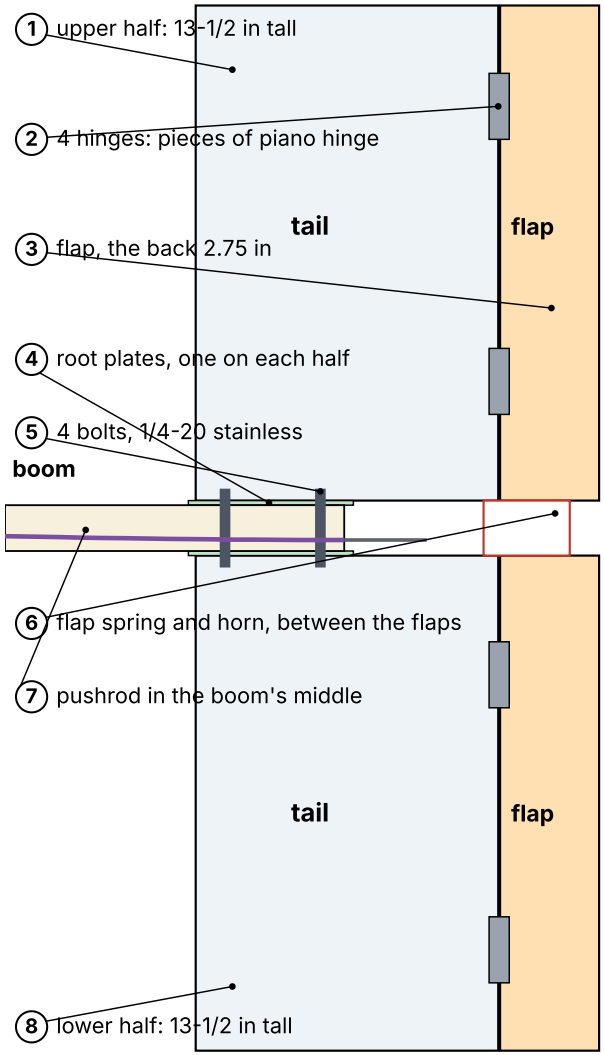
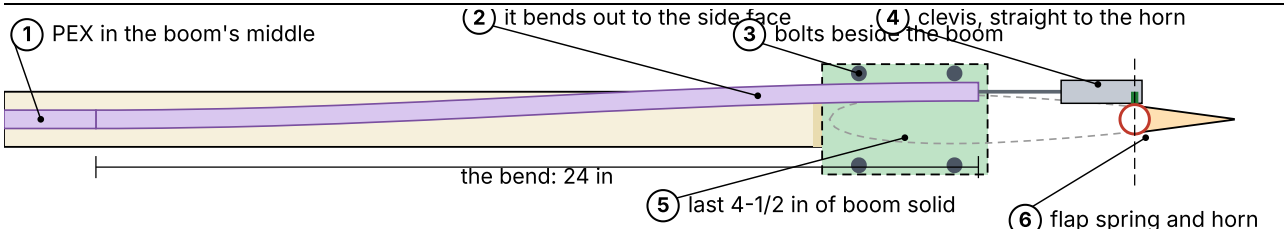
TAIL CENTERED ON THE BOOM: HOW IT FITS inches

The idea: the tail is built as two halves, 18 of its 36 slices each, one on the boom's top face and one on its bottom face, so it is centered on the boom as the July drawings had it. Each half has a G10 root plate glued to its inner face, and four 1/4-20 stainless bolts beside the boom clamp the two plates onto the boom. Nothing is meant to break. The flap is two halves too, tied by one axle; the flap spring and horn sit in the 1-1/2 in gap between them, level with the boom, so the pushrod runs straight to the horn.

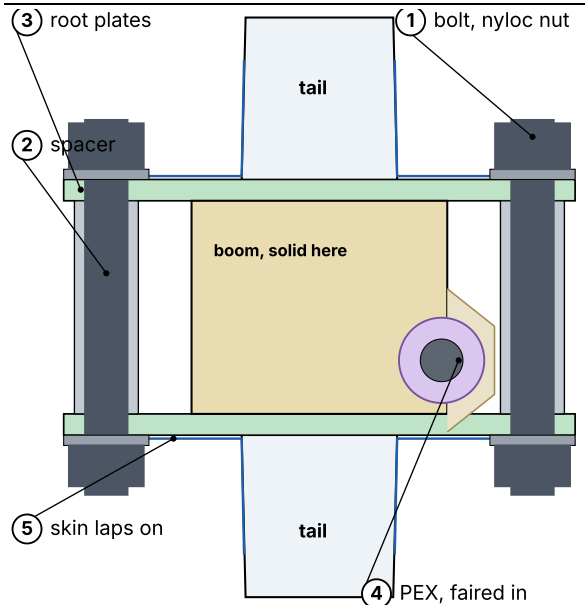
FROM THE SIDE, 1/5 SIZE



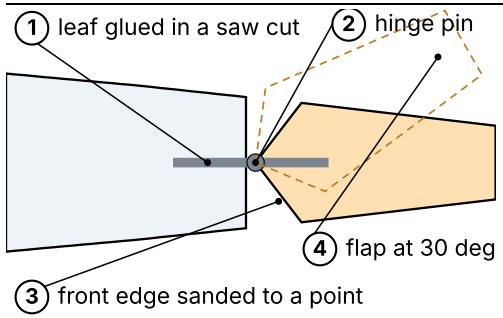
BOOM END AND TAIL FROM BELOW, 1/5 SIZE



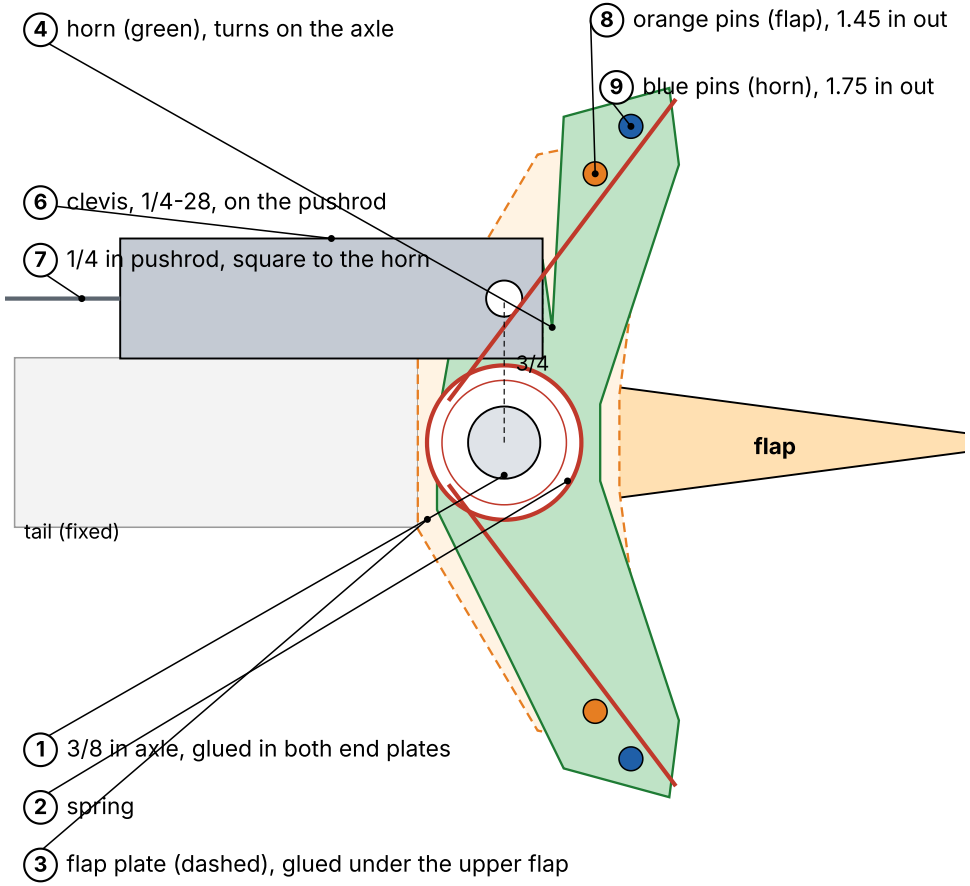
THE JOINT AT A BOLT, FULL SIZE



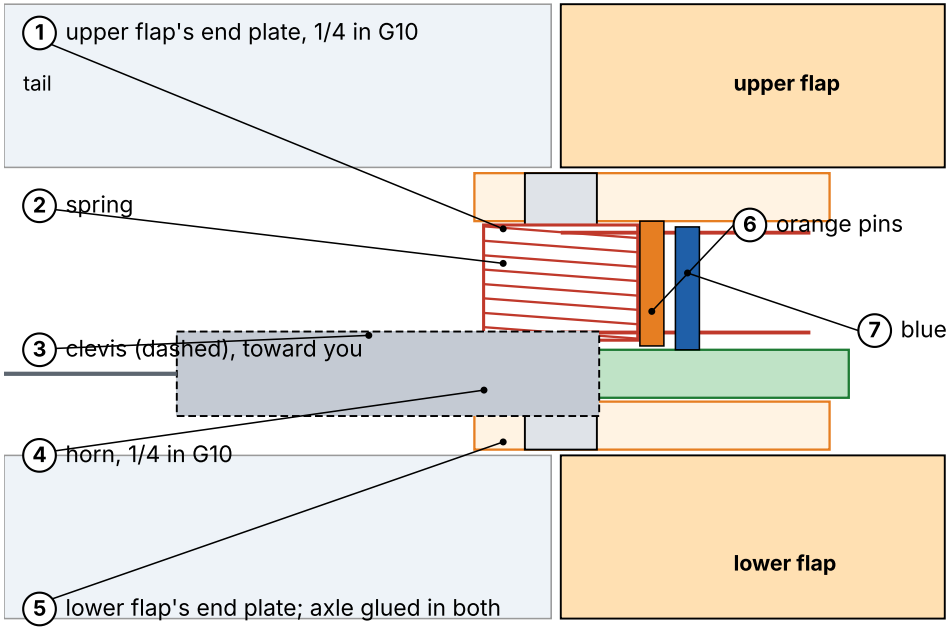
A HINGE CUT THROUGH, FULL SIZE



SEEN FROM BELOW



FROM THE SIDE



HOW IT WORKS

- The upper flap's end plate 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.
- The axle is glued into both flaps' end plates, so the two flaps move as one flap.
- Past the setting the flaps turn toward straight and the horn stays where the actuator holds it; when the wind eases the spring brings them back.
- The horn is 0.75 in long, square to the boom with the flaps straight; the pushrod's last 24 in run in a smooth S, out 0.75 in and down 0.33 in, and come out square to the horn.

BUILD

1. **Boom:** PEX groove down the core's middle; over the last 24 in curve it in a smooth S out 0.75 in and down 0.33 in, 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, faired in and glassed over, as the Oct 29 sheet. Fill the last 4.5 in solid with thickened epoxy, for the clamp. Glass as Stage 12.
2. **Tail halves:** slices 1 to 18 make the lower half, 19 to 36 the upper half, glued as Stage 12. Glue a 1/8 in G10 root plate, 3.0 x 4.5 in, on each half's inner face at the front, before glassing; lap the skin 3/4 in onto it.
3. **Flaps:** cut each half's back 2.75 in off; glass; seal the cut faces; sand the front edges to a point, 35 deg each side. Glue a 1/4 in G10 end plate on each flap's inner end, set 1/32 in short of the tail's inner face so it cannot rub.
4. **Hinges:** two 2 in pieces of piano hinge per half, four in all, leaves glued into 3/8 in deep saw cuts on the center line.
5. **Mount:** two 1/8 in 316 locating pins in each root plate, into the boom. Set both halves on, drill four 1/4 in holes through both plates, 1.25 in each side of center; spacers between the plates, cut 1/32 in shorter than the boom is deep, so the plates clamp the boom; bolts with washers and nyloc nuts.
6. **Spring and horn:** on the axle in the gap: upper end plate, spring, horn, thin washer, lower end plate; glue the axle into both end plates.
7. **Pushrod:** as before, threaded 1/4-28 both ends; the flat tab with two pins at the actuator.

NUMBERS

- **Bending at the tail's root** (worked out): on top, the push acts 14.4 in above the boom's center; centered, each half takes half the push at 7.5 in, so each root bends about 3.8 times less, and the boom is not twisted.
- **Loads** (the boom root calc of Oct 28): storm gust about 15 lb on the tail; knockdown guess about 113 lb; the boom root's weakest spot gives at about 162 lb (inferred from that calc, now no link lets go first).
- **Tail joint at 162 lb:** each far bolt pulls about 152 lb against about 2,385 for a 1/4-20 316 bolt (worked out); the joint is far stronger than the boom root, so it is not the weak point.
- **Horn 0.75 in:** about 5 lb on the pushrod at the spring's setting (4.0 in-lb), 8 lb at full give; the rod moves about 0.7 in for 30 deg each way, of the actuator's 2 in.
- **Pushrod bend:** about 21 thousand psi with the rod's room in the PEX (25 without), well under 316's about 35.
- **Still to add:** a light one-way preload, so the actuator's up to 0.047 in of built-in play (about 1.8 deg each way at this horn) never lets the flaps wobble (Wing Construction Guide Stage 12).
- **Area:** 2 × 13.5 × 11 in, the Stage 12 tail's 2.0 sq ft; the 1-1/2 in gap costs a little steering power (a guess: a few percent).

PARTS (AMAZON FIRST)

- Piano hinge, 316, four 2 in pieces: Amazon B09J23T1VM.
- Bolts: four 1/4-20 × 2 in 316, washers, nyloc nuts: the 1/4-20 kit on hand if it is 316.
- Spacers: 3/8 in 316 tube, 0.035 in wall, four short pieces (part to pick).
- Pins, 1/8 × 1 in 316 (locating pins and the tab pin): Amazon B00R1UV7QS.
- Axle, 3/8 in 316 rod: Amazon B076CMP5J5. No collar now: the lower end plate holds the horn.
- 1/4-28 die with its handle: Amazon B0FS1RN49Q.
- McMaster: spring 9287K47; two clevises 6071K47; 1/4 in 316 rod, 6 ft, cold drawn (part to pick).
- G10: 1/4 in on hand (end plates, horn); 1/8 in for the root plates; 4 mm for the actuator tab.

Prices not checked. Replaces the on-top tail of Tail_Assembly_2026-10-29 if Mike says yes.