

USING A LARGE ITEM COPIER TO SCALE MODEL AIRPLANE PLANS UP OR DOWN

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People usually think of a model airplane's size in one of two ways: (either by it's wing span, or by it's wing area). This article is written specifically for those modelers who think of model airplane size in terms of wing area.

Let's look at a specific example: Joe Blow has some model airplane plans left over from a kit that he built. The kit plane, as noted on the front of the box, had 589 square inches of wing area. Joe really likes this plane, and now he wants to enlarge the plans so he can build a larger version of it (specifically one having 1,275 square inches of wing area).

The problem now becomes: What enlargement setting should Joe set the large item copier at, in order to get a set of plans with 1,275 square inches of wing area? Several years ago, I was faced with a similar problem. After experimenting with a calculator for about an hour, I was able to come up with an algebraic equation that would yield the answer. What I discovered was this: The enlargement setting for the large item copier should be equal to the square root of [the product of the desired wing area multiplied by 100, divided by the product of the current wing area multiplied by .01]. Expressed as an algebraic equation it would be:

$$\begin{array}{l} \text{THE ENLARGEMENT} \\ \text{SETTING FOR THE} \\ \text{LARGE ITEM COPIER} \end{array} = \sqrt{\frac{\text{(THE DESIRED WING AREA) (100)}}{\text{(THE CURRENT WING AREA) (.01)}}}$$

Solving the equation for the above example, you would get:

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|--------|---|---|--|
| Step 1 | THE ENLARGEMENT SETTING FOR THE LARGE ITEM COPIER | = | $\sqrt{\frac{(1,275) (100)}{(589) (.01)}}$ |
| Step 2 | THE ENLARGEMENT SETTING FOR THE LARGE ITEM COPIER | = | $\sqrt{\frac{127500}{5.89}}$ |
| Step 3 | THE ENLARGEMENT SETTING FOR THE LARGE ITEM COPIER | = | $\sqrt{21646.859}$ |
| Step 4 | THE ENLARGEMENT SETTING FOR THE LARGE ITEM COPIER | = | 147.12871 (or 147%) |

In summary (for the above example), if you enlarge the original plans by 147% you will end up with an airplane that has exactly 1,275 square inches of wing area.

SPECIAL NOTE: This same equation works equally well for scaling plans down to a specific wing area. In this case the number that you plug in for the desired wing area will be smaller than that of the current wing area, and this will lead to an enlargement setting for the copy machine of less than 100%.