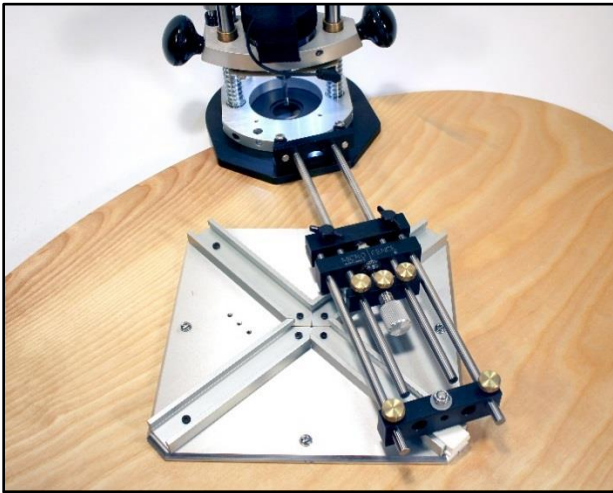


The Micro Fence Ellipse Jig

12970 Branford Street Unit M, Arleta, CA 91331 Phone: 1-800-480-6427

Email: microfence@microfence.com Website: microfence.com



The ellipse is one of the most pleasing shapes in all of geometry and natural science. Described in academic terms as a section through a cone (not parallel to its base), we find the ellipse form in the orbits of the Earth around the Sun and the moon around the Earth. It would be hard to imagine a shape more natural in design or unfortunately, more difficult to reproduce in material form.

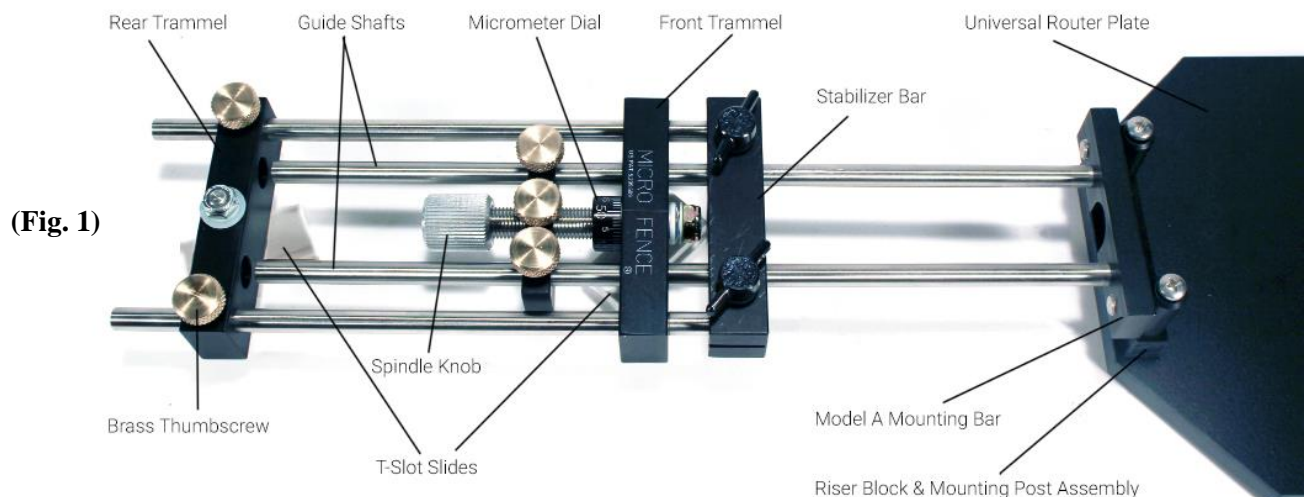
Ellipses and ovals are characterized by having two unequal axes: a **major** and a **minor**. The dimensional difference between these axes is called the **differential**. The drawing method used to generate the ellipse utilizes two centers, or foci. In general, the farther these two centers are placed apart, (creating a greater differential), the more elongated your

ellipse will be. Conversely, the closer together they are placed, (the smaller the differential), the less elongated. Theoretically, if both centers were placed in the same position (concentric), the result would be a circle.

Micro Fence® addresses the task of making ovals and ellipses with what we hope you will find to be (pun intended) unparalleled results. Our Circle Jig, with its measuring capability and fine adjustment, offers some interesting and previously difficult to attain results in the milling of these elongated shapes.

The two centers employed by the Circle Jig can be placed at any distance apart between the limits of 2" and roughly 6" with the Standard Ellipse Jig and up to 36" apart with the Large Ellipse, making it capable of a very wide range of elliptical shapes.

Our Standard Ellipse Jig kit includes all the basic parts you'll need to combine with the **Circle Jig** to start making ovals and/or ellipses. The standard **Circle Jig** provides two pairs of 12" stainless steel Guide Shafts (rods), providing up to a 24" reach when making circles or ellipses. Larger pairs are available in 24" and 36" lengths. (See **Figs. 3-6** further on in these instructions.)



Instructions for Set-up and Operation

Before you begin, be sure to verify that you have received all the parts that are checked off on the packing list.

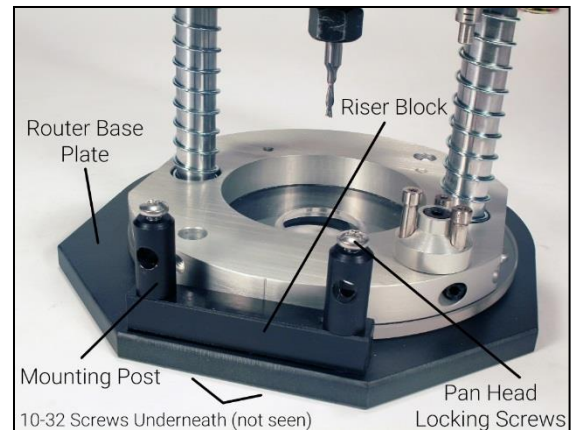
The **Standard Ellipse Jig** features a 9 1/2" cast aluminum tooling plate fitted with four 6" T-Slot track segments installed at a precise 90° to one another and tested for smooth slide travel. Optional longer track segments can be substituted to comply with your project's specifications. (See "[Changing the Track Segments](#)" below).

Attaching Your Router to the Router Plate

Virtually any router can be attached to the Ellipse Jig's Router Plate. You can order it pre-drilled for the router of your choice or you can drill it yourself using your router's factory sub-base as a template. Center the arbor of your router with the hole in the Router Plate using our centering hub and a 1/4" pin or router bit in the router's collet to locate the screw hole positions. Take care to keep the bottom, with the countersunk (or counter-bored) holes, facing downward to insure an accurate alignment. (If the holes in your router sub-base are not symmetrically placed, flipping the base can cause incorrect markings.) Mark, drill, and countersink the Ellipse Jig Router Base to copy your router base's hole configuration and screw requirements. (See the separate Universal Router Plate instruction page 12 for more detailed instructions.)

Assembling the Router Base Plate, Riser Block, & Mounting Posts

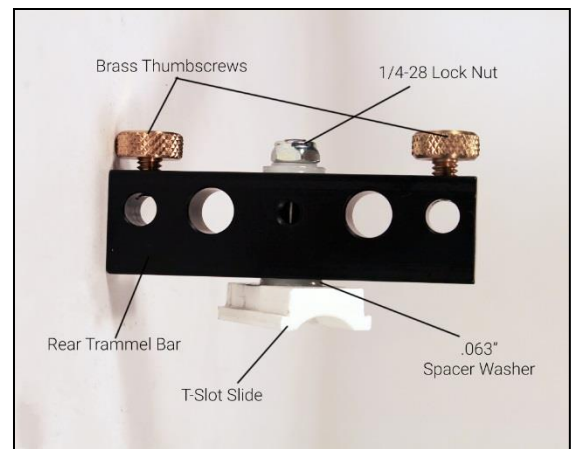
Take apart the Riser Block Assembly, insert the 10-32 x 1 1/8" Flat Head Screws up through the bottom of the Router Base Plate and slide the 1/2" x 1/2" x 3" Riser Block over them. Thread on the two Mounting Posts above the Riser Block as shown and gently tighten them down, leaving them loose enough to turn with finger pressure. (You will firmly tighten all screws once the jig is completely assembled prior to actual use.)



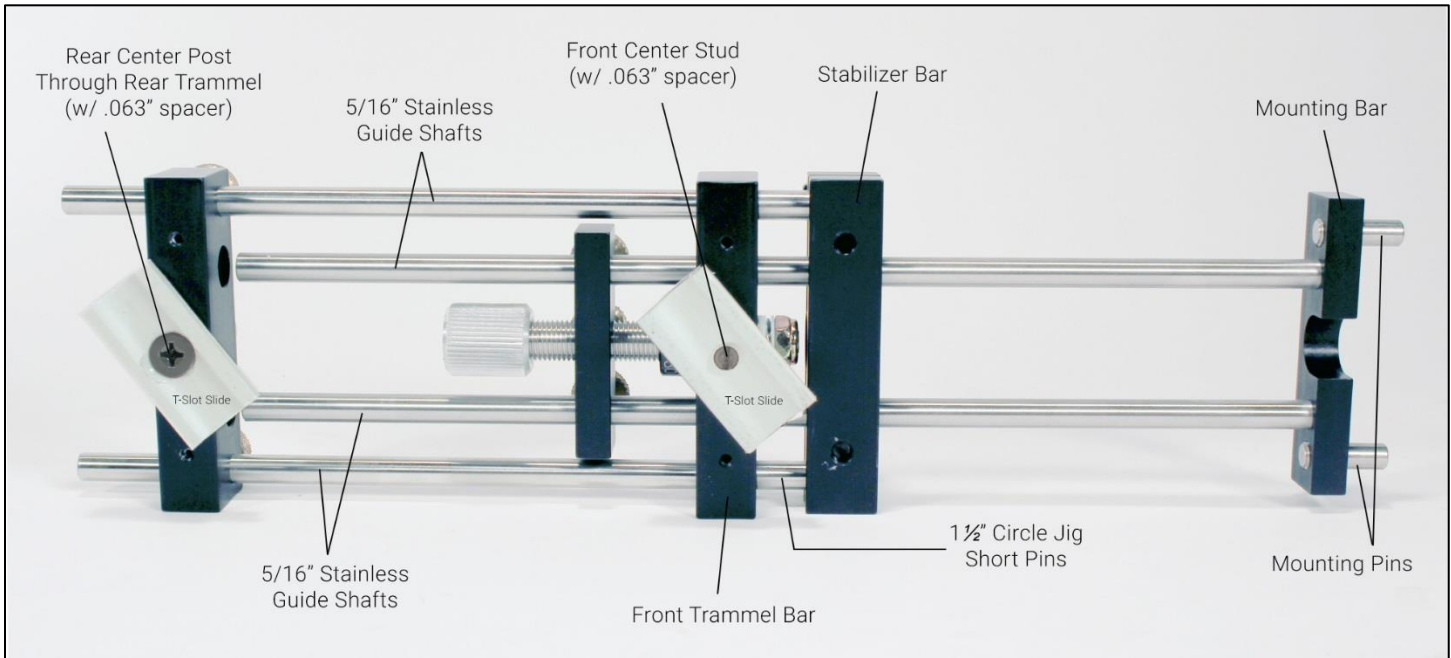
Fitting the Circle Jig with T-slot Slide Blocks and Centers

Install the **Rear Center Post** (1/4"-28 x 1 5/8" Flat Head Bolt) through one of the T-Slot Slides. Install one of the .063" spacer washers between the Slide Block and the Rear Trammel Bar. Install the nylon washer and lock nut and tighten to a point that allows the slide block to rotate freely, but with as little play as possible.

Once this assembly is completed, the Rear Trammel Assembly will be ready to slide onto the Guide Shafts.



(Fig. 2)



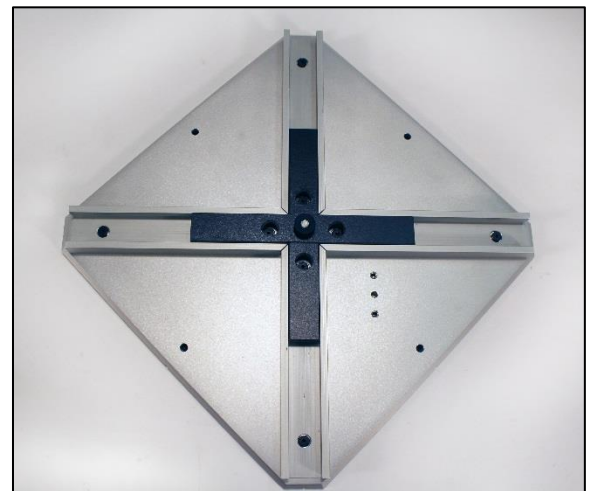
Thread the **Front Center Stud** into the middle 6-32 hole on the bottom of the Front Trammel Bar. (the one with Micro Fence laser-etched on it). Tighten securely without over-tightening. Install the second .063" spacer washer over the Front Center Stud.

In the photo above, one of the most common set-ups to make ellipses with the Circle Jig is shown, with both centers and a **Stabilizer Bar** installed.

Changing Track Segments

When changing out track segments remove the four segments and replace with the desired length. Leaving the track screws slightly loosened, align the four new segments with our **T-Slot Track Setup Gauge** (included with each Standard Ellipse Jig Package). Tighten down the four screws closest to the center first, then the outer four.

Once tightened down, test the alignment of the track segments by sliding one of the T-Slots through the intersection to check for smooth movement.



Attaching the Ellipse Axes Plate to the Work Surface

Draw perpendicular axes lines on your work surface or layout paper to use as a reference. Be sure these lines are at true 90° to one another and long enough to extend beyond the edges of the Axes Plate. The Axes Plates are milled with notches to mark the center-lines of the perpendicular ways. Position the plate so that all four of the notches align with your 90° penciled center-lines.

Fasten the plate to the work surface with appropriate length screws (we provide #8 x 5/8" phillips-drive pan head), being careful to avoid penetrating the back side of your material. If you choose to work with two-sided tape to hold the axes plate in position, be sure to conduct suitable tests before beginning to cut your actual work piece to verify that the sheer strength of the tapes' adhesive is adequate.

Our optional **Ellipse Vacuum Block** is available as an accessory to enable the Axes Plate to be held down with vacuum. Our **VCA** or **your own vacuum pump** can be used as a remote vacuum generator to eliminate the need for tape or screws.

Installing the Circle Jig in the Axes Tracks

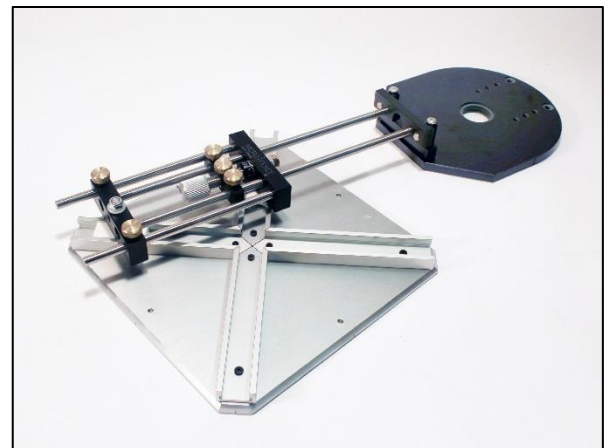
We recommend a dry lubricant be applied to the inner surfaces of the axes tracks before this assembly process. Our choice is DynaGlide Plus, which can be purchased through **Micro Fence®**. We've found it's a little easier to install the Circle Jig in the Axes tracks before attaching to the Router Plate (with the router mounted on it). Slide the unattached T-Slot Slide into the T-Slot Track that is parallel to the major axis. Be sure to install the .063" spacer washer between the bottom of the forward trammel bar and the T-Slot slide.







This will become the seat for the Front Center Stud you installed in the middle hole under the Front Trammel Bar (See **Fig. 2 on Page 3**). Position the T-Slot Slide at the center of the Axes Plate and align the Circle Jig's Guide Shafts parallel to the minor axis. Slide the Rear Trammel Bar with the T-Slot Slide mounted under it onto the Guide Shafts and into the T-Slot Track. Set the differential at the desired distance (one-half the difference between major and minor axes) and tighten all Brass Thumbscrews. As you turn the jig, both T-Slot Slides should travel smoothly along both axes.

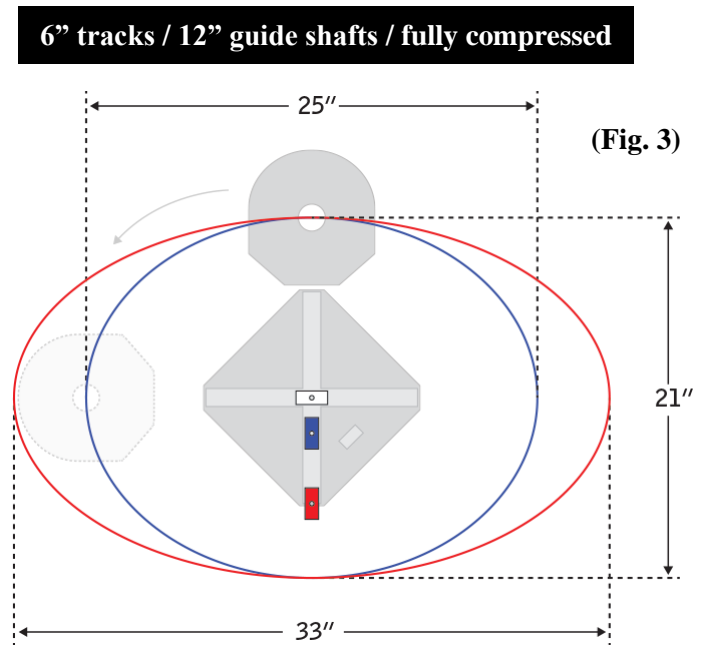
Attaching the Router with Router Plate to the Ellipse Jig

If all your assembling to this point has been done properly, the Router Plate with your router mounted on it should slide right up and align with the pins of the Model A Mounting Bar. Insert the Mounting Pins into the Trimmer Posts and firmly tighten the top Pan-head Locking screws.

At this point you should check the tightness of the 10-32 screws holding the Mounting Posts from the bottom of the router plate. To do this, loosen the Brass Thumbscrews and slide the Router Plate & mounting assembly out of the jig so that it can be turned upside down to check the screws. Firmly tighten and re-install. Your Ellipse Jig is now ready for use and should look like the photo on the right.



Legend	
	Router Plate
	Ellipse Axis Plate
 	Smallest differential setting
 	Largest differential setting



Setting Your Ellipse Jig for The Size and Shape Ellipse You Wish to Make

The **minor radius** is determined by the distance from the Front Trammel Center Stud to the router bit. It can always be described as one-half of the difference between the major and minor diameters of your ellipse. For example, if you want your major axis to be 25" and your minor axis to be 21", you'll set the distance between centers at 2" ($25" - 21" = 4" \div 2 = 2"$). This is represented by the blue slide in the diagram above (Fig. 3).

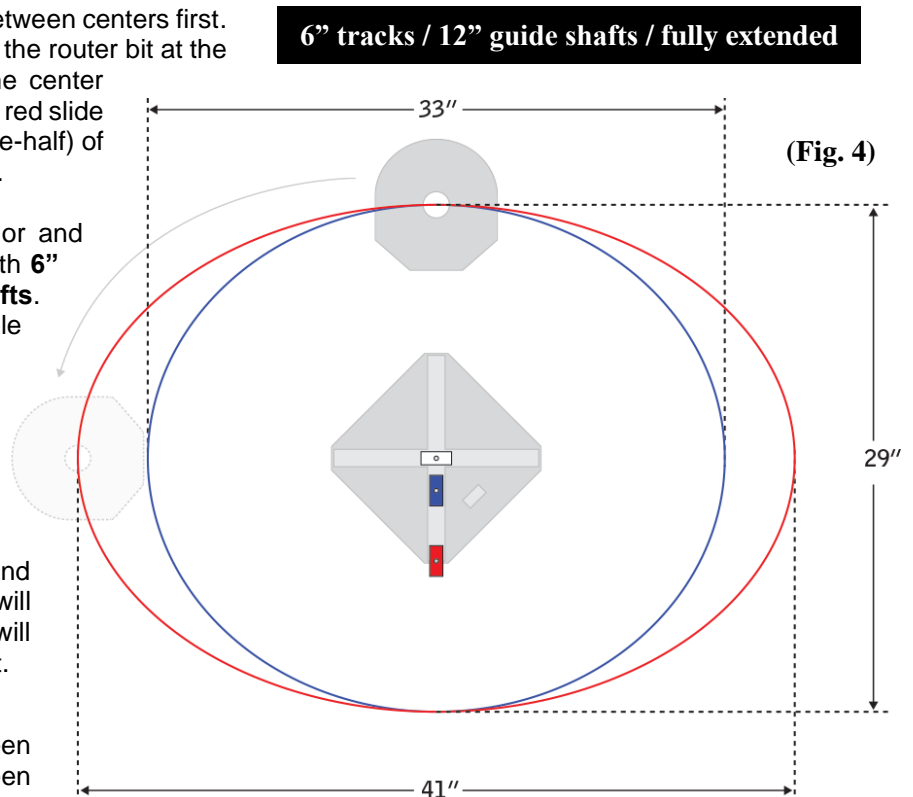
Generally, we recommend setting the distance between centers first. Then the **major radius** can be set by positioning the router bit at the required distance ($12 \frac{1}{2}"$ our example) from the center post located in the Rear Trammel Bar (the blue or red slide in our drawing). This setting will be the radius (one-half) of the major axis. ***(See measuring tip on page 6).**

This diagram of the Ellipse Jig shows the major and minor axes dimensions possible when set up with **6" T-Slot tracks** and two pairs of **12" guide shafts**. The **router plate** is positioned as close as possible to the top corner of the track (axes) plate.

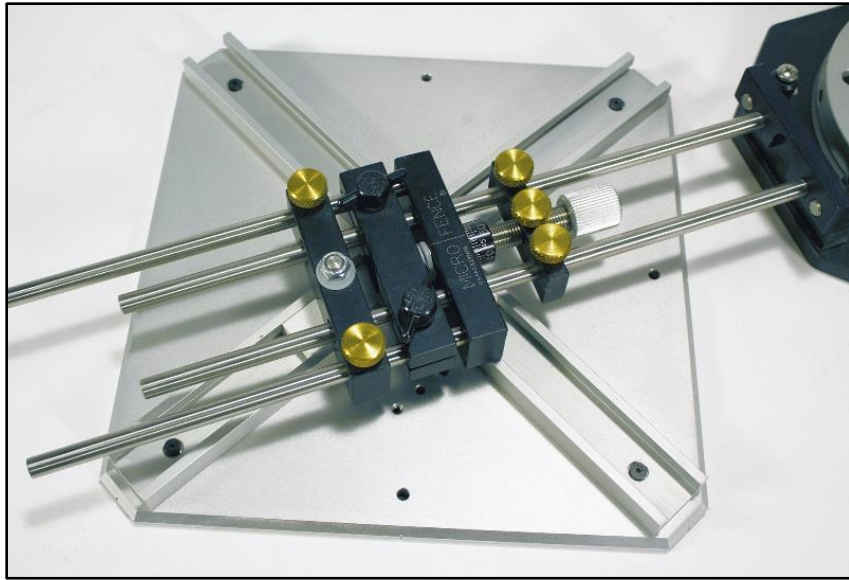
The white slide represents the position where the **Front Trammel Center Stud** will pivot as the jig is turned. The distance from it to your router bit will be $\frac{1}{2}$ your minor diameter.

The blue and red slides represent the smallest and largest differential settings that the 6" tracks will allow (2" to 6"). The blue and red ellipse shapes will result when either of those slide positions are set.

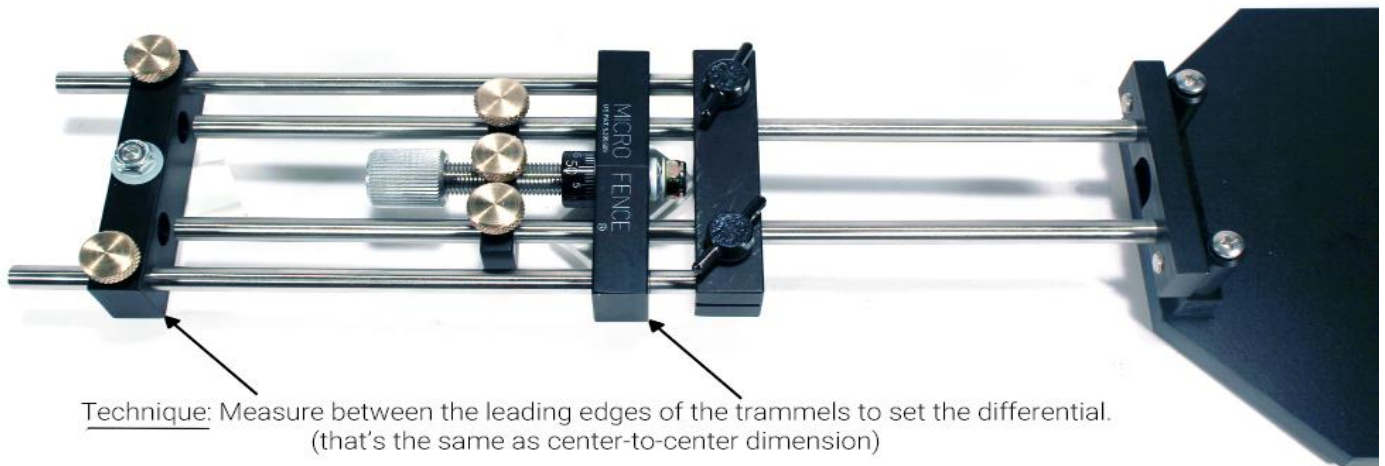
Remember: The differential (the distance between centers), will always be $\frac{1}{2}$ of the difference between the major and minor diameters.



Note: To accomplish the smallest differential settings, the **Micro Fence** Ellipse Jig can be positioned with the knurled knob of the Micrometer Spindle pointing toward the Router Plate (backwards from the way it comes from our factory). To accomplish this, unthread and remove the Guide Shafts and re-install them on the side facing the router. When assembled in this fashion, it will appear as in the photo below.



Tip: Differentials (the distance between centers) can be measured from like edges of the front and rear trammel bars.
(See photo below)



Our **Standard Axes Plate (9 1/2")** comes fitted with four 6" track segments that are factory set at 90° and ready for action. Optional track segments are available with 12", 24" and 36" lengths. The choice of which length segment to install on the plate is determined by the size of ellipse you wish to make. **Figs. 3 & 4** on page 5 describe size specifications that are possible with the various track segments.

Remember: The track length controls the differentials and the guide shafts control the overall diameters.

Using Longer Guide Shafts:

24" Guide Shafts: add 1' to the radii (2' overall)

36" Guide Shafts: add 2' to the radii (4' overall)

We highly recommend the use of our **Stabilizer Bar(s)** when utilizing the longer Guide Shafts to add rigidity to the jig. (one is included with our Standard Package).

Larger and/or More Elongated Ellipses with the T-Slot Tracks

For larger ellipses and especially those that require large differential settings (such as those required for transom windows or oval windows in entry doors), we offer T-Slot Track Segments in 12", 24", 36" and 48" lengths. These tracks come with pre-drilled mounting holes, are mitered on one end and can be cut to any desired length to suit your project's requirements. Drawing accurate axes lines on your work will assist you in your set up. Take care to ensure that these lines are drawn at true 90° to one another and that they are marked clearly enough to be seen easily.

Align the machined center marks on the Standard Axes Plate with your pencil-drawn axes lines and secure the aluminum plate to the workpiece with your choice of screws, double-sided tape or vacuum hold-down.

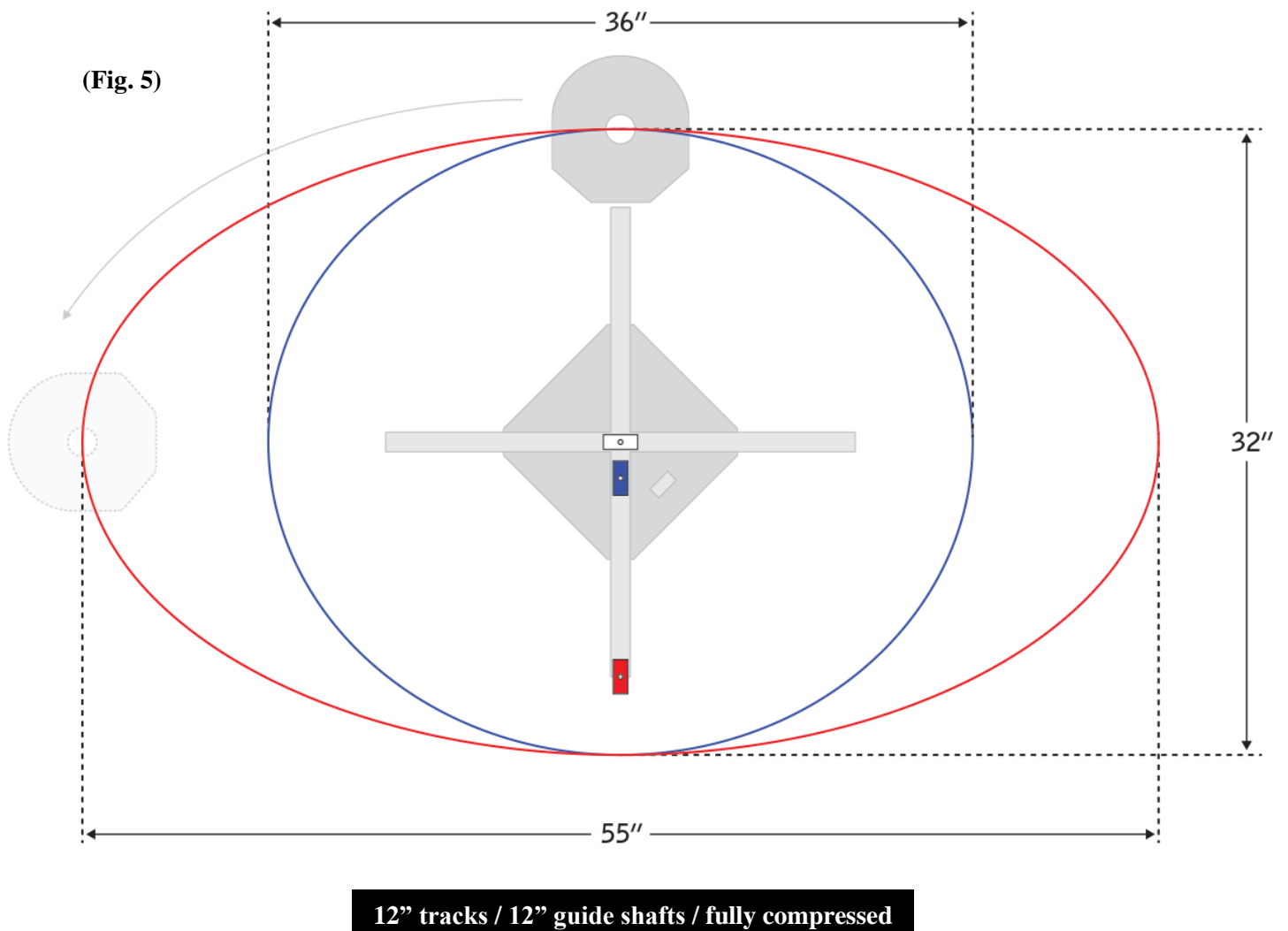
Note: For maximum rigidity and smooth slide travel we recommend supporting track segments 24" or longer with our **track support spacers**. They are made of the same aluminum plate as our axes plates and assure the jig's parallel quality to the work surface. They can be fastened down with screws or two-sided tape.

Tip: When cutting very large ellipses (or circles) with long guide shaft extensions, we recommend supporting the shafts with our **Stabilizer Bar Levelers**. The levelers eliminate any sag caused by their weight and keep the router plate flat on your work surface.



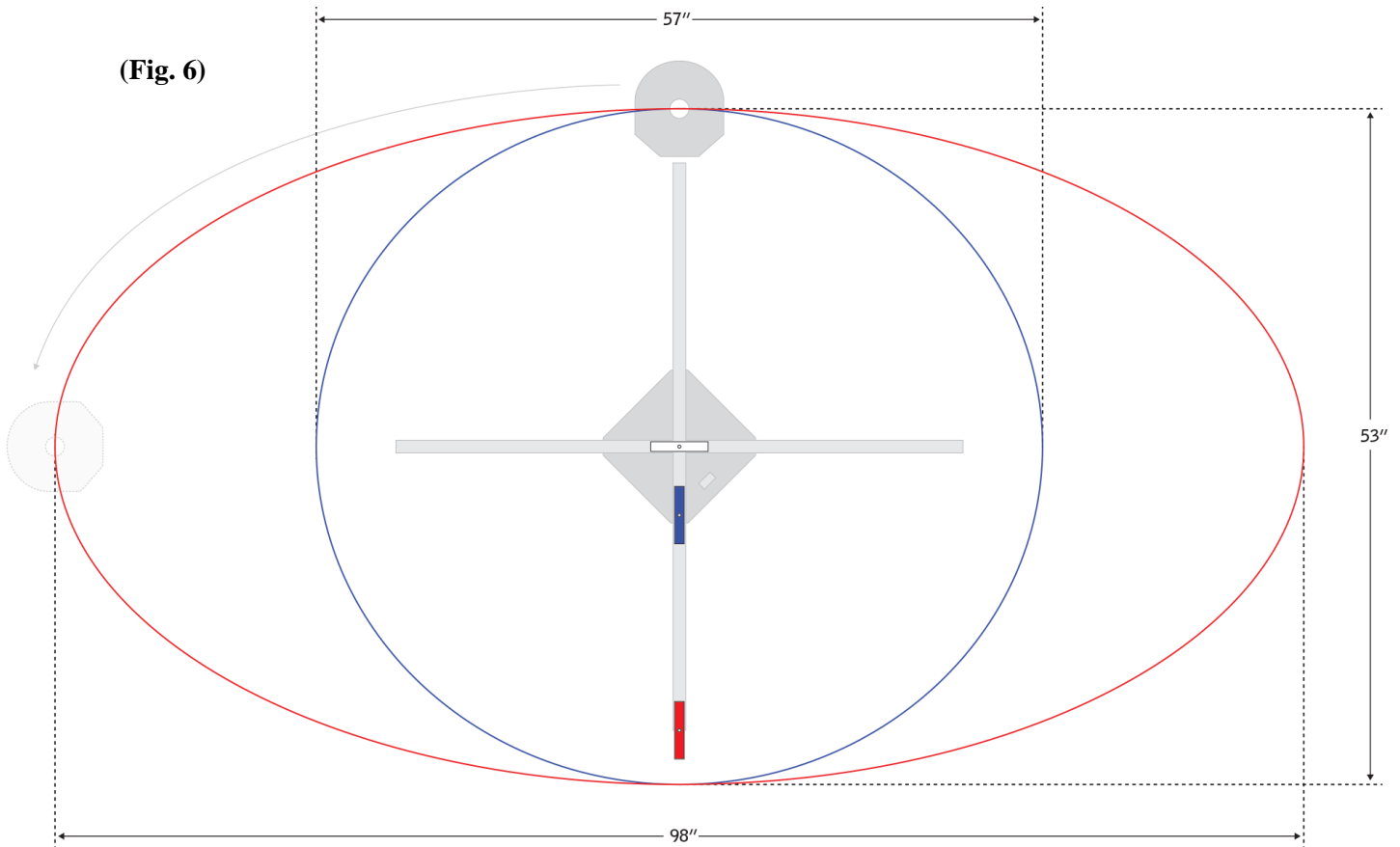
Stabilizer Bar Levelers

This diagram represents the Axes Plate fitted with **12" T-Slot tracks** and the Circle Jig with **one pair of 12" guide shafts** for setting the distance between centers and **one pair of 24"** to reach for the major diameter. This set-up will allow major axes from **36"** to **55"** to be cut.



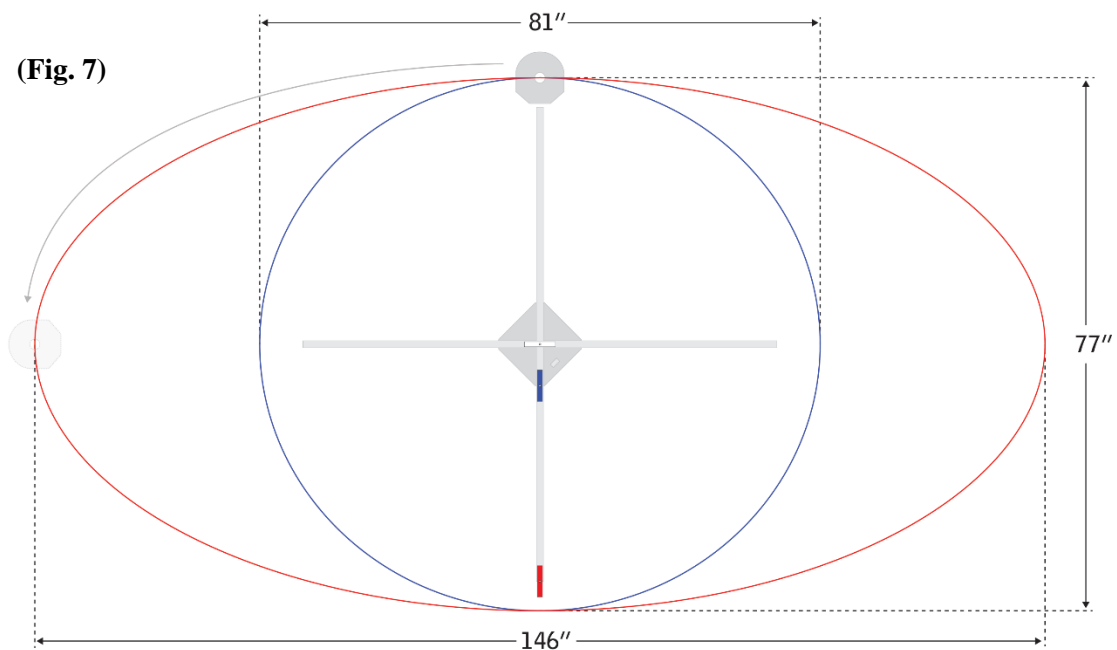
22¼" tracks / 36" guide shafts / fully compressed

(Fig. 6)



34¼" tracks / 36" guide shafts / fully compressed

(Fig. 7)



Cutting Ellipses: Tips & Techniques

- The success of your ellipse cutting will depend on your choice of router bit, the speed and feed of your cut execution as well as the rigidity of your **Micro Fence®** set-up. A little pre-cut planning and experimentation can go a long way toward understanding your set up, the character the material you're working with and the performance of your equipment. We encourage test cutting before each final application.
- Always plan ahead for power-cord management. A “dry run” before the cut may save costly errors. We recommend suspending the cord from above with a flexible tie or recruiting a second pair of helping hands to assist during the actual cutting process.
- Our router bit recommendation is for an up, down, or compression spiral. Some spiral bits offer **chip-breaker** grinds that are desirable when cutting hardwoods or composite materials. They allow faster feed rates with less resistance. Our favorite bits are made by the Onsrud Company and we carry them in solid carbide. We also advise a little spritz of dry lube, such as **Dynaglide** (our recommended dry-lube of choice), on both router bit and the router's sub-base to reduce friction and/or drag.
- We highly recommend the use of our **Stabilizer Bar** to add rigidity to your Circle/Ellipse Jig in any set up. The **Stabilizer Levelers** are especially recommended when longer guide shaft lengths (24” and/or 36”) are being used and in all cases to insure against thumbscrew loosening and slippage resulting from excess vibration.
- Our **Stop Collars** can be used with our Circle or Ellipse Jig to memorize a cut position or to pre-set where a second cut will occur. (Cases in point might be concentric or parallel cuts such as those required when making curved moldings, when enlarging cuts to accommodate mating parts like inlays, or when cutting inside and outside diameters, e.g. rings.) The **Stop Collars** are available in sets of four and feature nylon-tipped set screws that won't harm the guide shafts when tightened down.

Our optional **AXES TRACKS** are available in 12”, 24”, 36” and 48” lengths for larger and/or more elongated ellipses. These can provide differentials to 30” plus. We recommend our longer 4” T-Slot slides be used with the longer axes tracks for added rigidity.

Tip: When making ellipses with larger differentials (more elongated shapes), it may be necessary to remove a Minor Axis Track section during the cutting process to allow the router and plate to pass by. Once you have completed that section of the cut, replace the track and continue. Repeat on the opposite side.

Note: Unlike our Circle Jig, the Ellipse Jig cannot make concentric cuts. The jig has two centers and moves in a ‘trajectory’ rather than a circular shape. Moving the router plate either inside or outside of an initial setting will not produce a perfectly parallel cut. The greater the differential, the bigger the discrepancy (mostly at the 3 and 9 o'clock positions. For many applications this discrepancy may be inconsequential and acceptable to the eye, but in the case of making moldings which you wish to be of equal width throughout their circumference it may be necessary to use the jig to cut the inner dimension while band-sawing the outer one.

Drilling Techniques: The Universal Router Plate

Each Universal Router Plate comes with an aluminum Centering Hub to assist you in properly mounting your router on the Plate. This centering hub is made to fit the most popular template guide bushing recesses in router sub-bases (1.375").

Seat the hub in the template guide bushing recess of the **Micro Fence®** Plate as shown in the photo. (The 1.375" diameter should be facing upward).

Remove the manufacturer's plastic sub-base from the bottom of your router and place it over the Centering Hub to locate it on the Universal Router Plate. Pay attention to keep the sub-base bottom-side down and to position the mounting holes so that the router will mount in the posture you prefer.

(Some considerations are the position of the handles in relation to the edge-guide or circle jig, with 'side-to-side' being the generally accepted preference. Also note the position of the plunge lock on the router in relation to whether you are right or left-handed).

If the opening in your sub-base is *not* 1.375" and cannot be fitted with the Centering Hub, try installing the included 1/4" centering pin in the router's collet and use the through-hole in the middle of the Centering Hub to position and trace the shape of your router base. Remove the sub-base and align it to the tracing on the plate.

We suggest that you clamp the sub-base in the desired position and use it as a template to drill thru holes in the Universal Router Plate. After drilling, remove the clamps and the Centering Hub, turn the Universal Plate over and countersink (or counter-bore), the thru holes deep enough to allow the manufacturer's base screws to engage at least several threads into the 3/8" thick Universal Router Plate. The heads of these screws of course, should not seat proud of the plate's bottom surface.

