CP10/2

The following are average weights for items constructed from the VariEze plans:

CANARD (chapter 4) 16.7 lb.

Both elevons with weights 6.3 lb.

Each wing with fitting 34.0 lb.

CP10/3

When mounting the template drawings for the wing foam cores, use a straightedge to assure that the level lines are straight. If you line them up referring only to the vertical lines, it is easy to get the rib crooked. A good spray paper adhesive like 3M-76 prevents the wrinkling caused by waterbase glues.

CP10/3

When tacking the large blocks together for the wing cores, some builders have had the five-minute leak down in the joint far enough to hang up the hot wire. This can be avoided by laying a stick of wood across the joint and applying the five-minute to the stick, well away from the foam joint.

CP10/3

A couple builders have reported that the glass build up on the wing fittings has been too high, such that even without the tolerance pads, the last ply is higher than the WA8 tongue (page 6 - 8). This is due to one or both of the following: (1) Inadequate stippling/squeegeeing on the pad/ spar/skin layup causing an overly wet, thick layup. (2) The Brock wing fittings have a WA3 tongue which is about .015 undersize due to a machining operation. This is equal to one ply of BID. Thus, we recommend that if you are using the Brock fittings, you reduce the pad by one ply and carefully squeegee during the layup. If you do come up high, do not cut away the skin, it must be continuous under the wing fitting. Make an aluminum spacer from some aluminum sheet and install it between WA3 and WA1 to fill the gap caused by a high layup. A high layup due to excess epoxy can be lowered by applying pressure on the top plate if the layup has not started to cure. This is possible if the layup is done below 75 degrees F and with enough people so it can be completed within three hours. Never attempt any layup below 60 degrees F, since the higher viscosity of the resin will make it more difficult to wet out the cloth. A good quality layup is difficult to achieve below 65 degrees F.

CP10/3

A preferred method to potting the electrical wires in the wings is to install a conduit, then push the wires thru later when needed. The conduit can be thin-wall alum or plastic tube, 1/4 or 5/16 dia. Only two #18 wires are required per wing, since strobes should be mounted on the fuselage (one on top behind canopy and one on the bottom near the nose wheel well).

CP10/4

WING FITTINGS - Before you bond the fitting permanently to your wing-spar foam core (chapter 6, step 3), trial fit the whole wing foam core (with the fitting) in the jig. The fitting should fit flush with the inboard edge of the foam core. Check the positioning of the spar core carefully and make sure that the spar trough top and bottom is deep enough to accommodate the spar cap layup. Use the section views of the completed wing on pages 6-18 through 6-21. Make sure that the fitting is on the spar foam core straight and not cocked off to one side vertically or horizontally.

CP10/5

6 - 11, 2 - 2 and 2 - 3

AN 525 - 416R - 16 should be AN 525 - 416R - 14. If you have received -16 screws from Aircraft Spruce and Wicks, return them for -14 screws.

CP10/5

6 - 16, Template D

The notch which extends from talking number 11 to about 6.2 should extend another 1/2 inch to talking number 5.2. This allows the wing fitting to slide in another 1/2 inch to its correct position on the wing. \*\*SKETCH OMITTED\*\*

CP10/5

6 - 5, Pads

The 4" x 6" pads should be 2-1/2" x 6". The pads on 6 - 7 and 6 - 11 are correct. They can extend beyond the fitting. The sketches on page 6 - 4 do not appear to show the wing fitting at its 25-degree angle. This is shown correctly in the sketches and photos on page 6 - 5.

CP10/5

6 - 8, Spar cap

Clarification: The photo at the top shows the cap extending out onto the outboard core farther than it actually does. The photo was taken for the top layup (step 8), in which the cap is longer.

CP10/6

6-17, Wing Fittings

Material callouts omitted. All material except WA4 is 2024-T3. WA3 tongue is 3/8 inch plate, milled .003 thinner than WA5 to provide clearance. WA2 and WA1 plates are 1/8 thick. WA6 plates are 0.063 thick. WA7 tubes are 1X.035. Overall height to outside of WA1 plates is 6.0 inch. Scale other dimensions. WA4 pins are 4130 heat treat to 120KSI. Taper is 10 degree included angle. Top pins are drilled 1/4 inch. Bottom pins are tapped 1/4 X 28. The #10-32 tapped holes in WA3 should be only .35 deep. Use bottoming tap. Long bolt may have to be -51 length depending on tolerance accumulation, or an SAE grade 8 bolt can be substituted which has a longer thread length.

CP10/7

6-1 and 6-2, Step 1

Step 1, wing foam core cutting has several obvious errors VariEze wings sweep aft not forward! Replace step 1 with the revision shown here. You will cut 4 cores in the following sequence: RT OTBD, LT OTBD, RT INBD, and LT INBD. Each of the large blocks has one left and one right core. On page 6-12 through 6-15 are patterns for A, B, and C. The flip sides are X, Y, and Z, respectively.

STEP 1

CP10/7

HOT WIRE CUTTING THE WING FOAM CORES

This step will take about two hours. You need an assistant for hot wire cutting. First make the three airfoil templates A, B, C and the two spar templates D, shown on pages 6-12 thru 6-16 from plywood or sheet metal. While you're doing woodwork, make the three jig blocks E, F, and G shown on pages 6-12 thru 6-15 from 1/4 plywood. Lay two of the 9x18x67 blue foam blocks out on your work bench and nail together as shown. Remember that templates X, Y, and Z are the flip sides of A, B, and C. \*\*SKETCHES OMITTED\*\*

Carefully hot wire trim the blocks to the dimensions shown. Position the templates for the outboard right wing core as shown. Careful positioning is required so that enough foam is left for the inboard wing and winglet cores. \*\*SKETCHES OMITTED\*\*

Cut the core. Go slowly around the leading edge: pause at the marks. Don't rush the wire. \*\*SKETCHES OMITTED\*\*

Pull the templates off and set the whole block aside. Get the other blocks, assemble, and trim them as shown. \*\*SKETCHES OMITTED\*\*

Align and level templates Y and C as shown ( Y is the flip side of B, Z is the flip side of C ). Cut the left outboard foam core. Now, modify template B and Y by carving out the spar trough as marked on the template. \*\*SKETCHES OMITTED\*\*

Flip the foam block over and position template A and Y as shown. Cut the inboard right foam core. \*\*SKETCHES OMITTED\*\*

Now, set the finished cores and remaining foam block aside and put the first foam block back on the table. Locate the X and B templates as shown. \*\*SKETCHES OMITTED\*\*

Now, cut the inboard left-hand core. Go slowly around the leading edge, pause where indicated. Before you remove the foam cores from the block, mark the waterline on each with a ball-point pen. \*\*SKETCHES OMITTED\*\*

Don't throw the remaining block of foam away. Store it for use in chapter 7.

NOTE: Check vertical placement of templates to allow cores to be cut out of the block without interference.

CP11/3

Alignment - If your foam core is cockeyed when you glass it, your airplane will be cockeyed too and probably fly that way. Get your foam cores assembled correctly. Use lots of nails to hold it straight while the micro cures. Check the depth of the spar notch and be sure that it's correct, top and bottom. Wing and canard foam cores should be assembled vertically as shown in the photos on page 6-6, nailed together firmly, and the depth of both spar notches checked before placing it in the jig blocks.

CP11/3

Weight - Micro is heavy and costs a lot more than foam scraps. Use a foam block to fill the big gap around the wing fitting nuts instead of the large micro fill shown on page 6-18 (inside the wing root). Even a rough fitting foam block will be much lighter. The interior foam face is given a one-ply BID protective covering.

CP11/3

General Hints/Clarifications Page 6-5 - The seventh ply of BID, fifty-three inches by twelve inches, is used for the wing root and mid spar ribs shown on the top of page 6-6, same step.

CP11/4

Ed Hamlin reports that a Dremel #428 wire brush works beautifully for cleaning the residual foam and micro off of the canard, wing and winglet trailing edge overlaps in preparation for the top skin lay-ups.

CP11/4

Be sure you have at least the overlap shown at the trailing edge for the top and bottom skins (0.4 inch on canard; 0.5 inch on wing and winglet). Be sure the overlap area is sanded well before top skin layup.

CP10/7

6-21

The Radio Shack switch is not a spring-to-center type. A Micro switch #8A-2041 should be used.

CP12/6

Leading edge overlap on wings, canard, and winglets, can be done with ease and very neatly using the paint roller. As you layup the upper skin plies, use the roller to wrap the overlap up onto the bottom skin instead of stippling with a brush. The brush tends to fray the cloth as you stipple giving the cured overlap a very rough surface requiring ambitious sanding to fair. The roller leaves the cloth smooth and unfrazzled. Scissor trim each successive skin ply a bit shorter than the preceding ply giving the lap joint a semi-tapered finish requiring far less work to sand smooth, and eliminating any tendency for the plies to pull away before cure.

CP12/6

Trailing edges. When making your final inspection and preparation of the foam core for skinning, look carefully for potential trouble spots. A hot-wiring defect or too abrupt curvature may tend to leave voids in the trailing edge corners between the glass and foam. If you even suspect the possibility, sand the area to a more gradual transition before laminating. A well prepped foam core makes the layup much easier.

CP12/8

Spoilers. A couple of builders have reported that their spoiler torque tubes interfere with the brake master cylinders. If you run into this problem, the top of the master cylinder can be shifted aft (away from firewall) by redrilling the brake actuating arm as shown. \*\*SKETCH OMITTED\*\*

CP12/9

Section I

6-21

2.3 inch dimension should be 1.7 inch

CP13/5

Probably the most troublesome step in the EZ construction has been wings, step 4, page 6-5. There have been a few problems in several areas: 1) it's a long tiring job, ending in an important alignment of several pieces, 2) it covers some glasswork immediately, making it impossible for FAA inspection of vertical shear webs, 3) some builders have not been successful in making a uniform correct thickness layup on the pads in the wing fitting area and have found that they later did not have enough room for the spar cap and skin under the top plate. We are now recommending two improvements that should make this step VariEze. First, layup the 12 and 15-ply BID pads separately. Do this as follows: lay Saran Wrap on a flat surface, layup (RAES) 1 ply Dacron peel ply, the 12 or 15 plies BID and another ply Dacron peel ply. Cover with Saran Wrap, place a flat block of wood or aluminum and load or clamp with about 50 pound force. Let cure. Trim the cured pads to fit the wing fitting, rounding the edges to allow a smooth shear web layup. Peel the Dacron and bond the pads in place. Be sure they fit flush to the adjacent foam surface. This will assure a straight spar and a pad that is not too thick. The second method change we are recommending is to split step 4 into two separate cures. Stop at the bottom of page 6-5. Peel ply all sides of the box spar. Lay Saran Wrap on a flat surface and set the box on it being sure it is straight while it cures. After cure, peel the Dacron, drill holes for the dowel jigs (see newsletter 12, page 8) and continue with the jigging operation on page 6-6. At this point the aileron cores have been removed from the inboard trailing edge core. Place them back in and hold in position with nails so you will have the straight trailing edge to align the cores in the jig. In summary, an important step has been changed from a long difficult one to three relatively easy ones. Do use the separate-weighted cure method on the four thick pads in the center section spar also--this will avoid a high buildup there.

CP13/5

Several builders have asked how to repair a poor trailing edge overlap in the canard, wing, or winglet. The method shown below works quite well. The surface is prepared for bond, the dry BID cloth at 45 degrees is taped to one side, wrapped to the other side and taped snugly to pull out wrinkles. Once it is taped down well the BID is wet out with a brush (RAEF) and allowed to cure. Remove the tape (gray duct tape works well) and fair in the edges with 36 grit sandpaper. This method can be used full span on the wing for a super strong trailing edge joint, with a small weight penalty. It is not considered mandatory, though. \*\*SKETCH OMITTED\*\*

CP13/6

Check the length of the AN509-428-16 screws before countersinking the wing fittings. You should leave the heads a little high, not flush. Better yet, use the AN525's and do not countersink.

CP13/6

In areas where the thickness of glass buildup is important - shear webs, spar caps, pads, etc. - always calculate the thickness (0.13" per ply for BID, 0.009" per ply for UND) and measure the foam core to be sure the foam is the correct size before glassing. The spar cap and skins must make a smooth, straight transition onto the outboard cores (wing and canard). Be sure you fully understand the quality control criteria in "Section I," "Section V," and newsletter 10.

CP13/6

Section I

page 6-5

Photo at top is misleading--method is correct but the part is shaped different--it was from N7EZ.

CP14/9

Ray Mucha - "When joining canard and wing cores first put the templates together and drill the nail holes all in the same place. Then later when the cores are joined, a wooden Q-tip stick or round toothpick in a few of the nail holes will hold the cores in alignment."

CP14/9

Vic and Mary Sullivan - "Any type cake decorator's cone can be used to apply dry micro. After hot wiring the aileron piece from the wing, nail it back into place so you have the full straight trailing edge available to accurately jig the wing. Remove it before skinning wing."

CP14/10

ERROR: Foam cores jigged in wrong position so that wing or canard will have joggle when glassed. REPAIR: Cut core loose and bond (wet micro) in correct position before continuing.

CP14/10

ERROR: After wing was completed I noticed that shear webs were butted on sides, rather than top and bottom. REPAIR: This is a very extensive repair but does save $ and time over the job of completely replacing wing. Cut skin as shown on wing bottom. Remove foam wedge. Sand entire shear web face dull and glass with 3-ply BID at 45 degrees. Put in new foam wedge with wet micro. Be sure wedge fits well to avoid exotherm. Patch skin as shown in "bump" repair above. \*\*SKETCH OMITTED\*\*

CP15/5

Most people think the relative incidence of the two wings, set in chapter 8 is permanent, with no adjustment. This is not true. Several builders, on our instruction, have used the heat deformation method to straighten wing incidence on a completed airplane as much as one degree to correct a poorly trimmed airplane. Do this as follows: Attach a board as shown to the wing to provide a 600-ft-lb torque in the direction desired. Cover the wing root with corrugated cardboard to insulate it to protect the blue foam. Using hair dryers or radiant heaters\* slowly warm the center-section spar (three or four sides, depending on if fuel tank is on), continually checking the surface for correct temperature (at least five seconds to pain). Heat it uniformly from the wing fitting to the fuselage. Let the spar completely cool before removing the weights. Recheck incidence to see how much it changed - don't overdo it the first time, use only moderate heat until you see how much will be required. \*\*SKETCH OMITTED\*\*

CP15/6

Before glassing canard or wing bottom put masking tape below the knife trim line on the leading edge. This keeps epoxy off the foam on the top surface. A few pieces of 2"-thick, 2 ft-square foam rubber are handy to support wings and foam cores so they can be handled and worked on, without damage. Sticking nails into the leading edge of the wing cores at the W.L. at tip, root and mid-span will help in eyeballing the leading edge straight. Thanks, Duane Solberg, for the above hints.

CP15/6

Bob Gentry suggests adding 2" to the height of all wing jig blocks to give room to reach under to clean off micro.

CP15/7

Q. Can I use Scotch Brite dish pads to dull the fiberglass for a future layup? A. No, use only 36-grit or 60-grit sandpaper. Better yet, plan ahead and use peel ply. We've noticed that many builders are not using peel ply for winglet attachment. Be sure to peel ply the outboard 18" of the wing and the lower 14" of the winglet.

CP15/8

SECTION I

pg 6-7

Section A-A trough should only be 8" long on bottom of wing. Use the full 10" for wing top. Use care to not undercut this area. On glass dimensions, increase the 58" dimension (UND spar cap) to 62" and increase the top UND spar cap from 62" to 66" (page 6-11). New construction only, retrofit is not required.

CP15/8

SECTION I

pg 4-2, 6-1,

& 7-1

Add "Be sure to use the method shown at the top right of pg 7 of newsletter 12. This will assure a straight leading edge. Hotwire L.E. wire

CP15/8

SECTION I

Pg 6-14 & 6-15

The waterline on template Y/B and the straightedge of jig block F are at an incorrect angle by about 0.7 degrees. This error was noted in newsletter 11, and builders were told to shim F to get straight leading and trailing edges. Most builders have done this, taking the correct approach of making the root & tip waterlines parallel and shimming to get a straight L.E. & T.E., thus getting a straight wing with the correct twist. However, some did not notice the note in cp 11, and have questioned us on the jigging method. To avoid confusion, correct the waterline on Y/B and F as shown, by raising them 0.27" at the trailing edge. They are correct at the leading edge. Now, if the jig blocks are mounted on a flat table, the L.E. & T.E. should be straight.

\*\*SKETCH OMITTED\*\*

CP16/7

WING CORE SETUP - Trailing edge is at bottom on all four assembly drawings shown below. Templates are all placed upright. L/H are reverse of R/H. \*\*SKETCHES OMITTED\*\*

CP16/7

The best material for electrical conduit in the wings is a handful of soda straws. Stretch one end a bit so it will fit over the next straw. Gang them together and micro them into the slot in the wing. They are very light and large enough to push wires through for trim, or as a backup slot should you ever have to replace the rudder Nylaflow tube.

CP16/7

When you lay the peel ply into the trailing edge notch before glassing the first side of wings, canard, and winglets, hold it in place as shown with a few tiny brads or staples so it doesn't move out of position when stippling the skin over it. \*\*SKETCH OMITTED\*\*

CP18/5

Fiber Orientation - at least two builders have built wings with all the UND plies parallel to the T.E. rather than one parallel to the L.E.. Be careful to do this correctly, as we have no acceptable repair for this error, short of redoing the entire wing.

CP19/0

RAF ACTIVITY since the July Newsletter has involved some new developments in support of VariEze builders. We are now introducing two important new improvements for the VariEze - a wing leading edge cuff to improve stall margin, and a crank-type nose gear actuator.

CP19/2

WING CUFF IMPROVES VARIEZE STALLS - As you know from newsletters # 14, 15 and 18, not all the VariEzes flying have reported the safe, departure-free stall characteristics. Several aircraft have reported highly divergent wing rock or an abrupt roll-off into a nose down rolling dive resulting in a large altitude loss, when near full aft stick at aft cg. In late November, Dick was demonstrating stalls, with David Record in the back seat of N4EZ. After showing the stall resistance by level and turning stalls at full aft stick, including sideslips and reversals, Dick let David do some stalls from the back seat. In one of David's stalls, the airplane abruptly rolled left and appeared to spin one and half-turn before recovering, with a loss of 1200 ft altitude. This, of course was quite a shock, since we had never experienced a departure from controlled flight with our VariEze. A post-flight weighing revealed that the cg was within a half-inch of the aft cg limit.

We then initiated a complete series of new stall/spin tests with N4EZ to try and further quantify its stall resistance. The airplane was ballasted to various cg positions and tufted to visualize airflow. Dick flew the test flights. A summary of the results follows:

The aircraft was totally immune from stall departures or loss-of-control regardless of control inputs or attitudes or power setting as long as the cg was forward of F.S. 101 (short canard, 142 inch span). The following applies to its characteristics when the cg was aft of F.S.101: The aircraft was immune from loss-of-control or departure when maneuvered, ie, attempting accelerated stalls. It was also immune during low-energy entries, ie, hammerhead stalls or tail slides. However, occasionally the characteristic wing-rocking motion would diverge and result in a departure to the left within about four cycles of wing rock, at one g flight. Also, occasionally the airplane would depart in roll to the left without wing rock if the speed was about 48 knots (one-g, level or mild nose-up climb). The departure at first appeared to be entry into a steep spin, since rotations up to one and half "turns" were experienced. Recovery was prompt, as the the stick was pushed forward. We soon realized that the departures were not spins, as the angle-of-attack was rapidly decreasing and the motion was quickly converted into roll, i.e. there was no stable spin mode. To prove this, full pro-spin controls were held in (aft stick, left rudder), rather than attempting recovery. With these controls held in, the airplane's recovery was just as rapid as when recovery controls were used. Thus, rather than a spin, the aircraft was experiencing a "rolling departure". In military stall testing with fighters, we called these maneuvers "recovery rolls" or "augers".

The good news is, of course, that stable spins were not possible. The bad news is that the aircraft is susceptible to departures with altitude loss as great as 2000 ft when near aft-limit cg. It would be easy to merely brush this off as "normal" and stress the usual training lesson of speed control to avoid stall. We refuse to do this, because we have always been proud of the departure-resistance of a properly-designed canard airplane. Thus, with the help of NASA at Langley Va. we developed a solution. Joe Chambers at NASA had been conducting dynamic wind-tunnel tests with a model of the VariEze. He found that a partial-span drooped "cuff" that extends forward of the leading edge produced a vortex that prevented aft wing stall and eliminated wing rock on the model.

We then did more tests with tufts to verify that, indeed, the departure is caused by aft wing stall. We then installed the cuff - initially 50 inches long, and found that it eliminated departures but did not eliminate wing rock. We then trimmed it to 38 inches long, and found, as NASA predicted, it completely eliminated wing rock and departures. Wing rock induced with the ailerons would damp out after being excited.

At aft limit cg the airplane is as safe as at forward cg. The vortex formed by the sharp edge of the cuff results in the stall angle-of-attack being raised by more than can be expected by the increased droop of the leading edge.

If you have difficulty understanding the above technical discussion, that's ok. Your airplane may already be stall resistant at the aft cg limit in general. However, flight tests and homebuilder experience indicates that it is possible that at aft cg positions, certain conditions could exist where it may be possible to stall the aft wing. A stable spin will not result, but the airplane can roll off to one side and lose considerable altitude.

The end result is that when you install the simple extension to your wing leading edges your airplane should be totally stall resistant at any allowed cg position

Based on the results of these tests we recommend that you limit your aft cg to forward of F.S. 100.5 for short canard and 99.5 for long canard (see page 27 of your Owner's Manual), until you have installed the leading edge cuffs. Install them exactly as shown on page 6 of this newsletter. Do not modify their shape or round their ends. If you are now building a VariEze, the cuffs can be installed any time after chapter 6. Do not change anything in chapter 6.

The cuffs have been dive tested to 215 knots to verify freedom from flutter. Data also indicate that they provide a small improvement in stability, max speed is degraded slightly - about two knots. Climb and cruise range are not changed.

Do not omit this improvement - do take advantage of the extra work we are doing to provide you with the safest possible airplane.

CP19/5

Section I

Chapter 6 Add "see CP #19 for addition of stall cuffs on wing leading edges."

CP19/5

Q. I want my EZ to look more like a Defiant. Can I eliminate the lower winglet? A. Performance-wise, yes, it only gives about 1% induced drag reduction. But do not leave it off - it protects the rudder and cable in case you drag a wingtip on takeoff on landing.

CP20/2

JIRANâ€™S PREFAB WINGS - STATIC TEST Burt, Dick and Mike were present when Fred Jiran static loaded his VariEze prefab wings and center section. NASA was also there, and had installed 24 strain gauges all over the wings and center section spar. The wings were loaded to the design limit of 7.5 gs with no problem whatsoever. In fact, due to a calculation mistake we had earlier loaded them to 8.25 gs and almost twice the expected torsional loads. The strain gauges verified adequate stress margins at all measured locations. We will begin a thorough flight test program on these wings and center section (the same ones that were used for the static proof loading) here at RAF next month. Look for a full report in CP #21.

CP20/2

VE STALLS Dan Lee, of Livermore, Ca has installed wing cuffs per CP #19. Prior to cuff installation Dan had on four occasions experienced divergent wing rock, resulting in departures and spiral recovery rolling dives. (CP #19). His post-cuff installation flight report follows: "I did not get a stall with or without power, only a slightly perceptible wing rock, power off at full aft stick. The overall effect on slow speed flight control is great, as is the improvement in confidence and peace of mind". Do install the cuffs exactly as shown in CP #19.

CP21/4

MAN-GRD CP12-9 1.7" dim on tab

CP21/4

MAN-25HR CP19-2 Wing cuffs. Also, limit cg as shown until cuffs are installed

CP22/4

Steve Briggs found an excellent method of setting wing incidence. While wings are still in the jig, on the table (both root and tip water lines level) bondo a Stanley line Leveller (available at most hardware stores @ approx. $1.60 each) to the outboard edge and parallel to the buttline of your WA-1-1 wing fitting. Check that the root and tip water lines are level and that the Stanley is level before removing wing from jig. Use this level later to adjust wing to center spar (replaces the bondoed board, from CP #12 page 8).

CP25/5

BUILDER HINTS - VARIEZE ONLY When laying up UND spar caps be sure to butt the cap material to the wing fitting and squeegee outboard. Do not trim the glass cap material at the fitting, "yaw" or slide the UND to butt to the wing fitting (keep fibers straight spanwise).

CP26/6

DES, Section I, pg 6-5

Add the additional information for attach fitting layups shown on page of this newsletter, CP 26.

CP42/5

VORTILONS FOR VARIEZES

These little wing leading edge fences, or more properly, vortilons, have been seen by many builders on Mike and Sally's Long-EZ N26MS. Since Oshkosh '84, we have been testing them on several airplanes including the prototype Long-EZ, N79RA. We also received expert assistance from Chuck Richey who installed and tested them on his VariEze, and from Gary Hertzler who did essentially the same thing on his VariEze and from Bruce Evans who installed them on his VariEze and test flew it to Oshkosh.

We are pleased to be able to report that the vortilons, as shown here (full sized patterns) are approved for installation on VariEzes as called out. They replace the leading edge cuff, which should be removed if using the vortilons. There is little or no speed penalty caused by the vortilons, but there is a very noticeable improvement in takeoff and climb performance. Visibility over the nose during rotation for lift off as well as in the flare for landing is greatly improved. Stall characteristics are also improved at all weights to gross and at all c of g conditions from 97" to 102.2".

The installation information given is for VariEzes. The vortilons on the Long-EZ are not as effective as on the VariEze due to the higher sweep angle of the VariEze wing and the different airfoils used on the two airplanes. Vortilons only work on swept wings and will do nothing on straight wings. After considerable testing on 3 different Long-EZs we do not feel there is enough to be gained, to warrant the trouble to install them on the Long-EZ.

CP43/3

VARIEZE VORTILON UPDATE

We are very pleased with the positive feed back we have received from VariEze pilots who have installed the vortilons per CP #42. Steve Sorenson writes: "Dear RAF, I wanted to give you a testimonial for the new vortilons I installed on my VariEze. I installed them exactly as per the plans in the last Canard Pusher except I used super glue instead of epoxy or silicon. As you know my airplane has never had wing cuffs and I have always found the airplane extremely stable and easy to fly despite the wing rock at full aft stick. As a result I was a little skeptical about the performance improvements promised by the use of the vortilons but I figured I should try them since they wouldn't take much time to make and install. After having flown the plane now about 8 times with the vortilons, I am sold on them. I found that the wing rock at full aft stick is completely gone and I can now do any maneuvering I want at full aft stick without departures that I would occasionally get before. The biggest improvement, though was the stability improvement in the landing pattern. I have always flown final approach at about 90 mph or a little higher if I had a passenger. I could fly at 80 when lightly loaded but I got a high sink rate that was a little uncomfortable and gave me much reduced visibility over the nose. With the vortilons, I can very comfortably fly final at 80 mph, even with a passenger and have full control and a reasonable sink rate. The result is that I can now make the 1000 foot turnoff on the runway at my home airport, something I could never come close to doing before. I haven't noticed a significant increase in climb performance, but I haven't done any real tests of that yet. In short, I am sold on the vortilons and would recommend them to all VariEze pilots.

Steve".

Jerry Gardner was up at RAF last Saturday and claimed that after making over 1000 landings in his VariEze, now that he has vortilons, he is having to learn to land his airplane all over again! The glide is better, power must be reduced further out and visibility over the nose is much better during both take off and landing.

Gary Hertzler writes, "I tried 'em, I like 'em! Everyone should try them, in a word "fantastic".

If you have not yet tried them, do, even if you temporarily "Hot Stuff" them on. You will be glad you did.

NOTE: A few dimensions were omitted in the last CP. The value of "X" (top left) is:

at B.L. 81.6 "X" is 0.3"

at B.L. 102.7 "X" is 0.25"

at B.L. 122.4 "X" is 0.2"

These dimensions are not critical and if you made accurate copies of the full sized drawings of each vortilon, they will in fact fit at the appropriate B.L. with the above dimensions or very close.

We would appreciate feed back from the VariEze builder/flyers who install and fly the vortilons. Look for better visibility over the nose during take off and landings due to lower deck angle, better glide performance and better climb.

CP43/4

VariEze - The X' dimension for the vortilons was omitted on Page 6, CP 42.

B.L. 'X'

81.6 0.3"

02.7 0.25"

122.4 0.2"

CP44/3

VORTILONS

We noticed that almost all of the VariEzes at Sun 'n' Fun had vortilons installed on their wing leading edges, some even installed them over the cuffs! During some of the bull sessions, we talked to the builder/pilots and all agreed that the vortilons are well worth having. Slow speed stability, visibility over the nose for take off and landing were greatly improved. If you have not already installed them on your VariEze, do it, you will like 'em. We believe it is better to remove any existing wing cuffs before you install the vortilons,and the vortilons are definitely superior to the cuffs and are lower drag.

Vortilons are impressive little devices, but keep in mind that they only work on a swept wing. It would not help to put them on your canard for example. Any straight wing with no sweep will not benefit from vortilons.

CP48/2

VORTILONS ON EZs

We continue to receive glowing reports from EZ flyers who are very pleased with the results of installing the vortilons on both VariEzes and Long-EZs. Don't miss out on these definite improvements. Vortilons are now mandatory on VariEzes and Long-EZs (regardless of which canard you have). Do NOT slit the wing leading edge to install the vortilons. This will weaken the wing, particularly in a VariEze which has a monocoque wing structure. Vortilons should be installed per the CP recommended procedure. Make the vortilons with small flanges as shown in CP 42, page 7 (VariEze) and CP47, page 15 (Long-EZ), finish them in your trim color, and attach them to the leading edges using RTV silicone.

CP67/4

I recently installed a set of Liset vortex generators on the canard of my VE N02GR and have experienced good luck with the modification. During normal no-rain days the a/c flies as before with no noticeable change in any flight situation. The big step is with the rain...works great! I did get a very obvious pitch change during wet conditions and now have none. Guess this speaks for itself. For all the VariEze drivers, I think it is a good mod. Hats off to Liset.

CP68/7

Do not fly a Long-EZ or VariEze without vortilons. In addition, due to the variance in aircraft shapes, and indeed, airfoils shapes possible in a homebuilt aircraft, we would strongly recommend that you conduct a stall test at least 10,000 feet above the ground while wearing a parachute. This will clear the stall envelope on your particular aircraft which, as we have said, may not be identical to the RAF prototype or to anyone else's aircraft. If you see any sign of an unusual or uncommanded pitch up or any hesitance in nose down control power when at full aft stick, go to full power and full forward stick immediately and recover! If your aircraft hangs in a high sink condition, rock it out with ailerons and rudder, using maximum available engine power. Ballast your aircraft to a more forward CG and retest. If you do not want to take the risk of doing this stall test program, do, at least, limit your flying to mid or forward CG.

CP68/7

If a VariEze or Long-EZ is not equipped with Vortilons on the leading edges of the wings do not fly it!

CP69/9

Chapter 6

CP Issue 19-2

Subject cuffs

MAN-25HR Cuffs added to rear wing to prevent departure at low speed. (Replaced by vortilons.) Good discussion of aft wing stall & departures. AFT CG LIMITED UNTIL CUFFS ARE INSTALLED.

CP69/12

Chapter 6

CP Issue 34-6

Subject hinges

MAN Aileron hinge pins must be saftied. Shows proper method.

CP69/13

Chapter 6

CP Issue 61-10

Subject attach fitting

MAN/GND Check taper pins & AN-4 bolts for proper fit. Caused fatal accident.

CP69/13

Chapter 6

CP Issue 55-5

Subject attach fitting

MAN/GRD Check wing attach fittings for corrosion. Method for replacing fittings.

CP69/14

Chapter 6

CP Issue 50-4

Subject attach fitting

MAN/GND Use stud finder to verify all screws are installed. Missing screws caused fatal accident.

CP109

Varieze wing failure and corrosion and inspection