

WHEELER TECHNOLOGY INC.

March 15, 1991

WTI now has information which resolves the issue of Michael Betts' tail problem. Mr. Betts states in his letter to builders dated March 5, 1991, "this is the third EXPRESS with a problem and like 210EX could well have ended in fatalities. Surely it is time for WTI to stop gambling with people's lives..." His implication is that all three have had design problems. In fact there is no evidence of design or construction problems in either factory crash, (nor that WTI has ever gambled with anyone's lives), but there is now clear evidence that Mr. Betts has not been forthcoming regarding his tail "problem", and while he did not crash, he certainly would have had he continued flying. He has attempted to discredit WTI with his problem, but not only did he fail to produce even photographic evidence, he destroyed the tail before notifying the factory, and refused to allow other builders to examine it. In the same letter he announced that "Tooling and moulds are under construction now...and if you order before April 15, you will get preferential pricing.", so his real agenda is no longer hidden.

Mr. Betts has made a number of perplexing statements about his plane since he started flying it. He reported in the December issue of the EXPRESS BUILDERS EXCHANGE Newsletter that he put 12 pounds of lead ballast behind station 162 and was flying with an additional 50 pounds of ballast in the back seat. In a video of his plane, the battery (27 pounds) was located behind the pilot's seat which yields a total of 89 pounds of ballast aft of the CG. N210 required no ballast at all and the battery was on the engine side of the firewall. In the same newsletter he correctly stated that the factory setting for the horizontal stabilizer angle of incidence was from -0.2 to -0.8 degrees, and that he had set his at minus 0.5 degrees. However he also reported insufficient up elevator trim. He used the trim system WTI supplied, and again, WTI did not have that problem in N210.

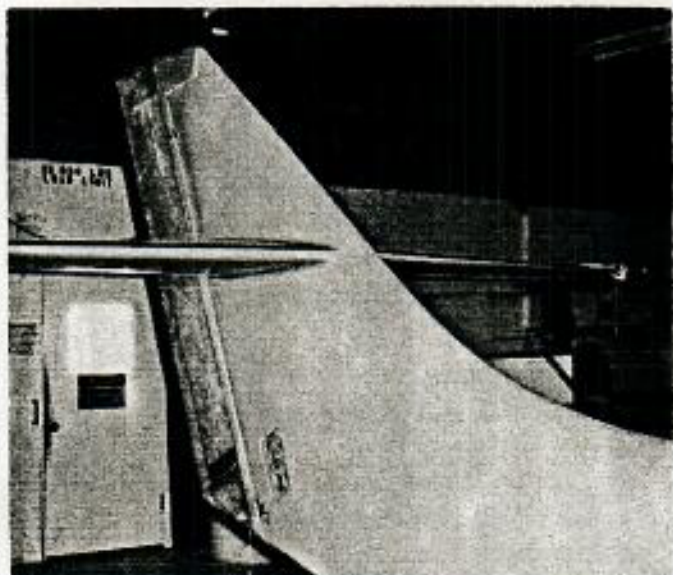
In the March 5 letter to EBU, Mr. Betts states that "During the construction of UPZ, I at no time deviated from instructions given to me by WTI employees...". However, in the tapes of the New Orleans meeting, he stated that when he received the tail parts they were "rough castings" that didn't fit well and that "we started cutting them apart." Mr. Betts also stated "This airplane's damn good.", but went on to say:

1. "We're landing fast, 30 degrees flaps, 100 MPH."
2. "If we try to stall it in, the minute the mains touch the nose gear falls hard."
3. "The slowest speed so far is 68 knots (78 MPH)."
4. "We used a builder's transit to set the angle of incidence of the tail at 1/2 degree negative."
(He may mean a builder's level.)
5. "Whether or not the angle of incidence needs changing, the plane performs really well."
6. "I am extremely confident in the structure that I have completed, having copied in most instances the Glasair technique with which I am familiar."

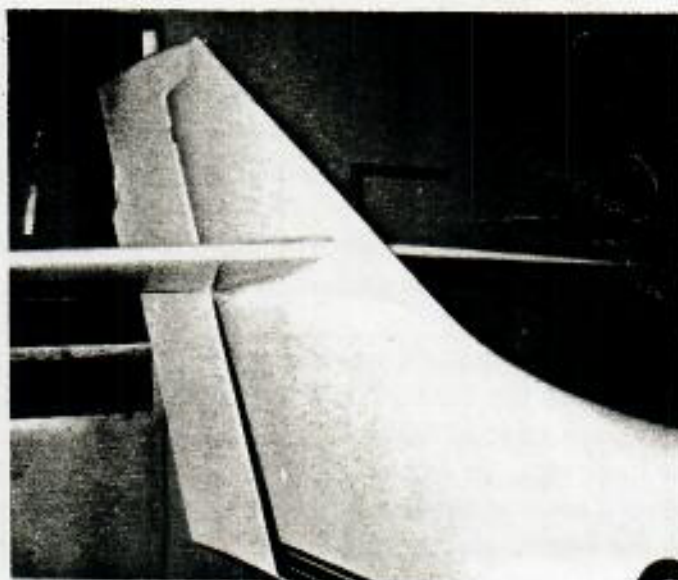
We have been puzzled by Mr. Betts' statements and actions, the abnormal aft ballast and high landing speeds of his plane and his refusal to WTI formally examine the purported problem. Thanks however, to photos supplied by several of our customers, we have now solved the puzzle.

In October 1990, one of our customers visited Mr. Betts and photographed his plane. After Mr. Betts' tail problem surfaced, he brought forth his photos and recalled his conversations with Mr. Betts. He

said that Mr. Betts had stated that he set the angle of incidence of the horizontal stabilizer at eight degrees and he complained that the fit of the tail section to the fuselage was very poor, so he had to do a lot of work to make it fit. One look at the photos confirms the positive angle, explains why he had difficulty fitting the tail to the fuselage, why he cut it off, why he needed ballast, the reason for his trim problem and high landing speeds, and even explains his "vibration in the empennage".



NEW FACTORY DEMO



C-GUPZ

Compare the angles of incidence of the horizontal stabilizers of C-GUPZ and the new factory demonstrator. These photos are nearly identical in size and perspective (GUPZ' rudder turned toward camera). The angle of C-GUPZ is clearly positive (leading edge rotated up) in comparison.

We have numerous other photos of Mr. Betts' plane from various sources including customers who attended the New Orleans builder's meeting and obtained side view photos of Mr. Betts' plane in flight. These photos and the video show a significant amount of "up" elevator in flight, but not clearly enough to measure. However, from those photos we could take other measurements of his tail. Because the stab and the fin are molded in one piece, the relationship between the stab angle of incidence and the trailing edge of the fin are fixed. The rudder trailing edge is parallel to the fin edge and easier to measure, so we used that edge. We measured the included angle between the trailing edge of the rudder and a reliable reference line, the lower edge of the windows. We also measured the angle between the rudder and the bottom of the fuselage as a check.

The correct angle between the window line and rudder edge is 115 degrees, which for reference, is what N210EX measures in the centerpiece photo in the AOPA magazine reprint. However, in the photos of Mr. Betts' plane, that angle measures approximately 118 degrees, which means Mr. Betts' horizontal stabilizer angle of incidence was in error approximately three degrees in the positive direction (leading edge up), which is a very significant deviation. As a check, the design angle between the fuselage bottom and the rudder edge is 58.5 degrees; Mr. Betts' plane measured 55.5 degrees, confirming the three degree change.

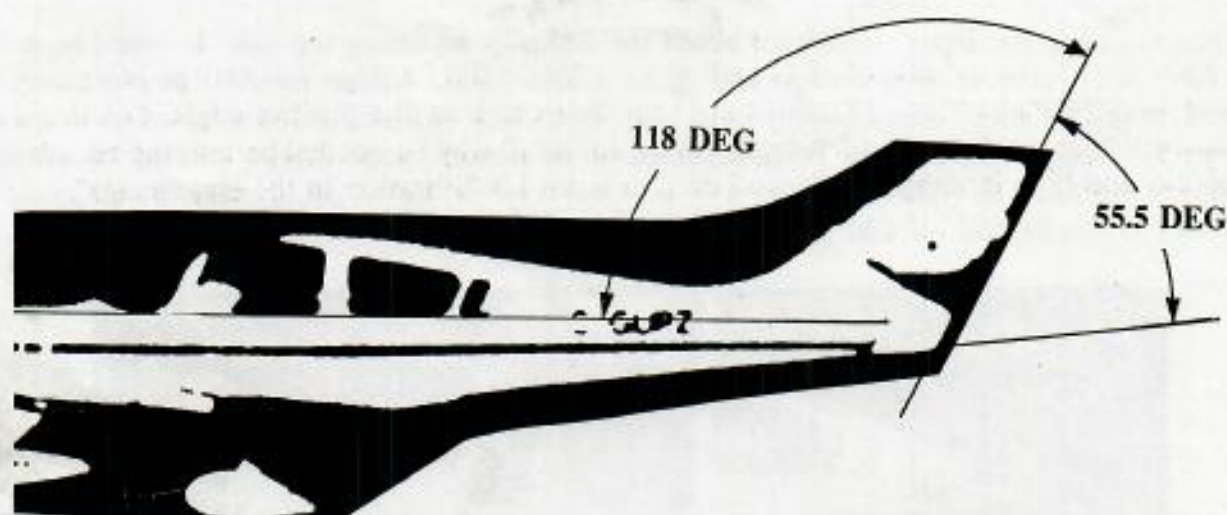


PHOTO COPIER-ENLARGED PHOTOGRAPH OF C-GUPZ

Three degrees may not sound like much, but over a length of 37 inches, (the root chord of the stab/elevator), the difference would be nearly two inches at the leading edge if the stab were rotated around the trailing edge. The deviation means Mr. Betts' horizontal stabilizer was not producing the down force it's designed to do, which is a dangerous condition possibly resulting in deep stall and a variety of other problems. It would require a major adjustment to the trim system to counter that force, and would limit elevator authority, requiring higher landing speeds. Obviously, ballast is a poor solution, working only in a narrow speed range, because the up force varies with speed, while the ballast remains fixed in weight and location. It also means that because of the angle of the stabilizer and the amount of up elevator required to trim the plane, turbulent flow would be very likely in some conditions, and possibly a stalled stabilizer or elevator. Either of those could and most probably would produce buffeting or "empennage vibration", but flutter is not dependant on the angle of incidence and is therefore unlikely.

The factory has now built three airplanes with their tails correctly installed, the last of which was done by Volunteers, and in fact, the Volunteer in charge of installing the tail on the demo now has his own tail completely (and correctly) installed. He states that the method is straightforward and he cannot understand how an error of three degrees is possible. He used exactly the same instructions as Mr. Betts, and all tail quads have been molded from exactly the same molds. The alignment method is similar to the wing jig setup. Saddles cut from templates are placed under the horizontal stabilizer skins and leveled with a good quality level on the lower edge which sets the angle of incidence. To give you an idea of the sensitivity when adjusting the saddles, rotating the saddle about its center point rather than an end causes the least movement of the leading and trailing edges per degree of rotation. A 1/2 degree rotation moves each edge nearly 3/8 of an inch. An error of three degrees would rotate the edges from nearly an inch to almost 2 inches, depending on the point of rotation. That much of an angle is obviously off the scale on a level, and easily seen, which of course is why the deviation on Mr. Betts plane stands out in the photos. Moreover, because the tail parts are joggled to the fuselage and self aligning, a misalignment of that magnitude is obvious in the poor fit of the parts.

Which then explains Mr. Betts' complaint about the difficulty of fitting the tail. It *would* be a lot of work to force that three degrees change and make it look good. Unfortunately, the old axiom "If it looks good, it will fly good" doesn't apply here. Mr. Betts lack of forthrightness leaves us in doubt as to whether his tail problem was a failed attempt at an unauthorized design change, or simply an extraordinary mistake. In either case, the only possible way Mr. Betts' could make his EXPRESS fly properly was to cut the tail off and try again.



In this photo of GUPZ, the positive stab angle is also quite evident. For reference, the visible bottom of the fuselage is a waterline, which of course means that it is at zero degrees. The door sill also makes an easy and known reference.

Mr. Betts concealed his error by removing the tail before notifying WTI of his "problem". He likewise notified EBU, but also without providing photographs and apparently without allowing examination of his "problem" or the airplane. EBU in its February newsletter stated that "The EBU, in the best interests of all builders, is assisting Mike analyze, re-engineer and test to ensure the new configuration is safe on his aircraft as well as our own." However, the EBU engineers also were apparently misled, and without physically examining the airplane or confirming the "vibration" in flight, their analysis was reduced to conjecture.

While WTI and its resources are available to assist builders in the analysis and solution of problems with both their kits and their airplanes, we cannot offer those services where someone has deviated significantly from the EXPRESS design. Because Mr. Betts has replaced the EXPRESS tail with one of his own design, WTI cannot now in any way be responsible for the flight characteristics of this aircraft: it is no longer a Wheeler EXPRESS. We have therefore notified the FAA the Canadian DOT, and the EAA of this fact as well as that of Mr. Betts' incorrect setting of his angle of incidence, lest they too are misled to believe that "unbonded foam" was the reason Mr. Betts replaced his tail.