

SHADOW HANG BRACKET

I promised earlier to talk about Shadow hang brackets, so here goes. I ought to say firstly, that I think the Shadow is a fantastic aircraft and that my hat comes off to David Cook, the designer, for bringing such a device into the world. I wrote earlier about simple design standards and their relevance, and I suppose this aircraft falls into the category of 'special and continual' inspections. Do not wait for the annual. Know your aircraft every last bit. Keep an eye on wear and do not let it become excessive.

Anyway, I digress. The bracket in the picture was sent in by another Inspector, David Bremner (thanks David). He is rebuilding a Shadow that suffered a heavy landing and required the boom to be changed; he noted the broken bracket and, quite naturally, put the break down to the heavy landing. David remembered that there is a PFA Airworthiness Information Leaflet (PFA/MOD/161/001) requiring a thorough check of this bracket at each Permit Renewal, so he took a closer look at it.



▲ Shadow hang bracket

I try my hardest to 'chase down' as much information as I can when confronted with a new Occurrence Report and, in this case, I was lucky enough to speak to all the relevant Shadow expertise. Special thanks go to Dave Cook, Danny Crosbie, Raymond Proost and of-course, David Bremner for their individual inputs. There is some evidence in this bracket that it had been subjected to loads that has caused work-hardening of the material's structure. It was suggested that the upgraded Crosbie undercarriage might be stiffer than the original CFM design and therefore less able to absorb landing loads, particularly in rough field operation. Investigations have revealed that the Crosbie type of undercarriage is not stiffer, but it is quite a bit stronger. It may be that this re-directs any failure point away from the undercarriage to some other point on the airframe, in this case the Hang bracket. Personally, and I think that most people with experience of the Shadow aircraft would agree, it's not a rough field aircraft.

However, after a very heavy landing (code for controlled crash!) in any type of aircraft it is essential to have a thorough check, and this includes taking panels off if necessary, to look around spar attachments. Do not forget things like engine mounts or exhaust supports. Pay particular attention to support structures holding heavy items. Things like fire extinguishers and batteries are often forgotten.

The above discussion does not address the work-hardening issue with this bracket and, in all truthfulness, I cannot say that we've actually cracked the problem.

If you've ever flown a Shadow you will know that cross-wind landings put a fairly large, i.e. noticeable, twisting moment through the airframe. David Cook told me that he was able to turn with a sort of 'lurching' manoeuvre through 360 degrees without using bank. To reduce this fuselage twist CFM introduced a mod that stabilised these two front hang brackets, it consisted of a plywood gusset set between the two brackets. It is possible that movement in this bracket over the years has caused the work hardening; one thing for sure is that it is this bracket that holds the body of the aircraft to the fuselage boom and I would not want it to break when I was flying the aircraft. The aircraft that the broken bracket came from had not been fitted with the recommended gusset.

I shall be writing to all LAA Shadow operators reminding them of the annual requirement to check this bracket and requiring them to incorporate CFM MetalFax Mod Number 9, which is the plywood gusset.