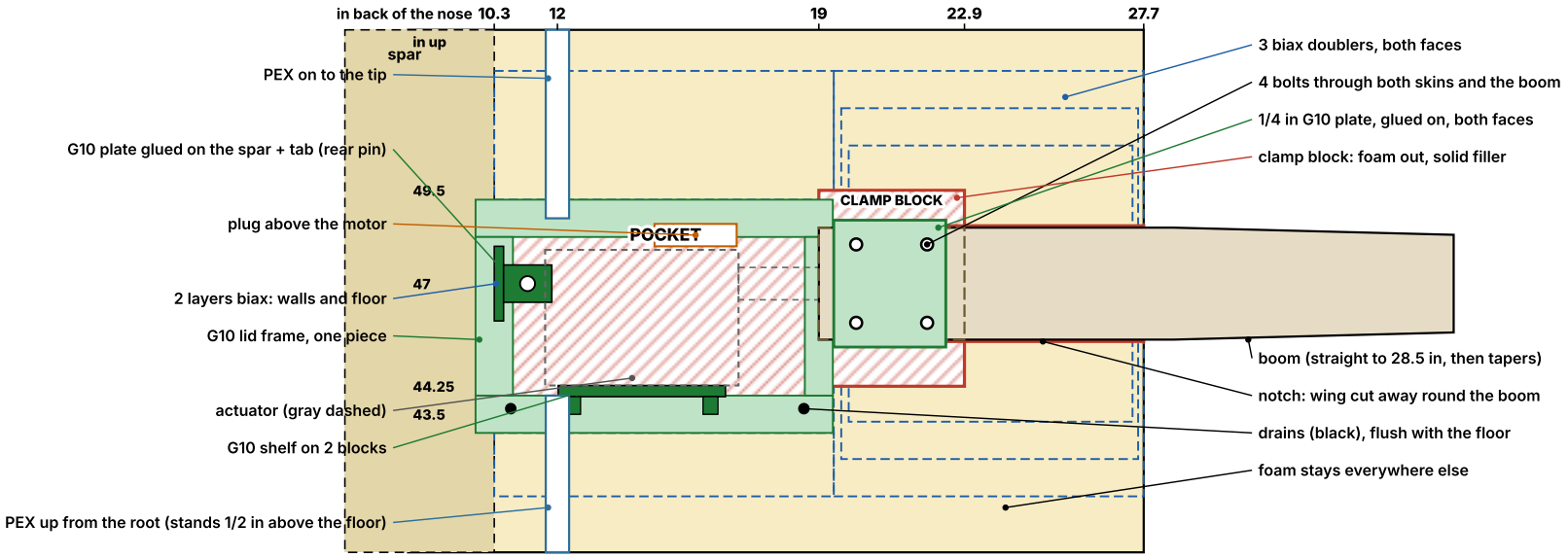
BOOM-ROOT POCKET: WHAT TO CUT, GLASS AND G10

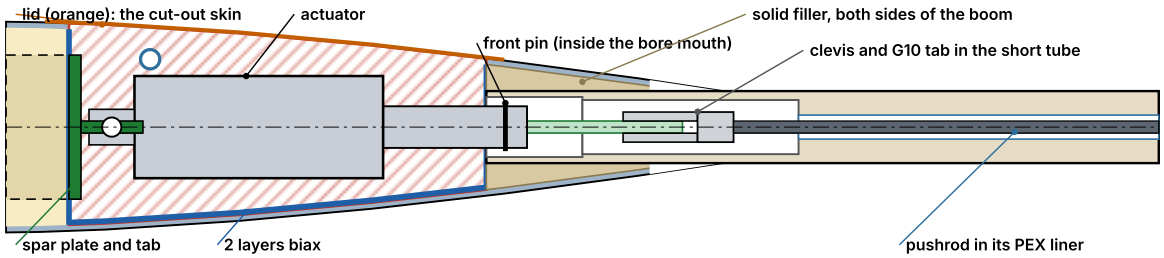
boom face of the wing · inches

Nov 2, 2026

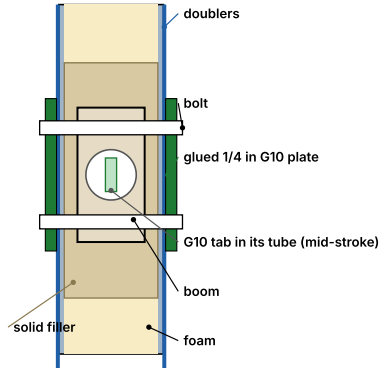
cut the foam out (red stripes) · biax glass · G10 · solid filler (thickened epoxy) · foam that stays · lid



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

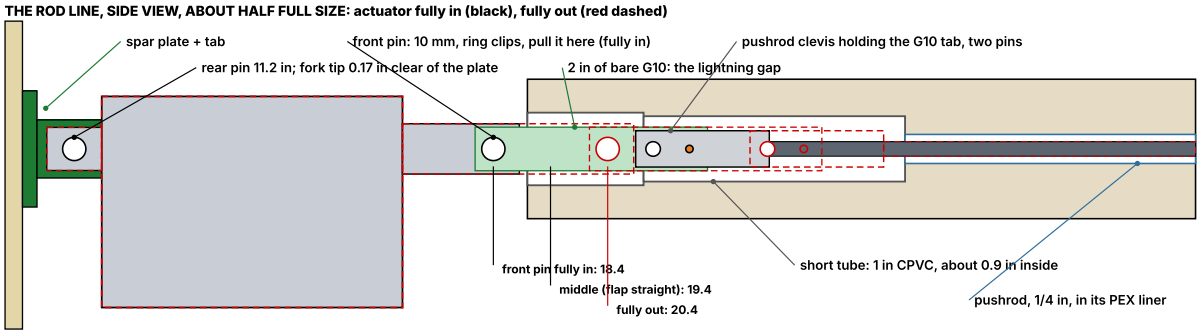


END: CUT AT 21 IN BACK, LOOKING AFT



HOW THE ACTUATOR, PUSHROD AND BOOM FIT TOGETHER inches

Nov 2, 2026

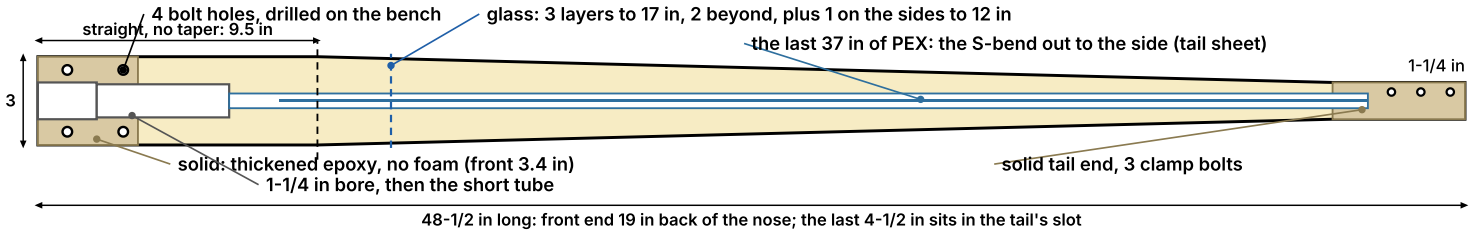


HOW IT WORKS

- **Actuator** hangs on its two 10 mm pins. Rear pin: a G10 tab on a G10 plate glued to the spar. The motor rests on a padded shelf, two snug ties.
- **Front end:** the pushrod's clevis holds a 1/4 in G10 tab with two pins (its own pin and a 10-32 screw). The tab goes into the actuator's fork on the 10 mm front pin.
- **Lightning gap:** 2 in of bare G10 between clevis and fork. Nothing metal across it. Keep it clean.
- **Pushrod:** 1/4 in 316, about 46-3/4 in, in a 3/8 PEX liner inside the boom. Bare jam nut at the back.
- **Flap straight** = actuator at mid-stroke. The front pin then sits 0.4 in inside the boom's bored front (1-1/4 in, 2 in deep).
- **Soft limits:** 0.875 in of rod each way = flap 30 deg. Full travel is only about 34 deg; the flap clears 40.
- **Give-way spring** is at the flap (tail sheet). **Lightning wires:** lightning sheet.

TAKING IT APART

1. Lid off. Run the actuator to its retract limit. One ring clip off; pull the front pin.
2. Unplug. Cut the two ties. Pull the rear pin. Tilt the actuator out, motor end first.
3. Actuator dead mid-stroke? Pull the rear pin, undo the lightning splice, 4 boom bolts out, slide the boom back 2 in, pull the front pin.
4. Boom off: undo the splice, 4 bolts out, slide it straight back. Tail and pushrod come with it.
5. Pushrod out (bench): pull the horn's clevis pin, unscrew that clevis counting turns, draw the rod out the boom's front.
6. Back together: bolts in sealant, 130 in-lb, new paint marks, sealant bead at the notch.



BUILDING THE BOOM

When: before the pocket.

1. **Core:** two 3/4 in H80 strips, 48-1/2 in long. Groove them first (step 2), then glue and plane to 1.16 in wide. Finished, it must stay under 1.65 in wide.
2. **Grooves:** half-round, down the middle of each inside face: short tube 2 to 6-1/2 in from the front, then the 3/8 PEX liner. Last 37 in: a smooth S out to the far-face side, ending about 1-5/8 in off center, a little low. Glue tube and PEX in, ends plugged.
3. **Shape:** 2.74 in deep and straight for the front 9.5 in. Taper to 1-1/4 in. Last 4-1/2 in straight at 1-1/4 in.
4. **Solid ends:** foam out of the front 3.4 in and the last 4-1/2 in. Fill with 406 epoxy, no voids.
5. **Round** the long edges to 1/4 in.
6. **Glass** (threads along and across, not 45 deg): 3 layers on the front 17 in, 2 beyond, 1 more on the sides to 12 in. Glass over the PEX exit and the front face.
7. **Bore** the front 2 in out to 1-1/4 in, on the tube's center line. Chamfer the tube mouth.
8. **Drill** 4 bolt holes, 5/16 in, drill press: 1.0 and 2.9 in from the front, 0.45 in in from top and bottom.
9. **Tail end:** 3 clamp bolt holes, drilled with the tail on (tail sheet). Weigh it: about 5 lb (a guess).

STRENGTH CHECK (WORKED OUT; MATERIAL STRENGTHS ARE TYPICAL)

PART	STORM GUST, 15 LB AT THE TAIL	BROADSIDE CAT 3 GUST, ABOUT 160 LB (AN ESTIMATE)	THAT X 1.5, 240 LB	STRENGTH
Boom just behind the wing	900 psi	9,400 psi	14,200 psi	about 35,000 psi
Boom pressing on its socket	120 psi	1,260 psi	1,900 psi	filler 8,000+ psi; foam 200, so the socket is solid
Each bolt, counting no clamp friction at all	about 110 lb	about 1,200 lb	about 1,800 lb	about 3,900 lb
Skin round a bolt hole, no friction (0.5 in stack with the 1/4 in plate)	720 psi	7,600 psi	11,500 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 the 1/4 in glued plate pushed out between the bolts	1,600 psi	16,800 psi	25,200 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	45 lb/in	68 lb/in	small for the skin

Biggest load: a Cat 3 gust (gusts about 160 mph, a guess) hitting the feathered tail broadside. Weakest spot: the skin between the bolts, good for about 285 lb at the tail, 1.8 times that gust. Keep the lid's 1/2 in round corners and run the first doubler layer to the spar. Full working: Reference/Boom_Root_Strength_Calc_2026-10-28.

BOOM-ROOT POCKET: STEPS AND PARTS inches

Nov 2, 2026

BUILD STEPS

When: between the guide's Stage 8 and Stage 9. Build the boom first: it molds its own socket. Skip the guide's Stage 10 root zone, doublers and metal plate.

1. **Mark** the pocket (10.3 to 19 in back, 43.5 to 48.75 in up), clamp block (19 to 22.9 back, 44.25 to 49.5 up) and notch (22.4 back to the edge, 45.45 to 48.55 up). Move top and bottom edges to the nearest rib glue lines. Mark the lid edge too.
2. **Cut the foam out** of the pocket and clamp block, down to the far skin. Cut the notch through both faces.
3. **PEX:** lay both 1/2 in tubes, 12 in back, with pull strings. Root tube: cut long; it runs on through the mast plate. Pull both cables and the 8 AWG ground wire in before gluing (1 ft spare in the pocket, 2 ft below the plate). Scuff and flame the PEX first. Ends 1/4 in deep at the pocket; the bottom one 1/2 in above the floor. Both ends of the root tube stay open.
4. **Glass** the pocket floor and walls: 2 layers biax, 1 in lap onto the face. Notch edges: 1 layer.
5. **Lid frame:** recess the face 0.2 in round the pocket. Glue in the one-piece G10 frame, half over the opening. Glue #10-24 316 nuts under its inner edge.
6. **Bed the boom:** tape and wax its front 9 in. Line it up with a straight board (0.01 in off here is 0.15 in at the tail). Clamp it in the jig. Fill the clamp block with 406 epoxy in 2 or 3 pours. Recheck after the first. Cure, slide out, strip the tape.
7. **Actuator parts:** boom back in. A straight 5/16 in rod down its liner places the spar plate and tab (rear pin 11.2 in back, 47 in up) and the shelf. Glue. Tape the spar plate on with biax. Do not drill the spar.
8. **Plug and skin:** thin foam on spacers over the pocket, tape on the frame's inner half. Tape the socket mouth. Skin the boom face.
9. **Doublers:** 3 layers biax, both faces, 19.4 in back to the back edge: 11.4, 9.4, 7.4 in tall, centered 47 in up. Round the notch, off the lid. First layer runs forward to the spar.
10. **Cut the lid out**, 1/2 in round corners. Pull the plug.
11. **Drill** the 4 bolt holes through the wing, boom in place, through its holes. Keep the drill straight: 0.3 in from the bore.
12. **Bolt plates:** glue the 1/4 in G10 plates on epoxy wedges, square to the bolts (the face slopes 7-1/2 deg). Epoxy fillet round the edges.
13. **Drains:** two 3/16 in holes in the far skin, flush with the floor, both ends. Small notch at the lid's lower back corner.
14. **Bolt up:** Belleville under each nyloc, blue thread locker, 130 in-lb, paint mark. Bolts in sealant; sealant bead at the notch.

G10 PIECES (1/4 IN UNLESS MARKED)

PIECE	SIZE
Spar plate	2 × 3 in, on the spar's back face
Rear tab	1 × 1.3 in, 10 mm hole, sanded to 0.22 in where the fork goes
Flat tab	3/4 × 4 in: see the actuator tab pages
Motor shelf	4.5 × 3 in, on two 1/4 × 3/8 in blocks, 1/16 in rubber on top
Lid frame	1/8 in, one piece: 1 in wide, back 3/4 in
Bolt plates	3 × 3.4 in, one on each face

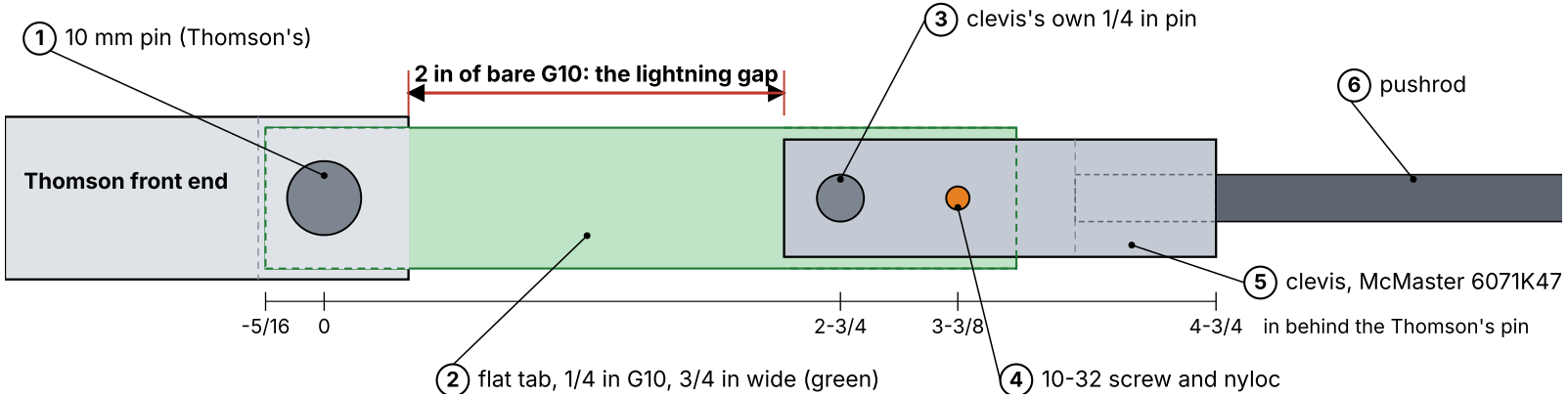
HARDWARE

- Four 5/16-18 × 4-1/4 in 316 bolts, Bellevilles, flat washers, nylocs.
- About 10 #10-24 316 screws and nuts for the lid; gasket tape.
- Rear pin McMaster 93890A742 (26 mm or more between grooves). Front pin 93890A741 (24 mm), ends cut to 1/16 in past the grooves.
- Plug: DTM 4-pin kit and crimper. It sits above the motor; grease and boot it.
- Two coated 316 ties, snug.
- Tef-Gel on both 10 mm pins and every stainless thread.
- Pushrod: 89325K113 cut to 54 in, trimmed to about 46-3/4 in; two 6071K47 clevises; 10-32 × 1 in screw and nyloc; bare 1/4-28 jam nut.
- Clamp block filler: about 0.6 lb of 406 epoxy (a guess).

PUSHROD TO THE THOMSON: THE G10 TAB WITH THE 2 IN GAP inches

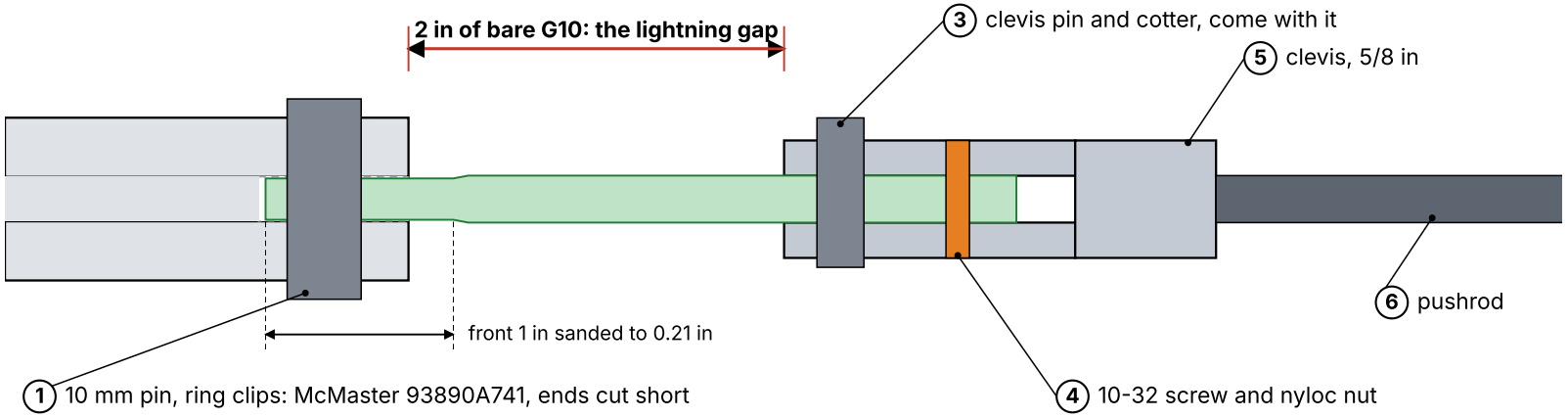
What it is: the Thomson's front end is a fork made for a flat plate. The pushrod's clevis (the U-shaped end screwed onto the rod) holds a flat G10 tab (its own pin plus a 10-32 screw). The tab goes into the Thomson's fork on its one 10 mm pin. Between the two metal ends is **2 in of bare G10**.

LOOKING ALONG THE PINS (THE TAB'S FLAT FACE)



FROM ABOVE (THE TAB ON EDGE)

Thomson front end: 0.87 in round, slot 0.236 in



THE NUMBERS, ALL MEASURED BACK FROM THE CENTER OF THE THOMSON'S 10 MM PIN

WHAT	WHERE
Tab's front end	5/16 in ahead of the 10 mm pin
Thomson fork's tips	0.45 in behind (Thomson catalog)
Clevis's jaw tips	2-1/2 in behind: the 2 in gap is between these two
Clevis's 1/4 in pin	about 2-3/4 in behind
10-32 screw	5/8 in behind the clevis pin, about 3-3/8 in
Tab's back end	5/16 in behind the screw; the tab is 4 in long
Clevis's back end (pushrod starts)	2 in behind the clevis pin, about 4-3/4 in

THE G10 TAB: MAKE IT, FIT IT, KEEP IT CLEAN inches

Nov 2, 2026

MAKE THE TAB

1. Cut **1/4 in G10** (on hand) to **3/4 × 4 in**. Stick the template (below) on.
2. Drill **10 mm** (25/64 in) on the front cross. Round the front end around the hole.
3. **Sand the front 1 in to 0.21 in** thick, both faces. One thin coat of epoxy. It should slide into the fork (0.236 in) with a little play.
4. Slide the back end into the clevis. **Jaw tips 2-1/2 in** behind the 10 mm hole. Drill 1/4 in through the clevis pin hole.
5. Clevis pin in. Drill **3/16 in** through clevis and tab, 5/8 in behind it. **10-32 × 1 in screw** and nyloc. No glue.
6. Pin head to one side, cotter legs flat. File the clevis corners if it rubs in the tube.
7. Round the corners. Wipe with acetone.

FIT IT

1. On the bench: pushrod into the boom's front, back end first.
2. Lid off. Run the actuator to its retract limit. Line the tab's 10 mm hole up with the fork.
3. 10 mm pin in with Tef-Gel. Ring clips on both ends.
4. Look: **2 in** from the clevis jaw to the fork tips, nothing metal between.
5. Back to mid-stroke: flap straight.

KEEP THE GAP CLEAN

- **Nothing across the 2 in:** no wire, screw, tape, paint or grease.
- At each refit, wipe it. Burnt or cracked? Make a new tab.

WHY

- **G10:** keeps the pushrod's metal off the actuator's. A strike down the pushrod must jump 2 in; the wire outside the boom is the easier path.
- **Second fastener** (the screw) stops the tab swinging in the clevis.
- **Strong enough:** the actuator pushes 56 lb at most; the tab holds about 2,000 lb (worked out).

PARTS

- 1/4 in G10 (on hand).
- Clevis McMaster 6071K47, with its pin and cotter.
- 10-32 × 1 in 316 screw and nyloc.
- 10 mm pin 93890A741, ends cut to 1/16 in past the grooves.

FULL-SIZE TEMPLATE: print at 100 percent, cut out, stick it on the G10 blank, drill the 10 mm hole on the cross

