maidenhood.

You wouldn't have wanted a beaten-up, hand-me-down for your first bra, so why content yourself with an inherited hammer?

Just remember that the guys who made fun of your first bra are now working in the hardware store. When you tell them that you want to buy a hammer, and they say: "What are you going to use the hammer for, ma'am?" don't try a smart comeback like: "For striking little steel spikes known as nails."

For one thing, this kind of hot-dogging will identify you to the hardware clerks as a BOOB, (bellicose, obdurate, overachiever babe). Maintain composure, because what the clerks are trying to find out here, is whether you need a smaller (5 to 12 oz) hammer for household uses like installing picture hooks, or a larger (14 to 20 oz.) hammer for stuff like building decks.

It can be confounding to select the best hammer from the array of products available. However, there are really just three things to consider when choosing your first personal, life-long hammer; the handle, the head, and the grip.

THE HANDLE

There are four kinds of handles available: steel, fibreglass, graphite and wood.

A steel shaft never breaks but it is the most uncomfortable to use because the vibration caused by repeated striking will travel up the handle and into your arm, causing tenderness and even tendonitis.

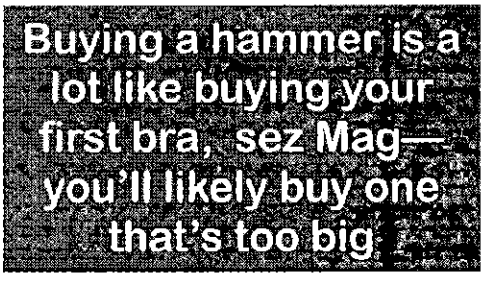
Fibreglass is somewhat better than steel for vibration. It has great durability, but is used mostly in heavier models meant for framing and rough construction.

Graphite is being used in a few of the newer hammers. As in higher-end tennis racquets and golf clubs, graphite reduces weight and contributes antishock properties. A graphite handle provides up to eight times better vibration reduction compared to an all-steel hammer. This is usually reflected in the cost. But they look darn hot; this is usually worth the cost.

The traditional favourite is the wood-handled hammer. Hickory is the most common wood variety used. The cell structure of this straight-grained wood absorbs much of the vibration, making these hammers pleasant to use.

THE HEAD

Heads are high-carbon steel. The striking face of the head can be smooth or waffle-textured. If you were working as a construction framer, you'd want the textured face because it helps the hammer grab the nail, so it self-corrects if you have bad aim. On the other hand, hanging pictures with a textured hammer head, and missing, will leave waffle-like scars on your walls. You don't want this, and neither does your husband. Trust me.



The claw on the other side of the striking head is used for removing nails that went in crooked or bent. (This is never your fault. Some nails just come from the wrong side of the foundry.)

There are two styles of claw: curved, and straight known as "rip." The rip claw has great leverage for removing nails, but tends to tear up surfaces. The curved claw doesn't mark surfaces as readily.

THE GRIP

Some handles are rubber-coated to give you a better grip and to reduce vibration. The tacky surface reduces the grip strength required to hold onto the hammer, so your muscles won't get as sore.

Practice swinging a hammer to feel its balance. Consider the diameter and length of the shaft. If you "choke up" on your grip (moving your hand closer to the head because the diameter at the bottom of the handle is too big for your hand), this is not the hammer for you. The right size hammer for your hand is one that can be comfortably held near the bottom for maximum swinging force.

Plus, the overall length of your hammer should not be greater than the distance between your fist and your elbow.

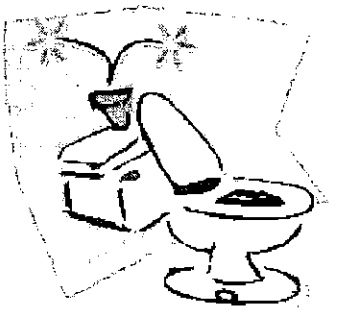
AND FINALLY

It's nice to have as many as 40 hammers but you may want to decide which features are most important, and then buy a single hammer accordingly. Choose a hammer that's easy to control but heavy enough to drive the kind of nails you are working with, and soon you'll be banging away with such enthusiasm, not even the phone will distract you.

from The Toronto Sun

Mag Ruffman can be reached at tool.girl@home.com

TOOL TIME



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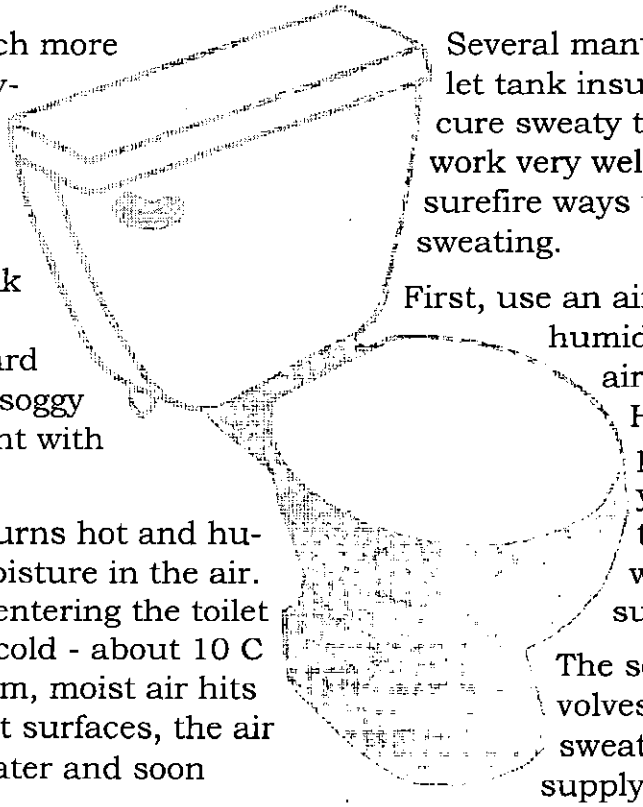
Perspiring potty a PAIN

By MERLE HENKENIUS Associated Press
from The Toronto Sun

Summer is the season for backyard barbecues, days at the beach and family vacations. Unfortunately, sweaty toilets are another sign of the season. In fact, every summer millions of homeowners have to deal with toilets that perspire puddles of water on to the floor.



This problem is much more than just a mild annoyance: Condensation running down the toilet can seep under the flooring, rot the plywood subfloor and soak into the floor joists. It can also stain baseboard molding, turn drywall soggy and discolour wall paint with mildew.

When the weather turns hot and humid, there's a lot of moisture in the air. Meanwhile, the water entering the toilet tank is comparatively cold - about 10 C to 15 C. When the warm, moist air hits the cool porcelain toilet surfaces, the air condenses, turns to water and soon drips onto the floor.

Sweating buckets

Although a toilet sweats only on warm, humid days, it can drop a surprisingly large amount of water in a very short time.

Several manufacturers make toilet tank insulators they claim cure sweaty toilets, but most don't work very well. There are only two surefire ways to stop toilets from sweating.

First, use an air conditioner or dehumidifier to dry out the air in the bathroom. However, this approach won't work if you don't have one of these units or don't want to run it all summer.

The second method involves installing an anti-sweat valve in the water-supply line leading to the toilet. The valve adds a little hot water to the line, which raises the water temperature in the toilet enough to warm up the tank and bowl. That's all it takes to keep condensation from forming, even in the most sultry weather.

TOOL TIME

Anti-sweat valves are sold at home centres and plumbing-supply dealers in both adjustable and preset types. Pay the extra $10 or so for an adjustable model. It allows you to regulate the water temperature and shut down the hot-water side completely when it's not needed.

Begin by shutting off the main water valve to the entire house. Then drain the hot- and cold-water lines by opening up all the sink and tub faucets and flushing all the toilets.

To avoid scorching the internal components of the valve with a soldering torch, make all connections to the valve with brass compression adapters (around $1.50 each). Loosely thread a 5/8 by 5/8-in. compression adapter into each of the three valve ports.

Hold the valve against the horizontal cold-water pipe with the lower inlet port even with the pipe. Note where the centre outlet port of the valve intersects the vertical pipe section; mark that spot on the pipe. Also mark the location of the lower inlet port on the horizontal pipe. Then use a hacksaw to cut out the pipe section.

Next, solder a 90-degree L-fitting to the vertical pipe coming down from the toilet, then extend it with a six-inch-long stub of 1/2-in.-diameter pipe. Use lead-free solder and a MAPP gas torch. Lead-free solder is relatively hard, and MAPP gas bums hotter and works more quickly than propane does.

With the cold-water line ready for the valve, locate a nearby hot-water line and cut out a section to accept a new copper T-fitting.

Splice the T-fitting into the line and assemble a short vertical riser pipe with a 90-degree L-fitting and short horizontal pipe stub. Point the stub toward the spot beneath the toilet where the valve will be installed. Solder the T- and L-connections. Add a length of pipe to reach the valve location.

Lightly coat the male threads of the three brass compression adapters with a pipe joint compound (pipe dope).

Thread the adapters into the valve ports and tighten them with a wrench. Slide a nut and compression ring on to each pipe end and insert the pipes into the adapters. Coat each compression ring with pipe dope and thread the nuts onto the adapters. Tighten each nut with a wrench. Turn the main water valve back on and look for leaks.

Bottom out

A slotted screwdriver is all you need to adjust the temperature of the water flowing through the valve. Start by turning the cold-water adjustment screw counterclockwise all the way. Then turn the hot-water screw clockwise until it bottoms out That will fully open the coldwater side and shut down the hot water.

Next, flush the toilet and open the hot-water side by turning the adjustment screw counterclockwise half a revolution. After waiting an hour or so, check for any condensation on the toilet. If necessary, open up the hot-water side of the valve a little more.

Finding the optimum water temperature will likely take several flushes over a couple of days. However, once the water in the tank nears room temperature, the sweating will end.

TOOL TIME

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The Physics of Freezing Pipes

BURST WATER pipes are caused by the expansion of freezing ice against the walls of the pipe, right? .....Wrong.

In a remarkable series of laboratory and field experiments, researchers at the University of Illinois have demonstrated that the actual cause of damage to freezing water pipes isn't the force of the expanding ice on the pipe, but rather an extreme rise in water pressure downstream from the blockage. According to the study, the water pressure can rise in these situations from about 40 pounds psi to more than 4,000 pounds psi.

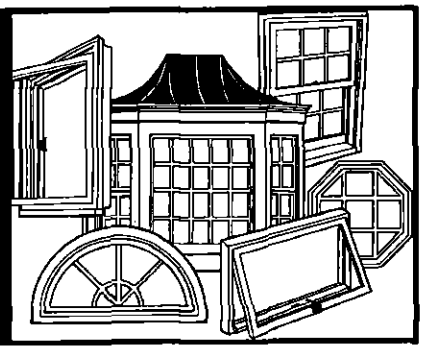
Typical scenario might go like this: A stretch of copper pipe is exposed to unusually cold temperatures, and ice begins to form on the pipe's inside walls. Since water volume expands by about 8 percent as it turns to ice, the ice formation eventually can completely block the water flow. Water upstream from the blockage is able to flow back to its source, such as the street connection. But the water downstream is trapped because the faucets are closed. As the ice continues to form and expand, pressures downstream, from the blockage skyrocket. Because this entire section of pipe experiences the same elevated pressure, the failure can occur at any point, even within the heated space of the building.

Now that researchers better understand the problem, they have devised a simple, effective solution: a modified faucet washer that enables the faucet to leak a little under high pressure. This inexpensive device could eliminate much of the $400 million per year of insurance claims now paid to homeowners for freeze-related plumbing damages.

Ned Nisson

Editors Note: Even if you don't have the new "high-tech" washer, you can help yourself by leaving the water running a bit from faucets on waterlines subject to freezing.

TOOL TIME



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How a house works

Gla$$ innovations– past and present

by **Duane Johnson**
The Family Handyman
October 1999

Fig. A

Old-Style Sheet Glass Window

WAVY SURFACES and distortion characterize many older sheet glass windows. They're usually puttied into a wooden sash.

My wife and I love the old swirly window glass in our home. its flaws and distortions make the outdoors shimmer and wave as you walk by, especially in winter when the old storm windows add yet another distorted layer. We're so taken with the stuffs character that we scrounge around for old discarded windows, hoping to rescue enough glass to replace several cracked panes. (One person's junk is another's treasure, don't you know!)

Window glass has rapidly change and improved over the last 50 years, yet windows from the past are still with us. In fact, you might see three or four types in an older home that's undergone several remodeling projects. So fixing a broken window can get complicated. You'll often have to identify the type of glass before replacing it. And if it's newer glass, a trip to the hardware store won't solve the problem.

In this article, we'll describe the various types of window glass in use today and tell you how to identify and replace the glass when it breaks.

OLD-STYLE WINDOW GLASS

The oldest glass you're likely to find in a house built before 1940 is called **sheet glass (Fig. A)**. It's easy to spot because it contains waves, swirls, spots and other imperfections that distort the view (the effect we like). It was made by drawing a wide ribbon of molten glass up into a thin sheet, in a process something like pulling taffy. The glass was then slowly cooled. The process wasn't precise, so the glass didn't come out distortion-free. However, the improvement over previous glass-making techniques was dramatic.

Invented about 1851, sheet glass made large glass panes practical and affordable. Finally you could have bright rooms in a home during the day, long before the invention of the electric light bulb. The distortions were a minor inconvenience. Besides, because the molten surfaces were air-cooled, they had a brilliant, fire-polished sheen not seen in glass today.

Practical Advice: *If you value the distortions and brilliance of sheet glass, you'll have to rummage through old windows in salvage yards to find replacement glass. Sheet glass is no longer made in the Unite States. When you find it, take it to a professional glass cutter to have it cut into the pane sizes you need. Old glass contains random scratches that make it so difficult to cut that even a pro can't guarantee successful results.*

GLASS STANDARDS FROM THE PAST

The sheet-glass era left us with two terms for glass thickness that are still used today- single- and double-strength. These two types accounted for almost all household window glass. The most common was single-strength, about 3/32 in. thick, which is the precise thickness of replacements now available. Generally it's best to replace broken single-pane glass with glass of the same thickness in order to maintain the window's appearance and weight. Older double-hung windows (that still slide well) may not stay up if you install thicker, heavier glass. Double-strength glass was approximately 1/8 in. thick, the modern size you now buy to replace it.

Window glass has changed rapidly. You might see three or four types in your grandparents' home.

Practical Advice: *Rather than guess at fine measurements of old glass, take a shard of the broken glass with you to match the thickness against the new.*

THICKER, STRONGER GLASS

When it came to thicker, stronger glass, the types that shop owners wanted to use for display windows, sheet glass wouldn't do. Imperfections in thicker glass produce too much distortion for clear viewing. Around the early 1900s, manufacturers refined an ancient process in which molten glass was rolled flat, and later, after cooling, the surfaces were ground perfectly flat and then polished. These sheets, called plate glass, could be made to any thickness without distortion.

Plate glass came home in the form of the large "picture window," a feature of many homes built between 1930 and 1970 or so. Sometimes you can find the word "plate" in tiny letters on a corner of the glass. Plateglass use in household and shop windows died out about 10 years after the popularity of the picture window waned. You can't find replacements anymore. Like sheet glass, it's no longer made in the United States except as specialty glass, since cheaper, more precise production methods have made surface grinding obsolete.

THE MODERN STANDARD

Both sheet and plate glass have been replaced by float glass, which is made by pouring molten glass over a bed of molten metal (usually mercury). Because it's lighter, the molten glass floats on top of the metal's flat surface and cools. The result is a smooth, flat pane, virtually free of distortion. The top, fire-polished surface is even more brilliant than the bottom, but only a practiced eye can detect the difference.

Practical Advice: *When you buy replacement glass, you can expect to receive flawless float glass. It's available in many thicknesses.*

PUSHING THE LIMIT WITH SAFETY GLASS

It's amazing how tough glass can be. A neighbor discovered this when he broke up an old patio door. He hit the glass with his hammer to break it out. it didn't break. He hit it harder, leaving a dent in the glass, but it still didn't break. Finally, he put on safety goggles and gloves and really belted it. Only then did it shatter into a thousand small pieces.

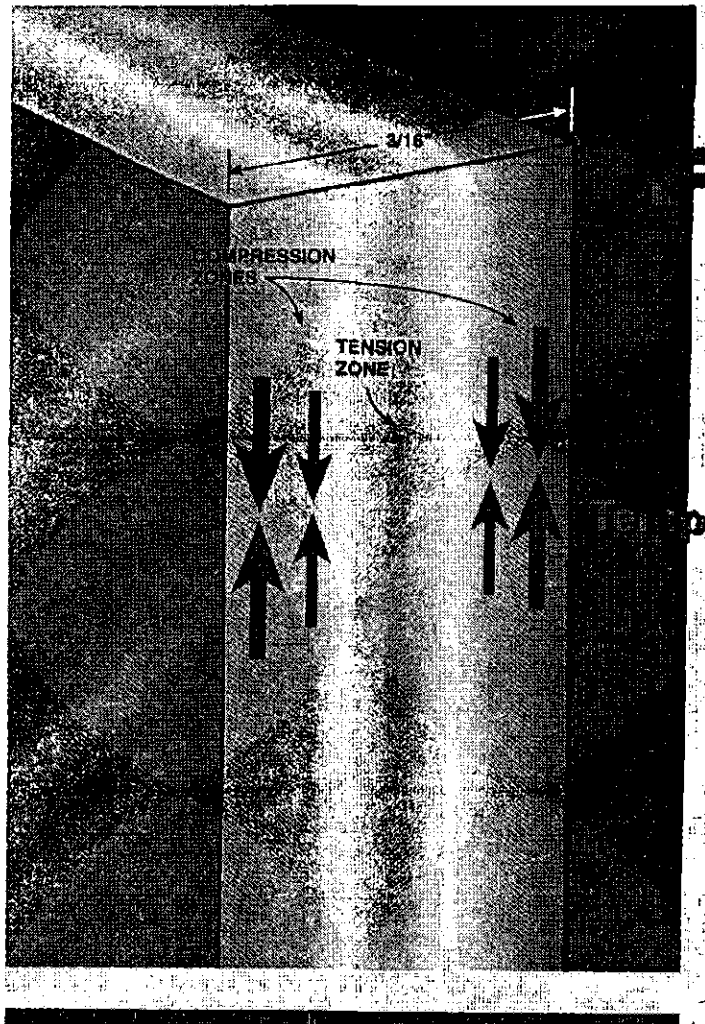
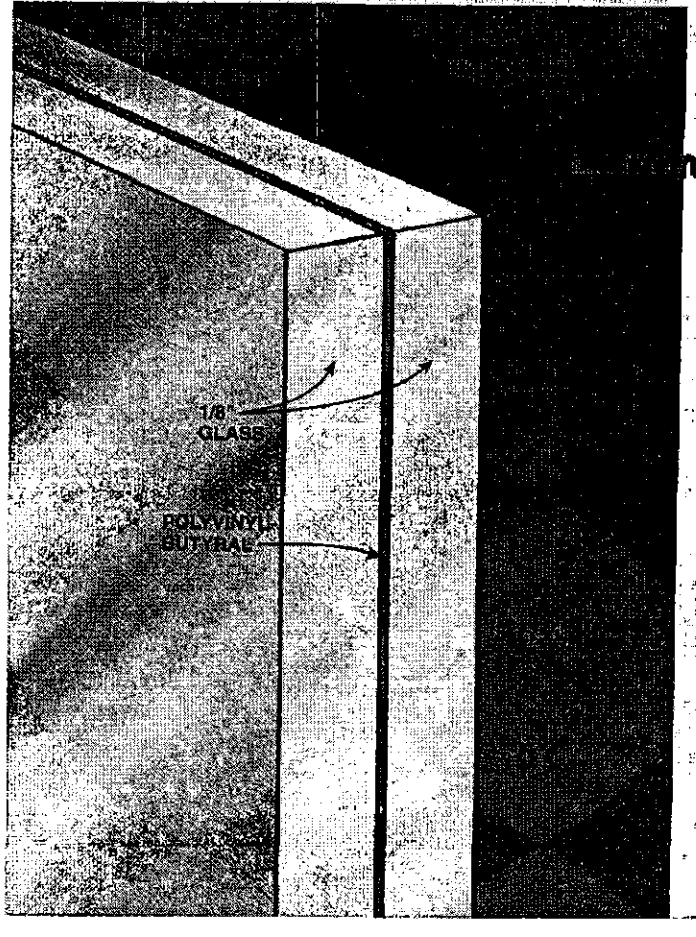


Fig. B

Two Types of Safety Glass

Tempered Glass

THE INTERNAL TENSIONS created by the rapid cooling of molten glass make tempered glass about four times as strong as regular glass. When tempered glass cracks, the balance of tensions throughout the pane is upset and the entire pane shatters.



Laminated Glass

A TOUGH PLASTIC CENTER holds the sharp glass shards together when laminated glass breaks.

The glass in most doors is tempered. **Tempered glass** is tough. The toughness comes from reheating a finished piece of regular float glass and cooling it rapidly, setting up internal tensions within the glass itself (**Fig. B, top**). The extra stress allows the glass to withstand the routine bumps and banging taken by doors, low windows, skylights and car windows. It's one type of safety glass. (Safety glass is a general term that includes several types of glass that meet certain strength and impact requirements.)

Tempered glass usually has the word "tempered" printed in tiny letters near a corner. But you're more likely to recognize it when it breaks. At the first crack, the whole pane shatters. The crack upsets the internal tensions, which immediately release and cause the entire pane to disintegrate into a pile of generally blunt-edged pieces. You can't even cut tempered glass to size without shattering it. It has to be cut before the tempering process.

Practical Advice: *When ordering tempered glass, make sure you have precise measurements; you can't trim it later. Tempered glass is available from glass shops and costs about twice as much as regular glass.*

Laminated glass (Fig. B, bottom) is another type of safety glass, though less common in homes than tempered. Laminated glass consists of a thin, tough, plastic sheet sandwiched between two layers of glass and bonded to them by heat and pressure. Even if the glass breaks, the glass shards remain bonded so they don't fly about. And the window itself also often remains intact, held together

by the plastic. Some doors use laminated glass for security reasons, and it's the standard material for auto windshields so glass shards don't fly about during an accident. Practical Advice: You'll find replacement laminated glass only through glass shops.

GLASS GETS WARM

Insulated glass has revolutionized the window industry. Single panes of clear glass offer a great view and lots of light, but they make homes uncomfortable because they transmit heat and cold 10 to 15 times faster than a typical insulated wall. So windows can make a home unbearably hot in summer and cool and drafty in winter. Storm windows, awnings, shades and such offer partial solutions, but the simplest, most elegant solution to date is insulated glass.

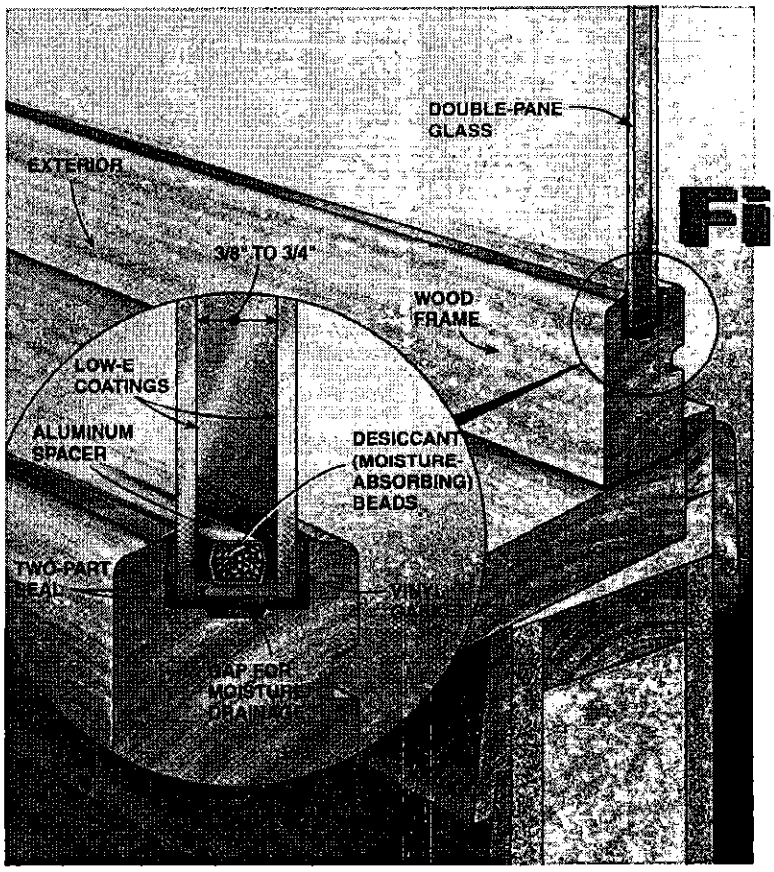


Fig. C

Standard Insulated Glass

INSULATED GLASS consists of two panes of glass with a 3/8- to 3/4-in. dead airspace in between. A high-quality seal between the panes is critical to prevent fogging and keep special insulating gases (usually argon) from escaping.

Insulated glass consists of two panes of glass bonded together with a trapped airspace in between (**Fig. C**). The trapped air cuts the heat loss by about half, the same as a storm window but without the extra hassle and expense. The substitution of argon or some other special gas for the air in the airspace, plus thin, virtually invisible metallic coatings, called low-E coatings, makes the glass even more energy efficient.

The payoff is particularly significant in the Sunbelt, where cooling is the biggest energy expense. The low-E coatings can be selected to block certain parts of the sun's radiation, in particular most of the material- and fabric-damaging ultraviolet rays, plus much of the heat-carrying infrared zone. As a result, this special glass blocks most of the heat but retains most of the brightness and clear visibility. It enables you to install a large expanse of glass in a room without sacrificing comfort or driving your heating and cooling bill through the roof.

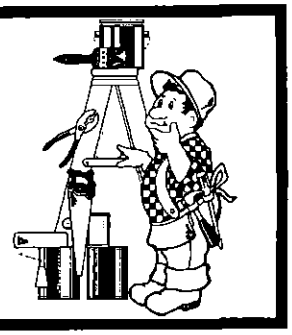
The first insulated glass windows hit the market about 40 years ago. The concept was good, but the glass-sealing technology wasn't always reliable. If the edge seal that joins the two panes of glass isn't absolutely airtight, moisture will leak in and fog up the inner surfaces of the glass, a common problem in older insulated glass. In fact, older windows were guaranteed for only five years, hardly a bargain, since there is no way to fix a broken seal. You have to throw away the old glass and install a new insulated glass unit.

Window seals have improved, and the 10- to 20-year or longer guarantee from window manufacturers on most insulated glass now makes it a worthwhile investment. Its energy savings almost always offsets the extra cost.

Practical Advice: *Replacing insulated glass isn't as easy as digging out the old putty and buying new glass at the hardware store. The unit may be gasketed, taped or caulked into its frame. Sometimes the frame itself is difficult to disassemble. And the thickness of the glass unit will vary from brand to brand. If you know the name of the manufacturer, (all the dealer who sold you the windows or a dealer who handles that brand. If fogging is the problem, maybe you'll be lucky and find that the window is under warranty.*

If you can't identify the manufacturer, remove the sash (glass, plus the frame that holds it) and take it to a window repair shop. A glass repair expert can replace the glass almost as cheaply as you can. Even if you want to do it yourself, it's best to take the sash in anyway to make sure you order the right replacement glass. Make sure the order is for glass with the same low-E coating as the old window. Otherwise, the new glass might contrast with the rest of the window glass in your home.

TOOL TIME



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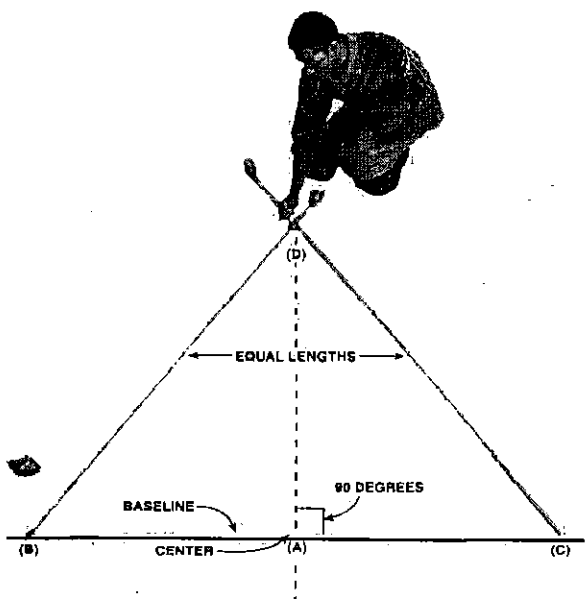
MAKE RIGHT ANGLES WITHOUT MATH

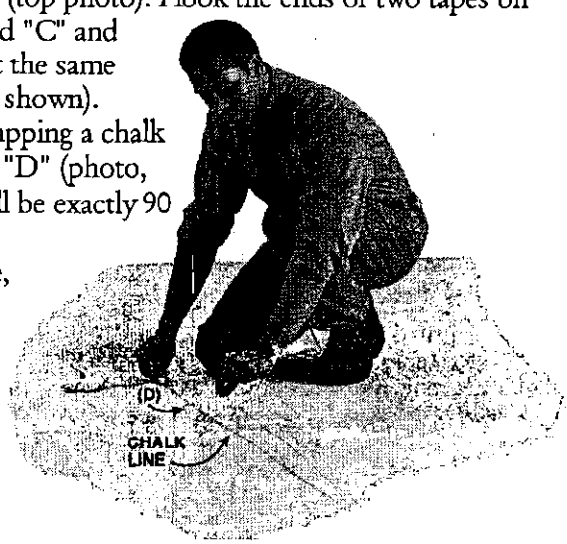
"Measuring Tips" MAY 2000
'THE FAMILY HANDYMAN'



Unless you live in an igloo, you'll probably have to establish right-angle reference lines for one of your home improvement projects. Laying floor tile, building walls and laying patio bricks are a few examples of jobs requiring perpendicular layout lines to get started. The method we're showing is based on simple geometry, but you don't have to do any math to make it work.

The photo at left demonstrates the principle, The goal is to draw a line that's exactly perpendicular to the baseline. Decide where you want the perpendicular line to intersect the baseline and make a mark ("A" in the top photo). Now measure out an equal distance on each side of this mark along the baseline and make marks "B" and "C." The distance isn't critical. In general, you'll get more accurate results with a larger distance (top photo). Hook the ends of two tapes on nails driven at points "B" and "C" and extend them so they cross at the same measurement (point "D," as shown). Complete the process by snapping a chalk line through points "A" and "D" (photo, right). The resulting lines will be exactly 90 degrees to each other.

If you only have one tape, swing two arcs an equal distance from points "B" and "C" that cross at point "D." Then connect "A" and "D" to create the right angle.



WASHER SHIMS FOR WOBBLY TABLES

It seems that every time you put a table on a hard floor such as wood or tile, the table rocks or wobbles-no matter how flat the floor is. Any matchbooks or scraps of wood used for shims constantly slip out of place.

For a permanent fix, extract the plastic or metal button foot and slip a washer or two through the built-in nail so the washer is between the foot and the wooden leg. Then pound the foot back into the original hole, trapping the washer between the foot and the leg of the table. Before you start, position the table in its permanent spot and slip washers under the feet until you find the right combination.

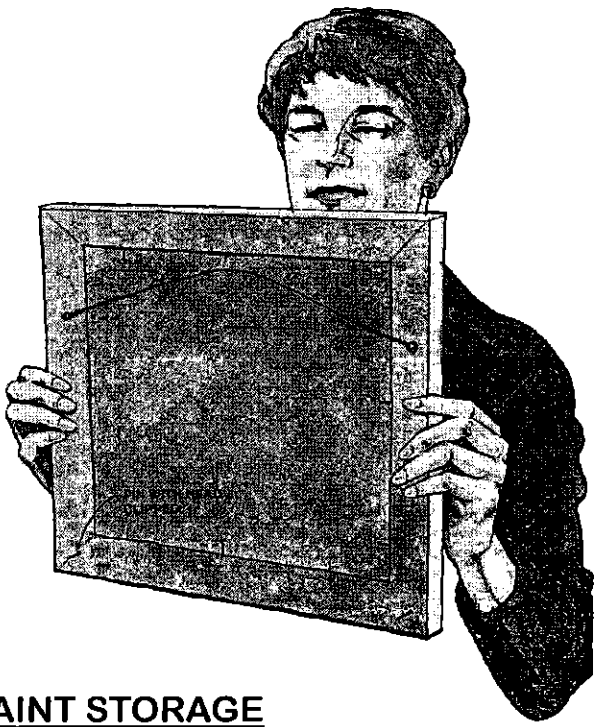
"Fender" washers work best. Their thinness allows for finer adjustments, and their small holes fit tighter around the nail.

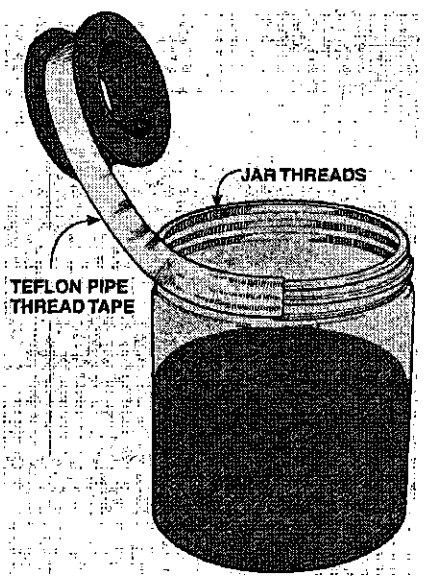
"Handy Hints" MAY 2000
'THE FAMILY HANDYMAN'

EVER-LEVEL PICTURES

Here's a way to keep pictures hanging level forever. Push a straight pin into each lower corner of the frame, then clip off the heads so that 3/8 in. of the pin protrudes. Level the frame, then push the pins into the wall. This works better on drywall than plaster.

"Handy Hints"
APRIL 2000
'THE FAMILY HANDYMAN'





LEFTOVER PAINT STORAGE

Jars are great for holding leftover paint. The paint is less likely to dry out and you can always spot the color you need quickly. But the paint can seal the lid on permanently. To prevent this, simply wrap Teflon tape-the tape that plumbers use to seal pipe joints-around the glass threads and top lip. Wrap the tape in the same direction that you tighten the lid so it stays put when you screw the lid on.

"Handy Hints" MAY 2000 'THE FAMILY HANDYMAN'

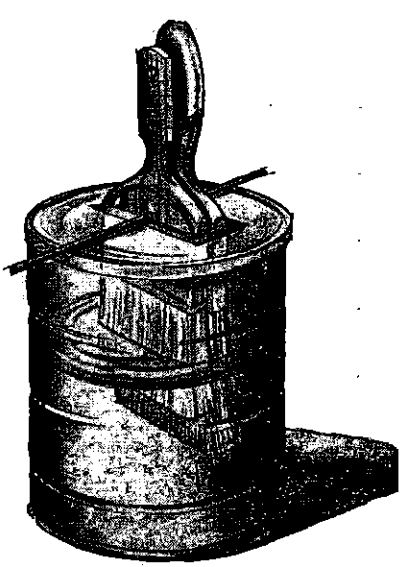
BATH FOR A PAINTBRUSH

There are few chores as tedious and messy as cleaning paintbrushes. But the results of doing the job right are brushes that will last a lifetime. Here's how to make brush cleaning easier and much less messy: Start by cutting a slit in the plastic lid of an empty coffee can. Bore a small hole through the paintbrush handle, just above the metal ferrule.

Push the brush handle up through the slit in the lid and insert a 4 to 6 in. long piece of wire coat hanger through the hole in the handle. Now pour into the can either water (for latex paint) or mineral spirits (oil-based paint). Make sure the bristles and not the ferrule are immersed and that the tips of the bristles are at least a half inch above the bottom of the can. (If the brush rests on the bottom, the bristles will become permanently bent.)

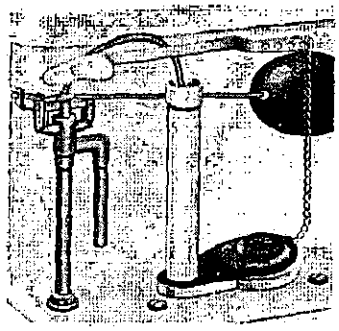
Soak the brush for at least two hours. Rake the bristles clean with a brush comb, then hang up the brush until it's dry, Before storing the brush, wrap the bristles in either paper towels or brown paper cut from a grocery sack.

"Simple Solutions" APRIL 1999 'TODAY'S HOMEOWNER'



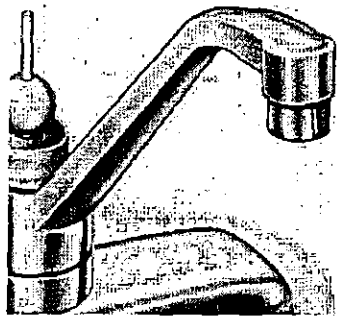
TOOL TIME

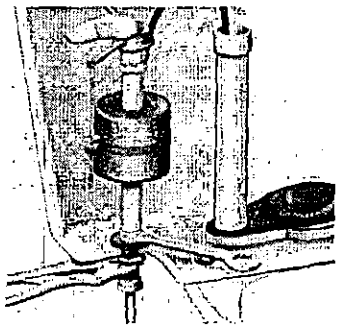
All Rovers, male and female, young or old, get called upon at one time or another to do fix-it jobs. Sometimes as a Crew project, sometimes as a home repair project, and sometimes to help a friend. In this column, we're going to try to bring you tips to make some of these jobs easier.

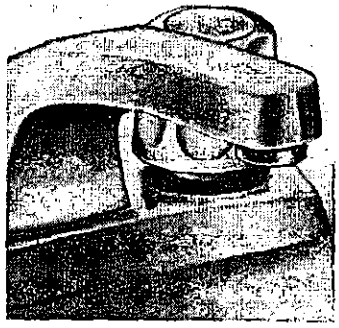


April 1999
'Today's Homeowner'

STOPPING the drip







Whether it's the toilet that gurgles or the steady drip, drip, drip of a faucet in the middle of the night, we'll show you how to silence the most common leaks

by John D. Wagner

Water dripping onto a boulder will eventually break down the rock. A little closer to home, water incessantly dripping from a leaky faucet in the wee hours of the night will lead to a breakdown of another kind. The drip, drip, drip has a way of driving you crazy.

Silencing a dripping faucet or a running toilet doesn't require an expensive visit from a plumber. Even if you consider yourself a klutz when it comes to washers and wrenches, you can stop the leaks with a little savvy and a few inexpensive parts. We'll show you how on the following pages.

Leaky Toilet

BEFORE YOU START

- Turn off the water at the shutoff valve near the base of the toilet. If there isn't one, see "Emergency Shutoff," on the next page, which will fill you in on how to locate shutoff valves. Once the water is off, flush the toilet a couple of times. This empties the tank so you can make repairs. If you're replacing the water-supply line or ball cock, sponge up the remaining water in the toilet tank.

FIND YOUR TOILET

- Check out your toilet-tank mechanism and match it to one shown below before buying parts or reading up on the repairs that we describe here. When buying parts, choose a kit (usually less than $30) rather than individual items. The kit will contain all of the working parts you need to repair your toilet. Buying a kit will also eliminate unnecessary trips to the hardware store or home center in the middle of the job.

Problem: Gurgles, ripples in the bowl or a hissing sound.

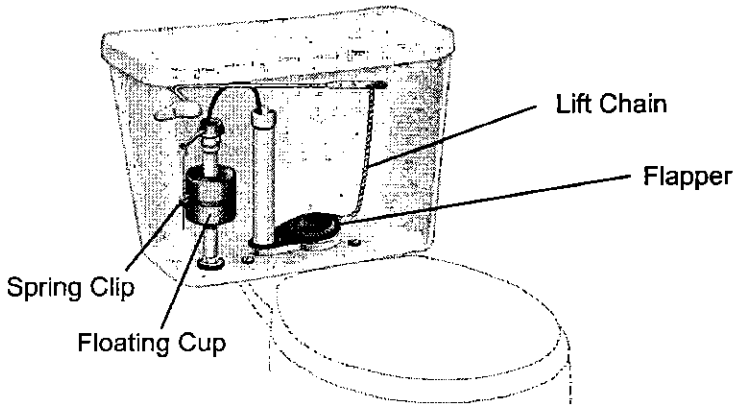
Solution: This problem usually indicates the water level is too high in the tank, with the excess pouring into the overflow tube.

In a toilet with a **float-ball ball cock**, the ball at the end of a brass rod rises with the water as the tank refills. At a set water level, the rod-and-ball assembly turns off the diaphragm ball cock, shutting off source water. If the ball isn't set low enough, water will crest and pour into the overflow tube. Stop this by gently bending down the rod by hand to lower the water level in the tank.

For a **floating-cup ball cock**, a cup slides up the ball-cock shaft as the water level rises and lifts a wire that trips the ball cock off. To lower the water level, pinch the clip holding the floating cup to the wire and slide it down the ball-cock shank.

For a **floatless ball cock**, turn the adjustment screw located at the base of the ball cock counterclockwise. Work the screw in half-turn increments. A new ball cock costs around $8.

Floating-Cup Ball Cock



Problem: Water to the tank goes on and then off every 20 minutes or so. There may also be a gurgling sound.

Solution: A leaky valve seat, the exit hole at the bottom of the tank, usually causes these problems. Here are the two possible scenarios:

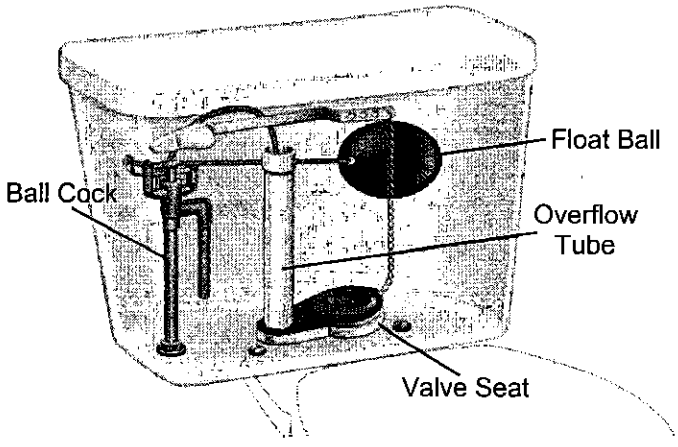
The flapper (or tank ball in some older toilets) should seal the valve. If the valve is caked with mineral deposits, it can leak.

Scrub the valve seal (and tank ball or flapper if necessary) with distilled white vinegar and a scouring pad.

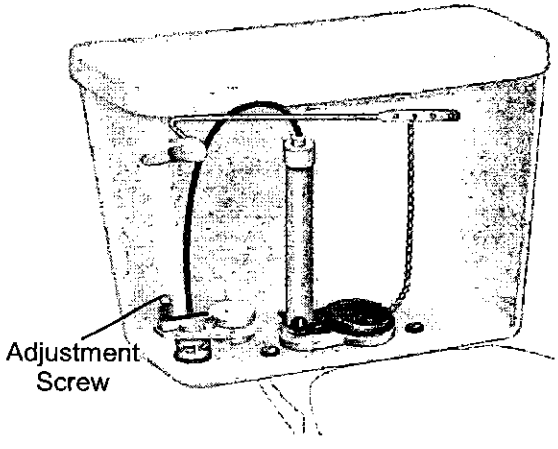
Another possibility is that the flapper or tank ball is misaligned or damaged. Inspect it for cracks, rips or tears, and adjust or replace it if necessary. For a flapper, make sure it's centered and square to the overflow tube. If you need to replace the flapper, simply unhook it and install a new one.

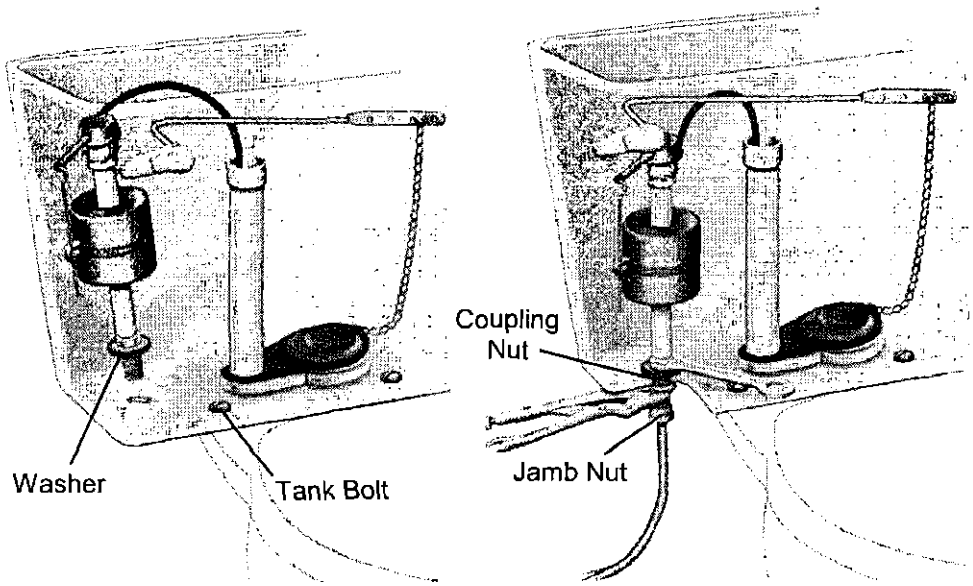
For a misaligned tank ball, adjust the wire until the ball fits snugly. To replace a tank ball, just unscrew it. Older ones often disintegrate when handled, so unscrew the ball mount with pliers.

Float-Ball Ball Cock



Floatless Ball Cock





IF THE BALL-COCK WASHER has hardened or if the ball cock leaks, start by replacing the washer (above left). If the leak persists, replace the entire ball cock. Use an open-end wrench inside the tank and self-locking pliers outside (above right).

Problem: water leaks out of the bottom of the tank.

Solution: There are three possibilities here. The bottom of the ball cock could be leaking, the connection between the external water-supply line and the ball cock could be loose or the tank bolts might have corroded, causing water to seep out.

The water-supply line feeds water into the threaded ball-cock tailpiece that protrudes from the bottom of the tank. It's held in place by a jamb nut that screws up from the bottom outside of the tank. Try tightening the nut as a first step.

If that doesn't work, replace the ball cock (around $8). Unscrew the supply-line coupling and detach the line. Then unscrew the jamb nut and pull the ball cock out. Fit a new washer over the new ball cock and coat the bottom of this cone-shaped washer with Teflon pipe dope. Thread the jamb nut by hand, then tighten with a wrench. Be sure to buy an antisiphon ball cock, which prevents the backflow of contaminated wastewater.

Another possibility is that there's a leaking connection between the supply line and tailpiece. To repair the connection, unscrew the supply tube coupling and replace the line with durable braided-stainless-steel line (around $8). Bring the old one to the store to match coupling sizes and line length. Coupling sizes are 3/8, 1/2 and 7/8 in. Check both ends because many supply lines are 3/8-in. on one end and 1/2-in. on the other. If the shutoff valve is leaking, replace it with a stainless- steel one for around $8.

In an older toilet, leaky tank bolts are another possible cause of a leak. First, try gently tightening the bolts (overtightening can crack the tank). If the leak persists, replace the rubber washers inside the tank or the bolts themselves if they're corroded.

Problem:
Toilet leaks at floor level.

Solution: If water is oozing from under the toilet or the flooring is damp, the seal made by the wax ring that connects the bottom of the toilet and the top of the waste pipe, called a closet flange, is broken. Try gently tightening (one full turn, maximum) the nuts that hold the toilet to the floor. If the problem persists, replace the wax ring.

Emergency Shutoff

When pipes burst, fixtures leak or appliances cause a flood, stop the deluge by cutting off the water at its source. Take a moment to locate all of the shutoff valves in your home so you'll be prepared for an emergency.

Whole-house shutoff
For a home served by a well, the shutoff will be on the house side of the pressure tank. You should also cut power to the tank so it doesn't detect a phantom pressure loss and burn out trying to compensate. In a home with metered water, look for the shutoff on either side of the water meter. Remember, your meter could be located in the basement, mounted on an exterior wall or even out near the street in a concrete "meter pit" where the household feed line meets the utility main.

Whole-house hot-water shut-off
On your water heater there should be a valve on the hot-water outlet, which controls all of the hot water to the house. If there isn't one on yours, you or your plumber should install one.

Toilet shutoff
Look for this inline shutoff — typically a ribbed oval handle — under the toilet tank.

Sink shutoffs
These inline shutoffs usually sit just beneath the sink or within the cabinet or vanity. The one on the left is usually for the hot water, the one on the right for cold water.

Dishwasher shutoff
Look first under the kitchen sink. Often there's a reducer coupling and shut-off valve leading to the dishwasher on the ½-in. hot-water sink-supply line. Not there? if you have a basement, look between the ceiling joists just below the appliance.

Clothes washer
There should be valves where the house-supply lines meet the washer hoses. Washer hoses are notoriously weak, so always close the valve when leaving home for an extended period.-J.D.W

Leaky Faucet

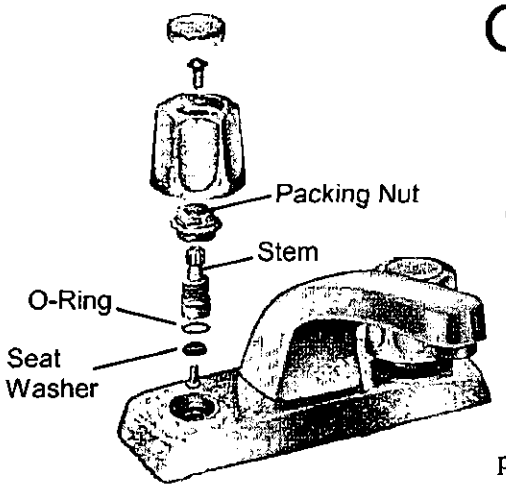
BEFORE YOU START

- *Shut off the water under the sink.*
- Close the sink drain; cover it with a rag to catch dropped parts.
- Tape the jaws of your wrench with a layer of duct tape to avoid scratching the fixture.
- Establish a place to lay out parts in order of removal.
- Use some distilled white vinegar and a soft scouring pad for removing mineral deposits on faucet parts.

FIND YOUR TOILET

- There are four kinds: compression, cartridge (sleeve), ceramic disk and ball type. Each type is illustrated below or on the next page. Except for the compression faucet, there are two illustrations for each. The less detailed version will identify the kind you have. The more detailed one will help as you make repairs.

A compression faucet relies on rubber washers to seal the valve seat. Rubber washers wear out and must be replaced occasionally. The other types, often called washerless faucets, last longer but they too can develop leaks. When these cartridge, ceramic-disk or ball-type faucets leak, you can either replace the 0-ring or neoprene seal that's causing the leak or replace the entire assembly for less than $28.



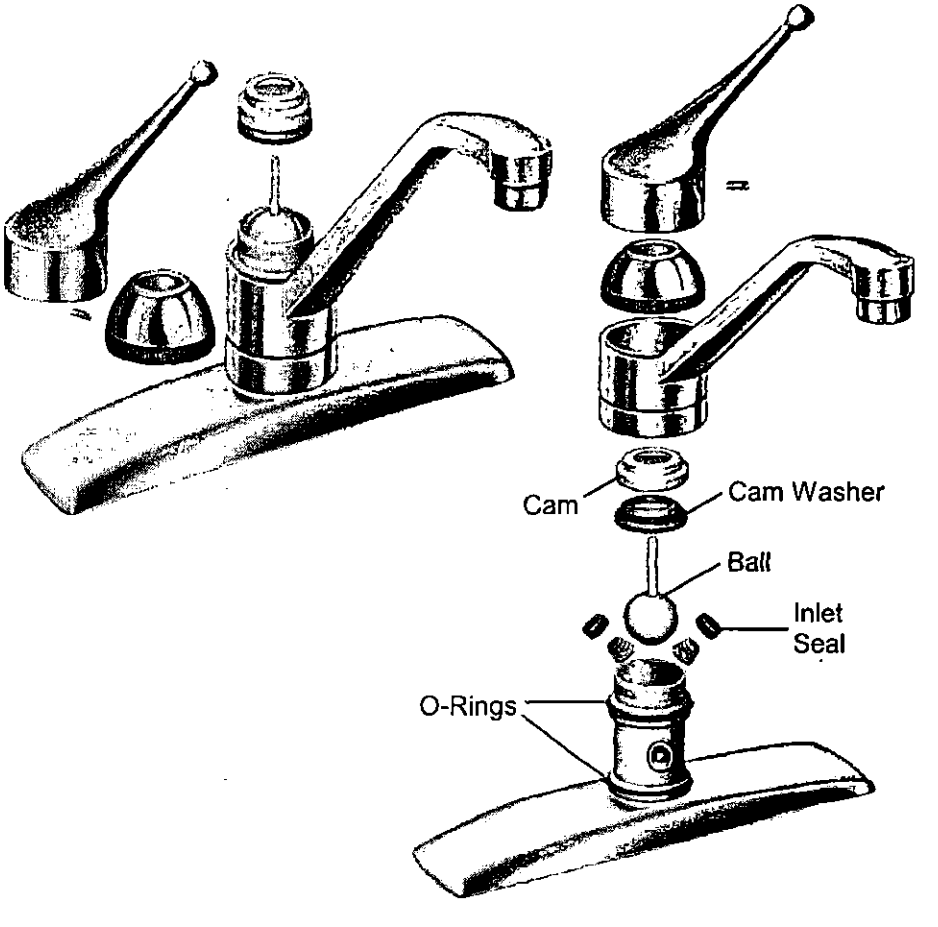
Compression Faucet

Most leaky compression faucets need new seat washers. Pry off the decorative cap on the handle, remove the handle screw, pull off the handle and use a crescent wrench to unscrew the packing nut. After unscrewing the stem, remove and replace the seat washer held in place by a brass screw. Coat the washers with nontoxic, heat-proof plumber's grease. Pop the stem out of the packing nut and replace the 0-ring, the culprit for leaky handles. 0 -rings range in size from 3/8 to 5/8-in., so it's crucial to exactly match the size on your faucet. Coat the new 0-ring with the plumber's grease. Reassemble the faucet and tighten the packing nut.

If your faucet continues to leak, the seat may be pitted. Remove the stem and grind smooth the valve seat with a valve-seat dresser ($4-5), a tool you temporarily screw down into the faucet.

Ball-Type Faucet

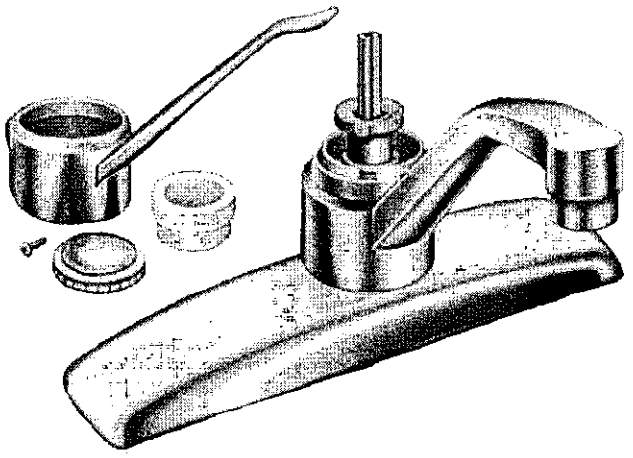
This type of faucet contains a lot of parts, and that often makes it difficult to find the cause of the leak. You can avoid the aggravation by buying a replacement kit (around $15) and putting in all new parts. First, remove the handle set screw and lift off the handle. Use adjustable pliers to remove the cap and collar. Using the special tool included in the faucet-repair kit, loosen the faucet cam and lift it out along with the cam washer and the rotating ball. Reach into the faucet body with needle-nose pliers and remove the inlet seals and springs. Next, cut off the 0–Rings, coat the new ones in nontoxic, heat-proof plumber's grease and roll them on. Install new springs, valve seats and cam washers as you reassemble the faucet. Another more expensive option for an older faucet is to replace the entire fixture. You'll need a basin wrench to do this.

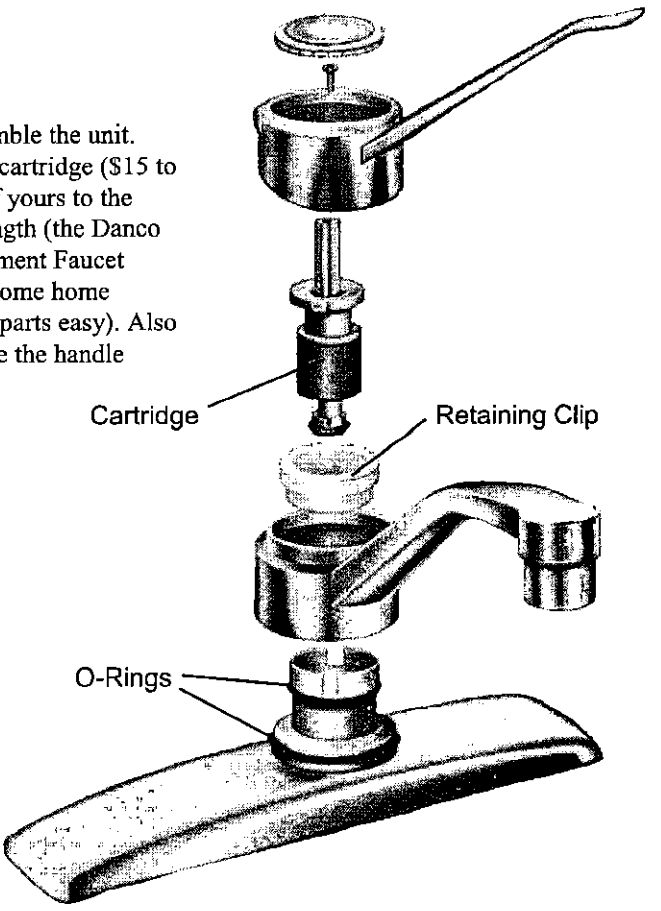


Cartridge Faucet

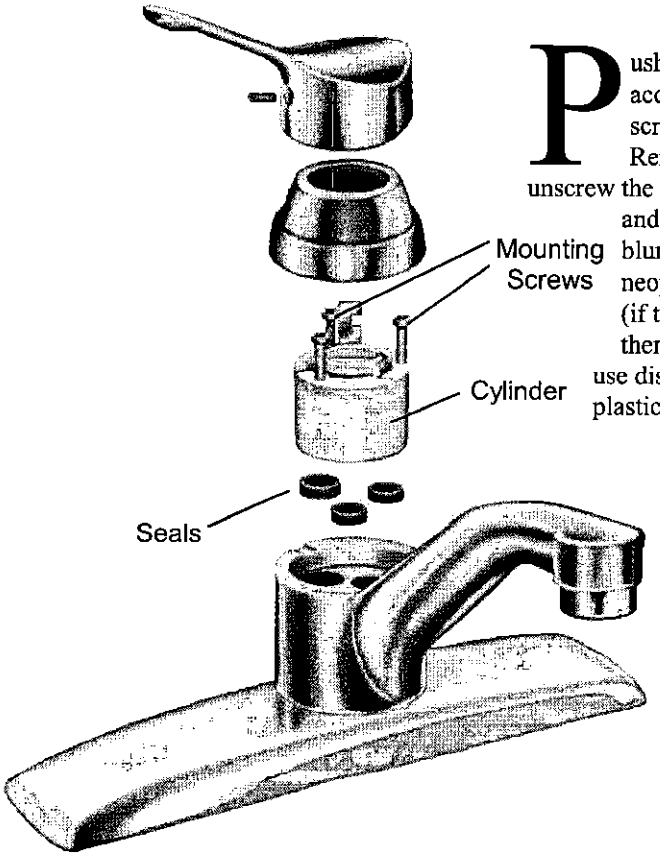
Pry off the decorative cap on the handle, remove the handle screw, tilt the handle back and pull it off. If there's a threaded retaining clip holding the cartridge in place, use needle-nose pliers to remove it, and then pull the cartridge straight up. Remove the spout and cut off the old O-rings using a utility knife. After coating the new O-rings with nontoxic, heat-proof plumber's grease, reassemble the unit.

To replace the entire cartridge ($15 to $20), match the length of yours to the replacement cartridge length (the Danco "Picture Perfect Replacement Faucet System" book, found at some home centers, makes matching parts easy). Also match the stem end where the handle attaches.



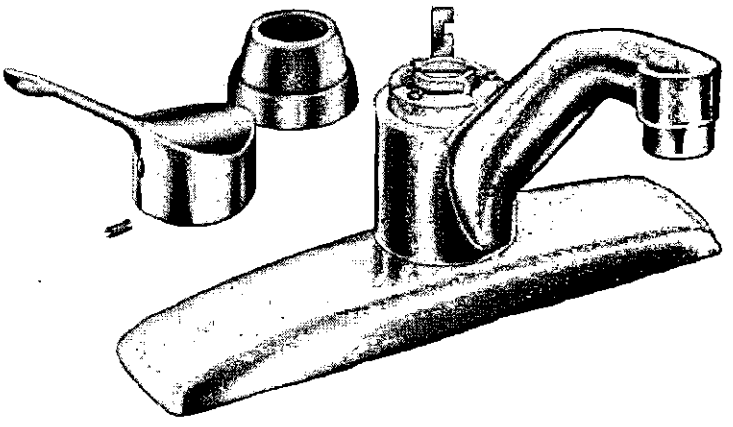


Ceramic-Disk Faucet

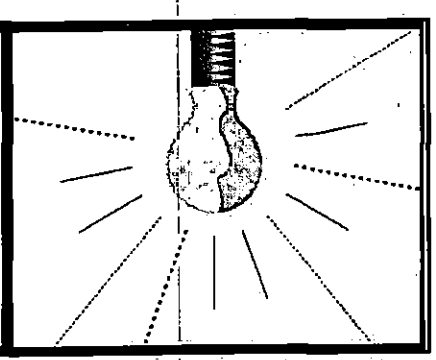


Push the faucet handle back to access the set screw. Remove the screw and lift off the handle. Remove the escutcheon cap, unscrew the disk cylinder mounting screws and lift out the cylinder. With a blunt screwdriver, lift out the neoprene seals from the cylinder (if the seals are damaged, replace them; they cost about $4-5) and use distilled white vinegar and a plastic scouring pad to clean the cylinder openings. Rinse thoroughly. Then replace the seals and reassemble the faucet. Move the handle to the "on" position and very slowly turn the water back on the force of the returning water can fracture the ceramic disk.

If you're replacing the entire cylinder, which seldom is necessary, merely set it in place and secure it with the new mounting screws. Replacement disks cost $12 to $20.



TOOL TIME



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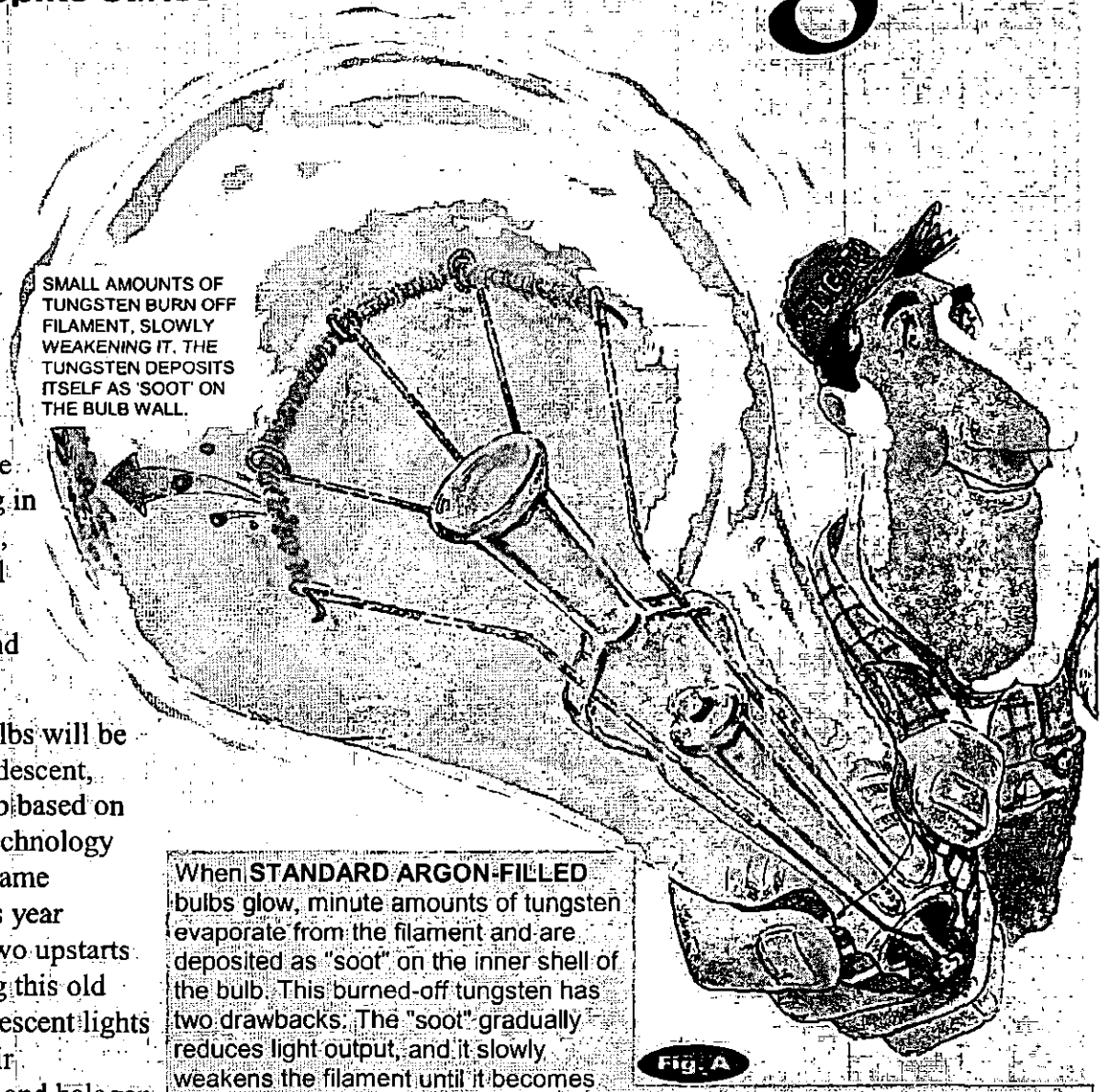
How a house works

by **Spike Carlsen**

Halogen

When and where halogens are worth the extra three bucks.



If you're an average homeowner living in the average house, 32 light bulbs will blaze away in your hallway, refrigerator and workshop tonight. The lion's share of those bulbs will be the standard 50¢ incandescent, screwbase type—a bulb based on simple yet ingenious technology that has remained the same throughout its 100-plus year history. But recently, two upstarts have begun challenging this old standby: compact fluorescent lights (CFLs), because of their tremendous efficiency, and halogen bulbs, because of their longevity and brighter, whiter quality of light. For the lowdown on halogen bulbs, read on.

When **STANDARD ARGON-FILLED** bulbs glow, minute amounts of tungsten evaporate from the filament and are deposited as "soot" on the inner shell of the bulb. This burned-off tungsten has two drawbacks. The "soot" gradually reduces light output, and it slowly weakens the filament until it becomes thin and breaks and the bulb "burns out."

COST: About 50¢ for a 75-watt bulb

LIFE SPAN: 750 to 1,250 hours

LIGHT OUTPUT: 1,180 lumens for a 75-watt bulb

BEST USES: The best and most affordable all-purpose bulb around. Good for general lighting in bedrooms and other living spaces where you want "soft" light and for fixtures with bulbs

Fig. A

Bulbs—a brilliant idea

HOW HALOGENS ARE DIFFERENT

Standard incandescent bulbs (Fig. A) work on a very simple principle: Electric current passes through a thin tungsten filament inside a gas-filled bulb. The resistance that the filament puts up causes it to heat up and glow. The gas inside the bulb—traditionally, argon—prevents the filament from combining with oxygen and burning out. As the filament, glows, microscopic amounts of tungsten burn or evaporate from the filament and are deposited as "soot" on the bulb wall. When enough tungsten has evaporated. the weakened filament finally breaks (usually from the shock of being clicked on) and POOF, you've got a burned-out light bulb.

Halogen bulbs (like the one shown in **Fig. B**) function similarly, but with a few key differences: They're composed of a small, pressurized, peanutsize bulb inside a larger outer shell. The gas inside this inner bulb is halogen.

When tungsten evaporates from the filaments of *these* bulbs, the halogen combines with it, escorts it back to the filament where it's redeposited, then heads out to round up more escaped tungsten particles. Since there's less soot on the bulb's shell, light output remains strong, and since filaments are constantly being rebuilt, the bulbs last longer. But the key difference—and the quality that makes them useful and unique—is they emit a whiter, brighter and more easily focused beam of light, almost like real sunshine.

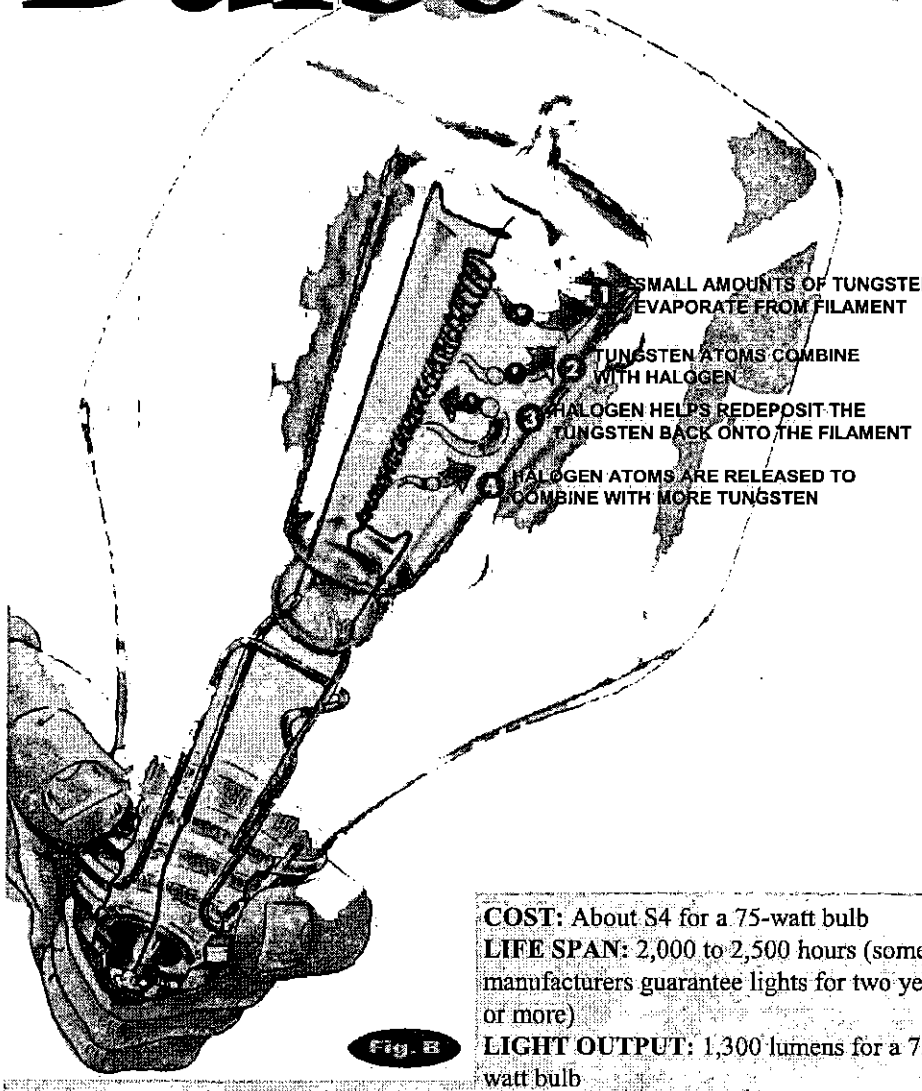


Fig. B

When **HIGH-TECH HALOGEN-FILLED** bulbs glow, small amounts of tungsten burn off the filament, but instead of being deposited on the bulb shell, they combine with argon, which redeposits the tungsten back onto the filament. This has two advantages: The globe isn't darkened by soot, and the filament lasts longer, since it's continuously being "rebuilt."

COST: About $4 for a 75-watt bulb
LIFE SPAN: 2,000 to 2,500 hours (some manufacturers guarantee lights for two years or more)
LIGHT OUTPUT: 1,300 lumens for a 75-watt bulb
BEST USES: In track and recessed light fixtures that you want to focus or concentrate light on a particular area or object; in desktop, reading or other work-area lights where you want bright, focused light; in fixtures that are tough to reach where you want long-lasting bulbs; in banks of light where you want all the bulbs (new or old) to glow at the same intensity.

BRIGHT BENEFITS OF HALOGEN LIGHTS

The pure white light halogens emit makes them ideal for certain fixtures and situations.

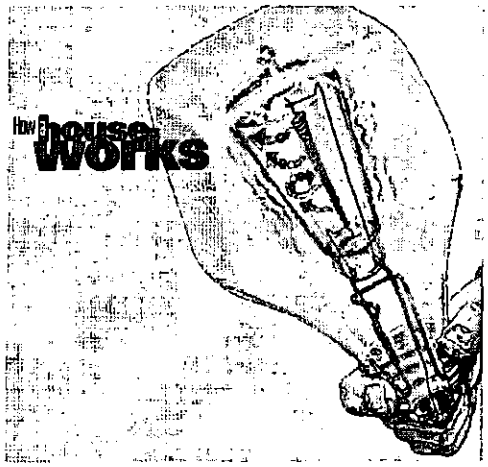
For reading and other exacting tasks, the bright light reduces eyestrain.

For display lighting, where you want to highlight artwork, photos, crystal or architectural features, the white focused light makes colors appear more vibrant. Halogen spotlights allow pinpoint focus. Using standard bulbs for general lighting in the same room heightens the effect of halogens even more.

For outdoor use, halogen floodlights cast a , brighter, easier-

to-see-by light. And since they last twice as long as standard bulbs, you won't need to struggle to reach hard-to-access outdoor fixtures as often. They have other benefits too. They're 10 to 20 percent more energy efficient and cheaper to operate. They burn brighter longer (a halogen bulb will still be cranking out 94 percent of its original light output near the end of its life, while a standard bulb diminishes to a measly 82 percent).

Of course, not everyone or every place loves halogen. They cost at least four times as much and don't give off that warm glow of a standard bulb we're accustomed to. And they have an intense glare; they need to be shaded, shielded or directed so the filament isn't in your line of sight.



HALOGEN BULBS BURN HOTTER

Halogen bulbs burn hotter than standard incandescents, so care must be taken in their use. It's possible for the protective outer shell to break and for the inner bulb to continue working (though the outer shells are incredibly durable). This can pose a hazard, as the hot inner bulb can explode if moisture hits it. Dispose of any damaged bulbs. And, as you should do before replacing *any* bulb, check the light fixture label to make sure a halogen bulb is compatible and within the fixture's listed limits.

Halogen floor lamp bulbs caused a flurry of fires a few years back. The bulbs weren't the standard screwbase type bulbs shown here, but long, skinny types with 500-watt filaments positioned only 1/8 in. away from the outer glass shell. These ultra-hot bulbs, coupled with the open-top design of torchiere lamps, meant objects contacting bulbs could easily ignite. Torchiere lamps today have safeguards—protective glass domes and metal grids—to shield the bulb and minimize fire hazards.

What you get when you you mix passion talent, and dedication...

On Nov. 18, 1999, Itzhak Perlman, the violinist came on stage to give a concert at Avery Hall at Lincoln Center in New York City. Getting on stage is no small achievement for Mr. Perlman. He was stricken with polio as a child. He has braces on both legs and walks with the aid of two crutches. To see him walk across the stage one step at a tine, painfully and slowly, is an awesome sight. He walks painfully, yet majestically, to his chair. Then he sits down, slowly, puts his crutches on the floor, undoes the clasps on his legs, tucks one foot back and extends the other foot forward. Then he bends down, picks up the violin, puts it under his chin, nods to the conductor and proceeds to play.

The audience knows this ritual. They sit quietly while he makes his way to his chair They remain reverently silent while he undoes the clasps on his legs. They wait until he is ready to play. But this time, something went wrong. Just as he finished the first few bars, one of the strings on his violin broke. You could hear it snap -- it went off like gunfire across the room. There was no mistaking what that sound meant. People who were there that night thought they know what would happen next: "We figured he would have to get up, put on the clasps again, pick up the crutches and limp his way off stage -- to either find another violin or another string." But he didn't.

Instead, he waited a moment, closed his eyes and then signaled the conductor to begin again. The orchestra began, and he played from where he had left off. He played with such passion and such power and such purity as they had never heard before.

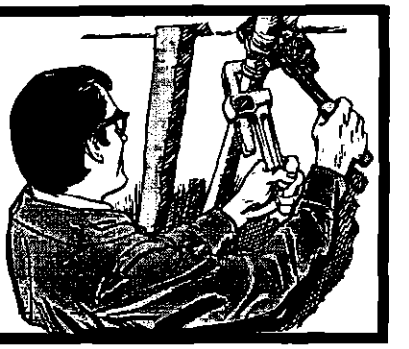
Anyone knows it is impossible to play a symphonic work with just three strings. I know that and you know that, but that night Itzhak Perlman refused to know that. You could see him modulating, changing, re-composing the piece in his head. At one point, it sounded like he was de-tuning the strings to get new sounds from them that they had never made before.

When he finished, there was an awesome silence. And then people rose and cheered. There was an extraordinary outburst of applause from every comer of the auditorium. We were all on our feet, screaming and cheering, doing everything we could to show how much we appreciated what he had done. He smiled, wiped the sweat from this brow, raised his bow to quiet us, and then said -- not boastfully, but in a quiet, pensive, reverent tone -- "You know, sometimes it is the artist's task to find out how much music you can still make with what you have left."

What a powerful line. It has stayed in my mind ever since I heard it. And who knows? Perhaps that is the definition of life - not just for artists but for all of us. Here is a man who has prepared all his life to make music on a violin of four strings, Who, all of a sudden in the middle of a concert, finds himself with only three; so he makes music with three strings, and the music he made that night with three strings was more beautiful, more sacred, more memorable, than any that he had ever made before. So, perhaps our task in this shaky, fast-changing, bewildering world in which we live is to make music, at first with all that we have, and then, when that is no longer possible, to make music with what we have left.

Jack Riemer, Houston Chronicle, February 10, 2001

TOOL TIME



No Sweat Plumbing Repairs

Fixing leaky pipes without having to use a soldering torch

by Joseph Truini

This article appeared in the February 2001 edition of "Todays Homeowner".

Most homeowners have the skills and confidence to tackle minor plumbing problems, like dripping faucets and clogged drains. But even moderately experienced do-it-yourselfers hesitate when it comes to repairing leaky water-supply lines, especially if it involves soldering. And that's wise because it only takes one mistake to turn a small leak into a flash flood.

Here, we'll show you how to make repairs to both copper and galvanized-iron pipes without using a soldering torch.

1. *HOLD the compression repair coupling against the damaged pipe and mark 1 in. in from each end.*

2. *WHEN space is limited, use a miniature tubing cutter to cleanly slice through the copper water pipe.*

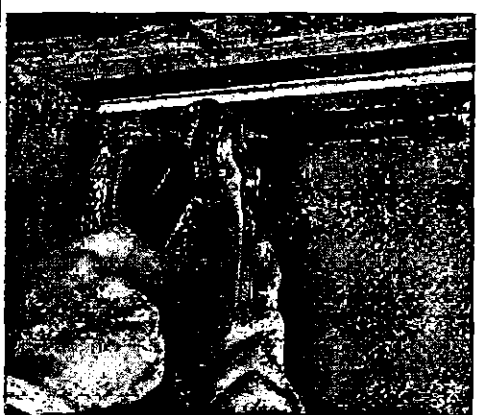
SPLIT-PIPE REPAIR

Millions of homes are plumbed with copper water-supply lines.

3. *SLIP the repair coupling into place after sliding the compression nuts and ferrules onto the ends of the pipe.*

The pipes and fittings are "sweated" together with solder, which is melted with a gas torch. Besides the obvious dangers of working with an open flame, it takes experience to make the hot solder spread uniformly so the sweated joint doesn't leak. And any moisture in the pipe will prevent a watertight seal.

A simple alternative to soldering when a leak occurs somewhere along a run of pipe (not at a fitting) is to cut out the damaged section and splice in a compres-



4. *HOLD the nut on the coupling with one wrench and use a second wrench to tighten the compression nut.*

sion repair coupling. These cut-and-paste couplings are commonly available for 1/2- and 3/4-in. dia. pipes in 6- and 12-in. lengths; prices range from $6 to $15. We used a 6-in. repair coupling from Prairie Home Products to fix a 1/2-in.-dia. copper pipe that had frozen and split open. Again, the beauty of this approach is that you can permanently repair the pipe-without solder-in less than 10 minutes.

Start by shutting off the water to the entire house at the meter or well-pump pressure tank. Drain the system by opening all the faucets on the lowest level. Next, remove the compression nut and ferrule (ring) from each end of the repair coupling. Hold the copper coupling up to the pipe, making sure it's centered on the damaged spot. Mark the pipe 1 in. in from each end of the coupling (photo 1). This overlap is necessary to allow the coupling to slip over the pipe ends.

Cut out the damaged pipe section with a hacksaw or tubing cutter. If space is limited, use a mini-tubing cutter (photo 2). Remove the burrs and any rough spots from the just-cut pipe ends with a strip of emery cloth or fine-grade sandpaper. Take the compression nuts and ferrules that you removed earlier from the coupling and slide them onto the pipe ends. Then slip the repair coupling into place (photo 3) and tighten the nuts with two wrenches (photo 4). Finally, turn the water back on and carefully check for any leaks.

1. *SCRAPE OFF ANY rust or debris from the area around the pinhole leak. Be careful not to enlarge the hole.*

2. *PLACE THE REPAIR clamp around the pipe and pinch it closed. Slip the bolt between the two iron prongs.*

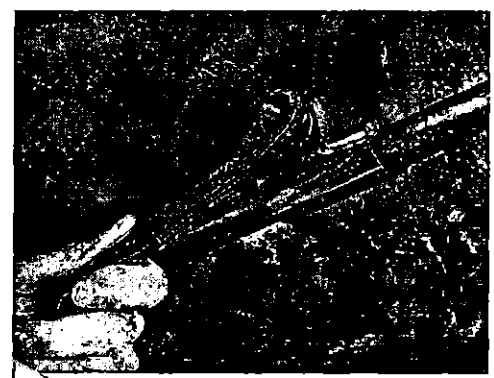
PINHOLE REPAIR

Although galvanized-iron piping hasn't been widely used since the 1940s, it still exists in millions of homes. The problem with iron pipe is that it corrodes from the inside out, making it difficult to tell what condition it's in. The first sign of trouble often appears as a pinhole leak. If you don't patch the hole, it will grow larger without your being aware of it.

The quickest, easiest way to repair a pinhole leak is with a stainless-steel pipe repair clamp. It consists of steel band that's lined with a thick rubber gasket. When the clamp's bolt is tightened down, the gasket plugs the leak. Pipe repair clamps won't stop corrosion from spreading. Once you've repaired the leak, have a plumber check out the condition of all the pipes in the system.

Pipe repair clamps come in two lengths- 3 and 6 in for use on pipes ranging from 3/8 to 3 in. dia. However, the 1/2- and 3/4-in. clamps are the most common sizes by far, costing between $4 and $9.50. For our repair, we used a 1/2-in.-dia. x 3-in. clamp from Prairie Home Products.

After shutting off the water and draining the system, use a putty knife to scrape away all rust, corrosion and dried gunk from the area around the pinhole leak (photo 1). Wipe the pipe clean with a cloth soaked in warm water, then dry the pipe. Next, spread open the clamp and slip it around the pipe (photo 2). Rotate the clamp so that its rubber gasket is centered over the pinhole. Pinch the clamp closed and press the clamp's bolt down between the prongs of the iron lug (that's the U-shaped fitting attached to the steel band). Use a wrench to tighten the nut on the bolt. Turn the water back on and immediately check for leaks. Then check again once a day for the next few days to make sure that no water is leaking out from under the gasket.



3. *TIGHTEN THE NUT with a wrench to compress the thick rubber gasket and plug up the pinhole-size leak.*

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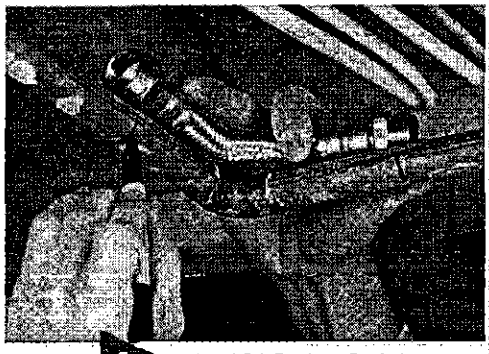
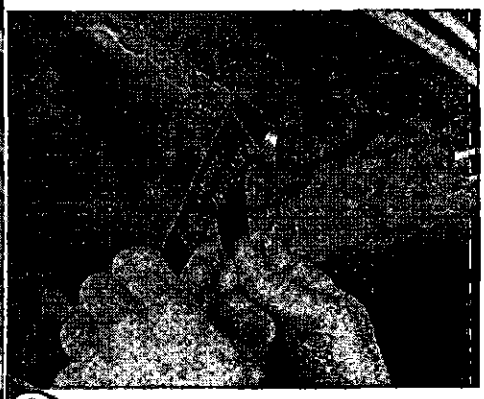


1. HOLD the Quick-Fix connector against the leaky elbow fitting, then mark where the pipes need to be cut.

2. IF you don't own a tubing cutter, carefully cut through the copper pipe with a hacksaw or reciprocating saw.



3. BUFF THE JUST-CUT pipe ends with a strip of emery cloth. Be sure to remove all burrs and rough spots.

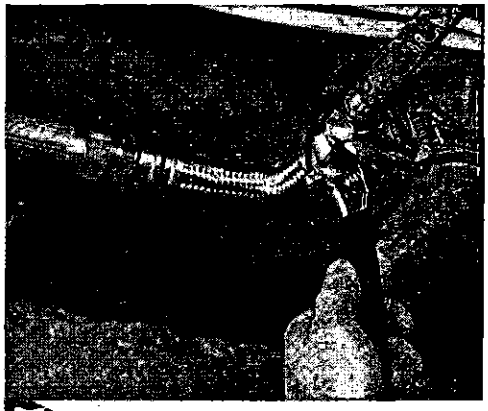
JOINT REPLACEMENT

Repair couplings work great on straight pipe sections, but they can't fix a leaky elbow fitting. For that job, you need a Quick-Fix Plumbing Connector, from LSP Specialty Products. The easy-to-install connector has a strong yet flexible braided-stainless-steel jacket that easily bends around corners. It's available for 1/2- and 3/4-in.-dia. pipes in 9- and 12-in. lengths; prices range from about $9 to $11. We used a 1/2-in.-dia. x 9-in. connector to replace a 90-degree elbow that had sprung a leak.

First, turn off the water and drain the system, as described above. Remove the compression nut and ferrule from each end of the Quick-Fix connector. Hold the flexible pipe connector against the leaky elbow and mark the pipe approximately 1 in. in from each end (photo 1). Cut through the copper pipes with either a tubing cutter or hacksaw (photo 2). Smooth the pipe ends with a strip of emery cloth or fine-grade sandpaper (photo 3). Be sure to remove all burrs and rough spots or you won't be able to install the connector.

Slip a compression nut and ferrule onto each pipe (photo 4). If a ferrule doesn't easily slide on, use the emery cloth to smooth the pipe end again. Next, while backholding the fixed nut on the connector with one wrench, use a second wrench to tighten the compression nut (photo 5). Turn the water back on, wait a few minutes and check for leaks. If you do spot a leak, try tightening both nuts a little more.

4. SLIP THE COMPRESSION nut over the pipe end, then slide on the ferrule, also called the compression ring.



5. USE TWO WRENCHES to install the flexible connector. Hold the connector nut stationary and turn the compression nut.

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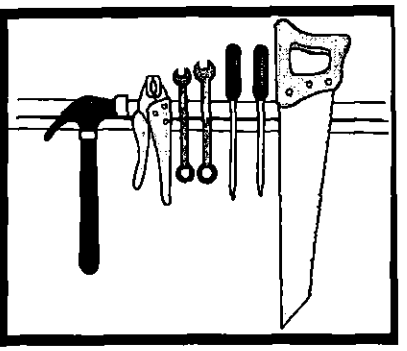

Home is where the Hammer is (and pliers, chisel, wire cutters, putty knife...)

by SUSAN MARTIN/News Style Write
The Buffalo News – Friday, November 16, 200

Like tools, the people who own them can be divided into categories. There are power people who keep tight control over their hammers, levels and hacksaws to the point of designating exact, put-it-back-here or-else places for them to be returned after use. There are sharp people who keep the most-often-used tools at their fingertips - in a toolbox in the closet, perhaps, or even in a nifty organizer in a kitchen drawer. No sense in running to the basement or garage all the time.

There are rusty people who can never remember that the Phillips head screwdriver is the one with the four-point tip. No that it matters. They can never find it anyway.

As one tool-wary man recently admitted: "I don't have a lot of tools. I have two flashlights and two screwdrivers - one is a Phillips and the other a regular screwdriver - but they never are the right size."

Tools. Everybody has them. Some have more than others.

Tool Tip No. 1: At the very least, even apartment-dwellers on good terms with the maintenance crew should own some basic tools: a hammer, screwdriver and tape measure are a good start (see accompanying story for other ideas).

Before he bought his Victorian fixer-upper in Allentown in 1996, Ray Ganoe owned zippo in the tool department.

"I had nothing. I kind of made my tools that first year. Very primitive tools," said Ganoe, who spent 4½ years renovating his house use with the help of family and friends - and their tools.

"Then I learned that in order to do something right, you have to buy the proper tools - and sometimes the tools can cost as much as the materials for the job," he added.

Number of trips to the hardware store: "10,256," he joked.

So where are the tools now? "In the basement - thrown into a bin that I hope I never have to open again in my life," said Ganoe, who heads Buffalo General Hospital's Project Reach program.

(Ganoe's house is being featured in ai upcoming show on Home & Garden Television.)

Ethel Ciesla, on the other hand, uses her tools all the time. And even after 31 years living in the same house in Hamburg and accumulating tools, Ciesla - a 62-year-old do-it-herselfer with "my hands into everything" - has a good handle on her tool collection.

"I have a toolbox that I keep in my bedroom for the tools I need on the main floor - hammer, screwdrivers, pliers...,"she began.

"But let me tell you about my basement," she continued.

At one time, the basement doubled as a family room. Once her children grew and moved out on their own, Ciesla and her tools took over.

I ripped out the bar and covered the pool table with plywood, which is now my work bench," said Ciesla, who has tackled everything from redesigning her powder room to making kitchen cabinet doors.

"All the main tools - like the basement hammer and pliers - I lay right on the end of the table. Things like my files and drill bits are in one of those storage cabinets with all the little drawers. I also have a big buffet down there where I keep a lot of tools," said Ciesla.

Tools: Shop at garage sales

Indeed, while people have different quantities of tools depending on their expertise, interests and circumstances, they also have different ways of storing them.

Those whose idea of home maintenance ends at changing a light bulb most likely are content with a couple of screwdrivers tossed into a junk drawer.

Big-league do-it-yourselfers not to mention real-life contractors have elaborate home workshops with an impressive inventory of hand and power tools.

And those who know their way around an electric drill but haven't the desire, space or time to build a

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workshop often get along fine with a pegboard, toolbox or tool bag (Rubbermaid makes soft-sided tool bags, for example.)

Tool Tip No. 2: Toolboxes are not just for tools. The well-stocked toolbox also includes safety glasses, ear protectors and a first-aid kit.

Some observations that may or may not ring true in local households:

- The longer you've lived in the house, the more tools you accumulate.
- The more projects you tackle, the more tools you think you need.
- Every project requires a trip to the hardware store.
- Every project requires a second trip to the hardware store to pick up the item you forgot the first time.
- Buying a tool often is more fun than using one.
- Even with today's tool organizers and storage gizmos, some people still prefer stashing their tools and hardware in old tin coffee cans and baby food jars.
- Most people can't throw out old tools or hardware even after they buy new ones.
- No matter how many screwdrivers you own, you can't always find one when you need it most.
- Some people can't resist buying tools at a garage sale. These people know who they are.

In the end, it's easy to see why so many homeowners end up with so many tools.

Obviously, they never heard the words of one wise man: "One only needs two tools in life: WD-40 to make things go, and duct tape to make them stop."

The Toolbox Basics

A dozen or so basic hand tools - plus an electric drill - will gear you up for most minor home repairs.

Here's what to keep in your toolbox - or wherever else you stash your tools:

- Measuring tape
- Straight- and Phillips-blade screwdrivers
- Regular and needle-nose pliers
- An 8-inch adjustable wrench
- A 16-ounce claw hammer
- Push drill (good for small holes)
- Combination square
- Crosscut saw
- Hacksaw
- Nail set
- Couple of chisels

This list came from Better Homes and Gardens' "New Complete Guide to Home Repair & Improvement" (Meredith, $35).

The editors also recommend the following: "Except for the drill and possibly an orbital sander for big finishing jobs confine your initial purchases to hand tools," they write.

"Power tools will do the same work faster, easier, and sometimes more accurately, but in the hands of an inexperienced person, they can wreck expensive materials in a hurry and cause personal injuries," they continued.

A word on quality: Most manufacturers make two or three different lines, the editors point out. Your best bet is to avoid the bottom level - the low-cost bargains - and opt, instead, for the middle or top level.

Susan Martin

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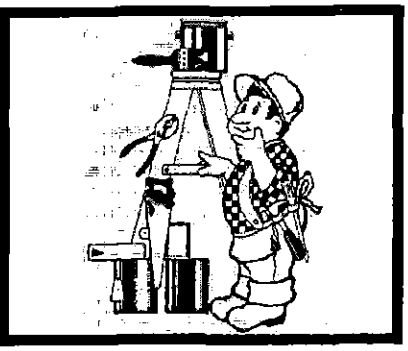
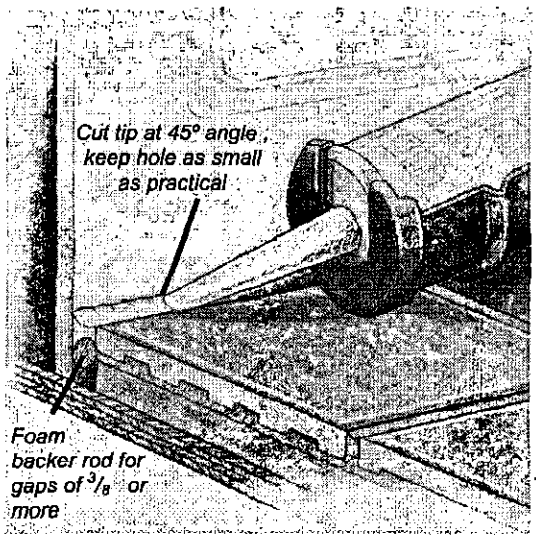


All Rovers, male and female, young or old, get called upon at one time or another to do fix-it jobs. Sometimes as a Crew project, sometimes as a home repair project, and sometimes to help a friend. In this column, we're going to try to bring you tips to make some of these jobs easier.

Effective Caulking

"tradesecrets"
from Danny Lipford
'Todays Homeowner' magazine
July/August 2000



Life seemed much simpler when the hardware store carried only three kinds of caulk. Now, home centers dedicate an entire aisle to caulk. As a result, confusion reigns when it's time to do a very simple job.

But I don't think caulking needs to be that complicated. Other than specialized caulk for specific tasks, like patching gutters, I've found that a high-quality siliconized acrylic-latex caulk is an excellent choice for almost all interior and exterior uses. That's what my crews use most of the time.

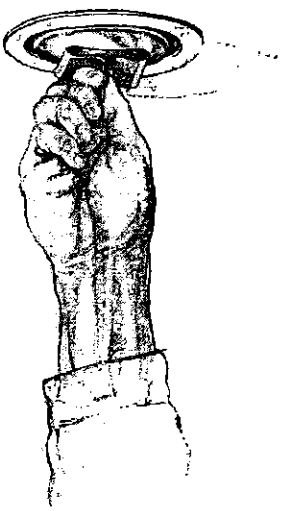
I know people who have paid $5 to $6 per tube for 100 percent silicone caulk and filled every crevice and seam they could find. It was only at the end of the job that they discovered that paint won't stick to silicone caulk. They were left with a job that could have looked much better. On the other hand, acrylic-latex caulk can be painted, cleans up with water and is almost half the price of 100 percent silicone.

But there are a few exceptions to that rule. You should use silicone tub-and-tile caulk in the bathroom because it resists mildew and doesn't shrink. For gaps of 1/4 in. or more, or where the caulk must join dissimilar materials, use urethane caulk because it's more elastic. For joints more than 3/8 in. wide, pack the crack with foam backer rod before applying caulk so the seam won't crack later. And bridge gaps up to 1 in. with a combination of backer rod and urethane caulk, but don't try to caulk anything wider than that.

When applying caulk, more is not always better. If you apply too much caulk to a joint and then smooth it out with a finger, the caulk tends to spread onto adjoining surfaces. This is just plain unattractive. And outdoors, this thin layer of caulk will weather differently than the rest of the seam. Getting an even bead of caulk is easier with a high-quality caulk gun, so skip the 99-cent special. Just remember to cut off the plastic tip at a 45-degree angle, which will help you apply the caulk evenly Another tip: Take advantage of the many colors that caulk now comes in. They help paint cover much better than regular old white.

Besides caulking around tubs and sinks (where you are protecting against water damage), don't forget to seal around window and doors, and any crack that leads to the outside. I tell people that if they were to add up all the cracks and holes in a typical 20-year-old house, it would amount to a 3x3-ft. space, which would be just like leaving a window open all the time.

Loosening Recessed Lightbulbs



Changing a lightbulb in a recessed ceiling fixture can drive you crazy. That's because there's very little space between the bulb and the trim ring, making it impossible to get a firm grip on the bulb.

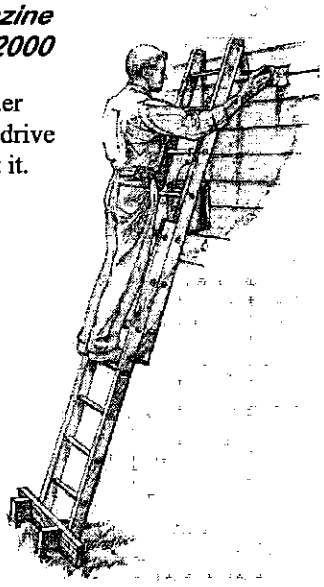
Defeat this frustrating problem with a strip of duct tape. First, make sure the bulb is cool to the touch. Then tear off a 12-in.-long strip of tape and press it onto the middle of the bulb. Fold each end of the tape back against itself to create two nonsticky handles.

Grip the handles between your thumb and forefinger and give them a quick twist in a counterclockwise direction. That should loosen the bulb so you can easily spin it out the rest of the way.

"simple solutions"
'Todays Homeowner' magazine
February 2001

Tips on this page from: "simple solutions"
'Today's Homeowner' magazine
July/August 2000

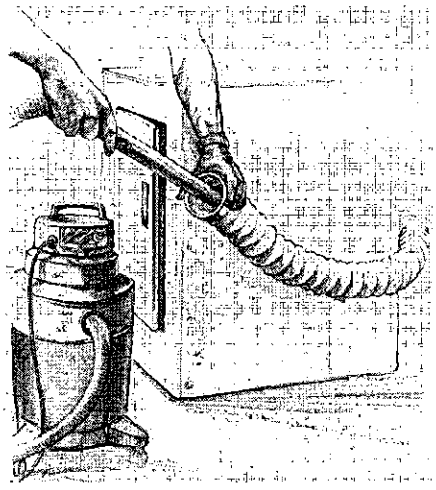
Ladder-Safety Tips



For many exterior chores, you need an extension ladder. Here's a way to keep it steady. Support the ladder base with a 2x4 cleat, as illustrated. Cut the cleat about 12 in. longer than the width of the ladder. Then drive two 16-in.-long 2x4 stakes a foot into the ground. Screw the cleat to the stakes and set the ladder against it.

Keep these safety rules in mind:

- Put the ladder only on dry, level ground, never on top of mud, ice or snow.
- The distance from the house to the base of the ladder should equal one-fourth the height of the ladder.
- When working on a ladder, don't overreach. Keep your hips within the vertical rails.



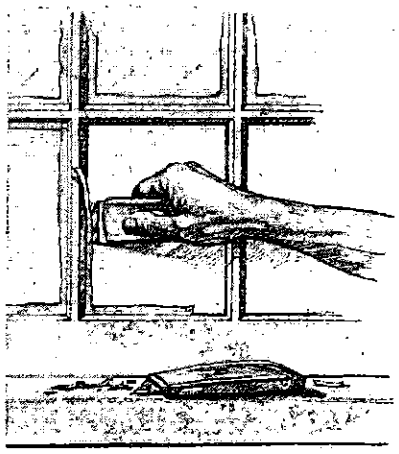
Cleaning Out Dryer Ducts

Clothes dryers exhaust more than just hot, moist air. They also spew out lint and dust, much of which gets stuck inside the ductwork. Over time, a thick layer of debris can build up and create a fire hazard.

To help reduce the chance of fire, use a shop vacuum to clean out the dryer duct at least twice a year. Start by disconnecting the flexible duct from the rear of the dryer. Insert the vacuum wand into the duct as far as possible. Then disconnect the other end of the duct and repeat the process. Vacuum out the port on the rear of the dryer, too, before replacing the duct.

Also, remove the louvered vent on the outside of the house and insert the vacuum wand into the duct to clear out any remaining dust and lint.

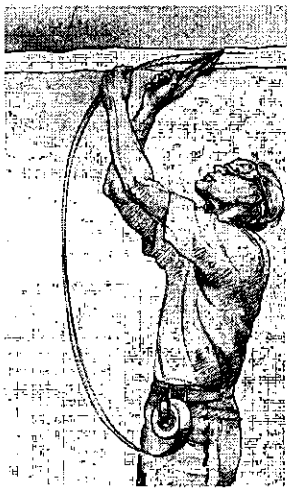
Paint-Scraping Secret



It's easy to paint the narrow wood muntins between window panes. The hard part comes when you have to scrape off the dried paint from the glass. Here's how the pros do it:

First, use a sharp utility knife to score the paint on the glass. However, don't press the knife tip right up against the muntin. Instead, score the line at least 1/16 in. onto the glass pane. This technique eliminates the likelihood of your cutting into the wood muntin and, more important, allows the paint to form an airtight seal between the glass and wood.

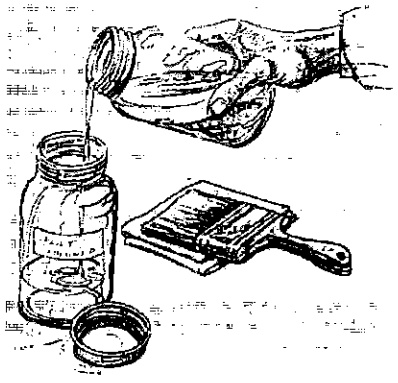
Next, use a razor-blade paint scraper to remove the excess paint. Push the blade into the paint, as illustrated, being careful not to scrape beyond the scored line.



Drywall-Tape Dispenser

This simple drywall-tape holder allows you to keep both hands free for positioning the paper tape and for pressing it down with a drywall knife. Take a wire hanger and bend it, as illustrated, to form a squared off U-shape. Turn down the two ends of the wire so that the holder can be clipped onto your belt or pants waistband. Make the hook section of the holder at least 2 1/2 in. wide so it will easily accept the 2-in.-wide tape roll.

Recycling Solvents



Paint thinner, or mineral spirits, is commonly used to clean oil-based paints and stains from brushes and tools. Most people dispose of the thinner after just one use, but that's wasteful and unnecessary.

Next time, soak the brushes clean, then allow the dirty solvent to sit overnight. The paint sludge and pigment solids will settle to the bottom of the jar, leaving a layer of clear thinner on top. Gently pour the clear thinner into a second clean jar and reseal it for future use.

Seal the jar of paint sludge and save it for the next paint cleanup. When it's full, bring it to a hazardous-waste-disposal site or similar municipal facility. Never pour solvents or paint sludge down a sink or into a storm drain.

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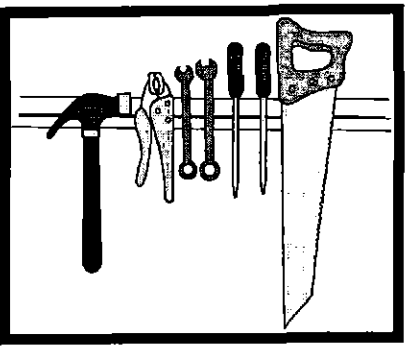
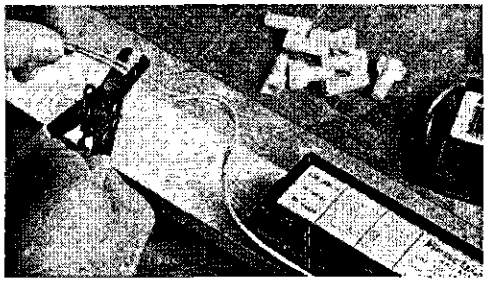


Change Faulty Ballasts

"Punchlist" by Scott Gibson
"Todays Homeowner" magazine – February 2001

FLUORESCENT LIGHT FIXTURES ARE MORE EFFICIENT AND CHEAPER TO RUN THAN INCANDESCENTS. But some fluorescent fixtures buzz or hum, and they take a long time to start when temperatures fall much below balmy. If your fixtures have these problems, a failing ballast--the component that gives the lamps the power boost they need to start--might be the cause. If the light flickers or won't work at all, the ballast is probably shot.

Replacing a faulty ballast isn't difficult, but it's essential to match the ballast to the lamps in your existing fixture. That 4-ft., two-lamp fixture in your garage or basement, for example, likely uses T12 lamps and a matching electromagnetic ballast, says Jeff Goldstein, of Lamar Lighting in East Farmingdale, New York. (The industry measures the diameter of lamps in 1/8-in. increments, so a T12 is 1 1/2 in. dia.) If you don't know which ballast to buy, take your old one to an electrical-supply house.

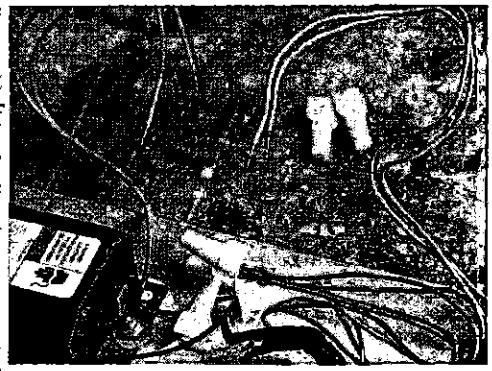


AFTER CUTTING the power or unplugging the fixture, remove the access panel and clip the leads from the old ballast.

Magnetic ballasts are readily available and cost about $16. If you want to eliminate loud buzzing noises, upgrade to an electronic ballast (about $28), which is quieter and more efficient. Electronic ballasts are standard on newer T8 fixtures, according to Goldstein, but it might be more difficult to find them for older T12 lights. Also consider the location of the fixture. Standard ballasts work best in temperatures above 50'F, but if lamps are in areas where it's colder, buy cold-weather ballasts; they fire up the lamps in conditions as low as 0* F.

To remove the ballast, cut power to the circuit at the panel. It's safer to turn the circuit breaker off at the main panel than it is to rely on a wall switch that might be wired improperly. Most corded garage or shop fixtures are hung from the ceiling by lightweight chain, so it's simple to take a fixture down for repairs. Take out the lamps, then remove the access panel on the fixture and disconnect the black and white wires from the power supply. Next, clip the three pairs of wires emerging from the ballast (above); there should be two reds, two blues and two yellows. Reconnect leads on the new ballast with wire nuts (right); the light should work fine once again. One tip: Reconnect each pair of colored wires individually. The ballast won't work properly if you gang together all four red wires, for example, and connect them with a single wire nut.

New federal (US) energy standards will eliminate T12 lamps and ballasts in 2005, according to Harold Thompson of Advance Transformer Co., a major ballast maker. If you decide to switch out a T12 ballast for a more efficient T8 before then, don't forget to change the lamps, too.



CONNECT THE LEADS from the new ballast to the fixture wiring with wire nuts. Tighten them firmly.

Buying Fluorescent Lamps

There's an option in buying a replacement fluorescent tube, or lamp, you might not be aware of. If you're tired of the harsh, gray light given off by standard fluorescents, look for a lamp with a higher Color Rendering Index, or CRI. The CRI is a relative scale that rates light sources on a scale from 0 to 100 (sunlight is rated at 100). Lamps with a higher CRI make people and objects look more realistic.

Manufacturers adjust the CRI by tinkering with the mix of phosphors that coat the inside of the lamp. A standard 34W "cool white" has a CRI of 62, but lighting stores and home centers also stock lamps rated all the way up to 90. The only downside is that you will pay two or three times as much per lamp for that great-looking light.