

RTJ400 OPERATION

CHAPTER 7 Through Dovetails

IMPORTANT SAFETY NOTE

Before using your Leigh RTJ400 you must have completed the preparatory steps listed in the previous pages, including reading the jig safety recommendations in Chapter 3.

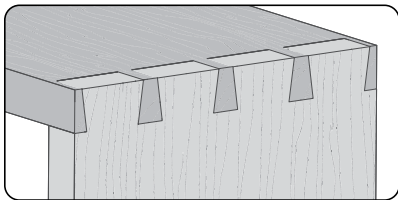
Note: The RTJ400 can rout Full Pitch and Half Pitch Through Dovetails (see Chapter 8 for Half Pitch Through Dovetails). **Instructions for routing Through Dovetails on thinner boards are identical with the exception of depths of cut and template positions for frame pins. Optional Leigh bits can be used with these instructions. See Step 7-2 below and pages 3 to 6 for complete details of optional items, router table requirements and the RTJ400 Accessory Kit.**

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 Leightools.com.

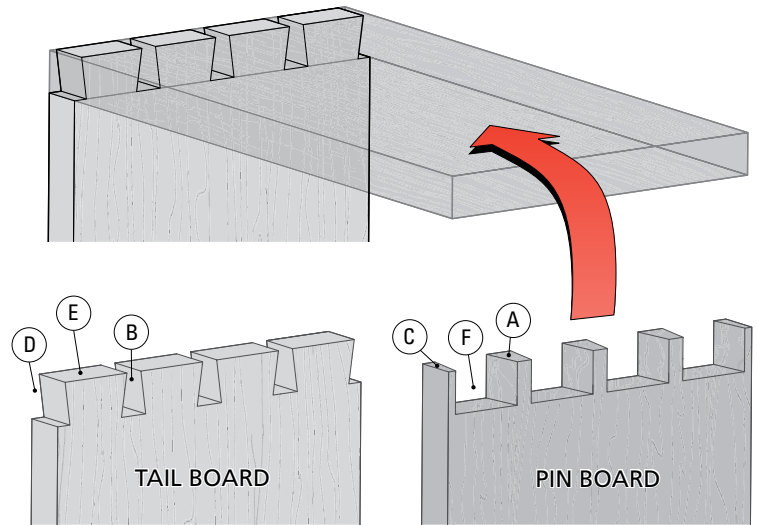


7-1 Getting Started

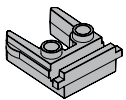
Review this drawing and joinery terms to get a clear understanding of how the boards fit together.



- (A) Pins
- (B) Pin sockets
- (C) Half-pins
- (D) Half-pin sockets
- (E) Tails
- (F) Tail sockets



7-2 Bits, Guide Bushing, Collet Reducer and Blockers



Blockers

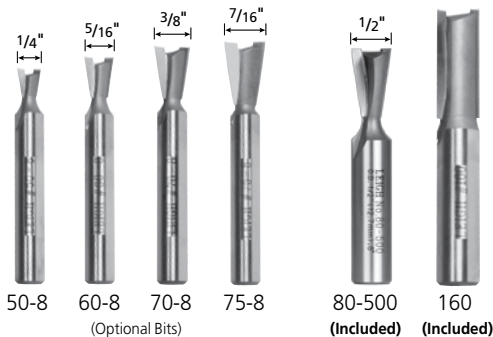


e10 Guide bushing (eBush)

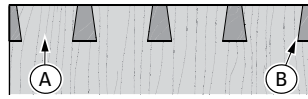


Collet reducer, 172-8 for 8mm bits (Optional)

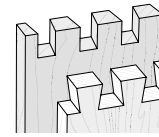
Through dovetail *tails* are routed using the included e10 guide bushing, blockers and the 80-500 through dovetail bit, or one of four optional 8mm through dovetail bits. **Note:** 8mm bits must be used with an 8mm collet or 172-8 (1/2" to 8mm) collet reducer. Through dovetail *pins* are routed with the included 160 1/2" straight bit. The 8mm dovetail bits and 172-8 are available individually or in the RTJ400 Accessory Kit (ACRTJ) at leightools.com. See bit specs on page 4.



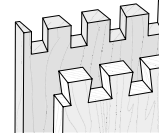
THROUGH DOVETAIL BIT CUTTING DEPTH						
All through dovetail bits have 8° angles. All carbide bit heights are slightly greater than maximum depth of cut listed.						
Bit No.	50-8	60-8	70-8	75-8	80-500	160
1/8"	[Diagram showing depth of cut range for 1/8" depth]					
1/4"	[Diagram showing depth of cut range for 1/4" depth]					
3/8"	[Diagram showing depth of cut range for 3/8" depth]					
1/2"	[Diagram showing depth of cut range for 1/2" depth]					
5/8"	[Diagram showing depth of cut range for 5/8" depth]					
3/4"	[Diagram showing depth of cut range for 3/4" depth]					
7/8"	[Diagram showing depth of cut range for 7/8" depth]					
1"	[Diagram showing depth of cut range for 1" depth]					



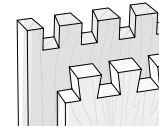
Board widths are based on the number of full tails **A** in your design. Board edges should almost always end in a half-pin **B**.



Widths specified in the **Exact** row result in half pins at each edge of the joint.



When board widths are reduced to less than the **Min** row, pins become very narrow and fragile.

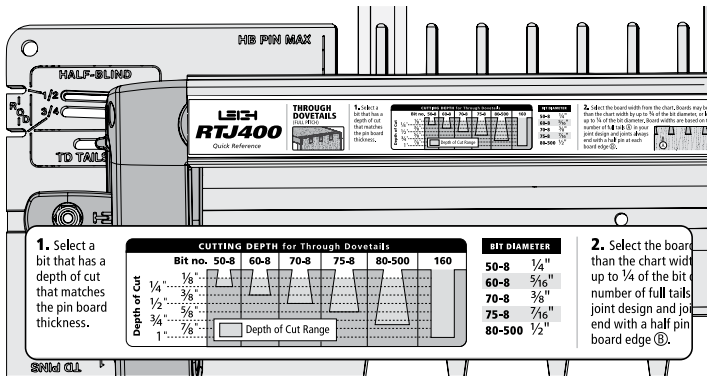


Joints routed using widths greater than the **Max** width result in larger pins at each edge of the joint.

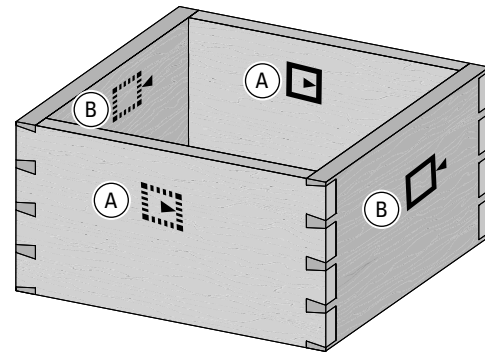
Board Width Selection for Through Dovetails

No. of Tails	1	2	3	4	5	6	7	8	9	10	
Inches	Min	1 7/16"	3"	4 9/16"	6 1/8"	7 11/16"	9 1/4"	10 13/16"	12 3/8"	13 15/16"	15 1/2"
	Exact	1 1/16"	3 1/8"	4 11/16"	6 1/4"	7 13/16"	9 3/8"	10 15/16"	12 1/2"	14 1/16"	15 5/8"
	Max	1 15/16"	3 1/2"	5 1/16"	6 3/8"	8 3/16"	9 3/4"	11 9/16"	12 7/8"	14 7/16"	16"
Millimeters	Min	37	76	116	156	196	235	275	315	355	394
	Exact	40	80	119	159	199	239	278	318	358	398
	Max	49	89	129	169	208	248	288	328	367	407

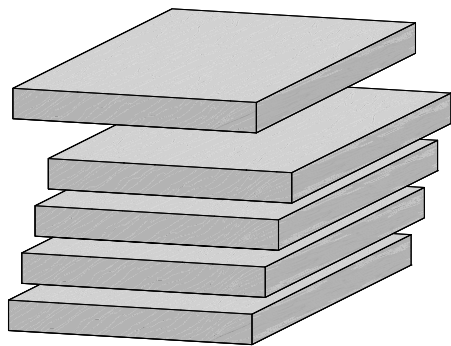
7-3 Use this chart to determine the board width for your project. Through Dovetail joints may be routed in boards up to 1 3/16" thick for pin boards and 1" thick for tail boards. Board widths are determined by the total number of full tails in the joint design. **Note: Board widths may be wider than the chart width, as indicated in the Max row or narrower than the chart width as shown in the Min row.** Boards narrower than the **Min** width will result in very small and fragile pins that may break during assembly. Board greater than the **Max** width will result in very large pins at each edge of the joint.



7-4 Use the Quick Reference strip to determine the correct dovetail bit and guide bushing combination for the board thickness, in this case, the Leigh e10 Guide Bushing and the Leigh 80-500 bit.

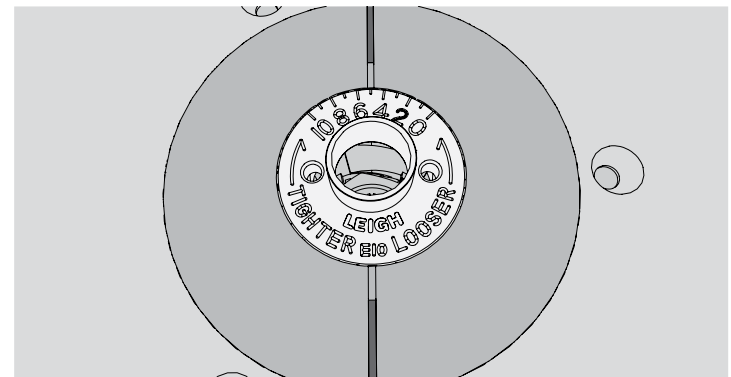


7-5 Making a Box Note the symbols indicating the inside or outside of the pin and tail boards. When assembled with the finished pieces properly oriented, any one of the pin ends will fit any one of the tail ends. **Mark the inside faces of the tail boards A and outside faces of the pin boards B.**

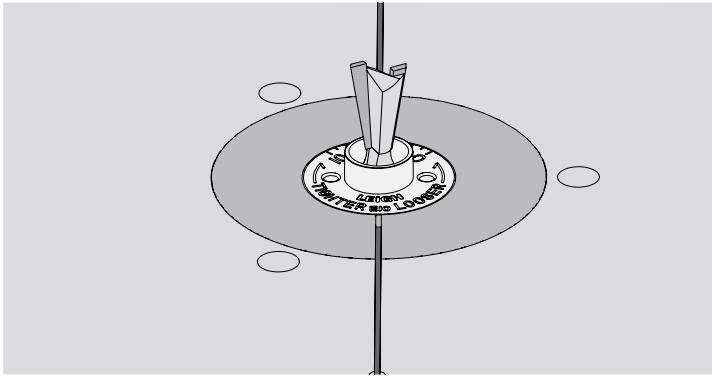


7-6 Use five similar boards (one for testing) about 3/4" x 6 1/4" by about 12" long [19mm x 159mm x 305mm]. Boards of different thicknesses may also be joined.

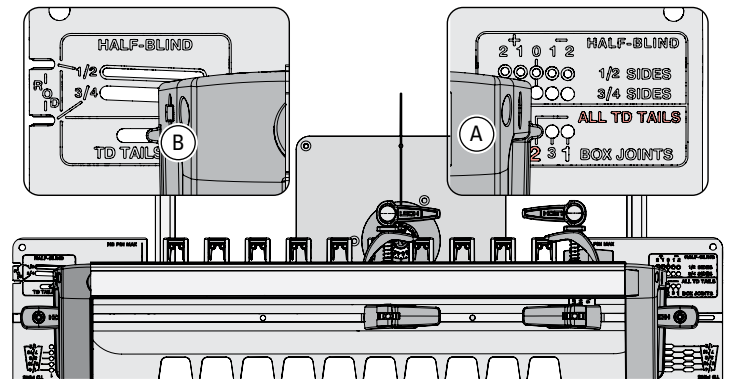
IMPORTANT: Read this whole chapter before routing any boards.



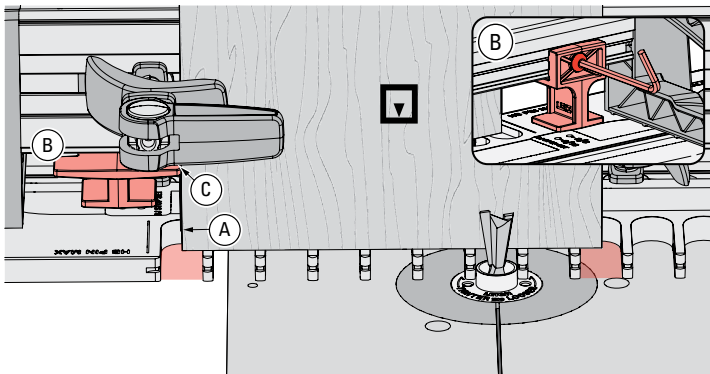
7-7 Fit the e10 eBush to the router table insert ring. Set the eBush to 5.



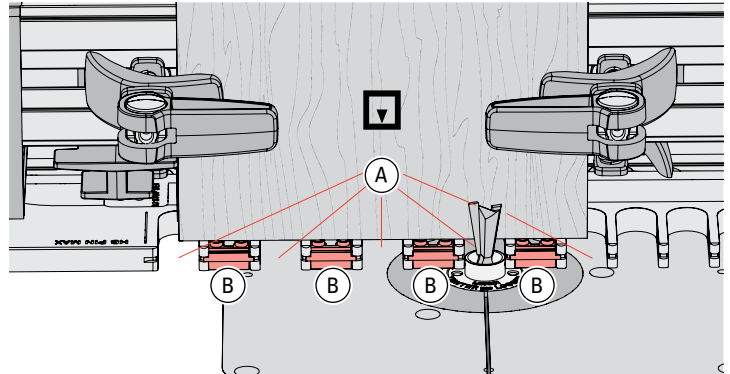
7-8 With the router unplugged, install the Leigh 80-500 dovetail bit. **⚠** Make sure the bit spins freely within the bushing before reconnecting the power.



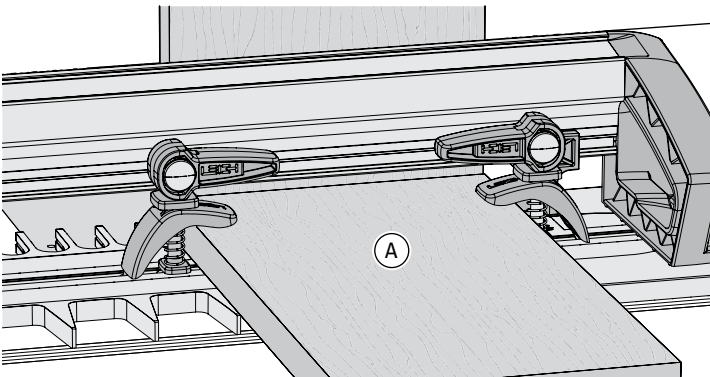
7-9 Insert the right frame pin in **hole no.2** of the **ALL TD TAILS** mode (A) and the left frame pin in the **TD TAILS & BJ slot** (B). Securely latch the frame. **⚠ Always latch the frame to the template after repositioning it.**



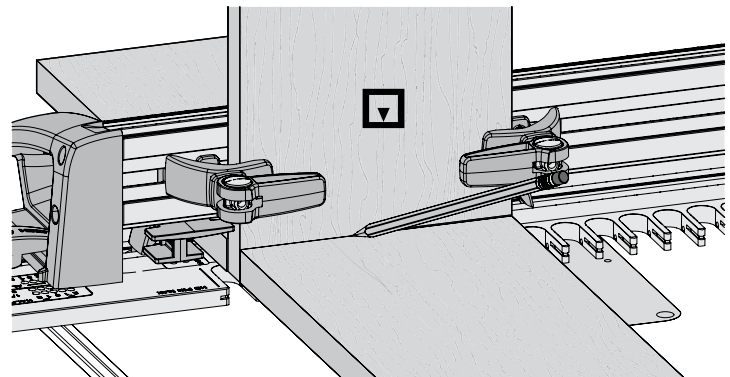
7-10 Center tail board 1 over the template, with board edge (A) in the first opening at the right hand end of the template, with the marked inside face showing out, bottom end flush on the template, and clamp. From the other side of the frame, slide the side stop (B) to touch the tail board (C) and tighten with the hex driver.



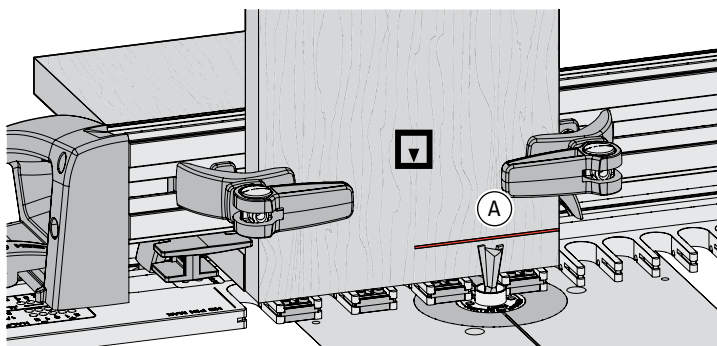
7-11 You will be routing into the first and every alternate template opening (A). To prevent routing in the wrong opening, fit a supplied blocker (B) into the second and every alternate opening.



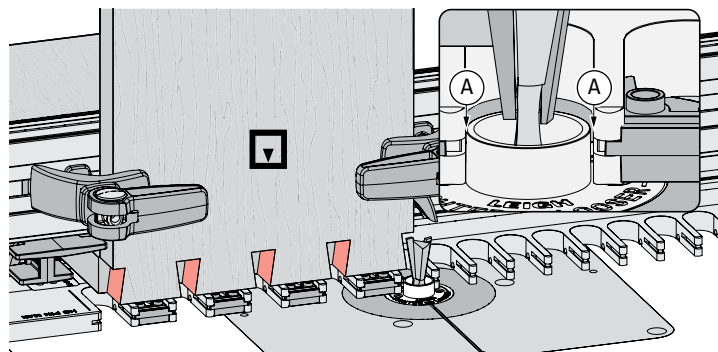
7-12 Clamp a short scrap backer board (A) horizontally against the tail board to help prevent tear out and direct chips and dust away. This can stay in place for routing of all consecutive tail boards. The scrap board should be at least as thick as the cutting depth of the bit in Step 7-14.



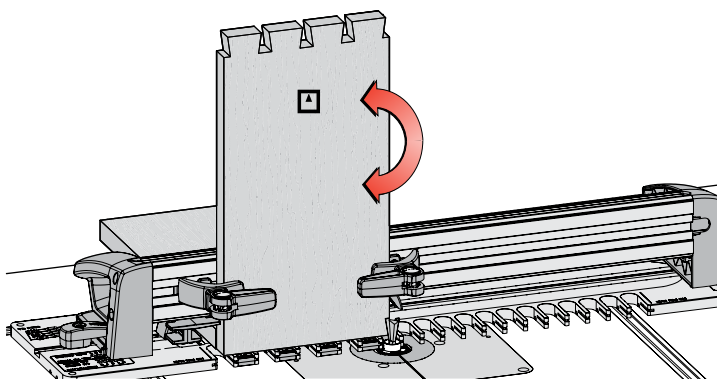
7-13 Bit height is set using the pin board as a gauge. Place the face of the pin board on the template and pencil a line on the tail board.



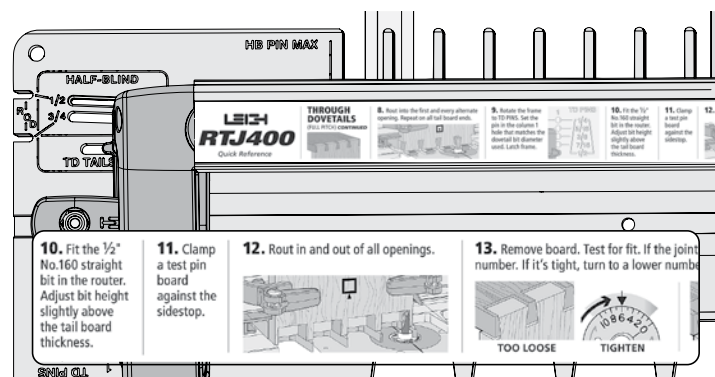
7-14 Position the jig and tail board close to the bit and adjust the bit height to the center of the line **A**. **⚠** Double check that the bit still rotates freely. **IMPORTANT: Bit height determines the flushness of the joint, so set your bit properly the first time.** Adjustments for flushness are near the end of the chapter.



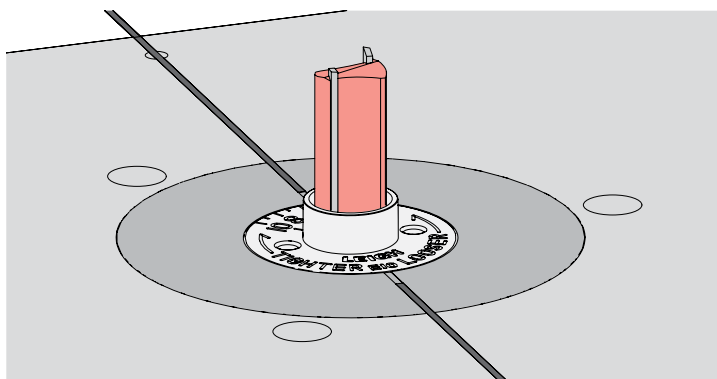
7-15 Rout in the first and every other opening, 1, 3, 5 and 7. The eBush when set at 5 is slightly narrower than the opening **A**. **⚠** The eBush must touch one side of the opening as you enter and the other side as you exit. Do not twist the jig on the table. Keep the edge of the template square to the center line on the table.



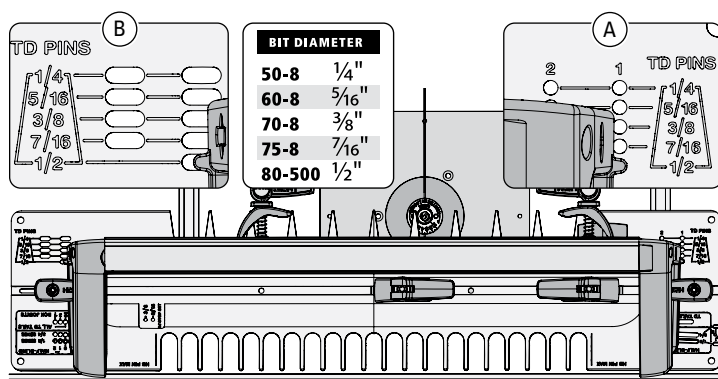
7-16 **⚠** Be sure the router bit has stopped moving before unclamping the tail board. Rotate tail board 1 keeping the same face of the board against the jig. Rout the tails. Repeat 7-15 and 7-16 for tail board 2. Remove the tail board and backer board. **Disconnect the power and remove the 80-500 dovetail bit.**



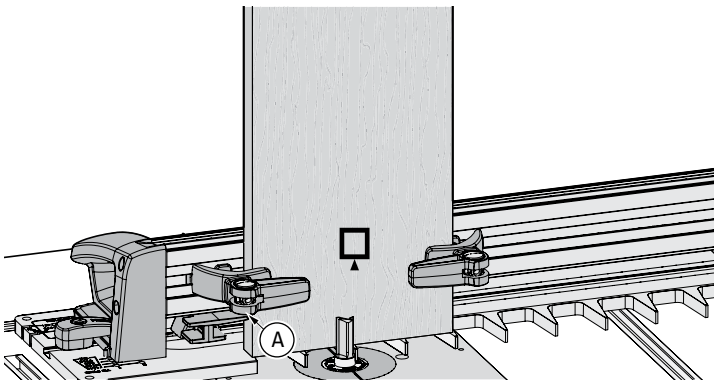
7-17 As instructed in the Quick Reference strip, always use the 1/2" [12.7mm] Leigh 160 straight bit or equivalent spiral bit to rout the full pitch through dovetail pins.



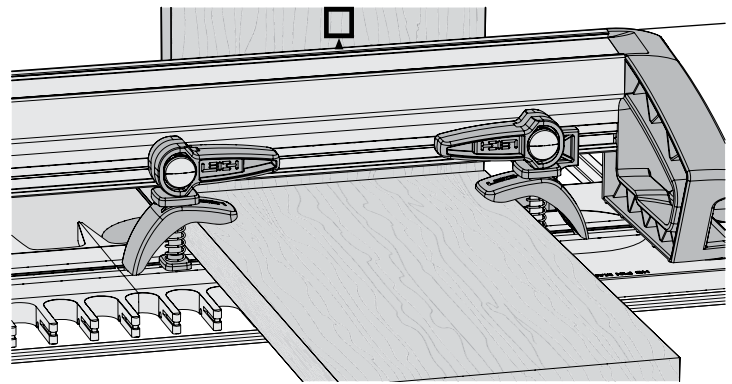
7-18 With the router unplugged, fit the 160 straight bit to the router and leave the e10 eBush set to 5. **⚠** Be sure the bit spins freely within the guide bushing before reconnecting the power.



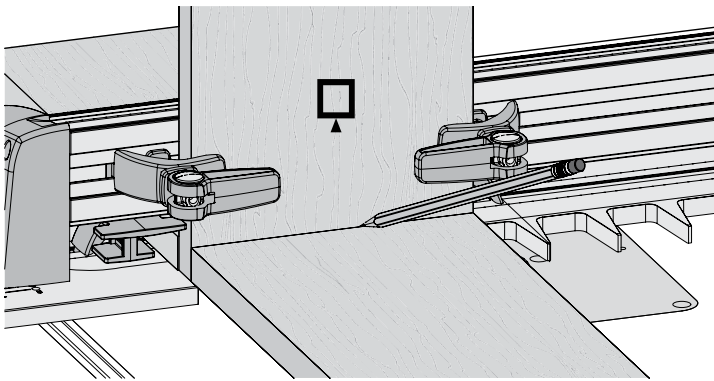
7-19 Rotate the frame to the **TD PINS** mode. Insert the right frame pin in the **Column 1 hole** that matches the dovetail bit diameter just used to rout the tails, 1/2" in this example **A**, and the left frame pin in the matching slot **B**. Latch the frame.



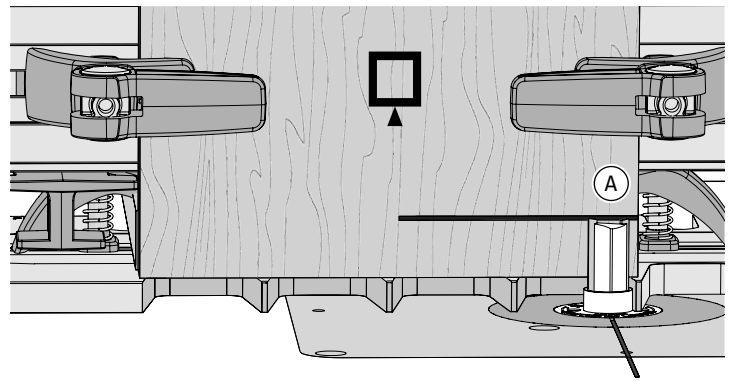
7-20 Clamp the **test** pin board in the jig with its edge against the side stop **A** with the marked outside face out and the bottom end edge flush on the template. **Note: The side stop was set when routing the tails, so no adjustment is needed.**



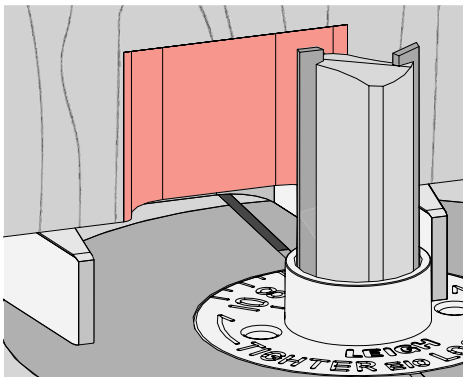
7-21 Clamp the other end of the scrap backer board horizontally against the back of the pin board.



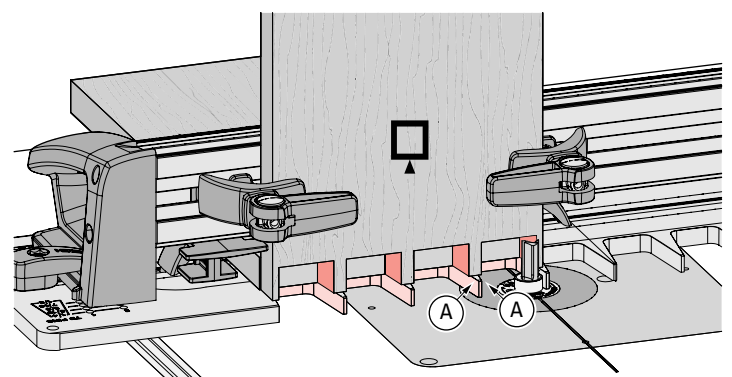
7-22 Place the edge of the tail board on the template and pencil a line on the pin board.



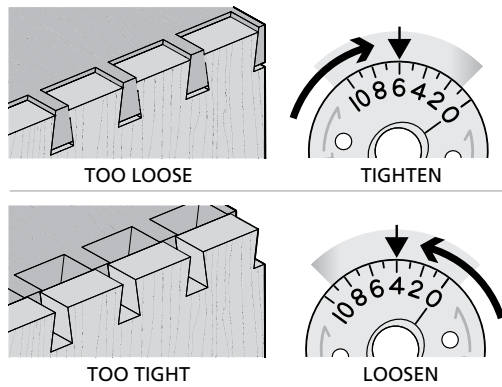
7-23 Position the jig close to the bit and adjust the bit height until the bit tip is touching the center of the line **A**. **⚠** Double check that the bit still rotates freely. **IMPORTANT: Bit height determines the flushness of the joint, so set your bit properly the first time.** Adjustments for flushness are near the end of the chapter.



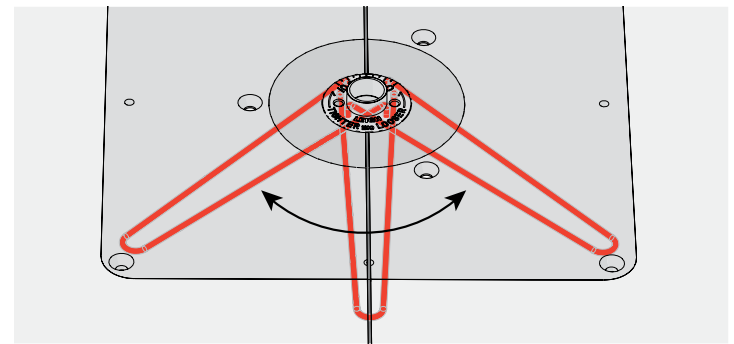
7-24 Always rout a light climb cut between the template fingers to leave a nice clean shoulder. **⚠** **A climb cut may pull the jig to the right so be sure to control the jig firmly at all times.**



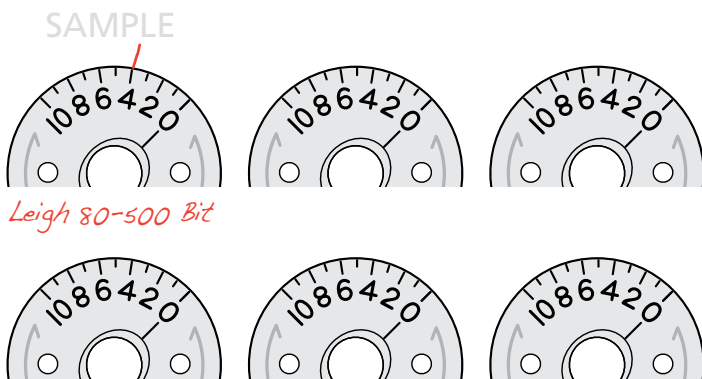
7-25 Rout out all spaces between the template fingers, being sure the guide bushing touches each side of each finger **A** and all waste is routed between the pins.



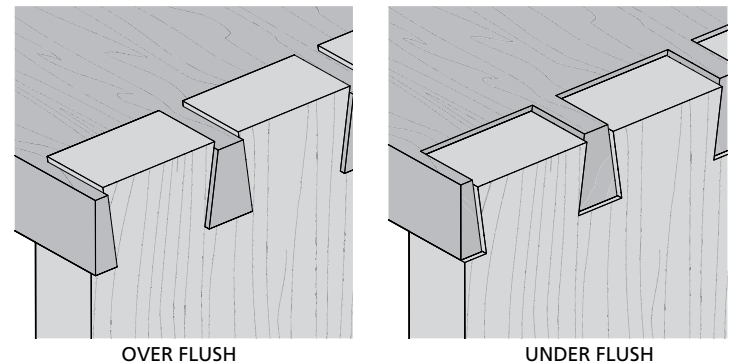
7-26 Test for Fit If the joint is too loose, turn the eBush to a higher number with the pin wrench, as shown in the next step. If too tight, turn the eBush to a lower number. Each increment on the eBush changes the joint glue line fit by 0.002" [0.05mm]. Half an increment, a mere 1000th inch!



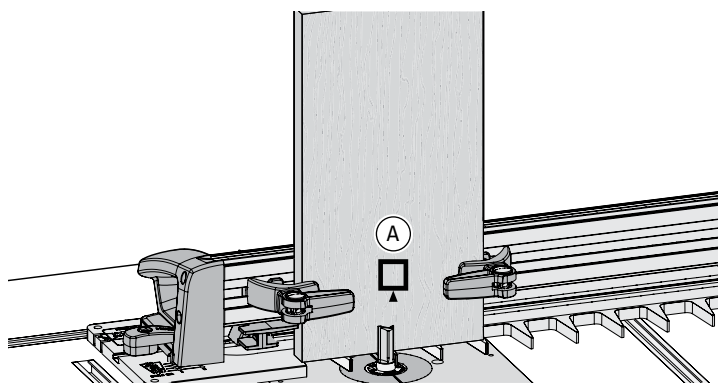
7-27 Re-tighten the eBush nut after each guide bushing adjustment. Rout the other end of the test pin board. Once the fit is correct, add the two eBush settings together and divide by two. **Example:** 5 for tails, 3 for pins. $(5 + 3 = 8 \div 2 = 4)$. Record setting "4" on an eBush diagram in the next step. Do not use this new setting for routing this test box, use **only** for future projects.



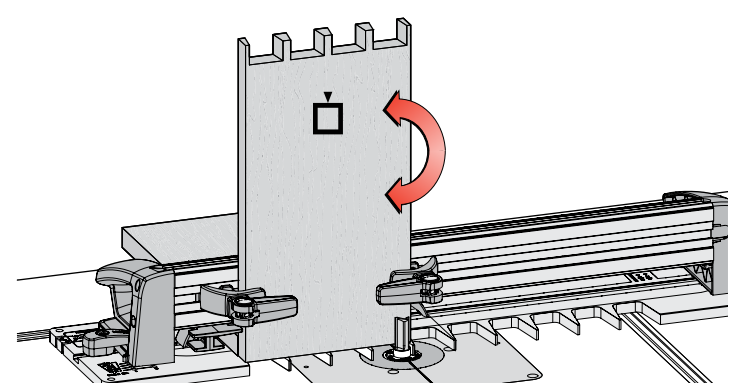
7-28 On the eBushes above, record the settings you used to achieve perfect joint fit. The first eBush is an example of how to record your setting.



7-29 Flushness If the joint is over flush, lower the bit, If the joint is under flush, raise the bit.



7-30 Utilizing the final fit setting you determined in Step 7-26 (not the calculated setting in Step 7-27), the two pin boards are now ready for routing. Clamp pin board 1 to the frame against the same side stop with the marked outside face out (A) and the bottom end edge flush on the template. Rout the pins.



7-31 Rotate pin board 1, keeping the marked face of the board facing out. Rout the pins. Repeat for pin board 2. All four boards are now complete and ready for assembly. ■