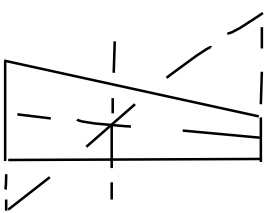
SOME HELPFULL [HOPEFULLY] DESIGN TIPS FROM THE BURGLAR.

For those of you foolish enough to embark on an own design project or even do some checks on an ARF or kit design, I shall do some articles during the following weeks whilst my arm is in a sling, and have nothing better to do !

FINDING YOUR CORRECT C.G.POSITION.

The first thing to do is to determine your MEAN AERODYNAMIC CHORD or MAC .If you have a straight not tapered wing with no sweep back or forward, then this is of course easy,it is just the mid point of the chord. However,things start to complicate when you get tapers, sweep backs ,deltas and other planforms. By far the easiest way to do this is to draw one wing out graphically, I usually do it on the garage floor.This method works for any wing shape including deltas .Project a line forward from the front of the tip the same length as the root chord,and parallel to the centre line of the plane. Now do the opposite at the root,that is draw a line from the rear edge of the root backwards the same length as the tip chord also parallel to the centre line of the plane. Now join these two points with a dotted line. Now draw another dotted line from the mid point of the root chord to the mid point of the tip chord.Where these two lines intersect is your centre of area, and if you draw a line through this point parallel to the centre line of the plane this is your MEAN AERODYNAMIC CHORD or MAC.



MAC

Of course if you have a rounded tip or a pointed tip, just disregard the rounded bit and come back in a minimal amount to be able to get a straight line.

Now the degree of stability depends on the distance between the centre of gravity and how far ahead of the neutral point it is.The neutral point for most models,to save further complication, is usually about 36%back from the leading edge measured along our MAC line. Therefore a stable CG position would be from 20% to 30% back from the leading edge measured back along our MAC line.Moment arm and relative tailplane area has an effect ,so say for a Warbird with a smallish tail area, then the 20% is a safer bet. Aerobatic planes would be closer to the 30% .The longer the moment arm is then the smaller the

tailplane can be, a short moment arm requires a bigger tailplane area,we will go into this a bit later. If you have a glider with a lifting section tailplane your CG will be much further aft,as this is a bit rare for us I will not go into it here but if anyone wants help with this one then ask me.

TAILPLANE AREAS AND MOMENT ARMS

The tail moment arm is measured from the CG position to 1/4 chord of your tailplane. A good average moment arm for a sport model would be around 2.5 to 3 times the MAC (mean aerodynamic chord,theres that word again) Of course this can vary wildly, and a very short moment arm has to be balanced out by a larger tailplane.However on the average run of the mill model a simple formula can be used as a guide to the area required. Tailplane area in square inches = (K x MAC x WA/TM)
K is a constant, .52 for semi and symetrical wings and .57 for flat bottom wings like clarkY
MAC is mean aerodynamic chord in inches
WA is wing area in square inches
TM is tail moment arm in inches.
Tail plane wing sections can be just a flat plate ,usually on smaller models,[although the full size cub has a flat plate section on the tailplane,but this is supported on strut wires] or a symetrical section, which is stronger of course but do not go too thick, NACA 0012 or thereabouts is good. Do not use a lifting section on a normal airplane, otherwise your CG position would have to be much much further aft.

That will do me for today,typing with my left hand index finger has taken its toll .I shall do some more articles whilst I have nothing to do stuck at home. Cheers all,happy flying.

THE BURGLAR.