

Brief Summary of Optimal Focus

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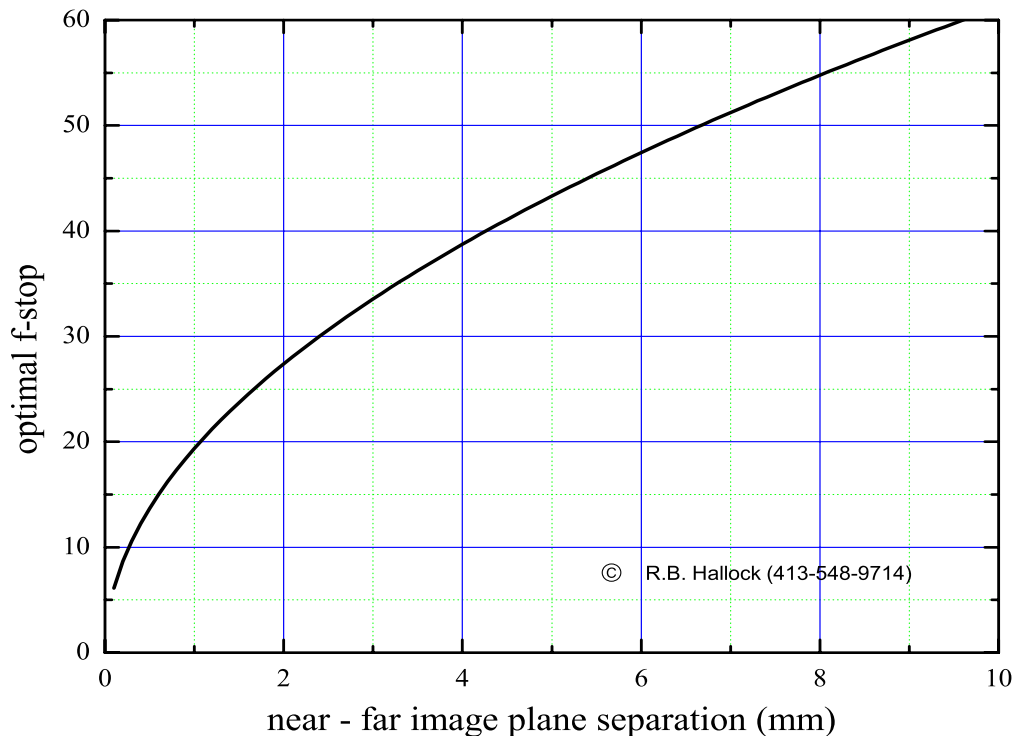
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These two pages may be separated from the longer presentation, placed back to back in a plastic page holder and taken into the field for direct use.

The plots shown here are useful when it is desired to check whether optimal focus has been achieved for two positions of the ground glass on a view camera. There are plots, each with a specific function. The plots are valid for most situations other than close-ups. This is a very brief summary of the longer and more detailed presentation.

The first plot shows the optimal f-stop (for any lens) if two objects in a scene that are different distances from the camera are to be in as sharp focus as possible. Focus on one object and note the position of the ground glass. Then focus on the other object and again note the position of the ground glass. The difference in the position of the ground glass for the two cases will be some distance; we call this the near-far image plane separation. Measure this in millimeters. Then, using this number on the bottom axis, go up on the plot to the curve and then read horizontally from that point back to the f-stop on the left axis. So, for example, if the difference in the positions of the ground glass for the two focus points is, say, 2 mm, then the optimal f-stop is about $f/27.5$. If the difference in positions were, say, 1 mm, instead then the optimal f-stop would be close to $f/20$.

Optimal f-stop for a Given Near-Far Focus Range



The second plot shows the circle of confusion (degree of blur) on the negative that results from a specific choice of f-stop for each of several values of the distance the ground glass has moved when you focused on those two objects in your scene. So, in one of the previous examples we noted that the focus shift in the position of the ground glass was 2 mm. One of the curves on the plot below is labeled 2 mm. Note that if we are on that curve, the minimum in the curve is at about $f/27.5$ and reading horizontally we see that the circle of confusion for that situation is 0.05 mm (on the negative). This choice is optimal and will produce the sharpest simultaneous focus for the two objects of interest. If we continue to look at the 2 mm curve, we note that $f/73$ results in a circle of confusion of 0.1 as does $f/10$. So, any choice of aperture between $f/70$ and $f/10$ will result in a degree of blur no worse than double the optimal values, i.e. no worse than 0.1 mm on the negative. As a figure of merit, a 4 x 5 negative enlarged to 16 x 20 and viewed from 20 inches will appear sharp even to a person with very fine vision if the circle of confusion is 0.05 or smaller (on the negative). Many people would likely think a 16 x 20 to be sharp when viewed from a normal distance of 26 inches (the diagonal dimension of the photograph) if the circle of confusion were smaller than about 0.1 (on the negative). Generally when I am in the field I aim for 0.08 mm or smaller and often get 0.05. Full details about this are presented in the accompanying longer description.

Resolution vs. f-stop for Various Near-Far Focus Film Plane Separations

