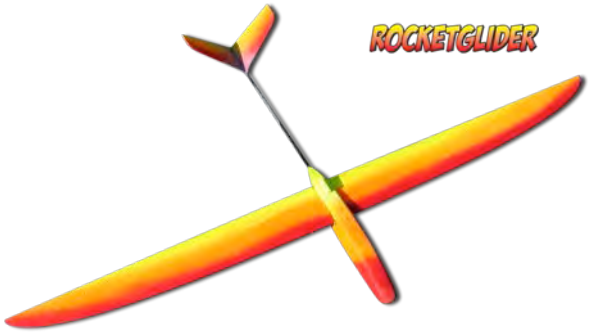
Getting Started in Gliders

or
"Blast off like a rocket, but
then glide like a bird."

Presented by
Mark "Bunny" Bundick
NAR 19250



Special thanks to Trip Barber and George Gassaway for some great presentation materials!

Glider Types:

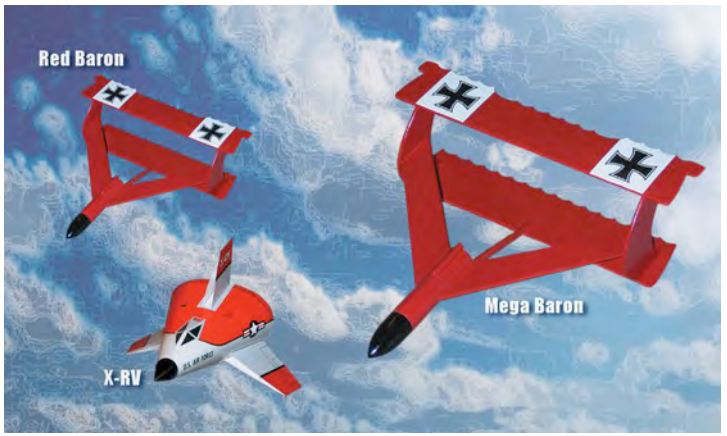
- Sport Models

- Competition Models
  - Boost gliders (BG): drop off the engine at peak
  - Rocket gliders (RG): glide back in one piece

- Radio Control Gliders

Sport Models

- Flown strictly for fun, not performance
- A good “first model”
- Estes Skydart
- Squirrel Works sport gliders



Sport Models – Estes Plans from Jim Z website:

- Astron Invader

- Scissor Wing Transport (pivot wing)

- Firefly (parasite)

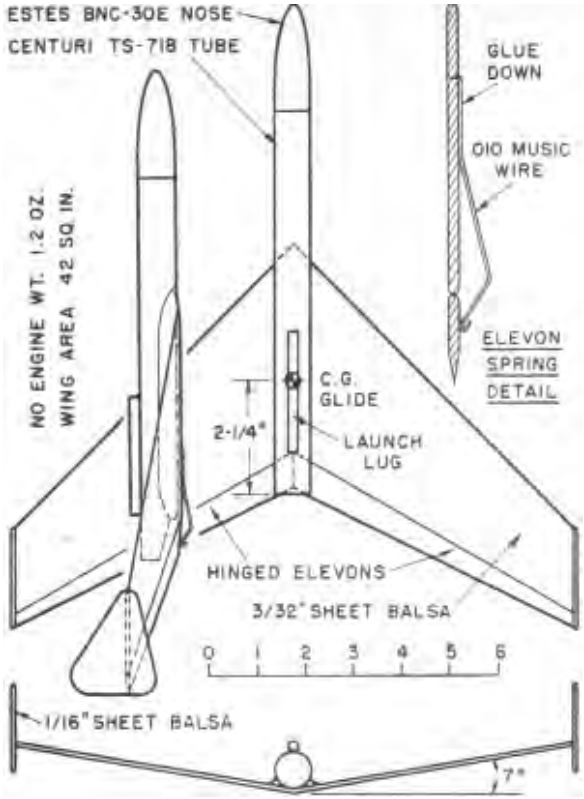
- Orbital Transport (parasite)

Sport Models – Centuri Plans from Jim Z website:

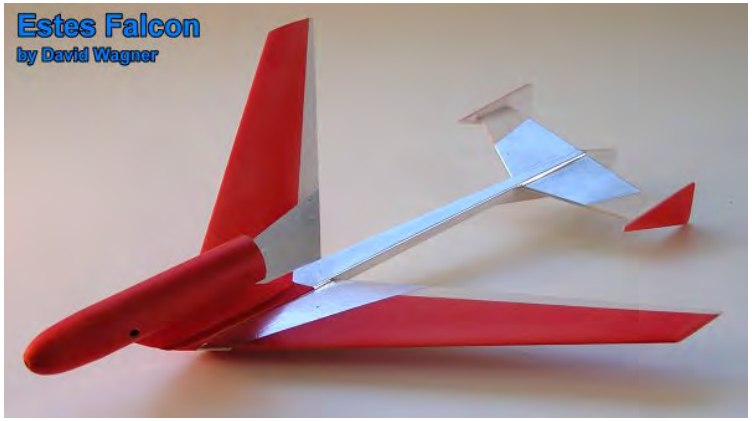
- Mach 10

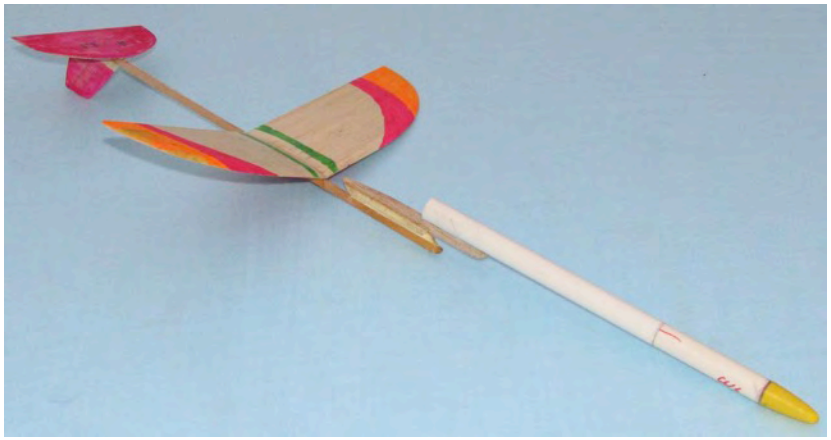
- SST Shuttle

Competition Models – Boost Gliders



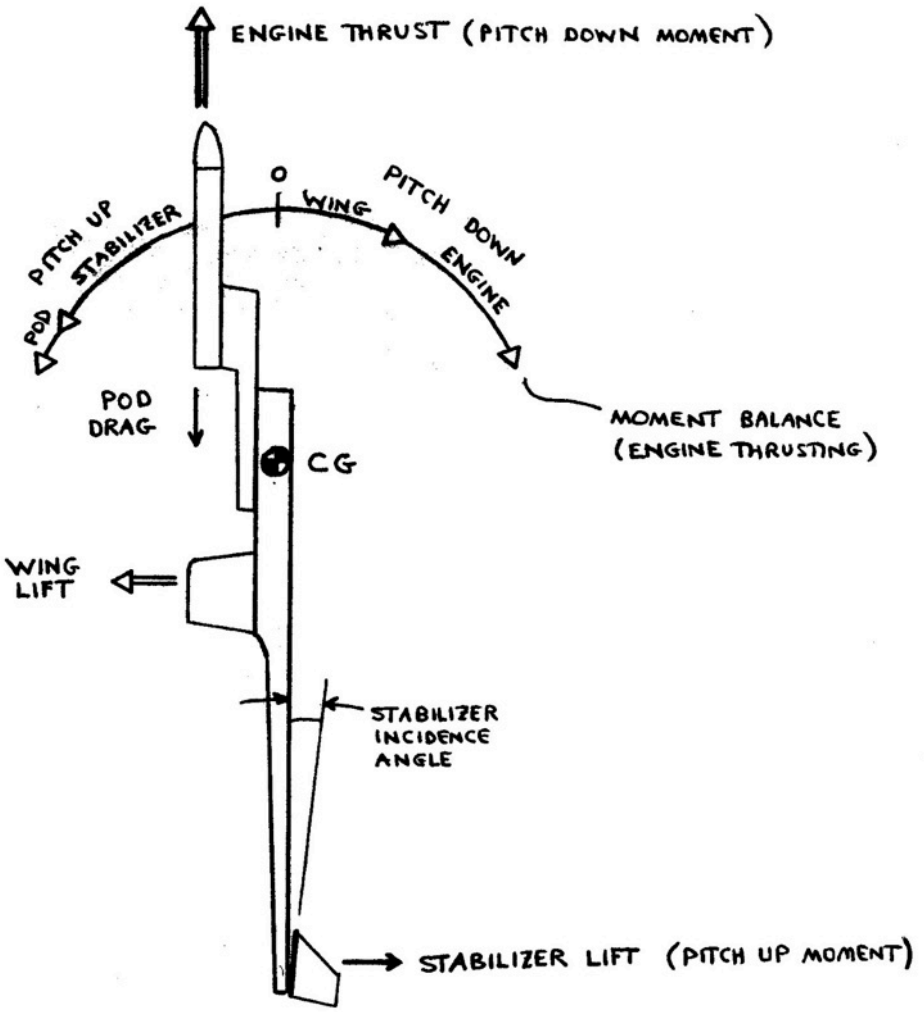
Competition Models – Boost Gliders





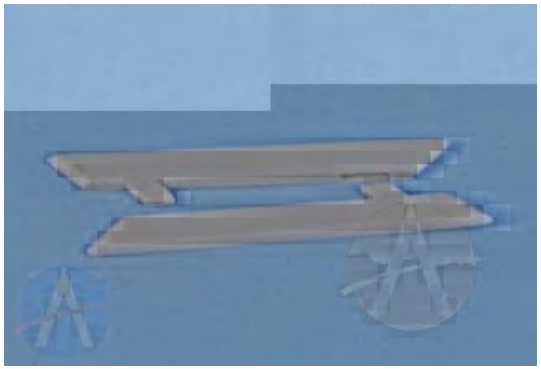
Boost Glider Stability

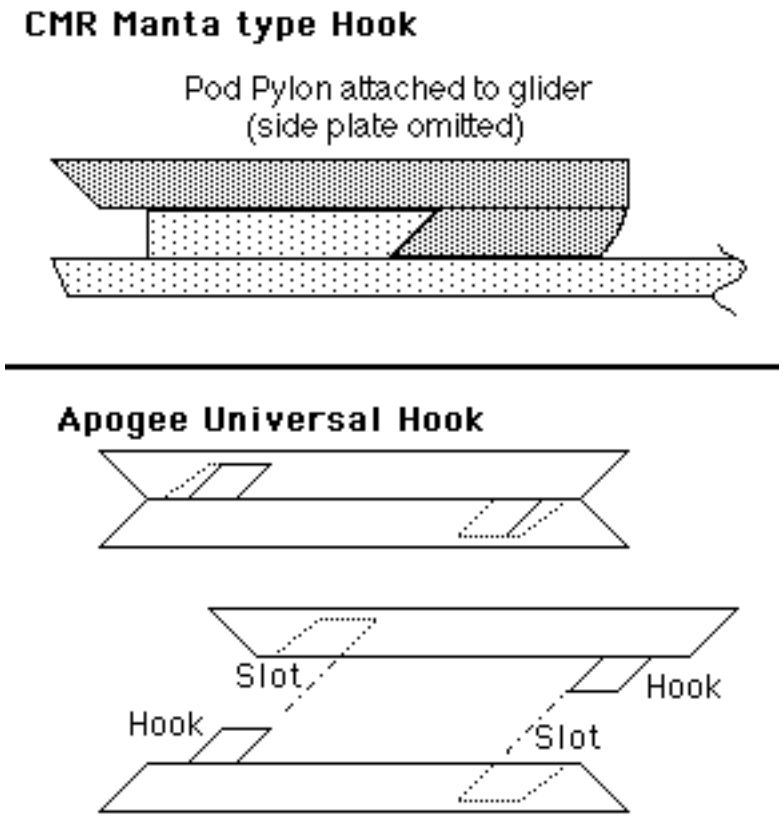
- Boost CG must be well ahead of CP
- Boosts nose-down; pod height governs how much
- Coasts with nose-up loop; stab incidence governs how much



Boost Glider Pod Hooks

- Keep the engine attached during thrusting, but
- Then separate smoothly at ejection.
- May required some “fiddling”.



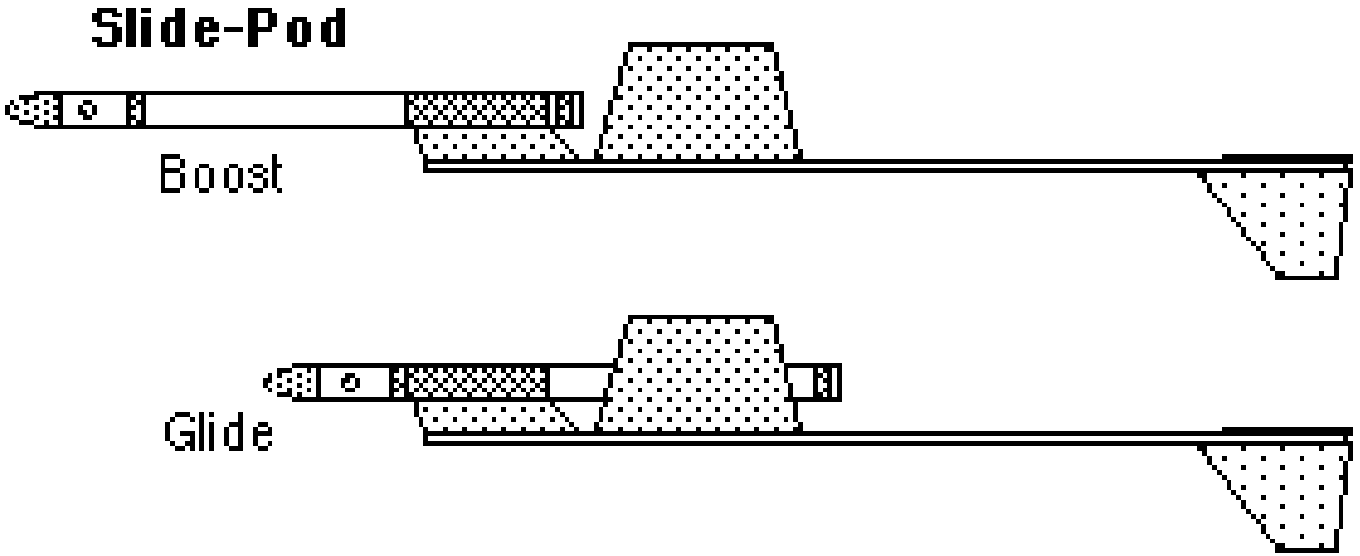


Rocket Gliders

- Everything glides back in one piece.
- But you still need to solve the same stability problem as the boost glider, and
- Figure out how to switch to glide mode without being able to eject engine or drop off a pop pod.
- Rocket Glider was added to the NAR contest rule book (“Pink Book”) in 1971

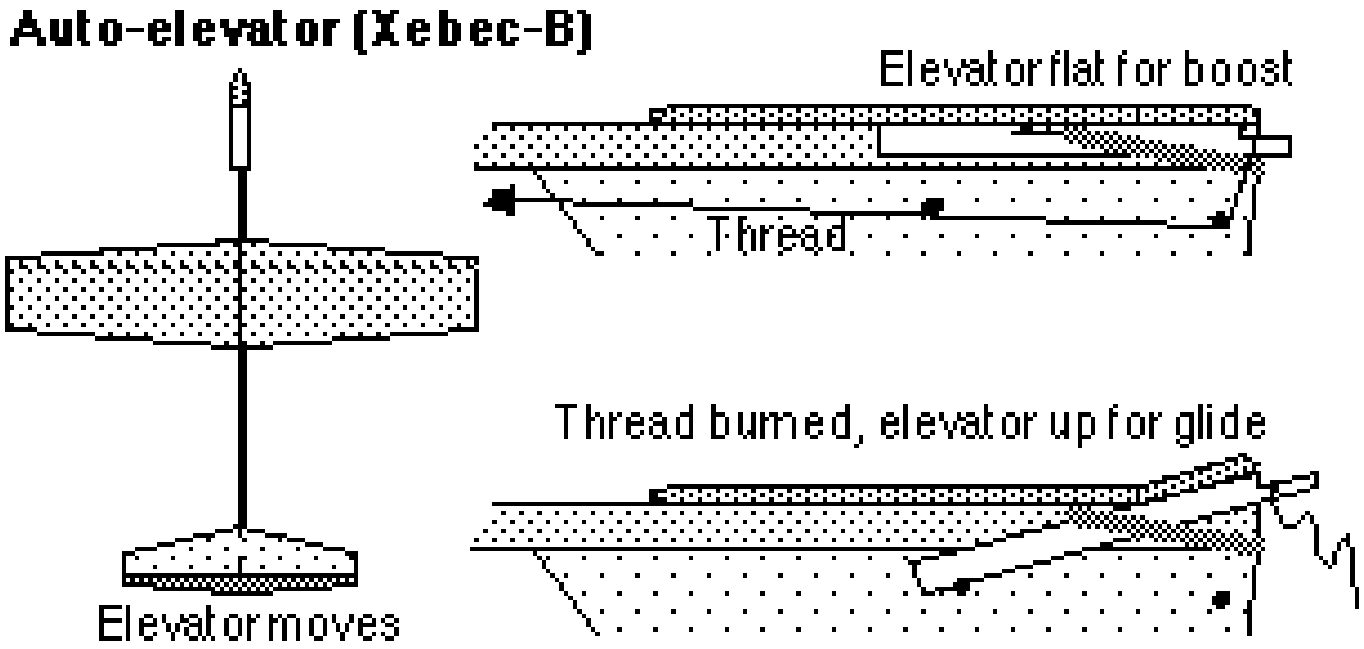
Slide Pod:

- Shifts the center of gravity from boost to glide.
- Rubber band pulls pod backwards.
- Sewing thread holds in place until ejection.



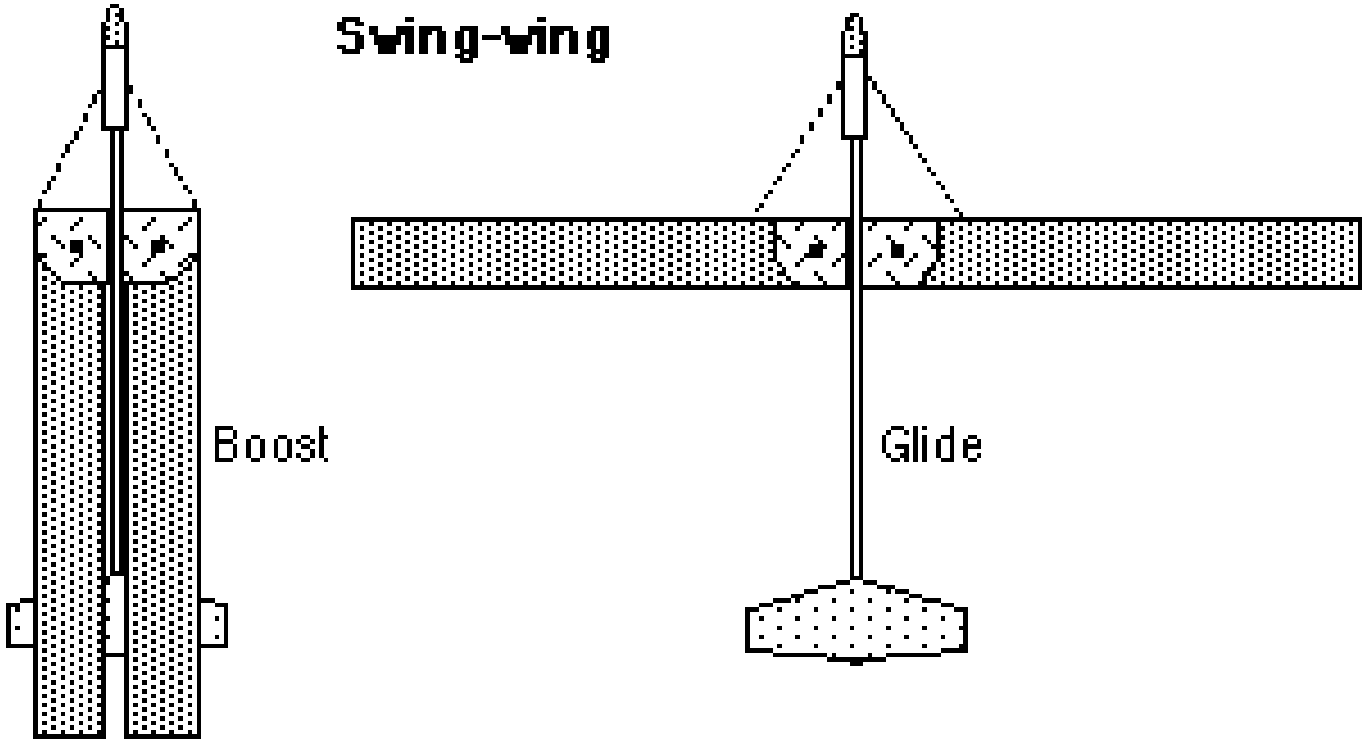
Auto Elevator:

- Works by forcing wing to a different angle of attack.



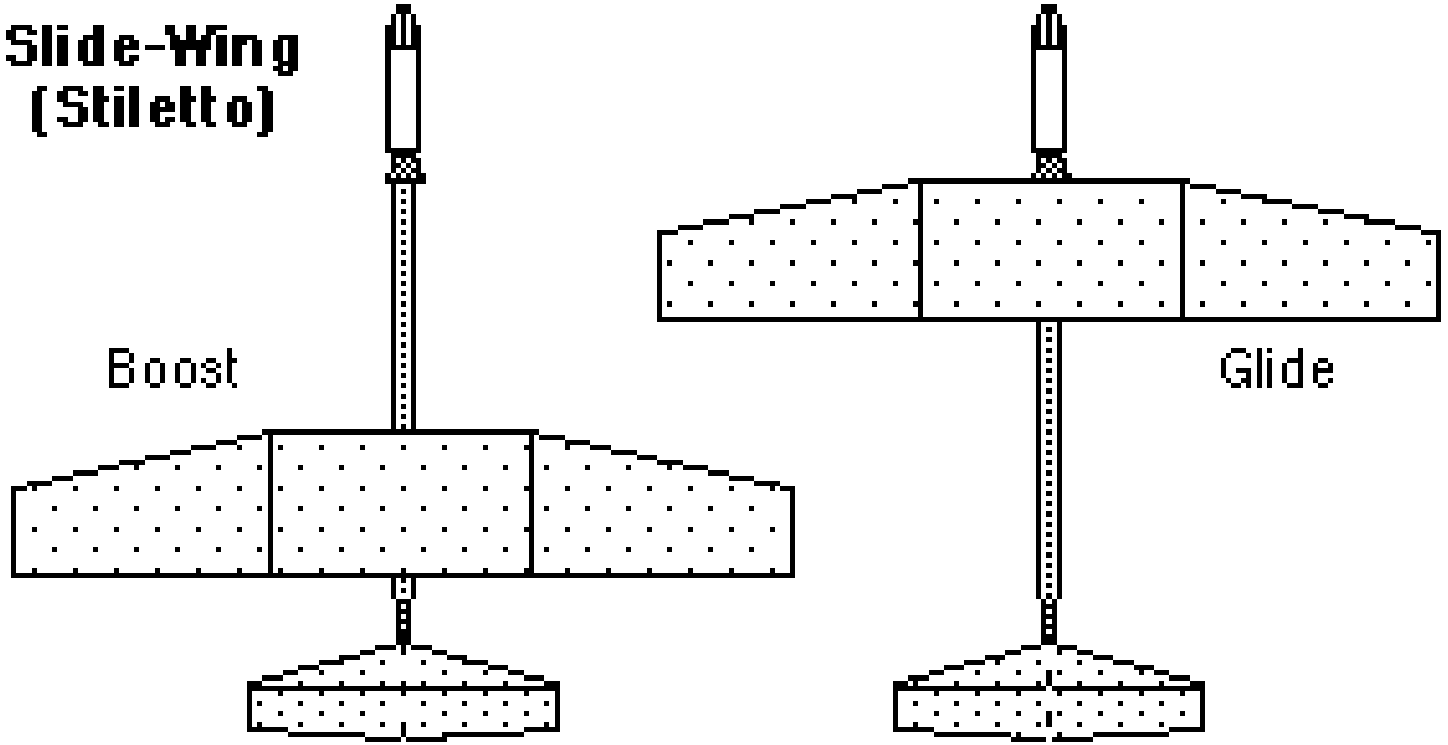
Swing Wing:

- Works by changing the center of pressure between boost and glide.



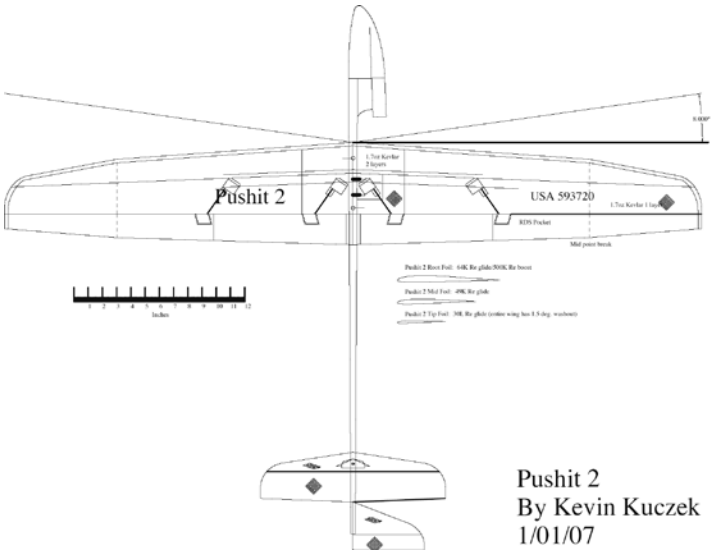
Slide Wing:

- A different way to shift the center of pressure.



Radio Control Gliders:

- MIT Rocket Society origins
- Similar today to discus launched RC glider (DLG's).
- These have to be flown up by a pilot.
- Can have 4 channels for flaps, etc.
- One of the most prestigious World Champs events.



Let's Get Building - "Straight is the way"

- Gliders do not like misalignments.

Strive for Performance

- Keep it light. Less mass = better performance.

Work to be Consistent:

- Build the same model over and over. Try some jigs. (Bunny uses Foamboard and hot melt glue!)

Build Naturally:

- Stick to balsa wood, spruce and Titebond and double glue joints.

The Care and Feeding of Balsa Wood:

A Grain – "tangent cut."

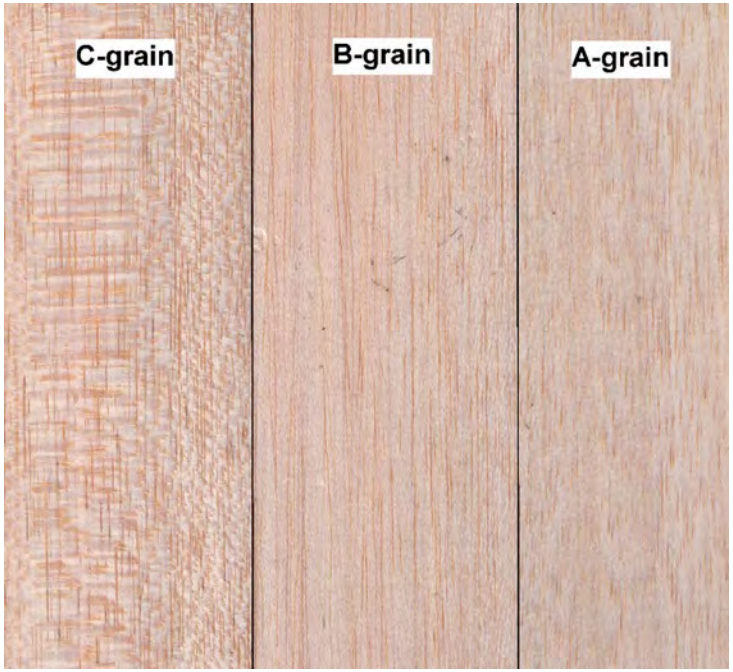
- Long fibers that show up as long grain lines.
- Sheets of A grain are VERY flexible.
- A grain warps easily.

B Grain – "random cut."

- Has qualities of both type A and type C.
- Good for general purpose uses.

C Grain – "quarter grain"

- Beautiful, mottled appearance.
- VERY stiff across the sheet; the most warp resistant type.
- Wanted for all flying surfaces: wing, stab, rudder



Tools of the Trade:

- #11 X-Acto knife blades – get lots of them or get a honing stone.
- 180,240,320 grit sand paper – you don't need more.
- Razor saw – good for sawing spruce

Tools of the Trade:

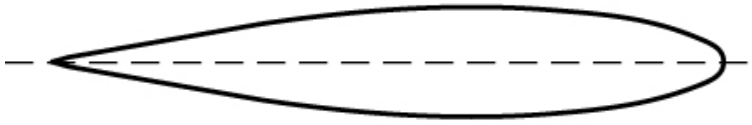
- A good sanding block – 3M's rubber ones are great; T-Shaped aluminum good, too.

- Optional - block plane, available at finer hobby shops.

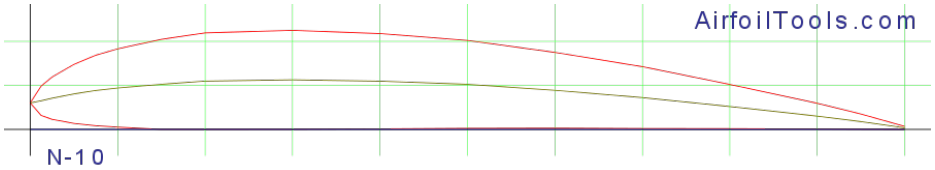
Shaping Your Airfoils

Symmetrical

- Same as fins!
- Used on stab & rudder



symmetrical airfoil

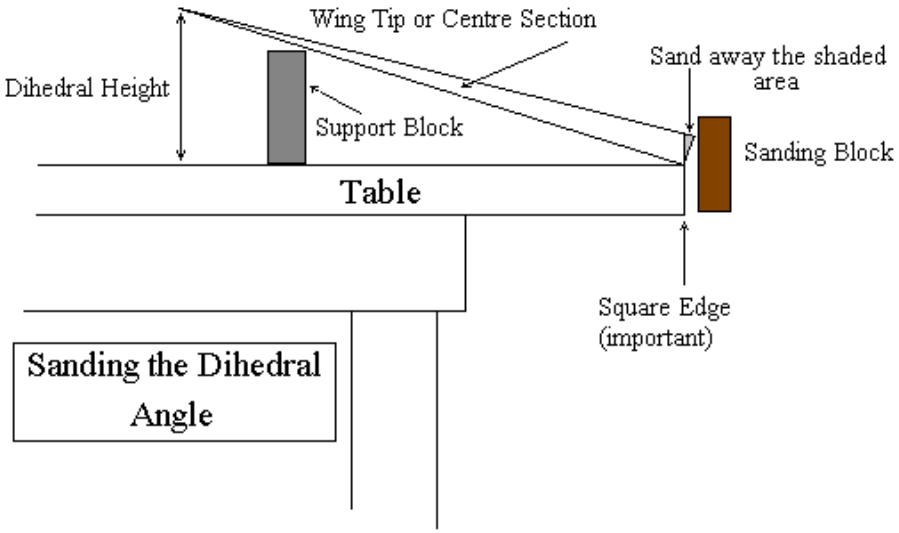


Flat Bottomed

- Used on wings

Dihedral or “controlling the roll”

- Need your sanding block
- A book, block or wood to elevate the wing
- A surface you can safely sand on



Trimming for Glide

- Your glider does **NOT** have a pilot, so you must trim it for glide before flight.
- Balance the glider at about 30-40% back from the leading edge at the wing root (or look up “neutral point” online).
- Adjust stab so the glider *just* will not fly in a straight line without stalling, no matter how slow you throw it. Remember to always toss it at a point on the ground about 20 feet in front of you.

Trimming for Glide

- Add about 10 degrees horizontal stab tilt to the right to induce a left turn.
- Add about a half gram of clay to the left wing tip to get the turn started.
- If it glides into a left turn that is pretty flat, you are very close to perfect.
- If it turns too fast, remove tip weight.
- If it won't break into the turn, add a touch of left rudder.

Preparing for Flight:

- Check your pod fit; not too tight, not too loose, but “just right”.
- If flying a rocket glider, make sure to hook up the rubber band!!!
- Build a "Power Tower“ from ¾” dowel with one end sharpened to push into ground.

Summary:

- Check out some glider kits or plans.
- Visit NAR's Contest Flying site:http://www.nar.org/contest-flying/contest-events/
- Find something you like, then built it.
- Fly it!
- Repeat!

mbundick@earthlink.net