

# TECHNICAL UPDATE

Distributed as a free service to all Lazair owners

Number **8** August '83

## 8.1 SPINNER MOUNTING FLANGES

We have had several reports of fatigue failures in the spun aluminum flange (F81) used for mounting spinners. Although this may not be a serious problem if it is noticed on a preflight inspection and corrected, we have had a report of a pilot receiving a foot injury when the whole spinner broke loose and flew off. While part of the problem may be due to an absence of loctite on the screws securing the spinner, or an improperly centered spinner, these are not likely the sole causes. Mounting flanges which have a larger bend radius appear to be better but not totally immune to fatigue problems. Newer propellers have a large area on the rear surface machined to fit onto the mounting flange, but some of the older propellers may have some slight interference with the flange from the trailing edge of the blade and this should be filed as necessary to avoid distorting the flange. We are presently running endurance tests with a new design of flange. When the testing is complete, the new flanges will be made available at no charge to all owners who return the original ones. In the meantime, it is strongly recommended that all spinners and mounting flanges be removed. Until new flanges are available, you can fly without spinners --- it doesn't look as good, but the difference in performance isn't noticeable.

## 8.2 TAPE ADHESION

In the past five months we have had four reports of loosening of Tedlar covering, apparently due to poor tape adhesion. As the reports are all quite different, there is no indication of any one particular problem, and therefore determining the cause (and remedy) is not easy. However, based on the information we have available, we can make the following suggestions.

- (a) Avoid overheating the tape (and the Tedlar) when heat shrinking. As stated in the manual, overheating the tape will cause it to shrink excessively and will lift it at the edges. It is also probable that excessive heat will have an adverse effect on the adhesive. Overheating the Tedlar will cause it to shrink excessively and could tend to pull it away from the tape.
- (b) When cleaning the aluminum prior to the application of the tape (whether on a new aircraft or when recovering) use only lacquer thinner as suggested in the assembly manual. There is some indication (but no proof) that the use of acetone for cleaning the aluminum may effect the acrylic adhesive on the tape. Do not use metal cleaners (such as Met-All, Nev-R-Dull, Flitz etc.) as many of these are designed to apply a protective coating as well as clean the metal. These coatings (especially the ones which contain silicones) can severely impede tape adhesion.
- (c) Make sure there is sufficient overlap of tape on the aluminum (as described in the assembly manual), especially along the D-cell and along the root rib. If in doubt, additional tape should be applied with at least 3/4 of an inch in contact with the aluminum.
- (d) If there is any indication of inadequate adhesion around the perimeter of the Tedlar, some of the

wide single face tape could be removed and replaced, or additional tape could be applied as in (c) above.

- (e) Lack of adhesion of the foam tape on the ribs, while not a common problem, could be a bit more difficult to fix. We have only seen this problem once, and the effected area was so small, it was just left (though watched closely) and the condition has not worsened. If you should ever encounter this situation (and assuming you don't wish to recover the wing), you could rivet an additional aluminum capstrip to the effected ribs on the outside of the covering (similar to C4 on the wingtip). However, if you do this, be sure to put at least one layer of 1 1/2" or 2" tape over the Tedlar before the capstrip is put on and use double face tape under the capstrip. Be sure to file or sand the edges of the capstrip so they do not cut into the covering. In any case, do not (as one customer suggested) attempt to rib stitch the Tedlar. Rib stitching a non rip-stopped material could potentially create many more problems than it could cure. While the additional capstrip suggested above does necessitate drilling rivet holes through the covering, the stress on the covering is distributed by the relatively large area of the capstrip. If rib stitching were used, the stress would be much higher due to the small diameter of the rib cord.
- (f) If you paint your Tedlar and/or tape, use a light colour. There is some indication that if it is painted a dark colour and left in direct sunlight for a prolonged period, the covering may tend to creep under the tape due to the extremely high temperature developed.
- (g) To check for overshrinkage on your wings, put a straightedge on the trailing edge and measure the deflection of the T25 trailing edge tube between each pair of ribs. A deflection of one sixteenth of an inch is about right. An eighth of an inch is excessive but acceptable. A quarter of an inch deflection indicates that the particular panel has been overshrunk. The covering and tape on that particular panel should be inspected and watched very carefully or replaced.
- (h) An inspection of the covering and tape should be included in every preflight.

The following two paragraphs have been added to the assembly manual, and should be observed if you recover your Lazair™:

"As with most acrylic adhesives, the initial tack with this tape is only moderate, but the adhesion improves as it ages. For this reason, it is essential that the tape be firmly pressed down to make sure there is 100 percent initial contact. Then, as the adhesive cures, a proper bond will develop."

"Unlike Mylar and most other heat shrinkable covering materials, Tedlar will continue to shrink significantly after the heat source has been removed. Therefore, to avoid overheating the Tedlar, apply the heat for a few seconds, then remove it and check for signs of shrinkage. If there is no indication, heat it a bit longer, then remove the heat and check again for shrinkage. As the heating period is increased, you will find the correct exposure so most of the shrinkage will occur after the heat source has been removed. If the heat is maintained on the Tedlar for a significant period of time after it begins to shrink, it is possible to overheat the material and reduce the adhesion of the tape."

### 8.3 ENGINE INSPECTIONS

We have received one report of a Rotax engine stoppage because the small wire between the magneto coil and the condenser was routed improperly and contacted the rotating flywheel. Although this is an unlikely

situation, we will be checking all engines before they are shipped to ensure that the wire routing is correct. Engines in the field can be checked quite easily if the engine is removed from the nacelle. The flywheel does not have to be removed since it has cutouts through which the wiring may be inspected. We also know of two engines which made rather ominous noises when the crankshaft was rotated because the polefaces on the lighting coil were rubbing on the flywheel, so it might be wise to also check that the two screws securing the lighting coil are tight. This can also be done without removing the flywheel.

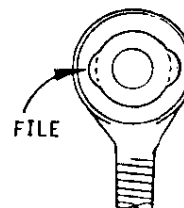
#### 8.4 COMPRESSION RELEASE

We recently received the second report of an engine being damaged because it ingested the valve stem from the compression release. To preclude the possibility of this happening on one of your engines, we suggest you pry off the little green plastic cap and inspect the quality of the riveting which holds the aluminum button onto the valve stem. If there is any sign of weakening or bad riveting, the compression release should be replaced. The plastic cap is not required and may be left off to permit a check of the compression release in every preflight inspection.

#### 8.5 RUDDERVATOR PUSHROD ROTATION

Item 6.16 in an earlier Tech Update described a problem where the BE rodends tend to rotate in the P3 plugs during cross control of rudder and aileron. This problem has been eliminated on the Series III Lazair™ by the use of a totally different control linkage, but if you have one of the earlier models with rudder pedals, you can make two relatively simple changes. First, replace the large diameter S675 spacers supplied with the earlier kits with the small diameter S344 spacers used on the Series III kits (with W3H washers added to make up the required length).

Secondly, the allowable rotation of the ball can be increased by inserting a 3/16 inch diameter chainsaw file through the pinhole in the ball and carefully filing out a small section of the ball retainer as shown. Only a very small amount of metal needs to be removed, so don't file away any more than necessary.



#### 8.6 FUEL FILTERS

That little white plastic cover on the bottom of the carburetor on the Rotax engines contains a small filter screen. This should be removed and inspected (and cleaned if necessary) after the first few hours and every 50 hours thereafter to verify that the fuel filter in the tank is doing its job.

The problem with the felt fuel filters described in Tech Update Item 5.2 appears to have been eliminated by the elimination of the felt fuel filters. The newer kits are supplied with an all metal screen-type filter.

#### 8.7 AXLE WEAR

If you're still flying one of the very early Lazair™s (the ones with the spoked wheels) you should pull the wheels off at least once every 50 hours and check the 4130 steel axle tubes for any indication of rust, wear or any other condition which could lead to failure. We have had two reports of axle breakage resulting in a sudden and extreme increase in dihedral. In one case, the airframe had been highly modified by a previous owner and the steel axle had been replaced by a small diameter aluminum rod with a cross-drilled hole in it

prior to the failure. The other one, however, appears to be a failure of the original axle tube caused by wear as a result of a wheel bearing seizure. In lieu of the frequent disassembly and inspection, the axle could be replaced by the later double wall large diameter aluminum one with the tundra wheels, or a 1/8 inch stainless steel cable could be installed to keep the A-frame from spreading in the event of an axle failure.

#### 8.8 ROTAX HEAD GASKETS

There is an indication that the head gaskets on the Rotax engines may compress unevenly if the head nuts are repeatedly retorqued, and this could eventually result in a cracked cylinder head. Retorquing the heads once or twice during the first few hours of operation is not uncommon, but if you find it necessary to retorque the head 3 or 4 times, it is strongly recommended that you replace the head gasket. The recommended tightening sequence and torque value are given in Tech Update Item 5.9.

#### 8.9 SWITCH CONNECTOR INSULATION

The following note regarding the terminals on the magneto switches has been added to Step 8.2.10 in the latest revision of the assembly manual. Please check this on your Lazair™ and make the recommended change if necessary. "Make sure the plastic insulator is properly positioned after crimping. If it appears loose, use electrical tape or plastic sleeving to ensure that the terminal cannot contact the F55 switchplate." A short piece of fuel line slipped over each terminal can provide additional protection against accidental grounding of the magneto wire.

#### 8.10 OIL FOR YOUR ROTAX

In the operating manual provided with Rotax powered Lazair™ kits, we recommend the use of mineral based two cycle oil mixed in a ratio of 25 to 1, and do not recommend the use of synthetic lubricants which are usually mixed in much lower concentrations. This advice is based on information supplied by the engine manufacturer, on our own testing and experience, and on feedback from customers. Although some owners have been using synthetics for a considerable length of time with apparently no problems, others have reported mysterious power losses and incipient seizures believed to be a result of inadequate lubrication.

#### 8.11 GROUND ADJUSTABLE PROPELLERS

Although most Lazair™ owners are familiar with the situation regarding the ground adjustable props, the following is provided for the information of those who may have heard only half of the story.

Following over a year and a half of development, we finally began shipping our composite blade ground adjustable propellers in June of 1983. In mid July we received a call from a customer who described in vivid detail what happened when one of his propeller blades separated in flight. Because of the very real danger presented by this situation (and because there was nothing obviously different about his propeller which could explain why it failed and the others with hundreds of hours on them did not) the decision was made to initiate a 100 percent recall of all the ground adjustable propellers. This decision was not made easily, but it was made quickly and every Lazair™ owner who had been shipped this propeller was personally phoned and asked to return the propeller (or part of it) to the factory. Customers who had received the ground adjustable props in their Series III kits were sent the proven carbon fibre blade props as replacements, and customers who had purchased the ground adjustable props for retrofit were offered a cash refund. As you

might imagine, the cost of this decision was substantial. Including the development costs incurred during the past year and a half, the cost of tooling, the production costs of the propellers which have now been destroyed, the cost of the replacement bi-blade props, and administrative costs associated with the recall, the bill came to over forty three thousand dollars. While this may seem like a small price to pay if it can avoid a serious accident, it is not an insignificant amount to a company the size of Ultraflight (sometimes we like to think big, but we're not exactly General Motors). It should be noted that the incident mentioned above was the first (and the only) blade separation on one of our production ground adjustable propellers. The recall was issued not because we felt there was a high probability of a second occurrence, but because the possible consequences of a failure are so severe. A failure of a wooden prop or even a small composite prop like our bi-blades can be frightening and is certainly not without danger, but there is usually enough propeller left after the failure to limit the unbalance to some degree. However, when the ground adjustable blade separated, one whole blade came off, resulting in a horrendous unbalance --- sufficient to tear the engine off its mounts, rip off both ground cables (which are rated at 600 pounds each in tension) and pull out the magneto wire so the engine could not be switched off. Only the throttle cable was left to support the engine and this served only to allow the engine to flail around like a guillotine on a string. Fortunately, the pilot, who has had many years of flying experience, was able to retain his composure, control the aircraft and shut off the engine with the choke, and he was able to land safely. However, if you can visualize yourself in this situation, you might understand why we took the only action which could positively prevent a recurrence. The reaction to the recall has, for the most part, been quite good. Almost every owner agreed to follow our instructions and stop using the propellers. Many even said "Thanks for telling me". However, two individuals have resisted our attempts to dissuade them and are continuing to fly with the ground adjustable props. We care about your safety. We care enough to spend that forty three thousand dollars to help preserve it. If you don't care, there may not be much we can do about it --- but we will continue to try. In the meantime, we are investigating other avenues to try to get a bit more efficiency out of the propulsion system. Many wooden props of various shapes, lengths and pitches have been tested and while some are certainly satisfactory, none has been outstanding, and so far not one has been able to match the thrust-to-noise ratio which was obtained with the ill-fated ground adjustable prop. However, our efforts are continuing and as improvements are made, you will be notified.