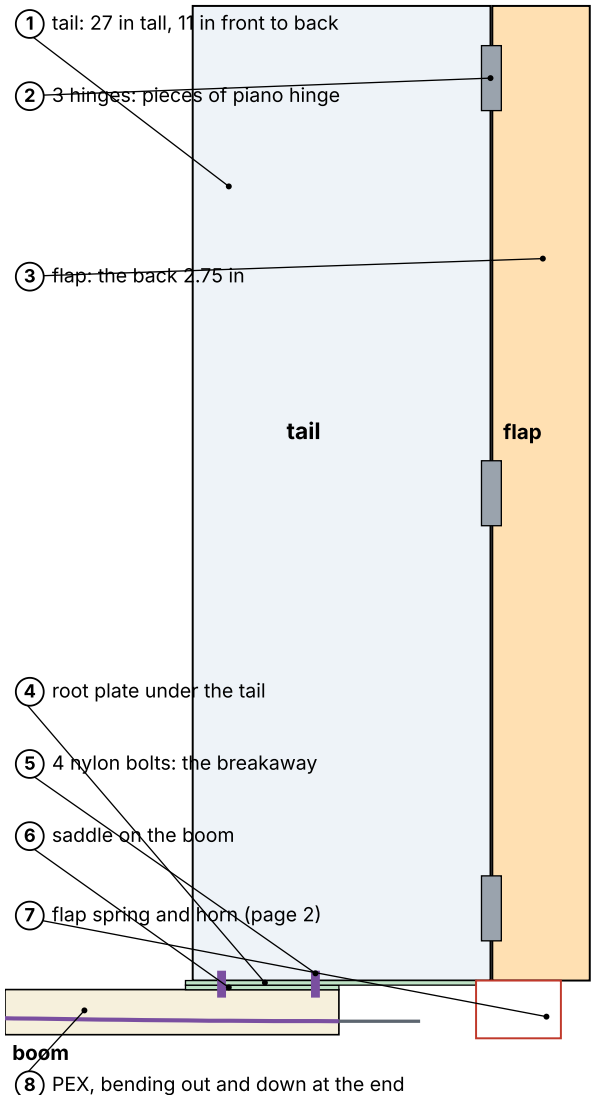
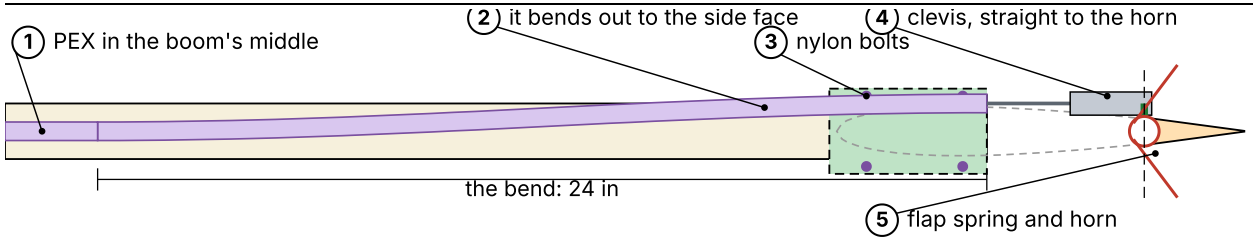
TAIL, FLAP AND BOOM: HOW THEY FIT inches

The idea: the tail stands on the boom's end, on a G10 plate that sits on a G10 saddle and is held by four nylon bolts that break on purpose in a hard knock (the breakaway). The flap swings on three short pieces of stainless piano hinge. Its give-way spring sits under the flap's bottom end, and the pushrod runs straight to the spring's horn: the PEX bends out to the boom's side face over the boom's last 24 in, so the rod meets the horn square. **Height:** the tail's middle stays where the design has it, about 47 in up the wing; so the boom is 14-1/4 in lower than the guides' 47 in, at about 32-3/4 in (Mike, Oct 29).

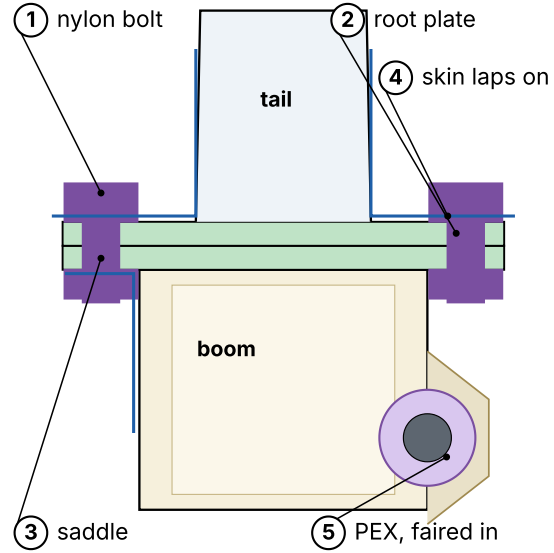
FROM THE SIDE, 1/4 SIZE



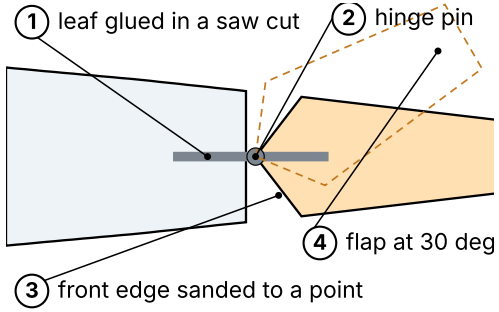
BOOM END, ROOT AND FLAP SPRING FROM BELOW, 1/5 SIZE



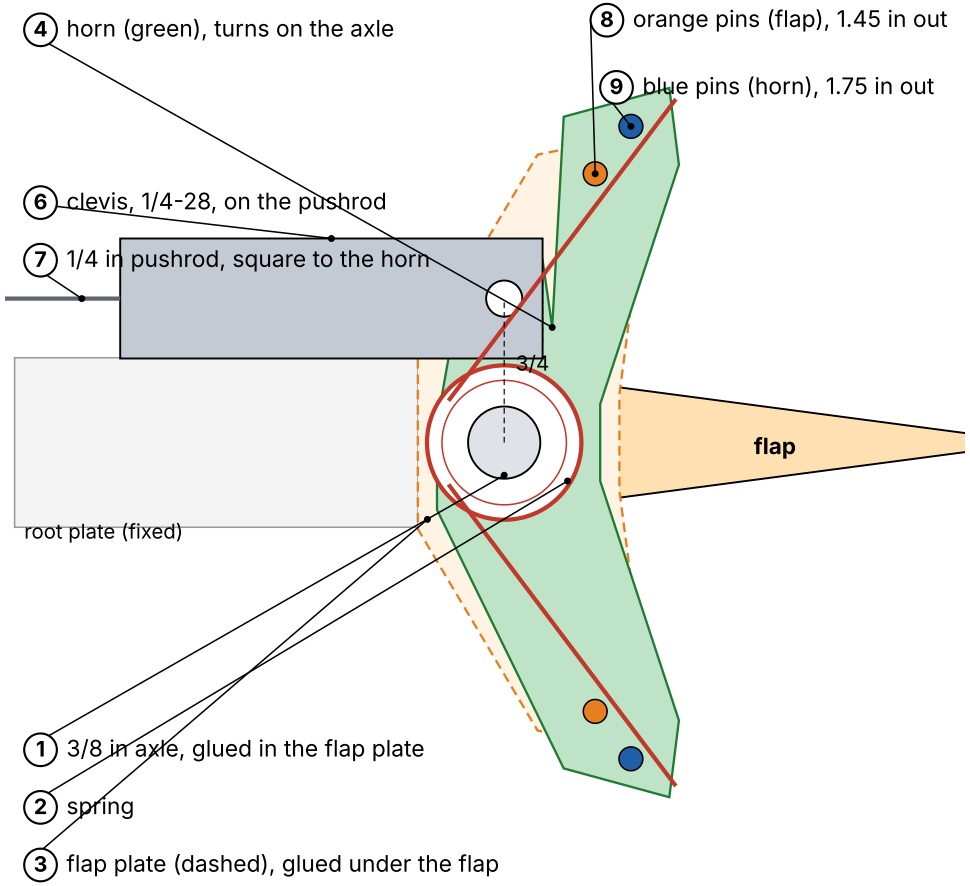
ROOT JOINT AT A BOLT, FULL SIZE



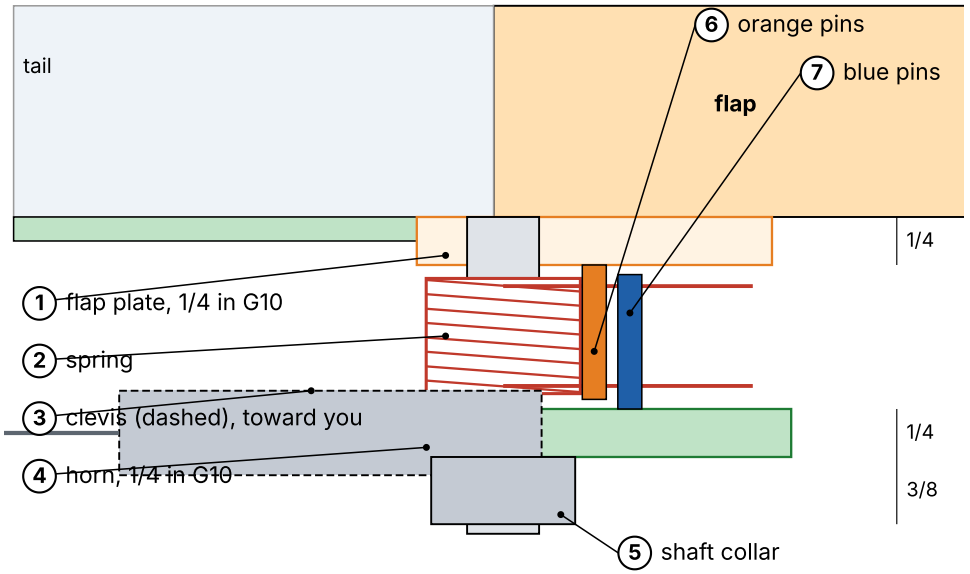
A HINGE CUT THROUGH, FULL SIZE



SEEN FROM BELOW



FROM THE SIDE



HOW IT WORKS

- The flap plate (under the flap) carries the orange pins; the horn carries the blue pins. The spring's legs press outward on both pairs, so flap and horn turn as one.
- Past the setting, the flap turns toward straight and the horn stays where the actuator holds it. When the wind eases the spring brings it back.
- The horn is square to the boom with the flap straight, so a push or pull moves the flap the same amount each way.
- The pushrod's last 24 in run in a smooth S in the PEX, out 0.75 in to the side and down 0.25 in to the horn's level, and it comes out parallel to the boom.

BUILD

1. **Boom:** rout the PEX groove down the core's middle as before, but over the last 24 in curve it in a smooth, even S out to the side and a little down. For the last 13 in it runs in the core's side, and for the last 9 in it stands up to 1/4 in proud of the side face. Fair it in with thickened epoxy and glass over it with the boom, plus 1 more layer 3 in past the bend each way.
2. **Tail** as Wing Construction Guide Stage 12, with the 1/8 in G10 root plate glued under the bottom slice before glassing; lap the skin 3/4 in onto it.
3. **Flap:** cut the back 2.75 in off; glass both parts; seal the cut faces; sand the flap's front edge to a point, 35 deg each side.
4. **Hinges:** three 2 in pieces of piano hinge, leaves glued into 3/8 in deep saw cuts on the center line of both faces.
5. **Saddle and mount:** glue and glass the 1/8 in G10 saddle on the boom's last 4.3 in, over the PEX; glue in the two locating pins; set the tail on, drill the four 3/16 in holes through both flanges, fit the nylon bolts snug.
6. **Flap spring and horn:** as page 2; the 1/4 in horn fits the clevis as it is.
7. **Pushrod:** cut the 1/4 in rod to length, thread both ends 1/4-28 with the hand die, slide it in from the tail end, clevis on each end.

NUMBERS (WORKED OUT)

PEAK BEND, THOUSAND PSI	12 IN BEND	15 IN	18 IN	24 IN
1/4 in rod	95	61	42	24
3/16 in rod	71	46	32	18

For a smooth S over the length shown, out 0.75 in and down 0.25 in, not counting the rod's room in the PEX. The 1/4 in rod has about 0.11 in of room in 3/8 PEX, so it cuts the curve a little: over 24 in it peaks at about 20 thousand psi instead of 24. 316 rod takes a permanent bend at about 35 thousand psi annealed, more when cold drawn (a seller's figure, and inferred). As the rod slides it moves only a little along the bend, so its bend barely changes: no wear-out from bending back and forth (inferred).

- **Breakaway:** the two far bolts, 2.1 in from the saddle's edge, at about 210 lb each dry and 150 wet (12,000 psi nylon, the seller's figure): the tail lets go at about 45 to 65 lb at its middle.
- **Flap spring:** wound 74 deg it holds 4.0 in-lb, the Trim Guide's 4 lb on a 1 in arm; 5.6 in-lb at the full 30 deg of give. About 5.3 lb on the pushrod at the setting.
- **Weight at the tail** beyond the bare tail: about 0.55 lb (a guess from sizes). Each pound there takes about 4-3/4 lb of nose lead.
- **Left out:** the centering spring (a free flap trails straight in the wind, and the flap spring is far stronger) and the flap stops (the actuator's limits set the travel, and the flap spring gives first). A shed tail now hangs on the pushrod; the wing still feathers, and the tail is too far back to reach it.

PARTS (AMAZON FIRST)

- Piano hinge, 316: Amazon B09J23T1VM.
- Nylon #10-24 screws, cut to 1/2 in: Amazon B00DD4D77S; nylon nuts: Amazon B0763JWD3M. Replace at every refit.
- Pins, 1/8 × 1 in 316: Amazon B00R1UV7QS.
- Axle, 3/8 in 316 rod: Amazon B076CMP5J5. Collar: Amazon B0D5RK2GGJ.
- 1/4-28 die with its handle: Amazon B0FS1RN49Q.
- McMaster: spring 9287K47; two clevises 6071K47 (one here, one at the actuator); 1/4 in 316 rod, 6 ft, cold drawn (part to pick).
- G10: 1/4 in on hand; 1/8 in for the root plate and saddle.
- At the actuator: the Thomson's front end is a fork made for a flat plate, and nothing sold screws on and fits it. So the rod ends in a flat blade: the front clevis with a 4 mm (0.157 in) G10 plate locked in its jaw by its own pin plus one 1/8 in 316 pin, drilled through clevis and plate together. One pin into the Thomson, so no knee; no glue. Plate 5/8 × 1-1/2 in, holes 0.9 in apart, the 10 mm one 5/16 in from the front end; drill the plate's holes first, then cut it out round them.

Prices not checked.