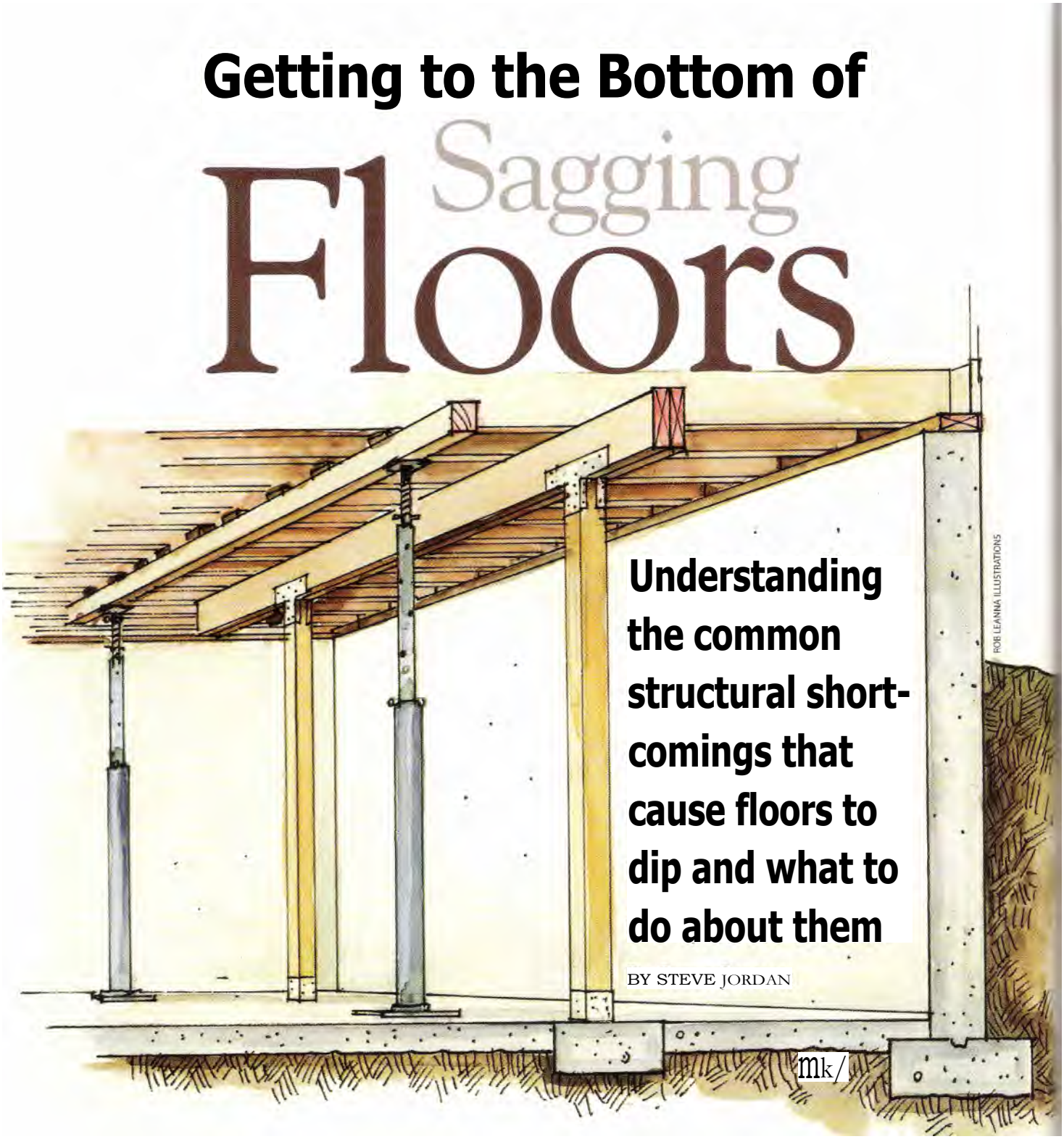
Getting to the Bottom of Sagging Floors



FOR LEANNA ILLUSTRATIONS

Understanding the common structural shortcomings that cause floors to dip and what to do about them

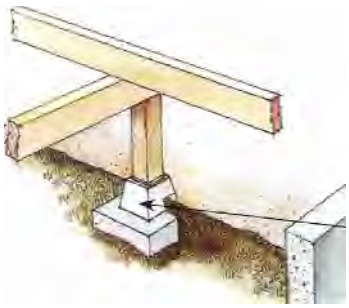
BY STEVE JORDAN

One of the most common complaints of old-house owners is sagging floors. In my own house, for example, every floor pitches toward the center stairwell. Although generally only an annoyance, sagging floors can be an indication of worsening problems. Here's a quick review of the most common problems and a few of the typical remedies.

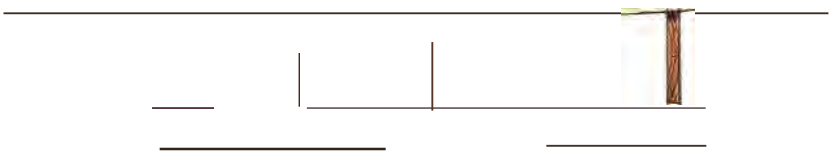
Investigate the Problem

Typically, floors settle near the center of the house because the perimeter walls are constructed over a sound, deep foundation and settle very little. Major support beams within this perimeter, though, are often supported by makeshift posts.

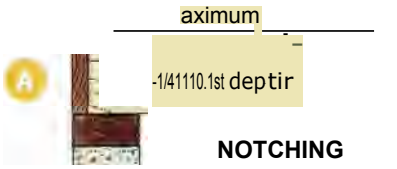
If your house is built over a basement, first inspect all of the basement support beams and posts where they meet the floor. Be suspicious of wood posts set on dirt floors or wood posts with concrete poured around the post bases. As the posts slowly rot and melt into the floor, the house settles accordingly, bottom to top. As a test, firmly push a metal probe or screwdriver into the post at the floor line. If this area is mushy, punky, or rotten, you may have found your problem. Also look for floor joists that have been cut improperly to install pipes, wiring, or HVAC ducts. If you've had a chronically damp basement or crawlspace, look for indications of insect damage to structural members. Powderpost beetles leave joists and



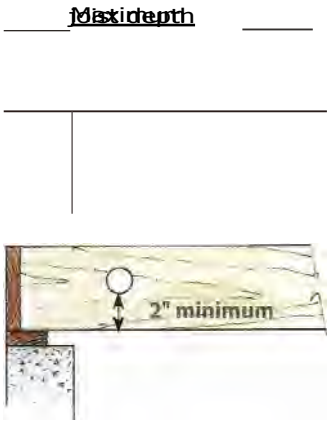
PROPER PADS
Support posts should not sit on dirt floors but instead be upgraded to concrete pads with footings that spread the load.



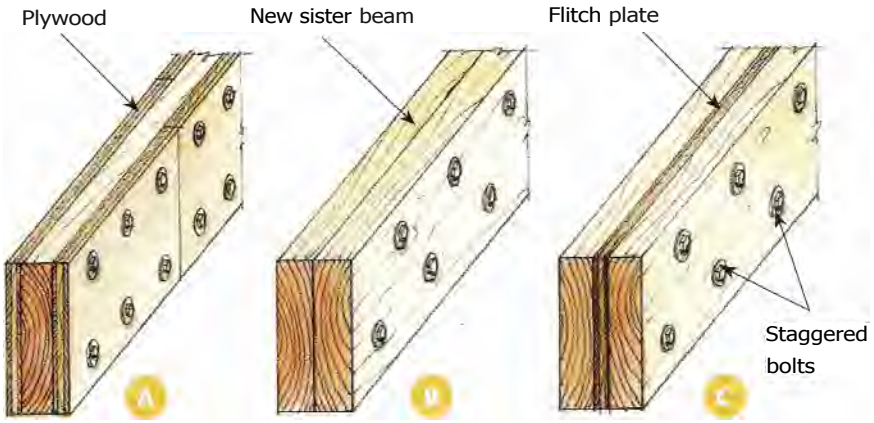
DETERMINING DEFLECTION
Stretch a string across the floor to evaluate the amount of deflection, then use it a benchmark for improment when jacking.



NOTCHING GUIDELINES



BEAM REPAIR BASICS



beams riddled with small holes, carpenter ants are usually apparent at the first sign of warm weather in the spring, and termites usually leave telltale mud tunnels on foundations and posts. Then solve moisture problems around and under the house and repair deteriorated or compromised structural members.

Improper holes and notches from alterations and running service lines are a major source of weakened joists (see above). Generally there should never be any cuts or penetrations in the middle third of any joist, or anywhere along the bottom of the joist. Notches at the end of a joist (A) should not exceed V4 of the joist depth. Center notches (B) should not exceed 1/2 of the joist depth. Holes (C) should be a minimum of 2" in from the top or bottom of the joist, and no larger than 1/2 the depth of the joist.

Plan the Remedies

Depending upon the conditions, it is possible to strengthen or repair existing framing members, such as floor joists or roof rafters, by adding reinforcing material. Sandwiching the member (A) on either side with plywood is sometimes worthwhile, but the plywood must be installed correctly for greatest strength. A better option is sistering (B), where identical lumber is bolted to the member. Better still is sistering with a flitch plate (C), a ⅛" to 1/2" piece of steel or plywood. Two flitch plates may also be used to repair localized damage. Where these repairs are not sufficient, also consider shoring up joists or beams that were cut, drilled, or notched for pipes, wires, or ducts.

One of the good things about floor deflection is that it is repairable. The had news is that it often takes a long time. The solution to sagging floors, or the damaged sills and joist ends that contribute to them, often involves jacking. A common scenario is to install temporary jack posts and support beams (left in drawing, opposite page) then permanent posts and beams over new footings. A taught string stretched across the floor will show the amount of deflection and improvement. Posts set on dirt floors should be upgraded to concrete pads with footings. Place wood posts on metal post supports to create a waterproof barrier between the post and the footing.

Jacking must proceed slowly; it took a long time for your floor to sink, so you can't push it back up quickly without causing cracks and stress in the building. As with other structural repairs, jacking must also be done appropriately. You cannot simply put a screw jack under the lowest spot and start turning. Ideally, someone with experience will assess the problem and set up the posts and any necessary beams. You can then screw the jacks up a turn or two each month. Expect some cracked plaster along the way, and aim not for perfection, but simply stability and improvement. After all, if perfectly level floors and pristine walls were important to us, we wouldn't live in old houses, would we?