Tail Volume Coefficient

The Tail Volume Coefficient is a very handy tool for understanding why a model acts like it does, and for determining what can be done to help it act more like what is desired. TVo will help decide just how big the stabilizer should be and provide a starting point for the Center of Gravity location.

Tail Volume = (Tail Area/Wing Area} X (Tail Arm/Wing Avg. Chord)
where:
- ➢ Tail Area = area of the horizontal stabilizer
- ➢ Wing Area = area of the wing
- ➢ [both areas include that encased by/covered by the fuselage]
- ➢ Tail Arm = distance from LE of wing to LE of stab [for untapered surfaces; for tapered, use LEs at average chord]
- ➢ Wing Avg. Chord = area / wing span

Looking at the formula, one can see [other parts being the same] that a larger tail area and/or a longer tail arm will produce a larger tail volume.

Here are some sample TVo numbers:

AMA gas models	1.0 to 2.0
Mulvihill rubber	1.5 to 2.2
Wakefield rubber	1.4 to 1.7
Indoor rubber duration	1.0 to 1.5
Hand launched glider	.6 to 1.1
Full size 1913 Moraine-Saulnier, Type 'L'	.16

We can find a good starting point for the center of gravity location.
CG [in % back from the wing's LE] = 16 + (36 X Tail Volume)
An example: if Tail Volume is .50, then CG is: 16 + 36 X .5 = 34%

This CG calculation is really handy for those old timer gas models that have no balance point marked on the plans!

What else does this mean? In general, a forward CG such as the typical '1/3 back' or the 36% noted above, means that the wing will need to be at a higher angle of attack - and a powered model will, because of that greater angle, require more down thrust.

You do, at least have the balance point at a near-optimum location for that design. Check out that Moraine-Saulnier 'L' above - with its 6% stab area, the TVo is very small and the balance point will have to be quite far forward.

For a model that you're designing [or a scale model that you're working up], checking out the TVo is a good idea so you can tune the design for more efficiency.

You can adjust the tail arm length and/or the tail area to get a greater TVo.