

CANARD PUSHER

JULY 1998

RUTAN AIRCRAFT FACTORY

VOL.14, ISSUE 3, NO. 93

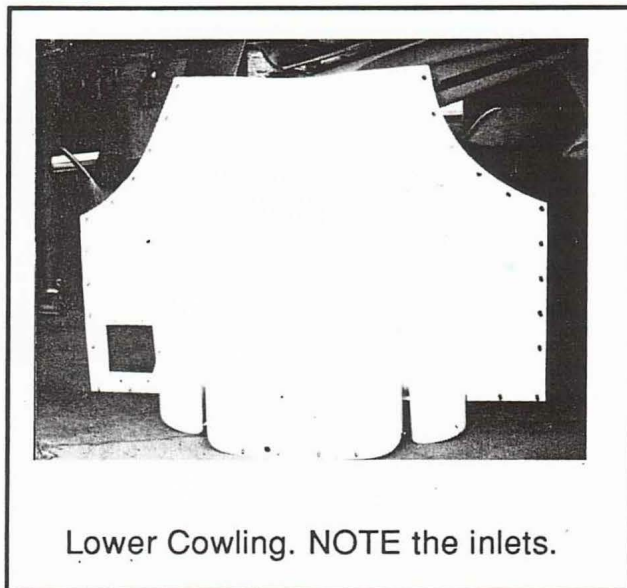
Feather Lite produces Mike's cowling

by Mike Melvill

Mike's Carbon Fiber engine cowling, is now available from Feather Lite. Call Larry Lombard, or Mike Dilley for details. The tooling is now in their hands, and I spent a weekend up in Boonville, discussing how to build the cowling, and taking photos of the cooling duct work that is in the lower cowl and required for good cylinder head and oil cooling.

First, a little history: during the early planning stages of my flight around the world, it was obvious that the marginal cylinder head and oil cooling that I had lived with for years in my Long-EZ, would not be adequate for the up-coming trip. The expected long climbs at very heavy take-off weights, in the warm temperate climate of the tropics, were sure to run my cylinder head temperatures to the stratosphere, and would peg my oil temperature for sure.

Over the nearly 18 years that I have been flying my Long-EZ, I have tried essentially every idea that came along to improve cooling. Most of them worked a little, but none of them completely cured the problem. A number of years ago, Jim Kern, of Task Research in Santa Paula, CA, built a highly



Lower Cowling. NOTE the inlets.

modified version of a Long-EZ, which had "armpit" cooling inlets in the corner of the wing/fuel strake and fuselage, at the forward edge of the cowling. These were quite large, and draggy, but very effective for cooling the engine and the oil. Some time later, we at RAF were involved with the US Army, in the modification and developmental flight testing of two Long-EZs. For other reasons they were not able to have the engine cooling inlet on the bottom of the plane, so we decided to design and install an "armpit" inlet on each side, similar to Jim Kern's design, but with a lower profile, with a smaller rectangular shape.

Much more recently, while flying Dave Ronneburg's Berkut, I was intrigued that he did not seem to have the same high temperatures that I did. Talking to Dave I learned that I should try something close to what he had, and he very kindly provided me with a couple of Berkut inlets to try. They were designed specifically for a Berkut, so did not fit into the square corner of a Long-EZ very well. However, they worked well enough that I decided to bite the bullet and make a completely new cowling.

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**For other photos & former article about Mike's custom cowling,
see Canard Pusher #86, October 96 issue**

Cowling

I actually used my original 17-year-old cowl for the male plug I built, so I was really committed! I removed the NACA inlet, filling that area in to be flush and smooth on the bottom of the plane. I extended the trailing edge of the cowling a couple of inches to try to achieve lower boat tailed drag, as well as to reduce the cooling air exit area. I believed that both of these features would result in lower drag.

I then designed and fabricated two inlet "armpit" scoops that were slightly less inlet area than what Dave had on his Berkut, not including the additional lower scoop that the Berkut uses for oil cooler cooling. I did not include one of those. My cowling only has two "armpit" inlets, both mounted on, and part of the lower cowl. The cooling air that passes into the cowling through these two inlet scoops, cools the cylinder heads, the engine and it's accessories, and the oil. In addition it also is the only source of breathing air for the engine (carb or fuel injector).

I conducted a very thorough evaluation of this cooling system, and found that I needed a larger oil cooler to keep the oil temperature in the middle of the green. I also had to control and deflect the high speed incoming air toward the cylinder heads to get the best possible results. I went through a number of variations on the composite ductwork in the lower, before I was happy with the results.

The final iteration is now documented and in the hands of Larry and Michael at Feather Lite.

I was so pleased with my new cooling system, that Dick Rutan, who had the same basic cooling situation that I had, decided to use my tooling and build and install one on his own Long-EZ. We both fabricated the cowling parts from Carbon Bid and epoxy, and were amazed at the weight savings over our old original cowls. My old cowl weighed 26 lb., and my new Graphite cowl weighs 13 lb. Cooling is dramatically improved, both in my plane, as well as in Dick's. Actually, my cylinder heads run almost too cold, in the low 300 degrees F at cruise, and never more than 390 on the warmest day, in the longest climb, at the heaviest gross weights!

As an example, the following data was taken at maximum power, in level flight, at 9000 feet, where the OAT was +6 degrees C. All temperatures are in degrees Fahrenheit.

Cylinder Heads:

#1-331, #2-335, #3-332, #4-336, Exhaust Gas Temps: #1-1380, #2- 1361, #3- 1385, #4- 1380.

All temperatures were taken on an Allegro Digital Engine Analyzer, which I believe to be the most versatile engine instrument available today. **Note** In order to cool the oil on a larger than standard engine, it is mandatory that you use a larger oil cooler. The one I have used for several years now with great success, is a Stewart Warner, part #10634R, with 13 "bays" and is almost square measuring Approximately 6" by 6.25" of

cooling area. This cooler is mounted in the same spot on the lower cowling as is called out in the original plans. I have tried mounting the cooler in every conceivable position, and have found this to work the best.

I must say, I am absolutely delighted with my lightweight cowling. It looks nice and clean, and it is definitely lower drag. It reduced the drag on Dick's Long-EZ, as I recall, he picked up about 7 knots. His temperatures also are excellent, although his oil temperature is not as cool as mine. We believe this is because he does not have as large an oil cooler as I do.

The new cowling design does not fit under the mounting flange on the plane as the old one used to. I added a flange under the existing flange, so that both the top and bottom cowls simply lay on to the plane, and are held in place with Cam Locs, no screws! Much quicker to remove, and I don't keep stripping the screw heads like I used to!

Installation details, together with internal ducting in the lower cowl, will be provided by Feather Lite when they send you your new lightweight graphite cowling.

See Page 10 for a list of Feather Lite products.

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