The Cleco

Experimental Aircraft Association • Chapter 393 • Concord, CA

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JANUARY 1995

YOUR 1995 OFFICERS

PRESIDENT	Fred Egli 935-7551
VICE PRESIDENT	Lisle Knight 658-6629
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EDITORS	Ken & Linda McKenzie 283-3119

CHRISTMAS DINNER

Our annual Christmas dinner was held Sunday, December 18, 1994 at Petar's in Lafayette. No host cocktails and hors d'oeuvres were served in the bar area, where we had a tape of Oshkosh 94 was running.

Will Price presented the first flight awards with his normal dry humor. The recipients were: Rick Young's Neiuport 17, N17RY; Phil Jenkin's and Bob Decker's Glasair IIS, N73SB; Bruce and Nancy Seguine's Tempco Swift GC1B, N3384K; and finally the SX300, N89EE, built by Rick Lambert.

Glenn Werner presented Blooper awards, with help from Chris Kenyon. Rick Young for ground looping the Neiuport, Ray Nilsen for dropping a pair of vise-grips through the Christen Eagle's wing (after the painting was completed), Will Price for turning on the Lancair's master switch with the gear up switch on, and Scott Achelis for experimenting with the RV6A's C.G. Chris awarded Glenn an award for being unprepared for an FAA ramp check.

Will Price closed out the awards segment of the event with the presentation of "The Man of the Year Award", given to Lisle Knight for his persistence in following through on all of those thankless tasks that are the fabric of an active club.

We retired to the dining room for a wonderful dinner, while Larry Laughlin emceed the Raffle.

MEMBERSHIP MEETING

January 25, 1995, (the 4th Wednesday of every month) @ 7:30pm, Old Buchanan Terminal Building, Concord Airport. Please wear your badges to help those of us who have trouble remembering everyone's name. Bring chairs since we never seem to have enough.

BOARD MEETING

The board meeting is scheduled for 7:30 p.m., Wednesday, February 1 at Fred Egli's house. If you are interested in attending or have a matter you wish to discuss, please call Fred.

JANUARY PROGRAM

Aerospace Composite Products

by Larry Laughlin

Have you ever heard of this company? Probably not, since George and Barbara Sparr (the principal owners of ACP) seem to cater heavily to the high performance Radio Control modeling gang. Actually, Barbara Sparr runs ACP, while George, for the time being, is wrapping up a contract to introduce Russian made Composite Products to the US markets. Fortunately, ACP is rocketing upward in sales and George is likely to join Barbara full-time very shortly. ACP's products and services are very applicable to our "homebuilt aircraft" industry and ACP is a great source for unique supplies such as carbon fiber graphite, S2 glass & Kevlar, vacuum bagging supplies, epoxy resins, and more (over 400 line items to be exact). Between George, Barbara and Justin (son), they really know their way around composite products and systems for punching out quality parts. The fact that George has spent nearly 20 years in sales and marketing composite products to companies such as Northop, Grumman, and Boeing Military (to name a few) gives him unique and vast experience on what's hot and what's not in the composite business.

Fasten your seat-belts and prepare to witness some of the cutting edges in composites construction!

THE RAFFLE
by Larry K. Laughlin

Now that Chapter 393 members have had a little taste of what our monthly raffle can do and I've gained a little experience as Raffle Chairman, I think a few changes are in order for 1995. For starters, I'm going to change the price of each ticket as follows: 1 ticket for $1.00, 3 tickets for $2.00, and 7 tickets for $5.00. This will make it easier for everyone to whip their names on the raffle drawing copies and/or keep track of their own copies for the "grand-year-end-raffle". We have just too many tickets to deal with using the old system, and the results should come out about the same for everyone. The second change is for me to vary the prizes in that some meetings you'll find a table full of little things, and other meetings you may find just one big item on the table. Again, the end result should come out the same - GREAT PRIZES for the raffle winners! The last change is to attempt to show a profit come year's end. If the monthly expenses of the raffle prizes are limited to $75 or less and you all spend $2 to $5 each on raffle tickets every month, Chapter 393 should be able to put $250 - $500 back in the bank account in profit! By the way, I have funded that 1994 Raffle Program personally, but never intended to show a profit a year's end. All moneys collected went right back out for the next month's raffle prizes and I've kept accurate records accordingly. Now that I've got a feel for what's happening in the raffle game, we can all use our raffle program as a vehicle to build the club's bank account. It was pointed out that Chapter 393 made about $30 - $40 every month on the "old crappy" raffle and that was about it for fund raisers towards the club treasury. So, how does that sound? Any and all ideas are welcome, as well as any contributions to the effort. Please contact me at (510) 758-3533, if you have an idea that might help the raffle effort or any prize donations.

Great Massage Prize?

Raffle Chairman, Larry Laughlin, forgot to send a well deserved "thank you" to the donor of the unique Massage Raffle Prize, awarded at our recent Christmas Party. Will either the winner of that prize or the #393 member that presented it to Larry in November, please contact Larry at (510) 758-3553 for a name and address? Yes, the pressures of being the Raffle Chairman are overwhelming at times.

MINUTES OF THE BOARD MEETING

The final Board Meeting of 1994 was held at Fred Egli's house, Wednesday, December 21 at 7:30pm. It was decided that Fred would contact Petar's to reserve the Sunday, December 17, 1995, for the next Christmas Party.

Since Lisle is scheduled to be out of town, Larry Laughlin has been enlisted to arrange for the January speaker.

We requested that Louis prepare a full accounting of the revenues and expenses for the Christmas Party. The actual cost per person turned out to be $21.88.

TREASURERS REPORT

Balance in the Checking account is $194.86; the balance in the Savings account is $2,316.43. $300.00 was transferred from the Savings to the Checking to cover expenses incurred in December.

68 persons attended the Christmas Party, at a price of $20.00 each for total receipts of $1360.00. We paid $1488.00 for the dinner, including wine at the tables and hors d'oeuvres. The Chapter Treasury covered the $128.00 balance.

UNCLASSIFIEDS

FOR SALE: IO-360-A1B (fuel injected, 200hp) for sale "at more than a fair price." Call John M. Agee, M.D. at (916) 484-7038. [Ed. Note: Larry Laughlin says this is a 17 year, Angle Head, Zero Time engine (since NEW), all updated and test run for $14,500]

FOR SALE: Lightweight starter for Lycoming engine. Manufactured and STC'ed by Lycoming. New; $450. Call Mike Parker, (510) 685-4809 (leave message).

FOR RENT: Hangar space is available in one of the West Ramp Port-to-Port for building a kit. Contact Barry Burgess, 118 West MacDonald Ave., Richmond, CA 94801. Home (510) 215-2991; Work (510) 532-5242

Start the new year right: put an EGT gauge in your plane!

Alcor EGT gauge -- the ubiquitous 2.25" model -- for sale, with probe and lead. This gauge was working fine in my Mooney, removed when an Insight GEM was installed. The lead should be long enough for any single-engine plane with the fan in front. $100.

- les niles (415) 812-4812.
  Mooney N975M

Have a 0-300MPH Bendix 3" A/S indicator for sale. Was serviceable when removed from C-172. $65

408-370-7983 Art

Pete Wiebens has hangar space for rent. Call 933-7517.

FOR SALE:

1. Trimble Flightmate GPS $400.00
2. Genave Model 1000 720 Channel Nav-Com $400.00

Call Seth Hancock at (512) 251-2768 or (512) 863-2019.

Effects of Lower Winglets on Stall Characteristics

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Reprinted from Contact!, with permission from author, Shirl Dickey

Shirl Dickey is the designer of the E-Racer, a two place side by side canard airplane which is powered by a Buick/Rover V/8 engine and was first flown in 1986. Typical conventional airplanes produce a noticeable buffeting of the tail surfaces before the stall of the main wing, created by naturally by disturbed airflow from the wing, in some designs triggered by leading edge stall strips. Correctly built Rutan canard designs like the Varieze and Long-EZ differ from these normal sensory warnings in that partial loss of canard lift produces a cyclic bobbing of the aircraft nose averting canard stall. All bets are off if conventional or canard airplanes are flown aft of their specified C.G. limits. MCM (Michael C. Myal, EAA 7978, Editor of Contact!)

I have been asked by E-Racer builders to comment on the flight testing conducted on the Cozy Mk IV and documented in Cozy Newsletter No. 44. The concern is whether the removal of lower winglets is a positive or negative effect. The following is my perspective on this difficult issue surrounding canard aircraft designs:

To deep stall or not to deep stall, that is the question. Given the choice between deep stall vs. conventional stall, which would you choose? It has been demonstrated on at least three occasions (2 Velocity, 1 Long-EZ) that upright deep stalls can be survivable. One inverted deep stall (Velocity/N. Hunter) was fatal. Once entered, a deep stall becomes "locked in" and nearly impossible to escape from, no matter how much altitude you have to work with. On the other hand, a conventional stall is not a stable or "locked" condition and can be recovered from provided that there is enough altitude. If the conventional stall is allowed to fully develop it then becomes a spin which is more stable and more difficult (though not impossible) to escape from. A conventional stall into the ground is not likely to be survivable where as deep stalls are generally more survivable. Why is this? This is probably due to the attitude of the descending craft. A deep stalled aircraft is generally descending in a slightly nose high attitude relative to the horizon while a conventionally stalled aircraft usually descends in a steeply nose down attitude relative to the horizon. Also, the conventionally stalled aircraft may have a higher decent rate than a deep stalled aircraft. In a nose down impact with the ground the occupants are slammed into the instrument panel at high Gs. In a nose high impact with the ground as in a deep stalled aircraft there are some beneficial things that help dissipate the impact energy and reduces damage to the occupants. The first thing to hit is the landing gear, a device that is designed to absorb energy in this direction. Other parts of the composite fuselage will fail in shear and compression, absorbing energy as the crash deceleration takes place. Important to this scenario is the fact that the occupants are in a semi-supine position. Occupants that impact the ground in this attitude will sustain sever back injuries which, though disabling, can be more survivable than the head and chest injuries that result from the nose down impacts as seen in the conventional stall.

NORMAL VS. DEEP STALL

This situation leaves the designer or the builder/pilot with a Draconian choice, deep stall vs. conventional stall. Do you design for or accept a deep stall that may be more survivable but inescapable once entered, or do you accept a conventional stall that is less survivable upon impact but easier to escape, making ground impact less likely? A nasty choice to be sure...

Stall concerns have led designers to the canard configuration aircraft which offers the possibility of eliminating stalls totally thus side stepping the choice all together. A neat solution if you can pull it off.

Back to the Draconian choice. I believe that most aircraft designers, if given such a choice, would choose the conventional stall option over the deep stall option because, though both stalls can be entered inadvertently by the errant pilot, only the conventional stall has the escape option. Also, the conventional stall comes equipped with lots of early warning cues while the deep stall is insidious in its onset and can easily be missed by the inattentive or distracted pilot. Enter a deep stall and you will hit the ground. Enter a conventional stall and you probably will not hit the ground; at the very least, the pilot can take action that will effect a recovery given sufficient warning, skill and altitude to do so. This places the aircraft in the hands of the pilot, where it should be. Only he has the choice to put himself, his passengers and his aircraft at risk by stalling the aircraft and, once entered, only he can extract himself, his passengers and his aircraft from the situation. By comparison, once in a deep stall no amount of skill or altitude can prevent the ensuing impact with the ground. He may live to tell about it though...from his wheel chair. In short, deep stalls are to be avoided at all costs.

This brings us to the science of Aircraft design. It is obvious that an aircraft must be as stall resistant as possible within the constraints of the design objectives. What design philosophy do you as the designer use at the interface between stable flight and the stall? Do you design for a transition from stable flight to a conventional stall, or do you design for a transition from stable flight to a deep stall? Again, a nasty choice.

A review of Cozy Newsletter #44 suggests, reading between the lines, that this designers's philosophy is the latter; i.e., transition from stable flight to deep stall. According to his data, the Cozy MK IV, before the aft C.G. study, would drop a wing at the stall followed by a normal recovery. The aircraft had no lower winglets. The result was that at high angles of attack and low indicated airspeeds, span wise flow from the lower surface would spill off around the end of the wing causing wing rock and ultimately the aircraft would roll off into a full departure at aft C.G.s. Deeming this as unsatisfactory, the designer reinstalled the lower winglets on the aircraft. The lower winglets capture and contain the span wise flows which establishes a stable and balanced side to side lift distribution at the stall. Once in this stable/stalled condition, airspeed drops toward zero where the deep stall locks in. I believe that the Cozy designer was very lucky not to have gone over the edge into a locked-in deep stall during testing. Only careful attention to airspeed coupled with immediate recovery inputs once airspeed dropped from the stable 55 knots towards zero, prevented the deep stall lock up. The inattentive or distracted pilot might not be so lucky. Once airspeed reaches zero the deep stall locks up and ground impact is inevitable.. The observation that the Cozy's angle of attack was in the 13 degree range is more likely to have been its deck angle (horizontal fuselage reference) relative to the horizon, not angle of attack. As airspeed drops to zero, angle of attack increases towards 90 degrees with no change in deck angle (angle of attack is chord line vs. relative wind angle, not deck attitude relative to the horizon). I suspect that the actual angle of attack in the Cozy tests exceeded 18 degrees at the 55 knots stall and his angle of attack was very much higher as his airspeed dropped towards zero even though his deck angle remained at +13 degrees. Had the Cozy pilot allowed his airspeed to go to zero the angle of attack would have been about 103 degrees! That's one hundred and three degrees of angle of attack, folks. With zero airspeed the relative wind is upwards at 90 degrees to the earth, add to this the apparent 13 degrees positive deck angle and you get 103 degrees angle of attack and BIG TIME DEEP STALL! No airfoil or control surface will operate in this regime. I am amazed that the Cozy was not lost to a deep stall incident after eight attempts to induce it. NOTE: High angle of attack testing done by Danny Maher using a ground test vehicle showed that at least 18 degrees of angle of attack was needed to stall the main wing of a Velocity (which is very similar to the Cozy Mk IV). The Velocity tests also showed that its large strakes did not stall until 28 degrees which, due to their location ahead of the C.G. would create a destabilizing effect that would contribute to the risk of deep stall.

EARLY WARNING

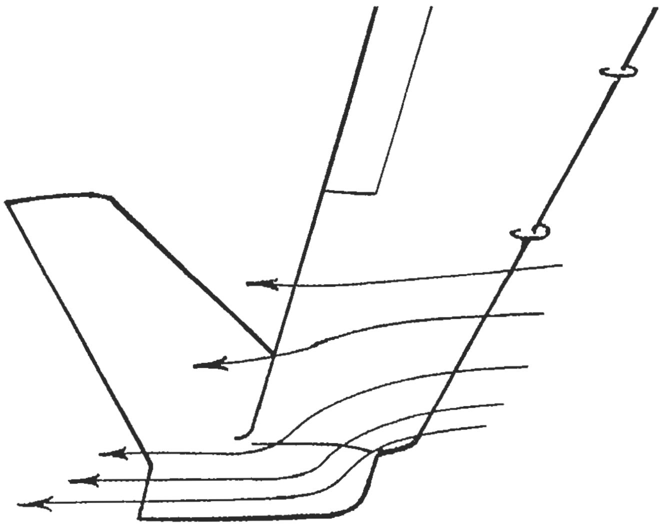
The insidious thing about deep stall is that the transition from normal flight into the deep stall is not detectable looking out the wind screen. No sudden changes in attitude, no obvious loss of control, little or no changes in deck angle, just a loss of airspeed to zero and an increasing sink rate. Only riveting attention to the airspeed and rate of climb instruments can give the pilot any warning. An angle of attack instrument or stall warning device would also be most helpful but who puts such an instrument in a homebuilt aircraft? *(Ask Lyle Powell. - Ed.)*

The Cozy tests showed that the lack of lower winglets reduced the aft C.G. limit by 0.50 inch. This may be true on Cozy aircraft, and perhaps on other Rutan derivatives as well. One thing that was apparently not recognized was the safety benefit that this omission gave the aircraft, which was a less roll stable wing at high angle of attack and low airspeed. One thing that the pilot desperately needs are visual cues to incipient problems or threats. As airflow is allowed to bleed off the wing in the span-wise direction the aircraft will develop some initial "Dutch Roll" followed by a wing drop (or departure). The pilot will sense he has a problem. By replacing the lower winglets the Cozy may have regained the 0.5 inch of aft C.G. range but in doing so it limited span-wise flow and established a roll stable wing (even at zero airspeed). It took away an important visual cue (that the pilot needs) and greatly increased the possibility of an inadvertent entry to a deep stall. The designer then went on to re-gain several inches of additional C.G. range by chopping the Canard span.

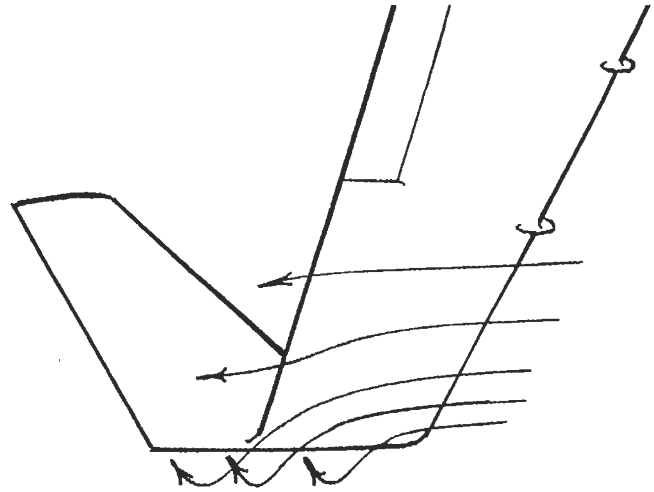
DEEP STALL CURE

I submit that the trade-off of important visual cues to a very dangerous and insidious deep stall condition in exchange for 0.5 inch increase in C.G. range was a very poor choice. My speculation is that the aircraft, with no lower winglets and a canard shortened by 6.0 inches would have an aft limit of about 103 inches. It would have the additional benefit of the visual cues of 'wing rock' and 'nose bob' at full aft stick that make it unmistakably clear to the pilot that further aerodynamic abuses will result in something very unpleasant.

It was not clear from the Cozy newsletter whether this aircraft was equipped with vortalons. These are mandatory for all Rutan type aircraft providing the most important function of preventing span-wise flow at minimum airspeed and high angle of attack along the top surface of the wing. Top surface airflow provides 80 percent of the performance of the wing (acting in the low pressure regime of the wing). Airfoil performance is not drastically effected by bottom surface (or high pressure side) airflow direction so long as it remains attached and does not experience flow reversals. Thus, some span-wise flow on the lower surface is not detrimental to airfoil

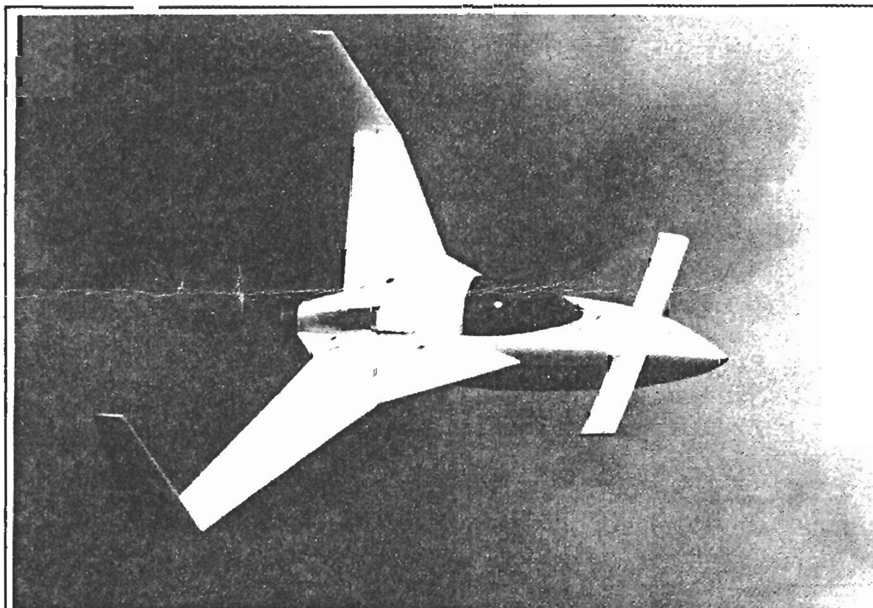


Lower winglet acts as air fence to minimize span wise flow



Span wise flow at high angles of attack causes wing rock

performance until the angle of attack approaches the point of flow reversal which is well beyond the point where the top surface is totally separated. Therefore, the lower winglets do little or no good as far as airfoil performance is concerned, but at low speeds they act as air traps (dams) forming a stable air cushion at each wing tip that tends to balance the loads side to side, not allowing the alternating spilling of air from under one wing tip or the other, characteristic of wing rock, or Dutch roll. This 'roll stabilized' condition takes the aircraft closer to the deep stall "abyss" while at the same time removing important sensory cues to the pilot that tell him that he is in trouble.



Flight photo of E-Racer powered with a modified Buick 215 engine.

I, for one, prefer to give the pilot the benefit of aerodynamic feed back in the high angle of attack, low airspeed regime while accepting a small penalty in C.G. range that can easily be overcome with a shortened canard. Chopping the canard increases the canard loading but at a cost. It moves the whole C.G. range aft, not just the aft limit. This will increase take-off rotation speed when flown at the forward limits of the C.G.. This is especially critical to side-by-side Rutan types which tend to be flown at the forward limits when ever both front seats are occupied. It is foolish to test 'rotation speed' while in flight. The aircraft will always fly slower than its rotation speed because while in flight it has the appropriate angle of attack to sustain canard lift at speeds below the rotation speed. In the take-off ground roll the canard must develop enough lift to rotate while in a level stance (at the aircraft's static angle of attack). This speed will be much higher than the aircraft's minimum flying speed. The way to test rotation speed is in the ground roll at take off.

RECOMMENDATION

So what do I recommend. I think that this is a decision that is best made by each individual pilot. Leave the lower winglets on and you will have a roll stabilized aircraft that is solid as a rock right up to and including deep stall lock up. Take them off and you destabilize the aircraft in roll at high angle of attack and low airspeeds which can lead to a conventional stall if the aircraft is flown outside of sane (C.G. and control input) limits. I have stated here in what my choice is... you decide which poison suits you best. **SD**

The Cleco

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OAKL... CA 946
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(9)Dues Due , 2/28/95

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