SEATTLE FACETOR DESIGN

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In the October 1978 issue of SEATTLE FACETOR DESIGN I presented my version of a "Standard Brilliant" which had a 53 percent table and would have exactly the SAME PLAN VIEW FOR BOTH CROWN AND PAVILION regardless of the main angles selected. In this article, variations of the "Standard Brilliant" are given similarly for some other percent table facets. Since the table facets are not the same it is not possible to have identical appearance on the crown, but I have adjusted BOTH STAR AND BREAK FACETS to maintain the same proportion between the "star" and the total horizontal distance between table/girdle measured along the bearing of the "star". Other critera could have been used (such as the "C-15" used by C.A. Stratton; or maintaining constant proportion on the main facet) however my preference is for the "Standard Star".

Basis for the designs given here are the formulas:

$$(1)\quad S = \mathrm{Tan}^{-1}\ \frac{(0.16681 - 0.19217\ T)\ \mathrm{Tan}\ C}{(0.18055 - 0.12875\ T)}$$

$$(2)\quad B = \mathrm{Tan}^{-1}\ \frac{(0.33319 - 0.30783\ T)\ \mathrm{Tan}\ C}{(0.31331 - 0.32679\ T)}$$

$$(3)\quad H = 50\ (1 - T)\ \mathrm{Tan}\ C$$

B = Crown break angle
C = Crown main angle
H = Crown height as percent of diameter
S = Crown star angle
T = Table fraction of diameter

Given C and T, any of the other parameters can be oalculated. To be consistent with my 53% table design I chose the "Star ratio" as 0.36111. This was an arbitrary decision. C.A. Stratton used a slighly different ratio to derive his formula "for the Correct Value for the Crown Break Angle". (See article Stratton, C.A., "Cutting the Breaks on the Standard Brilliant", Gem & Minerals, November 1978, p 38). To derive his "Table of Crown Break Angles" Stratton used the criterion that star angle should be "C - 15" e.g. 15 degrees less than the main angle (C). However, in the text of the article he recognized that if a different criterion was used for Crown Star the "C - 15" in the basic formula would have to be replaced with the actual angle. Figure 1 (in this article) compares Stratton's "C - 15" criterion which is independent of Table fraction with a plot of formula (1) above which very much depends upon the Table fraction (T). For some Crown Main angles the two approaches can give identical results, but in general they are quite different. How different is shown in Figures 2 thru 10. These sketches show a plan view of the crown and and an elevation view of a "typical" stone for T = 0.25, 0.50, and 0.75 and C = 15.0, 30.0, and 45.0. I am only concerned with the "Crown", but a 43 degree pavilion has been added to each Figure to make it look more natural as a complete stone. Even a casual glance at these sketches should suggest that Stratton's C-15 criterion leads to many DIFFERENT crown designs even at a fixed Table fraction; but formula (1) gives IDENTICAL crown designs (in Plan View) with a fixed Table fraction. This is my primary objection to the "C-15" system. Fortunately in the 35 to 45 degree range for Crown mains the two systems are fairly close to each other so that the casual cutter who confines himself to the "usual" crown mains will not go too far astray.

As one would expect if T is fixed both formulas (1) and (2) reduce to the "Tangent Ratio" conversion equation typical of all "Meet Point" designs. The Standard Brilliant is certainly one of this type because five facets meet at a common point (in eight places).