

ULTRA TEC

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● INSTRUCTIONS FOR THE ULTRA TEC OFFSET ATTACHMENT

1.0 MOUNTING THE ATTACHMENT--setting it onto the Mast, and adjusting it to the proper radial position (relationship to the Index Gear). In doing this, the Mast is set onto the machine, and a flat lap is set on the platen. For references to parts of the Attachment, refer to the outline drawing [fig. 1]--

a) Mount the attachment onto the Mast's Spindle. The hole (J) slides over the Spindle--slightly snug the two set screws (D) that bear on the Spindle--so that the Spindle can still be made to rotate within hole (J).

b) Set the Index Gear in a $\frac{1}{4}$ around position (16 on a 64 gear, for example).

c) Insert and lock-in the Alignment Bar in the Attachment spindle (E) (note: an Alignment Bar comes with the Keyed-Spindle Ultra Tec--if you do not have that configuration, in place of the Alignment Bar, use the long side of block C to accomplish the following instructions),

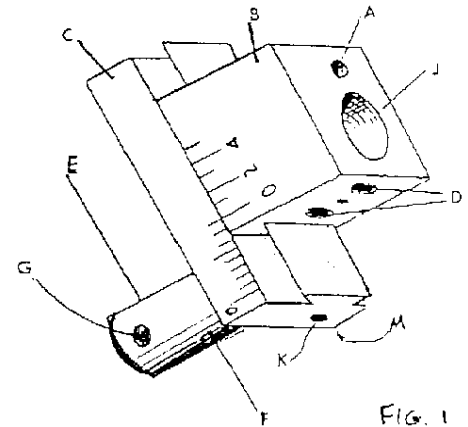


FIG. 1

d) Press the Alignment Bar flat against the lap [see fig. 2], that will cause the Attachment to turn within the Spindle--aligning the Attachment to the Index Gear. Now, tighten the two set screws (D) firmly. Set the Angle Dial to 90° as for girdle grinding.

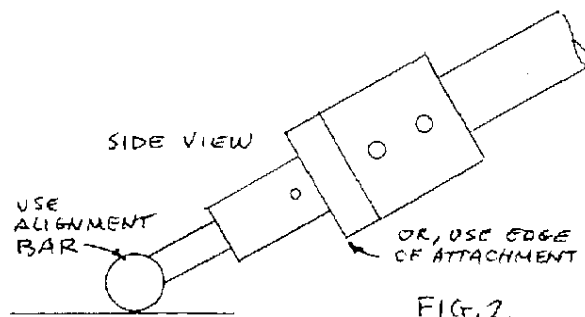


FIG. 2

2.0 PREFORMING THE MARQUISE

1. Determine the size of marquise that can be obtained from your rough. Using a millimeter caliper determine the desired major axis (length) and the desired minor axis (width) of the planned gem. [see fig. 3]

2. Dop the rough so that the planned major and minor axes align reasonably well with the keying V-grooves on the back of the dop. [see fig. 4]. Set the dopped stone aside.

3. Determine the offset [see fig. 5] by referring to one of these tables:

a) **Table A**, which provides offsets for many gem sizes, or

b) **Table B**. If you want a size that is not listed in Table A, Table B provides constants to calculate any offsets based on the length to width ratio.

4. To set the offset--loosen set screw (A), which allows the blocks (B) and (C) to slide. After setting the determined offset, retighten set screw (A) to hold the position. This setting can most easily be done with the spindle in a freewheeling mode.

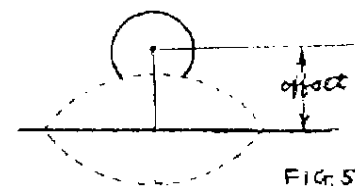
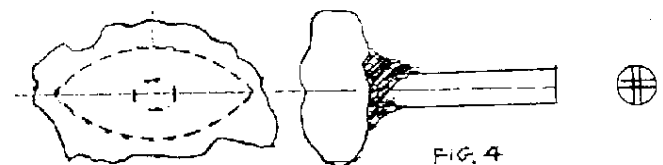
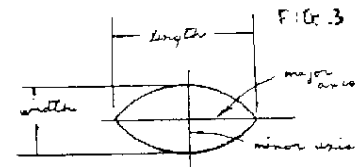


FIG. 5

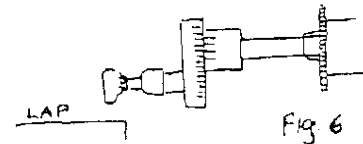
a) **Reading the scale:** The scales are metrically calibrated, and can be read to the nearest 1/10 of a millimeter. The readout is a vernier type.



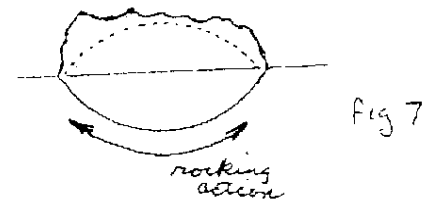
The first reading is 11 mm. The 0 lines up with the 11th point on the long scale. The second reading is 11.4 mm. The 0 of the short scale is a bit past the 11, and the 4 on the short vernier scale meets a line on the long scale.

5. With the spindle (E) closer to the lap surface than the

machine spindle [see fig. 6], insert the dop into the spindle (E). Push the dop against the pin (F)--rotate the dop until the V-groove is felt to engage the pin. Lock it there with the retention set screw (G).



6. With the faceting head in the free-wheeling mode and the angle dial set at 90° as for girdle grinding, turn on the machine. Gradually lower the lead screw while rocking the stone side-ways against the lap [fig. 6]. The cutting action will be similar to girdle grinding a round stone, except that the rocking motion is used. Measure the stone (a few scribe marks with an aluminum pencil are helpful) as the final shape is approached. Stop somewhat short of the final girdle, and preform the opposing side.



7. To move to the opposing side, loosen the retention set screw (G), rotate the dop 180° to re-engage the V-groove with the pin, retighten (G). Repeat the steps of 7 above--grinding the opposing side gradually, until the desired dimensions are obtained.

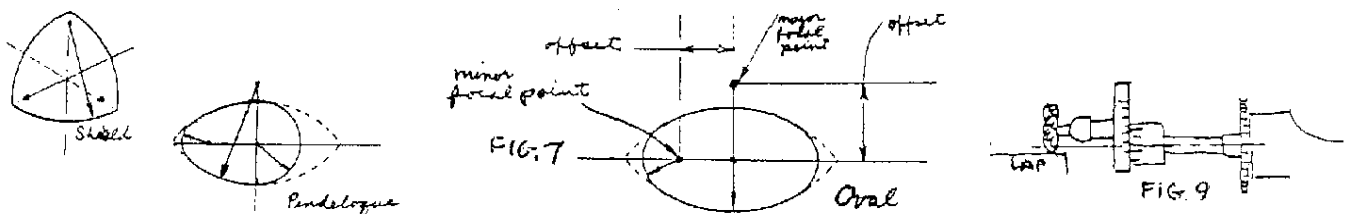
8. Remove the dop from the Attachment. Separate the Offset Head from the machine spindle.

9. The dopped preformed stone can be inserted into the Mast Spindle, aligning the dop's rear V-groove with the alignment pin in that Spindle. (If you do not have the keyed configuration, you will use the pointed ends of the marquise to align the stone relative to the Index Gear and the lap--measure from the lap surface to the points, and adjust the stone radially so that the stone is horizontal on the 0 index gear position).

10. The preform is ready for faceting.

3.0 PREFORMING THE OVAL--this is very similar to preforming the marquise--the oval starts with a marquise shape and then the pointed ends are rounded. Since very little material is removed from these ends, it makes good sense not to preform the ends at all, but rather proceed from the marquise shape directly to the faceting of the oval shape. If you wish to preform the ends, however, proceed as follows:

The amount of offset for the ends is best determined from a drawing of the shape. Using a compass and a millimeter scale, draw the basic marquise. Draw the major and minor axis. At points along the major axis, draw the minor focal points for the desired shape. The amount of offset can be measured from your drawing [see fig. 7].



The V-groove is engaged, as for the major axis--except, of course, the groove at right angles to the originally engaged groove is used.

In grinding the ends of the oval, the centerline of the machine spindle is below the centerline of the attachment spindle [see fig. 9] a similar sort of rocking motion is used. (It may be necessary to shim up the laps to handle the desired height, without running out of downward adjustment of the head.)

After completing the oval, the removed dopped preform is ready for faceting and can be inserted into the keyed faceting Spindle. *(If you do not have the keyed configuration, before removing the dop from the Offset Attachment, engage the Index Gear in the 0 position; using a square block and scribe a mark on each side of the stone (or, across the entire face if possible) with an aluminum pencil. This will assist in realigning the preformed stone in the machine spindle for faceting.)*

TABLE A Offset required for common marquis sizes.

LENGTH to		LENGTH to		LENGTH to	
WIDTH	OFFSET	WIDTH	OFFSET	WIDTH	OFFSET
6x 3	2.25	14x10	2.40	23x 8	14.53
7x 3	3.33	15x 7	6.28	23x11	9.27
8x 4	3.00	15x10	3.12	24x12	9.00
9x 3	6.00	16x 8	6.00	25x10	13.12
9x 6	1.88	16x12	2.33	25x18	4.18
10x 5	3.75	17x 7	8.57	26x 6	26.66
10x 7	1.82	17x 9	5.27	26x 7	22.39
10x 8	1.12	18x10	5.60	27x 9	18.00
12x 6	4.00	18x12	3.75	27x13	1.94
12x 8	2.50	18x13	2.98	27x18	5.63
12x10	1.10	20x 8	10.50	28x 8	22.50
13x 6	5.50	20x10	7.50	29x13	12.92
13x 7	4.28	20x15	2.91	30x 7	30.39
13x 8	3.28	21x 9	10.00	30x12	15.75
13x 9	2.44	22x10	9.60	30x15	11.26
14x 7	5.25	22x16	3.56	40x20	15.00

TABLE B If the size you want to use is not listed in Table A, you can determine the offset by using Table B. To use this table, calculate the ratio by dividing the length by the width. (EXAMPLE: If the length is to be 16mm and the width is to be 12mm, the calculated ratio is 1.333 the result of 16 divided by 12).

In the table find the appropriate constant. To calculate the offset, multiply the constant by the length and then subtract $\frac{1}{2}$ of the width. In the example: Offset = (16 X .5208) - ($\frac{1}{2}$ of 12) = (8.33) - 6 = 2.33mm

RATIO	CONSTANT	RATIO	CONSTANT	RATIO	CONSTANT
1.100	.5022	1.700	.5722	2.250	.6735
1.200	.5083	1.750	.5802	2.300	.6836
1.300	.5173	1.800	.5889	2.333	.6875
1.400	.5285	1.875	.6022	2.400	.7042
1.333	.5208	2.000	.6252	2.500	.7250
1.500	.5418	2.100	.6440	2.600	.7463
1.600	.5563	2.125	.6489	2.666	.7603
1.666	.5665	2.200	.6635	2.750	.7783
				3.000	.8333

THE OFFSET FORMULA This is not necessary for faceting a stone, but for those of you who are interested in the underlying mathematics: The calculated ratio (length divided by width) equals the tangent function of angle M. Consult a trigonometry table to find angle M. Find the secant and cosecant of angle M. The formula is:

Offset = (length X .25 X secant M X cosecant M) - $\frac{1}{2}$ width