Through Dovetail Procedures

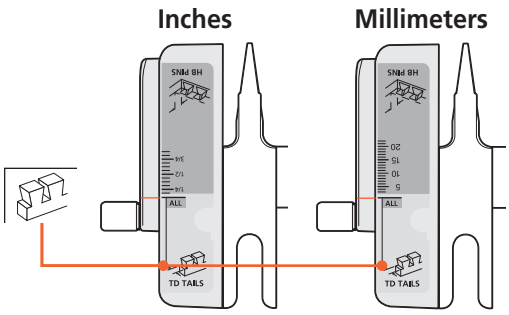
In these instructions for using the Leigh Superjig dovetail Jig, we recommend using certain bits and board sizes just because they are easy to work with. When you have cut some practice joints and gained confidence in your ability to get the results you want, feel free to use the bit selection charts in Appendix II to plan whatever dovetail routing you need for your projects.

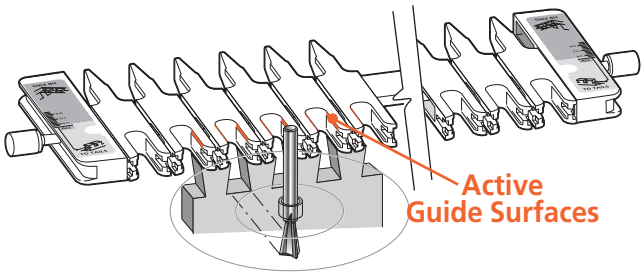
Concept of Jig Operation – THROUGH DOVETAILS

Start with the Finger Assembly in the TD TAIL mode and follow these steps on your jig. Grasping the simple basic concept of operation will now greatly assist you in understanding the instructions. *Note that the active guide surface (against which the guidebush runs) is indicated in red in these illustrations.*

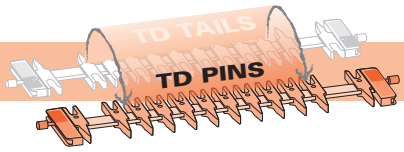
1 Start in
Through Dovetail Tails (TD TAILS) mode

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.

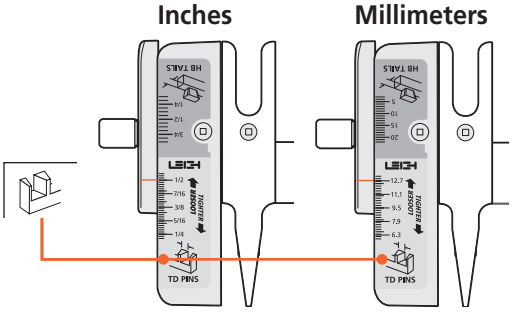


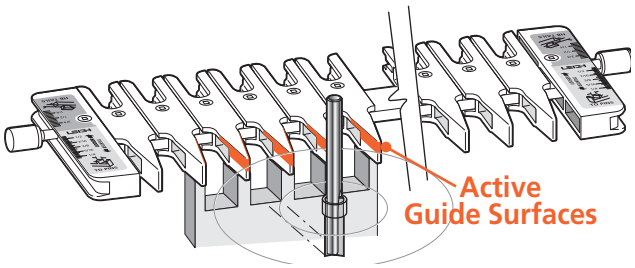


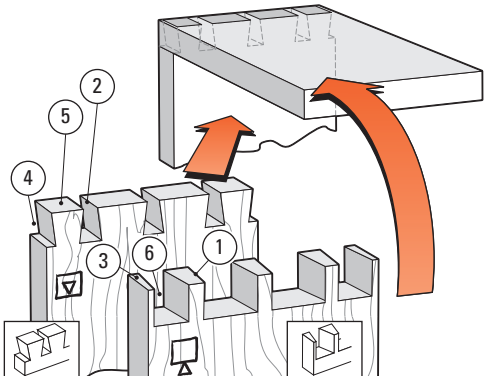
2 **ROTATE** the finger assembly toward you 180°



3 Now the Finger Assembly is in
Through Dovetail Pins (TD PINS) mode



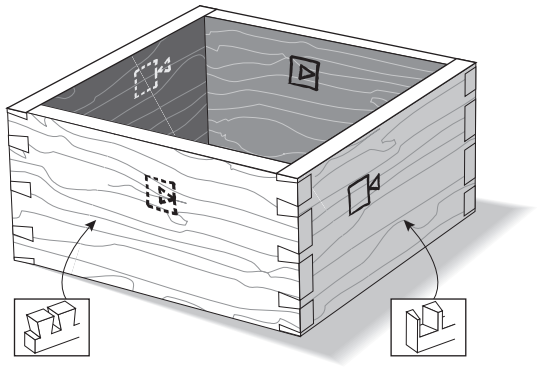




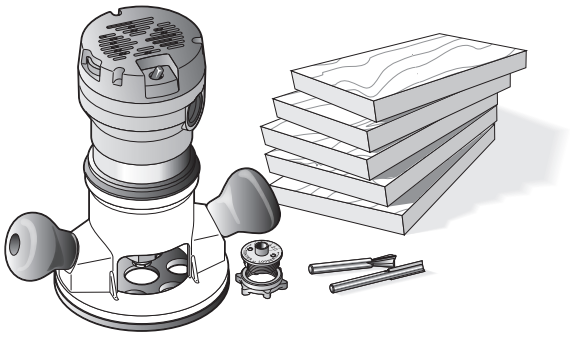
8-1 Through Dovetail Terminology:

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

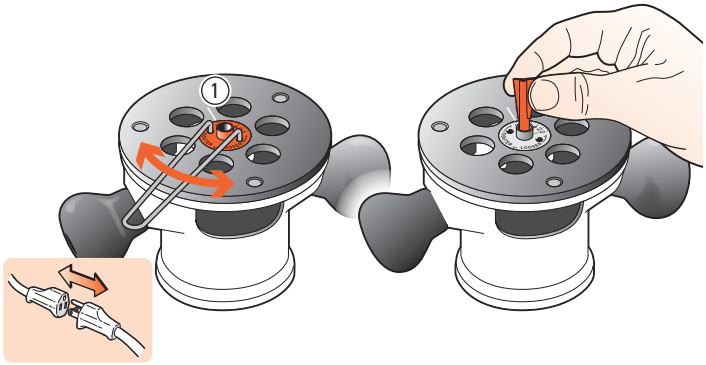
The pins fit in the pin sockets. Joints should almost always end each side with half-pins.



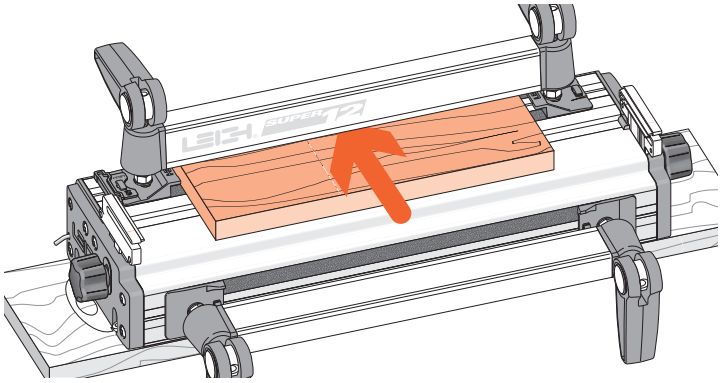
8-2 Let's look at how to make a simple square box. When you assemble the finished pieces with the faces properly oriented, then any one of the pin ends will fit any one of the tail ends. In fact, the box can be put together in six different ways.



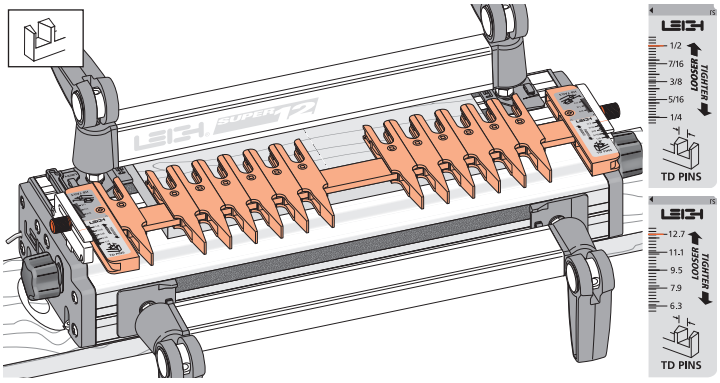
8-3 For this trial you need five identical boards ¾"x 5-½"[20x140mm] x about 8"[200mm] long. Mark inside faces for two tailboards and outside faces for three pinboards (one pinboard is a spare). Use the **e7-Bush**, the No. 80-8 ½"[12,7mm]x 8° dovetail bit and 140-8 5/16"[7,9mm] straight bit (all included with Superjig). *Note: 13/16"[20mm] is maximum through pin board thickness.*



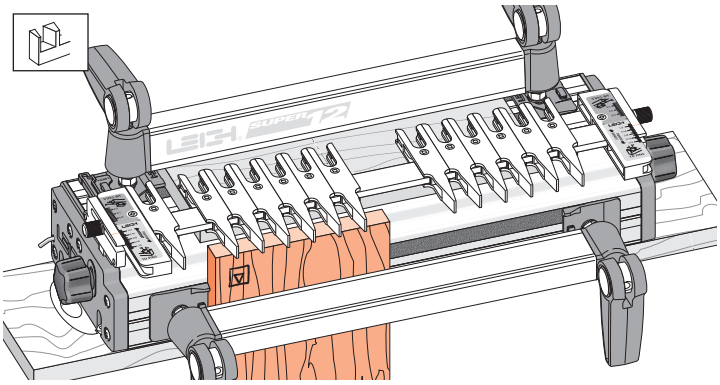
8-4 Fit the E-7 guidebush to the router. Align the No. 10 mark with the base mark ①. No guidebush adjustment is required with through dovetails. If you have a router that is incompatible with the e-Bush, you can use a standard 7/16"[11,1mm] guidebush (min. depth ¼" see page 67) for through dovetails.
Then fit the supplied 80-8 dovetail bit to the router.



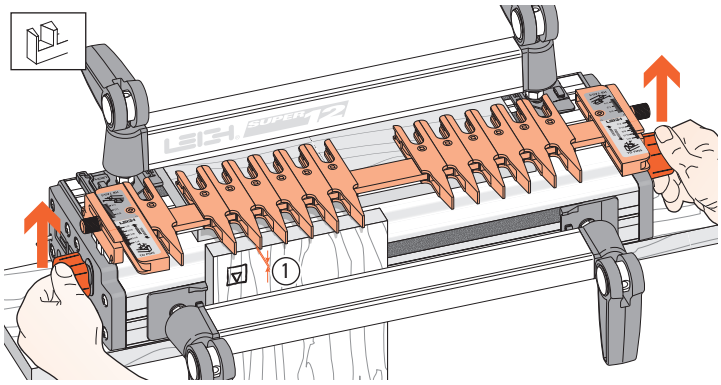
8-5 Clamp the finger support board in the rear clamp.



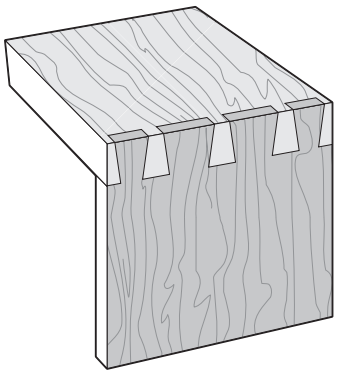
8-6 Place the finger assembly on the support brackets in the TD PINS mode, flat on the spacer board, and with the scale set on the ½"[12,7mm] setting for now. Don't worry about the scale's specific meaning now. Each scale's use will be fully explained in the appropriate section.



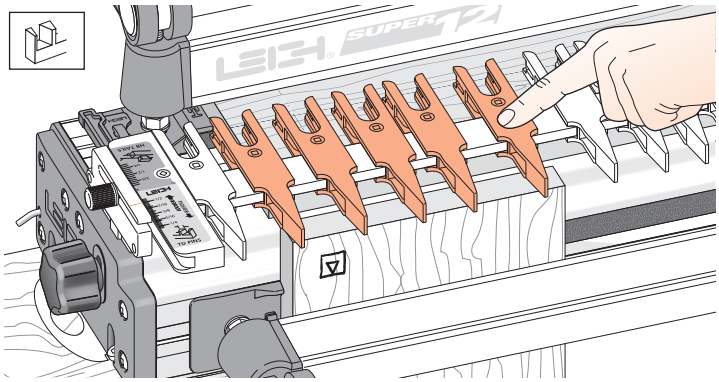
8-7 **Clamp a tail board** against the left front side stop, top edge touching flush under the guidefingers, inside face ⊡ away from the jig body. Although you will cut tails first, adjust the guidefinger layout in TD PINS mode. The adjustment screws are on top in this mode, and it's easier to visualize the finished joint pattern.



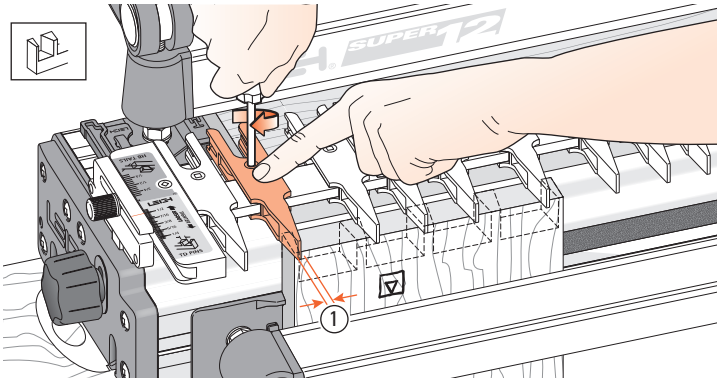
8-8 Loosen the support bracket knobs and raise the finger assembly about 1/16"[2mm] ① above the boards, then re-tighten the knobs. This will allow easy and accurate guidefinger adjustment.



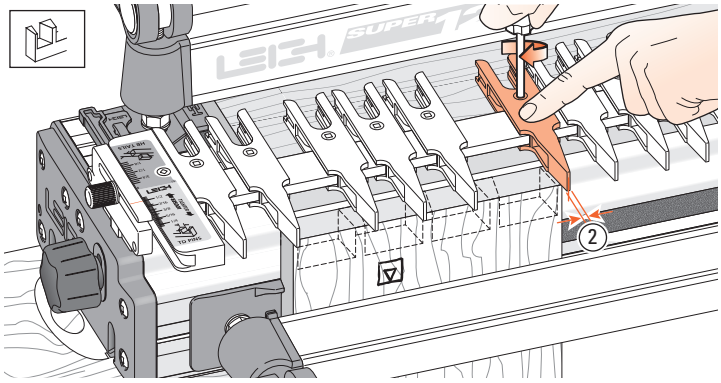
8-9 This joint layout is just a suggestion for this trial. It has a typical, traditional **symmetrical** pin layout, with half-pins at each edge. The Superjig however, allows for infinite dovetail spacing. Also, boards of different thicknesses can be joined to each other as shown in this illustration. Before attempting an **asymmetrical** joint layout, see chapter 12.



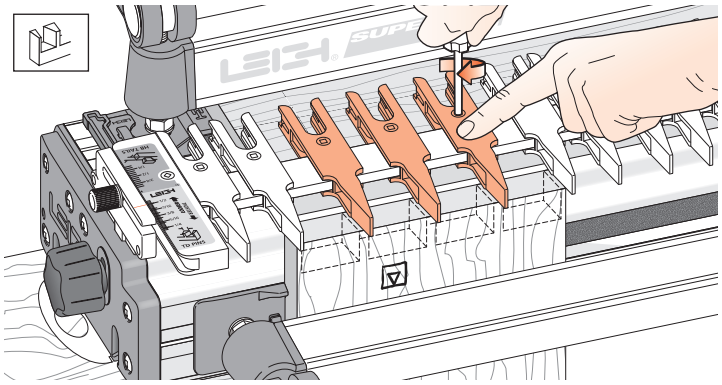
8-10 Ignoring the extreme outer guidefinger next to the scale (it just supports the router), loosen the next five guidefingers and slide them over the top of the workpiece.



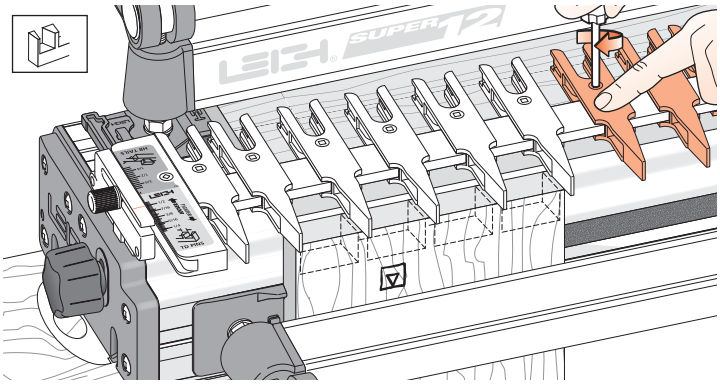
8-11 Lock the left-most guidefinger with its center-line about 1/8"[3mm] ① in from the left edge of the board to form a half-pin.



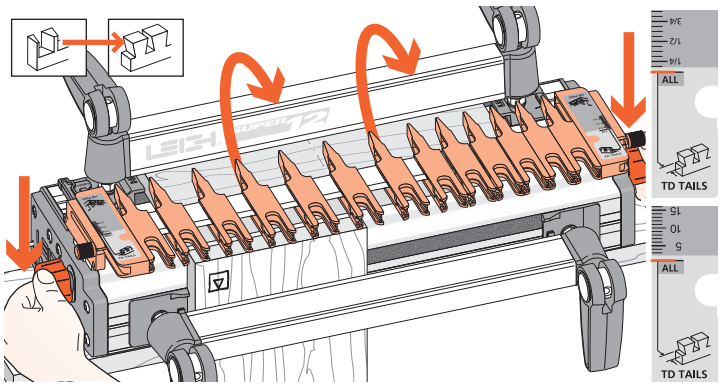
8-12 Leave three guidefingers over the board. Lock the right-most guidefinger with its center-line about 1/8"[3mm] ② in from the right edge of the board to form the other half-pin. Judge this distance by eye: it need not be exact. The sockets and pins will align automatically.



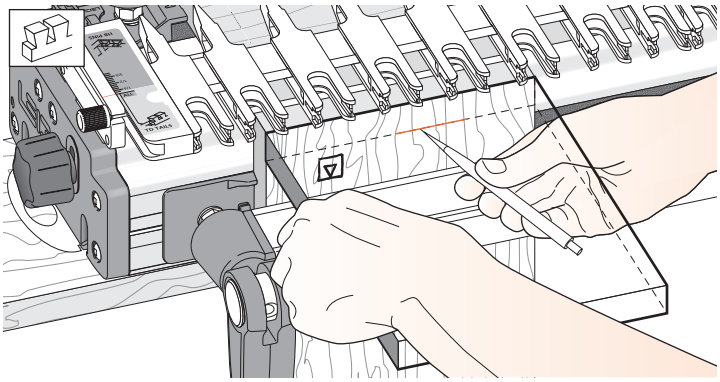
8-13 Space and lock the three remaining guidefingers as shown. Again, judge it by eye. If it looks right on the jig, the finished joint will look right.



8-14 Tighten any other loose guidefingers.

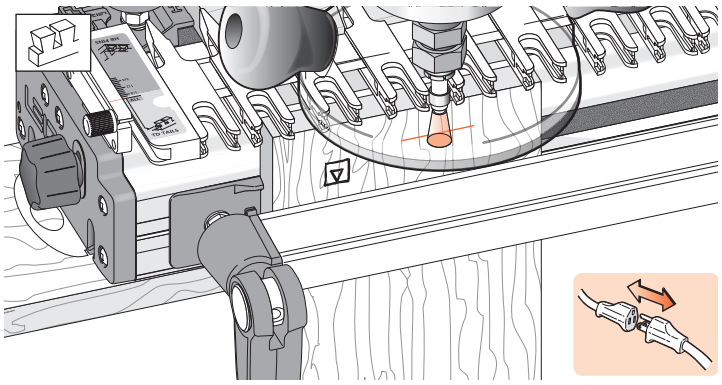


8-15 Rotate the finger assembly to TD TAILS mode, and set it to the "ALL" position on the scale. Lower the finger assembly onto the spacer board. **All TD tails are routed at this "ALL" setting. (This setting allows the dovetail bit to pass completely through all tail boards.)**

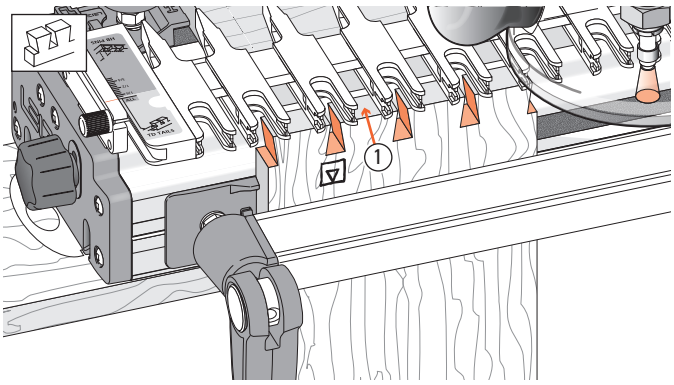


8-16 Place the end of a *pin board* horizontally flush under the guidefingers and mark a thin pencil line partly across the tail board.

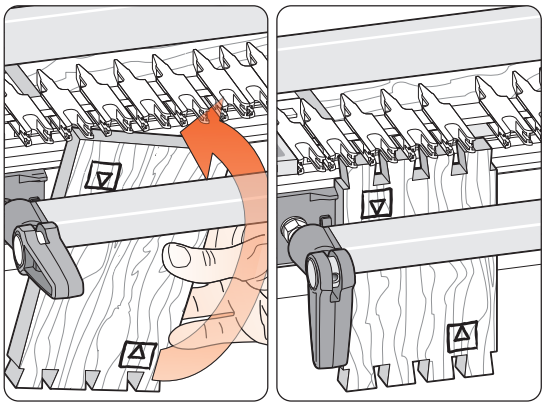
REMEMBER SAFETY!



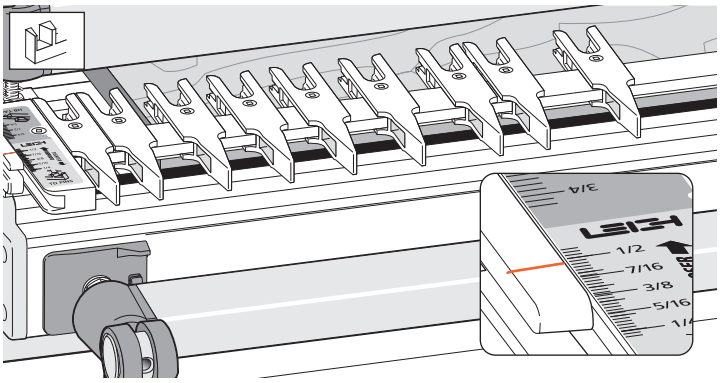
8-17 Place the router on the finger assembly and adjust the router until the dovetail bit tip is level with the **center** of the pencil line. *Note: This means the pin socket will be half a thin pencil line deeper than the thickness of the pin board, leaving minimal clean-up after assembly.*
Check to make sure the bit rotates freely.



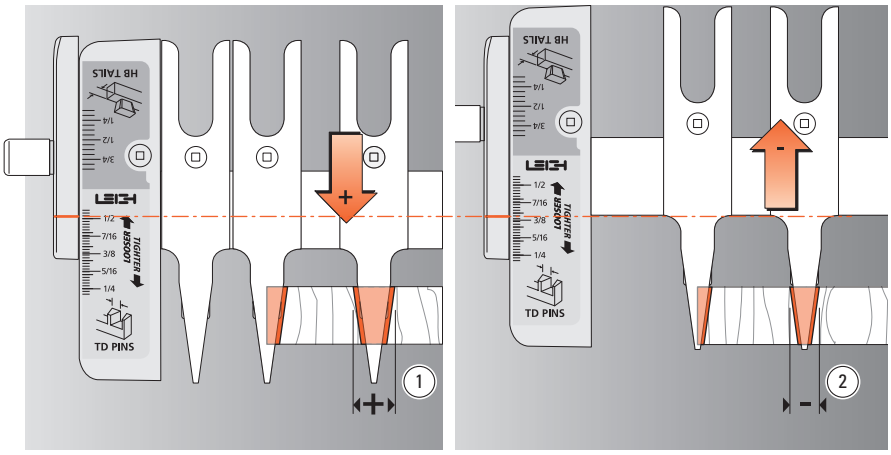
8-18 Plug in the router and rout out the half-pin and pin sockets. **Use only light side pressure on the guide fingers.** Make sure to run the guidebush along both sides of the finger opening. Take care not to rout unwanted sockets where there are gaps between pairs of fingers ①. Rout only between the rounded guidefinger tips. *See Hints and Tips Chapter 15.*



8-19 Before removing the routed board from the jig, check by eye and touch to make sure no parts have been missed. Release the clamp and reverse the tail board in the jig, keeping the same inside face ⊡ away from the jig body.
Rout the other end of this tail board and both ends of the second tail board in the same fashion.

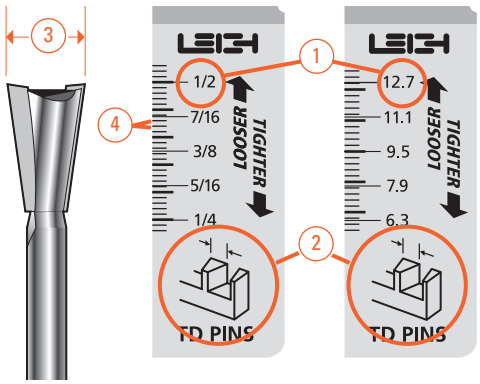


8-20 Rotate the finger assembly to TD PINS mode and set it on the ½"[12,7mm] mark ①. **Do not change the guidefinger layout.**



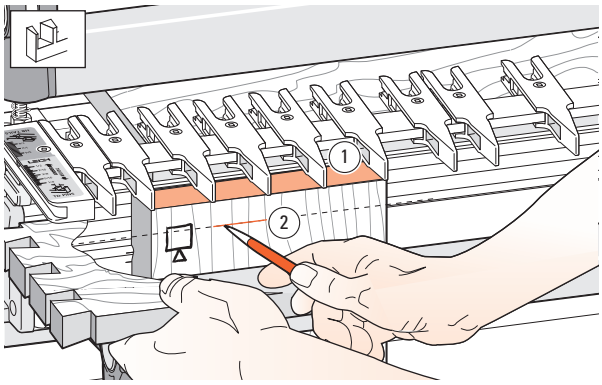
8-21 Finished Joint Tightness

The tightness of the finished joint is determined in TD PINS mode. The farther out toward the operator the finger assembly is set, the larger the pins will be ①. Moving the finger assembly in will make the pins smaller ②.

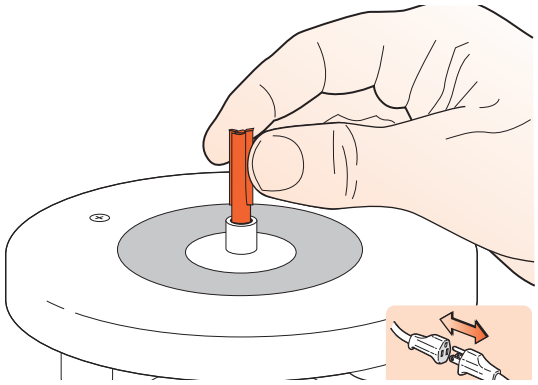


8-22 How the TD PIN Scales Work

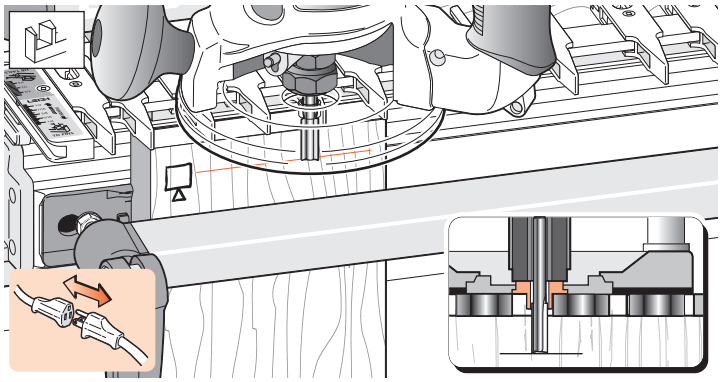
The dimensions on the TD Pin scale ① indicate the major width of the pin to be routed ②. This matches the size of dovetail bit just used to rout the tails ③. The increment lines on the scale ④ are spaced so that moving the finger assembly by one increment changes the joint glue-line gap by just 0.005"[0,125mm]. Even better, a one quarter division movement changes the fit by 0.00125"[0,03mm], a tiny one and a quarter thousandth of an inch! Once you achieve the desired joint fit, simply record the setting using the illustrations at the end of this chapter.



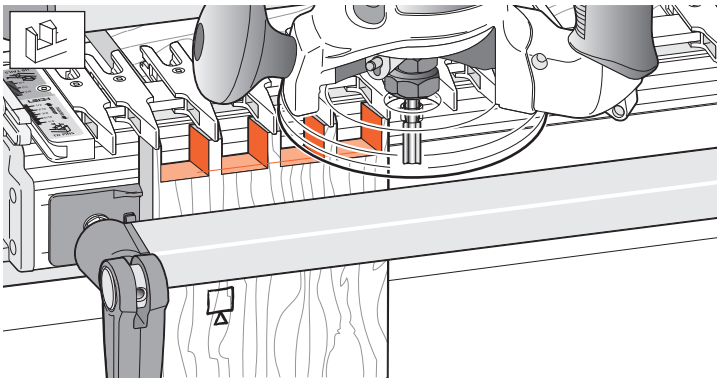
8-23 Clamp a test pin board against the left hand side stop, outside face ☐ away from the jig, with the top end flush under the guides ①.
Place the side edge of one of the finished *tail boards* horizontally flush under the guidefingers and mark a thin pencil line part way across the pin board ②.



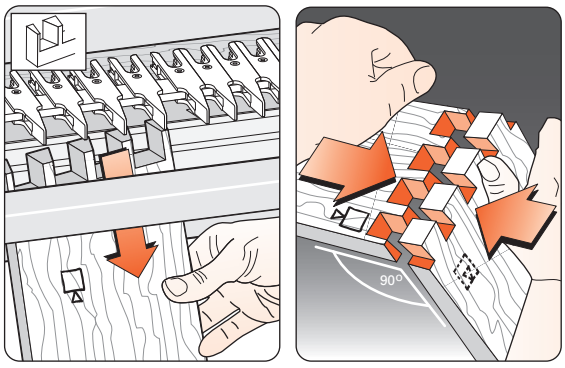
8-24 Unplug the router and remove the dovetail bit. Mount the included No. 140-8 straight bit to the router.



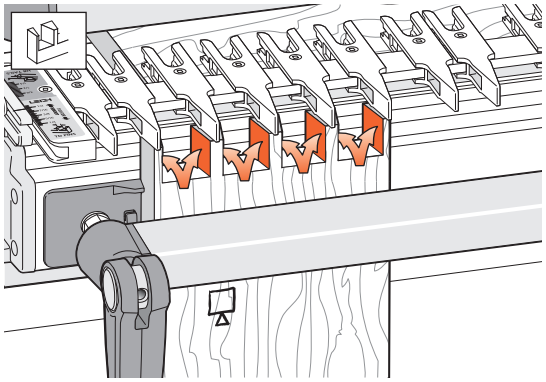
8-25 Place the router on the finger assembly and adjust the router until the bit tip is level with the center of the pencil line. Check to make sure the bit rotates freely.



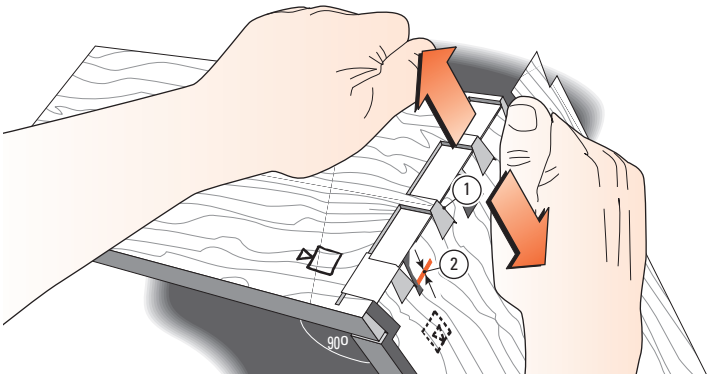
8-26 Rout out the waste between the pins. Check to make sure no parts have been missed. *See Chapter 15 "Hints and Tips" on how to minimize tearout.*



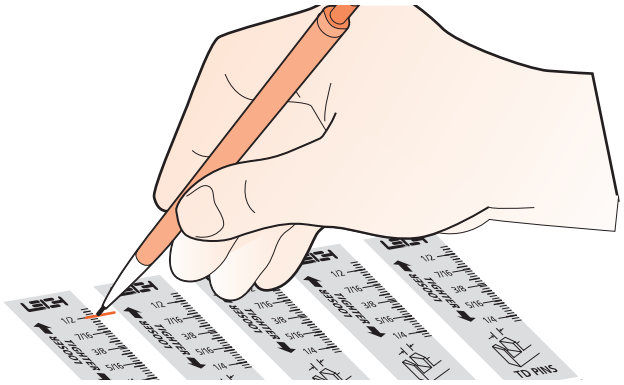
8-27 Remove the test pin board from the jig and test it for fit in one of the tail boards.
Make sure the outside faces outward on both pieces. A firm push fit is perfect, perhaps a tap with the heel of your hand. Having to use a mallet means the joint is too tight to take glue.



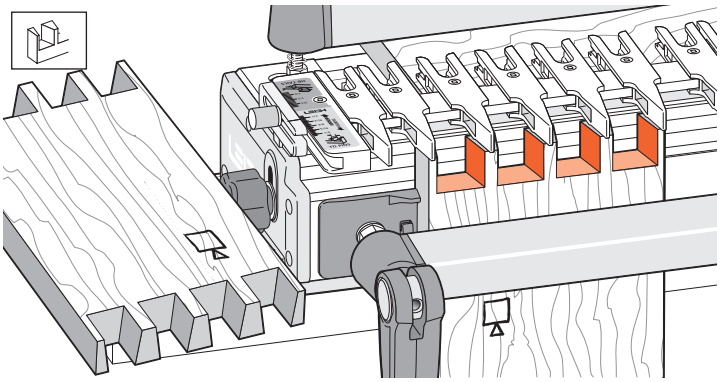
8-28 If it is too tight, move the finger assembly in (away from you) by one division on the scale. If it is only a little tight, adjust the scale by only half a division. Replace the same pin board back in the jig, carefully aligned against the same side stop. Rout off the sides of the pins and test it again for fit. Repeat as necessary to get a good fit.



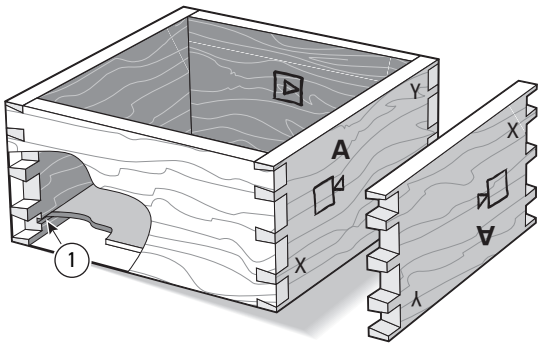
8-29 If the joint is loose, pull the pin board so that the angled sides of the pins and sockets jam tight together ①. The gap at the bottom of the pins ② is the amount you will have to move the finger assembly out (toward you). Reset the finger assembly and test again on the other end of this board.



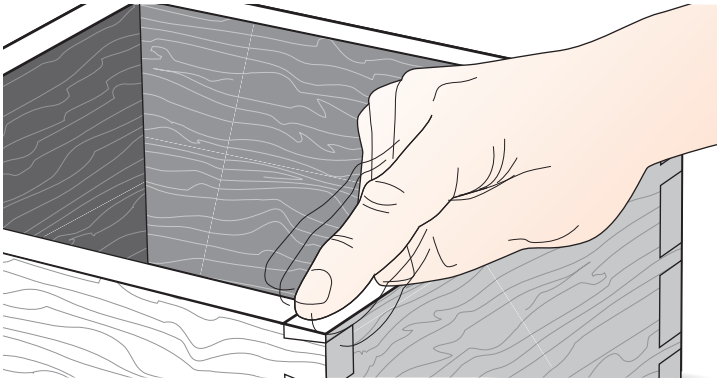
8-30 Once the correct fit is achieved, mark the final TD PINS scale setting on the pull-out or on one of the scale prints at the end of this chapter. Very slight variations to the scale setting may be necessary with different wood species or hardness. You can also note this on the Quick Reference pull-out card.



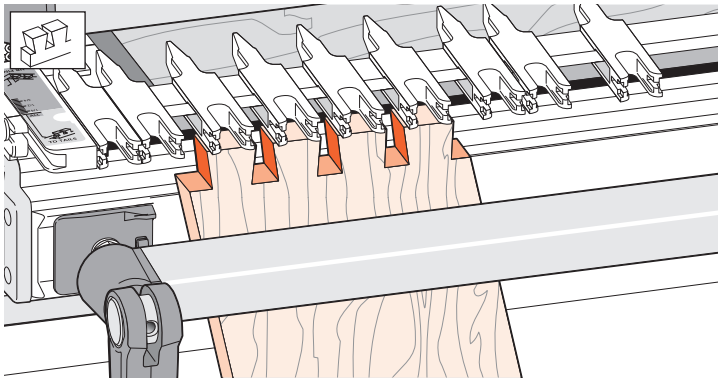
8-31 Rout all four ends of the pin boards, keeping the outside face ☐ outwards. (With luck you may not have used the fifth board.)



8-32 Assemble the box, making sure the tail boards face the proper way, i.e. tail boards inside face **in** ☐; pin boards outside face **out** ☐. Provided you haven't already routed out the drawer bottom grooves ①, it doesn't matter which edge of any of the boards are at the top or bottom, the box will still fit together i.e. pin board "A" can be up either way.

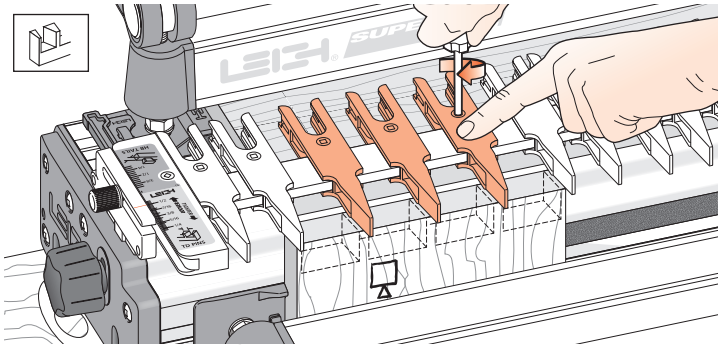


8-33 The box should be square and in plane. If it is not in plane (i.e., the side edges of each board are not in line), then either the ends of the boards are not square, the board widths are not exactly equal, or there is a concentricity problem (see 7-2 to 7-7).

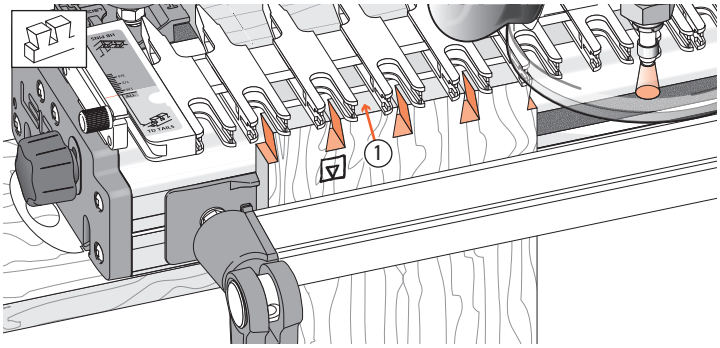


8-34 To form angled dovetails, refer to the Technical bulletin "How to Rout Angled Through Dovetails on your Leigh Jig". You can download a printable file of the bulletin from our website: www.leighjigs.com/support.php. ■

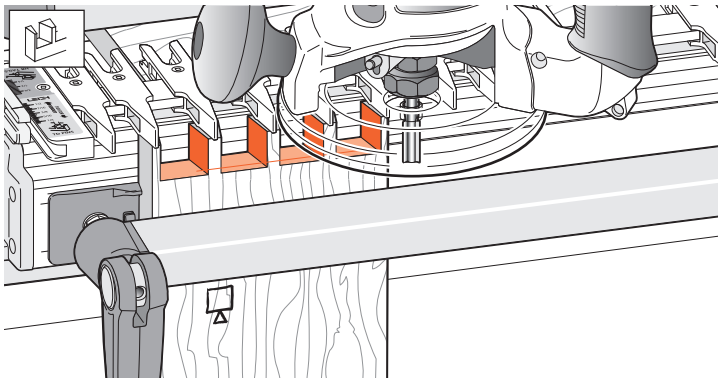
QUICK REFERENCE REMINDERS



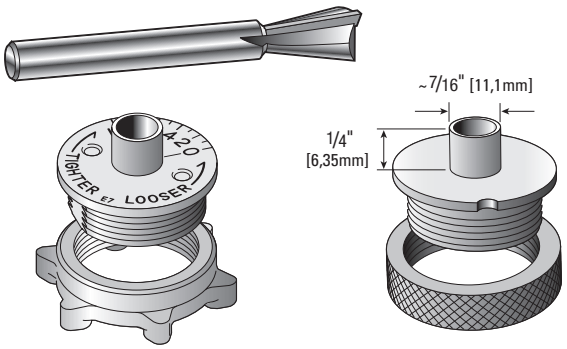
8-QR1 Through dovetails are laid out in TD PINS mode with the finger assembly slightly raised above the spacer board and the pin board. The outside face ☐ of the TD pins is away from the jig body.



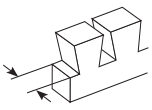
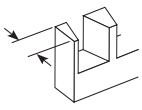
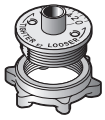
8-QR2 TD tail boards are clamped vertically in the jig. The inside face ☐ of the TD tails is away from the jig body. The finger assembly is in TD TAILS mode, set on the "ALL" setting. There is only one setting in this mode.



8-QR3 The finger assembly is in TD PINS mode, with the scale set to a recorded setting (see detailed fit instructions, 8-24 to 8-30). TD pins are cut with a straight bit; **the only time a straight bit is used in dovetailing.**
This is the only one of the four main modes that puts the outside face of the board away from the jig body.



8-QR4 Through dovetail tails are always routed with an 8° dovetail bit to match the 8° guidefinger. All through dovetail routing on the Superjig is done with the Leigh **e7-Bush**, or any ~7/16" [11,1mm] diameter bush (min. barrel length 1/4"[6,35mm]). *See page 68 for more on routers and guide bushings.*

				
Thickness of Tail Board	**Thickness of Pin Board**	**Dovetail Bit**	**Straight Bit**	**Guidebush Diameter**
up to 13/16"[21]	1/2" - 13/16" [12-20]	No.80-8	No.140-8	e7-Bush or ~7/16" [11,1] diameter bush
up to 13/16"[21]	3/8" - 5/8" [10-16]	No.75-8		
up to 13/16"[21]	1/4" - 1/2" [6-13]	No.70-8		
up to 13/16"[21]	up to 3/8" [10]	No.60-8		
up to 13/16"[21]	up to 1/4" [6]	No.50-8		

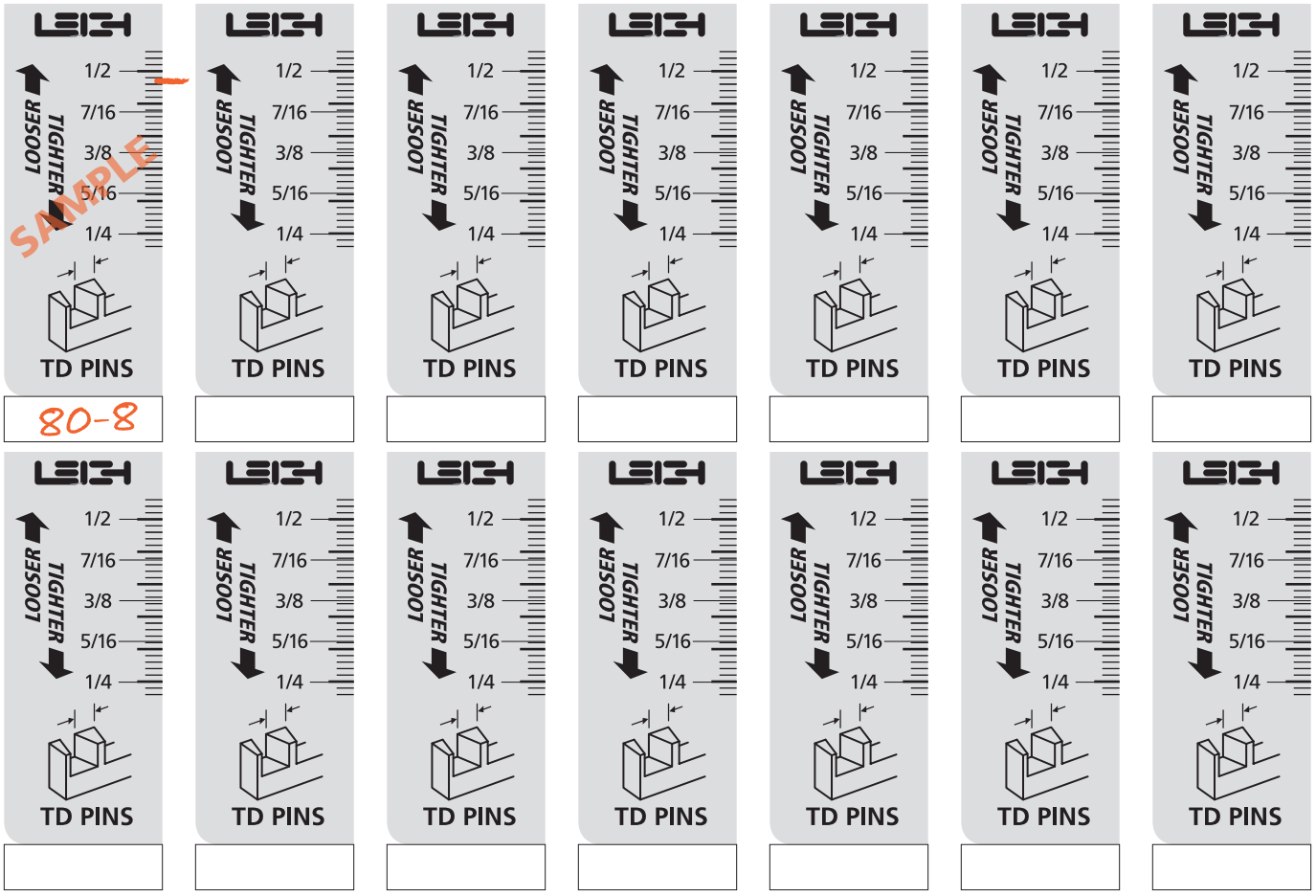
Numbers in brackets are millimeters

8-QR5

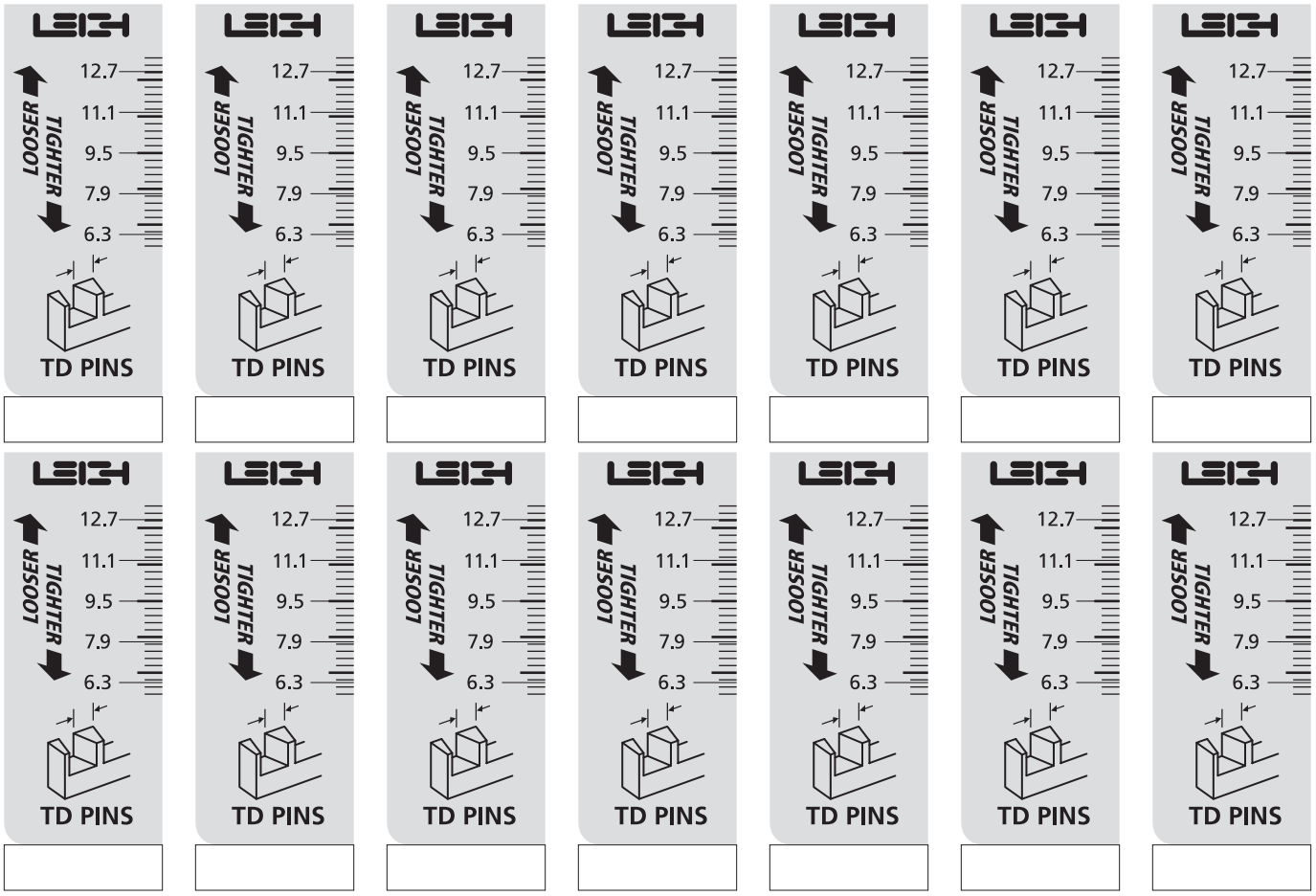
Here is a quick reference selection chart for through dovetail bits and guidebushes. Please study the bit and guidebush selection appendices for a full explanation. *Note: 13/16"[20mm] is the maximum through pin board thickness.* ■

Project Settings

INCHES



METRIC



Variably Spaced Half-Blind Dovetail Procedures

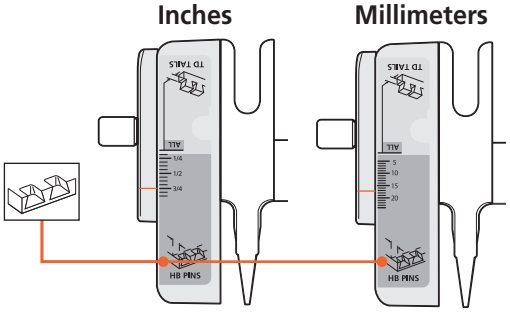
IMPORTANT! *The most commonly misunderstood aspect of routing half-blind dovetails is how the dovetail bit's depth of cut is used to adjust the joint fit, and how the angle of the bit affects that depth of cut. Review this chapter for a clear understanding of this concept.*

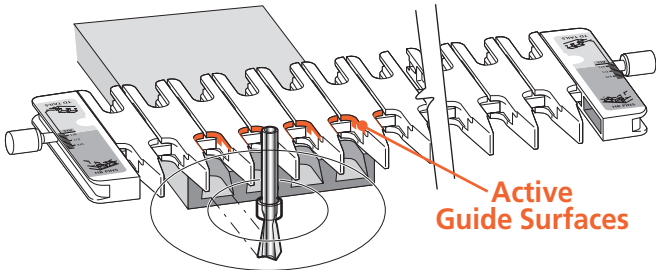
Note: Use the e7-Bush set at "10", or any round ~7/16"[~11,1mm] bush (min. depth 1/4" see page 67), and any one of the five bits listed on the next page may be used for half-blind dovetails. See Appendix II "Half Blind Bit Selection" for a full description on how to select an appropriate bit.

1 Start in Half-Blind Dovetail Pins (HB PINS) mode

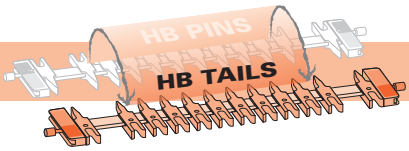
MODE ICONS

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

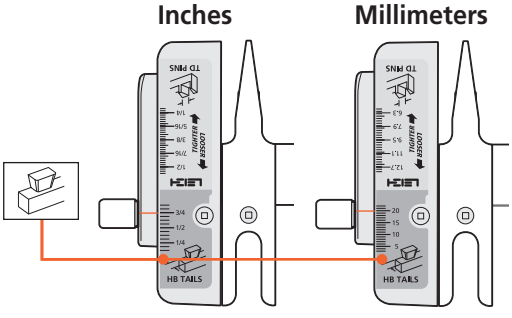


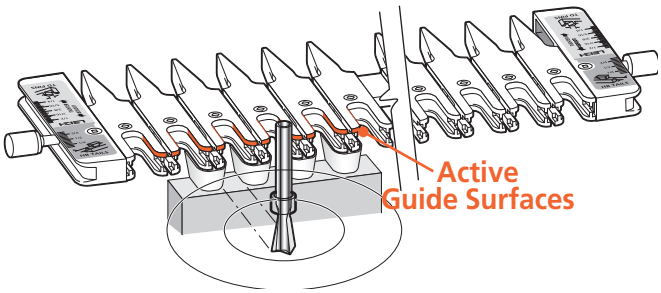


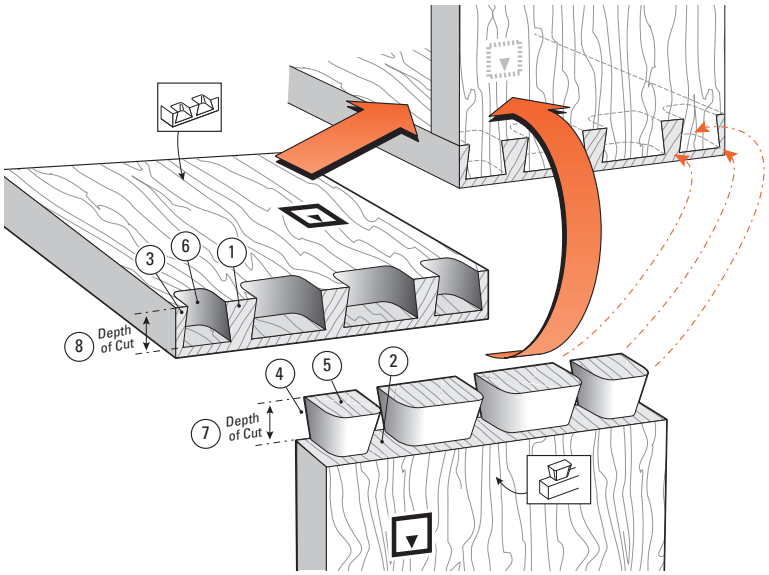
2 ROTATE the finger assembly toward you 180°



3 Now the Finger Assembly is in Half-Blind Dovetail Tails (HB TAILS) mode





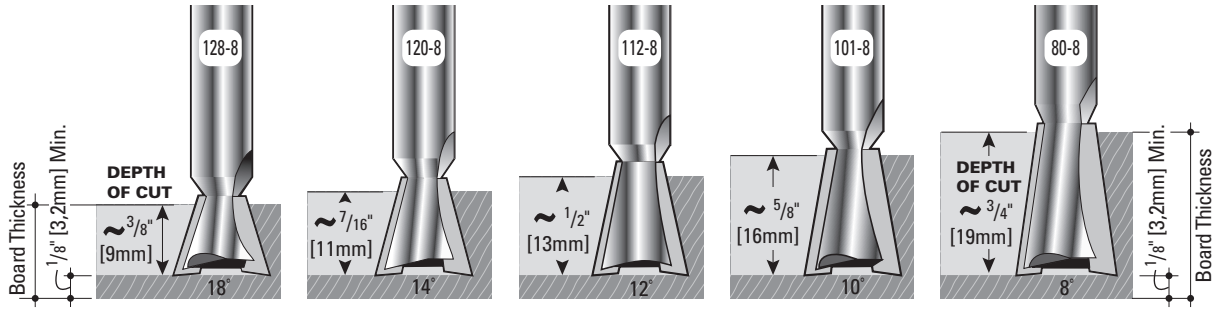


9-1 Half-Blind Dovetail Terminology:

① Pins
② Pin sockets
③ Half-pins
④ Half-pin sockets
⑤ Tails
⑥ Tail sockets
⑦ Depth of Cut (tails)
⑧ Depth of Cut (pins)

The pins fit in the pin sockets. Joints almost always begin and end with a half-pin as shown.

9-2 Cutting Depth for Variably Spaced Half-Blind Dovetails

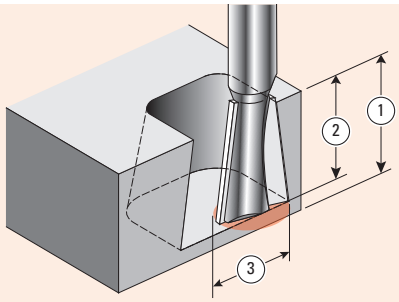


Note: Add at least 1/8"[3,2mm] to the depth of cut for board thickness. ~ Symbol for "approximately"

⚠ 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 pinboard (drawer front) thickness you are using.

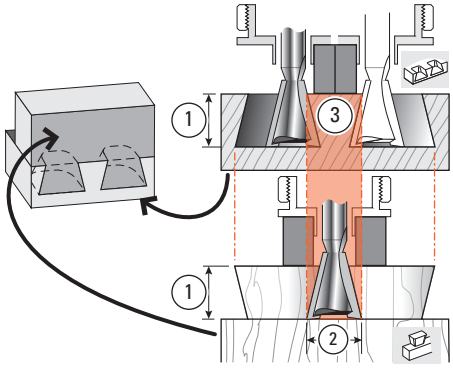
- **Choose one of the five 1/2" [12,7mm] diameter dovetail bits shown above. Check bit selection in Appendix II.**
- **Depth of cut must be as specified for each of the five bits illustrated above.** *Note: Leigh bits 101-8, 112-8 and 128-8 are optional.*
- **Raising the bit above its specified cutting 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 why in Steps 9-3 to 9-5.***
- **Half-blind PINS and TAILS are routed with the same dovetail bit and must be at the same Depth of Cut.**
- **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.**



PINBOARD THICKNESS ① determines the **maximum depth of cut** ② you can use. Select a bit with a specified cutting depth that is at least 1/8" **less** than the pinboard thickness.

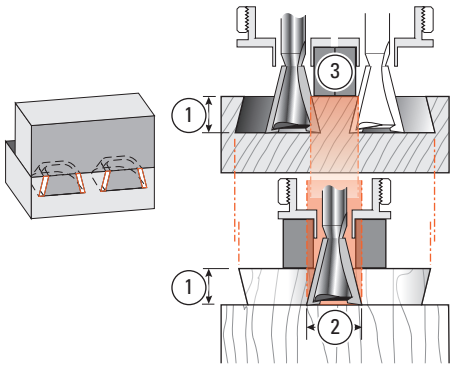
A dovetail bit will produce **only one specific cutting depth.**

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

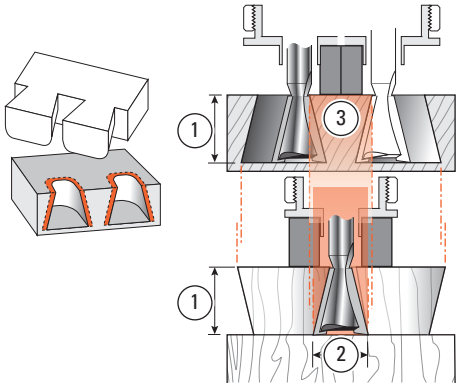


9-3 Joint Fit and Depth of Cut

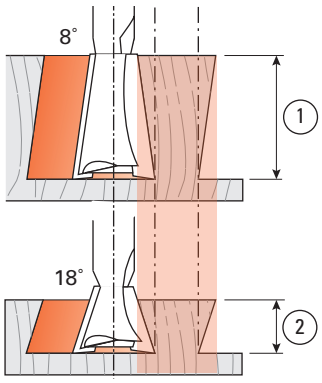
Here's why the depth of cut ① changes the fit in half-blind dovetails. Increasing or decreasing the depth of cut does not affect the pin socket width ②, but does affect the width of the pin ③ that goes into the socket ②.



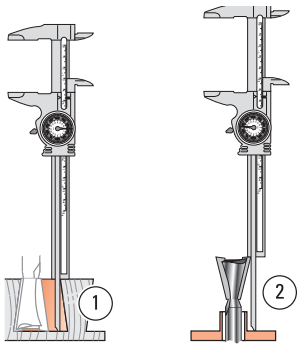
9-4 Note that decreasing the bit depth ① makes the pin ③ narrower while the pin socket ② stays the same width, producing a loose fit.
Decreasing the bit depth (i.e. raise the bit into the router) produces a looser fit.



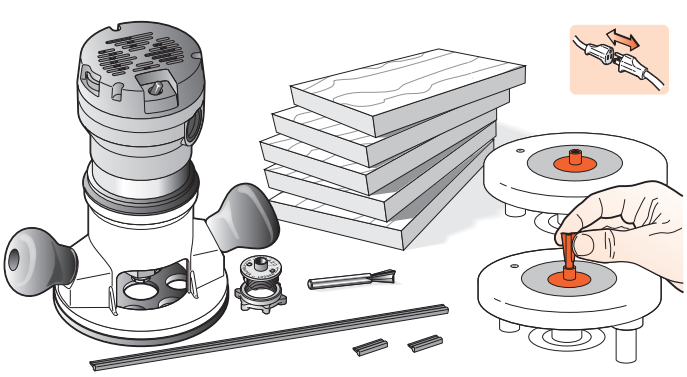
9-5 Increasing the bit depth ① makes the pin ③ larger while the pin socket ② stays the same width, producing too tight a fit.
Increasing the bit depth (i.e. lower the bit) produces a tighter fit.



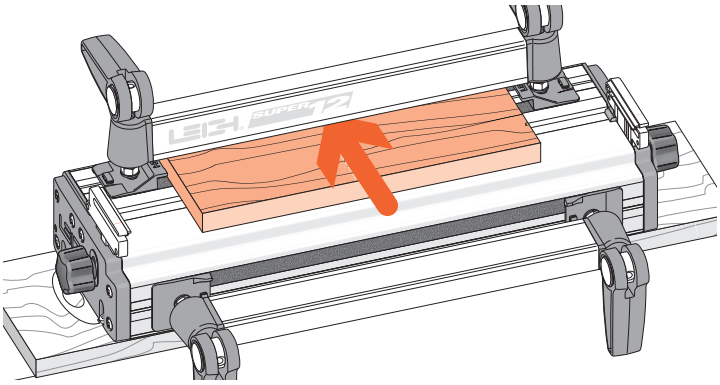
9-6 Bit Angle and Depth of Cut Half-blind pins and tails are routed with the same dovetail bit, the **same** guidebush, and the **same** depth of cut. A different depth of cut requires a different angled bit. Leigh offers five different angled dovetail bits for a range of cut depths. A lesser angle, say 8°, for a deeper cut ①; a greater angle, say 18°, for a shallower cut ②.



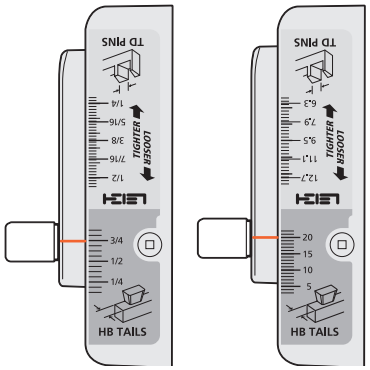
9-7 Cumulative plus/minus tolerances in routers, bits and guidebushes, make it impossible to state exact bit depth for first-time precision fit. All dovetail jigs require trial and error tests to attain fine fitting joints. The good news; we give a starting depth for each bit. Test and measure the successful 'Best fit' depth of cut ① or bit projection ②. Record for future first-time fits.



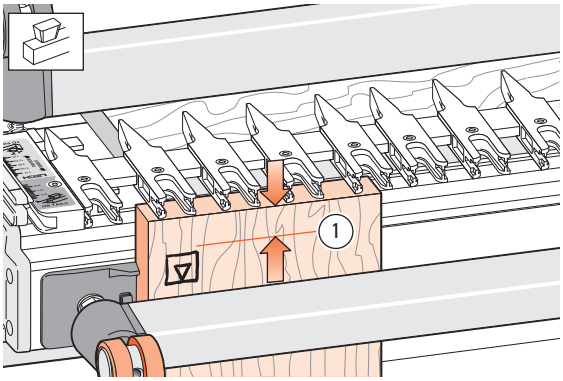
9-8 Routing a Test Joint Use the e7-Bush or a 7/16"[11,1mm] diameter bush (min. depth 1/4" *see page 67*) and No.120-8 1/2"[12,7mm] 14° dovetail bit. (80-series bits cut too deep for 3/4"[20mm] boards, see HB bits, Appendix II). Select several pieces of 3/4"x5 1/2"[20x140mm] x about 8"[200mm], and the plastic bridge. *Note: Half-blind pin boards must be minimum 1/2"[13mm] thick to clamp. Thinner boards; see 9-21.*



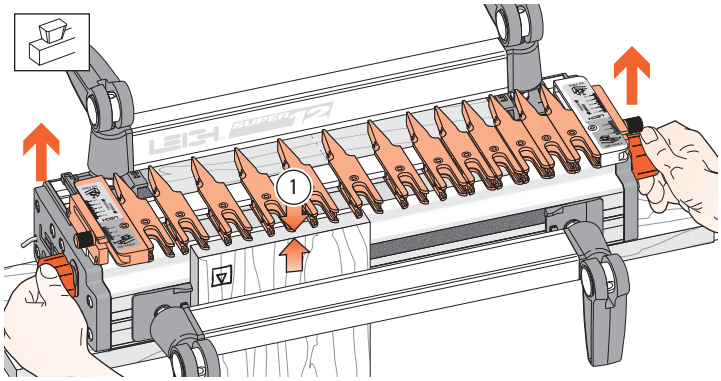
9-9 Clamp the spacer board in the rear clamp.



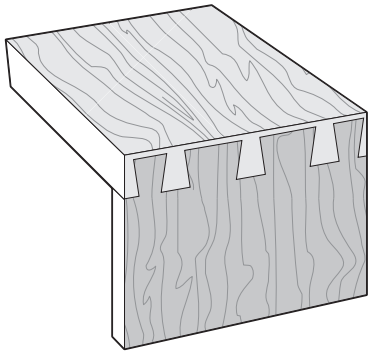
9-10 Mount the finger assembly on the support brackets in the HB TAILS mode, **flat on the spacer board**, scales set on the thickness of the tail board (3/4"[20mm] in this instance). **The HB TAILS scale is always set at the tail board thickness.**



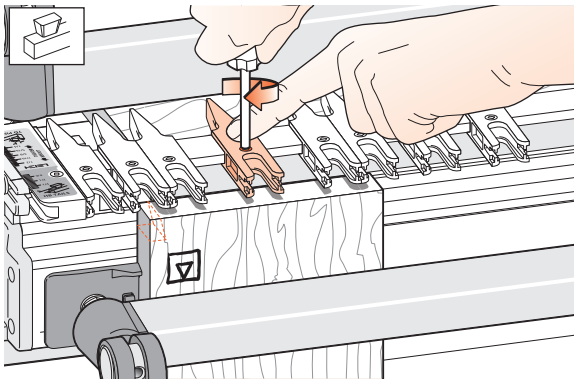
9-11 Measure and mark a line on the inside face of the tail board ① to the bit's depth of cut as in 9-2. Clamp this test tail board in the left front clamp, against the side stop with the top edge flush under the guidefingers, and the inside face ◻ of the drawer side away from the jig.



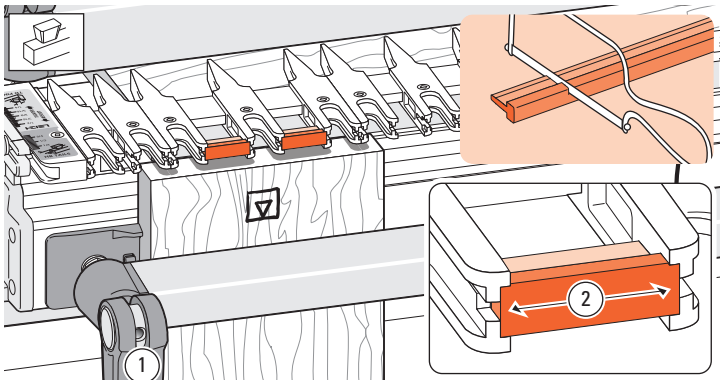
9-12 Unlock and raise the finger assembly support brackets slightly so that the finger assembly is about 1/16"[2mm] ① above the boards. This will allow easy movement of the guidefingers.



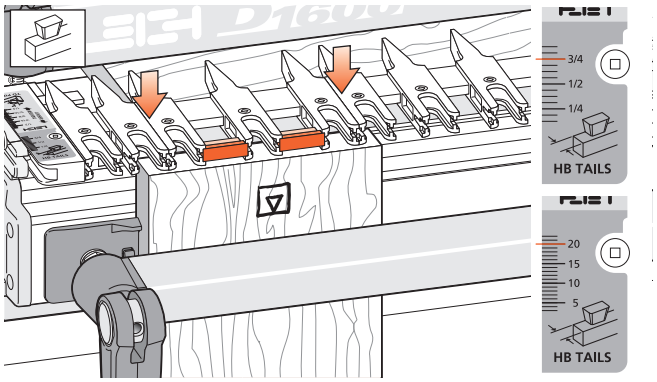
9-13 The following joint design is suggested for this trial. It has a typical and traditional even layout of pins, with half-pins at each edge. The Leigh jig, however, allows for an infinite variety of joint designs, and boards of different thicknesses can be joined to each other as shown in this illustration. Before attempting joints of asymmetrical design, see chapter 12.



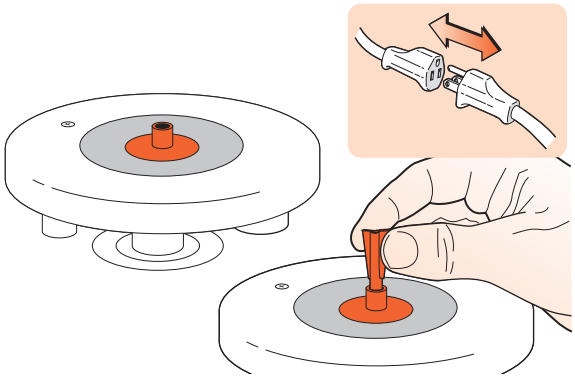
9-14 Ignoring the extreme outer guidefinger next to the scale (which just supports the router), loosen enough of the adjacent guides to give the required pin socket layout. The half-pin guidefinger position illustrated will give a half-pin socket profile like that shown (dotted lines).



9-15 If the gaps between the guidefinger tails are wider than about ⅛"[3mm], mark off and cut some pieces of bridge extrusion ① to fit into the slots in the ends of the guidefinger tails. Cut the pieces a "bare" ⅛"[3mm] more than the distance between the fingers ②. They are a firm friction fit.
After completing a project, save the bridge pieces for future use.

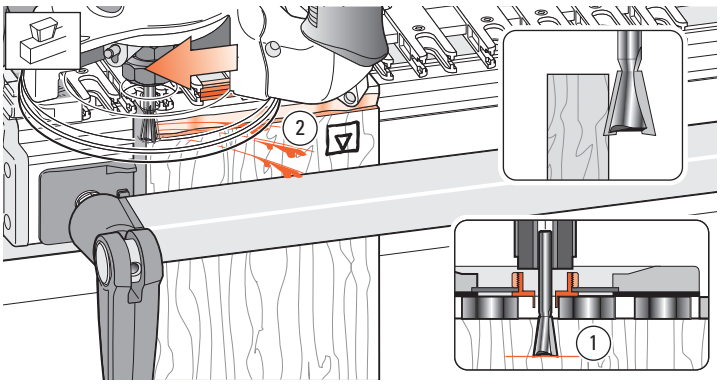


9-16 Remember to tighten any loose guidefingers. **Lower the finger assembly back onto the spacer board and workpiece. It must touch the workpiece or the depth of cut will vary and the joint won't fit.** The scale should be set on the tailboard thickness, in this case ¾"[20mm].

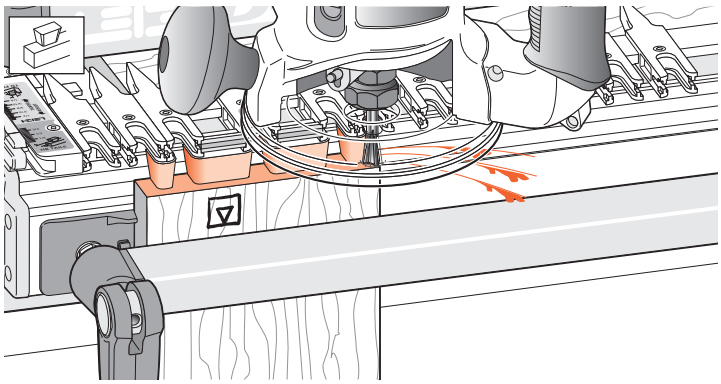


9-17 Attach the provided **e7-Bush** or a 7/16"[11,1mm] diameter bush securely to the router. No guidebush adjustment is required with half-blind dovetails.
Fit the selected dovetail bit to the router.

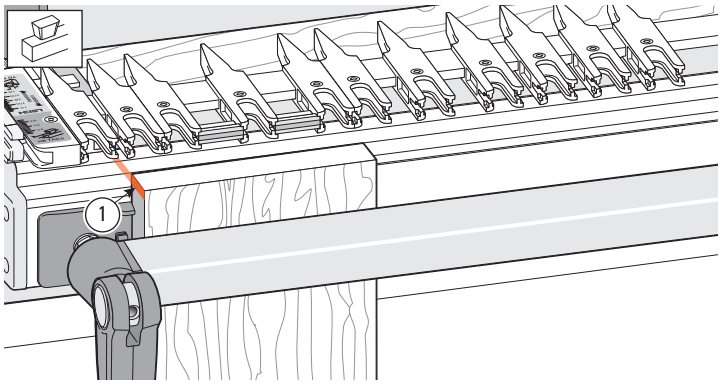
REMEMBER SAFETY!



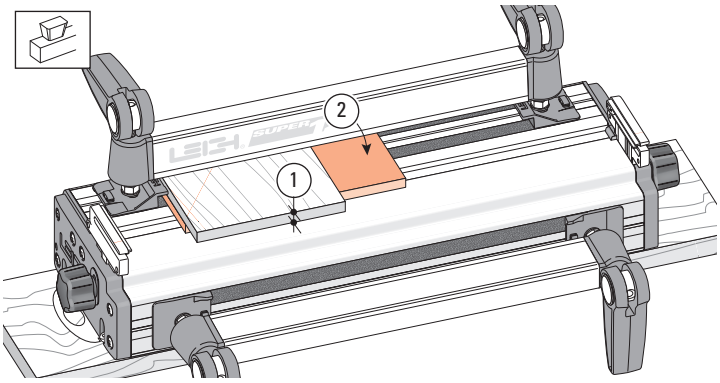
9-18 ⚠ Adjust the bit height until the bit tip is level with the marked line ①. For the first light cut move the router from right to left. **Make sure you control it firmly, because it is driven in this direction by the bit. Only the tip of the bit should be cutting on the first cut** ②. This *back* or *climb* routing leaves a very clean shoulder in side grain.



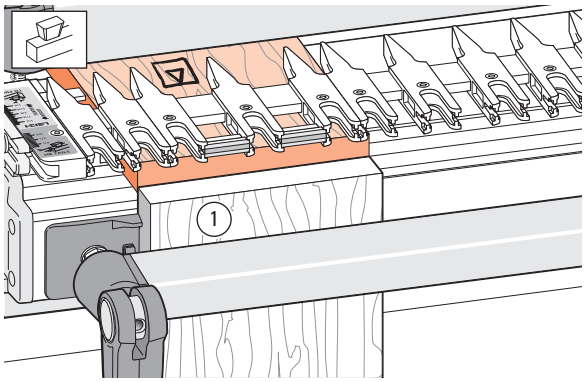
9-19 Now rout in and out from left to right following the guides and bridge pieces to rout out the pin sockets, leaving the tails.
See Hints and Tips 15-11.



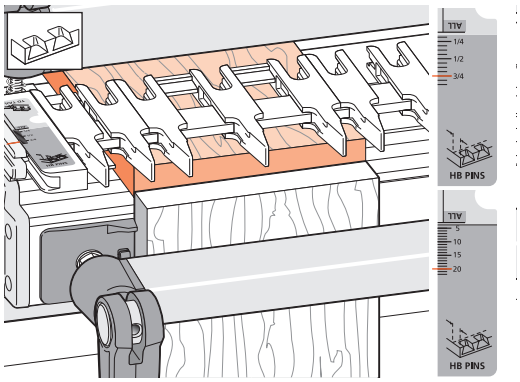
9-20 Remove the test tail board, then clamp a scrap board in the front of the jig so that the top edge projects above the top face of the jig by about ⅛"[3mm] ①. This will keep the scrap piece below the path of the bit when routing the pin board.
Remove the spacer board from the rear clamp.



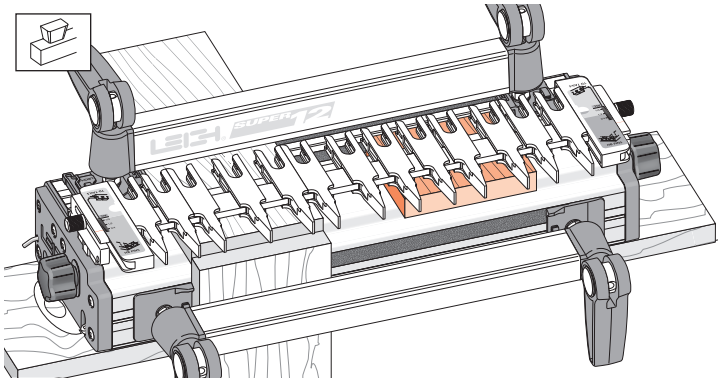
9-21 If you're mounting Thin Pin Boards: Minimum recommended pin board thickness is ½"[13mm]. Remember, No.128-8 bits rout at ⅜"[9,5mm] deep. If you rout a pin board less than minimum thickness ①, you need to pack the board up from the jig body. We suggest a piece of ¼" to ⅜"[6 to 9mm] plywood for this purpose ②.



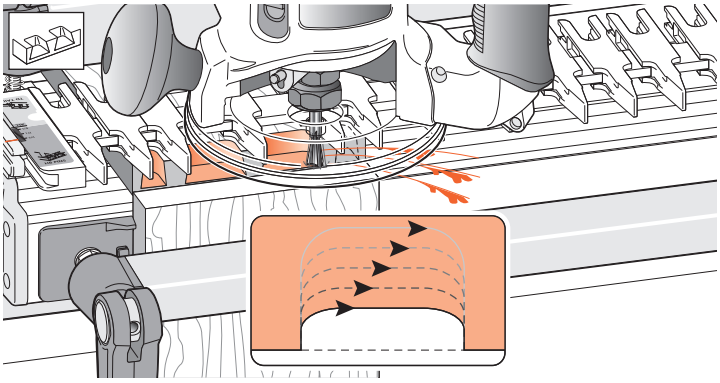
9-22 Flush Drawers Place a test pin board in the left rear clamp against the side stop, its front end edge flush to the vertical board, the inside face ⊡ of the drawer front away from the jig body. The pin board is now positioned with the edge to be routed flush with the jig's front face, correctly registered for the scale readings. **For rabbeted drawer fronts, see Chapter 11.**



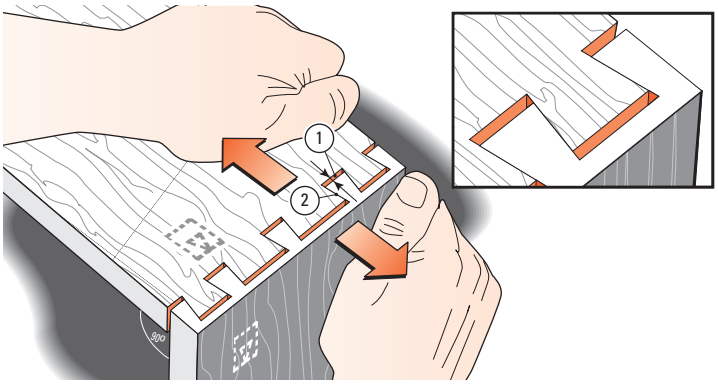
9-23 Rotate the finger assembly to HB PINS mode. Set the HB pins scale *equal to tail board thickness* (i.e., same setting as tails: this example, ¾"[20mm]). **HB pins and HB tail scales are always set to tail board thickness. Make sure the finger assembly is flush and level on the pin board.** The guidefingers must touch the pin board or depth of cut will vary, causing poor joint fit.



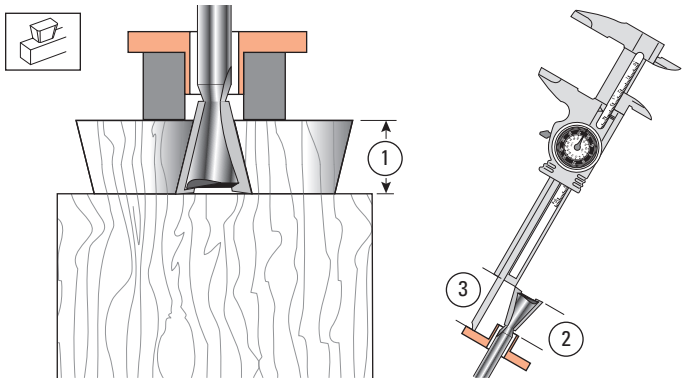
9-24 If you have difficulty leveling the finger assembly on a narrow workpiece, place a board the same thickness as the pin board under the other end of the finger assembly, **but not in the rear clamp.**



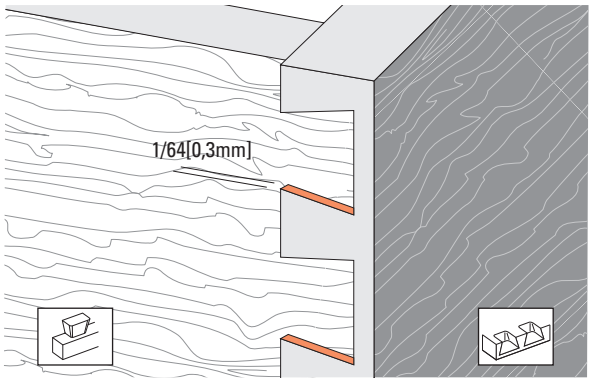
9-25 ⚠ Rout out the waste between the pins. Rout each space from **left to right. Do not back-rout on end grain. If the bit enters on the right side of the opening there will be a very strong pull to the left, so…** rout each opening in at least three or four passes, left to right.



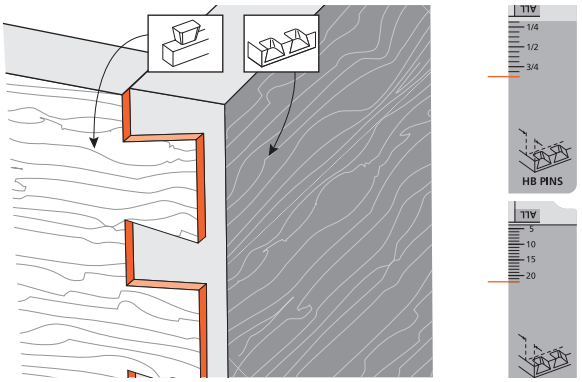
9-26 Remove the pin board and test the joint for fit. If the joint is loose, as shown here, you need to **lower** the bit by the same amount as the gap at the bottom of the pins ① (when the pins are pulled against the socket sides ②). If the joint is too tight, **raise** the bit slightly. Test again. You cannot rout the same board twice with a dovetail bit, so use two fresh board ends for each test.



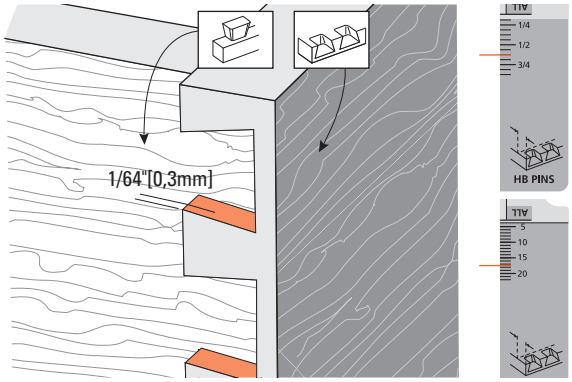
9-27 Keep the test tail board that fits well, and mark it with the number of the bit you used to rout it. For quick set-up next time, clamp this tail board in the jig as a *depth-of-cut gauge* ① to show how far to lower the bit. Better yet, measure the bit projection from the end of the guidebush ② or guidebush flange ③ and record this for fast set-ups in future.



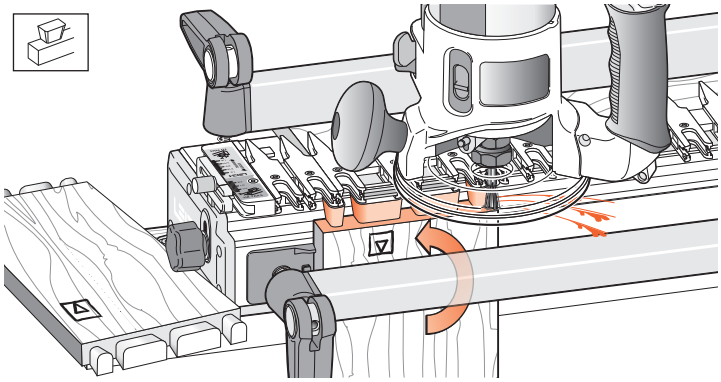
9-28 When you have the proper tightness of fit, check the flushness. The tails should be under flush to the pins by *no more than 1/64"[0,3mm] to allow for cleanup (exaggerated here)*. Any concentricity errors in the collet and guidebush on different routers will affect this tolerance.



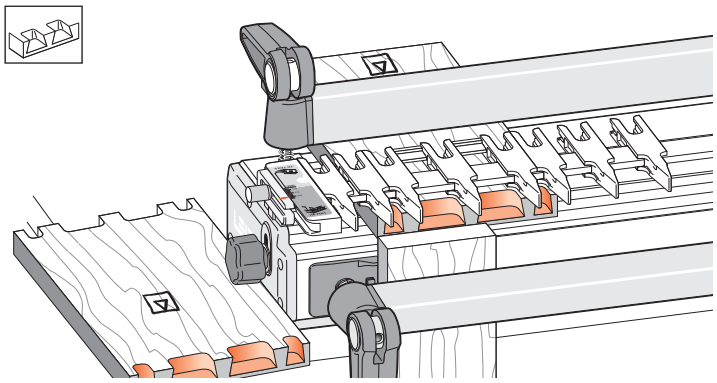
9-29 If the tails stand out from the pins, set the HB PINS scale **away from the operator** by the amount required.



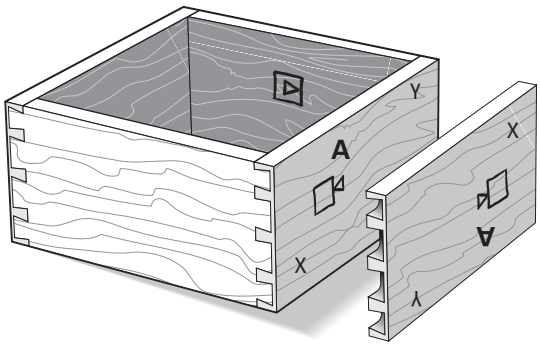
9-30 If the tails fit in too far past the pins ends, set the HB PINS scale **toward the operator** by the amount required. These adjustments for "flushness" are made only in the HB PINS mode.



9-31 To make a box, rout all four ends of the tail boards, keeping the inside face ⊡ of the tail boards away from the jig.

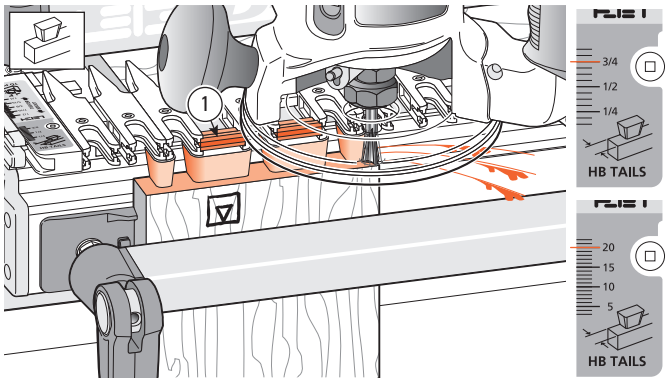


9-32 Rout all four ends of the pin boards keeping the inside face ⊡ of the boards away from the jig.
Note: When making drawers you may prefer to use through dovetails on the rear corners.

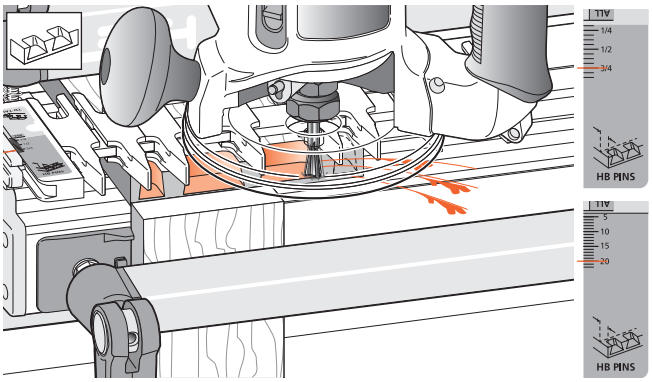


9-33 Assemble the box. As with through dovetails, it doesn't matter which edge of any of the boards are at the top or bottom, the box will still fit together e.g. pin board "A" can be up either way.

QUICK REFERENCE REMINDERS

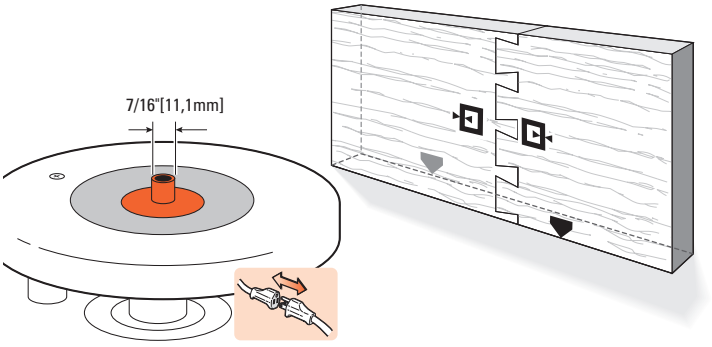


9-QR1 Half-blind (HB) tails: Drawer sides (tailboards) are clamped vertically in the jig. The inside face ⊡ of the drawer side goes away from the jig body. The finger assembly is in the HB TAILS mode, set to the thickness of the drawer side. Use bridge pieces where required ①.



9-QR2 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 9-28 to 9-31).

Thickness of Tail Board	Thickness of Pin Board	Depth of Cut	Dovetail Bit	Guidebush Diameter
up to 1"[26]	7/8" -1" [22]	~ 3/4" [19]	No.80-8	
up to 1"[26]	3/4" -up [20]	~ 5/8" [16]	No.101-8	e7-Bush
up to 1"[26]	5/8" -up [16]	~ 1/2" [13]	No.112-8	or
up to 1"[26]	9/16" -up [14]	~ 7/16" [11]	No.120-8	~7/16" [11,1]
up to 1"[26]	1/2" -up[12]	~ 3/8" [9]	No.128-8	guidebush



9-QR3 On the Leigh Superjig, all half-blind dovetails are routed using the **e7-Bush** or a 7/16"[11,1mm] diameter (min. depth 1/4" *see page 67*) bush. **Instructions for end-on-end dovetails** are at www.leighjigs.com/support.php. Scroll down Bulletins to "Superjig/D1600 End on End Dovetails". ■