The Factors Controlling Prop Thrust

By George White

In reading Larry Kruse's column in the August 2004 issue of Flying Models, I came across something which I'd never considered. In a discussion of the problems of dynamic balancing of one-bladed props, he quotes Joe Wagner, a rather famous free-flight designer (including the Dakota) as saying:

"...The main reason one-bladed props work so well on models (many control-line speed records have been set with them) is efficiency. This may be hard to believe, but basic engineering equations for propeller thrust don't involve the number of blades!

Generally, the thrust developed by a propeller (airplane or boat) is proportional to the square of its rpm, but to the fourth power of its diameter.... Because the diameter of a single-bladed prop is larger then that of a two-blader, that power source can spin at the same speed, it develops more thrust — often significantly more."

For a semiliterate non-engineer like me, this is enlightening!!