

RAY TRACING EXPERIMENT with ROUND BRILLIANT

The figures on the right represent "Brightness Plots" for four different versions of the Round Brilliant. In plots such as these dark areas (* or S) mark rays which did not exit from the stone in the viewing direction. These regions in a real stone would appear DARK. Clear areas however, mark rays which did exit the stone in the viewing direction and would appear brighter.

Design (SRB)	DESIGN PARAMETERS			
	A-1	A-2	B-1	B-2
Crown Main	37.0	37.0	35.0	35.0
Pavilion Main	43.0	43.0	41.0	41.0
Refractive Index	1.54	2.42	1.54	2.42
Table Size (% width)	60.0	60.0	60.0	60.0
View Angle	1.0	1.0	1.0	1.0

Figures A-1 and A-2 contrast the effect of Refractive Index (R.I.) on a stone that is optimized more for Quartz than for Diamond. The 37C/43P main angles return light from crown mains and stars in both "Quartz" and "Diamond" but the diamond also returns more rays thru the mains (with shadows from pavilion mains showing in the table).

Figures B-1 and B-2 contrast the effect of Refractive Index (R.I.) on a stone that is optimized more for Diamond than for Quartz. The 35C/41P return practically all of the rays in "Diamond", but almost none of the rays from the break facets in "Quartz". In addition even the small (1 degree) viewing angle is enough to give a large very strong pavilion main shadow in the table of "Quartz". A few of the high refractive index rays are trapped (indicated by "S" in the diagram) within the stone in the "Diamond", but none are trapped in "Quartz".

The general lesson to be learned is that we almost never expect a "Quartz" to look as bright as a "Diamond", but there can be a very dramatic difference when sub-optimum angles are used.

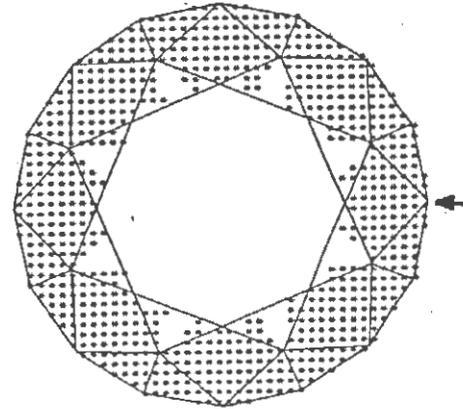


Figure A-1 R.I. 1.54
Quartz angles

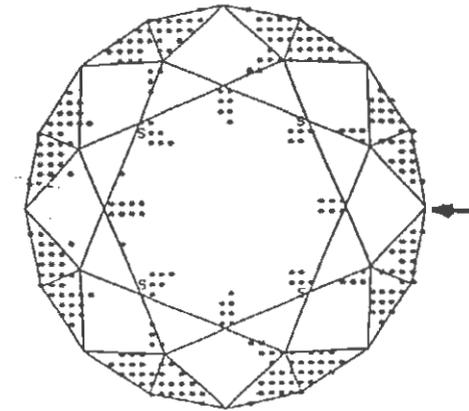


Figure A-2 R.I. 2.42
Quartz angles

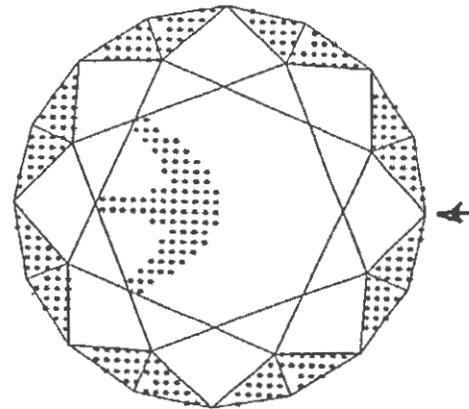


Figure B-1 R.I. 1.54
Diamond angles

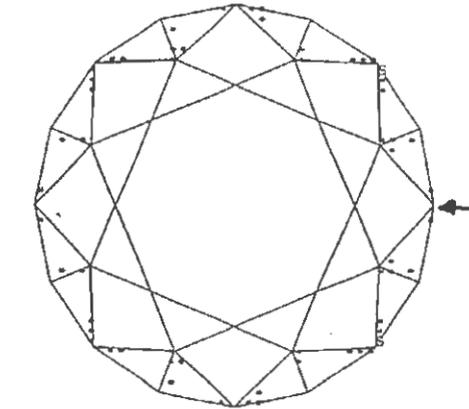


Figure B-2 R.I. 2.42
Diamond angles