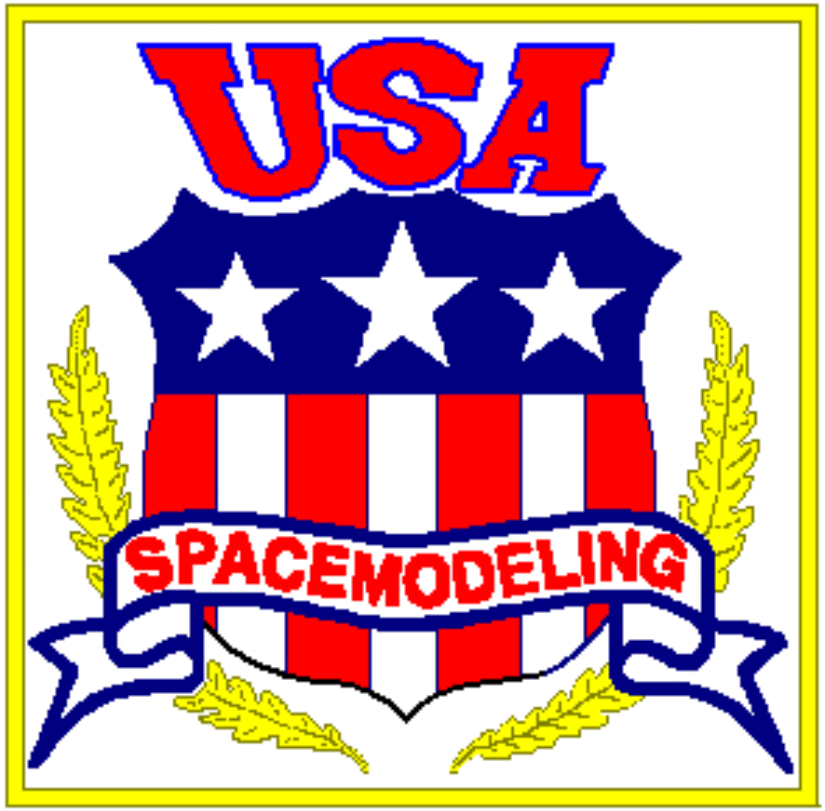
International Spacemodeling Competition

Flying for the United States of America



Trip Barber

1978, 1985, 2006, 2008, 2010, 2012, 2014 US Team Member

What's it all About?

- Measuring your modeling and flying skill against the best in the world
- Flying as a team, not just an individual
- Representing the USA
- Seeing other cultures and places with your rocketry friends
- Spending a lot of money and time!

International Competition

- Run by Federation Aeronautique Internationale (FAI)
- Different rules and competition structure from US
  - Rules often prescribe minimum rocket size/weight
  - About 25 international World Cups held each year
    - In 18 different countries, one of them in the US
    - Great Lakes Cup (Oswego, IL) in June 2014
  - World Spacemodeling Championship every 2 years
    - 2014 WSMC is in Kaspichan, Bulgaria August 22-30
- US participation is managed by the NAR
  - Team selection by flyoff at odd-numbered NARAMs
  - Two teams: Junior (18 and under) and Senior

Members and supporters of the 2012 US Spacemodeling Team in Liptovsky Mikulas, Slovakia

“Teammate” is a 24/7 thing

U.S. Team marching in at the 2006 opening ceremony, one of the 23 participating national teams

Grand finale of the 2006 opening ceremony at the Baikonur (Kazakhstan) stadium, with 10,000 Baikonur city residents in attendance

The opening ceremony is different each time. The 2008 ceremony in Spain was indoors and featured costumed roller-skate dancers!

Aerial view of a typical flying range (2006), with launch pads in a semicircle on the left and team prep tents on the right

“Main Street”, the row of team tents at the flying range in 2006

Inside the US Team prep tent in 2008 – each nation has their own and uses it from dawn until past dark every flying day

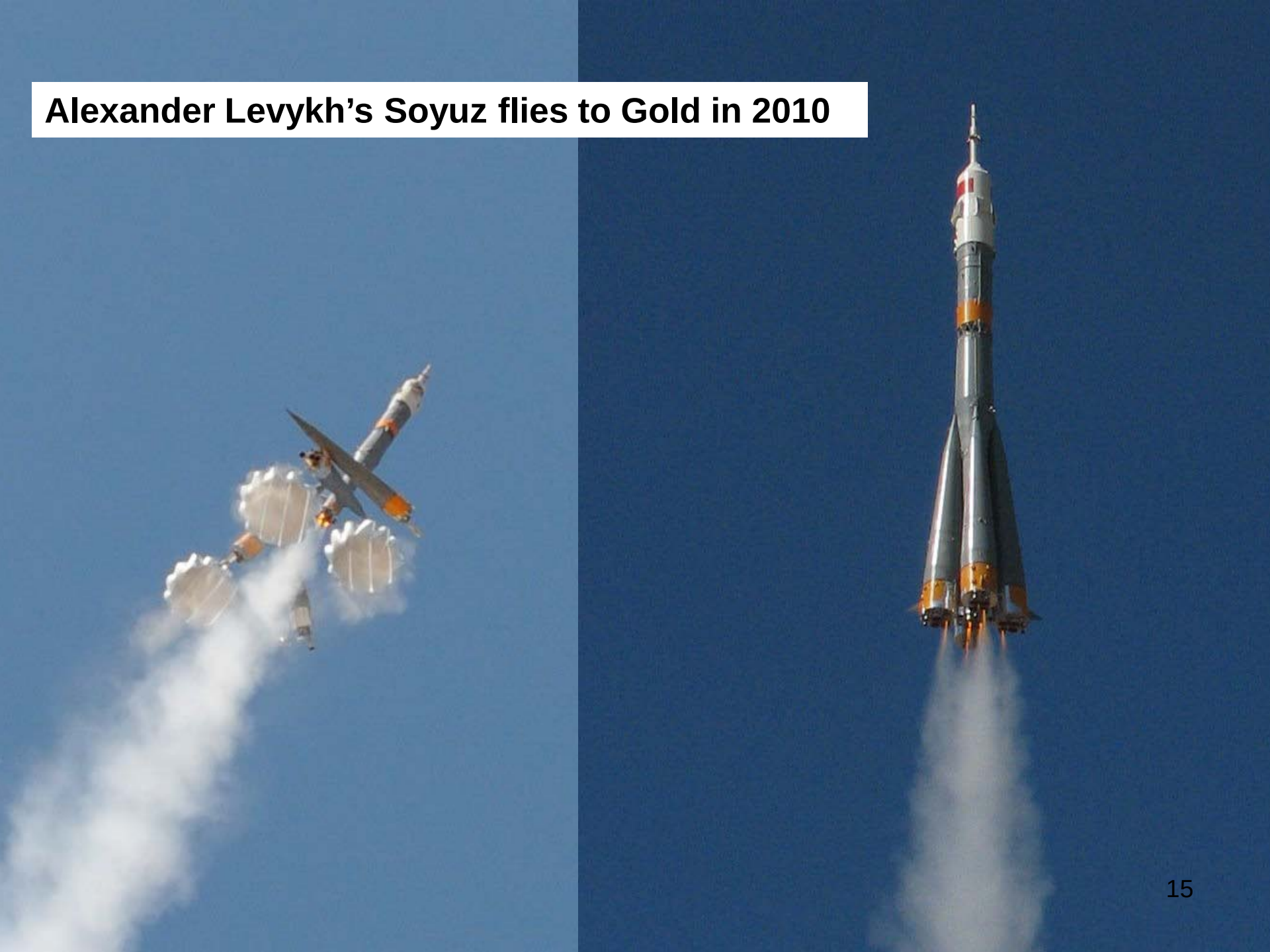
Katherine Humphrey's S1A
Altitude model lifts off in 2006

The pads are very close together!

U.S. Junior Team for S8D R/C Glider with their models in 2012

The Russian Alexander Levykh, who won S7 Scale in 2006, 2010, and 2012 places his Soyuz model on the pad

Alexander Levykh’s Soyuz flies to Gold in 2010



Polish team loads S7 Scale models on their pads in 2006

Not every one of the fabulously-detailed Scale models works in flight!

Slovak girls who presented awards on the field in 2012

They play the gold medal winner's national anthem at the awards for each event – here the U.S. Juniors win S8 R/C Glider in 2010

US Team (2006) on the Soyuz launch pad used by Yuri Gagarin in 1961 and still used today

The opportunity to tour interesting places is part of the experience

US Team at the Soyuz booster assembly facility

Baikonur Cosmodrome 2006

Buran Space Shuttle, with Team Manager John Langford and family, Baikonur Cosmodrome 2006

FAI Spacemodeling

- Rulebook is posted on the FAI website
  - www.fai.org, CIAM (aero modeling) section
  - Section 4 of the FAI Sporting Code
- Comprehensive information is on the NAR website
  - “FAI Spacemodeling” section under the “Contest Flying” button
  - Includes all the “how to” material that exists in English
- Modeling techniques are based on use of very lightweight fiberglass, plastics and composites
  - Nobody uses balsa nose or spiral paper tube models
- Rocket motors that are competitive in most FAI flying events are made in Europe & not certified in the US
  - A disadvantage for the US Team except in S8 (R/C R/G)

WSMC Events

- Always the same 8 events (3 have options by age division)
- “Tube events” using 40 mm x 500 mm models
  - A Parachute Duration (S3A, in “FAI speak”)
  - A Streamer Duration (S6A)
  - A Helicopter/Autogyro Duration (S9A)
  - A or B Altitude (2-stage) (S1A or S1B) – with tiny altimeters
- Glider events with weight limits
  - A Boost/Glide (free flight) (S4A) – really free flight Rocket-Glider
  - D or E Radio-Controlled Rocket-Glider (S8D or S8E/P)
- Scale events
  - B or C Scale Altitude (2-stage) (S5B or S5C)
  - Scale (S7): the “prestige” event
- S2/P “FAI TARC” will be a demonstration event in 2014

Model Construction

- Fiberglass used for body tubes
  - Formed over a male mandrel coated with mold release
  - One layer of tissue/mylar, one layer of 0.5-0.7oz glass cloth
  - “West Systems” finishing epoxy resin
  - 5-10 degree boat-tail depending on event
  - Small tube in tail to hold 10.5mm rocket motor
- Nose cone is fiberglass or vacu-formed plastic
  - Apogee makes plastic ones for sale
- Fins are 1/20 or less balsa, epoxy coated
- Ejectable plug protects recovery device
- A good airframe weighs <7 grams, with nose/fins

Materials for making a fiberglass body

Close-up of fins and boat-tail of S6 streamer model

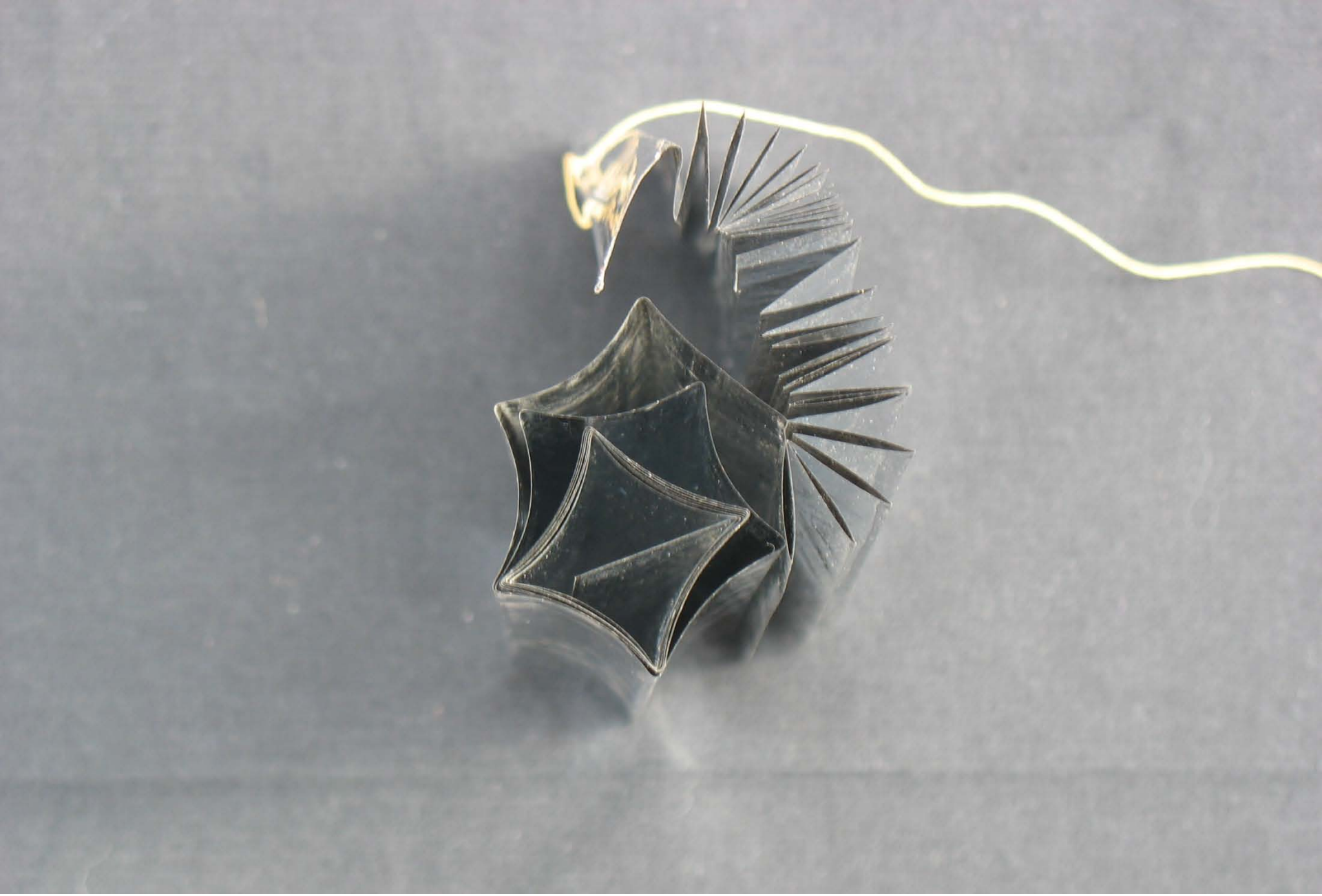
Flying an Event

- All events are flown in 3 consecutive 80-minute “rounds”
  - Duration events have a “max” time (score) per round
  - Only 2 models permitted – so a big recovery team is essential
  - Dethermalizing at “max” is popular with the recovery team!
  - Score = sum of 3 flights (best single flight for altitude)
- 3 people make up a national team for an event
  - Must share the launch lane, timers, and the hour in a round
  - Team score = sum of their scores
  - Unless every flight is perfect – no medal chance
  - Everyone else supports those who are flying – a team sport
- Everybody uses piston launchers, some with towers
- Picking thermals is the key to victory in duration events

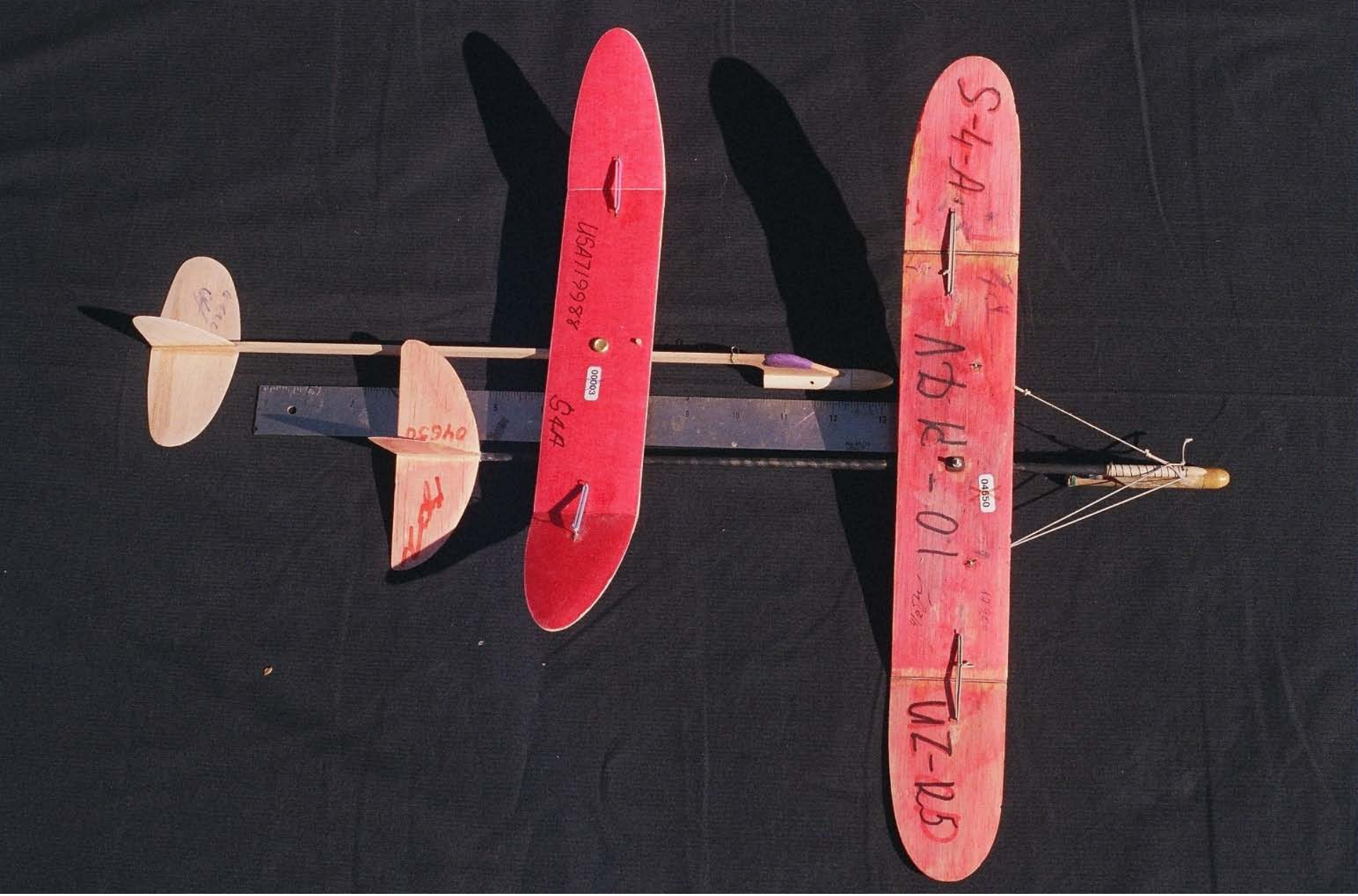
Trip Barber loading his S6A Streamer Duration model in a piston-tower in 2006

Competitive Designs

- Light weight and perfect surface finish for everything
- For streamer (S6A): brilliant origami and thermal-picking
  - One-mil mylar streamer material with baked-in tiny creases
- For parachute (S3A): perfect deployment & dethermalizers
- For boost-glider (S4A): variable (swing-wing) geometry
- For helicopter (S9A): great blade design and light weight
- For altitude (S1/S5): “flash tube” staging and piston launch
  - Using 3-gram Polish “Adrel” altimeters
- For scale (S7): thousands of hours of work, molded parts
  - Only Saturn, Soyuz, or Arianes with multi-staging get places!
- For R/C glider (S8): superb flying and landing skills

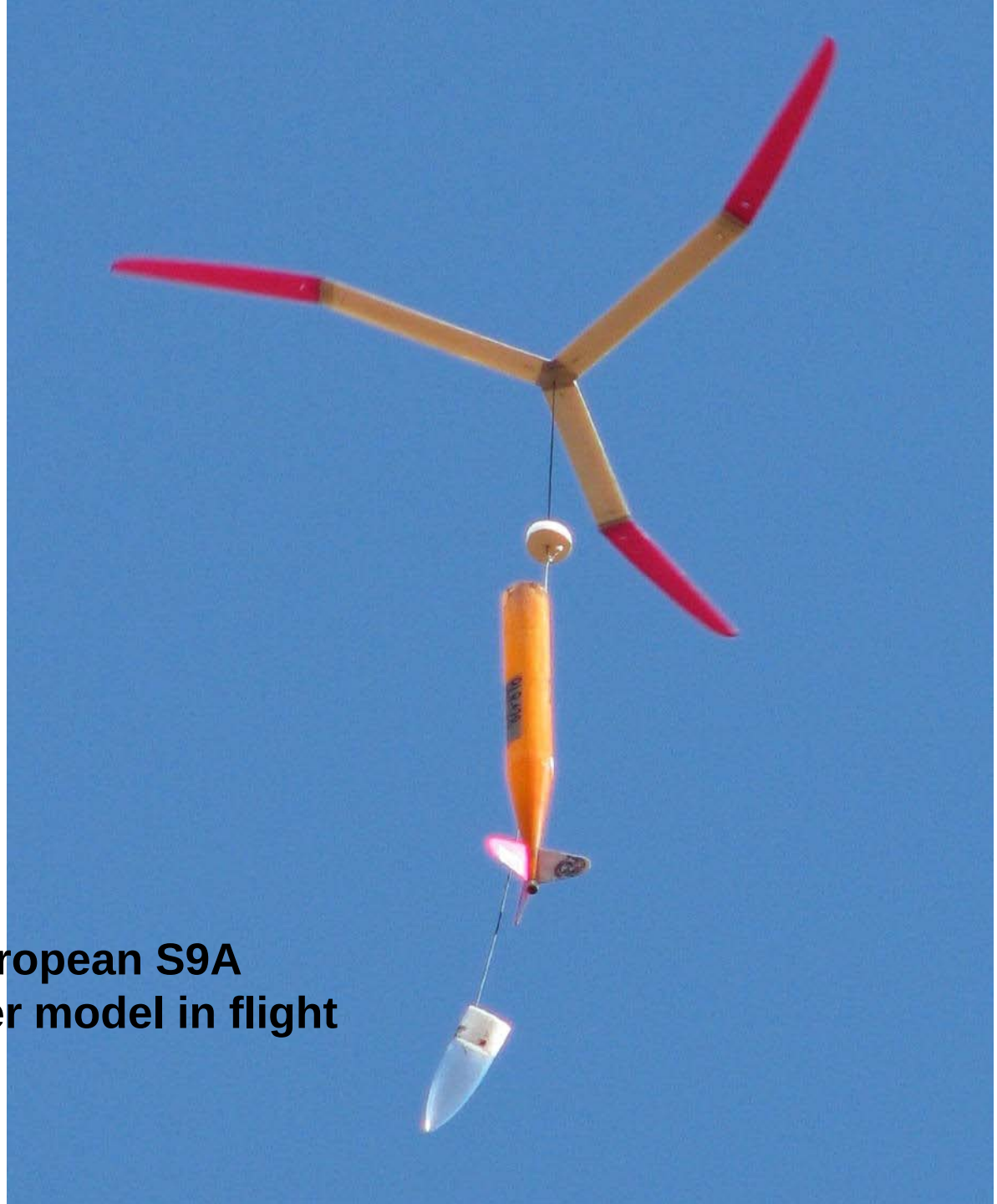


Streamer showing “accordion” and “scorpion” folds



Russian swing-wing S4A boost-gliders

Close-up of Russian S4A boost-glider



Good European S9A helicopter model in flight

Joining the US Team

- Every team slot is won in a competitive flyoff
  - Held the first weekend of odd-numbered NARAMs (i.e. next year)
  - More competitors than slots, but good new fliers can get on
  - Flown with US-certified motors only
- Team members must pay their own expenses
  - Typically ~$2500 plus models for Seniors
  - Juniors get about 2/3 subsidy from NAR & Aurora
  - Family members and others often travel with the team
- Once on the team, then the real work begins
  - The European fliers are good at FAI and the rules are different
  - Any good US competitor can succeed, but not easily

Come fly against the best in the world with Team USA!