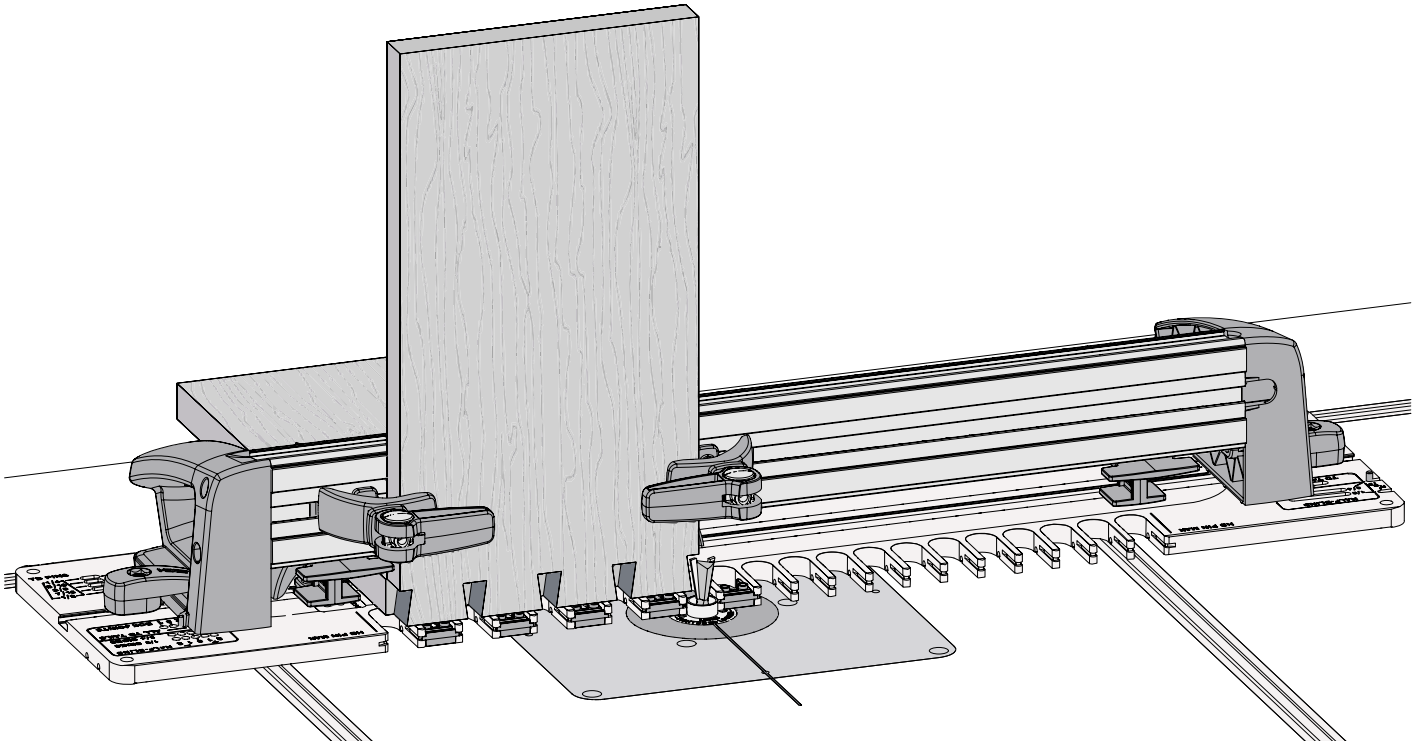
LEIGH RTJ400

16" Router Table Dovetail Jig

User Guide



Dedicated Customer Support

1-800-663-8932

Your New Leigh RTJ400 Router Table Dovetail Jig for Through Dovetails, Half-Blind Dovetails and Box Joints

The RTJ400 was designed for the ever increasing use of router tables in shops everywhere. The RTJ400 can produce sizes and types of joints not possible with typical template jigs, including through dovetails, half-blind dovetails and box joints (finger joints), and thanks to the patented Leigh eBush, perfect fitting joints are guaranteed every time.

Customer Support
If you have any questions that are not answered in this user guide, please call Leigh Customer Support: **1-800-663-8932** in North America or email: **help@leighjigs.com.** For support contacts in your country of purchase, see Customer Support, Chapter 15.

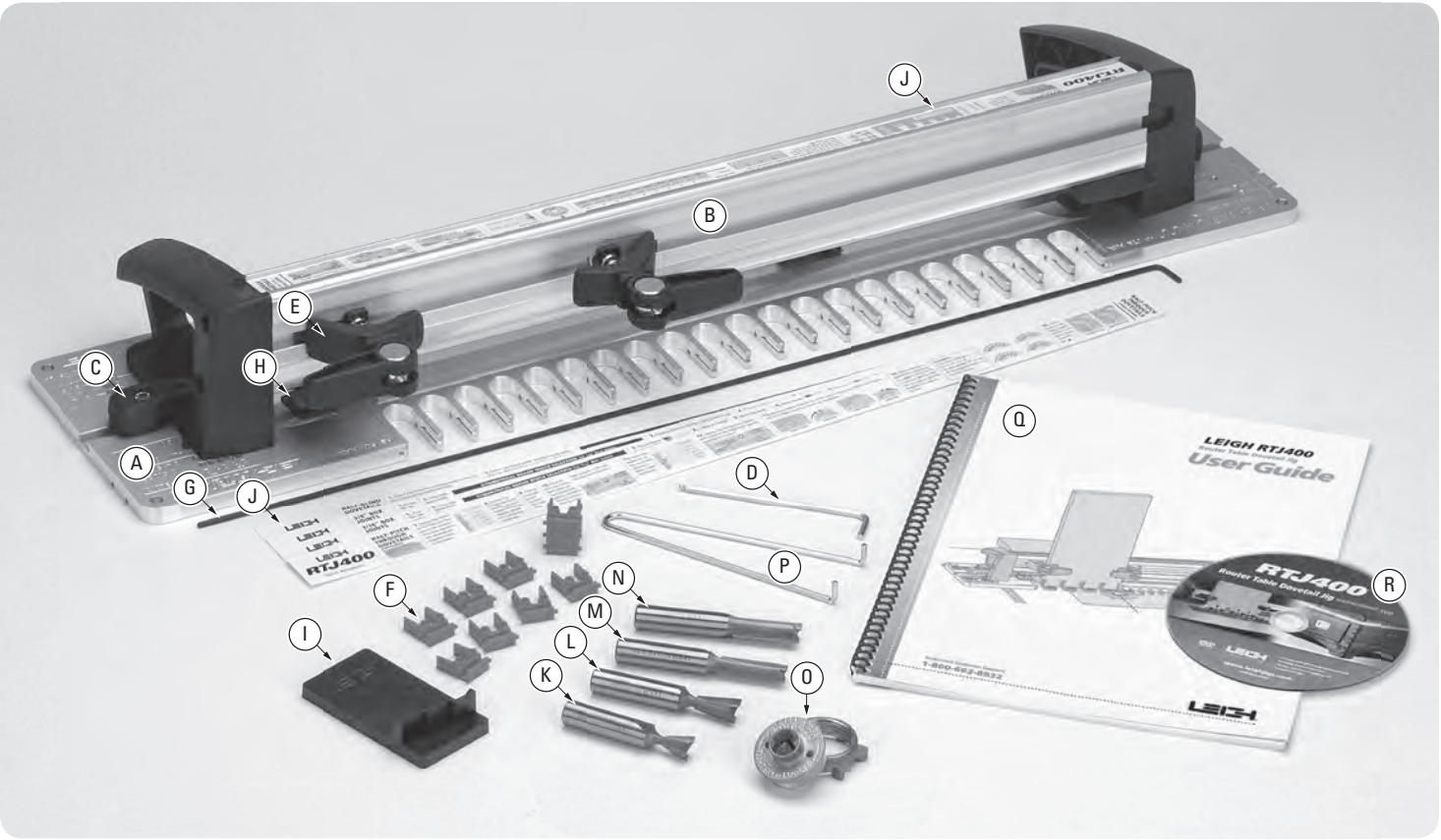
Reminder: If at first you don't succeed, read the instructions!

Important! Inches and Millimeters
Text and illustrations in this English language user guide indicate dimensions in both inches and millimeters, where applicable, with "inches" first, followed by "millimeters" in square brackets, i.e. ½" x 2"[12mm x 50mm].

Do not be concerned that the inch/millimeter equivalents are not mathematically "correct". Just use the dimensions that apply to your guides and bits.

The RTJ400 is covered by the following patent: U.S. Patent No. 8,534,329
Patents for all Leigh elliptical guide bushings: U.S. 8,256,475 UK GB2443974

Contents



RTJ400 Jig Features and Parts

See complete list of jig parts in Chapter 14.

Ⓐ **Jig Template**, CNC machined, with holes and slots to position the frame, and precision guides for routing tails, pins & sockets

Ⓑ **Jig Frame**, CNC machined, with pins that fit into template holes & slots

Ⓒ **Frame Latches**, **2**, to secure jig frame to jig template

Ⓓ **Hex Key**, 1/8" Ball End

Ⓔ **Cam-Action Speed-Clamps, 4**, for mounting workpieces to jig

Ⓕ **Blockers, 10**, inserted in template guide openings to prevent routing

Ⓖ **Stop Rod**, inserted in template holes to limit cutting depth

Ⓗ **Side stops, 2**, for mounting workpieces; adjustable for all joint types

Ⓘ **Bit Depth Gauge**, for setting cutting depth on half-blind dovetails

Ⓙ **Instruction Strips, 5**, for quick reference; inserted in jig top

Ⓚ **Dovetail Bit 120-500**, 1/2" x 1/2" x 14º

Ⓛ **Dovetail Bit 80-500**, 1/2" x 13/16" x 8°

Ⓜ **Straight Bit 143-500**, 3/8" x 1-1/4"

Ⓝ **Straight Bit 160**, 1/2" x 1-1/4"

Ⓞ **Guide Bushing**, e10 Elliptical eBush, for perfect joint fit

Ⓟ **Pin Wrench**, to adjust e10 eBush

Ⓠ **User Guide**, Fully Illustrated

Ⓡ **DVD Video**, Instructional

You will need:

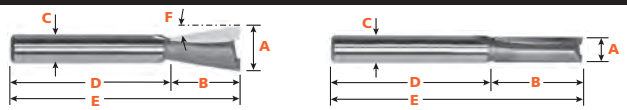
• A router table that accepts standard size (1-3/8"OD) guide bushings

Note: See page 6 for instructions on fitting the Leigh eBush to your router table.

Bits for the RTJ400

This chart shows all bits available for the RTJ400.

RTJ400 BIT SPECIFICATIONS



Leigh Bits	A Bit Diameter	B Max. Cutting Depth	C Shank Diameter	D Shank Length	E Overall Length	F Angle	Use with Collet/Collet Reducer	Full Pitch Through: Use with Straight Bit	Full Pitch Through: Use with e-Bush	Half Pitch Through: Use with Straight Bit	Half Pitch Through: Use with e-Bush
Through Dovetails											
50-8 Carbide Tipped	1/4"	1/4"	8mm	1-3/4"	2"	8°	8mm collet or 172-8 collet reducer	160 180 180C	e10	140-8 170 170C	e7 & e10
60-8 Carbide Tipped	5/16"	3/8"	8mm	1-3/4"	2-1/8"	8°	8mm collet or 172-8 collet reducer	160 180 180C	e10	140-8 170 170C	e7 & e10
70-8 Carbide Tipped	3/8"	1/2"	8mm	1-3/4"	2-1/4"	8°	8mm collet or 172-8 collet reducer	160 180 180C	e10	140-8 170 170C	e7 & e10
75-8 Carbide Tipped	7/16"	5/8"	8mm	1-3/4"	2-3/8"	8°	8mm collet or 172-8 collet reducer	160 180 180C	e10	140-8 170 170C	e7 & e10
80-500* Carbide Tipped	1/2"	13/16"	1/2"	1-3/4"	2-3/4"	8°	1/2" collet	160 180 180C	e10	–	–
140-8 Carbide Tipped	5/16"	1-1/4"	8mm	1-3/4"	2-3/4"	–	8mm collet or 172-8 collet reducer	–	e7	–	–
170* High Speed Steel	5/16"	1"	8mm [5/16"]	1-3/4"	3"	–	8mm collet or 172-8 collet reducer	–	e7	–	–
170C* Solid Carbide	5/16"	1-1/4"	8mm [5/16"]	1-3/4"	2-3/4"	–	8mm collet or 172-8 collet reducer	–	e7	–	–
160* Carbide Tipped	1/2"	1-1/4"	1/2"	1-3/4"	3"	–	1/2" collet	–	e10	–	–
180* High Speed Steel	1/2"	1-1/4"	1/2"	1-3/4"	3-1/2"	–	1/2" collet	–	e10	–	–
180C* Solid Carbide	1/2"	1-1/4"	1/2"	1-3/4"	3-1/2"	–	1/2" collet	–	e10	–	–
Half-Blind Dovetails											
112-500 Carbide Tipped	1/2"	19/32"	1/2"	1-3/4"	2-9/16"	12°	1/2" collet	–	e10	–	–
120-500* Carbide Tipped	1/2"	1/2"	1/2"	1-3/4"	2-1/2"	14°	1/2" collet	–	e10	–	–
128-500 Carbide Tipped	1/2"	3/8"	1/2"	1-3/4"	2-3/8"	18°	1/2" collet	–	e10	–	–
Box Joints											
163 High Speed Steel	3/32"	3/8"	1/4"	2"	2"	–	1/4" collet	–	e10	–	–
166* High Speed Steel	3/16"	5/8"	1/4"	1-3/4"	2-7/8"	–	1/4" collet	–	e10	–	–
166C* Solid Carbide	3/16"	5/8"	1/4"	1-3/4"	2-1/2"	–	1/4" collet	–	e10	–	–
143-500* Carbide Tipped	3/8"	1-1/4"	1/2"	1-3/4"	3-1/4"	–	1/2" collet	–	e10	–	–
173-500* High Speed Steel	3/8"	1-1/4"	1/2"	1-3/4"	3-3/4"	–	1/2" collet	–	e10	–	–
173-500C* Solid Carbide	3/8"	1-1/4"	1/2"	1-3/4"	3"	–	1/2" collet	–	e10	–	–

*Bits 80-500, 160, 120-500 & 143-500 come with the RTJ400
*Spiral upcut bits rout cleaner and faster, leaving a smoother finish

172-8
1/2" to 8mm collet reducer
1 1/4" long. For 8mm shank bits

Accessory Kit for the RTJ400 (ACRTJ)

This optional kit offers great savings over individual prices, and opens up a world of possibilities. Available from leighjigs.com

The ACRTJ includes:

Through Dovetail Bits
Carbide tipped, 8°, 8mm shank, for through and half pitch through dovetail tails

50-8 1/4" bit
60-8 5/16" bit
70-8 3/8" bit
75-8 7/16" bit

Straight Bit for Half Pitch Dovetails
Carbide tipped, 8mm shank, for half pitch through dovetail pins

140-8 5/16" bit

Half-Blind Dovetail Bits
Carbide tipped, for half-blind dovetails

112-500 12° 1/2" bit
128-500 18° 1/2" bit

Straight Bits for Box Joints
High speed steel, for box joints

163 3/32" bit
166 3/16" bit (spiral upcut)

Collet Reducer
For 8mm shank bits

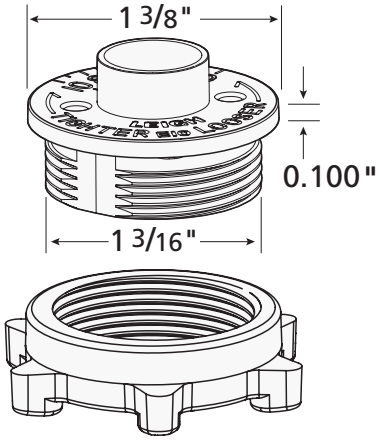
172-8 1/2" to 8mm, 1-1/4" long

Guide Bushing
For half pitch through dovetail pins

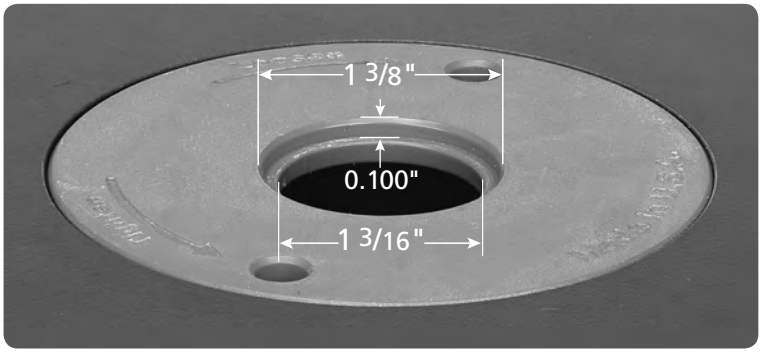
e7 Leigh elliptical eBush

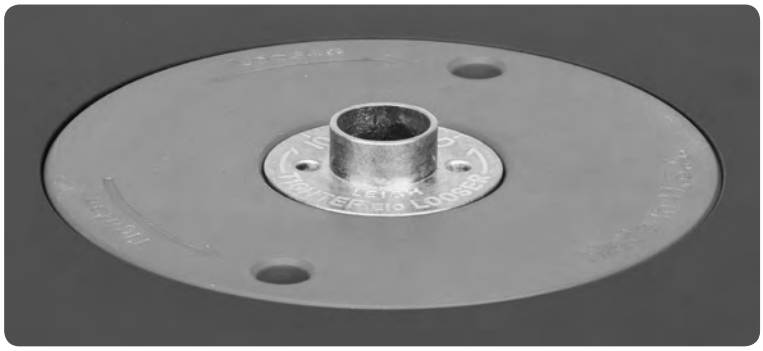
Router Table Requirements

Router tables are typically used with a bearing or fence, however, the Leigh RTJ400 is guided around a guide bushing mounted in the router table. Leigh eBushes (guide bushings) are designed around the decades-old Porter Cable/Black & Decker industry standard. Therefore, you will need an insert ring to fit the eBush to your router table or router plate. See specifications below. ■



Leigh eBush and Nut

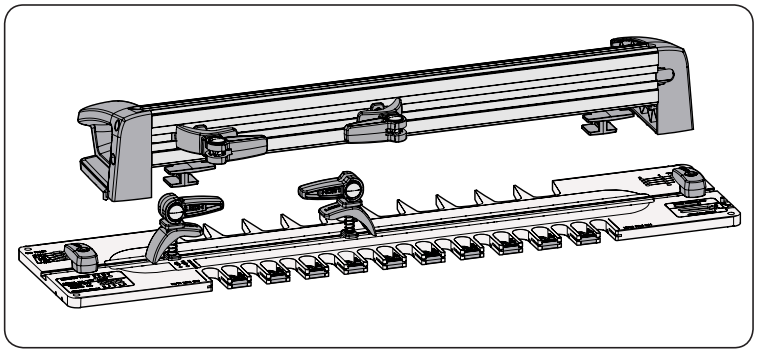


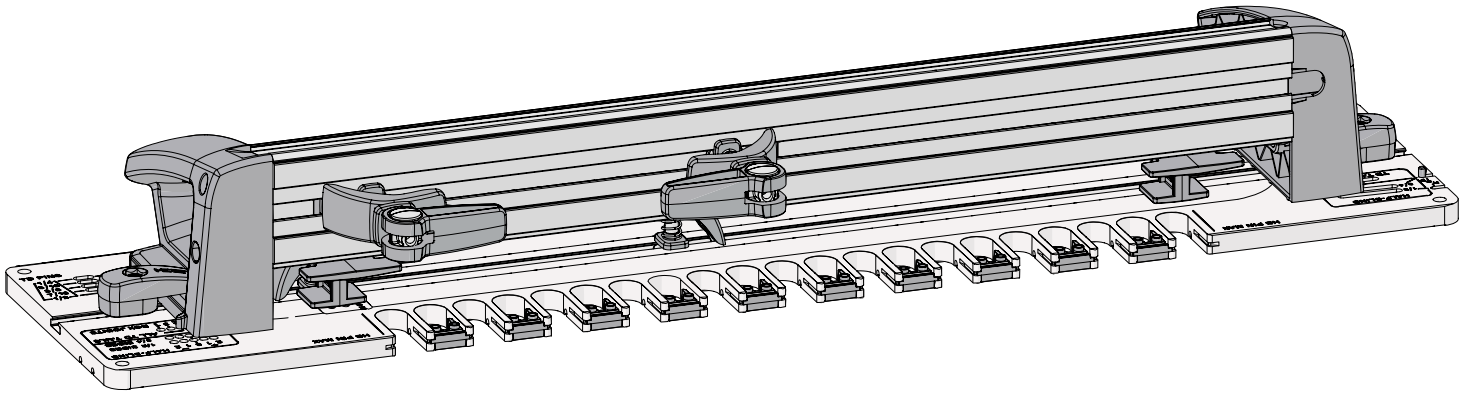


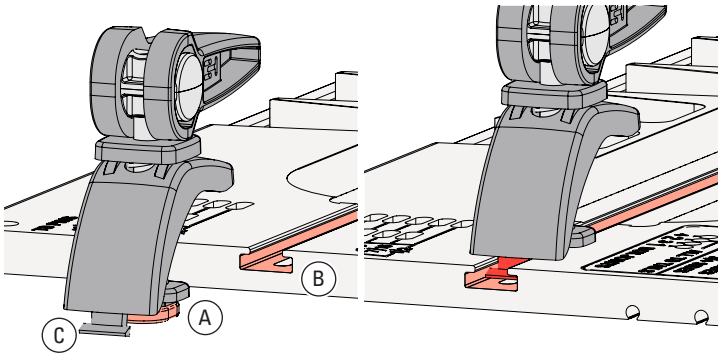
To fit the eBush to your router table insert plate, you need a 1-3/8" diameter counter bore insert ring. Check with your router table or insert plate (router lift) manufacturer, as to what adaptation, if any, is required.

CHAPTER 1
Assembling the RTJ400

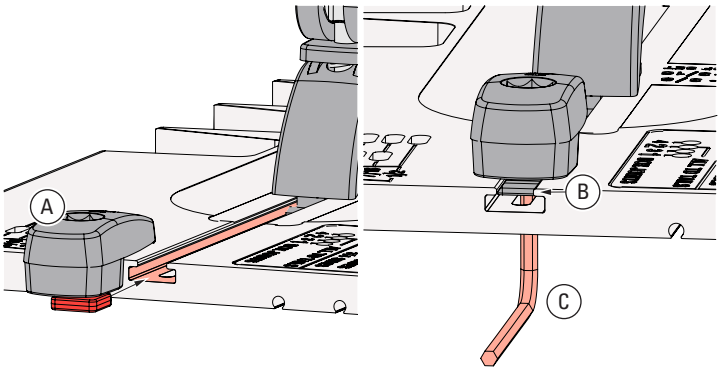
The following instructions will guide you through the assembly process for the Leigh RTJ400 Router Table Dovetail Jig.



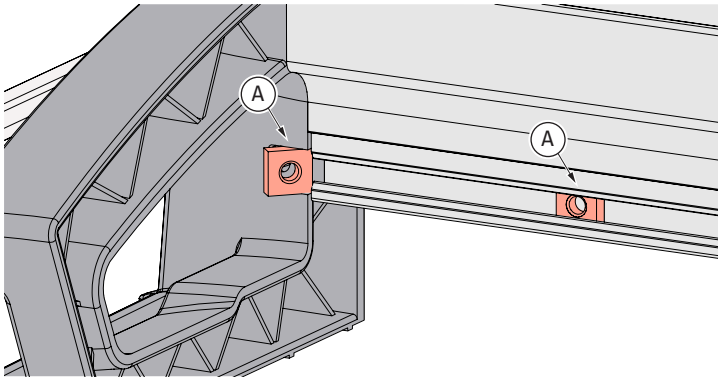




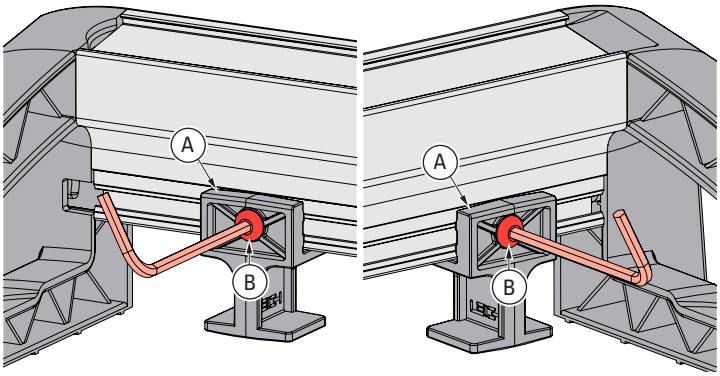
1-1 Template Clamps: Insert the clamp T-bolt head Ⓐ into the T-slot at each end of the template Ⓑ followed by the clamp heel Ⓒ. Make sure the heels are pointing out at both ends of the template.



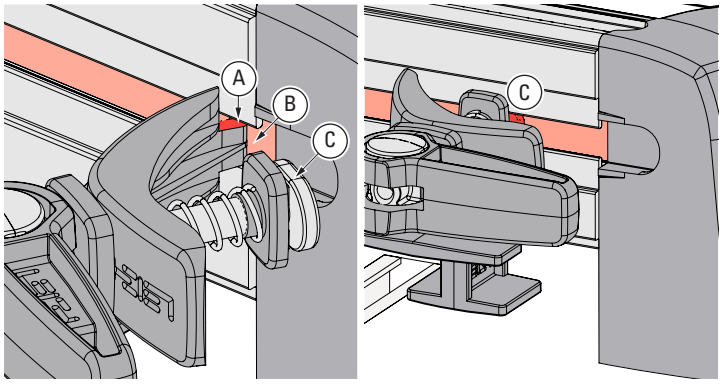
1-2 Template Latches: Slide a latch Ⓐ into each end of the template making sure the washer Ⓑ is in the T-slot. Use the hex key Ⓒ through the slot on the bottom of the template to firmly tighten the latches, pulling the hex nuts down into each latch recess. Adjust the latches so they are stiff to slide on the template.



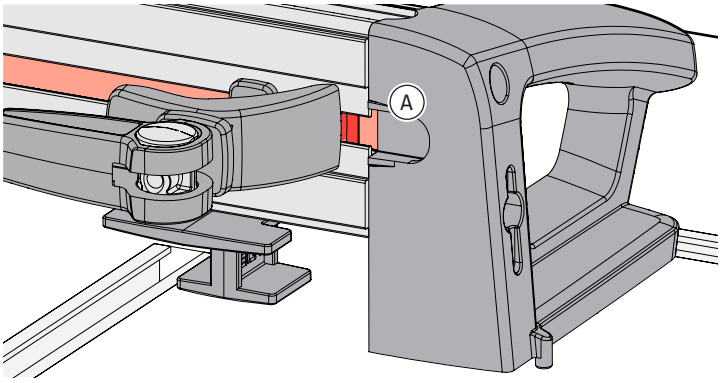
1-3 Insert the two square nuts into the rear of the frame Ⓐ and slide them to each end of the frame.



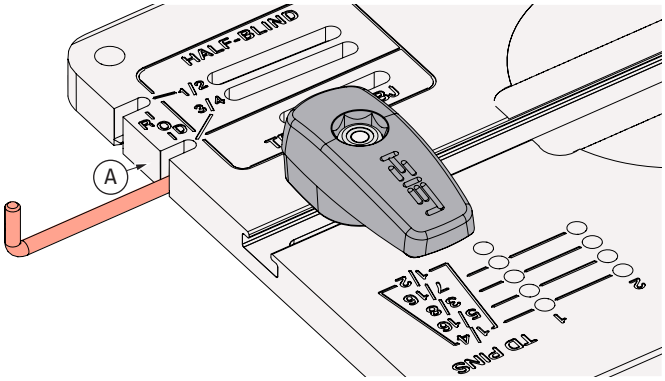
1-4 Side stops: Attach the two side stops Ⓐ to the square nuts in the frame using the hex socket button head screws Ⓑ, and lightly tighten one side stop at each end of the frame.



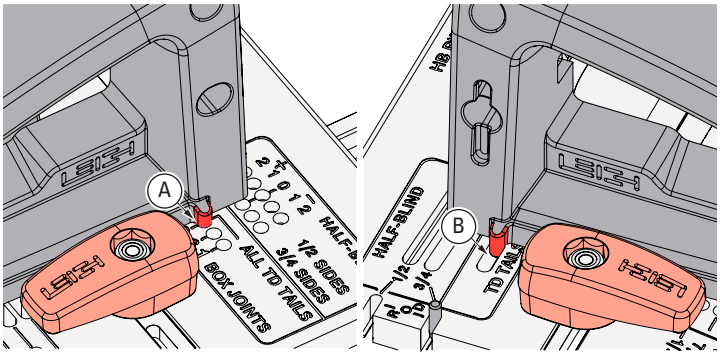
1-5 Frame Clamps: Insert the heel Ⓐ of a pre-assembled clamp assembly into the end of the frame T-slot Ⓑ followed by the clamp T-bolt Ⓒ, and slide the clamp to the other end of the frame. ***Note: The clamp arm spring washers are under tension. They may need to be pulled away from the T-bolt to aid in ease of assembly.***



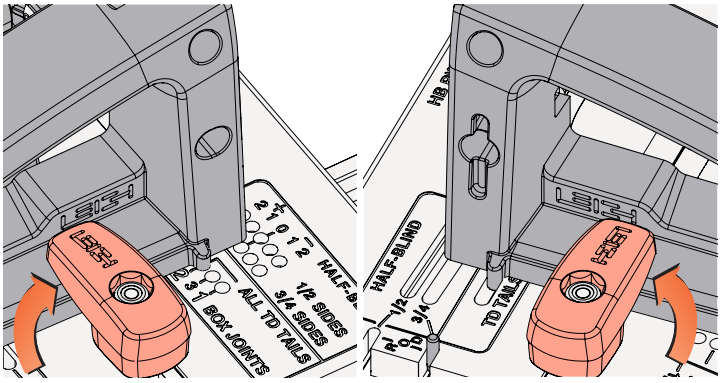
1-6 When installing the second clamp, insert the T-bolt first and the heel last Ⓐ.



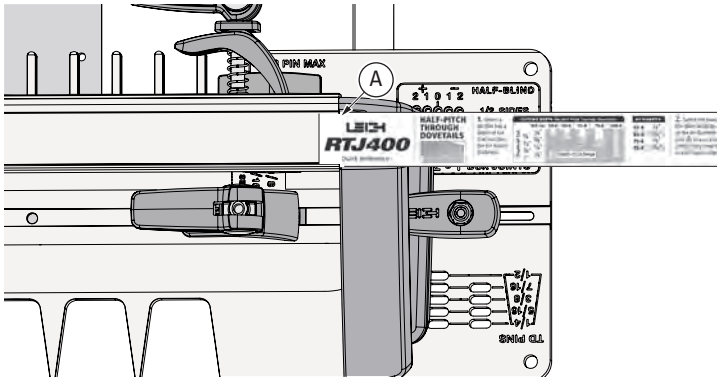
1-7 Stop Rod: Insert the stop rod in the ¾" slot Ⓐ. The stop rod remains here for all routing operations except half-blind dovetails and box joints. Note: The stop rod may have been shipped in this location.



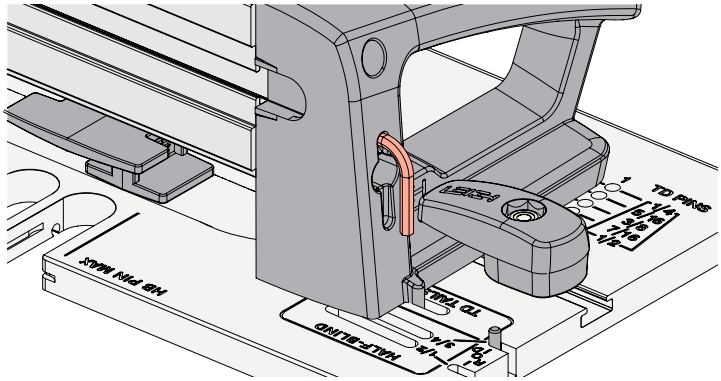
1-8 The frame is located on the template by a pin on the frame handles. Place the frame on the template by inserting the right frame pin in the ***ALL TD TAILS*** hole Ⓐ and the left frame pin in the ***TD TAILS & BJ*** slot Ⓑ. ⚠ ***To prevent damage to the frame pin always remove the right frame pin first when lifting the frame handle.***



1-9 Pivot both latches to secure the frame to the template. Double check the latches to ensure they are fully seated. ⚠ ***Only when the frame is latched securely is it safe to lift and or carry the jig by the handles.***

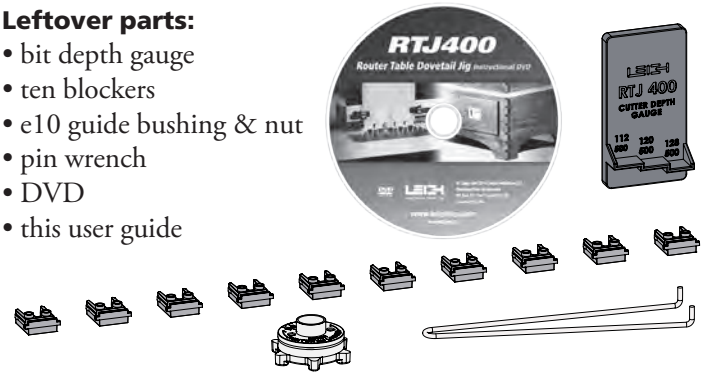


1-10 If not already in channel, slide the Quick Reference strips into the channel in the top of the jig Ⓐ.



1-11 Store the hex key in the left hand handle.

Leftover parts:
- bit depth gauge
- ten blockers
- e10 guide bushing & nut
- pin wrench
- DVD
- this user guide



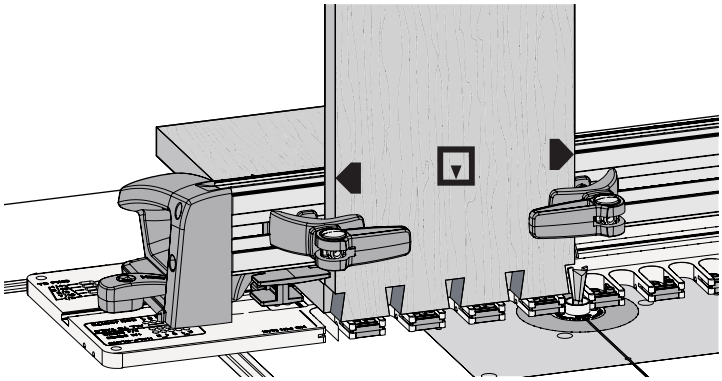
1-12 You will have leftover parts. Keep them to use as required for various jig operations. ■

CHAPTER 2
Glossary of Symbols

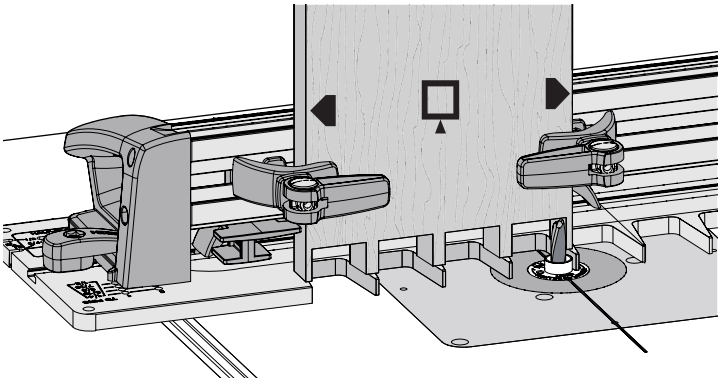
Which Way Around Should the Board Go?

The following symbols/icons are used throughout this user guide. They indicate which side of a board faces out when clamped in the jig, and which edge goes against the side stop. They also indicate which faces are in or out when assembled. Dashed line symbols indicate the other side of the board (hidden from view). ***Note: Before you place the boards in the jig, you must mark them with the appropriate symbols.***

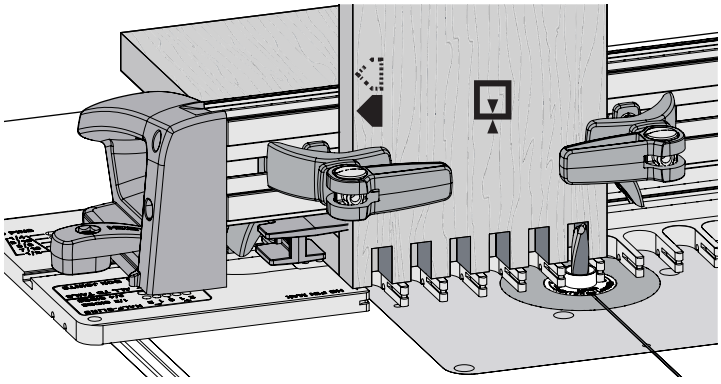
- **"Outside" of board**
- **"Inside" of board**
- **"Either side" of board**
- **"Outside" of board** (on other side of board)
- **"Inside" of board** (on other side of board)
- **"Either side" of board** (on other side of board)
- **"This edge" against sidestop**
- **"This edge" against sidestop**
- **"This edge" against sidestop** (on other side of board)
- **"This edge" against sidestop** (on other side of board)



2-1 Icons such as the one used on the board above indicate which side of the board faces away from the operator when clamped in jig, and which faces are in or out when assembled.



2-2 **Note:** Because through dovetail pin and tail boards are rotated and clamped with the same face against the frame, both side edges are alternately used against the side stop.

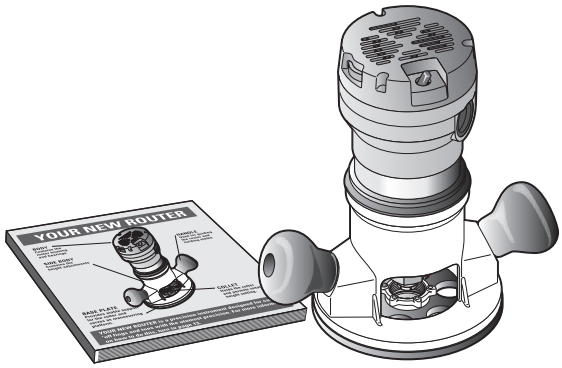


2-3 Box joint boards are clamped against the frame both face in and face out for alternate end cuts. With box joints, the same side edge always goes against the side stop. ■

CHAPTER 3
Using Your Jig Safely

Safety is not optional.

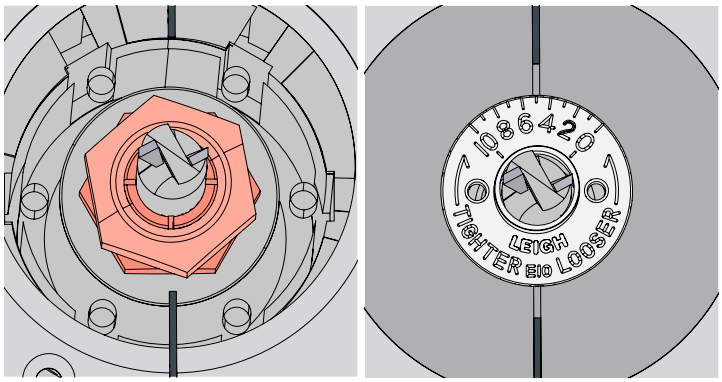
Read and follow the recommendations in this chapter.



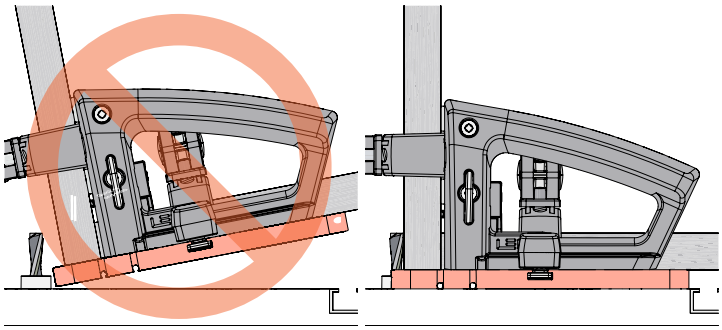
3-1 Read the owner's user guide that came with your router and router table. It is essential to understand all manufacturer's instructions completely.

3-2 Always wear:
- approved safety glasses;
- a face mask to protect yourself from harmful dust;
- hearing protection.

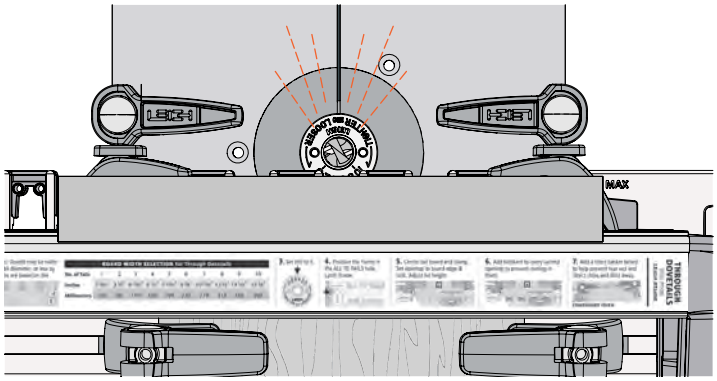
3-3 ⚠ ***Never drink alcohol or take medications that can cause drowsiness while operating a router.***



3-4 Always disconnect the power source and be sure the router has stopped turning before fitting bits, guide bushings or making adjustments. Before reconnecting the router to the power source, make sure the bit and collet revolve freely with and without the guide bushing in place.



3-5 Do not tilt the jig. Keep the template flat on the router table at all times.

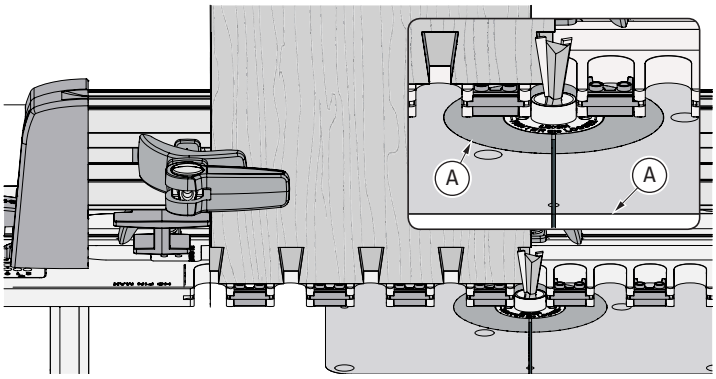


3-6 Chips and sawdust are thrown out at high speed. Always stand and use the RTJ400 from behind the router bit, opposite to chip and sawdust ejection. ■

CHAPTER 4
Basic Jig Functions

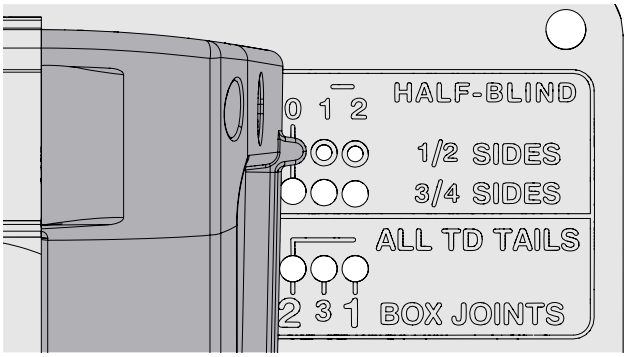
Router Table Surface
Template Markings and Orientation
Frame Pin Positioning
Quick Reference Strips
Routing Position
Side stops
Clamping
Backer Board

IMPORTANT NOTE: Many of the images in this user guide show the "action" side of the jig, however the operator stands behind the RTJ400, away from the chips and sawdust thrown off by the router bit.



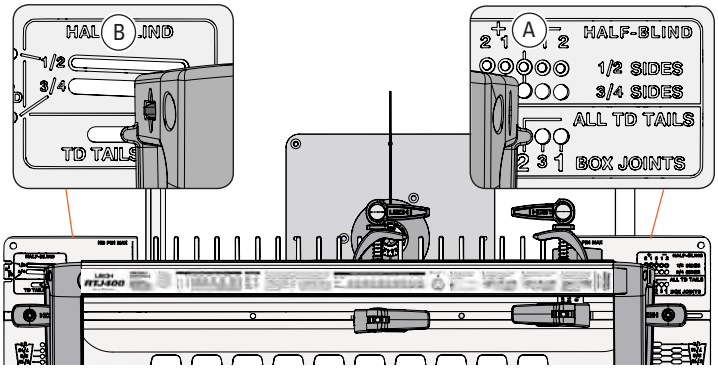
Router Table Surface

4-1 Make sure there are no ridges Ⓐ anywhere on the router table surface. The template must slide smoothly over the table top. If the router table is not flat it will have the effect of changing the bit height as the template moves across the table.

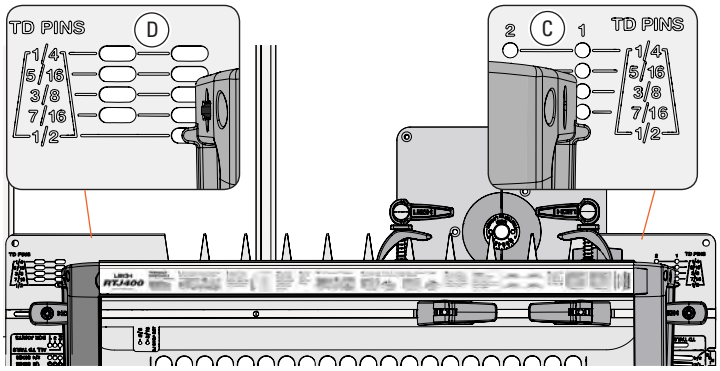


Template Markings and Orientation

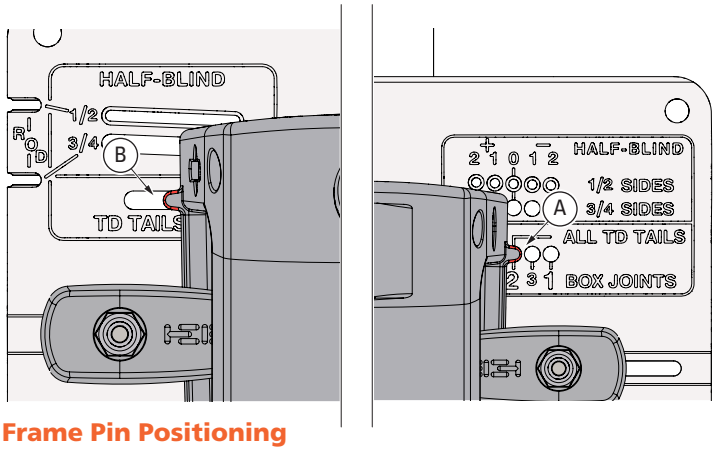
4-2 The engraved side of the template always faces up. The markings clearly identify which pin hole or slot to position the frame pin into, based on the joint type and size. Joint type determines the orientation of the template, as outlined below.



4-3 The template must be used perpendicular to the line drawn on the table. In this orientation, pin holes Ⓐ and corresponding slots Ⓑ are for half-blind dovetails, through tails and box joints.

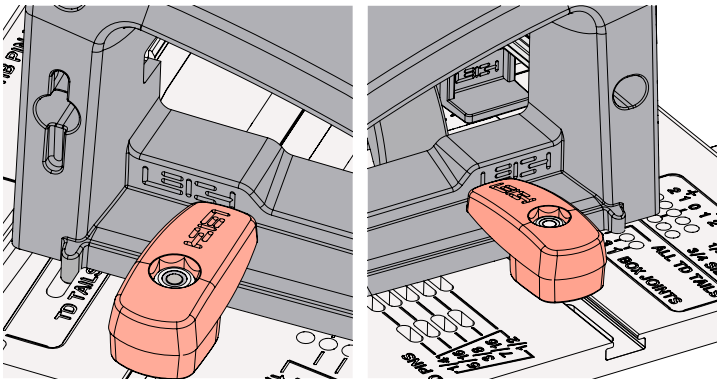


4-4 In this orientation, pin holes Ⓒ and corresponding slots Ⓓ are for through dovetail pins and half pitch through dovetail pins.

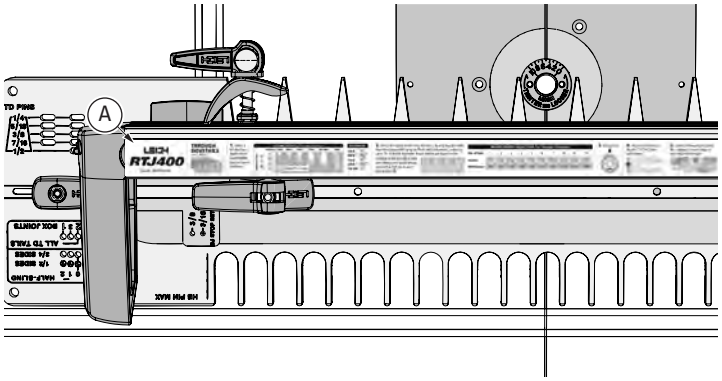


Frame Pin Positioning

4-5 The frame is positioned on the template by inserting the frame pins into the pin holes Ⓐ and slots Ⓑ. The frame pins are intended to be snug in the template holes. ⚠ ***To prevent damage to the frame pin always remove the right frame pin first.***

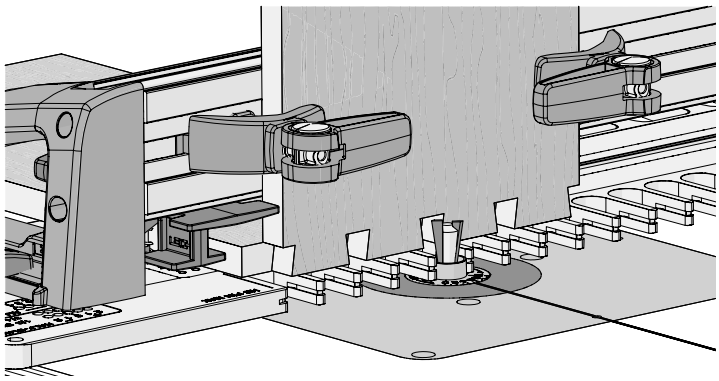


4-6 ⚠ ***Be sure to latch the frame securely each time the frame is repositioned.*** Only when the frame is latched securely is it safe to lift and or carry the jig by the handles.



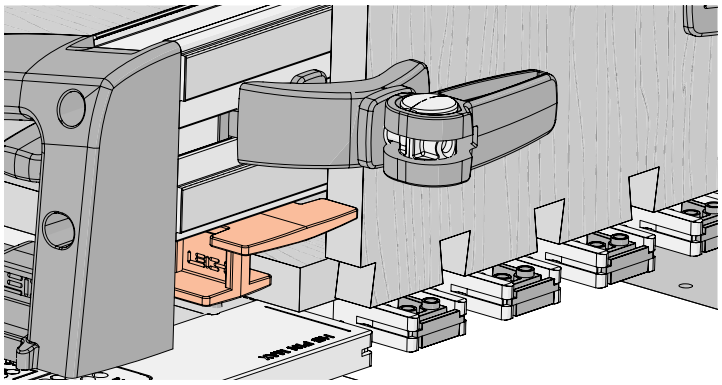
Quick Reference Strips

4-7 Quick Reference strips Ⓐ for each joint type are stored in the slot on the top of the jig frame.



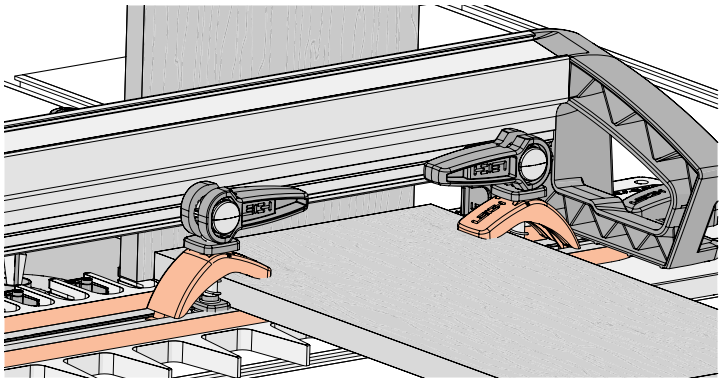
Routing Position

4-8 Always use the right-hand side of the jig as shown above, except where specified. ***Note: When instructed to rout from right to left, this is from the "operator's" position, standing behind the RTJ400.***



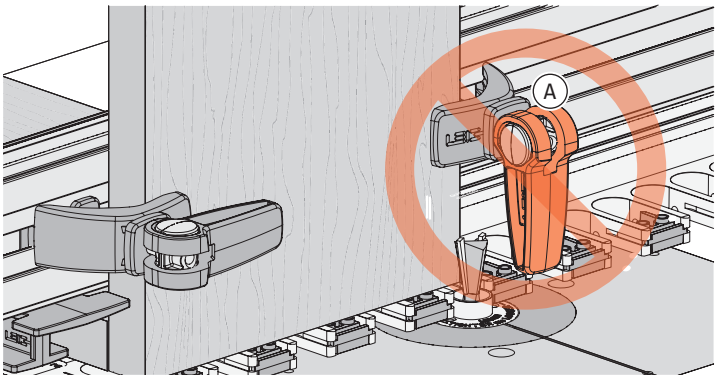
Side stops

4-9 The adjustable side stops are user set in a predetermined position for box joints, or positioned against the edge of the workpiece.

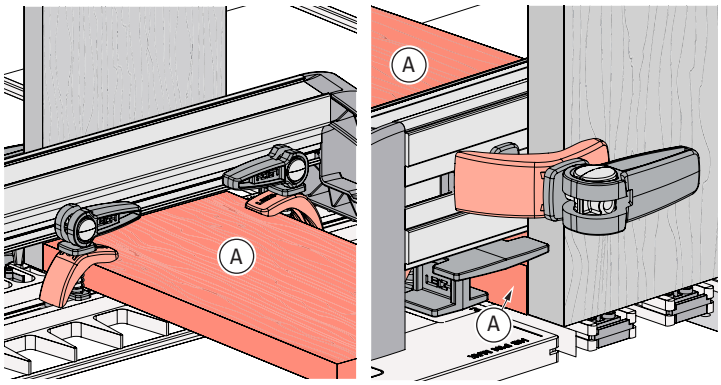


Clamping

4-10 Cam-action speed-clamps are exceptionally strong. The clamp arms in conjunction with the machined texturing on the template and frame ensure secure clamping.



4-11 ⚠ ***Always ensure that the frame clamp levers do not project below the frame when engaged*** Ⓐ.



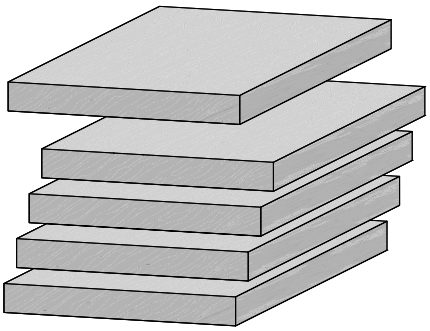
Backer Board

4-12 A short backer board Ⓐ is clamped horizontally behind the tail board, to help prevent tearout, and to direct dust and chips away when routing. ■

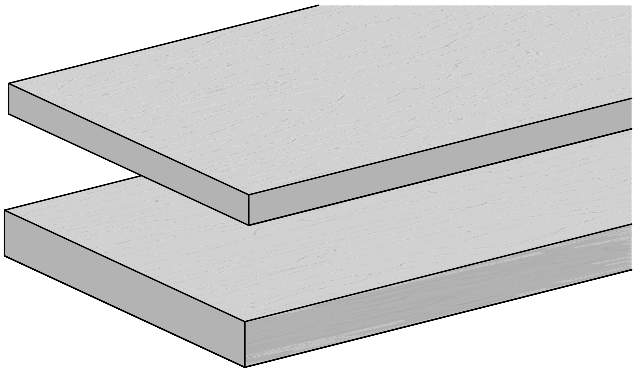
CHAPTER 5
Wood Preparation

Garbage In — Garbage Out

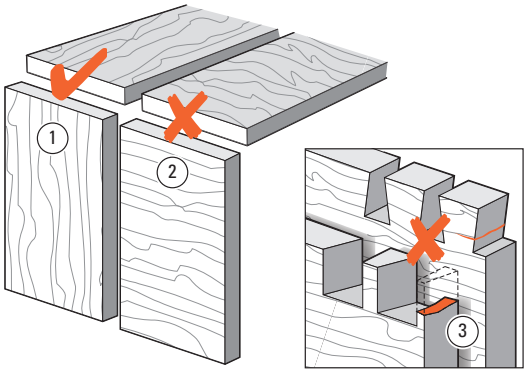
This adage of the computer age stands equally true for dovetail joinery.



5-1 Accurate and perfectly aligned joints require stock that is straight, flat, even thickness and equal widths, with square ends and edges. ***Note: Plywood is generally unsuitable for routing because of tearout problems.***



5-2 You will want to test the jig, so prepare boards of suitable size for the required joint type and size. Use them for practice with the jig's various joint modes so you can see how the different modes work. ***Note: Two boards of different thicknesses can be joined as easily as one thickness.***



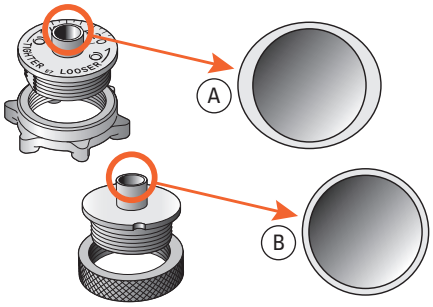
5-3 ⚠ ***Dovetail joints are intended for joining end-grain to end-grain*** ①. Dovetails in side-grain ② do not work because the wood will tear out badly when routing and the pins and tails would easily break off ③, either during or soon after the assembly when the boards start expanding or contracting at different rates. ■

CHAPTER 6
The Leigh eBush

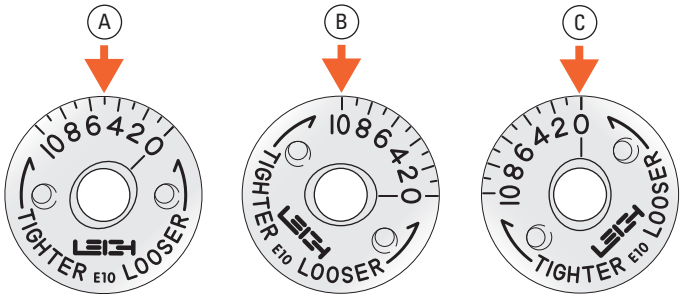
Note: Normal tolerances with bits, guide bushings and router runout will generally produce poor fitting joints. Leigh elliptical guide bushings (e7 and e10) solve this problem.

Patents for all Leigh elliptical guide bushings: U.S. 8,256,475 UK GB2443974

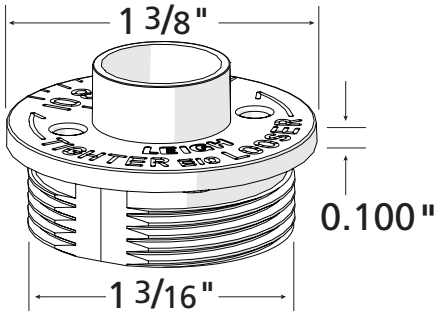
Joint Fit Adjustment



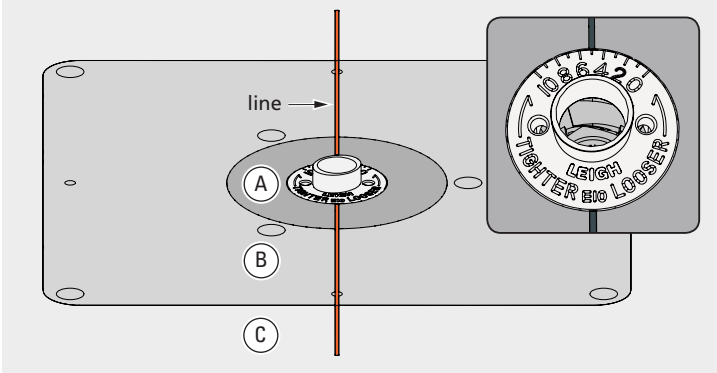
6-1 The Leigh eBush barrel is elliptical Ⓐ, unlike plain circular template guide bushings Ⓑ. When rotated, the effective diameter of the barrel changes, allowing fit adjustments as small as 0.001"[0.025mm]. The e10 eBush is included with the RTJ400.



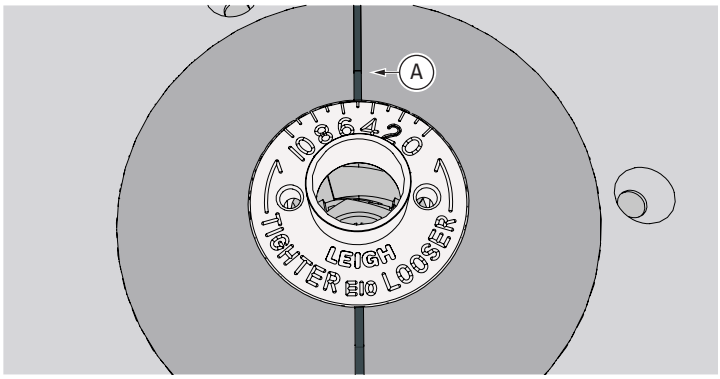
6-2 ***All routing starts with the eBush in the No.5 position*** Ⓐ. Turning the eBush toward the No.10 position Ⓑ results in a tighter fit because the guide bushing is now wider. Turning the eBush toward the No.0 position Ⓒ results in a looser fit.



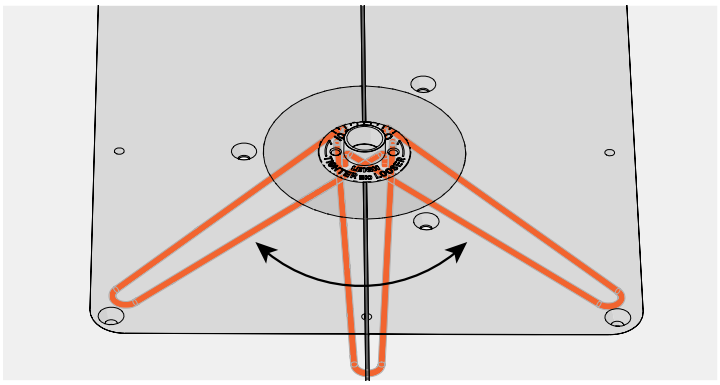
6-3 The Leigh eBush system is designed around the decades-old Porter Cable/Black & Decker industry standard. Therefore you will likely need to adapt your router table or router table insert plate to accept a Leigh eBush with an insert ring that has a 1⅜" diameter counter bore. See page 6 for details. Check with your router table or insert plate manufacturer as to what adaptation is required.



6-4 Draw a line with a permament pen on the router table, centered on the guide bushing opening at 12 o'clock and 6 o'clock (shown in red for clarity only). This will ensure correct orientation of the eBush to the insert ring Ⓐ, the insert plate Ⓑ, and the router table Ⓒ.



6-5 All settings for the eBush will be aligned to the line Ⓐ you've drawn on the router table. The line will also help guide the RTJ400.



6-6 Adjust the eBush with the pin wrench. Markings on the eBush indicate which way to turn it for a looser or tighter fit. ***Remember, every time you adjust the eBush you must re-tighten the eBush nut.***

6-7 One division of the eBush changes the joint glue line by 0.002" [0.05mm]. A perfect fit will be established with one or two test cuts.

6-8 As shown in the examples above, each chapter provides a place to mark your perfect eBush setting, for easy repeatability the next time. ■