

## Watch the Online Instructional Video

The online video will reduce your learning time dramatically! Stream to your smart phone or tablet to use in your shop as a visual reference. Find the video in the Instructional Videos section of the Support menu at [leighjigs.com](http://leighjigs.com).



# D4R Pro - CHAPTER 10

## Variably Spaced Half-Blind Dovetails

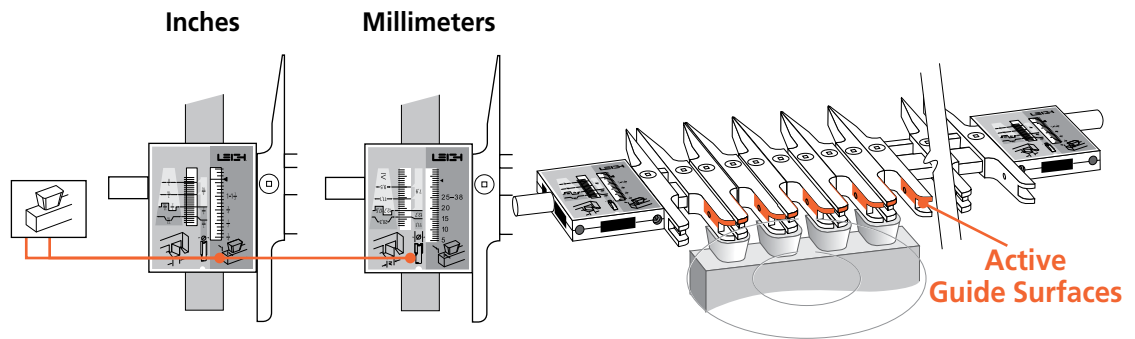
**IMPORTANT!** The most commonly misunderstood aspect of routing half-blind dovetails is how the dovetail bit's depth of cut is used to adjust the joint fit, and how the angle of the bit affects that depth of cut. Review this chapter for a clear understanding of this concept.

**Note:** The Leigh e7-Bush or any  $7/16"$  [11,1mm] guidebush with a min. barrel length of  $1/4"$  [6,35mm] (see page 70), and any one of the bits listed on the next page may be used for half-blind dovetails. See Appendix II, Half-Blind Bit Selection, Page 75, for a full description on how to select an appropriate bit.

1

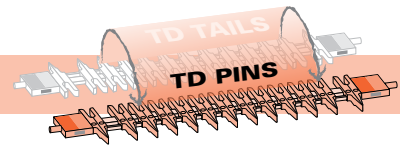
Start in

### Half-Blind Dovetail Tails (HB TAILS) mode



2

ROTATE the finger assembly toward you 180°



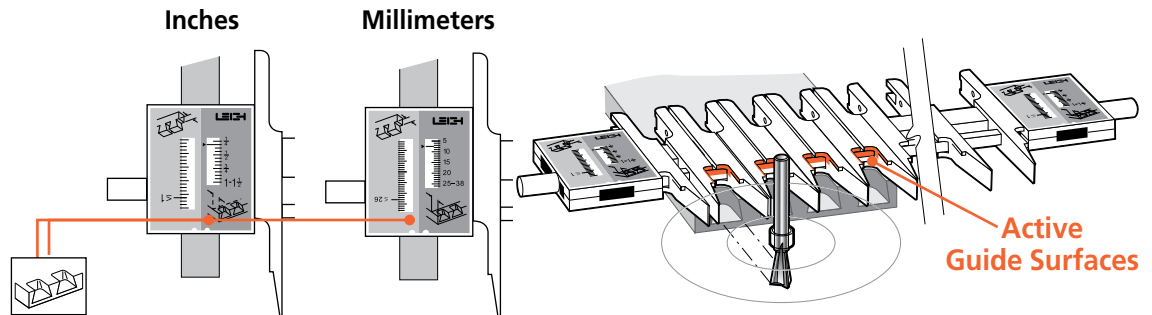
3

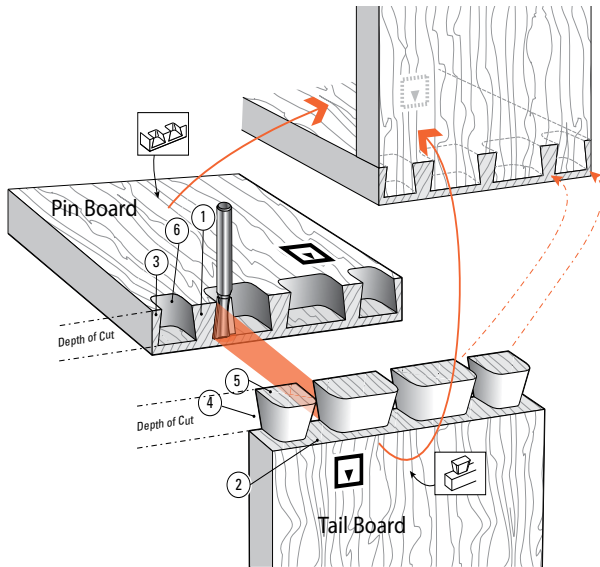
Now the Finger Assembly is in

### Half-Blind Dovetail Pins (HB PINS) mode

#### MODE ICONS

Illustrations in this user guide include the correct *mode* icon for the current instruction. The icons are also used in the instruction text.



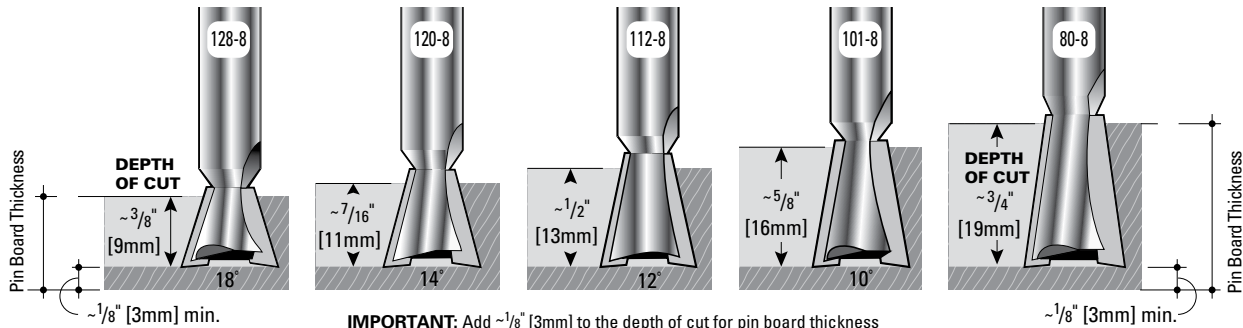


**10-1 Half-Blind Dovetail Terminology:**

- ① Pins
- ② Pin sockets
- ③ Half-pins
- ④ Half-pin sockets
- ⑤ Tails
- ⑥ Tail Sockets

The pins fit in the pin sockets. Joints should almost always end each side with half-pins.

**10-2 Cutting Depth for Variably Spaced Half-Blind Dovetails**



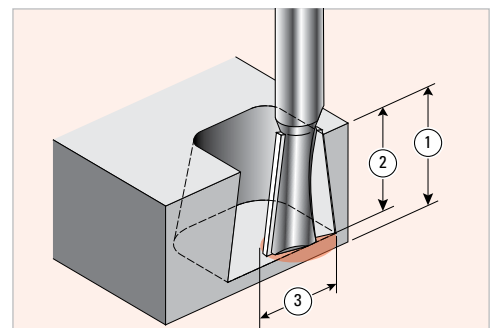
**IMPORTANT:** Add  $\sim 1/8"$  [3mm] to the depth of cut for pin board thickness  
**NOTE:** See 10-35 chart on p.38 for range of tail board thickness  
**NOTE:** Bits 120-8 and 80-8 are included with the jig  
 $\sim$  Symbol for approximately

**! Important! Read This About HB Depth of Cut**

Bit selection is critical. You need to select a specific dovetail bit for your half-blind dovetail project, depending on the pin board (drawer front) thickness you are using.

- Choose one of the five  $1/2"$  [12,7mm] diameter dovetail bits shown above. Check bit selection in Appendix II.
- Depth of cut must be as specified for each of the five bits illustrated above. *Note: Leigh bits 101-8, 112-8 and 128-8 are optional.*
- Raising the bit above its specified cutting depth will result in loose joints and may damage the jig, bit and/or guidebush. A lower setting will result in tighter joints that may not fit together.

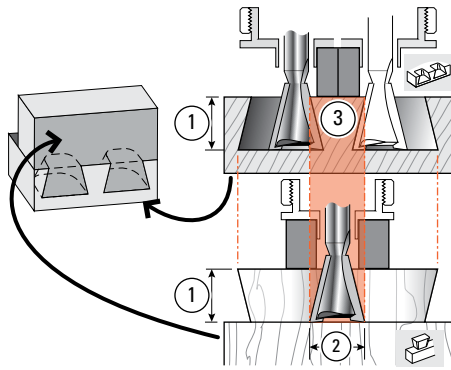
- Small Depth of Cut adjustments will change joint fit tightness. See 10-3 to 10-5 for why.
- Half-blind PINS and TAILS are routed with the same dovetail bit and must be at the same Depth of Cut.
- The e7-eBush should be set at 10 for ALL half-blind dovetail routing.
- All half-blind dovetail bits work with the Leigh e7-Bush supplied with your Leigh jig, or standard  $7/16"$  [11,1mm] outside diameter guidebush.



**PIN BOARD THICKNESS** ① determines the **maximum depth of cut** ② you can use. Select a bit with a specified cutting depth that is at about  $1/8"$  [3mm] **less** than the pin board thickness.

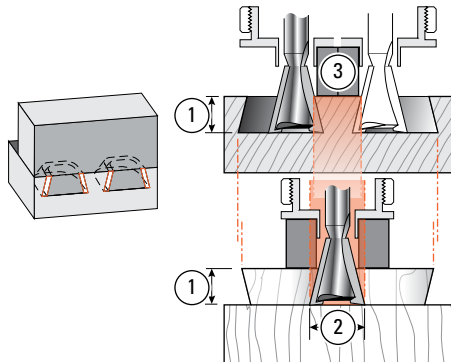
A dovetail bit will produce **only one specific cutting depth**.

**Only**  $1/2"$  [12,7mm] ③ cutting diameter bits can be used for half-blind dovetails.



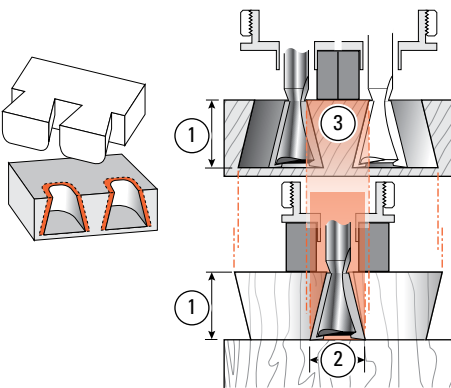
**10-3 Joint Fit and Depth of Cut**

Here's why the depth of cut ① changes the fit in half-blind dovetails. Increasing or decreasing the depth of cut does not affect the pin socket width ②, but does affect the width of the pin ③ that goes into the socket ②.

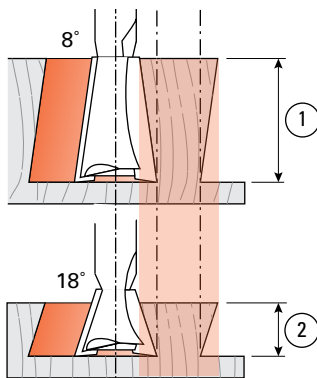


**10-4** Note that decreasing the bit depth ① makes the pin ③ narrower while the pin socket ② stays the same width, producing a loose fit.

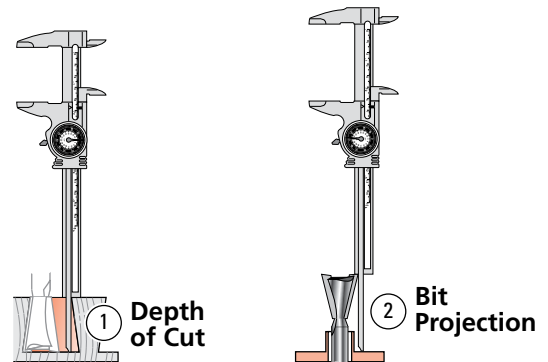
Decreasing the bit depth (i.e. raise the bit into the router) produces a looser fit.



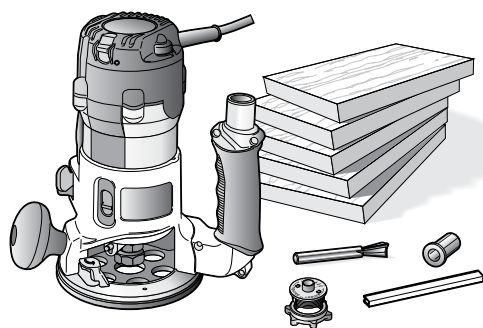
**10-5** Increasing the bit depth ① makes the pin ③ larger while the pin socket ② stays the same width, producing too tight a fit. Increasing the bit depth (i.e. lower the bit) produces a tighter fit.



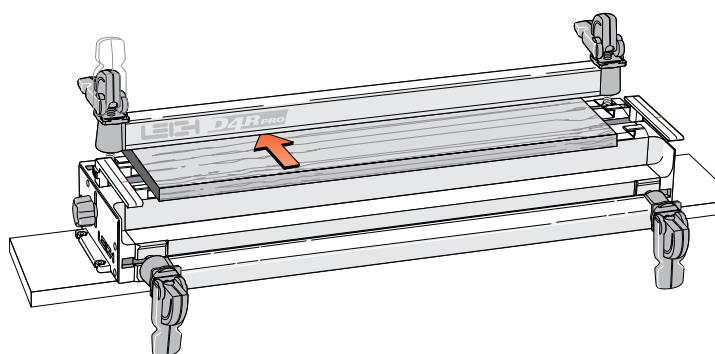
**10-6 Bit Angle and Depth of Cut.** Half-blind pins and tails are routed with the **same** dovetail bit, the **same** guidebush, and the **same** depth of cut. A different depth of cut requires a different angled bit. Leigh offers five different angled dovetail bits for a range of cut depths. A lesser angle, say 8°, for a deeper cut ①; a greater angle, say 18°, for a shallower cut ②.



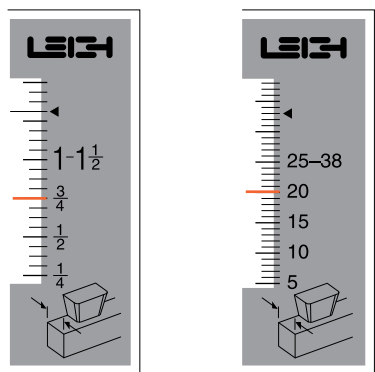
**10-7** Cumulative plus/minus tolerances in routers, bits and guidebushes, make it impossible to state exact bit depth for first-time precision fit. All dovetail jigs require trial and error tests to attain fine fitting joints. The good news; we give a starting depth for each bit. Test and measure the successful 'Best fit' depth of cut ① or bit projection ②. Record for future first-time fits.





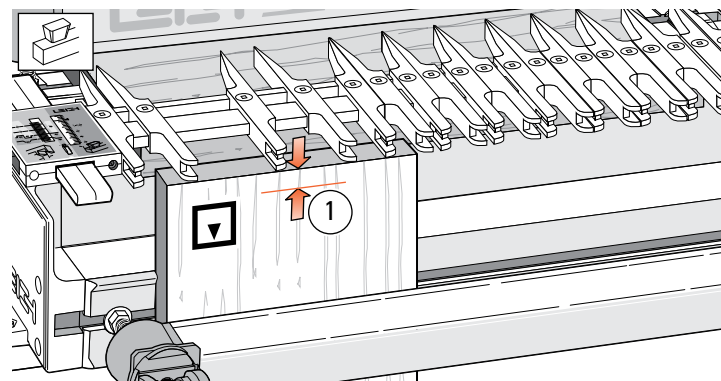
**10-8 Routing a Test Joint** Use the Leigh e7-Bush, and No. 120-8,  $\frac{1}{2}$ " [12,7mm] 14° dovetail bit. Select several pieces of  $\frac{3}{4}$ " x  $5\frac{1}{2}$ " [20 x 140mm] x about 8" [200mm], and the plastic bridge extrusion. *Note: Half-blind pin boards must be minimum  $\frac{1}{2}$ " (13mm) thick to clamp. For thinner boards see fig. 10-21.*




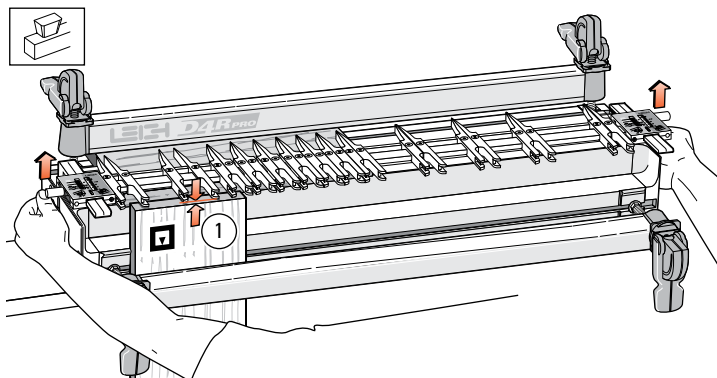
**10-9** Clamp the spacer board in the rear clamp.



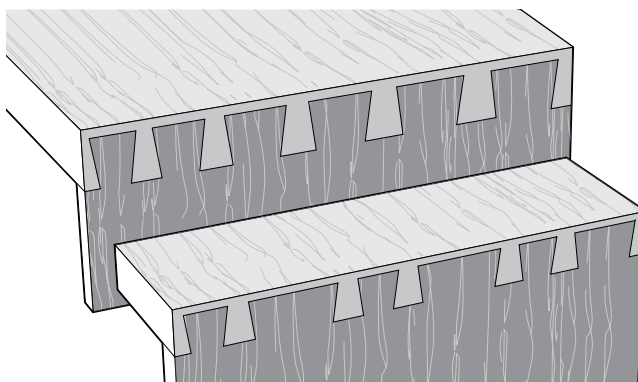
**10-10** Mount the finger assembly on the support brackets in the  HB TAILS mode, flat on the spacer board, *scales set on the thickness of the tail board* ( $\frac{3}{4}$ " [20mm] in this instance). The  HB TAILS scale is always set at the tail board thickness. The scale increments above  $1-1\frac{1}{2}$ " [25-38mm] are for use on sliding dovetails (see Chapter 16).



**10-11** Measure and mark a line on the inside face of the tail board ① to the working depth of the bit to be used as per 10-2 of this chapter. Clamp this test tail board in the left front clamp, against the side stop with the top edge flush under the guidefingers, and the inside face  of the drawer side away from the jig.

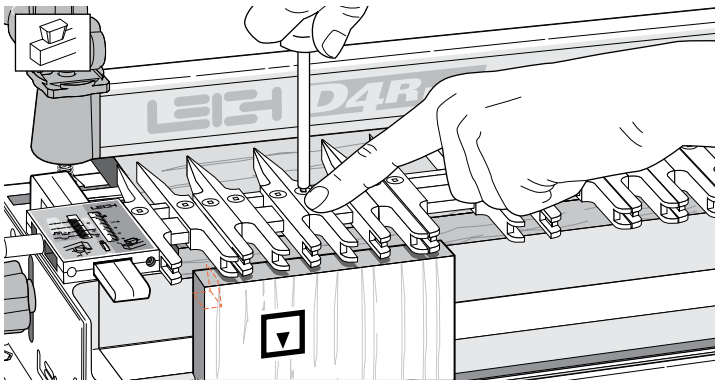


**10-12** Unlock and raise the finger assembly support brackets slightly so that the finger assembly is about  $\frac{1}{8}$ " [2mm] ① above the boards. This will allow easy movement of the guidefingers.

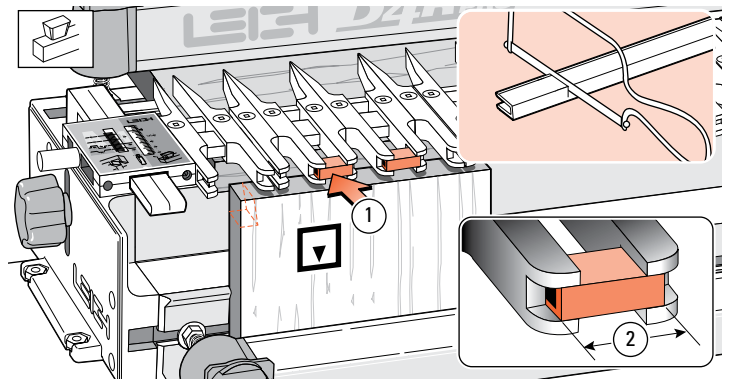


**10-13** While typical traditional layouts have symmetrical pins and spacing with half-pins at each edge, the Leigh jig allows infinitely variable joint designs. Different thickness boards can be easily joined together. Pins can be various sizes and randomly spaced to suit just about any design you create. *Before attempting joints of asymmetrical design, see Chapter 14.*

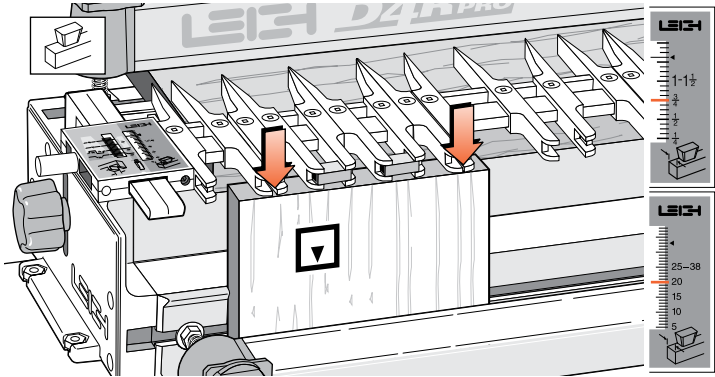




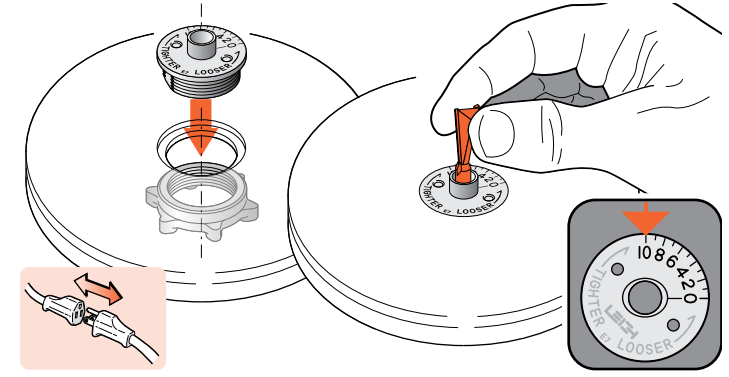
**10-14** Ignoring the outer guidefinger (router support) at the scale, loosen enough guides for the desired tail layout. The illustrated half-pin guidefinger position gives a half-pin socket profile as shown (dotted lines). *NOTE: The first few uses, some fingers may “stick”. This is normal. To “unstick”, loosen the finger screw 3/4 turn. Press down firmly on the screwdriver (in the screw) to loosen the finger locking wedge.*



**10-15** If gaps between the guidefinger tails are wider than about 1/8" [3mm], mark and cut pieces of bridge extrusion ① to fit the guidefinger tail slots. Cut slightly shorter than the space between the guidefinger shoulders ②, so guidefingers won't force apart with the bridge pieces. Squeeze the open side of the pieces and push into place for a friction fit.

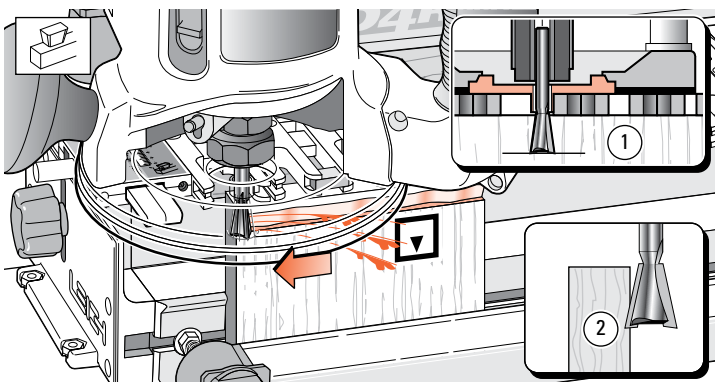


**10-16** Remember to tighten any loose guidefingers. Lower the finger assembly back onto the spacer board and workpiece. It must touch the workpiece or the depth of cut will vary and the joint won't fit. The scale should be set on the tailboard thickness, in this case 3/4" [20mm].

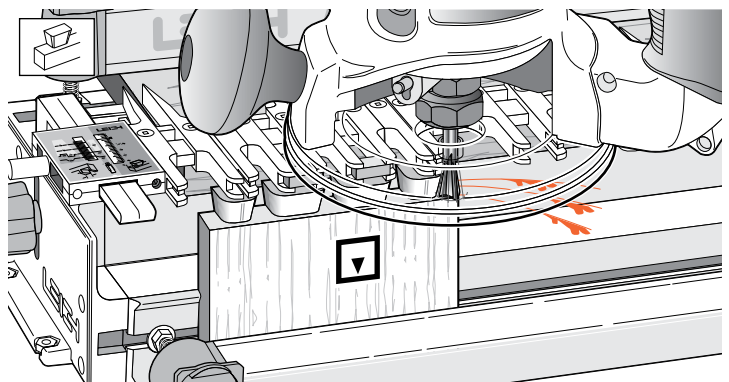


**10-17** Attach the e7-Bush securely to the router and mount the supplied No. 120-8 bit to the router. Set the e7-Bush to No. 10. See Chapter 3, page 9 for details.

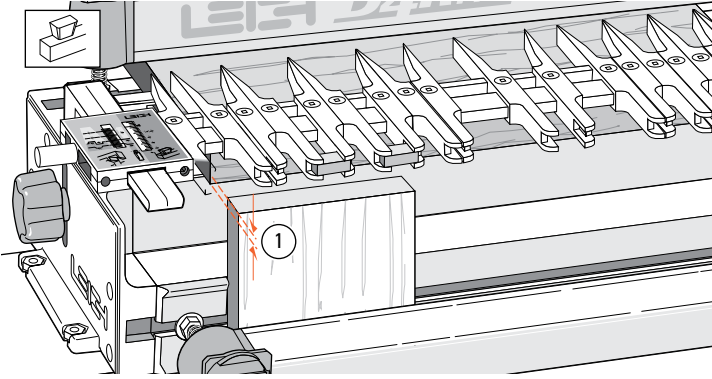
**REMEMBER SAFETY!**



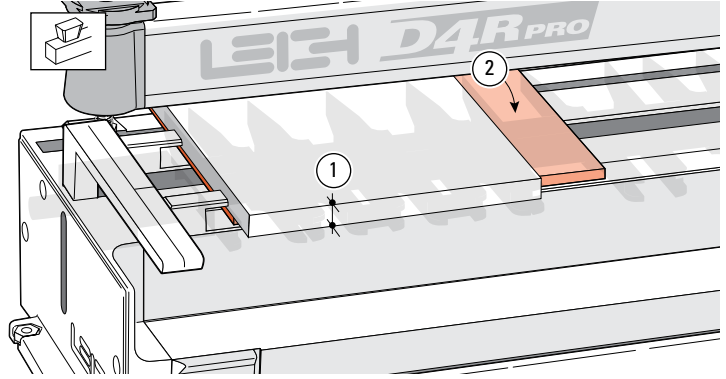
**10-18** Adjust the bit height until the bit tip is level with the marked line ①. For the first light cut move the router from right to left. Make sure you control it firmly, because it is driven in this direction by the bit. Only the tip of the bit should be cutting on the first cut ②. This back or climb routing leaves a very clean shoulder in face grain.



**10-19** Now rout in and out from left to right following the guides and bridge pieces to rout out the pin sockets, leaving the tails. See fig. 17-10 “Hints and Tips”.

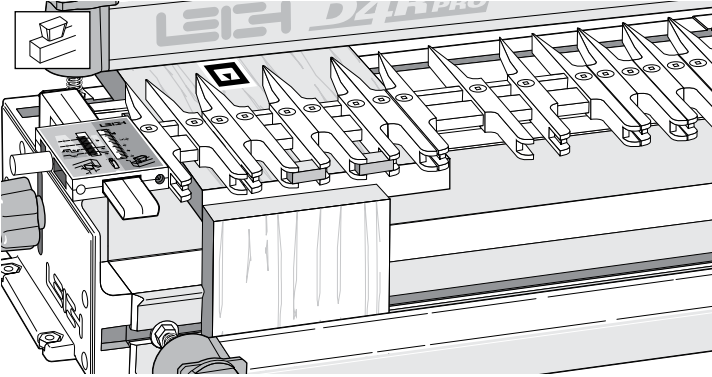


**10-20** Remove the test tail board, then clamp a scrap board in the front of the jig so that the top edge projects above the top face of the jig by about  $\frac{1}{8}$ " [3mm] ①. This will keep the scrap piece below the path of the bit when routing the pin board. Remove the spacer board from the rear clamp.

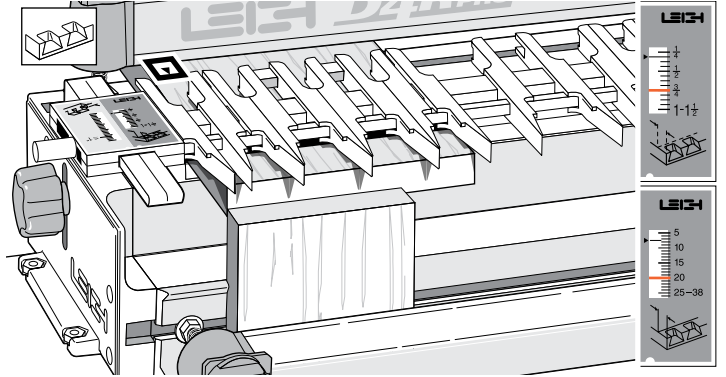



**10-21 If you're mounting Thin Pin Boards:**

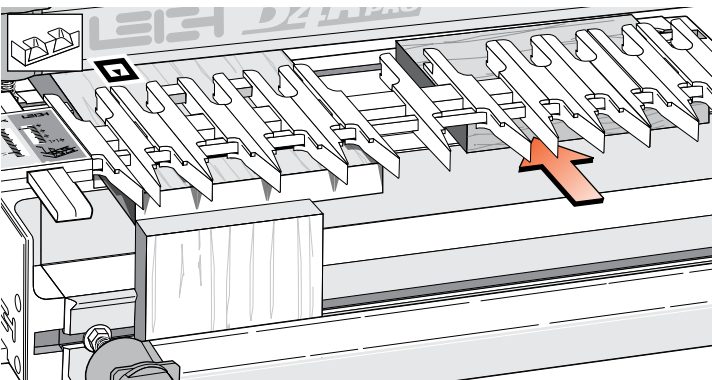
The minimum recommended pin board thickness is  $\frac{1}{2}$ " [13mm]. If you wish to rout a pin board less than the minimum thickness ①, it will be necessary to pack the board up from the jig body. We suggest using a piece of  $\frac{1}{4}$ " to  $\frac{3}{8}$ " [6 to 9mm] plywood for this purpose ②.



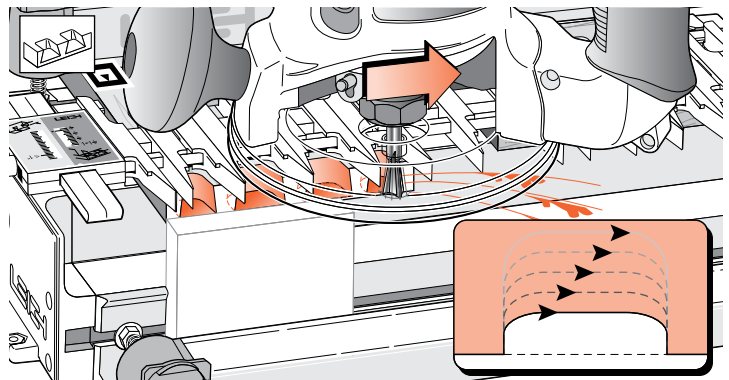
**10-22 Flush Drawers** Place a test pin board in the left rear clamp against the side stop, fitting its front end edge flush against the vertical scrap piece, inside face of the drawer front away from the jig body. The pin board is now positioned with the edge to be routed flush with the jig's front face, correctly registered for the scale readings. For drawers with rabbeted fronts, see Chapter 12.




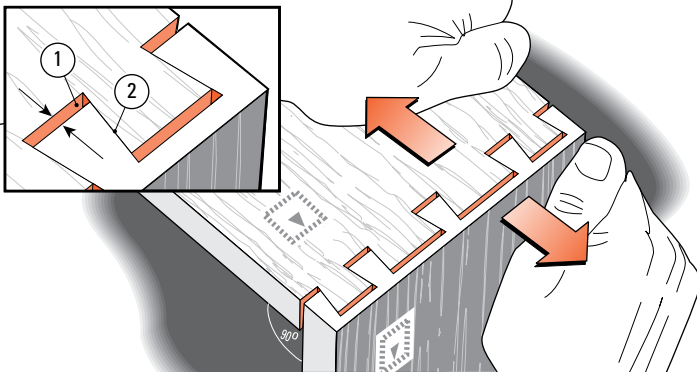
**10-23** Rotate the finger assembly to the  HB PINS mode. Set the HB PINS scale *equal to tail board thickness* (i.e., same setting as tails: this example,  $\frac{3}{4}$ " [20mm]). HB pins and HB tail scales are always set to tail board thickness. Make sure the finger assembly is flush and level on the pin board. The guidefingers must touch the pin board or depth of cut will vary, causing poor joint fit.



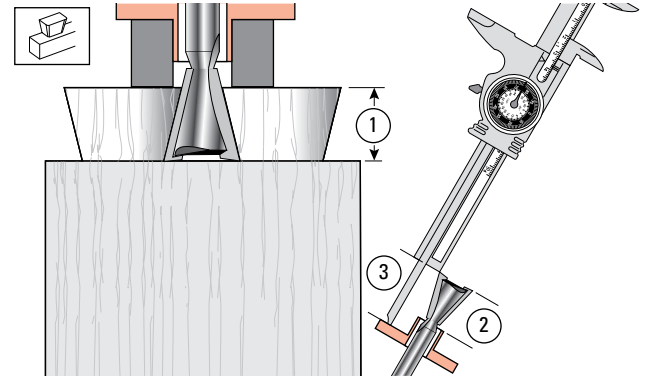
**10-24** If you have difficulty leveling the finger assembly on a narrow workpiece, place a board the same thickness as the pin board under the other end of the finger assembly, *but not under the rear clamp*.



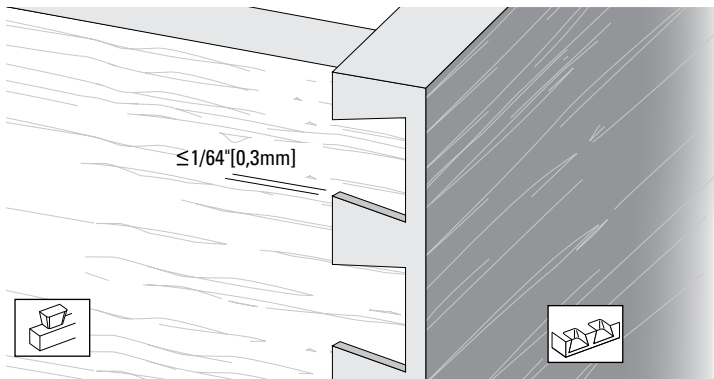
**10-25**  Rout out the waste between the pins. Rout each space from **left to right**. Do not back rout on end grain. If the bit enters on the right side of the opening there will be a very strong pull to the left, so... Rout each opening in at least three or four passes, left to right.



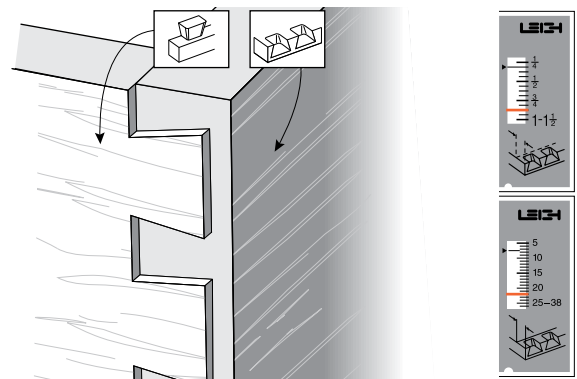
**10-26** Remove the pin board and test the fit. If the joint is loose, lower the bit to increase the depth of cut, by the amount of the gap at the bottom of the pins ① (when the pins are pulled against the socket sides ②). If the joint is too tight, raise the bit slightly to decrease the depth of cut. Test again. You cannot rout the same board twice. Use two fresh board ends for each test.



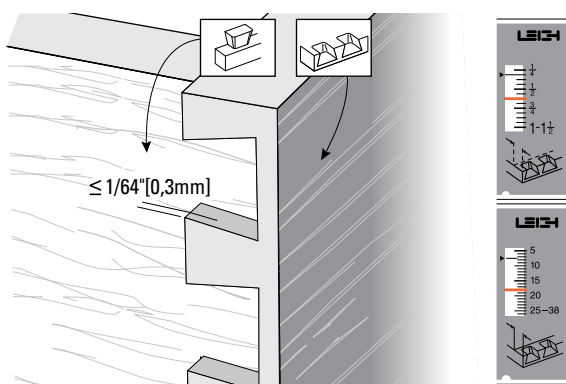
**10-27** Keep the test tail board that fits well, and mark it with the number of the bit you used to rout it. For quick set-up next time, clamp this tail board in the jig as a *depth-of-cut gauge* ① to show how far to lower the bit. Better yet, measure the bit projection from the end of the guidebush ② or guidebush flange ③ and record this for fast set-ups in future.



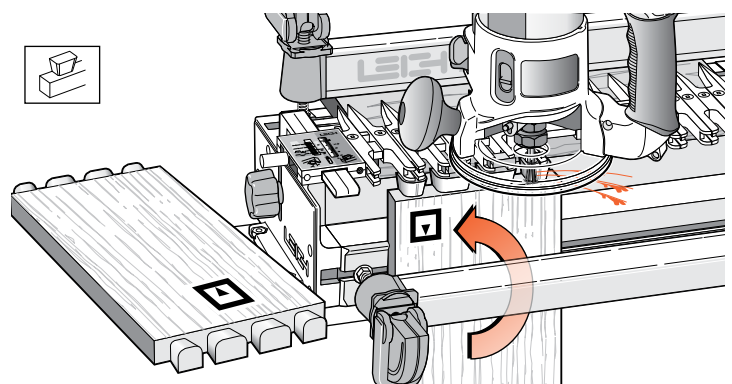
**10-28** When you have the proper tightness of fit, check the flushness. The tails should be under flush to the pins by *no more than 1/64" [0,3mm] to allow for cleanup (exaggerated here)*. The concentricity of the collet and guidebush on different routers will affect this tolerance.



**10-29** If the tails stand out from the pins, set the HB PINS scale **away from the operator** by the amount required.

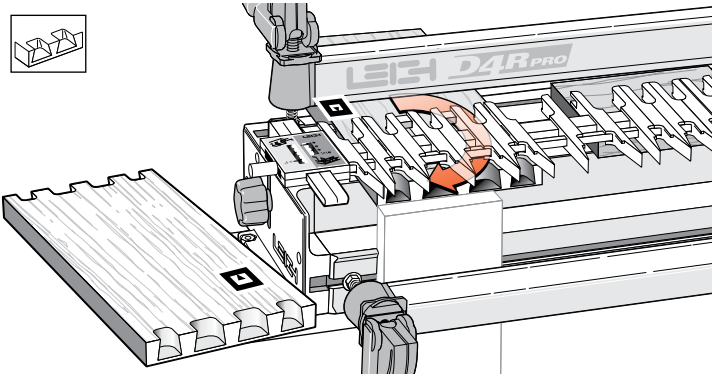



**10-30** If the tails fit in too far past the pins ends, set the HB PINS scale **toward the operator** by the amount required. These adjustments for “flushness” are made only in the HB PINS mode. The tail mode scale setting remains the same.



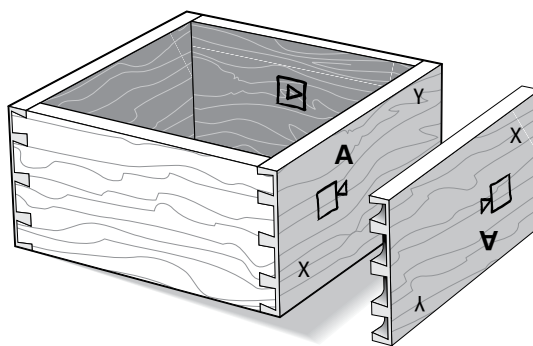
**10-31** To make a box, rout all four ends of the tail boards, keeping the inside face  $\square$  of the tail boards away from the jig.





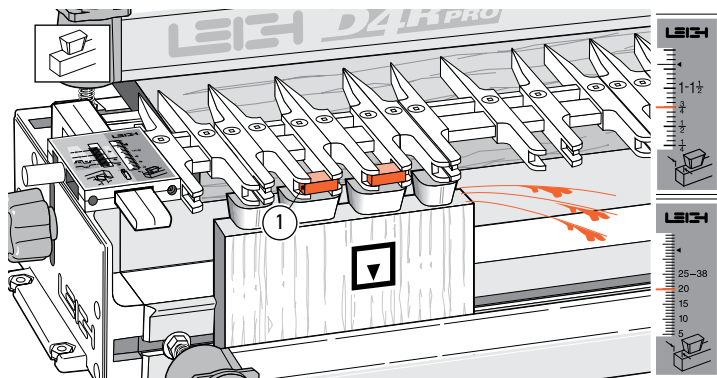
**10-32** Rout all four ends of the pin boards keeping the inside face  of the boards away from the jig.



*Note: When making drawers you may prefer to use through dovetails on the rear corners.*

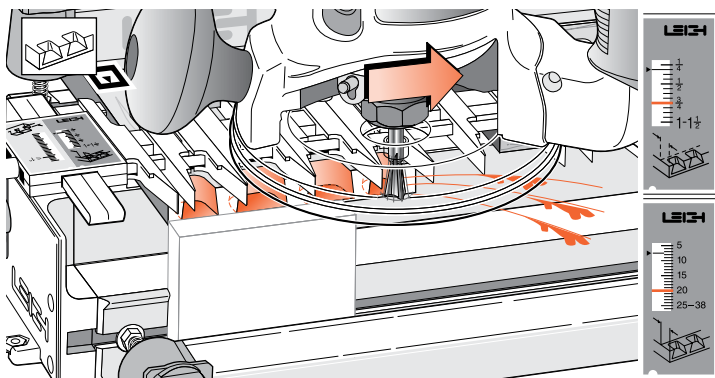




**10-33** Assemble the box. As with through dovetails, it doesn't matter which edge of any of the boards are at the top or bottom, the box will still fit together e.g. pin board "A" can be up either way.

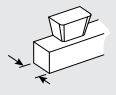
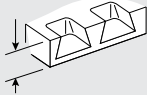



**QUICK REFERENCE REMINDERS**



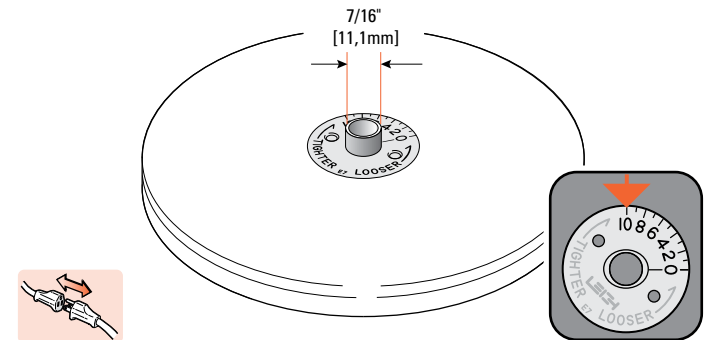
**10-34** Half-blind (HB) tails: Drawer sides (tailboards) are clamped vertically in the jig. The inside face  of the drawer side goes away from the jig body. The finger assembly is in the  HB TAILS mode, set to the thickness of the drawer side. Use bridge pieces where required ①.



**10-35** Half-blind (HB) pins: Drawer fronts (pinboards) are cut with the board clamped horizontally in the jig. The inside face  of the drawer front faces away from the jig body. The finger assembly is in the  HB PINS mode, and again set on the thickness of the drawer side (but adjusted for a flush fit, see 10-28 to 10-30).

				
Thickness of Tail Board	Thickness of Pin Board	Depth of Cut	Dovetail Bit	Guidebush Diameter
1/4" - 1 1/2" [6-40]	min. 7/8" [22]	~ 3/4" [19]	No.80-8	Leigh e7 or 7/16" [11,1]
	min. 3/4" [20]	~ 5/8" [16]	No.101-8	
	min. 5/8" [16]	~ 1/2" [13]	No.112-8	
	min. 9/16" [14]	~ 7/16" [11]	No.120-8	
	min. 1/2" [12]	~ 3/8" [9]	No.128-8	

Numbers in brackets are millimeters



**10-36** On the Leigh D4R Pro, all half-blind dovetails are routed using the Leigh e7-Bush set at No.10 or standard 7/16" [11,1mm] diameter bush (min. depth 1/4" [6,35mm] see Appendix I). For instructions to rout end-on-end dovetails see Chapter 13. ■