Murphy Bed Magic

Turn any room into a spare bedroom with this easy-to-build space-saver

by Dan Cary

PHOTOS BY MARK MACEMON
Like many homeowners, I converted a small bedroom into a home office. It’s a trade-off that makes sense, except when we have visitors and must give up our bed. We considered buying a sofa bed, but we’ve never liked sleeping on them, and our current sofas don’t need replacing.

In my search for a new and better alternative I found a solution that isn’t new at all — a murphy bed. It’s an ingenious piece of furniture that combines the comfort of a standard mattress with the appearance of a closet or cabinet that is less than 18 in. deep. You can customize most designs to fit your home’s décor, adding trim, matching bookcases or even built-in lighting (see “Design Options,” p. 35).

The bed’s name is attributed to William L. Murphy, who designed and patented the original Murphy Bed in San Francisco around 1900. His company, The Murphy Bed Co., and several others continue to manufacture and sell murphy beds.

Now you see it; now you don’t. Lift-mechanism hardware makes opening and closing this modern murphy bed easy for anyone.
Several of these companies have designed their own lift systems, some adopting the murphy bed name and others simply calling their products wall beds.

Even though they’ve been around for more than a century, murphy beds aren’t common in today’s homes. You won’t find them in most furniture showrooms, and many people incorrectly assume that installation requires cutting into a wall. Although early versions were built into apartment walls and concealed with closet doors, today most murphy beds are placed in the room like a large piece of furniture. Besides greater installation flexibility, modern murphy beds also have improved lift mechanisms, so you don’t have to worry about being gobbled up into the wall like the comedians in old slapstick movies.

There are three basic requirements to consider before buying or building a murphy bed. First, you need at least 4 ft. of open wall space for a twin bed and more for a larger bed or if you intend to connect a bookcase. Second, you need 7 ft. of clearable space (with easy-to-move furniture) in front of the bed for it to open. Finally, you must have an egress window (a window large enough for a person to climb through) in any room that will be used for sleeping. Check with your local building inspections department for minimum egress requirements.

Murphy bed construction

Whether you choose to call them murphy beds or wall beds, they feature three key components: the lift mechanism, the bed frame and the cabinet. There are two main types of lift mechanisms: spring and piston. Both systems operate under a similar principle — they create force that helps lift the bed into the closed position (see “How a Murphy Bed Works,” p. 37).

The force is balanced so that the weight of the bed frame and mattress together is enough to hold the bed down on the floor. Some spring systems feature adjustable tension, but piston systems are typically not adjustable. Different piston strengths are matched to the style and size of bed you are building. The variable is the mattress weight. If the mattress that you are using with a nonadjustable piston or spring system is too light, the bed will rise slightly or float off the floor. In this case, you must add a small amount of weight under the mattress to keep it grounded.

The bed frame holds the mattress. Because the bed frame must fit into the cabinet, thickness is an issue. A typical installation does not contain a box spring, and the mattress cannot be more than 12 in. thick.
**Design options**

Murphy beds can be designed to complement any home’s décor, and you can install a mattress as large as queen size in either the vertical or horizontal position. The strength of the lift mechanism required depends on the configuration that you choose. — DC

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### Vertical configuration

- **Step 3:** Reattach the lift-mechanism hardware to the side rails and then attach the head, foot and side rails to the inner frame with 1-1/4-in. wood screws.
- **Step 4:** Attach 5-1/2-in. strips to the second panel.
- **Step 5:** Position the face panels facedown. Apply glue to the bed frame struts, and fasten the frame assembly to the face panels with 1-1/4-in. screws.
- **Step 6:** Install the 1/4-in. plywood mattress panels over the inner frame. Drive 1-in. screws to secure the elastic straps that will hold the mattress in place.
- **Step 7:** Reattach the lift-mechanism hardware to the cabinet sides before installing the bed. Fasten the pivot rod plates and upper ball-stud plates with wood screws, machine screws and T-nuts.

### Horizontal configuration

- **Step 8:** Fasten the aluminum strips to the bottom edge of the four bottom face panels and to the top and bottom edges of the top panel.

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![Vertical configuration](image1)

![Horizontal configuration](image2)
Spring systems often incorporate a metal bed frame. These systems are usually fastened to the floor, and the cabinet is a freestanding box built around the bed frame. Piston systems use a wood bed frame that is connected to the cabinet by pivots, and the cabinet is fastened to the wall.

Most murphy bed manufacturers do not require professional installers; in fact, they encourage DIY construction. Product options range from basic lift-mechanism kits, which cost $250 to $300 and require you to build the bed frame and cabinet from scratch, to complete ready-to-install beds that cost several thousand dollars.

I chose to use a piston-mechanism kit manufactured by Create-A-Bed Inc. of Louisville, Kentucky. The kit costs $279 and includes all necessary mechanical hardware, building plans for a bed and bookcase and a videotape that demonstrates the construction process and building techniques.

One of the benefits of this bed system is that you don’t need many tools to build it. You will need basic hand tools (a tape measure, a hammer, clamps, etc.), a table saw or circular saw equipped with a sharp plywood-cutting blade and a drill/driver. A miter saw is helpful for cutting pieces to length, but it’s not required.

**Materials**
The bed in the Create-A-Bed design is built from a combination of solid stock and veneer-core plywood or particleboard.
How a murphy bed works

A murphy bed closes with the assistance of a spring or piston mechanism. The bed I built uses a piston system. The piston is compressed when the bed is open (left). When the bed is closed the piston extends, exerting force to help lift the weight of the bed. — DC

Direction of piston force

Upper ball-stud plate
Compressed piston
Lower ball-stud plate
Pivot

Anchoring a murphy bed

It is critical that you properly anchor the bed cabinet to the wall. Here are the three most common wall materials that you will encounter and the correct anchor to use in each case.

Stud: 3-in. coarse-thread screws
Masonry: 3/16 x 2-in. masonry anchors
Metal stud: 3/16 x 4-in. toggles

material, such as melamine. Different building plans are provided depending on the combination of material, bed size and orientation that you choose.

I built a full-size vertical bed with one 24-in.-wide bookcase using cherry plywood and solid cherry. It required five sheets of 3/4-in. cherry plywood, one sheet of 1/4-in. cherry plywood, two sheets of 1/4-in. birch plywood, about 24 lineal ft. of 1x4 solid cherry and 14 pieces of 1x2 x 8-ft. solid poplar.

Create-A-Bed’s cabinet is designed to look like a closet with bifold doors, but I wanted to create a more modern style. With the approval of the manufacturer’s technical advisor, I modified the front panel and leg to suit my taste (see “Our Design Modifications,” p. 38). The change had little effect on the material requirements.

Safety note: Murphy bed lift systems create strong forces on the structure. Be sure to check with the manufacturer before making any changes to the design.

Building the bed

The construction process is not difficult (see how-to photos beginning on p. 34). The biggest obstacle for many people will be finding enough space to work. You need a large, flat work surface — a full sheet of plywood is just the right size. The finished bed is large, so if you have a narrow hallway or stairway to contend with, consider machining and finishing the parts in your shop or garage and assembling the bed in its designated room.

Most of my building time was spent cutting and finishing the large plywood pieces before assembly. I used a table saw to cut the plywood, but you could also use a circular saw with a straight-edge guide.

Tip: When you cut plywood with a table saw, keep the good side of the plywood faceup; when you use a circular saw, keep the good side of the plywood facedown.

Cover all of the plywood edges that will be left exposed with heat-activated edge banding, which is sold in rolls (see SOURCES). Cut each strip of edge banding a couple of inches longer than the plywood edge. Press the edge banding along the plywood edge with a hot household iron. (Protect the face of the iron by covering it with aluminum foil.) While the edge banding is still hot, press it down with a roller or scrap of wood. Allow it to cool for a few minutes and then trim off the excess with a utility knife, chisel or special edge-banding trimmer, also available where edge banding is sold.

Fasten the bed hardware and then remove it before sanding and applying the finish. The manufacturer provides detailed diagrams that show where each piece of hardware is located.

After sanding, I chose to apply three coats of wipe-on polyurethane finish to
Our design modifications

The murphy bed shown in the photos required several changes and additions to the Create-A-Bed plan provided with the kit:

Inner Bed Frame
Reposition and add frame struts to provide support behind the horizontal face-panel seams (see drawing below).

Face-Panel Hinge Openings
The leg hinges fit through notches cut through the second face panel from the top. Cut three 2-1/4-in.-wide x 3-in.-long notches through the top edge of the panel. Locate the outside notches 5-7/8 in. from each side, and center the middle notch along the top edge.

Aluminum Accents
Aluminum strips are attached between the face panels as a decorative accent. You can purchase aluminum at a metalworking or metal supply shop. When we bought aluminum, the supplier cut it to length, and we drilled countersinks and pilot holes through each strip for No. 6 screws.

Tip: Use a carbon steel drill bit to bore through aluminum. To cut aluminum, use carbide-tip saw blades designated for nonferrous metals (metals that don’t contain iron).

Support Leg
Two small legs are replaced with one long leg. Use 7-in.-wide stock, or glue together pieces of 3/4-in. solid stock to create the 7 x 45-in. leg.

Cutting List Changes

**Bed face panels, veneer-core plywood**
- Top face panel . . . 3/4 x 11-13/16 x 56 in. (1)
- Face panels . . . . 3/4 x 15-7/8 x 56 in. (4)
- Aluminum strips . . . 3/16 x 3/4 x 56 in. (5)
- Aluminum strips . . . 3/16 x 3/4 x 5-1/2 in. (2)
- Leg, solid wood . . . 3/4 x 7 x 45 in. (1)

**Additional Materials**
- 3/4 x 1-1/2-in. x 8-ft. solid frame stock (2)
- 25 lineal ft. of 3/16 x 3/4-in. aluminum 30-in. cabinet pull (see SOURCES)

Connecting the pistons to the ball-stud plates is the final step before securing the cabinet to the wall. The piston is labeled to show the correct installation orientation. Close the bed a few inches beyond vertical to snap the piston onto the ball-stud plates. If the piston does not fit, double-check the ball-stud and pivot-hardware locations and adjust them if necessary.

The cabinet must be properly fastened to the wall for safe operation. When a murphy bed is in the open position, the lift mechanism is storing the energy that will be used to help lift the bed. If the cabinet is not properly secured, the lift mechanism could pull the cabinet away from the wall and down on top of the bed.

Use the appropriate type and number of fasteners for the size of bed you are installing and for the room’s wall framing (see “Anchoring a Murphy Bed,” p. 37). Drive one fastener into each stud located behind the bed, or drive masonry anchors at 16-in. intervals in masonry walls. Use three anchors for a twin or full-size bed and four for a queen-size bed.

Once the bed is secured to the wall, it is ready for the mattress. The bed frame will be a little difficult to pull down without the mattress. Get a helper to assist you in holding the bed frame down and placing the mattress. If the bed floats above the floor, more weight is needed under the mattress. A simple solution is to fasten a 2 x 4-ft. scrap of 3/4-in. medium-density fiberboard to the plywood panels under the mattress with 1-1/4-in. screws. Once the bed frame stays down on the floor, the bed is ready for use.

For online information, go to www.HandymanClub.com and click on SOURCES ONLINE.

Murphy bed mechanism:
Rockler Woodworking and Hardware, 1-800-279-4441
http://www.rockler.com/vertical-mount-murphy-bed-hardware-hardware