

## 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:

Finish Door Kit  
1 1/4" Collated finish nails  
2 1/2" Collated finish nails  
1 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"x3"x5" Shims  
1/4"x3"x5" 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.
2. Verify correct door type, size, and swing according to the House Plan. Set the door next to its intended location.

**NOTE:** Before starting the following steps, using a framing square, check the bottom of the hinge and strike side jack studs for excessive twist. If either is clearly out of square it will likely require special shimming considerations. Consult with the Site Leader or Construction Supervisor.

3. If there is any damage or a door is missing or is the wrong size, type or swing, notify Construction Supervisor or Site Leader.
4. The following Steps 5 and 6 are designed to reduce the difference between the width of the door frame and the width of the rough opening to roughly center the door in the rough opening.
5. Adjust hinge side Jack stud.
  - a. Measuring from the bottom of the hinge side jamb, mark the location of the hinges on the hinge side and strike side Jack studs.
  - b. In all cases in this section, install  $\frac{1}{8}$ "x3"x5" or  $\frac{1}{4}$ "x3"x5" shims (using  $1\frac{1}{2}$ " finish nails or  $1\frac{1}{4}$ " collated finish nails) with their **5" dimension vertical** and flush with the hinge pin side of the framing to ensure that the top hinge screw will go through the shim. Use two  $1\frac{1}{4}$ " finish nails or  $1\frac{1}{4}$ " collated finish nails to secure shims.
  - c. Set a 6' level on the jamb, hinges or hinge pins and check if the Jack stud is plumb. If NOT PLUMB, shim the top or bottom hinge areas until it is plumb.
  - d. Measure the width (between any installed shims) 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 GREATER than  $\frac{5}{8}$ ", install a combination of 3"x5" and cardboard shims to the hinge side Jack stud at the top and bottom hinge locations until the difference is less than  $\frac{5}{8}$ " but greater than or equal to  $\frac{3}{8}$ " at BOTH locations.
    - ii. The top and bottom hinge locations on the Jack stud should have a minimum of a  $\frac{1}{8}$ " shim,

6. Adjust strike side Jack stud.
  - a. Add a combination of 3"x5" and cardboard shims to the strike side Jack stud at the top and bottom hinge locations until the differences are less than  $\frac{3}{8}$ " but greater than or equal to  $\frac{1}{4}$ " at BOTH locations.
7. Place a 6' level against the top and bottom shims and install a combination of 3"x5" and cardboard shims at the middle hinge areas on BOTH hinge and strike side jambs until flush with the level (or less than a  $\frac{1}{8}$ " gap).

### 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  $\frac{3}{8}$ " shim (one  $\frac{1}{4}$ " and one  $\frac{1}{8}$ " shim) under each side jamb; otherwise, set the jambs directly on the hard flooring.
2. Temporarily secure the door in the rough opening by installing tapered shims (as "pressure" 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 removed or adjusted later).

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

3. 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.
4. Recheck that the hinge side is still plumb (set level on hinges or hinge plates).
5. Center the hinge side jamb between both wall surfaces.
6. Add appropriate 3"x5" and/or tapered shims at the bottom of the jamb, and temporarily secure it with one 2½" collated finish nail just above the shims on the non-hinge side of the door stop. Verify that the bottom of the hinge jamb is still centered between wall surfaces. Do the same for the strike side jamb.

**NOTE:** 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  $>\frac{1}{4}$ " see the Construction Supervisor. Otherwise, adjust the top and/or bottom of the strike side jamb (may need to split the difference) to get consistent contact.

### 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 to the non-hinge side of door stop 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/door frame 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 away from their position centered on the wall surface (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 of the bottom hinge. Shim as needed and secure with a 2½” collated finish nail.

**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 still “good”. 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.

**NOTE:** Strike side reveals have priority over hinge side reveals.

7. While keeping consistent reveals top to bottom, install all remaining shims (nailing with 2½” collated finish nails on the non-hinge side of the doorstop) in the following strike side locations: across from the top and bottom hinges and at 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 the non-hinge 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"x3"x5" shim placed on the edge of the jambs until proper door-to-doorstop contact (jambs a maximum of ⅛" past or short of the plaster) and re-nail as needed; or,
  - move the door stop by tapping the doorstop with a ¼"x3"x5" shim until proper door-doorstop contact (maximum movement of ⅛") and re-nail 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, halfway between the hinges and similarly on the strike side. This should result in six sets of shims on each side jamb. Secure the shims with 2½" collated finish nails on the non-hinge side of the doorstop.
11. Finish securing the door on all three jambs at each shim location by putting a corresponding 2½" collated finish nail into the jamb on the opposite side of the doorstop (or the hinge side).
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 or hammer so door trim will NOT rock on the end of the sheetrock and 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 of the jamb, 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, continue to trim or scrape plaster with a utility knife, rasp or hammer) 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 exterior doors and any interior doors that will not hit a wall at 90°, install hinge stop bumpers - one in the middle hinge of interior doors and one each in the top and bottom hinges of exterior doors. Refer to Figure 18-1 for correct orientation of the bumpers.



Figure 18-1. Correct Bumper Orientation.

Incorrect Bumper Orientation.

## 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 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. Open the door packaging including the track, the door hangers, and screws. It will contain either four identical hangers or two pairs of hangers with different offsets.

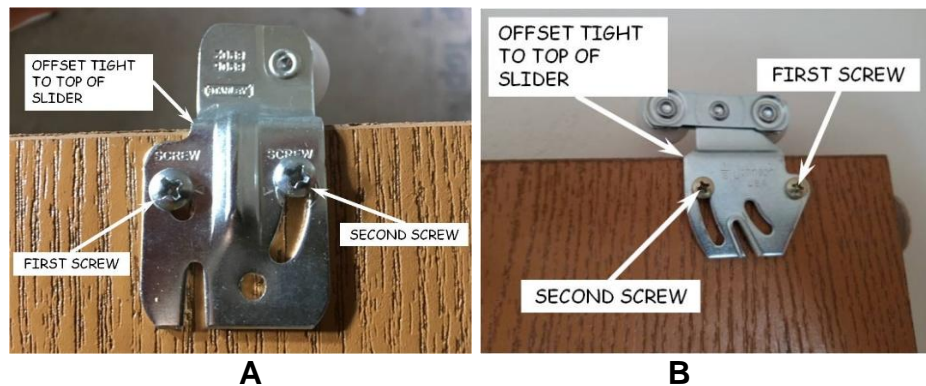


4. Attach the hangers at the top of the back face of each door so there is a 2” gap between the edge of the hanger and the vertical edge of the doors. When using the four identical hangers, there is no difference between the front and rear doors. However, when using the two different pairs of hangers, the hangers with the deep offset are for the rear door; those with the shallow offset are for the front door (see Figure 18-2).
  - a. When using the four identical hangers, install one screw in the top of the short arc opening and the second in the top of the long arc opening (a third screw will be installed later). This will result in the door hanging at its upper limit (see Figure 18-3A).
  - b. When using the pairs of different hangers, attach each hanger with one short screw in the swivel hole and one at the top of the long arc opening (a third screw will be installed later). This will result in the door hanging at its upper limit (see Figure 18-3B).

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



**Figure 18-2. Sliding Door Hangers.**



**Figure 18-3. Closet Door Hanger Screw Locations.**

### 18.2.3. Hang the Door

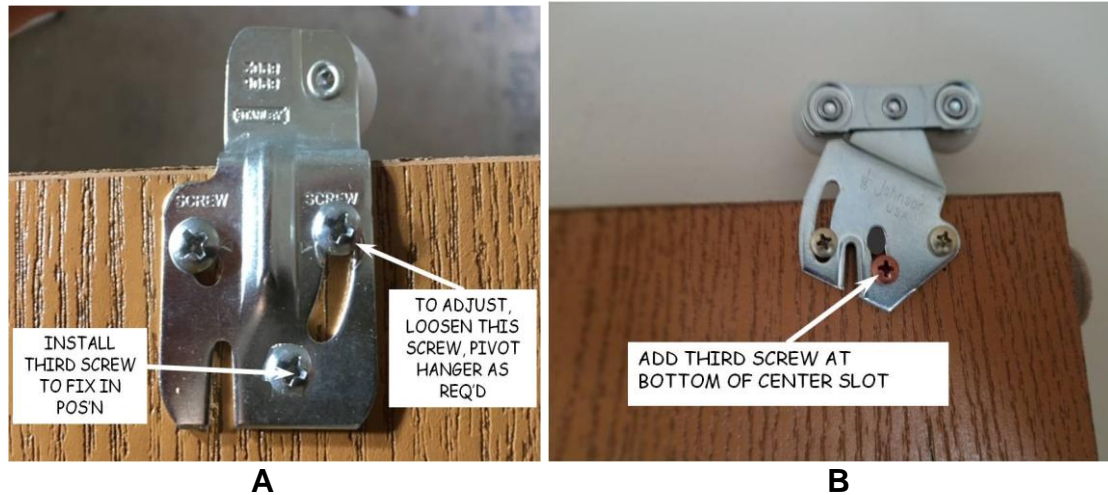
1. Hang the doors on the track. Starting with the rear door, tilt the top of the door into the closet and engage the rollers in the roller guide at the back of the track. Repeat with the front door and engage the rollers in the guide inside the front of the track.
2. Close the doors. At the middle of the door opening, 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"-1½".
  - b. For doors over hard flooring, the gap from the bottom of the door to the installed flooring should be ⅜"-⅝". **If the hard flooring is not yet installed**, add ¼" to the specified gap range to allow for the flooring thickness. To confirm, set a door guide on the finished floor (or on a ¼"x3"x5" shim if unfinished) and slide it under the door edge. The top of the guide should be approximately ⅛" above the bottom of the door. If not, adjust door height as required.
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, 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"-⅝". If the finished floor has not yet been installed, target the shim thickness to provide a gap of ⅝".

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 round hole (see Figure 18-4A) or in the bottom of the small, curved slot (see Figure 18-4B), depending upon the type of hanger, and hand tighten all the screws.



**Figure 18-4. 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 ¼”x3”x5” shims under the door edges at this center mark. Place the door guide on the shims and slide it under the edges of the overlapped doors. The top of the guide should be approximately ⅛” above the bottom of the door. If not, adjust as needed, using an appropriate mix of ¼” and ⅛”x3”x5” shims.
  - c. Create several sets of 5”x 6”-wide shims by taping together pairs of 3”x 5” shims with painter’s tape. Create pairs of both ⅛” or ¼”x3”x5” shims as dictated in Step b above. These sets of 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" 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 18-5).



**Figure 18-5. Shim Adjustment for Uniform Door Reveal.**

- h. Nail the paired 3"x5" shims to the floor with a 1¼" collated finish nails at each corner of each 3"x5" piece.
  - i. Leave the door guide and screws provided on the window sill for later installation.
4. For doors installed over hard flooring:
- a. Verify that the gap between the bottom of the door and the hard flooring is ⅜"-5/8" and that when closed, both doors have uniform contact with the wall, (or if the floor trim has been installed, that the bumpers are contacting the wall and floor trim).
  - b. Locate the door guide supplied with the doors. Do **NOT** use a door guide from the finish door kit for finished floors.

- c. Move both door panels tight to the Jack stud. Adjust the sliding door guide to fit the door thickness and slide the guide under the opposite door edges. Align the left side of the guide flush with the door edges. Move the guide and doors front-to-rear until the reveal between the surface of the front door panel and the wall corner is uniform from top to bottom (see Figure 18-5).
  - d. Drill two  $\frac{1}{8}$ " diameter pilot holes through the door guide mounting holes into the flooring and fasten the guide to the floor with two of the screws provided with the door hardware.
5. Measure the width of the door opening at the track and cut a piece of floor trim to that length. Using  $1\frac{1}{4}$ " collated finish nails, attach the floor trim to the pine strip, with the square edge tight to the plaster, to hide the track. Keep nails 3" from the ends to prevent splitting. Set nail heads and putty the holes.

**WARNING:** Do NOT use  $2\frac{1}{2}$ " collated nails because they will penetrate into the track and interfere with door movement.

6. Install bumper pads (located in the Finish Door Kit). Attach  $1" \times \frac{3}{8}"$  felt pads at the top of the vertical edges and  $\frac{3}{4}" \times \frac{1}{8}"$  clear pads at the of the bottom vertical edges of both doors.

### **18.3. BIFOLD DOORS**

1. Install the track  $1\frac{3}{4}$ " back from the outer edge of the doorjamb. Fasten using 2" flathead screws.
2. Location of the pivot hole determines the direction the door will open.
3. Bottom pivot point locations must be plumb with top pivot points. The bottom pivot bracket may need to be shimmed up  $\frac{1}{2}$ " to allow for carpet. Attached the bracket to the deck and doorjamb.
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  $1\frac{1}{2}$ " of the floor trim extends horizontally beyond each door jamb. Using  $2\frac{1}{2}$ " collated finish nails, attach the floor trim to the wall.
7. Set nails and putty.

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