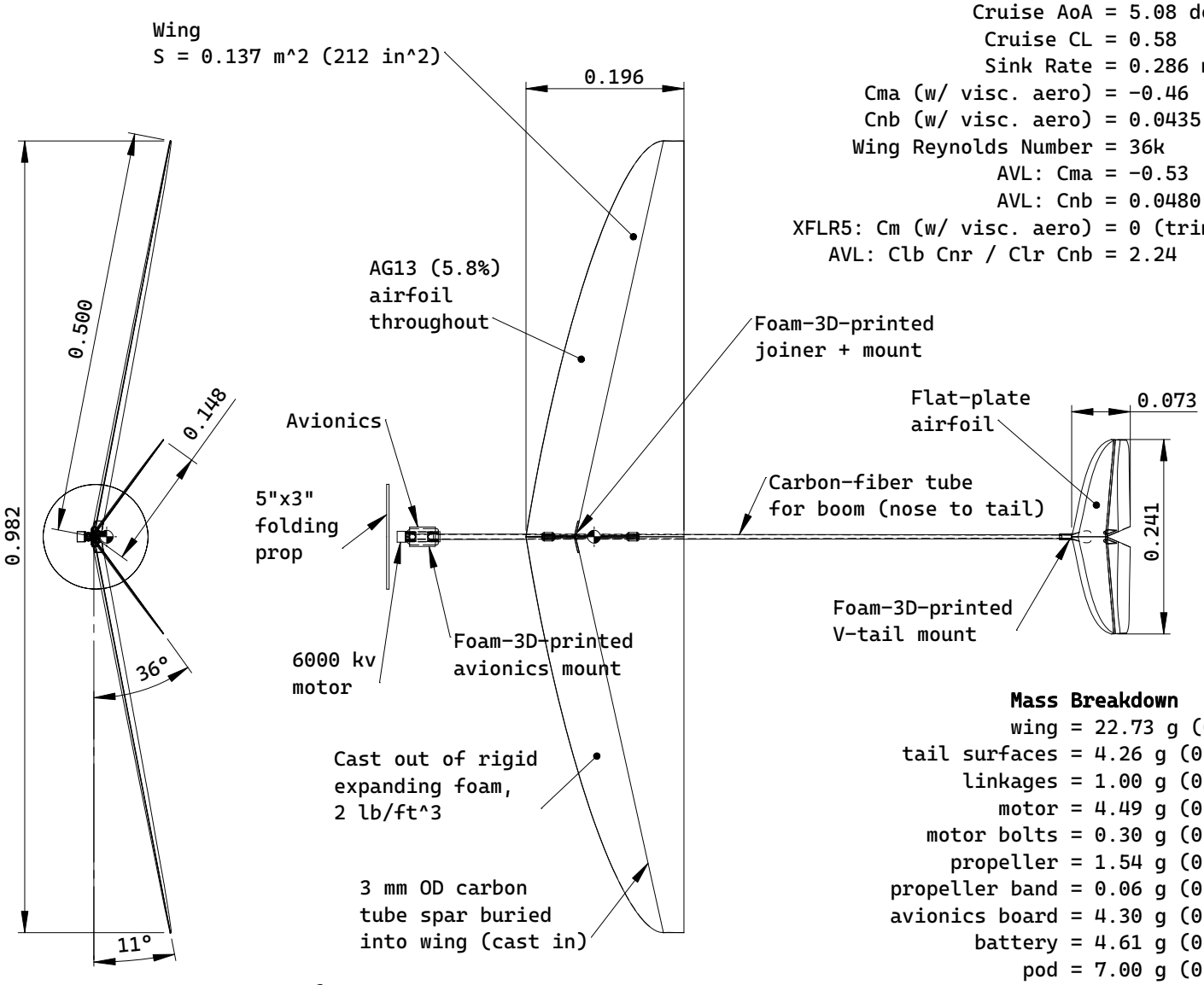
Feather Motor-Glider

Peter Sharpe
(design heavily inspired by Drela Apogee)

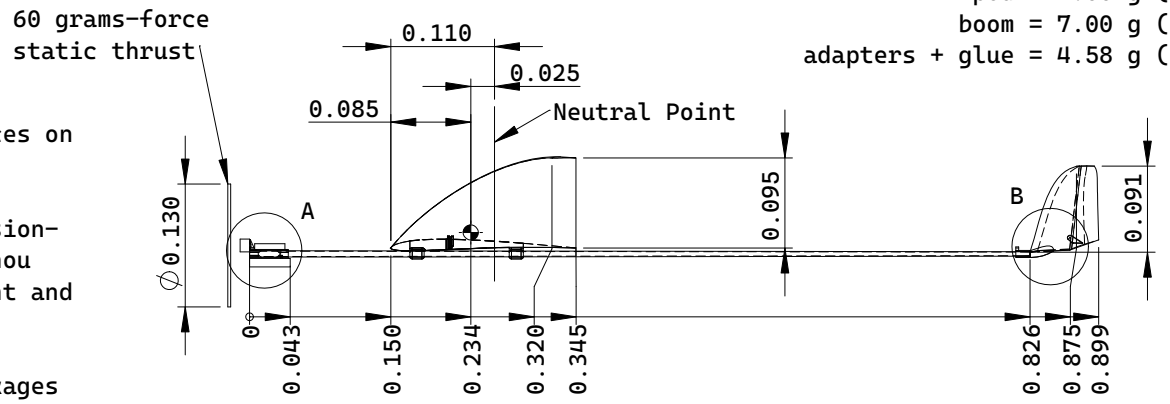
Overall Properties

All-up weight = 61.9 g (2.18 oz)
L/D (ideal piloting) = 12.4
Cruise Airspeed = 3.53 m/s
Cruise AoA = 5.08 deg
Cruise CL = 0.58
Sink Rate = 0.286 m/s
Cma (w/ visc. aero) = -0.46
Cnb (w/ visc. aero) = 0.0435
Wing Reynolds Number = 36k
AVL: Cma = -0.53
AVL: Cnb = 0.0480
XFLR5: Cm (w/ visc. aero) = 0 (trimmed)
AVL: Clb Cnr / Clr Cnb = 2.24



Mass Breakdown

wing = 22.73 g (0.80 oz)
tail surfaces = 4.26 g (0.15 oz)
linkages = 1.00 g (0.04 oz)
motor = 4.49 g (0.16 oz)
motor bolts = 0.30 g (0.01 oz)
propeller = 1.54 g (0.05 oz)
propeller band = 0.06 g (0.00 oz)
avionics board = 4.30 g (0.15 oz)
battery = 4.61 g (0.16 oz)
pod = 7.00 g (0.25 oz)
boom = 7.00 g (0.25 oz)
adapters + glue = 4.58 g (0.16 oz)



Control Scheme

No control surfaces on wing (tail-only control). Tail surfaces are torsion-sprung using 9 thou music wire, Z-bent and CA-glued in.

Spectra line linkages connect printed-in control horns up to 2x linear servos on avionics board.

Flight Dynamics

- Phugoid ζ = 0.23
- Dutch roll
  - f = 0.76 Hz
  - ζ = 0.38
- Spiral τ = 1.38 s (stable)