

Some Effects of Scaling

By George White

Let me start this article with a disclaimer — that I'm not in the least qualified to deal with issues involving the addition of more than 3 numbers — I'm only commenting on an article by Dave Harding in the December 2004 issue of Model Aviation.

Having set that stage, I found some of the numbers in the article more than a little surprising. He starts with an example of a 5 oz. 24" span model which is to be doubled to a 48" span. While a 5 oz. freeflight model would be something of a lead sled (he uses RC stuff for his examples), when that model is doubled in size, the weight goes up 9 times to 45 oz, or more than a pound and a half!! The spar strength must increase 2.25 times, and the stall speed increases 50%. Worse yet, for us free flight types, the kinetic energy, which must be dissipated when the ground rises up to smites that sucker, goes up 20 fold. While he only deals with the problem of aerobatic R/C models needing to hover in a straight up position, it is interesting to know that the power required to hover increases 13.5 times over what it was at 24 inches. Our free flight models don't hover (well — mine do sometimes just before rotating straight down to become lawn darts!) that gives you an idea of what we are dealing with when we increase the weight of our models. Take a look at the article, and if you enjoy dealing with square root and cube root formulas you can figure what you gain by scaling down — especially in weight!