

# TECHNICAL UPDATE

# 4

Number December '81

Distributed as a free service to all Lazair owners

## 4.1 LET IT SNOW -- BUT NOT ON YOUR LAZAIR

This winter we have received three reports of Lazairs, tied down outside, being damaged by snow loads. In each case, the weight of the snow caused a strut to buckle. In one incident, the buckled strut was the only damage, but in the other two, the wingtips and D-cells were damaged when the wing struck the ground.

We did a few measurements and calculations to determine how much load might be caused by snow on the wings. By weighing a plastic bucket full of snow, we arrived at a density of 13.3 pounds per cubic foot. This was done on a relatively warm day when the snow was quite dense, but there will no doubt be days when the snow density will be even higher. Using this measured value of 13.3, and a wing area of 142 square feet, a six inch snowfall would produce a snow weight of 944 pounds. Based on a gross weight of 340 pounds, this snow load would be the equivalent of -2.8 g's.

Hudson's "Engineer's Manual" gives the density of snow as 5 to 12 pounds per cubic foot, fresh fallen, and 15 to 50 pounds per cubic foot when wet or compacted. Using the upper limit, a layer of snow *just over an inch thick* could exceed the design limit of -2 g's. All of these calculations have assumed an equal load distribution over the length of the wingspan. For a snowload, this is a reasonable assumption, but normal flying loads tend to be more concentrated at the wing root and diminish toward the tip, so a snow load will tend to stress the strut more than a flying load of the same average value.

What does all this mean? *Don't leave your Lazair outside if there is a chance it might be snowed upon!!*

## 4.2 PINNED ROD ENDS

Several months ago we received a letter from a builder claiming that a BEP pinned rod end broke as he was tightening the nut. We pulled a random sample of twenty units from stock, did a torque test on them, and they all passed with no problems. For two months, there were no more reported BEP problems, and the first incident was chalked up to a "ham fisted mechanic". Then suddenly we received several reports of BEP's being broken during installation. These failures occurred shortly after we phased in a new batch of BEP's from the manufacturer, so we pulled another sample and discovered that about 90 percent of them could be broken if the nut were tightened to a torque of about 60 inch-pounds. We returned the whole batch to the manufacturer and they replaced it with another batch. We tested the new batch and obtained about the same yield as the batch we returned. We have now been told that the specified torque for these units is 50 inch-pounds and the breaking torque is about 54 inch-pounds. Based on experience to date, it is obvious that this is not a sufficient margin, so we have discontinued the use of this particular part. We are now manufacturing our own BEP's using a standard BE rod end with a specially machined 10-32 capscrew and a shoulder standoff. These units will withstand a torque in excess of that which would normally be applied during installation, and have been designed so that if the nut is overtightened, the standoff will yield before the capscrew, resulting in an inherently safe failure mode (with the rod end captivated on the capscrew).

We do not advocate arbitrary replacement of the previous style BEP's since those which do not break during installation will not break in service (there is a stress reduction in the BEP caused by cold flow of the F18/19 mixer plate). However, anyone ordering a BEP as a replacement part will receive the new design.

#### 4.3 MYLAR WING COVERING

Since the last update, we have continued our efforts to extend the life expectancy of the covering material. The obvious solution is to use a mylar which has been treated with an ultraviolet inhibitor. We have tried several samples of UV inhibited mylar, but unfortunately, one of the steps in the UV treatment involves a flame heating process. This stress relieves the mylar and virtually eliminates its shrinkability. We have tried samples of many other materials (including Lexan which has recently become available in thin film form) but have not yet found a material which combines all of the required qualities (including strength, transparency, shrinkability and UV resistance). We are presently testing and evaluating many types of films including vinyl, acrylic, oriented polystyrene, Tyvek and Tedlar.

In addition to these, we will be looking at off-the-shelf and custom manufactured laminates which combine the properties of two or more materials.

Based on tests conducted to date, mylar still appears to be the best material for the application, and therefore we will continue to use it until we can prove that something else is better. In the meantime, we suggest that you follow the guidelines provided in Item 11 of Update Number 3, and check future Updates for new developments.

#### 4.4 PUSHROD WEAR

Although no serious problems have been encountered, we have seen a couple of Lazairs with measurable wear on the 1/4 inch ruddervator pushrods (T26) where they pass through the F32 guides. The amount of wear does not seem to be a direct function of the time on the airframe, as the most wear seen to date was on an aircraft with only sixty hours on it, while our company demonstrators with several hundred hours on them show virtually no wear. One possible explanation is that dust or other airborne contaminants are trapped by the grease and act as an abrasive and/or corrosion accelerator. We are now considering the use of graphite as a lubricant rather than grease, but we have not had sufficient test time yet to make any firm recommendations on lubricants. However, we do recommend that the pushrods be checked for wear at least once every twenty flight hours. Since the pushrods are made from thick-wall tubing, they can tolerate a noticeable amount of wear without posing a serious problem. However, any pushrod which looks like it is worn should be checked with a micrometer or vernier caliper by measuring the diameter of the worn section and comparing it to the measured diameter in a section where there is no wear. If the difference exceeds .030 inches, the pushrod should be replaced.

#### 4.5 KEEP YOUR TIPS UP

In the last update, we advised against making design changes in the Lazair unless you are qualified to predict the consequences of the changes. Since then, we have received a report of a situation which illustrates the point rather dramatically.

Most Lazair owners are probably used to having people ask why the wingtips are turned up rather than down (since the trend on many light airplanes is toward downturned wingtips). Downturned tips tend to increase lift, but since the Lazair was designed around a very high lift airfoil, the additional lift provided by downturned tips is not necessary. What is necessary, is a smooth airflow over the ailerons (to increase their effectiveness), and a force which will lift the leading wingtip if the aircraft tends to slip sideways.

One Lazair owner decided to redesign his aircraft by installing the wingtips upside down. Fortunately, he had the foresight to have the aircraft test flown by his local Ultraflight distributor who is a commercial pilot with a wealth of flying experience. During the initial phase of the test flight, while executing gentle maneuvers, everything appeared normal. However, after entering a turn with a very high angle of bank, the

aircraft began to slip into the turn and refused to come out of it. Only by using every bit of his skill and knowledge was the pilot able to regain control, and in doing so, he lost nearly *four hundred feet* of altitude. This is exactly the same characteristic which was related to us at Oshkosh this summer by the owner of a Mirage (which, incidentally has downturned wingtips).

There is nothing in this world which is so perfect it cannot be improved — not even the Lazair — but the message should be clear. If you don't know what you're doing, don't change it!!

#### 4.6 MOVING OR SELLING?

These technical updates can be important for the safe operation of your Lazair. If you change your address, please let us know so we may continue to keep you informed. Similarly, if you sell your Lazair, please be sure that either you or the purchaser fills in the change of ownership form so we may send the updates to the new owner.

CHANGE OF ADDRESS		ULTRAFLIGHT SALES LIMITED	P.O. BOX 370 PORT COLBORNE, ONTARIO CANADA L3K 1B7
NAME	_____	KIT NO.	_____
NEW ADDRESS	_____		
	_____		
	_____		
	_____		

CHANGE OF OWNERSHIP		ULTRAFLIGHT SALES LIMITED	P.O. BOX 370 PORT COLBORNE, ONTARIO CANADA L3K 1B7
SELLER	_____	KIT NO.	_____
PURCHASER	_____		
ADDRESS	_____		
	_____		
	_____		
DEALER (if known)	_____		