Sliding Lock Bar Kit Assembly Instructions

New or beginner folder makers should refer to the expanded assembly instructions following this ORDER OF FABRICATION. Veteran folder makers jump right in.

Rev 5/3/24

The picture above is a basic kit. The scales will vary. Note the scales and blade are not finished.

Here is a picture of a dissembled build. This is from our first generation design. This kit is gen 2 that had some slight, but important improvements.

This kit is not a screw together and done. You will need to shape the scales, profile and grind the blade, heat treat the blade, shorten parts to the correct length, counterbore several holes, tap several holes, drill and ream several holes.

The picture below shows a partially assembled kit.

Order of Fabrication

1. Review and sort your kit parts.

2. SCALES: Cut your scales out. Profile the scales to match the v groove profile outline. Grind up to the outer edge of the outline. This will leave the scales slightly oversized for now.

3. SCALES: Counterbore the OUTSIDE or “show” side screw holes in each scale .040” deep. This will put the screw heads mostly flush with the scale. (After contouring your scales, you may want to come back and re-counterbore back to .040” deep.)
   a. Note: do not counterbore more than .040” on the scale front screw hole since it is pocketed on the inside of the scale.

4. SCALES: Couterbore the scales pivot hole .040” deep. The knife kit pivot barrel is 3/16” with .310” diameter pivot heads. Use a counterbore that is 3/16” pilot and 5/16” cutters.

5. SCALES: Note: You may need to enlarge the pivot hole .005” to .010” in the scales (not the liners) if the hole diameter is too snug. Phenolic type material tends to drill a bit undersized. You do not want the scale putting side pressure on the pivot barrel. Your pivot barrel should slide in and out easily, loosely in your scales

6. BLADE: Counterbore your blade .040” deep on each side of the pivot hole. You will be left with a web of .040” to .050” which is plenty. The counterbore is 3/16” pilot and 3/8” cutting edge.

   a. Note: in assembly, the bearings go against the blade surface. The hardened washers go against the (softer) titanium liners. This is important. I’ll remind you again.

7. BLADE: Once the blade is counterbored. Measure the stack thickness of the blade, the bearings and washers. It will be anywhere from .155 to .170” depending on exact blade thickness and the depth of your counterbore holes.

   This stack thickness will be the thickness of your back space bar.

8. BLADE: Grind the blade to your preference (or grind after heat treat – your choice).
   a. **The blade is oversize for the knife.** It’s too long and probably too wide. This is intentional to give you a little room to shape the blade to your preference. Grind the blade profile so it fits the proper length of the handle.

9. BLADE: There is an arc in the blade geometry where the sliding bar lock will (“slide”) ride as you flip it open. This surface should be dead smooth and polished. Any

roughness or bumps will telegraph to the lugs and feel terrible.

a. I use a J-flex 240 or 400 grit to smooth the inside of the arc. I will also use EDM stones for any stubborn spots. I follow up with buffing for a high polish.
b. The outer (concave) part of the arc can be finished smooth also but generally the sliding lock does not touch this surface. I usually don't finish the non-contact side but it can be polished up also.

10. BLADE: The blade lock face and lock ramp should be made smooth and polished. Any material you remove from the stop pin lock face will raise the blade tip in the open position. **I highly recommend you remove very little material here.** Just get it polished.

11. BLADE: Jimp the flipper lever end. A smooth surface here makes it hard to flip. I use a checkering file but any style of jimping should work. See the pic above.

12. LINERS: Ream the liners pivot holes with a 3/16” reamer

13. LINERS: Ream the stop pin liners holes with a 3/32” reamer. Note the stop pin is trapped between the scales. The length can be slightly under but never over sized.

14. LINERS: Tap 2-56 scale screw holes in the liners. There will be 4 total.

15. LINERS: Select one liner and mark it as FRONT (or face side). Redrill the 3 back spacer holes to #43 for pass through holes with a 2-56 screw. Make sure you mark this clearly or you are almost guaranteed to assemble it backwards.

16. LINERS: Tap the 3 space bar holes on the BACK liner for 2-56.

17. BACK SPACE BAR: Clamp the BACK LINER and space bar material in position over the 3ea back spacer holes. Drill through the liner with a #48 through the back space material.
    a. Trace the outline of the liner onto the back space bar material and grind away any excess of the space bar material. Leave a little extra around the outside. You will grind away the excess along with the liners in later step.
    b. The space bar can interfere with the blade fully closing. The blade should not touch the back space bar. Check this when you do your first assembly. ***You will almost certainly have to remove some excess material on your back space bar for the blade to fully seat when closed.***
    c. TIP: Make sure the space bar material is flat and parallel. This is important. **Get your space bar to the proper thickness first, then profile it to the liner out line and for blade clearance.**

    d. In this picture below, it is hard to see but the blade is contacting the space bar.

e. 

18. PARTS: Shorten the 3/16” pivot barrel to your space bar plus both liners thickness. Add .020” to the length of the pivot.

19. PARTS: Shorten the 3/32” stop pin to space bar plus 2 liners thickness.

20. PARTS: Shorten the 5/32” pivot barrel to space bar plus 2 liners thickness plus .010”.

    a. If the 5/32” pivot barrel is too short, the cap heads drag on the sides of the liner and inhibit the action. If the pivot barrel is too long, the flanges on the cap heads will drag on the scale. Watch for this when you do your first full assembly.

21. PARTS: Shorten the back spacer 2-56 screws (3 of them) to space bar plus 2 liners thickness.

22. PARTS: Shorten scale screws to be flush to the inside of the liner when screwed on.

23. PARTS: It is likely the length of the threads on the Lock bar caps are too long and will clash inside the 5/32” pivot barrel. Shorten one of these a few threads.

24. PROFILE: Assemble the knife without the blade. Attach the scales and grind the edges profile to make the scales and back space bar flush with the liners.

25. PROFILE: Contour the outside of the scales to your preference.

26. PARTS: On the omega springs, there is a right and left. Orient them with the lock bar caps. Now slightly bend the closed loop a little smaller. This is the end that attaches to the bar cap. You want the cap head to stay attached. I use a needle nose to snug the loop around the bar cap heads slot. This helps with them shooting off never to be found. If you don't do this, you will end up buying replacement omega springs.

27. ASSEMBLY: Deburr your liners and scales if needed. All flat surfaces should be flat.

28. FIRST ASSEMBLY:
    a. Attach a blade pivot head to the 3/16" pivot barrel, push through the font liner, then stack washer, bearing, blade, bearing, washer, back liner. **Remember the**

hardened washer goes next to the titanium to avoid making a channel or ripples from the ball bearings.

b. Attach the other blade pivot head so it doesn't fall apart.
c. Screw the back space bar in place through the front liner, space bar and threaded to the back liner. These screws should be flush to the back liner, if not do that now.
d. Insert your stop pin. This can be a snug fit. Ensure the liners are parallel as they sometimes squeeze together when putting in this pin. If both sides of the pin are not flush, grind them flush now.
e. Thread the front sliding lock cap onto the 5/32" pivot barrel. Push through both slots in your liner and screw on the back side cap head.
f. Using a needle nose pliers helps with the omega springs. Attach the hooks on the omega springs to the liner.
    i. Do not attach the scales yet. Test it without the scales for any interference or friction points. The blade should swing freely when open and hanging down. The sliding lock should move smoothly with no binding.
    ii. At this point the knife should be functional without the scales.
    iii. It is possible, almost likely, the back space bar is contacting the blade in the closed position not allowing it to seat completely. Remove any material you need to so the blade does not contact the back space bar.

29. Once you have checked the operation without the scales, attach the scales and verify everything is working smoothly with no binding.
30. Usually adding a pocket clip is left until the end of the build. Add a pocket clip now if you want one. We have included a flat Ti pocket clip with screws.
31. 
    a. Drill 2ea #43 holes in the "head" end of the pocket clip.
    b. Using a torch, bend the clip 180degrees adjusting it so you can still access the screw holes with your screwdriver. Do not bend titanium cold. It will bend but it

will also crack. Titanium can be heated red hot to bend with no problems. When heated correctly, there will be almost no resistance in folding the metal.

c. Attach the back scale to the back liner with screws. On the back liner, position and mark your holes. Drill #48 through the liner and attached back scale.
d. Remove the back scale and redrill the #48 holes in the scale to the larger #43 holes for through holes of the 2-56 screws. The liner holes remain #48 for tapping.
e. Tap the liner screw holes you just made for 2-56.
f. Reattach the rear scale and then attach the pocket clip and grind the screws flush.
g. Optional but recommended: I usually trace the pocket clip “head” onto the outside of the rear scale and mill away .050” so the attached portion of the clip is flush with the scale surface. This helps slide it in and out of your pocket with out catching. See the example picture above how the clip is recessed.

32. Final assembly and clean up.

33. Add light oil to the rolling lock bar. Oil here makes a big difference. The bearings don’t really need oil but you can. The action should be very loose with no side play in the blade. The “walk” of the blade should be silky smooth. The lock bar should slide freely with no binding or rubbing anywhere.

34. After you are sure everything is good, put a small drop Blue (medium) thread locker on your pivot heads and lock bar cap heads. It doesn’t take much and you want to be able to disassemble it later.

Rolling Lock Bars and assembly

A little background on this key part:

This 3 part assembly allows you to accommodate most any typical blade width and bearing set up for this style of lock. It consists of our custom-made lock bar cap heads with one of our pivot barrels. All lock bar parts are hardened 416ss. The width of the assembly is adjusted by grinding the pivot barrel to length. The flange of the cap heads slides between the liner and the scale. The cap heads ride inside a slot in the scale and sit slightly proud of the scale for gripping.

Your kit will have 2 cap heads and 1ea 5/32” diameter pivot barrel to create the assembly. You will need to shorten the pivot barrel to fit your build. These will come to you with a gray patina from heat treat. You can buff these to a bright shine if you prefer that.

Counterboring Bearing Pockets in the Blade

The bearings are .047” thick. The washers are .010 thick. You should verify this by measuring as the kit parts may change without notice.

Using a counterbore with 3/16” pilot and 3/8”” cutting edge, counterbore pockets into each side of the blade pivot hole.

These bearing counterbore holes should be .040” deep on both sides.

The smoother the bottom of the pocket is, the smoother the “walk” will be on the blade. Forming tools like a counterbore should be operated at half the RPM’s or less that you would normally drill. Use cutting fluid and allow the cutters to dwell a few seconds when you have reached your depth to help smooth the bottom.

A word about blade bearings. You *could* over tighten your pivot head and really smash the bearings to tighten things up. The problem with this is you will likely flatten the small ball bearings or put ripple dents into the washer. If the blade has not yet been hardened, you could also put dents into the blade pockets. You will feel these bumps in the “walk” of the blade. Tighten your pivot just enough to eliminate blade wobble and that is it. No extra torque for “good measure”.

Making the Back Spacer Bar

The back space bar does not come with a separate pattern. You will use a liner to trace an outline, drill the holes and grind to size by eye.

First, we need to know how thick this space bar should be. We need to measure the stack of the blade (with bearing pockets done), bearings and washers**. The bearings always go in the blade pockets, the washer always goes against the titanium liner.**

So here is some basic math to give you an idea.

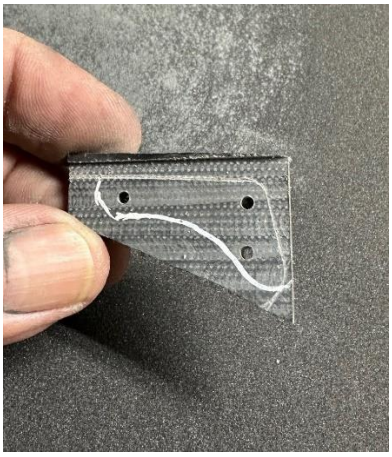
- The blade is .125" thick (this will vary – check your blade thickness). If you mill 2 pockets at .040" you have a web left in the blade of .045" which is plenty.
- The bearings are .047" thick and washers are .010" thick. 2 bearings and 2 washers add up to .114"
- Now add the web thickness of .045" to .114" and you end up with a stack thickness of .159". In practice, you will likely be slightly over or under depending on how accurately your pocket milling was. Now measure your stack and see how it compares.
- **It is much easier and more accurate to measure the actual blade/bearings/washers stack.**

Here we see the blade, bearings and washer all stacked together and we measure the thickness. This is the exact thickness you need for the spacer bar. In this case, we need a spacer bar of .162". My bearing pockets on this example were .041" deep. If the spacer bar is not the exact same thickness, the liners will not be perfectly parallel and will likely create an issue.

I am using a digital Fowler snap gauge caliper. Every single time I work on knives, I use this tool. Micrometers are more accurate than calipers, but this is generally good enough for knife work. Highly recommended. We don't sell these. We should. They are awesome.

Continuing with our example back space bar….

Using a mill, I milled my piece of carbon fiber to .164" and then hand lapped it down to .162". Notice there is extra all around the scribe and paint marks. When you hand lap, you will almost certainly lap in a slight taper at the edges and it will show as a gap between your liners. Leave extra around the edge for the taper and the rest will be flat.



Below I am hand lapping the back space bar on a surface plate with abrasive sheet. I use an even, circular motion and try to keep balanced pressure on the part as I reduce the thickness. I will measure several times around the edge in multiple places and adjust my pressure and sanding on the high spots. Take your time doing this or waste your time making another one when you get a sloppy fit to the liners.

In just a couple of minutes I have hand lapped this back space bar to the perfect matching thickness with little or no taper so it will be flush against the liners. The oversize of the part helps eliminate any taper issues since the final edge thickness after clean up will be flat.

NOTE: You can NOT get material flat on a belt grinder flat platen. A belt platen will put significant edge tapers on both the top and bottom of your material giving you gaps between the liners and space bar. The exception to this would be to have material that is oversize enough that the “middle” of the material is somewhat flat. This applies to scales also. Use a disc sander or hand lap using a surface plate to get things flat.

Counterbore the scales

Using the appropriate size counterbores, pocket the scales for the screws and pivot head. Generally, a 2-56 cap head is .040” - .050” tall. We will countersink the .040”. Keep in mind the front screw for the scale is located in the middle of your omega spring relief pocket. The pocket for the springs are .055”-.060” deep. That leaves approximately .080” in material. If we counterbore another .040” that leaves .040” of web which is about as thin as you want to go in laminate.

When you tighten the front screw on your scale, (the one that has an open space under it for the omega spring), you can easily over tighten it and break the remaining web in your scale. Just snug this up lightly and the front pivot head will hold the front t scale firmly in place since you can tighten that up more firmly.

Below is a finished scale showing the counterbores and resulting pockets for screws and pivot head. These are one piece carbide counterbores we have made to our specifications. Counterbores are available from machine supply houses in literally thousands of size combinations so you are not required to purchase one from USAKnifemaker.com….but it helps.

You don’t have to counterbore for the screws or pivot heads but it makes the knife look and feel more finished.

Blade Clean Up and Adjustments

This picture shows the rough finish from water jetting on the cam portion of the blade and the flipper lever. First, let's talk about the cam portion.

The lock bar will ride on this cam when you flip the blade. If you leave this rough it will feel like sand is in the knife mechanism. You will want to smooth and polish this cam lobe. There are several ways to do this. I use a 240 or 400 grit J-flex belt on my slack belt grinder attachment. After the roughness is gone, I buffed it to a high shine using green chrome buff compound. The smoother the cam the face is, the better. You will feel any ripples you sand into this lobe. Keep it silky smooth.

Below, see a before and after picture of the cam, lock and stop pin faces on the blade.

Note the lock barrel only rides on the one surface (the buffed one as shown here). The inner arc surface on the flipper lug side of the arc does not require any cleanup other than cosmetics and it is largely hidden in both open and closed positions.

EDM stones are typically used by Tool and Die makers. I use them frequently and can't recommend them enough. Here I am cleaning up the lock face and stop pin face. There are several types of abrasive stones but the EDM type seem to lend themselves to knife making particularly well. They come in several grits and sizes. For economy over expensive abrasive sheets, they can't be beat. You can always use abrasive wrapped around some flat stock. I would not use a belt grinder to clean these faces up as it will remove too much material and change the open blade position and lock up.

Here we can see jimping added to the flipper lever end. Using a checkering file makes this easy. There are several methods to jimp a blade. The flipper lever can be slippery and you will want to add some type of texture to this area.

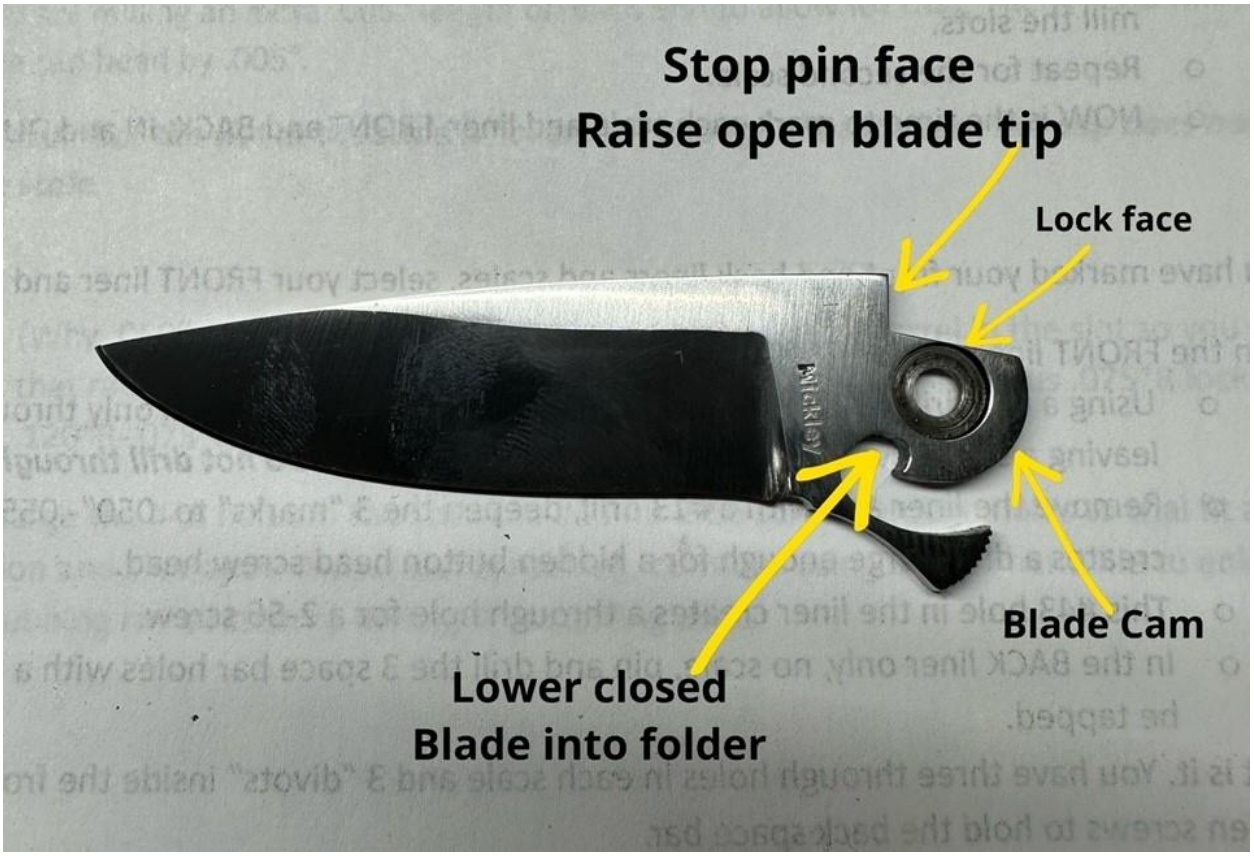
Looking at the geometry of the flipper blade there are a few points you should know. The cam face we have talked about. It should be silky smooth and buffed to a very fine finish. The lock face and stop pin face should also be cleaned up.

Note that whatever you remove on the Stop Pin blade face will raise the blade tip in the open position.

Also, **if the blade does not sit down into the knife far enough when closed, use a small round file to remove some material inside the arc as shown. *Do this only after you have triple checked to make sure the back space bar is not touching the blade!***

Be careful how much you remove. A very small amount of reduction will yield a bigger than expected move at the tip of the blade.

A smooth lock face will help with a smoother lockup when open and will help eliminate lock rock from an uneven lock face surface.



If you compare this blade profile to your kit, you will see it has been modified slightly to a different profile. I would encourage you to adjust the profile of the blade to your preference.

Grind and heat treat the blade according to the blade steel that comes in your kit.

Sizing the Blade Pivot, Stop Pin and Lock Bar

WE need to shorten a few parts now.

Pictured below:

A pivot lap will make shortening a pivot, stand off or pin stock easy and precise. If you don't have one, no worries, it can still be done by hand. If you shorten by hand, make sure the ends are flat and square.

The item at the top in the picture is a Pivot Lap. More on that later.

To the far right we see an alternative blade pivot called a 3/16" Chain Ring bolt. To the left of that we see a more traditional blade pivot with 2 caps and 3/16" pivot barrel. To the far left we see the Lock Bar assembly and finally we see the 3/32" hardened stop pin.

The length of the stop pin is equal to the thickness of the space bar plus both liners minus .005". Measure the liners and space bar assembled. Shorten the stop pin to .005" less than your assembled knife is thick. Crown the ends slightly to ease assembly.

Shorten the 5/32" pivot barrel from the lock bar assembly. The reason for this is the threads cut into the cap heads necessarily do not snug up perfectly flat to the cap heads and you need to allow for this. You want the lock bar assembly when fully assemble and inserted into the knife slot to closely or the flange will rub against the inside of the scale pocket. You may need to shorten this a bit more if the flange is rubbing. The liners are .050" thick and you have plenty of room. The screws on the lock bar caps are long and may require you to shorten one so they don't collide in the middle

preventing you from screwing them together completely. If this is too long, one or both sides will push out on your scale leaving you with an easily visible gap between the scale(s) and liner(s).

The 3/16” blade pivot barrel should be .020” LONGER than your stack so it is proud of the assembled knife when in the pivot hole. There is enough web in the scales to allow the pivot cap heads to seat easily. Again, slightly crown the pivot barrel ends to ease assembly.

Trouble shooting

- The first thing to check is if the knife operates properly without the scales attached. If it works fine that way, attach one scale and check it. Then remove the first scale and attach the second and check that. If it works fine without the scales, concentrate on those.
    - Start with the slot, it's the easiest. If the lug on the lock bar is rubbing, use a small file or sandpaper on a flat thin piece of scrap. The slot might be slightly high or low.
        - A small rotary tool like a Dremel really goes fast and tends to gouge. A file or sandpaper is better. You are only looking to remove a few thou at a time.
    - Ensure the spring isn't trapped by the scale. Look around the edges to see if there is any gaps. You may need to enlarge (not deepen) the pocket. You shouldn't have to enlarge the entire pocket. Only where the spring is close to the edge
    - The lock bar cap flange may be rubbing just inside the pocket and you can't see it. Check for adequate clearance around the top and front of the pocket relief. Normally this will show up as the lug not quite reaching the front or back of the milled slot in the scales.
    - Check the length of the 5/32"(pivot barrel) lock bar. It might be a bit too long.
- The sliding lock bar pivot won't go through the slots in the liners.
    - The water jet cutting may leave some flashing inside the slot. Use a very small file or sand paper to remove any flashing. The tolerance needs to be close. An oversized slot will give you blade tip play when open. Remove any extra flashing but do not enlarge the slot.
- The "walk" feels gritty or bumpy.
    - The walk here means the tactile feedback you can feel as the knife opens and closes. The cam surface on the blade should be smooth. Polished smooth is better. Always use a bit of lube here. Grease or oil, your choice.
    - A "gritty" feel when opening or closing may also indicate the omega spring is rubbing somewhere but not so much is binds up.
    -