

CUTTING THE NOVIMMX

BY JEFF FORD

Jeff Ford's "NOVIMMX" in CZ

Beginners Stone, 2010 SSC



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In this article I'm going to detail how I approached test cutting the 2010 novice stone.

(Usual disclaimer - Others may do it differently, this is how I did it.)

Part One – Cutting the NOVIMMX Pavilion.

Before we begin I would like to point out a few things about approaching this pattern with 'competition eyes', first notice the number of meets. That is the number of meets used for scoring. By definition a meet used for scoring is one where four or more facets come together, also be aware that all meets are scored equally. This does not matter if the meet is comprised of four or 16 facets, they all carry the same scoring value! Meet count – 1 culet, 8 table, and 32 girdle; for total of 41 meets. The point I want to make is, yes there is honor in making the 8 facet culet meet, but you might want to think twice if you start doing so at the expense of too many of the girdle meets!

What material to cut? Sometimes you have no choice and have to work with a specified material. If you are lucky enough and have a choice, i.e., cutters choice. ABSOLUTY select a material you know how to polish! I could recommend some materials that I'm comfortable with, but in reality that might be the WRONG choice for someone else. A competition is a personal test of sorts; in general 'a test' is generally not the best time to learn something new. This is why I'm reluctant to jump up and suggest that others should go with a favorite of mine. For example quartz might be considered a typical beginners material, true it is fairly easy to cut and polish, but ask most any master level cutter and most if not all will agree that it can a challenge to achieve a 'master level polish' on quartz.

Lets start cutting - For this stone I would suggest starting with the pavilion, although no real reason why someone could not start with the crown. Let's go ahead and put in the four of the P1 facets, see Figure 1. The idea is to cut them in as pairs and get a good culet started. In theory it is simple, just cut the facets to an equal depth. In practice the cutter needs to rely on the machine at this point. Often I will just use a hard stop for this and let the stone cut away with no hand pressure until no more cutting can be heard. Others may also be able to accomplish this by using indicators (mechanical or electrical) as a depth of cut device. Initially I may start with a relatively coarse lap to get the basic shape, then end up with a 1200 to zero in on the center of the stone.

Next step put in the next four by splitting the first four and bring them into the culet, the habit of cutting 'in pairs' is just something I do. If I had to

Figure1: P1 96-24-48-72

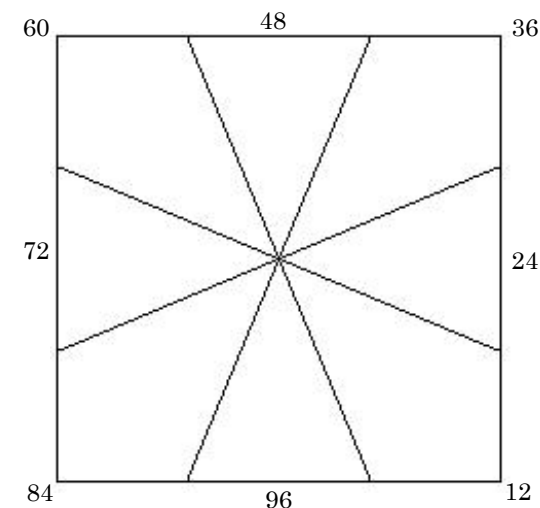
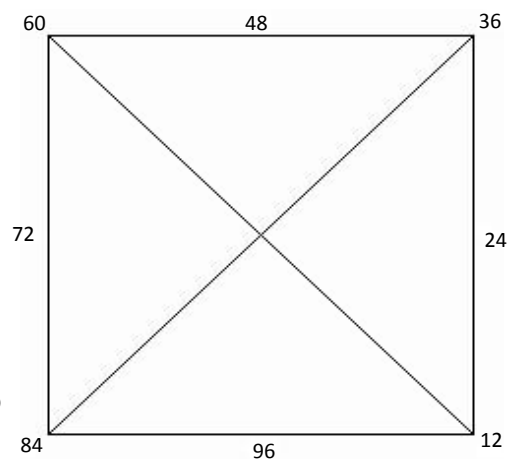


Figure 2, Cutting in P1 12-36-60-84

explain why it would probably come down to having control over bringing in the meets as much as anything, see Figure 2. Putting in the additional P1's at this point can be done with a 600~1200 lap as we are not removing very much material. Next put in the remaining P1's, see Figure 3.

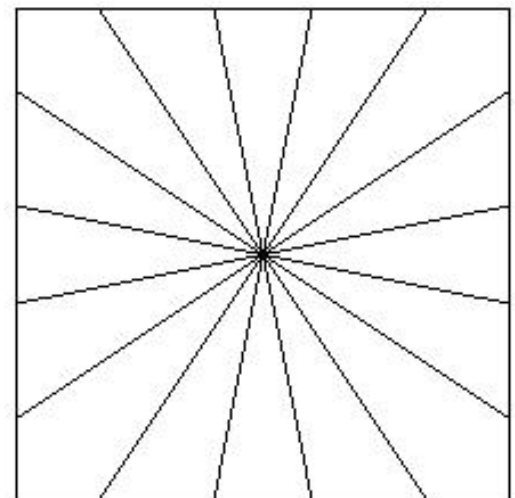


Figure 3, Cutting in P1 6-18-30-42-54-66-78-90

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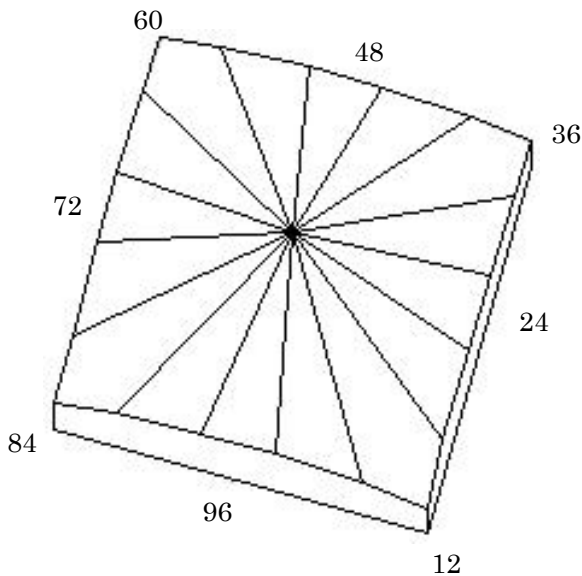


Figure 4, Starting to size the width of the stone.

The next step is to start the girdle; to do this I want to begin by sizing the stone width. The pattern calls for a finished size of 12mm. Again I like to think in terms of pairs, the first set will be 96-48 & 24-72, see Figure 4.

Now start taking some measurements with a goal of hitting just over 13mm. After you get there with the 96-48 & 24-72 pairs go ahead and put in the rest of the girdle facets, see Figure 5.

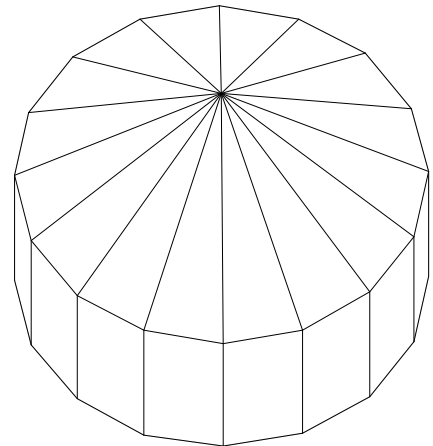


Figure 5, The Girdle is roughed in.

Wearing my competition hat, at this point the big item I want to get out of the way is getting the girdle accurately established. Going back to the competition specifications, we are to have a finished stone that is 12mm +/- .5mm. In other words it can be between 11.5 & 12.5mm. To do this I'm going to switch to a finer lap, this might be a 1200 or a worn 600 NuBond. I want to recut all of the P1's, again in pairs like I did before. Take a little time here and start using the loupe to bring them in to a good culet. When you're happy with the culet, I would consider taking the pavilion to an initial polish, taking care to make the culet meet to a 10x loupe (again thinking in pairs). Ok the polish does not have to be perfect, but I do want to be comfortable with finding the center of the culet the best I can.

At this time I want to take a bit a break and talk about the time when I notice a cutters skills will noticeably improving. Probably the biggest thing that will separate beginning cutters from good cutters is knowing when-to-stop-cutting. IDEALLY, you want to cut in the facets just ever so short of making a meet, too far and about the only choice is to recut the whole tier, just ever so short and it's just and easy touch up later on. In other words start thinking and practicing; cut-a-little, look-a-lot.

Back to the task at hand - Now go ahead and start cutting the girdle facets with the 1200 or 600 NuBond. Start by sizing the 96-48 & 24-72 to just over 12.5mm. Once you have the height set for this we need to switch gears a bit and start chaining in the remaining girdle facets, do this IN ASCENDING OR DESCENDING ORDER. Go ahead and just kiss the 96 again, then bring in 6-12-18, and so on, in to the previous girdle meet working around the stone, see Figure 6.

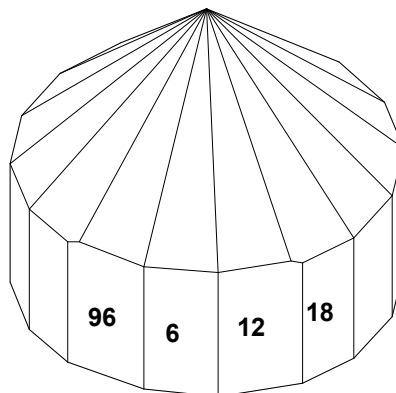


Figure 6, chaining in the girdle.

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If everything is right up to this point the last facet at index 90 it will look something like Figure 7. With any luck when you do bring it in to 84&90 the meets will be very good. If not you may have to chain them ever so slightly a time or two.

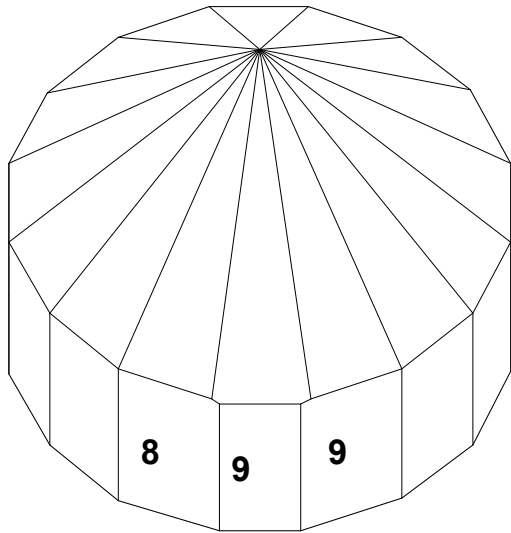
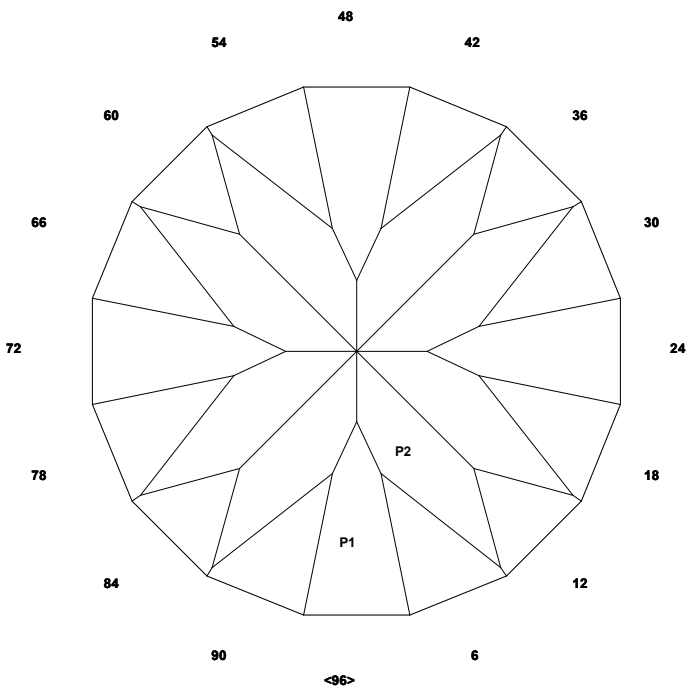


Figure 7, The chain is almost all the way around.

Figure 9, Rough cutting in the P2's



Next switch to the polish lap and polish in the girdle by chaining again. Our best friend at this point is the 10x loupe. Tip – if you feel the girdle facets are too wide and a chore to polish, you can back cut the girdle with the 1200 at something like 85~95 degrees or what ever your machine will allow I will generally leave about a 2mm 90 degree girdle width when I do this, see Figure 8. Now that you have the girdle chained in to a good set of meets check the width, ideally we are just below the 12.5mm. Here is where competition thinking differs a bit from other styles of cutting. NOW I want to go back and get a perfect polish on the P1's and girdle. Why now? Basically I want to get the girdle done, perfect, and out of the way.

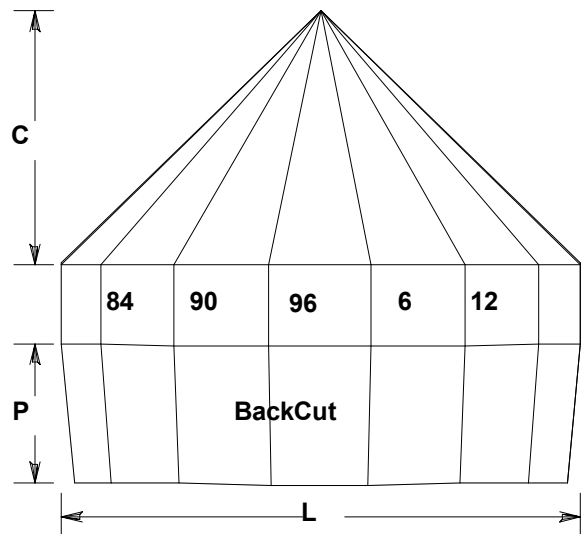


Figure 8, Backcutting the girdle.

It's time to go back and get the pavilion P2 mains. To do this I want to put the 1200 back on and just place them in just short of making the girdle meet, see Figure 9.

We are ready to go ahead and start polishing in the P2's, but I want to do this again in pairs starting with the 9-57 & 33-81, be careful of making those girdle meets!

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Next go ahead and bring in the remaining P2's (any order you wish) but you make have to start making some height adjustments (vertical cheating) to maintain the culet,,, keep thinking to UNDERCUT ever so slightly and keep pecking away at it until you make all of the meets. Congratulations, you have finished the pavilion! Take a break, seriously its time to take the evening off, you deserve it.

Part Two – Cutting the NOVIMMX Crown

The next thing to do is transfer the stone; I'm not going to include a dopping lesson here, so use anything that works for you. If you use keys fine, I do not use keys so I will briefly go thru how I align the stone back in the quill. One of the things that I did before I removed the dop from the quill was to mark the 96 index spot, for this I use a small diamond file and just place a mark on the dop end of the 96 'back cut' facet,,, I have used marker and the like before, but more times than not it gets wiped off or something.

Skip this paragraph if you use a keyed dop system - With the transferred stone in the quill place the index at 96, set the angle for 5 degrees (in my case the amount of back cut), bring the stone near your polishing lap, slowly bring it down so it just touches. The dop is not clamped quite yet, bring the stone down so it just touches the polishing lap (allowing it to rotate a little if needed) now clamp the dop in the quill. Go ahead and take a very quick swipe with the polish the entire facet should begin to polish. If not you will need to cheat (radial) just a little, keep doing this on other facets if needed until the whole facet begins to polish, or at least until the leading edge is parallel with the girdle line.

Checking the transfer – Even with keyed dops you will probably want to check the transfer; here is one way to do it. This crown is a relatively simple one in that it only has break facets and a table. The first goal is to check that our stone is exactly aligned to the previous register. To do this I choose to cut the C1 (@ 30 degrees) facets plus a set of fill in facets to replicate the C2's using the C1 angle. For now just rough them in with a hard stop leaving the girdle about 1.5mm thick. There is no need to get too precise with the depth of cut at this point we are just removing material, see Figure 11

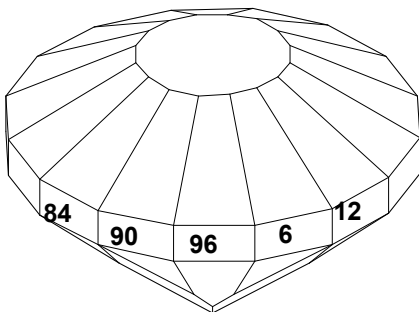


Figure 11, Roughing in the crown w/ a complete set of P1's

Okay what's wrong? Essentially we cut a spiral because the register between the transfers was off by a very slight amount (graphically I used .25 degrees)

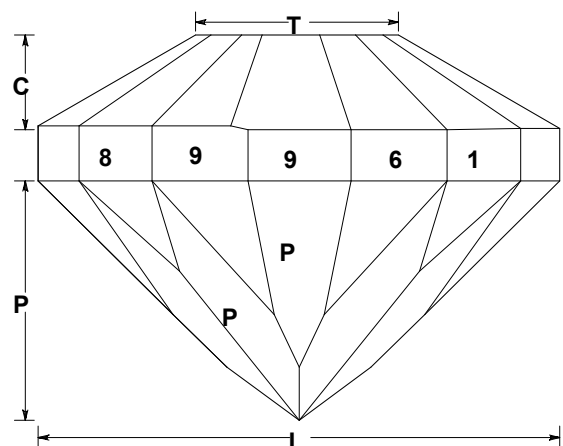
We still have plenty of girdle width, what we need to do is cheat the system a little and recut the chain again,,,, do this a little at a time until the spiral is eliminated. When the last and first facet become aligned, the register of the pavilion to crown is perfectly matched! Go ahead and trim the girdle

Next go ahead and switch to at least a 600 lap or even a 1200 lap, go back and re-cut P1 96 just a little deeper, now chain in the remaining facets in the tier;

P1 @ 30 deg, 96-6-12-18-24-30-36-42-48-54-60-66-72-78-84-90

Chances are the last facet didn't quite meet up with the first, see Figure 12.

Figure 12, cutting a spiral.



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down to .4mm to .45mm. thick. The mantra is still chain cutting. At first this might seem like a lot of cutting and looking, but with practice it goes much faster than it would seem.

The next step is to place in the C2 facets, since they are at a lower angle they will remove the temporary C1's we cut earlier, go ahead and bring them to the girdle AND try not to over cut them as we are getting close to the .3mm girdle width, see Figure 13.

So far the girdle is just about 'IN' with regards to the finished dimension. The next thing is to go ahead and polish it in. For now I want a pretty good polish, but not quite perfect is okay for now. I do want to pay attention and start chaining the girdle to do this you can take a little short cut to minimize the angle changes. To do this polish in C2-96 then C1-6&90, then C2-12&84, and so on alternating between C2 & C1 until you come back around to C2-48

At this point I want to go ahead and get the table done. Here goal is to cut and polish it perfectly. The one thing that might be different is I want the table over cut the meets just a little bit, see Figure 14.

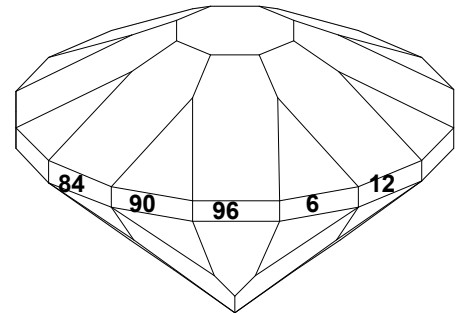


Figure 13, Placing the C2 facets

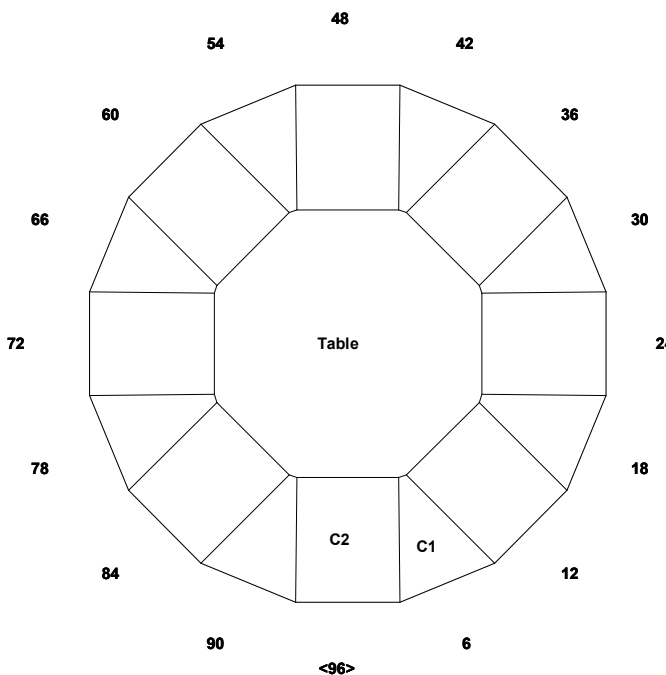


Figure 14, Cutting and polishing the table, with the goal of just over cutting the meets.

If you are using a table adaptor – After the table is polished to perfection you will need to put the dop back in the quill. To do this we are going to 'find-the-facet' If you used a keyed system it should be just a simple matter of chuck and clamp. Since I do not use keys I will have to go back and find the facet to re-register the index of the stone. This is very similar to the way we checked the register after transfer.

Finding the facet - The key folks may want to follow along and confirm their keys are doing the job. For this I'm going to reference off of C2-96, set the index to 96 and angle to 28.12 degrees. The polish lap should still be on the spindle. With the dop just snug enough to prevent falling out bring the C2-96 facet down almost to the lap, now loosen the clamp (setscrew) and let the C2-96 settle on to the polishing lap, then tighten the quill. With the lap not moving (stationary) we want to sweep the stone just a little. Next pick up the

stone, with the 10x loupe and a little luck you should be able to see where the sweep polished the stone just a little, ideally this should be evenly across the lap. In most cases (because the screw may have twisted the dop a little) it is probably off just a little. Here we need to make just a little bit of a cheat, note this might be index and/or height. Sweep the stone again and see if you corrected it. If you want or feel that you need a fresh facet go ahead and select one of the other C2 indices and repeat the sweep. Do this until you are satisfied the facet (C2 tier) is perfectly matched (cheated) into the running plane of the polishing lap.

So far so good? Lets go ahead with normal polishing and bring the rest of the C2's in to a perfect polish. Since the width was just at the top side of the tolerance we have saved ourselves a little room to play with, but we also want the

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C2 girdle width to get just inside of the competition tolerance. Now you will probably over cut the table meets just a little, in fact this is what we want to do, Figure 15 shows what we are trying to achieve.

Up to this point the once thing we have accomplished is missing all 24 crown meets. It might not look we know a darn thing about faceting. What we have done is set ourselves up for the final step. Let's consider some basic geometric facts. A flat plane can be defined by a minimum of three points in space, i.e., a three sided facet. A four sided facet may also be flat, but it can also be curved. In reality cheating in a four or more sided facet is more difficult because it can in fact be curved. With this information what we want to do now is go back to the C1 facets (three sided facets) and carefully polish them in, cheating each one as needed (remember: cut-a-little, look-a-lot) to land the three meets perfectly. TIP - If you want to cut something like a SRB, this is exactly how the stars are finished if you care to make all of the meets.

Still thinking about meet count keep in mind that each C1 is responsible for ONE table meet and TWO girdle meets. ALSO, when cheating in any sort to facet IDEALLY you should cheat in the whole facet and not the tips. It might be tempting to just pull/push in the tip of the meet. The caution that I want to point out is not is keeping the facet flat and not ending up with a ghost facet by cheating in only the tips. In Fig 16, I have tried to show what a ghost facet at C1-90 might look like.

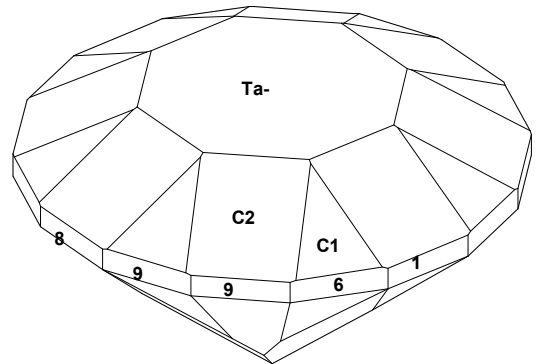


Figure 15, Final polish on the C2's

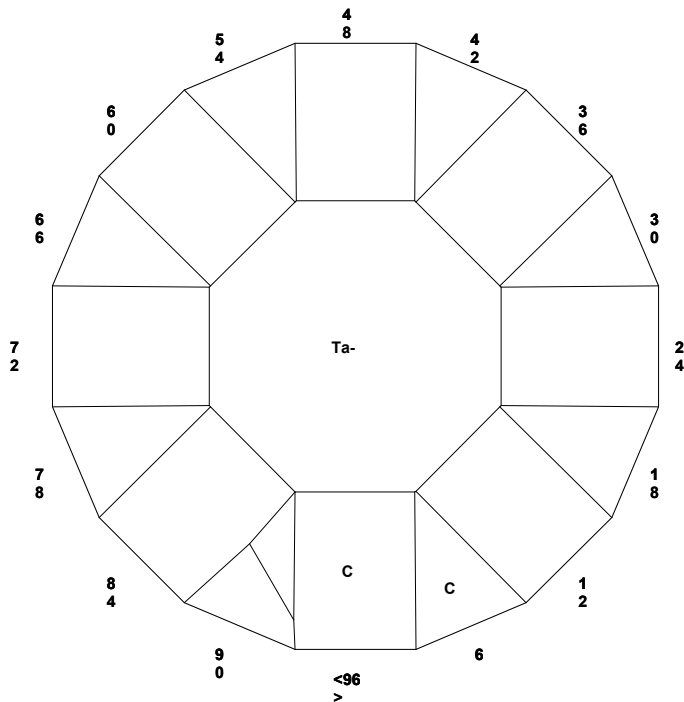


Fig 16, Ghost Facet at C1-90

Although this was a step-by-step example of how I approached and test cut the NOVIMMX, this does not mean that others may have a better method. Hopefully by sharing this type of detail someone might be able to pick up on something or perhaps improve upon it. If you do feel that you have a special trick or tip to share, I would encourage others to consider submitting an article to the USFG editor.

Editors note: The "ghost" line shown in the figure can be very difficult to see—you must move the stone around in relation to your light source to make sure the reflections or shadows remain smooth across the facet in every direction. If they don't, you've got a ghost in the house! And yes, sometimes it seems that these are poltergeists—at least things can get thrown around in my shop if I can't get them to go away!

Huge thanks to Jeff for great graphics showing what can go wrong, or how things might look when things aren't actually going bad at all!