

## Chapter 18. Interior Doors

### 18.1 SWINGING DOORS

### 18.2 SLIDING DOORS

### 18.3 BIFOLD DOORS

#### Tools needed by volunteers:

Hammer  
Nail apron  
Tape measure  
Square  
Pencil

#### Tools and equipment needed:

Extension cord  
Chop saw  
Finish nailer  
Drill driver  
1/8" Drill bit  
Sheetrock rasp  
6' Level  
Saw horses  
Finish door kit

#### Materials needed:

1/4" Collated finish nails  
2 1/2" Collated finish nails  
1/4" Trim nails  
2 1/2" Trim nails  
1 1/2" Finish nails  
2" Flathead screws  
2 1/2" Wafer-head screws  
3" Phillips brass-colored construction screws  
Painter's tape  
Tapered shims  
1/8" & 1/4" 3"x5" Flat wood shims  
Cardboard shims  
Floor trim  
Door trim  
Doors  
Door guides  
Door hardware  
1"x3/8" Door edge felt pads  
3/4"x1/8" Door edge clear pads  
Wood putty  
Padding (e.g., cardboard)

#### Personal Protection Equipment:

Safety glasses (required)

#### Reference Materials:

House Plan

**Safety First! Review the Safety Checklist before performing tasks in this chapter.**

## 18.1. SWINGING DOORS

### 18.1.1. Door and Rough Opening Preparation

1. Before removing packaging and shipping parts, check door and frame for damage. If damaged, notify Construction Supervisor or Site Leader.
2. Verify correct door and size. Verify proper door swing according to the House Plan.

**NOTE:** Before starting the following steps, using a framing or carpenter's square, check the bottom of the hinge and strike side jack studs for excessive twist. If either is clearly out of square and is likely to cause difficulty in installing the door, replace the King/Jack stud pair with straight pieces.

3. The following Steps 4 and 5 are designed to reduce the difference between the width of the door frame and the width of the rough opening at the hinge locations to  $\frac{3}{8}$ " or less. Doing so helps to
  - Center the door in the rough opening;
  - Avoid trying to install spacers and/or thick shims once the door is in place; and,
  - Equalize the overlap of the interior trim.
4. Adjust hinge side Jack stud.
  - a. Mark the location of the hinges on the hinge side Jack stud.
  - b. In all cases in this section, install 3"x5" flat shims (using 1½" finish nails or 1¼" collated finish nails) with their 5" dimension vertical.
  - c. Measure the width of the door frame at the head jamb and the width of the rough opening at the top and bottom hinge locations.
    - i. If the difference between the door frame and the rough opening at either location is LESS THAN OR EQUAL to  $\frac{5}{8}$ " add a  $\frac{1}{8}$ " 3"x5" flat shim to all three hinge locations. Go to Step d below.
    - ii. If the difference between the door frame and the rough opening at either location is GREATER than  $\frac{5}{8}$ ", attach a combination of  $\frac{1}{8}$ " and  $\frac{1}{4}$ " 3"x5" flat shims to the hinge side Jack stud at the top and bottom hinge locations until the difference is less than  $\frac{5}{8}$ " at both locations. At a minimum, each Jack stud hinge location should have a  $\frac{1}{8}$ " flat shim.
  - d. Using a 6' level, check if the Jack stud is plumb. If NOT PLUMB, shim the top or bottom hinge areas until it is plumb.

- e. Keeping the 6' level against the top and bottom spacers, attach 1/8" and 1/4" 3"x5" **flat shims** and/or **tapered** shims at the middle hinge area until flush with the level.
5. Adjust strike side Jack stud.
    - a. Add a combination of 1/8" and 1/4" 3"x5" **flat shims** to the strike side Jack stud at the top and bottom hinge locations until the difference in the opening width is less than 3/8" at both locations.
    - b. Place the 6' level against the **flat shims** and install a combination of 1/8" and 1/4" 3"x5" **flat shims** and/or **tapered** shims at the middle hinge area until flush with the level.

### 18.1.2. Position and Temporarily Secure Door in Opening

1. Set door into the rough opening, tight to the hinge side Jack stud. If in a carpeted area (see the House Plan), insert a piece of 3/8" scrap floor trim under each side jamb; otherwise, set the jambs directly on the **hard** flooring.
2. Center the hinge side jamb between both wall surfaces.
3. Temporarily secure the door in the rough opening by installing **tapered** shims at the very top of the strike jamb (even with the head jamb). Wedge these shims in TIGHTLY (do NOT nail so they can be adjusted later).

**NOTE:** This process is designed to apply horizontal pressure to hold the top of the hinge jamb tight against the hinge side Jack stud. The top of the door may rub on the strike jamb at this stage but this is normal and will be corrected later.

4. Check the reveal between the top of the door and the head jamb at the left and right corners of the door. If necessary, shim under the strike jamb or hinge jamb until these reveals are equal.
5. Recheck that the hinge side is still plumb (set level on hinges or hinge plates).
6. Verify that the bottom of the hinge jamb is still centered between wall surfaces, add appropriate **flat and/or tapered** shims at the bottom of the jamb, and **temporarily** secure it with one 2 1/2" collated finish nail just above the shims. Do the same for the strike side jamb. This will help to hold the bottom of the side jambs in place for the remainder of the installation but can still be easily moved if necessary.
7. Close the door to check contact with the doorstop. If the gap between the door and door stop is >1/4" see the Construction Supervisor. Otherwise, adjust the top and/or bottom of the strike side jamb to get good contact before nailing the hinge jamb.

### 18.1.3. Permanently Secure Door

1. With the door still held tight to the hinge side Jack stud, secure the hinge side jamb with one 2½” collated finish nail at the top, middle, and bottom hinges.
2. Check that the hinge side of the door is still plumb. Adjust shims as needed.
3. At the top door hinge, replace the screw closest to the doorstop with a #8 3” construction screw (brass-colored) to secure the top hinge to the Jack stud and ensure the door does not sag over time.

**NOTE:** Tightness of the 3” brass screw in the top hinge can affect the reveals at either end of the head jamb. Tighten or loosen the screw and/or adjust shims as needed. Or, adjust the strike side jamb up or down as needed.

4. Check complete door operation and verify that contact between the door and the doorstop is consistent (no gaps or light visible) along the head jamb and the strike jamb. It may be necessary to adjust one or both side jambs from the centered position (a maximum of ⅛” past or shy of the wall surface). Confirm that latch and strike are aligned.
5. Check the reveal on the top and the bottom of the hinge jamb. If necessary, adjust the shims against the head jamb until the top hinge jamb reveal matches the reveal just below the top hinge. If necessary, adjust and shim the bottom of the hinge jamb to match the reveal at the top. Shim as needed and secure with a 2½” collated finish nail on one side of the doorstop.

**NOTE:** Adjusting the reveal at the top of the hinge jamb will affect the reveal at the top of the strike jamb. Check to be sure the reveal at the top of the strike jamb is ⅛” or greater. If not, it may be necessary to “split the difference.”

6. Check the reveal at the top and the bottom of the strike jamb. If necessary, adjust and shim at the bottom of the strike jamb until there is a consistent reveal at both locations.
7. While keeping consistent reveals top to bottom, install all remaining shims (nailing with 2½” collated finish nails on the same side of the doorstop) in the following strike side locations: across from the top and bottom hinges and above the door latch location.
8. Install shims in the center of the head jamb, adjusting for a consistent reveal across the jamb. Secure the jamb with a 2½” collated finish nail on one side of the doorstop.

9. Recheck the complete door operation, making sure that contact with the doorstop remains consistent (no gaps or light visible) along the head jamb and the strike jamb. Adjust as needed by:
  - lightly tapping on a ¼” flat shim placed on the edge of the jambs until proper door-to-doorstop contact (try to keep jambs ⅛” or less past or short of the plaster); or,
  - tapping the doorstop with a ¼” flat shim until proper door-doorstop contact (limit moving the doorstop to ⅛”) and re-nailing as needed; or,
  - removing the doorstop, closing the door, and re-installing the doorstop until proper door-to-doorstop contact (a last resort option).
10. To ensure consistent reveals along the side jambs, install additional shims on the hinge side, about halfway between the hinges and similarly on the strike side. This should result in six sets of shims on each side jamb. Secure the jambs with 2½” collated finish nails on one side of the doorstop.
11. Finish securing the door on all three jambs at each shim location by putting a 2½” collated finish nail into the jamb along the opposite side of the doorstop.
12. Conduct a final verification of the complete door operation ensuring there is uniform contact with the doorstop and all reveals are consistent. Adjust as needed.
13. Set and putty all nail holes.

#### 18.1.4. Install Door Trim

1. Pre-cut door trim is provided for interior doors. Uncut trim is provided for exterior doors and must be field-cut to fit. Refer to the House Plan to see if the door is over carpeting or over a finished floor.
2. Check wall thickness vs. doorjamb thickness. If the wall is thicker, trim or scrape plaster with a utility knife or rasp so door trim will fit tight to both the door jamb and the plaster.
3. For exterior doors, miter-cut top pieces to extend about 3/16” past each corner of the door jamb. For all doors, cut side pieces to fit.
4. If the door is over a carpeted area, keep the trim off the floor with a piece of ⅜” floor trim. If the door is over finished flooring, cut the trim to be tight to the floor.
5. Door trim **MUST** be tight to the jamb. Before nailing, hold the trim piece in place and check the inside edge. If it is tight the **ENTIRE** length, push the outside edge tight to the wall. If the inside edge stays tight to the jamb, proceed with nailing. If the trim rocks back and forth and the inside edge does not stay tight to the jamb,

chip away or hammer the plaster until the trim is TIGHT against the jamb and the plaster.

6. Door trim is usually delivered in separate pieces. A primary objective during installation is to achieve a uniform reveal between the door jamb and the edge of each trim piece - typically, about 3/16".

**NOTE:** If trim is delivered preassembled (glued and screwed at the corners), be sure that jamb-to-trim reveals are consistent on all three sides before nailing.

7. Cut two pieces of scrap left- and right-side door trim, about 6-12" in length. Using painter's tape, tape each piece along the respective side jambs with a 3/16" reveal with the jamb and with the inside miter joint corner about 3/16" above the corner of the jambs.
8. Set the top trim piece in place above the top jamb and with the ends tight to the side pieces. If necessary, adjust the two side pieces left or right, up or down until all reveals with the door jambs are equal and the miter corners are tight
9. Using a 2½" collated finish nail, attach one end of the top trim to the header, placing the nail about 2" from the end and one-third of the way down from the top edge. Repeat at the other end. Angle the nails slightly up to ensure hitting the header.
10. Remove the two scrap pieces and install the side trim butted to the mitered top trim, maintaining a tight miter joint and consistent reveal from top to bottom.
  - a. If the side trim is too long and the miter joint is good, turn the side trim upside down and mark where it meets the top edge of the top trim; cut the side trim to that length.
  - b. Test for proper length and for a tight miter joint. Trim either if needed.
  - c. Apply glue to the mitered joint and attach side trim using five 2½" collated finish nails evenly spaced top to bottom (be sure the top and bottom nails are at least 2" away from the end and all are about one-third of the way from the outside edge of the trim). Angle the nails slightly outward to ensure hitting the Jack stud.
11. Finish securing the top trim by installing a 2½" collated finish nail at the center, about one-third of the way down from the top edge.

12. Recheck that the entire length of the inside edge of each trim piece is tight to the jamb. If not, at any loose spots hold the inside edge tight to the jamb, angle a 2½” collated finish nail from the center of the trim piece, away from the jamb into the Jack stud.

**NOTE:** Do not attempt to drive collated nails into the edge of the jamb (this is likely to split the trim). If necessary, pre-drill pilot holes through the trim piece only with a 2½” trim nail and hand nail with 1¼” trim nails to ensure being tight to the jamb.

13. Set nails as needed and fill with putty.
14. For exterior doors, follow the same procedure as for interior door trim.

### **18.1.5. Install Door Hardware**

1. Install lockset, verify door lockset operation and adjust as needed. Lockset should operate easily and door should rest against entire doorstop and latch snugly with no play. If the door does not latch snugly, bend the tab inside the strike plate with a flat-blade screwdriver until it does. (In the worst case, the strike plate may have to be moved toward the door stop.)
2. For interior doors that will swing against a wall at 90°, install a door bumper where the door handle will hit the wall. To locate this spot, rub the center of the doorknob with a red crayon, press the doorknob against the wall, and turn the knob to mark the wall. Center the door bumper on this mark and install with the screw and anchor provided with the bumper (if not hitting a stud or blocking). If hitting a stud or blocking, simply anchor with the screw provided.
3. For both exterior doors and any interior doors that will not hit a wall at 90°, install hinge stop bumper - one in the middle hinge of interior doors and one in the top and bottom hinges of exterior doors

## **18.2. SLIDING DOORS**

### **18.2.1. Door and Opening Preparation**

1. Before removing packaging and shipping parts, check doors and frame for damage. If damaged, notify the Site Leader or Construction Supervisor.
2. Select a pair of doors that match in visual appearance (grain pattern, grain direction, color, etc.). Check to see if the doors have been predrilled for door pulls. If they have, pairs will have holes approximately 36” from the bottom of the door and on opposite edges.
3. Put the two doors together (surface to surface) and check for crown. Install with the concave faces together and with the best side facing toward the room.

4. Before installing the door track, confirm that the door height is 80" and that the rough opening height is ~83" (82" Jack height + 1½" bottom plate - ½" sheetrock thickness).
5. Check that the header is level. If not level by more than ⅛", consult with the Site Leader or Construction Supervisor.
6. Use a 6' level to check the Jack stud and the flush closet wall for plumb or gaps. If either is out of plumb by more than ⅛" or any gap exceeds ½", consult with the Site Leader or Construction Supervisor.
7. Install the track 2" back from the room side wall surface with the track roller guides facing the rear of the closet. Attach with only three 2½" wafer-head screws (one at each end and one in the middle), in case the track has to be lowered later to achieve the proper gap at the floor.

### 18.2.2. Install Door Hardware

1. Do not lean the doors against the wall to install hangers or door pulls. Instead, set up saw horses with padding (e.g., cardboard) and lay the doors on them for installation of door hardware.
2. Install the door pulls in the pre-drilled holes. If holes are not pre-drilled, install the door pulls 36" above the bottom of the door and 1½" from the edge. Drill the hole with a ¾" Forstner bit to the depth of the bit. Protect the pull with a piece of wood (e.g., a flat or tapered wood shim) and hammer it tightly into the hole.

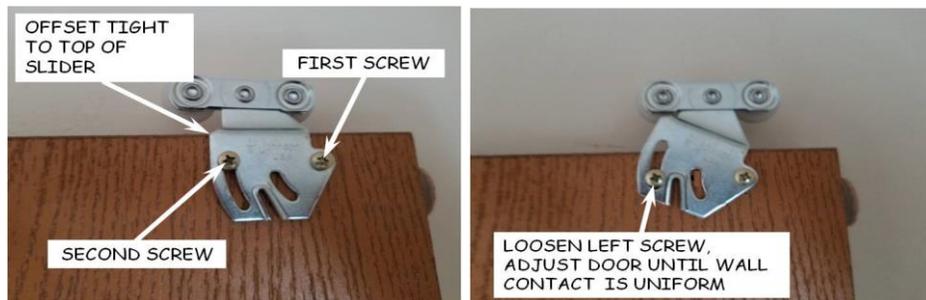
**NOTE:** When deciding on which edge of the doors to install the door pulls, remember that the doors will be positioned so the overlapping edge of the front door is not visible when entering the room. Install the pulls at the door edges closest to the walls.

3. Turn the doors over. Attach the hangers on the top of each door so there is a 2" gap between the edge of the hanger and the vertical edge of the doors. The hangers with the deep offset are for the rear door; those with the shallow offset are for the front door (see Figure 18-1). Using two screws supplied with the sliding door kit, attach each hanger with one screw in the swivel hole and one at the top of the long curve (a third screw will be installed in the small, center slot later). This will result in the door hanging at its upper limit (see Figure 18-2).

**WARNING:** Do not use an impact driver when installing or loosening hanger screws in this or any of the following steps.



**Figure 18-1. Sliding Door Hangers.**



**Figure 18-2. Closet Door Hanger Screw Locations.**

### 18.2.3. Hang the Door

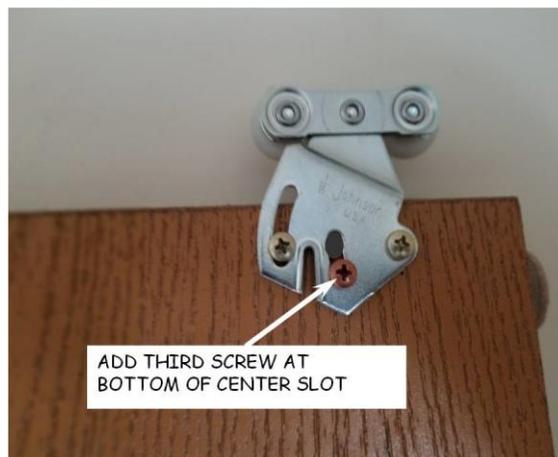
1. Hang the doors on the track. Starting with the rear door, tilt the top of the door into the closet and engage the rollers in the roller guide at the back of the track. Repeat with the front door and engage the rollers in the guide inside the front of the track.
2. Close the doors. At the middle of each door, measure the gap from the bottom of the doors to the floor.
  - a. For doors over future carpeting, the gap from the bottom of the door to the subfloor should be 1"-1<sup>3</sup>/<sub>8</sub>".
  - b. For doors over **hard** flooring, the gap from the bottom of the door to the installed flooring should be <sup>3</sup>/<sub>8</sub>"-<sup>5</sup>/<sub>8</sub>". **If the hard flooring is not yet installed**, add <sup>1</sup>/<sub>4</sub>" to the specified gap range to allow for the flooring thickness.
3. Loosen the screws in the long slots and adjust the doors up and down as necessary until the gap below the doors falls within specification and the door edges have uniform contact with the walls from top to bottom. If the floor trim has already been installed, go ahead and install the bumper pads as described in Section 18.2.4.6 below. Adjust the doors to provide bumper contact to the wall/trim.

**NOTE:** Before adjusting the doors, verify that the front and rear doors are not reversed but in their intended positions (i.e., door pulls are close to the walls not the door centers).

4. If the doors have been lowered to their lowest level and the gap is greater than the upper limit, remove the doors and the track and install a shim of appropriate thickness between the track and the header with 1¼” or 2½” collated finish nails.

**NOTE:** If cutting a track shim for doors over installed vinyl floors, target the shim thickness to provide a gap of ⅜” versus the allowable gap range of ⅜”-5⁄8”. If the finished floor has not yet been installed, target the shim thickness to provide a gap of 5⁄8”.

5. If the doors have been raised to their highest level and the gap is less than the lower limit, it will be necessary to cut off the bottom of the doors. See the Site Leader or Construction Supervisor for direction.
6. Verify that the bottom gap is still within specification and the contact between the door side edges and the wall is uniform top-to-bottom. If so, add the third screw to each hanger, in the bottom of the small, curved slot, and hand tighten all the screws (see Figure 18-3).



**Figure 18-3. Closet Door Hanger with 3<sup>rd</sup> Screw Installed.**

#### **18.2.4. Finish Doorway Installation**

1. Finish screwing the track to the header using 2½” wafer-head screws. One screw per every other hole is sufficient.
2. Cut a ¾”x1¼” pine strip. With the ¾” face against the track, install the strip along the front of track so trim can be attached. Nail this to the header with 2½” collated finish nails.
3. For doors installed over carpeted areas:
  - a. Measure the door opening and mark a pencil line on the floor at the midpoint of the opening.

- b. Slide two layers of  $\frac{1}{4}$ " flat shims under the door edges at this center mark. Verify that the gap between the bottom of the door to the top of the shims at the middle of the door opening is between  $\frac{3}{4}$ "- $\frac{7}{8}$ ". If adjustment is needed, use an appropriate mix of  $\frac{1}{4}$ " and  $\frac{1}{8}$ " flat shims.
- c. Create several sets of 5"x 6"-wide flat shims by taping together pairs of 3"x 5" flat shims with painter's tape. Create pairs of both  $\frac{1}{8}$ " or  $\frac{1}{4}$ " shims as dictated in Step b above. These shims will be used to support the door guide.
- d. Move the front door panel tight to the Jack stud end of the opening (non-flush side).
- e. Center the paired shims on the midpoint mark made in Step a. above. Orient the 5" dimension parallel to the doors.
- f. Locate the appropriate door guide from the Finish Door Kit. Do **NOT** use the guides supplied with the doors for carpeted areas.
- g. Adjust the door guide sliders to fit the doors. Slide the door guide under the door edges and roughly center it on the paired 3"x5" flat shims. Keep the guide centered on the shims and move the shims until the reveal between the door and the corner of the wall is uniform from top to bottom (see Figure 18-4).



**Figure 18-4. Shim Adjustment for Uniform Door Reveal.**



4. Door pulls should be installed at the same height as interior doorknobs and in the middle of the two inner panel fronts.
5. On 4-panel doors (two bi-fold doors opening in opposite directions), align the doors by moving the top or bottom pivot point.
6. Measure the width of the door opening, add 3" to that measurement, and cut a piece of floor trim that long. Place the bottom edge of the floor trim flush with the top edge of the door opening and centered so that 1½" of the floor trim extends horizontally beyond each door jamb. Using 2½" collated finish nails, attach the floor trim to the wall.
7. Set nails and putty.