Lettair

December '81

News from the land of the Lazair™

FLOATS ..... AND A NEW POWER PLANT FOR THE LAZAIR

After several years of championing the cause for low power microlights, and demonstrating how well the Lazair flies on just eleven horsepower, Ultraflight has done the unthinkable and elected to incorporate a larger engine. This decision was not the result of a submission to the power battle so evident at Oshkosh this year, nor was it based on the popular theory that bigger is better — it was the eventual outcome of a development program which began over a year and a half ago when we first began flying the Lazair on floats. The first time the Lazair was tested on a pair of crude floats, it flew — in fact it flew very well. Not only that, it was able to take off using only its two tiny 5 1/2 horsepower engines. Based on this remarkable success, it seemed obvious, at the time, that just a few minor changes should result in a hull design which would serve as a model for the first production run of floats.

Then came the Sun-and-Fun Fly-in at Lakeland, Florida and a chance to try the new floats. The results were less than astounding. Back to the drawing board again .... and again .... and again. Many times we would notice a particular problem, then make a minor change which would overcome that problem — and create another brand new problem. Every conceivable hull shape was tested — long hulls, short hulls, skinny hulls, fat hulls, hulls with round bottoms, flat bottoms, concave bottoms, Vee bottoms, inverted Vee bottoms, and more. We had more bottoms than the chorus line at Caesar's Palace. Most of these were based on scientific (or at least pseudo-scientific) theory, but some were tried only to appease the multitude of self appointed experts who magically appear in the middle of any highly visible development program.

In the end, we arrived at a hull design which is certainly far superior to the original design, but still will not guarantee any reasonable minimum take-off run with a heavy pilot, with no wind, on glassy water, *with 5.5 horsepower engines*. Of these four conditions, only the latter (engine size) can be altered by a design change.

Not wanting to obsolete the Lazairs already purchased with the 5.5 horsepower engines, we investigated the possibility of extracting more power from the engines. Because of the inherent unreliability of reduction drive systems (in spite of the claims made by other manufacturers) and the drag caused by the increased frontal area, we decided to stick with the tried and proven direct drive — keeping in mind that "a speed reducer which does not exist cannot possibly fail". After testing many minor engine modifications, which produced measurable but relatively insignificant increases in output power, we concluded that the only feasible way to obtain the increase in power we wanted would be to use a tuned exhaust system. Once again, enter the experts — not pseudo experts this time, but real ones. (they must have been at *that* price). This time we got results — significant results. From an engine which used to produce thirty-five pounds of static thrust, we could now get fifty. Quick .... back to the floats! Heavy pilot, no wind, glassy water — take-off run less than three hundred feet. This was the performance we'd been looking for! But like everything else in this world, there was a price to be paid — not just the monitary cost of the tuned pipes, but in performance. Under full throttle, the power is there, but as the throttles are advanced, the power doesn't increase gradually. It picks up normally until the thrust reaches the old limit of about thirty-five pounds, then hesitates for a second or two before instantly jumping to its maximum value. This makes it difficult to maintain a steady cruise power setting and makes taxiing a challenge for a circus acrobat. A more serious problem results from the basic theory that unless you improve the thermal efficiency of an engine, extracting more power from it will increase the heat which it generates. Measurements of cylinder head temperature made on the test stand, as well as during flight tests, indicated a considerable rise with the tuned exhaust under full power — hot enough under hot day take-off conditions to possibly cause the lubricating oil to break down.

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Both of these problems can be lessened, but not sufficiently to give us the margin of safety and reliability we would like to have for an aircraft engine. So exit tuned pipes, stage left. Once again we were faced with another well known but often avoided truism: If you want horsepower — real reliable horsepower, at low RPM, you have to have cubic centimetres. Fortunately, in parallel with the engine and float development program, we were quietly beating the bushes to locate a larger engine — just in case we might need it.

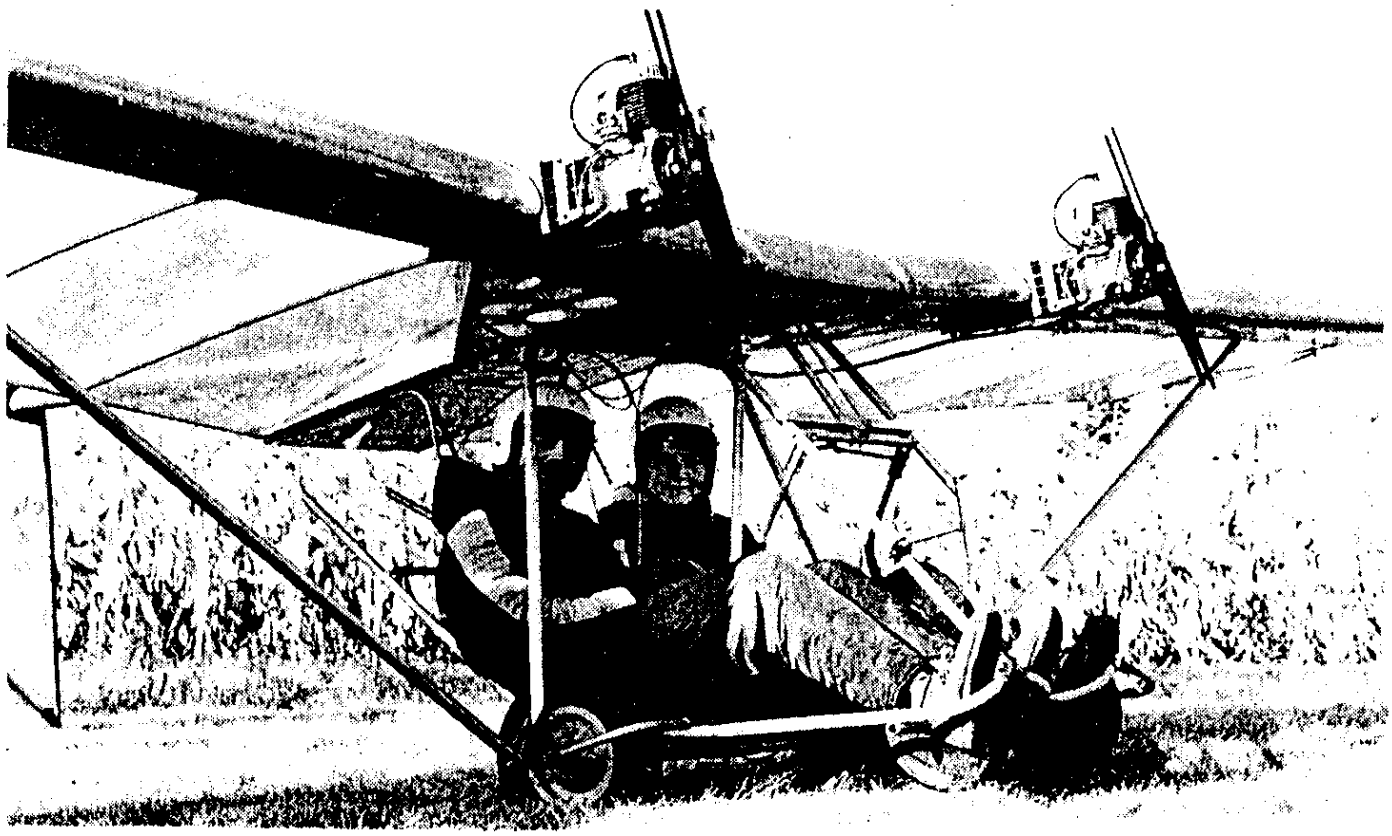
After testing, tearing down, and flying with a myriad of candidates, we selected a 185 cc two stroke engine manufactured in Austria by Rotax. It is a universal industrial engine designed for a multitude of applications, one of the most common being a portable water pump used for fighting forest fires (where lives can often depend on the performance of the engine). Before selecting this engine for the Lazair, we questioned the people who use and maintain them. In every case it was obvious that this particular engine has earned an excellent reputation for performance and reliability. Although this engine cannot be considered a modern design and its power-to-weight ratio is not as high as some of the "screamers" designed for motorcycles, go-carts, or snow-mobiles, it has a long stroke (relative to most two-stroke engines) and develops its peak horsepower at the relatively low speed of 5,700 RPM, making it ideal as a power plant for a microlight aircraft. The 185 cc power plant uses the same carbon fibre filled nylon propellers as the 100 cc engines with one rather significant difference — *two* propellers are mounted on each engine. When first tested, the two propellers were mounted at ninety degrees in a four-bladed configuration. With the engine mounted on a test stand so its performance could be monitored, the angle between the two propellers was gradually changed in order to determine the angular displacement which produced the maximum thrust. Surprisingly, the thrust changed by no more than one percent over the whole range of angle from 90^{o} to 0^{o}. Consequently, the production configuration now has one propeller mounted directly on top of the other (somewhat like the wings on a biplane). This unusual looking configuration is not quite as efficient as an optimized two-bladed propeller, but it provides more than adequate thrust with a very small propeller disc (thereby keeping the propeller farther from the pilot) and creates much less aerodynamic drag when gliding than would a conventional four-bladed propeller.

With static thrust increased from thirty-five pounds to about sixty-two pounds, there is a noticeable improvement in take-off roll (now about fifty feet on grass) and rate-of-climb (we're now claiming 400 FPM but we haven't made an accurate measurement yet). Float performance is now very acceptable, with a roll of less than three hundred feet with a heavy pilot on glassy water. With a slight breeze, a slight chop, and an average weight pilot, it will lift off in less than a hundred feet.

We expected that the larger engines would provide more power, but one advantage we didn't anticipate is the improved performance at *low* power settings. Experienced Lazair pilots are aware that a landing in a short field with the Pioneer engines requires shutting down the engines well before touchdown to reduce the tendency of the Lazair to float. This is necessary because at the lowest speed at which the smaller engines will run smoothly, they produce about twelve to fifteen pounds of thrust. The larger engines can be throttled back to produce a thrust of four to five pounds.

As with any product improvement of this type, the bottom line is the pilot reaction. Pilots who have flown the Lazair with the new engines have been unanimous in their reports ... the Lazair flies beautifully with the small engines, but with the larger engines, it's even better. Since floats have just recently become available, only a few pilots have been able to test fly them, but again, the response has been excellent. As expected, virtually everyone who has flown the Lazair on floats has expressed the view that it is even more fun than flying it on wheels. What may surprise some pilots is the fact that flying on floats is also *easier* than flying on wheels.

Although the new engines are now being shipped with complete Lazair kits, they are not yet available for retrofit purposes. The price and availability of the engine retrofit kit and the floats will be announced before the end of January.



THE LAZAIR II TWO-PLACE MICROLIGHT MAKES IT'S MAIDEN FLIGHT

At 1625 hours on November tenth, the Lazair II, Canada's first two-place microlight lifted off the ground and climbed gracefully into the air. Piloting the craft was Dale Kramer, creator of the very successful Lazair and President of Ultraflight.

After a relatively short but rigorous test sequence which included steep turns and stalls, Dale landed the aircraft, announced that it flew perfectly, and invited his wife Linda to climb aboard. Linda, who is manager of Ultraflight Sales Limited and also pilots the single-place Lazair, was beaming after her first flight in the two-place version. When asked how she enjoyed the flight she replied, "It was great!", then added — "Dale turns a lot steeper than I do!"

Far from being a totally new airplane, the Lazair II is essentially the same as its single place baby brother except that the cockpit has been widened to accommodate the extra seat (with dual controls) and a twenty-four inch wide mid-section has been added to the wing. The two 18 foot outboard wing sections for the two-place prototype were taken from one of the company's single-place demonstrators. Even the power plant, which consists of two 185 cc Rotax industrial engines with carbon fiber filled nylon propellers is standard equipment on the single-place aircraft.

Following a test flight by Ultraflight Test Pilot Peter Corley and Chief Engineer Peter Lawrence, Ron Dennis, Air Canada 747 Captain and MOPAC President, accepted an invitation to fly as First Officer in the new Lazair and was obviously impressed by its flight characteristics. Subsequent test flights have been made with combined pilot weights as high as 375 pounds.

Although the F.A.A. in the United States, in its latest NPRM, does not allow a two-place microlight (or ultralight),

the Canadian Department of Transport has come out strongly in favour of a two-place for use as a training aircraft. The DoT regulations, as presently proposed, will permit two-place microlights to fly only if one of the two occupants is an accredited Microlight Instructor. Following the successful maiden flight of the Lazair II, Dean Broadfoot, Chief of Flight Standards with the DoT and the senior official responsible for the impending microlight regulations, offered his congratulations and expressed his belief that the availability of a two-place trainer will do much to maintain, and even improve, the excellent safety record that the microlight movement has achieved during its infancy.

Although empty weight and wing loading limits for microlights have not yet been made official, it is anticipated that different requirements will be placed on the two-place trainer. The numbers presently being talked about within the DoT for the two-place trainer are 150 kg (330 pounds) maximum empty weight with a maximum wing loading of 20 kg/m^2 (4.1 pounds per sq. ft.) based on a combined pilot weight of 160 kg (350 pounds).

Although plans to market the Lazair II have not yet been announced, it will be made available to Ultraflight dealers and other approved Microlight Instructors.

LAZAIR SALES HIT RECORD HIGH

November 1981 saw the largest monthly sales volume in the company's three year history. Although total sales of Lazair kits have not quite reached the five hundred mark, the number of kits ordered in November was just short of a hundred (ninty-nine to be exact). Although some of these sales are attributable to more and more pilots discovering the superior flying characteristics of the Lazair, many purchasers ordered their kits in November to beat the December price increase. A lot of people recognized a bargain when they saw it. Obviously, this sudden jump in sales just as we are phasing in a new engine has caused a few problems in production scheduling, but the first shipment of engines from Austria has arrived and will be modified and ready for shipment early in January. The second shipment is now in transit and the order has been placed for another two hundred engines, due to arrive in March. The backlog for complete kits is now approximately twelve weeks, but this should be reduced considerably in the next few months.

LAZAIR PILOT REPORTS

During the annual EAA Fly-in at Oshkosh this summer, Peter Lert, noted aviation writer and editor of Air Progress magazine, and David Martin, a navy F4 pilot and freelance writer, both test flew the Lazair. Obviously, both were very impressed by the Lazair's flight characteristics and they made no attempt to *suppress their enthusiam.*

David Martin's report appeared in the December 1981 issue of Ultralight Flyer. He sums up his impressions with "The Lazair is a delight to fly, even when conditions are not ideal. It is fun, clever, efficient, quiet and always draws a crowd. In the competitive world of Ultralights, it should be a winner."

Peter Lert's article, complete with coloured photographs, encompasses some eight pages in the November 1981 issue of Air Progress. He uses expressions such as "State of the art in Ultralights" and " Its deceptive simplicity, which tends to overshadow some rather astonishing sophistication" to describe the Lazair. After witnessing Dave Martin's flight, he wrote "...only the fact that Dave is stop-drilled at his ears prevented the grin from causing the top of his head to fall off." Peter underscores his detailed flying impressions with "As you may have gathered, I'm impressed."

If you are a Lazair owner or pilot, or would like to be, you owe it to yourself to find a copy of Air Progress and read Peter's article. If you can't find a friend who will lend you his copy, try your public library.

What is probably the most significant statement made by these distinguished pilots and writers was not published in the magazine —— after only one brief test flight, they have each placed an order for a Lazair for their own flying enjoyment.