HANGER TALK

NEWSLETTER OF EAA CHAPTER 58

OGDEN, UTAH

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Chapter 58 meets monthly on the SECOND Thursday of the month. Meetings are held at 7:00pm at Ogden Hinkley Airport Terminal. Other meetings are held "on site" in members' hangers, shops, or garages. Onsite meeting locations are announced in the newsletter.

This Month's Meeting: "On Site"

Location: Ogden Airport Terminal Building

Subject: Metallurgy

Thursday, 13 October 2011 1900 HRS, 0200 Z, or 7:00 PM

PREZ SEZ:

Hi all,

I am sorry I am so late with notifying you about the meeting for tomorrow. Glen Gunther has offered to teach a class on metallurgy as it relates to aircraft. I have always wondered why we use 4130 steel when other steels are similar in properties. Why do we use 2024-T6 aluminum or 6061-T6? What cautions do we need to take when forming, bending,

welding, etc.? Maybe you have questions of your own and perhaps Glen will be able to help all of us be just a little smarter next time we are making or repairing a metal part.

Come join us tomorrow night at 7 pm in the usual place at the Ogden Airport terminal building.

See you tomorrow night!

Todd Parker, Prez

FROM THE EDITOR:

PLEASE NOTE THAT THE ADDRESS HAS CHANGED!!! The old address has been given to another party and so we got reassigned. The box number is C-3.

The official mailing address for the chapter is:

EAA CHAPTER 58
3815 AIRPORT ROAD
OGDEN, UTAH 84405

The location of the Chapter web is www.eaa58.org,

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Young Eagles

POC: Tom Holt (tom.holt@zionsbank.com) (801-497-0364)

Flights Through December 2010: 500

Flights In 2011: 93

Next Event: October

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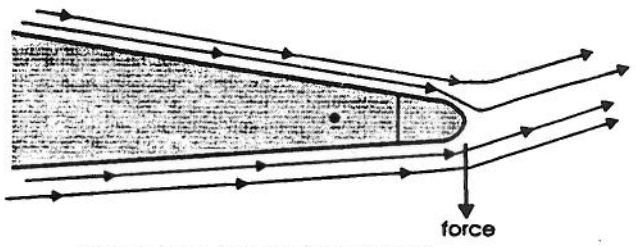
Aileron Trim Via Trailing Edge Radius [8/92]

Unlike the in-flight adjustable aileron trim discussed elsewhere, we have found it necessary to provide fixed trim adjustments to most RVs. This is to compensate for minor misalignments which occur in even well built airplanes. Chapter 15 of the construction manual covers the installation of fixed trim tabs. However, there is another method of adjusting the trim of ailerons which we had been aware of for some years but had never experimented with. It consists of nothing more than slightly altering the radius of the trailing edge of the ailerons.

We've long been aware of the dramatic effect trailing edge radius can have on control loads and have repeatedly cautioned builders on the undesirable effects (even dangers) of excessive trailing edge radii. The ideal trailing edge has a cross section very close to that shown on the plans; a 3/32" radius which transitions smartly to flat skin surfaces. There is a tendency among builders to underbend the trailing edges and end up with it bulging out just forward of the bend. This causes a lower hinge moment and light control forces. In some cases it can cause "aileron snatch", a tendency for the ailerons to seek a neutral position to either side of center. This condition is impossible to trim and makes the airplane touchy to fly because the stick must be held in center; a condition which is easily upset by light turbulence or inattention. Fortunately, this condition is easily corrected by decreasing the trailing edge radius; using clamping blocks, hand seamers, or even hand pressure alone.



airflow around aileron trailing edge

A by-product of this technique can be used for lateral trim. Since altering the trailing edge radius

alters stick force, it follows that altering only one aileron could affect lateral trim. It does, for reasons which we will later attempt to explain for those interested. The essential info is that lateral balance can be achieved by decreasing the trailing edge radius of the aileron on the light wing. This means that if the airplane has a left rolling tendency, decreasing the trailing edge radius of the right aileron will make the right wing heavier and bring it into balance. On the flip side, increasing the radius of the trailing edge of the aileron on the heavy wing will bring trim into balance.

It is obvious that squeezing the trailing edge will decrease the radius, but how does one conveniently increase (un-squeeze) the trailing edge? There is a simple but effective procedure; one which most, intelligent, builders find distasteful. Hit it with a hammer!!! Actually, the procedure calls for holding a wooden block along the trailing edge and tapping it with a hammer or similar heavy object. It usually doesn't require much force, so no damage is done to the aileron.

When I test flew our RV-6T, I found that it had a rather strong tendency to roll left. While the bias spring trim system at full travel was able to correct it, it is preferable that the ailerons be in aerodynamic trim so that the variable trim can be reserved for load imbalances. The wings, ailerons, and aileron rigging were as accurate as Art Chard could make them, and there was no obvious trailing edge radius problem. However, the aileron stick forces were lighter than we wanted. So, with some trepidation, I took a hand seamer, lined the jaws with masking tape to prevent scratching, and carefully squeezed along the trailing edge of the right aileron. The resulting effect on the trailing edge was so slight that it was difficult to feel. However, the effect on trim was pronounced; now it wanted to roll right nearly as much as it before rolled to the left. I had over squeezed. The stick force had increased to what I considered desirable. Now I was faced with two options to correct for the heavy right wing: 1. Squeeze the left aileron to make the left wing heavier and bring it into balance (would increase stick forces beyond what I wanted). 2. Attempt to decrease the trailing edge radius of the right aileron by hitting it. I chose to "un-squeeze" the right aileron, but very carefully. After the 2nd application of this "heavy hammer" approach to airplane tweaking, both trim and stick force were as I wanted. Now the aileron trim lever remains near center unless needed for fuel and/or pilot load imbalance, and the ailerons are clean; no trim tabs. Thanks are in order to Dave Lewis Jr., John Harmon, and Jerry VanGrunsven for sharing with me their acquired knowledge of this procedure.

Now, if you're thinking that this method might be used to trim the elevator or rudder, forget about it. This method only works because the ailerons operate in opposition to each other. However, trailing edge radius control is very important on these control surfaces as well as the ailerons; to maintain desired control feel and effectiveness.

In Feb. '92 we referred to a Kitplanes article by Barnaby Wainfan on Wing Trailing Edges. This article helps explain this phenomenon. The simplest explanation I can offer is: Air flowing over any surface tends to remain attached to the surface. When the surface curves, the air will tend to stick to that surface until the curvature is too sharp and separation occurs. This is what happens on the trailing edge radii of the ailerons. Because air pressure on the bottom of the aileron is greater than on the top, the bottom air tends to follow the trailing edge curvature more than the top air does. What results is an upward jet of air as I have shown (exaggerated) in the accompanying sketch. This upward jet pulls (or pushes?) the aileron down and lifts that wing. Thus, if we reduce the radius of an aileron trailing edge, we decrease the jet action, that aileron will move upward, and the wing will come down. In the case of our own airplane which had a "light" right wing, we decreased the radius of the right aileron, it deflected upward which in effect made the right wing heavier and brought the plane into balance.