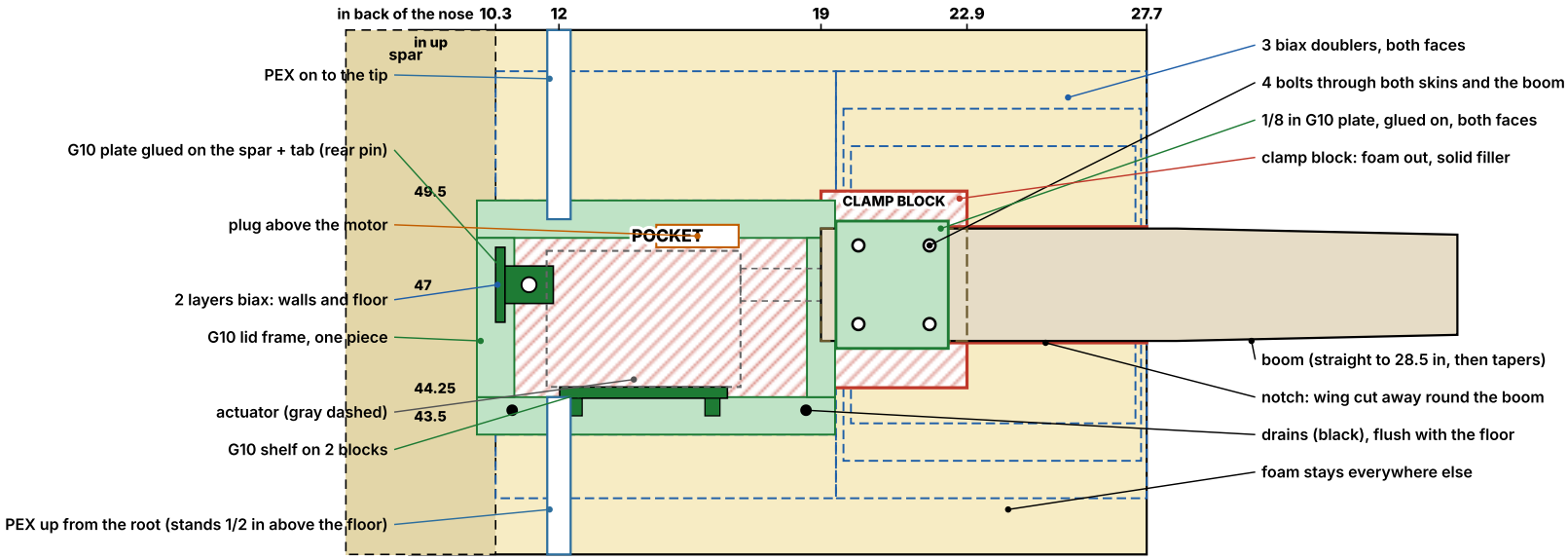
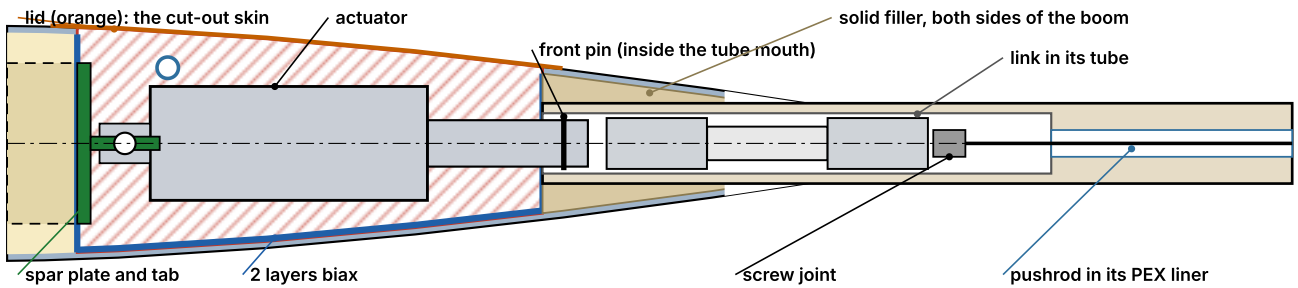
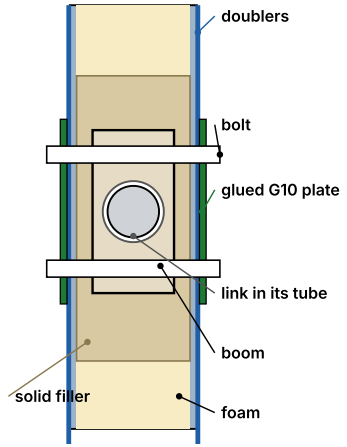
cut the foam out (red stripes) · biax glass · G10 · solid filler (thickened epoxy) · foam that stays · lid



FROM ABOVE: CUT AT 47 IN UP (THE ROD LINE), ACTUATOR AT MID-STROKE

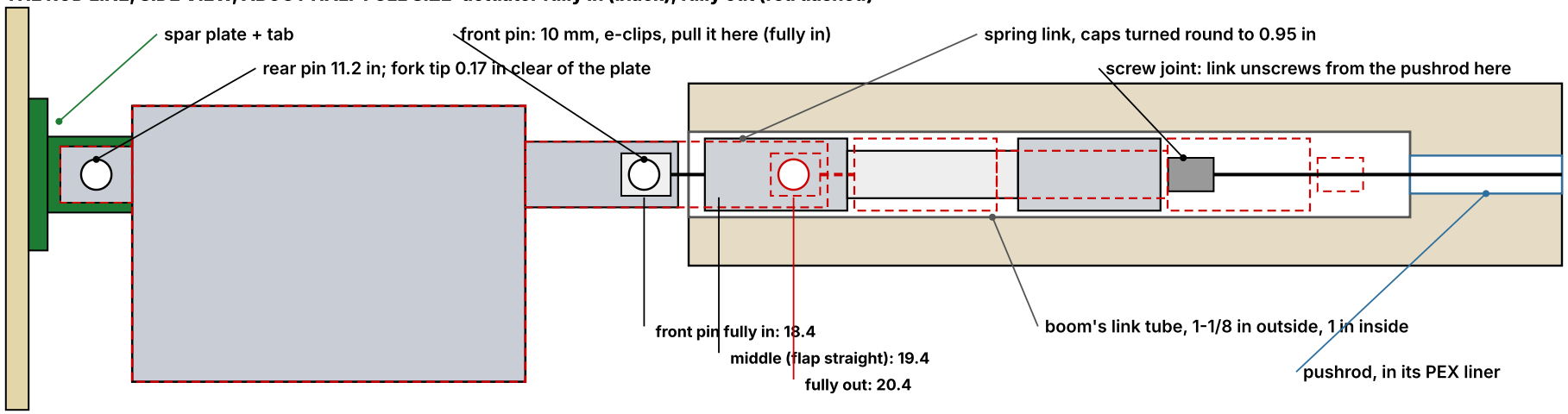


END: CUT AT 21 IN BACK, LOOKING AFT



HOW THE ACTUATOR, LINK AND BOOM FIT TOGETHER inches

THE ROD LINE, SIDE VIEW, ABOUT HALF FULL SIZE: actuator fully in (black), fully out (red dashed)



WHAT MOVES, AND WHAT HOLDS IT

- **Actuator:** held only by its two 10 mm pins. The rear pin goes through a G10 tab glued to a G10 plate on the spar's back face; the tab is sanded to about 0.22 in where the actuator's rear fork goes over it, since the fork's slot is 0.236 in (Thomson catalog, from the second review). The front pin joins it to a flat G10 or stainless tongue, also about 0.22 in thick, on the spring link's front stud, since the actuator's front end is a fork too. The shelf under the motor is only a padded rest, and the two ties are snug, not tight, so nothing pushes the actuator rod sideways.
- **Spring link** (Trim Guide sec 6): rides inside a tube built into the boom's front end. Its caps are turned round to 0.95 in so it slides in the 1 in tube. Its rod stops short inside, so it never hits the front stud when the link gives.
- **Screw joint** just behind the link: a 1/4-28 coupling nut joins the link to the pushrod. It stays inside the tube at full stroke. The nut is locked on the link's rod (red thread locker); the pushrod screws into it snug, with anti-seize, no locker. It cannot work loose, because neither side can turn: the actuator holds the front, the clevis on the tab horn holds the back. The pushrod is about 47 in long, so one 48 in rod covers it.
- **Pushrod:** runs in a 3/8 PEX liner in the boom to the tail flap. It comes out with the boom, on the bench.

WHY THE FRONT PIN GOES INTO THE TUBE

The flap is set straight with the actuator at mid-stroke (Trim Guide sec 7). There the front pin is 19.4 in back, 0.4 in inside the boom's front end. The actuator's front end is a 0.87 in round tube with a slot, and the pin with its e-clips is a little wider than that. So the boom's solid front is bored out to 1-1/4 in for its first 2 in, the farthest the fork ever reaches inside (1.8 in at full stroke). That gives the pin and fork about 0.19 in a side, with no need to try parts for fit. Behind that the link rides in the 1 in tube.

TAKING IT APART

1. Lid off. Run the actuator fully in: the front pin is then 18.4 in back, in the open. Pull it.
2. Unplug the actuator, cut the two ties, pull the rear pin, tilt the actuator out motor end first.
3. If the actuator is dead part way out: pull the rear pin, take out the four boom bolts, slide the boom back 2 in, then pull the front pin.
4. Boom: four bolts out, slide it straight back out of its socket. The tail, link and pushrod come with it.
5. Link and pushrod, on the bench: pull the clevis pin at the tab horn and draw the link out of the boom's front end; the pushrod follows it out. Hold the coupling nut with a wrench and turn the pushrod by its clevis to unscrew it. Leave the clevis set on the rod, so the flap's straight setting comes back by itself.
6. Back together: bed the bolts in sealant again, 130 inch-pounds, new paint marks, sealant bead round the boom at the notch.

Built in for good: the link tube and the PEX liner inside the boom (a new boom replaces them), the spar plate and tab, the motor shelf, the lid frame and its nuts, and the two PEX tubes in the wing. The cables in the PEX tubes pull out and in. A stripped lid nut is ground off and a new one glued on from inside.

BOOM-ROOT POCKET: STEPS AND PARTS inches

BUILD STEPS

When: between the guide's Stage 8 (far face skinned) and Stage 9 (boom face skinned). **Before you start:** build the boom (page 4), since it molds its own socket. **Leave out** the guide's Stage 10 boom-root solid zone, its doublers and its metal clamping plate: this replaces them.

1. **Mark** the pocket (10.3 to 19 in back, 43.5 to 48.75 in up), the clamp block (19 to 22.9 in back, 44.25 to 49.5 in up) and the notch (22.4 in back to the back edge, 45.45 to 48.55 in up). Put the pocket's top and bottom and the block's top and bottom on rib glue lines (these heights assume the ribs start at the root; shift to the nearest lines). Mark the lid's edge outside the pocket too, so you can find it after skinning.
2. **Cut the foam out** of the pocket and the clamp block, right down to the far skin. Cut the notch all the way through, both faces. The cut-out foam is not reused.
3. **PEX:** lay the two 1/2 in PEX tubes 12 in back, with pull strings. Where they meet the pocket, set them 1/4 in deeper so the lid frame passes over. The bottom one ends 1/2 in above the pocket floor. Epoxy and sealants grip PEX poorly: scuff it and pass a propane flame over it quickly before gluing; it is held mainly by being buried.
4. **Glass** the pocket's floor and four walls with 2 layers of biax, lapped 1 in onto the face. Glass the notch's cut edges with 1 layer. Use slow hardener.
5. **Recess the face** round the pocket by about 0.2 in, so the lid frame and the glass laps sit flush. Glue in the one-piece G10 lid frame (front, top and bottom 1 in wide, back 3/4 in), half over the opening. Glue #10-24 316 nuts under its inner edge, top, bottom and front.
6. **Bed the boom:** wrap the boom's front 9 in in packing tape and wax it. Line it up with a straight board to its mark at the tail position (0.01 in off here is 0.15 in at the tail). Clamp the boom down in the jig: it floats in wet epoxy. Fill the clamp block round it with epoxy thickened with 406, using slow hardener in two or three pours, or pack it with G10 offcuts glued in; check the line again after the first pour. Let it cure, slide the boom out, strip the tape.
7. **Set the actuator parts** after bedding, so they line up with the boom: put the boom back in its socket, push a straight 1 in rod through its tube and out the front, and use it to place the spar plate and tab (rear pin 11.2 in back, 47 in up) and the shelf on its two blocks. Glue, and tape the spar plate to the spar with biax. Do not drill the spar.
8. **Plug and skin:** lay a thin foam sheet on spacers over the pocket as a plug, with gasket-thick tape on the frame's inner half. Tape over the socket mouth. Skin the boom face.
9. **Doublers:** 3 layers of biax on both faces over the bolt spot, from 19.4 in back to the back edge: 11.4, 9.4 and 7.4 in tall, centered at 47 in up. Cut them round the notch, and keep them off the lid. Carry the first layer forward above and below the lid to the spar on the boom face, and over the whole area to the spar on the far face.
10. **Cut the lid out** along the marked edge, with 1/2 in round corners. Pull the plug.
11. **Drill** the four boom bolt holes through the wing, using the boom's own pre-drilled holes as the guide, boom in place. Each hole is 0.3 in from the link tube: keep the drill straight.
12. **Glue the 1/8 in G10 plates** (holes pre-drilled) on both faces over the bolts, each on a wedge of thickened epoxy so its outer face is square to the bolts (the wing face slopes about 7-1/2 degrees there).
13. **Drains:** two 3/16 in holes through the far skin, flush with the pocket floor at both ends, and a small notch at the lid's lower back corner.
14. **Bolt up** as the guide says: Belleville under each nylon-insert nut, blue thread locker, about 130 inch-pounds, paint witness mark. Bed the bolts in sealant; run a sealant bead round the boom at the notch.

G10 PIECES

PIECE	SIZE	WHERE
Spar plate	1/4 × 2 × 3 in	glued on the spar's back face
Rear tab	1/4 × 1 × 1.3 in, 10 mm hole, sanded to about 0.22 in thick where the fork goes	in a slot in the spar plate; the actuator's rear fork (0.236 in slot) goes over it
Front tongue	about 0.22 in thick, 10 mm hole (G10 or stainless)	on the spring link's front stud, locked on with red thread locker; inside the actuator's front fork
Motor shelf	1/4 × 4.5 x about 3 in, on two 1/4 x 3/8 in blocks, 1/16 in rubber pad on top	across the pocket under the motor
Lid frame	1/8 in, cut as one piece: front, top and bottom 1 in wide, back 3/4 in	round the pocket edge
Bolt plates	1/8 × 3 × 3.4 in, two	glued on each face over the four bolts

GLASS AND FILLER

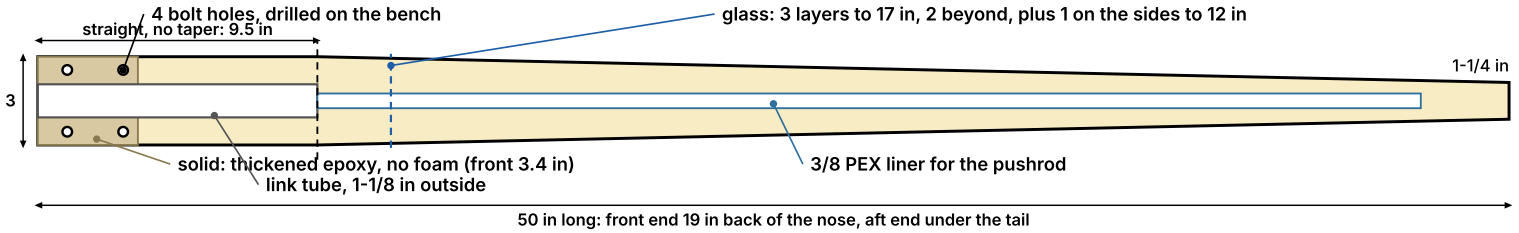
- Pocket floor and walls: 2 layers biax. Notch edges: 1 layer. Lid: 1 more layer inside the cut-out skin.
- Doublers: 3 layers, both faces (step 9).
- Clamp block: epoxy thickened with 406, slow hardener, about 0.6 lb (a guess).

HARDWARE

- Four 5/16-18 316 bolts: two about 3-3/4 in (front pair), two about 3-1/4 in, with Belleville washers, flat washers and nylon-insert nuts.
- About 10 #10-24 316 screws and nuts for the lid; gasket tape.
- Front and rear pins: 10 mm stainless, short, with e-clips.
- Plug on the actuator's lead (it comes with bare wires): a 4-pin Deutsch DTM pair, DTM04-4P and DTM06-4S, with wedgelocks (MUYI DTM kit), and size 20 stamped contacts crimped with the JRready crimper kit, which comes with 50 pairs; prices not checked. It sits above the motor, wherever the lead reaches; grease it and boot it.
- Two coated 316 ties round the motor and shelf, snug.
- One 1/4 in 316 rod, 48 in, for the pushrod; a 1/4-28 316 coupling nut for the screw joint; anti-seize.

LIGHTNING AND THE GUIDES

The guide's lightning jumper went to a metal clamping plate that is gone. Land it on the actuator's rear pin with a ring terminal: the metal pins and the link carry it to the rod. The Trim Guide's anti-rattle spring now runs from the actuator's front end to an eye on the pocket's back wall below the boom.



BUILDING THE BOOM

1. **Core:** two strips of the wing's 3/4 in Divinycell H80, 50 in long, glued together and planed to 1.16 in wide. Finished with its glass, the boom is about 1-1/2 in wide: the exact number depends on the cloth, and it does not matter, because the socket is molded on the boom itself. It must be under 1.65 in so it fits inside the wing's foam at 22.4 in.
2. **Grooves:** before gluing, rout a half-round groove down the middle of each strip's inside face for the link tube (front 9.5 in) and the 3/8 PEX liner (the rest). Glue the tube and PEX in with the strips, ends plugged.
3. **Side shape:** 2.74 in deep (3 in with glass) and dead straight for the front 9.5 in, then a straight taper to 1-1/4 in at the tail end. Straight at the front so it slides out of its socket.
4. **Solid front:** cut the foam away round the tube for the front 3.4 in and fill with 406-thickened epoxy, slow hardener. Then bore the front 2 in out to 1-1/4 in, for the actuator's front fork and pin.
5. **Round the long edges** to about 1/4 in.
6. **Glass:** threads running along and across the boom, not at 45 degrees. 3 layers over the front 17 in, 2 beyond, plus 1 more on both sides for the first 12 in. Glass over the front face, leaving the tube open.
7. **Drill the four bolt holes on the bench** with a drill press: 5/16 in, at 1.0 and 2.9 in from the front end, 0.45 in in from the top and bottom.
8. **Tail end** as the guide's Stage 12. Weigh it. Guess: about 5 lb.

STRENGTH CHECK (WORKED OUT; MATERIAL STRENGTHS ARE TYPICAL)

PART	STORM GUST, 15 LB AT THE TAIL	BREAKAWAY, 60 LB	60 LB X 1.5	STRENGTH
Boom just behind the wing	900 psi	3,500 psi	5,300 psi	about 35,000 psi
Boom pressing on its socket	120 psi	470 psi	710 psi	filler 8,000+ psi; foam 200, so the socket is solid
Each bolt, counting no clamp friction at all	about 110 lb	about 450 lb	about 670 lb	about 3,900 lb
Skin round a bolt hole, no friction	950 psi	3,800 psi	5,700 psi	about 30,000 psi
Bolt tearing out of the boom toward its top or bottom edge (0.45 in)	up and down at 5 g: about 160 lb each			about 2,600 lb
Skin, doublers and glued plate pushed out between the bolts	2,800 psi	11,100 psi	16,700 psi	about 30,000 psi
Clamp pressing on the filler	816 psi	816 psi	816 psi	8,000+ psi
Twist carried down the wing skins	4 lb/in	17 lb/in	25 lb/in	tiny for the skin

The boom is good for about 25,700 in-lb, about 6-1/2 times the worst case. Nothing in the table counts on clamp friction, since bolt squeeze can't be measured once it is built; any friction is extra. The weakest spot is the skin over the boom, pushed out between the bolts, at about 1.8 times the worst case. The near skin's pull runs toward the lid hole 1 in ahead of the front bolts: about 2,300 psi beside the hole, about 7,000 at its corners (inferred), and the round corners and the doubler carried forward to the spar take care of it. Full working: Reference/Boom_Root_Strength_Calc_2026-10-28.md.