THE FACETRON OPERATOR'S MANUAL

Dear Facetron owner,

Congratulations on buying the finest faceting machine available today.
You have joined a family of proud FACETRON owners throughout the world who use their FACETRONS for cutting precious gemstones. Some use the FACETRON in their hobby workshops, others use FACETRON professionally and then some use FACETRON's to cut world class competition stones. In fact the majority of award winning competition cutters today use a FACETRON. All owners will tell you emphatically that the FACETRON is the best faceting machine you can chose due to attractive pricing and high quality. FACETRON by design is the very definition of simplicity, style and value.

Today to remain competitive a company can not rely on old design technology even though they set the standard for excellence in the past. A company must always listen to their customers, look forward to the future and innovate, incorporating new methods and technology to provide excellence in customer service and remain in the leadership role. This is exactly what The Jarvi Tool Company has done with the FACETRON.

What does this mean to you?

- **It means the first really modern all mechanical instrument whose elegant simplicity belies its ruggedness and precision has moved into the 21ST Century with the next generation of innovations.**
- **It means a highly professional lifetime faceting machine which is easy and cost effective to use attracting beginners and professionals alike.**
- **It means a machine which holds its value over the years due to its precise accuracy, extreme repeatability and value added features as with the exclusive mechanical digital readout, new mechanical dial indicator depth of cut indicator, dependable cam lock dop chuck, keyed dops, the ability to make rapid height adjustments easily and precise incremental adjustments accurately, high quality Accu-lign transfer fixture along with a wide variety of optional accessories which are practical and affordable.**
- **It means that if you examine the FACTS, FEATURES and BENNEFITS of all faceting machines you'll learn that you can own an extremely high quality machine designed to last for a lifetime of use for a price you can't afford to pass up.**

The Jarvi Tool Company is proud to offer a faceting instrument designed to last a lifetime providing enjoyable usefulness and functional beauty that is only equaled by the brilliance of the gemstones it is capable of producing with a little effort and a desire to learn on your part.

Your Facetron faceting machine is a precision instrument designed and manufactured to exacting tolerances using the finest materials and careful craftsmanship during assembly and final inspection. Years of research, development and improvements have been devoted to one goal;

THE FACETRON OPERATOR'S MANUAL

providing you with the finest, most advanced instrument for practicing the art and science of faceting.

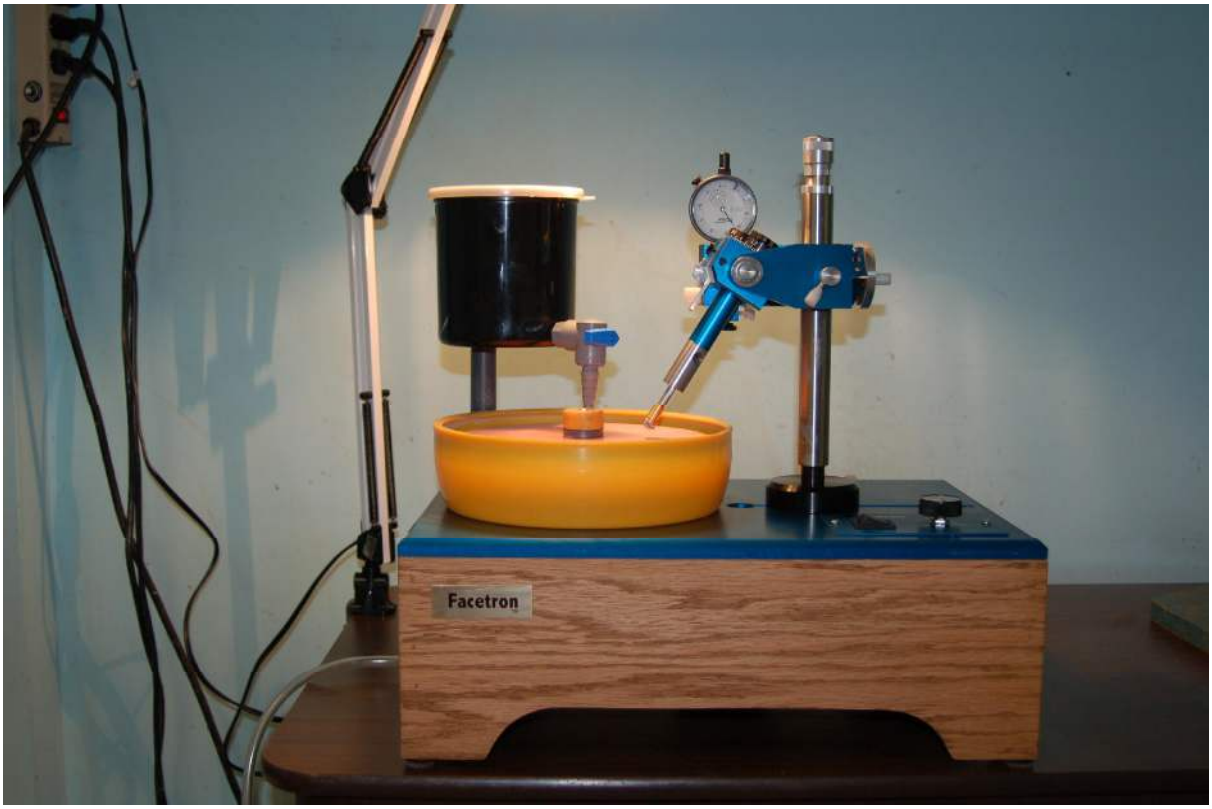
To take full advantage of your new FACETRON it is imperative that you familiarize yourself with its operation and maintenance. Reading this manual will provide the information necessary to achieve excellent results and protect your investment against accidental misuse or damage.

Please read and understand your operator's manual before using your machine. Make sure to learn about standard shop safety when using power machinery, abrasives, chemicals and other accessories used in conjunction while using this instrument for its intended purpose.

DO NOT plug instrument in to a wall outlet unless the electronic speed control is in the off position (full counter-clockwise).

DO NOT change lap rotational direction when motor is turning. The direct current DC permanent magnet motor will become a generator momentarily and current will flow in the wrong direction and may cause damage to the diodes in the electronic speed control or could also do damage to the motor itself.

THE FACETRON OPERATOR'S MANUAL



The FACETRON with new dial indicator and standard deluxe water tank reflects elegant design engineering yet provides dependable reliability. FACETRON customers expect the value and precision and they are not disappointed in this fine faceting instrument which is why FACETRON is the most popular faceting machine in the world among professionals, hobbyists and competition cutters alike.

THE FACETRON OPERATOR'S MANUAL

Shown above is a set of 15 standard dops (# 15), Acu-lign transfer fixture (#14), dop chuck key(#12) , target dop and table dop (13) which are standard accessories included with your new FACETRON along with one index gear (96-index is recommended).

A wide range of optional extras are available for those unique projects you may want to create such as odd symmetry gems, diamond replicas and many others.
Choosing a machine with such a wide range of extras adds greatly to the creative flexibility of the machine.

THE FACETRON OPERATOR'S MANUAL

Before you phone or write that you've encountered a problem with your FACETRON, please review the advice below:

1. **Make sure your machine is plugged into a power outlet. We recommend plugging the machine into a computer grade surge protector or even a battery back up power supply which can protect your electronic speed control from power surges, brown outs or black outs.**
2. **If the dial indicator does not function properly make sure it is free of dirt and aligned properly.**
3. **If there is a slight side play in the index gear make sure the teeth are free of dirt and that the freewheeling screw located on the index gear lever is not turned in too much.**
4. **To prevent contaminants from getting into your dop chuck and gumming up the cam lock do not rest the dop arm in the upright position. Here is a tip to prevent contamination from seeping into the dop chuck. Buy an O-ring at your local hardware store or home center which slips over the outside diameter of your dops. Make sure the dops are clean before inserting them into the dop arm and then slide the O-ring up tight against the dop arm.**
5. **When placing a dop in the dop arm chuck give the dop a little torque counter clock-wise then tight the cam lock. After you transfer your stone follow the girdle alignment procedure shown in LEARNING TO FACET IN THE 21st CENTURY FOR FACETRON. Proper girdle alignment will assure cutting a parallel crown girdle.**

IMPORTANT

This machine was carefully inspected and packed before leaving our factory. Therefore the carrier is responsible for any visible or concealed damage incurred in transit. Report the damage immediately with the local UPS office and file a claim.

Please contact The Jarvi Tool Company if you are having a problem with your FACETRON do not call your dealer. Who know more about the FACETRON than the people who make it? Please do not ship anything back unless you call first.

If the problem is with the faceting head then only send the faceting head. Do not send the mast. Leave an index gear on the quill and do not fold the dop arm back; leave it flat. It is safer to send the head via UPS rather than through the U.S. Postal Service.
All foreign return shipments must be marked for customs as follows:

ATTENTION CUSTOMS: CONTENTS OF THIS PACKAGE IS BEING RETURNED TO THE ORIGINAL MANUFACTURER FOR REPAIR AND RETURN.

Assembly:

1. **Place the machine base on a clean and solid work surface.**
2. **Mount the mast with the brass "T" nut.**
3. **Rotate the mast post base until it is snug.**
4. **If the mast post handle is in the six or nine o'clock position then turn the "T" nut 180°.**

5. **Connect drain tube to the drain fitting located on the bottom of the machine on the urethane splash pan.**
6. **Route the drain tubing to a suitable container. A one gallon milk jug or a five gallon plastic pail makes a good container.**
7. **Route the electrical cord to a convenient grounded power outlet or computer grade surge protector.**

Assembly and mounting of the mast tube:

1. **Slide the mast tube through the faceting head until it is near the center of the mast tube. Snug the faceting head lock screw with light finger pressure.**
2. **Slide the tube and faceting head assembly down over the mast post.**

Installing laps:

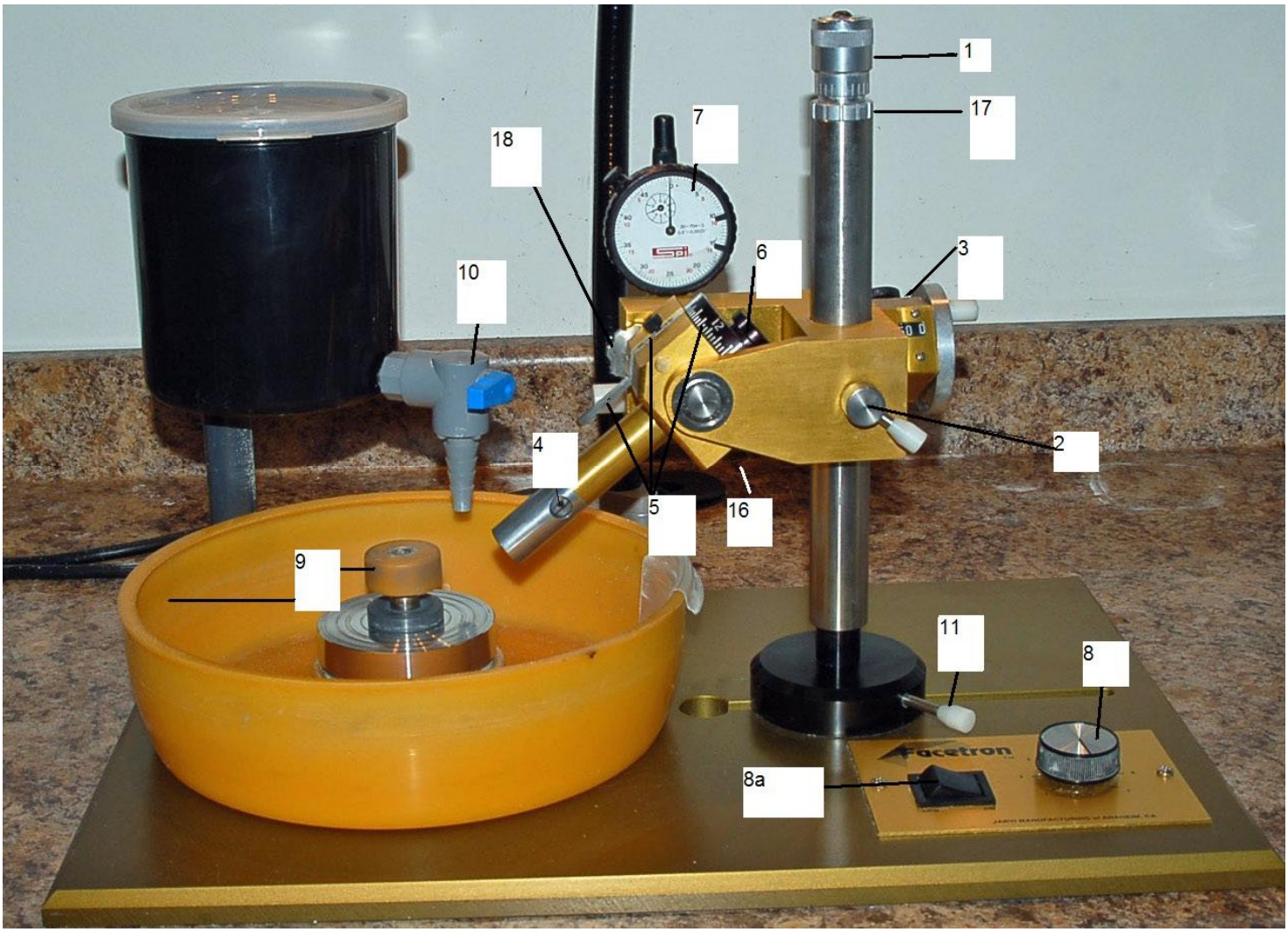
1. **Remove the cushioned lap nut from the platen and install the desired grinding or polishing lap. All mating surfaces should be clean and dry. Insert the lap nut and tighten while holding the edge of the lap.**
2. **If the lap is less than ½" in thickness use the spacer washer provided with your machine on top of the lap.**

Important precautions:

1. **Do not over tighten lock screw light finger pressure is all that is required.**
2. **Do not loosen faceting head lock without supporting the faceting head with your other hand.**
3. **Lightly lubricate the mast post periodically with silicone grease or Vaseline.**

This is the only lubricating point on the FACETRON. All other bearings surfaces are lifetime sealed.

THE FACETRON OPERATOR'S MANUAL



THE FACETRON OPERATOR'S MANUAL

General Specifications:

- **Power requirements: 110 Volts/60 Hz. 5 amps.**
- **Variable speed range 0 to 1600 rpm continuous.**
- **Lap size: 6" or 8" diameter with ½" hole.**
- **Water Supply: gravity fed 2 quart capacity**

Faceting head and mast: (See photos)

1. **Micro adjustment: rotate clock-wise to raise, counter-clockwise to lower. Resolution .001" increments. Wear adjuster ring (located below micro knob). Turn to left or right to adjust "feel" of the micro knob to your preference.**
2. **Faceting head lock lever: Loosen to raise or lower faceting head rapidly while supporting the faceting head with your opposite hand. Do not over tighten lock screw. Light finger pressure only.**
3. **Digital angle readout: Loosen the lock screw and rotate the hand wheel to set the facet angle to within 1/10° (00.0).**
4. **Dop chuck and dop cam lock mechanism.**
5. **Index lever, index gear and freewheeling lockout screw.**
6. **Index gear retaining knob.**
7. **Dial Indicator depth of cut indicator, .0005" resolution**
8. **Electronic speed control and ON/OFF switch**

8a. **Spindle Direction switch (clockwise or counter-clockwise).**

9. **Cushioned lap nut and urethane splash pan.**
10. **Non-corrosive coolant supply valve**
11. **Mast base and lock lever (DO NOT OVER TIGHTEN)**
12. **Acculign dop chuck key**
13. **45° table adapter**
14. **Acculign transfer fixture**
15. **Acculign precision dop sticks**
16. **Adjustable hard stop screw. The FACETRON may be used as a hard stop or soft stop machine. It is not recommended to facet your stones in the hard stop mode though as it negates the advantages of the accuracy and repeatability of the dial indicator.**
17. **Micrometer Mast Cam Lock (rotates clockwise or counter-clockwise).**
18. **Radial Cheater wheel (incremental adjustment left or right).**

Laps are not perfectly flat which may cause the dial indicator needle to waive at you. This is not an indication that your indicator is bad however you will know that your lap is worn and may need to be resurfaced or replaced.

Using the angle compounder: The compounder is sometimes called the "cheater" and is used for correcting radial angle misalignment. Each division on the compounder represents ¼ °. When the index lever is centered in the slot and the number zero on the compounder aligns with the reference mark the compounder is aligned to its zero start position.

THE FACETRON OPERATOR'S MANUAL

Maintenance:
As with any precision instrument the FACETRON should be kept clean and dry.
It is recommended that at the end of any faceting session the machine should be cleaned with a mild detergent cleaner, rinsed with clean water and then dried with a soft clean cloth. Lubricate all external moving parts liberally with WD-40™. Be sure to clean out the dop chuck with WD-40 so that all moving parts are clean and well lubricated.

Periodically clean the wooden machine base with good furniture cleaner and apply a good quality furniture oil to preserve the wood and its beauty.

After cleaning cover the machine to keep it free from dust or other contamination.

Keep dops clean also.

Main belt drive:
Periodically check the drive belt tension. If required loosen the motor mount and adjust belt until it is tight enough to prevent slippage. Periodic application of belt dressing will keep the belt from making noise or slipping. Belt dressing is available in many hardware or automotive parts stores.

LIMITED LIFETIME WARRANTY

Your FACETRON instrument is warranted against defects in materials or workmanship for the lifetime of the original owner. This warranty is limited solely to the repair or replacement of original parts which in FACETRON's opinion are defective. Electrical components are warranted by their manufacturers for a period of 90 days from the date of machine shipment. Any evidence of abuse or tampering will be taken as sufficient cause to void all warranties whether stated or implied.

THE FACETRON OPERATOR'S MANUAL

Set-up and application of the Dial Indicator for FACETRON:

The new dial indicator stop system consists of a new hard stop and also the mechanical dial indicator for dependable and accurate depths of cuts. Three options are available:

1. **Dial stop only**
2. **Hard stop only (the hard stop adjustment is the black knurled screw directly under the dial indicator assembly).**
3. **Or both**

The dial indicators resolution is .0005" increments. The small indicator inside the middle of the dial is a revolution counter and has no significance on your cutting. Your machine is factory preset so that your desired angle will be met when the indicator needle reaches zero, which is factory preset at the 12 o'clock position.

Calibration procedure:

Calibrating is easy for anyone to perform without previous experience. Simply follow the steps in order listed as follows:

1. **Put a flat hard lap such as a ceramic or master lap on you platen and hold firmly in place with the padded lap nut.**
2. **Place the 45° table dop in the quill (be sure the compounder is zeroed)**
3. **Set the digital readout to 45.0°**
4. **Loosen the index gear retaining screw so that the quill moves freely**
5. **Set the table dop onto the master lap and make sure it is flat from side to side**
6. **Now adjust the mast height until the table dop sits flat on the master lap front to back**
7. **Now loosen the dial indicator face plate screw and set the face plate so the needle is exactly on zero. Then tighten the dial indicator face plate screw making sure it does not walk on you.**

Congratulations! You have just calibrated your FACETRON dial indicator head.

THE FACETRON OPERATOR'S MANUAL

Hard stop screw information:

The black knob on the bottom of the housing that holds your dial indicator is your hard stop screw. The nylon screw on the side is to keep tension on your hard stop screw.

The hard stop should be set so the indicator reads +/- 20 to 30 graduations minimum.

MICROMETER MAST CAM LOCK:

PLEASE NOTE: It is very important that when using the micrometer mast that you need to use the cam lock which is located just below the micro adjustment knob near the top of the mast.
See photo and number key on pages 7 and 8.

Many customers fail to use the cam lock, and during the normal faceting action of sweeping your stone across the lap the micro knob can slowly move and create a non-concentric stone.

HOW TO USE: The cam lock can be turned clockwise or counter-clockwise this puts pressure on a Derlin pin which puts pressure on the micrometer threads to prevent the micro-adjustment from moving. Failure to use the cam lock could ultimately produce a non-concentric or irregular stone.

If you have any questions regarding this procedure, please contact us by telephone.

THE FACETRON OPERATOR'S MANUAL

Step by step faceting instruction lessons are presented in LEARNING TO FACET IN THE 21st CENTURY USING THE FACETRON. All computer generated faceting diagrams can be found at the end of the text along with other useful information for all faceters from beginners up.

It is recommended that beginning faceters take lessons from an experienced faceting instructor familiar with using the FACETRON. Investing in formal instruction will dramatically reduce your learning curve and prevent you from developing bad habits which must be untaught before meaningful correct learning can begin.

Good faceting instruction should include:
Machine nomenclature and standard operation
Machine and lap maintenance
Shop safety procedures
Selection and care of grinding laps
Selection of polishing laps
Selection of faceting rough
Orientation of color zoned materials
Preparation of rough
Dopping techniques
Selection of diagrams and the purpose of all those numbers and ratios
Cutting procedures
Polishing techniques
Transferring your stone
Aligning the girdle after completing the transfer
Cutting the crown
Cutting and polishing the table
Polishing in perfect meet points
Removing and cleaning your stone
Storing or setting your stones
Using Gem Cad to adjust angles for optical performance
Supply sources

The following tips are provided for new faceters however may also be beneficial to experienced faceters:

THE FACETRON OPERATOR'S MANUAL

1. **Select eye clean natural faceting rough. Select a piece which will produce a round gem of about 12 to 14 mm with good yield. If the rough is color zoned then the stone should be cut so the color will be in the culet of the finished gem so that it will fill the rest of the stone with color. Hold the stone with your fingers and grind a flat spot where the table will be using a 360 diamond wheel. Clean the ground surface with a paper towel and isopropyl alcohol. Then dop the rough using a dop about ½ to 2/3 of the desired finished diameter of the gem. Warm the stone using a Blazer torch or alcohol lamp and then melt Leeco dop wax onto your dop and stone and bond them together. Make sure you heat the wax so the edges feather out to a thin edge indicating a strong bond. If the wax has a thick rolled edge it is weak and likely to break loose from the stone during cutting.**
2. **Set the digital angle readout and adjust the faceting head so that the stone is slightly above the lap. Start the motor in the clock-wise direction and then start a slow water drip about one drop every other second. Carefully lower the stone onto the lap so that the dial indicator needle moves about 10 to 15 thousandths lefty of zero and grind opposite sides of the stone to a center edge. Once you have established a center edge you can move to the other side of the stone and grind two more opposed facets to form a center point. Then return to the other indexes and cut around the stone so that all facets are cut to the same depth or the zero on your indicator. When roughing you simply want to remove excess material. As you revisit the facets with finer wheels the indicator needle will become more stable and your point will become more refined. If your laps are not flat you can shim them so that they are and the indicator needle will be more stable.**
3. **Once you have a single center point for the culet and not a chisel edge you may set the angle readout to 90 degrees and lower the dop head so that you can cut the girdle facets. Some facetors cut the splash guard so there is an opening while cutting the girdle. If you decide to cut an opening in your splash bowl a house hold sponge makes a good dam to keep from getting splashed when you return to the pavilion facets and run the motor clock-wise. When cutting the girdle facets run the motor counter clock wise so that any water is thrown away from you.**

4. **Cut and polish your stones in the following sequence in most cases:**

Pavilion breaks first, girdle facets (finishing to the polished stage before returning to the pavilion). Then return to the pavilion and cut the pavilion mains. Polish the stone in the same order you cut breaks then mains.

5. **Place your cut stone in the Acu-lign transfer fixture moveable side. Then place a cone dop into the fixed side. Use wax or epoxy and fill the cone cavity. Gently push the moveable vee so that the pavilion sets into the cone cavity. Leave just enough space so that the adhesive forms a cushion between the stone and the cavity. Let the adhesive cool or cure then place the cone dop into the transfer vee so that the flat dop is exposed to the right of the transfer fixture. Heat the flat dop until it falls free of the stone. Do not touch the dop with your fingers as it is very hot. Allow it to cool and then soak in a sealed jar of acetone or denatured alcohol to loosen the wax so you can wipe it off the dop. Learn and observe all shop safety practices when working with power tools, open flames and flammable chemicals. A fire extinguisher and a first aid kit are handy accessories in any work shop.**
6. **Place the cone dop in the dop chuck and lock the cam down with the dop chuck key but don't over tighten finger pressure is all that is required.**
7. **Set the angle digital readout and adjust the faceting head so the stone is just above the lap. Cut a crown break facet. Look to see if it is straight. If it is the stone is aligned. If it is cut on an angle you are not aligned. Refer to the LEARNING TO FACET IN THE 21st CENTURY USING THE FACETRON book for tips on girdle alignment. Once the stone is aligned cut the girdle height. Leave enough material so you can revisit the crown breaks with the 600 and 1200 laps and end up with a .5 mm to .7 mm finished girdle height.**
8. **Always remember we are backing off of zero on the dial indicator using the micro-adjustment on the top of the mast tube and cutting back to zero on the first facet. Then for the other facets in that tier simply cut to the zero point so that you have all your facets cut to equal depth.**
9. **Next cut the crown mains to the girdle line and then cut the star facets so they just kiss the peak or apex of the crown break facets. Then polish the facets in the same direction in which you cut them; breaks, mains, stars.**
10. **Next set the digital angle readout to 45 degrees, place the table adapter in the dop chuck then place the dop into the hole and lock in place using the knurled knob on the screw. Set the facet head so the top of the stone is slightly above the lap. Then with the lap and water drip running use the micro-adjustment to lower the stone into the 1200 lap. Cut the table so that the table is tangent to all the mains even if you have to over cut some of them.**
11. **Next put a Spectra Ultra lap on the master lap shiny side down with a little water to hold it in place without it flying around. Polish the table making sure there are no scratches or other defects in the polish.**

12. **Remove the dop from the table adapter, remove the table adapter from the dop chuck, put the dop back into the dop chuck and align your girdle flat to the master lap.**
13. **If some of your crown mains were over cut by the table lower the angle of the stars a few tenths of a degree from that shown on your diagram. Raise the facet head so the stone is slightly above your polishing lap. Start the motor and lubricant and gently lower the stone using the micro-adjustment and polish the stars on either side of the main at the new angle until the main comes back to a point at the table. Continue to cheat in any remaining over cut facets so that all mains are just kissing the table. This is called cheating up the mains and nobody will ever know you changed the angle a couple tenths unless you tell them.**
14. **Using this technique you can cheat facets up or down just remember if you increase the angle you must lower the height and if you lower the angle you must raise the height. This is a cardinal rule of faceting.**
15. **You can also use the radial compounder or cheater dial to cheat facets left or right. Just use this feature discretely as new faceters often over abuse the radial cheater. Also always set the cheater back to zero and check it by setting the angle readout to 45 degrees and the dial indicator to zero while the table adapter is in the dop chuck and flat in both directions left to right and front to back on the master lap.**
16. **Now that we have all the crown facets polished cut a small strip of paper towel and soak it in water. Wrap it around your stone to keep it cool while you place the dop into the transfer fixture and heat the metal dop only until you can feel the wax or glue release the stone then remove it carefully with tweezers never pulling on the stone with any force otherwise you may damage the stone. Allow it to cool to room temperature and then soak it in a sealed jar of acetone or denatured alcohol to loosen the wax or glue so you can gently wipe it off with a paper towel. Never clean the wax or glue off with a knife or pull, pick or dig it off the culet as you will surely damage your stone. Sometimes you may have to soak your stone over night but patience is the key to good faceting.**
17. **When you stone is cleaned off just look at the fine gem you produced with the help of your FACETRON, <u>congratulations.</u> Now clean the acetone or alcohol residue off the stone by soaking it in room temperature soapy water and then clear water and dry it off and all that is left is to show it off to your friends and family who will be impressed by your new talent, enjoy.**

Some additional tips:

1. **If you are cutting a very small stone 6 mm or less don't start with a 360 lap you may find starting with a 600 lap is easier.**
2. **Use candle oil for coolant with diamond powder it doesn't smell bad and isn't too hard on your skin.**
3. **Remember exposing your hands to water will dry them out so use a good hand cream to restore moisture into your skin and prevent cracking and peeling.**
4. **Always be sure to align the girdle flat to the master lap before cutting the crown to insure a straight girdle line and prevent a cork screw or stair stepped girdle.**
5. **If you are having problems polishing the girdle adjust the angle from 90 degrees to 89 degrees and only polish the portion which won't be cut away when you cut the crown.**

THE FACETRON OPERATOR'S MANUAL

FACETRON INDEX GEAR LIST

32: good for symmetry of 1, 2, 4, or 8 not used as much today as in the past.

64: good for symmetry of 1, 2, 3, 4, 8 many designs available especially diamond replicas.

72: An excellent gear to have good for symmetry 1, 2, 3,4,6,8, and 9. Odd symmetry enhances scintillation due to light ray splitting.

77: Designs are available for this gear and it can be used for symmetry 1, 7 and 11 producing some very unique looks and great scintillation and interesting reflection patterns.

80: Another excellent gear to have for Texas Stars and symmetry of 1,2,4,8,10 fun designs can be cut with this gear that everyone loves.

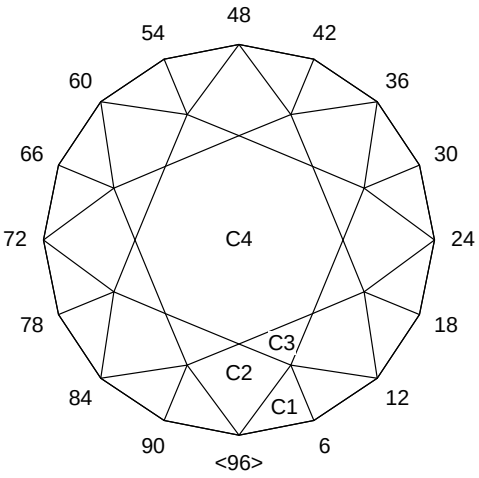
84: good for symmetry of 1, 2, 4,6,7, and 12.

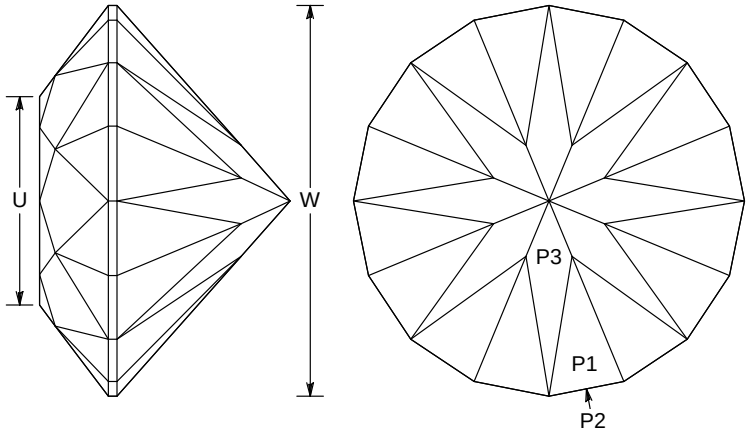
88: good for symmetry of 1, 2, 4, 8 and 11.

96: The most popular gear in faceting today good for symmetry of: 1, 2, 3, 4, 6, 8, and 12. If you only have one index gear this is the one to have.

120: Another good gear for diamond replicas and symmetry of: 1, 2, 3, 4,5,6,8,10 or 12.

Oval: a special index for production cutting of ovals with slight variations of a true classical ellipse.

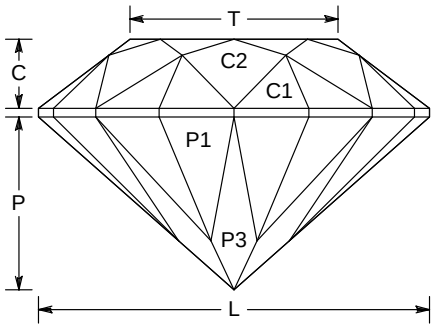




ROUND BRILLIANT FOR QUARTZ

C.A.D. BY Jim Perkins, jimperkins@zoominternet.net

Angles for R.I. = 1.550
57 + 16 girdles = 73 facets
8-fold, mirror-image symmetry
96 index
L/W = 1.000 T/W = 0.533 U/W = 0.533
P/W = 0.442 C/W = 0.176
Vol./W³ = 0.218



PAVILION

P1	43.00°	03-09-15-21-27-33-39-45-51-57-63-69-75-81-87-93	CREATE A CENTER POINT.
P2	90.00°	03-09-15-21-27-33-39-45-51-57-63-69-75-81-87-93	SET SIZE; POLISH THE GIRDLE.
P3	41.50°	96-12-24-36-48-60-72-84	PCP ; GMP.

CROWN

C1	42.00°	03-09-15-21-27-33-39-45-51-57-63-69-75-81-87-93	SET GIRDLE HEIGHT.
C2	37.00°	96-12-24-36-48-60-72-84	GMP
C3	22.00°	06-18-30-42-54-66-78-90	MP@ C1 - C1.
C4	0.00°	Table	MP@ C2.

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