Lazair™

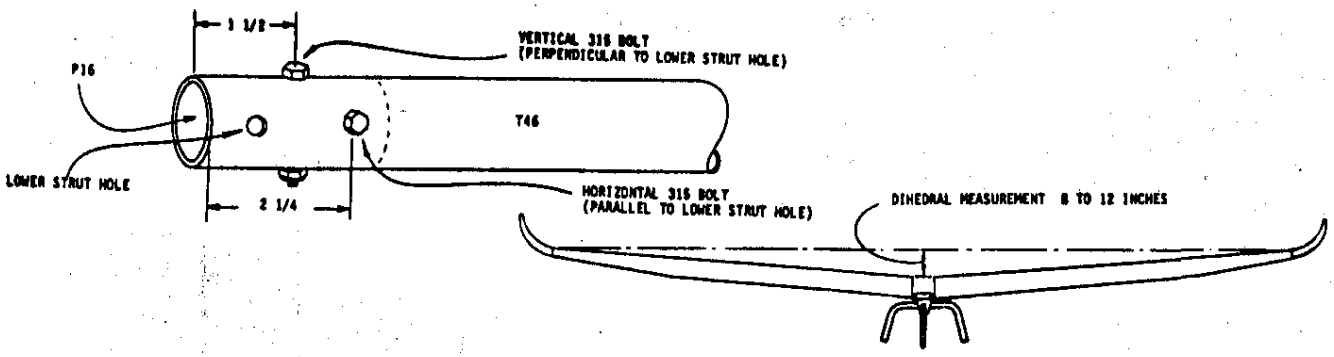
TECHNICAL UPDATE

Distributed as a free service to all Lazair owners

Number 5 June'82

5.1 LOWER STRUT PLUG INSTALLATION

Early Lazairs (the ones with the spoked wheels) were designed so that the P16 strut plug extended beyond the end of the T27 strut tube. Later models (with the "Tundra Tires") have a larger diameter axle (which increases the spacing between the F6 gussets to 1 1/4 inches) and therefore the P16 must be installed so that it is flush with the end of the T46 strut tube. If you have one of the first few kits shipped after the changeover, your assembly instructions regarding the position of the P16 may have been somewhat ambiguous. Please check to make sure that your P16's are installed as shown below, and there are two 3I5 bolts in each strut plug (P17's as well as P16's). As a secondary check, you can measure the Dihedral by stretching a string between the top of the D-cells at the tips. The distance from the string to the top of the D-cell at the root should be between 8 and 12 inches.



If it is necessary to reposition your P16 plugs, it should be possible to do so without having to scrap either the strut or the plug. Wherever possible, use existing holes in the strut. Rotate the P16 and drill new holes in it as necessary. Make sure the center of the lower strut hole is at least 1/2 inch from the end of the strut.

5.2 TINY BUBBLES IN THE LINE

Now that we have eliminated the primer bulb, the in-line filter, and the tee fitting, the problem of bubbles in the fuel line should be gone forever — but now we have found a new source of bubbles — this one even more intriguing than the others.

After one of our factory demonstrators displayed some noticeable bubbles, we checked the fuel line for leaks and determined that there was no place where air could get into the line — this is the main advantage of the submersible fuel filter. Since the bubbles appear to emanate from within the fuel itself, it has been determined that the bubbles are not air, but vaporized fuel. The exact cause of these bubbles is difficult to determine, but it is believed that water in the fuel effectively plugs the filter. Then each time the diaphragm in the fuel pump is pulsed there is a momentary reduction in pressure in the fuel line. This reduction in pressure lasts for only a very small fraction of a second, but it is sufficient to cause a small amount of fuel to vaporize and form a tiny (almost invisible) bubble. These gradually merge to form larger bubbles as they migrate toward the carburetor.

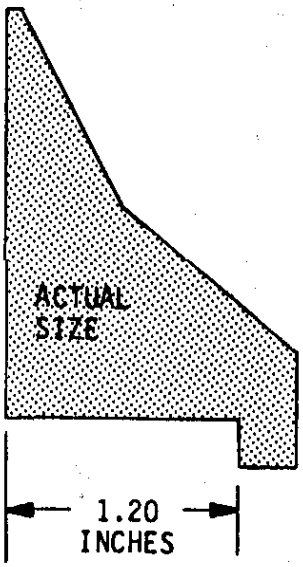
This theory has not been proven, but it has gained credibility from the fact that any time the problem has occured, it has been eliminated (completely) by removing the felt from the fuel filter and rolling and stretching it to get rid of the water.

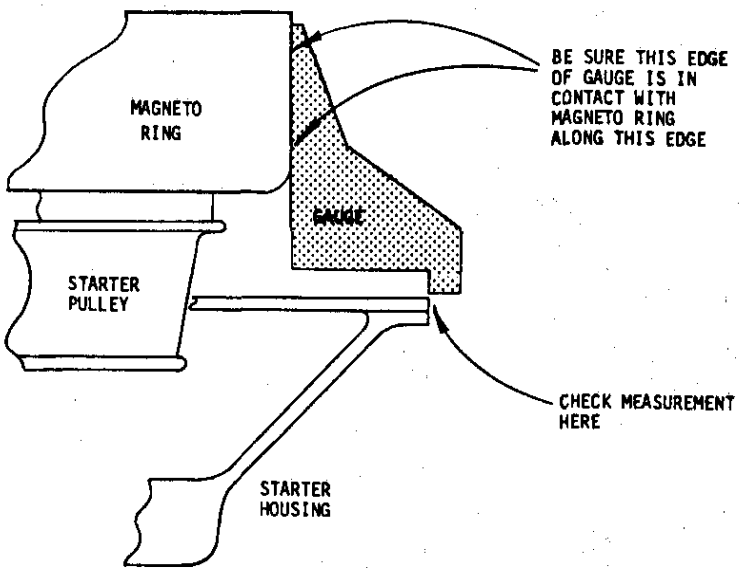
We are now investigating the use of other materials (such as a brass screen) to eliminate the felt filter. In the meantime, check your fuel lines for bubbles frequently while flying. Check your filter periodically (especially if you suspect there may be water in the fuel). Roll the felt between your hands, stretch it, compress it and then put it back on.

5.3 CENTERING OF STARTER ASSEMBLY

To prevent possible damage to the starter pulley on the rotax engine, it is essential that the starter pawl assembly be centered properly. If you remove the starter assembly from the engine or if the engine is removed from the engine mounting assembly, the starter assembly position should be checked after re-assembly as follows:

First, make a measuring gauge from thin sheet metal as shown. Use this gauge to check the radial spacing between the starter housing and the magneto ring. Check the spacing at four places (approximately equally spaced) around the circumference and make sure it does not vary more than plus or minus 1/32 of an inch. If necessary, loosen the 5/16 inch mounting bolts and re-position the engine on the mounts.



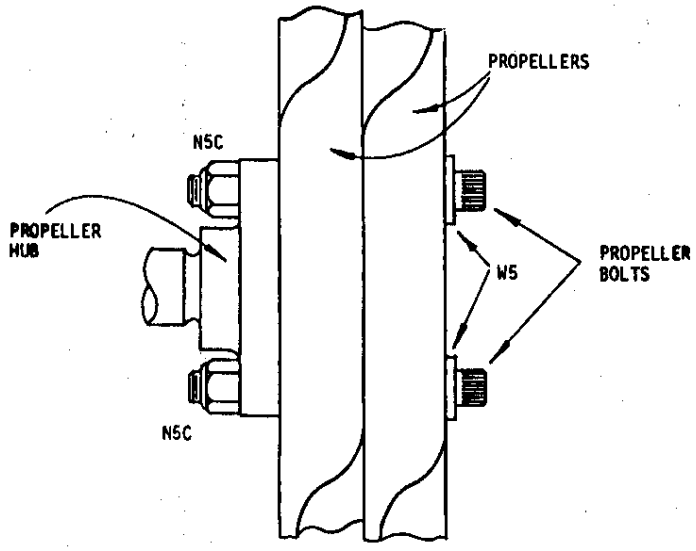


5.4 PROPELLER BOLTS

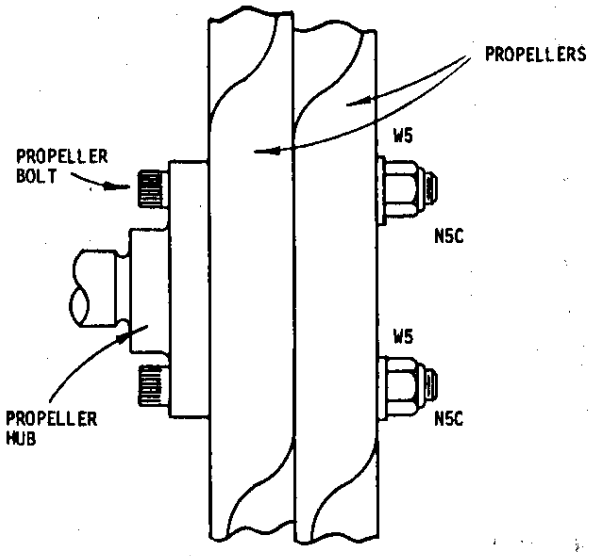
Since the introduction of the rotax engine in November '81 we have had three reports of broken propeller bolts. After examination, it was determined that one of these failures was a result of the engine being run for a considerable length of time with the propeller bolts loose. The other two resulted from the propeller bottoming on the crankshaft nut rather than seating properly on the hub. A special notice regarding this potential problem and a suggested method of checking the depth of the counterbore in the propeller was mailed to all owners of kits shipped prior to January '82 (those who we thought could have experienced this problem) but it appears that some of the notices either did not reach their destination or were ignored by their recipients.

Please check the installation of your propellers and ensure that they are properly seated on the propeller hub. The depth of the counterbore may be increased slightly if necessary to allow the propeller to fit properly against the hub.

To reduce the possibility of a bolt failure (even if a propeller is improperly installed) all kits shipped after May 17, 1982 have the bolts inserted through the hub in the opposite direction to that in the original configuration. To increase the margin of safety, it is recommended that owners of Lazairs shipped prior to May 17, 1982 reverse their propeller bolts as shown below.



ORIGINAL CONFIGURATION

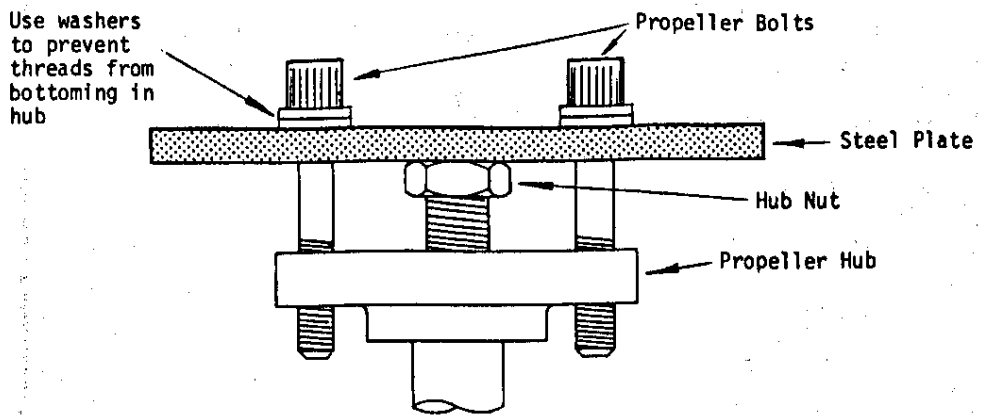


RECOMMENDED BOLT ORIENTATION

This requires drilling out the holes in the propeller hub to 5/16 inches diameter, and allows the part of the bolt which goes through the hub (where the stress is highest) to be the full diameter. As originally configured, the bolts were threaded into the propeller hub.

The threads on the bolt not only reduce the cross sectional area of the bolt by approximately forty percent, but they also introduce a stress concentration, which, under fatigue loads, can be as high as 2.7 to 1. By reversing the bolts, the threaded part of the bolt is moved from the area of maximum stress to the area of minimum stress.

To insert the bolts as recommended, it will be necessary to remove the propeller hub from the crankshaft. If you don't have a gear puller, the following method may be used: First, loosen the crankshaft nut and screw it off until it protrudes about 1/16 of an inch past the end of the crankshaft, then remove the propeller hub using a puller made from 1/4 inch steel and the two propeller bolts as shown. If you don't have a piece of steel handy, you can use one of your nacelle weights and drill a couple of 3/8 inch holes in it. Tighten the two bolts alternately, slowly and evenly until the hub breaks loose from the crankshaft. Tapping the puller where it fits over the end of the crankshaft, while you tighten the bolts, may help to loosen the hub.



When drilling the holes to 5/16" diameter, make sure the drill is perpendicular to the face of the hub. Make sure you put the bolts in the hub before you install the hub on the crankshaft.

To reinstall the propeller hub, make sure the taper on the crankshaft and the hole in the hub are absolutely clean and free of grease. Apply a small amount of Loctite 242 or similar locking compound, fit the hub onto the shaft and tighten the nut to a torque of 35 foot pounds. After the propellers are installed, the N5C propeller nuts should be tightened to a torque of 15 foot pounds.

5.5 UP YOUR CABLES

In update number 2 we discussed the problems of catching long grass in the cables. To alleviate this problem, all new Lazairs have the cables attached to the stabilizer at the end of the spreader (T11 or T11S) rather than at the lower (outboard) corner as was done originally. If you wish to modify your Lazair to move the cables up, it is a relatively easy change provided that you have access to a Nicopress tool and sleeves, since the cables must be shortened. If you can't locate a tool readily, check with your local EAA chapter.

5.6 RUDDERVATOR PUSHRODS

In a previous update (item 4.4, December '81) we reported on a potential wearing of the T26 pushrods where they pass through the F32 pushrod guides. To alleviate this situation, kits shipped in May and June of 1982 included a roll of 5421 or 5423 abrasion resistant tape. We have been flying factory demonstrators with this tape installed for over four months and have not encountered any difficulties. However, if the tape is not properly installed, or if it becomes damaged (by mishandling while assembling or trailering the aircraft) there is a possibility that it could come loose and get wedged in the F32 making it difficult to move the ruddervator pushrods. Although this has not happened, the possibility does exist. Therefore, if you have the tape on your aircraft, it is recommended that the tape be removed from the pushrods and discarded. If you received the tape with your kit, but have not installed it yet, don't.

5.7 D-CELL NOSERIBS

The owner of a highly modified Lazair reported recently that several of the foam noseribs inside his D-cell had moved out of position. This was one of the earlier kits with the .016 inch D-cell skin, (kits A192 and

subsequent have a .020 inch D-cell skin) and was fitted with relatively heavy reduction units and very large propellers.

Although this is believed to be an isolated case, it is recommended that all owners check the position of their noseribs occasionally (especially in the area of the engine nacelles). This can be done easily by tapping along the top of the D-cell (about 4 inches ahead of the main spar) and listening for the ribs. There should be a rib every 4 inches. If you should ever get an indication that two or more adjacent ribs are out of position, drill out a few rivets so that the D-cell skin may be lifted sufficiently to look inside (with the aid of a flashlight). Any displaced ribs should be repositioned and bonded in place with panel adhesive. To avoid loosening the D-cell skin, remove only as many rivets as necessary and use tools made from coat hangers to fish the ribs into position.

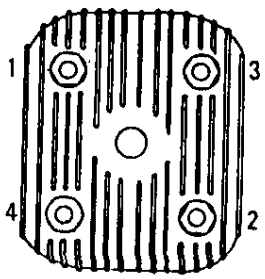
It should be noted that because of this possible problem, the use of Rotax engines on a Lazair with .016 inch leading edge skin is not recommended.

5.8 CARBURETOR STUDS

In spite of the fact that carburetor studs are installed with Loctite and the carburetors are attached with metal-to-metal shakeproof nuts, we have had three reports of carburetor studs or nuts working loose on the Rotax engines. While it is unlikely that this would ever cause a carburetor to fall off, it could become loose enough to cause an engine to stop. To lessen the chance of studs becoming loose, make sure the carburetor nuts are tight. They should be retightened after the first few taxi runs, before the first flight, and at least once every 20 flight hours thereafter. Tightening the carburetor nuts can be made much easier if you modify a 10 mm wrench by making a 45 degree bend in it about 1 1/2 inches from the (open) end.

5.9 CYLINDER HEAD NUTS

As with any engine, the head nuts on the Rotax engine should be re-torqued after the break-in period. It is recommended that this be done after taxiing and before the first flight. To avoid distorting the head, the nuts should be tightened in the sequence shown in the figure below.



When re-torquing the nuts, they should be torqued to 17 foot-pounds. If a head has been removed, or the nuts are very loose, tighten all the nuts to 5 foot pounds each (using the sequence above), then to 10 foot pounds, then to 17 foot pounds.

5.10 ADDITIONAL AIRFRAME CHECKS

NOTE: In May 1982 a completely revised Lazair assembly manual was introduced. For the benefit of those owners having earlier revisions

of the manual, some selected paragraphs from the new manual are reprinted below. If you have completed your Lazair, you may wish to check the items listed below, but note that this information is provided as a guide only. If you are satisfied with the way your aircraft flies, it is not necessary to make changes based on these checks, however, you might find the information useful if you plan to make any other changes.

5.10.1 BALANCE (CENTRE-OF-GRAVITY) CHECK

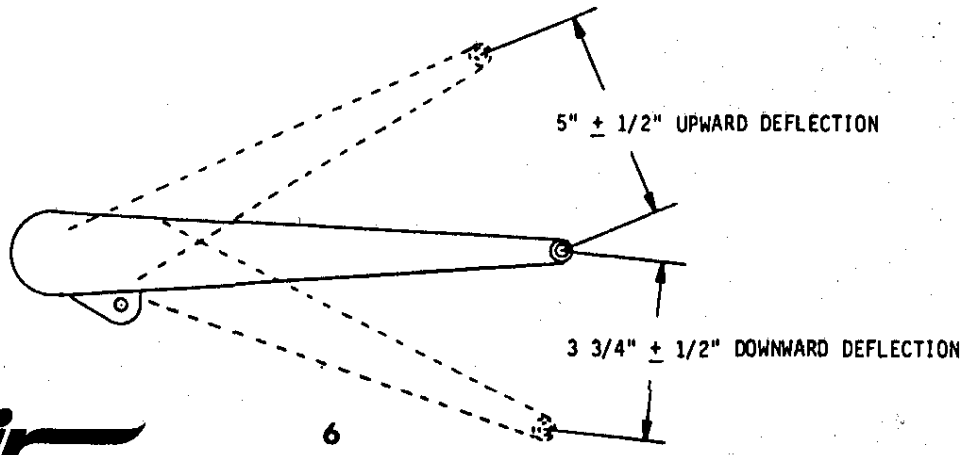
Flight testing has shown that the Lazair is very tolerant of changes to the position of the centre-of-gravity. However, for comfortable hands-off flying at a reasonable airspeed, and for assurance that there is no gross error affecting the centre-of-gravity, the check outlined below is recommended with the centre-of-gravity positioned as defined, the Lazair should trim out hands-off at approximately 25 to 28 MPH indicated airspeed.

With the seat positioned as indicated in the Assembly Instructions, the pilot sits very near the centre-of-gravity, so reasonable differences in pilot weight do not have an appreciable effect on the position of the pilot's feet, or even the type of shoes he is wearing. Minor in-flight adjustments to the position of the centre-of-gravity can be made by just moving the position of your feet. Also, there will be an effect from the weight of the fuel, so it is recommended that the following check be made with the fuel tank approximately half full.

With the aircraft on the ground and the pilot sitting in the seat in the normal (or most comfortable) seating position, raise the tail until the boom is level (use a spirit level). Hold the aircraft in this position with a bathroom scale under the spreader (TTIS). The reading on the scale should be between 1 and 5 pounds. If the aircraft meets this requirement it is adequately balanced for the first test flight (if possible the first flight should be made by an experienced Lazair pilot who is capable of recognizing any unusual flight characteristics). Fine tuning of the balance is best done by flying the aircraft and adjusting the centre-of-gravity for hands-off trim at the power setting and airspeed preferred by the pilot.

5.10.2 AILERON DEFLECTION CHECK

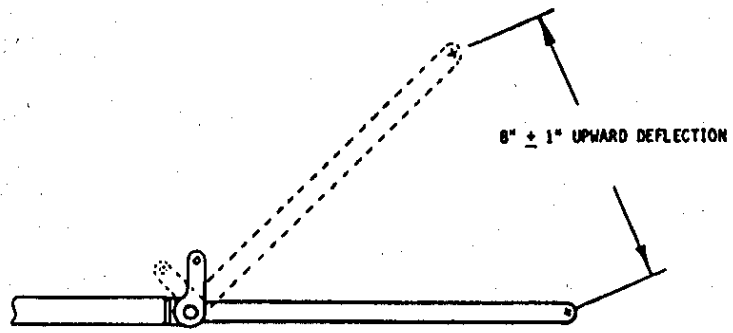
Move the stick as far as possible to the right, making sure it is neutral fore and aft. Check that the aileron deflection is within the limits shown in the figure. Move the stick as far as possible to the left and check the aileron deflection. Aileron travel may be adjusted by removing or inserting washers as described in the Assembly Manual.



5.10.3 RUDDERVATOR DEFLECTION CHECK

Push the stick forward as far as possible. The downward deflection of the ruddervators should be such that they almost touch each other. Adjust the length of pushrod T18 as required to achieve the correct downward deflection.

Pull the stick back as far as possible. The upward deflection of the ruddervator (from the neutral position) should be within the limits shown. Adjust the stop on the control stick as required to obtain the correct upward ruddervator deflection. If the stop is moved, be sure to recheck the downward travel and readjust if necessary.



5.11 AILERON BELLCRANK CLEARANCE

Please check the clearance between the 35 bolt holding the BE rodend to your F39 aileron bellcrank (F39) and the spar cap (reference drawing G in the parts catalog). Although we have seen a problem in this area, a worst-case tolerance buildup plus a slight error in locating the bellcrank mount F38 could possibly combine to cause the bolt to foul on the spar cap. If necessary, the spar cap should be bent slightly to provide sufficient clearance.

5.12 FUEL TANK STRAP ROUTING

When the large (20 litre) fuel tank was introduced, the assembly manual indicated that the rubber strap holding the tank in position should be routed over the top of the tank and beside the large cap. As most owners have already realized, an extra measure of safety can be obtained by routing the strap through the handle on the fuel tank before hooking it onto the T22's.

5.13 FUEL TANK SUPPORT RIVETS

We have had one report of loose rivets on a fuel tank support angle (where it is riveted to the T22's), after a series of hard landings. As a minimum, these rivets should be checked on your walkaround, and it is recommended that they be removed and replaced by stainless steel rivets. On older models, the rivets would be those in F29 and F30. On newer models, (with the 20 litre fuel tank) this would be G62. On newer models, it is also recommended that the bottom three rivets attaching the fuel tank saddle, G63, to the seat back, be replaced by stainless steel as an added precaution.

5.14 NACELLE MOUNTING BOLTS

After three years of production and hundreds of Lazairs flying all over the world, there was never a report

of nacelle mounting bolts working loose in flight.....until last week when we were told of two such instances. Fortunately, the remaining bolts held the engines on the wing, but the possibility of an engine falling off is obviously somewhat disconcerting. Since the mounting bolts are threaded into nutplates with an elastic stopnut feature, the bolts should stay in place unless something degrades the gripping action of the stopnut. Although the grip can be reduced slightly with repeated insertion and removal of the bolt, other factors such as the presence of grease or oil are probably more significant.

To make sure your bolts don't work loose, it is recommended that they be lockwired. This may be done by replacing them with drilled-head bolts (type AN3H5A and AN3H6A) or by drilling a small hole through the heads for the lockwire.