A DISCUSSION OF WING LOADING

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Serving as a quick, one number index to speed, power consumption and thermaling ability, wing loading is the single most important measure of any rubber powered, free flight model. To figure yours, divide the ready to fly, total weight in grams, by the wing area in square inches. A highly respectable result is 0.5 grams per square inch. Still less is better, for the lower the wing loading, the better the endurance. More is bad, and at above 2.0 grams per square inch, a usefully large flight time is most unlikely. How come?

As model weight and wing loading increase, the speed necessary to support flight also goes up. The increase in speed is reflected in greater power consumption. As a result, a heavier motor may well be required, one that unwinds more quickly, Result: shorter duration.

Once in glide, the heavier wing loading model, moving faster, will consume altitude at a greater rate, landing more quickly. If thermal currents are about, the greater model descent rate means that only the stronger currents will be able to support the model. As most currents are quite weak, the effect is to decrease the likelihood of thermally assisted duration.

With all these drawbacks, why fly a high wing loading model? Sometimes it comes about accidentally, the result of many weighty repairs. Sometimes it reflects a too cautious, heavy weight design. Active may be the fear that light weight building will result in a quick wipe-out, should it hit a tree or car. To hold down wing loading, a certain fatalism is necessary. Overbuilding must be resisted.

Another factor promoting high wing loading is size itself. As models are made larger there is a powerful, automatic tendency for model weight to increase faster than expected. This has to do with the properties of size. As an example, consider the volume of a small prop block, say 1 by 1 by 6 in. The volume is 6 cubic inches, and the prop weight proportional to this volume. Now let's double the size of the model, and block. The new size is 2 by 2 by 12 and the volume is 48 cubic inches. In sum, doubling the size of the model results in 8 times the prop weight. Of course, the wing area has also increased-by 4 times-and that helps, but not enough. Only 8 times would be enough. The end result is that the larger prop size will greatly increase the wing loading of the bigger model.

Should not only the prop, but every stick and bit of tissue also be scaled up, the result will be one of doubling the wing loading. In going big, it's important to give some extra thought to slimming down — otherwise the effort may be doomed. True, Mother Nature does provide some special help to those going big, tending to reduce the burden. Bigger means a larger Reynolds' Number, with better aerodynamics, as the wing functions more efficiently. However, don't bet on it — slim down.

With the importance of wing loading clear, one might expect every published design to carry the resulting number. Not so. These are rarely given. Even those few that are actually published tend to be wrong. Be wary. If the model weight itself is given, do your own calculation.