CP10/4

The dimension shown should be checked on the canopy when jigging it to the blocks on the fuselage (top of Page 22-2). Adjust the forward blocks if required, to attain the 12-inch height shown. In no case should this dimension be less than 11.5 inch. This would impair forward/downward visibility during climb and landing. This dimension cannot be determined by measuring the canopy as received from Cowley. The canopy is blown into a frame that is 20 inches wide at the front and 19 inch wide at the rear. The canopy is then bent inward to a smaller width when it rests on the blocks. This causes its height to increase in the center. Do not attempt to bend the canopy in until it is trimmed as shown in chapter 22. \*\*SKETCH OMITTED\*\*

CP10/5

22 - 4, Top sketch Arrow from 'plexiglass' is incorrect.

CP11/4

One builder moved his canopy forward two inches from the position shown on the plans to obtain more room for the pilot to lean forward in flight. (This is being done on Jirans prefab canopy frames.

CP11/4

VARIEZES HAVE MODERN CABIN HEAT SYSTEM

Those of you northern die-hards that still think the VariEze needs an exhaust-powered cabin heat system should go to the library and look up a book on solar heating systems. You will find that the VariEze fuselage is strikingly similar to a well-designed solar heat collector--a urethane foam box, diffused surfaces inside, glazed on top with plexiglass. It is well ventilated for summer cooling but with the vent closed and a good canopy seal you can maintain seventy degrees Fahrenheit inside temperature, with an outside air temperature of ten degrees Fahrenheit! This heating system, of course, does not work at night, but good fighter pilots fly in the daytime and love at night.

CP10/7

22-8

You may want longer canopy hinge screws than the 509-10R-6's shown if your canopy frame is thicker than the prototype N4EZ. Get as much grip as possible.

CP10/7

22-7

Blank should read "See page 25-1."

CP10/7

22-8

AN509-10R-12 should be AN509-10R-10.

CP12/6

Canopy. If you move the canopy forward as mentioned in Newsletter #11, be sure that you leave the cut between front cover and canopy in the same place as shown on Page 22-4. The front cover is required for the torsional rigidity of the fuselage. If the vent is too cramped to fit between the plexiglass and the edge on centerline, move it off center.

CP13/6

Canopy locks must be installed in the correct alignment and engage fully in the positions shown on page 22-10. Adjust so the handle must be forced hard forward to engage the lock while firmly squeezing the rubber canopy seal. This prevents the locks from wearing due to rattling and prevents the canopy from locking when it is closed from the outside. I installed a "drawer lock" ($1.69 at any hardware store) in the fuselage side so I can close the canopy and lock it from the outside with a key. The drawer-engage tab is replaced with a longer aluminum arm shaped to engage the center canopy lock bolt in the closed position. We are using the low density foam rubber weather stripping for a canopy seal. This is the real light material that is about 1/4 inch thick but easily squeezes flat.

CP13/6

If you insist on a capability to open the latched canopy from the outside, install a door on the fuselage side aft of the canopy latch. Wicks did this, and included a key lock in the door.

CP13/6

Clarification--the canopy cross brace goes under, not thru, the plexiglass. The plexiglass has no holes on a VariEze installation.

CP13/6

VARIEZE PLANS CHANGES

Newsletter 11

page 7

On the second 22-8 change, the AN509s should be AN525s.

CP13/6

VARIEZE PLANS CHANGES

Section I

page 22-10

The solid line on the lower drawing of C-7 should be dashed.

CP14/9

Dale Findlay - Dale devised a clever way to lock the canopy from the outside by installing a removable link between the canopy handle and the lever for the speed brake. When the speed brake is closed from the outside, the canopy is secured. To open the canopy he pries the speed brake open, which opens the canopy handle! The link is a piece of .063 2024 with two holes about 5.8" apart.

CP14/9

If you have purchased a Jiran mounted canopy be sure to check its width before mounting the reinforcements and laying up the inside skin. It may have to be bowed inward somewhat to have adequate room for mounting the 3 brackets on the left side.

CP14/11

Q. My cockpit vent on my Ez does not flow air below 100 mph. Can I fix this? A. I have noticed this on other EZs I have flown. N4EZs does flow down to 60 mph. I think the difference is due to a change in slope of the canopy frame. The change was made after N4EZ was built to improve forward visibility. I think your vent will work at lower speeds if you carve a smooth radius on the front and sides and raise the rear lip about 1/4 inch.

CP14/11

VARIEZE AND VARIVIGGEN RETENTION OF CANOPY

As we have mentioned several times before canopy retention is very important. An inflight canopy opening has resulted in the destruction of Tony Ebel's VariEze and a horrifying pattern flight by Peter Krauss. Peter took off without the canopy locked. It opened wide open at 100 mph during the initial climb. He grabbed it, pulled it closed on his fingers and held it while he returned for a good landing. Tony had a canopy latch that was adjusted so loose that it allowed the canopy to rise and fall noticeably during flight. Tony was flying at 6000-ft altitude and 185 mph true (165 indicated) when the canopy opened. He doesn't remember if he had bumped the latch. When it opened the airplane immediately departed from controlled flight, yawed, pitched down past vertical, did a 1/4 turn spin, then pitched up. Tony grabbed the canopy, it was pulled from his hand and the airplane repeated the above maneuvers. This happened about six times until he finally got the canopy closed with fingers outside (Tony did not have the knob installed on the inside). Once recovered to level flight (only 800-ft altitude) he noticed that his prop was stopped and thus he had to make a forced landing.\* Due to a combination of almost passing out and fear of the canopy opening, he did not flare. He shoved the stick forward near impact. His own words follow: "When the canopy opened, it was as if someone threw a hand grenade.\*\* It really startled me. I knew I was in trouble. The plane shuddered and shook. Then started a left turn. It slowed down very fast.

After the first few wild gyrations, spins to the left, recovering straight down, etc., I got it to stall, nose high, and tried to close the canopy. As it fell, the canopy pulled open. This went on for the 5000 ft I fell. I wish I had tried a steep right side slip, or a full power stall, while trying to close the canopy. I was in (a) tense situation, real busy, jump or close it. I did not register any other event. As soon as the canopy came shut, and I noticed that the engine was dead, I had a thought that the sky was getting overcast. I had trouble thinking, finding a field and getting in position. I put the gear down. Then just as I landed, I thought..why did the sun go down? So I shoved forward on the stick, but the bean field was real dark, I heard the nose wheel breaking. Nothing more till after the wreck. So I was out, before I hit anything. Probably lack of oxygen, as maybe I was not breathing much on the way down.... I knew the fence was just ahead. I had tried a 90 degrees turn at about 70 ft., had to level it just before I landed, got 45 degrees of the turn.

Next day I walked the field. It was smooth and solid. So the gear probably would have stayed on, but I would have hit the fence.

I know now..don't try to knock the gear off by pushing on the stick. If I would have been really alert and not passing out, I could have landed in a circle and gotten away from the fence.

Spread the news that I have a good canard, good canopy frame and a repairable left wing for sale, damaged fin and tip, good fitting.” Tony's airplane dug a large hole, cartwheeled once, tore off the right wing and ended up inverted. Tony dug himself out and found that his injuries were minor - cuts and bruises. The airplane was extensively damaged. Since this was the first major overload failure condition on an Eze structure, I was quite interested in inspecting the modes of failure. I flew over the next day and observed the following: wing failure occurred in the spar caps, 3 to 6 inches from the wing fitting - there was no damage in the fittings, winglets failed either in the wing or at the winglet 1/2 span. The joint did not fail. The canard, itself, was not damaged. All seat belt fittings were intact. The canopy plexiglass was broken in front but the canopy frame was not damaged. The forward fuselage back to instrument panel was totally destroyed. The rear seat area, fuel tanks, c/s spar, fuselage tank, etc., were undamaged. The engine, mount, firewall and everything in engine area were intact and not damaged. Nosegear strut and all its fittings were undamaged. The maingear tabs failed. The gear strut failed at 1/2 span.

\* While the prop will windmill down to 60 kt, once stopped you must go above 120 kt to restart. Tony's engine failed due to negative "g" at a speed below 60 kt during gyrations.

\*\* At that high speed it is surprising that the canopy was not torn off. The gyrations at that speed (above maneuvering speed) also should have resulted in airframe failure, but none occurred.

I am confident that inadvertent canopy opening cannot occur if the canopy is built and adjusted properly and locked before takeoff. The handle should be rigged so it must be forced hard forward to engage the latch. The latch and handle should be rigged for preload toward each other. Thus it is impossible to open it by bumping the handle. It should take two hands to open. Be sure the latches engage fully in the positions shown on the plans. Do install the warning horn that sounds if takeoff is attempted without canopy fully locked. Do use your checklist. Do not omit the canopy inside knob.

CP15/3

Seal cowling leaks around the fuselage, exhaust and aileron tubes. Air leaks here slow the airplane and reduce cooling. Canopy air leaks can also reduce performance.

CP15/8

SECTION I

Pg 22-8

Reference the canopy opening occurrences described in newsletter 14. A builder has suggested a car-hood type secondary latch system that doubles as an engagement point for the canopy key lock. To open, use key to rotate lock arm vertical. Then raise canopy 1.5" and push in on the latch. I haven't installed this but it looks like it would work fine. \*\*SKETCHES OMITTED\*\*

CP17/5

On one occasion each, both Mike Melvill and Burt Rutan forgot to lock the Viggen canopy for takeoff. Mike's opened at 300 ft on climb and he was able to catch, close, and lock it inflight while maintaining control. Burt's opened during takeoff roll. He closed, locked it, and continued the takeoff. Do not assume it will not happen to you. If you are flying a Viggen or a VariEze, ground your airplane until you install the secondary catch.

Since both VariEze and VariViggen aircraft are both susceptible to the pilot taking off with the canopy unlocked we are asking all VariEze and VariViggen owners to install the secondary safety catch shown in CP15 pg 8. We consider this modification a mandatory safety change and ask your help to insure that all VariEze and VariViggen, are grounded until this safety catch is installed. The one we installed in N4EZ is simpler than the CP 15 design and is more positive - see below. Note that the safety catch will prevent the canopy from opening more than one inch even if the pilot forgets to lock it. To open the canopy normally, raise it one inch, push in on the catch then open. This works the same as the secondary catch on a car's hood. \*\*SKETCHES OMITTED\*\*

CP17/8

Section I Add:

Chapter 22

The hood-catch shown on page 6 of this newsletter is mandatory and must be installed before flight. This protects the pilot should he takeoff without locking the canopy. Do not omit.

CP20/8

CANOPY SAFETY PHILOSOPHY There aren't many things on the VariEze that a pilot can forget that will hurt him. Failure to extend the gear prior to landing will only cause superficial aircraft damage. But forgetting to lock the canopy can be a very serious problem. I see some EZs flying without the safety latch or a warning system and ask, why? The response is "I am a good pilot, I always use a check list and would never forget it". Let me categorically state that no matter how good or conscientious you may think you are there will develop a set of circumstances that will lead into an error of omission.

CP20/8

All of us here at RAF have, at least once, taken off without locking the canopy. Each time it happened was when the "normal" procedure was interrupted by something abnormal, such as a change in runway, followed by an immediate takeoff clearance. This can and eventually will, happen to you. Having separate, redundant latches that you have to close, will not protect you. You need the catch and warning to protect you when you forget.

CP20/8

Some of you have found that the stainless steel SC1 catch (CP #17 pg 6 is difficult to carve out. We have released a drawing of it to Brock, so he can have them punched out and should have them available for sale.

CP21/7

Safety Hint. This suggestion comes from Lee Herron. "It has been pointed out by the F.A.A. Eastern Region E.M.D.O. that the canopies of the bubble-type found on VariEze, Quickie, KR-2 etc., are impossible to break or open with the bear hands in an emergency and not all emergency personnel know to freeze the Lucite canopy with Carbon Dioxide before it will break. Therefore, an emergency canopy opening system is desirable.

An acceptable answer was found when using MS20001 type hinge, the hinge pin is replaced with 1/8" stainless music wire that has a one inch finger loop at the front end. A 1/8" hole is then drilled into the base side of the hinge and the wire loop end snaps into this hold and locks the pin in place until pulled to release the canopy in an emergency. To finish the job, use 3/8" red "stick-on" letters along the hinge "PULL EMERGENCY". Simple and safe. \*\*SKETCH OMITTED\*\*

CP25/6

DES, Section I, Page 22-5

Move canopy safety catch to F.S. 57.

CP29/4

PLEXIGLASS HINTS FOR PERFECT CANOPIES.

1. Cutting: An abrasive disc powered by a high speed drill, a Dremel tool, or a hand held circular saw is recommended. We have found that abrasive cut-off wheels of aluminum oxide or silicone carbide provide excellent cutting results. A six inch disk is available at most hardware stores for around $3.50 A small grinding disc or Dremel saw disc will also give good results. Reciprocating saws like saber saws are not recommended and will probably break your canopy. A tool that progresses slow and hot on the canopy to grind through the canopy is best. Tape a poly plastic cover on the canopy and mark your outline with masking tape. Never cut a cold canopy. Allow the canopy to warm to 70 or more for at least an hour. Don't allow the canopy to vibrate or chatter during the cutting or it may chip and crack. Support your canopy on a flat surface so it will not twist or spread during the trimming. Duct tape is handy to hold things in place. Remember: cut slowly, don't push the cutter. Let the tool do the work. Be sure to use eye protection. Plexiglass chips can be a problem in your eyes since they are clear and difficult to see.

2. Drilling: The drill should be ground off to a zero rake angle to prevent digging in, chipping and cracking the Plexiglass. A standard drill bit, ground with no cutting edge pitch, is a safe method of making holes. Be sure to make the holes oversize to allow for motion caused by thermal expansion and contraction. The drill bit should not be allowed to chatter or will chip and break the Plexiglass. Don't push the drill. Let it cut at its own rate.

3. Cleaning: A damp soft cloth or an air blast will clean the saw dust away. The damp cloth will also dissipate static electricity. To clean dirty plexiglass use plenty of water and a non abrasive soap or detergent. Dry with a clean chamois or soft cotton. Never use acetone, benzene, carbon tetrachloride, lighter fluid, lacquer thinners, leaded gasoline, window sprays or scouring compounds. Grease or oil may be removed with kerosene, white gasoline, naphtha or isopropyl alcohol. Small scratches can be buffed out with "Mirror Glaze" HGH-17 and a lot of rubbing. Hard automobile paste wax should be applied as a protective coating and buffed with a soft cotton flannel cloth. Do not use cheesecloth, muslin or shop cloths, they scratch. For deep scratch removal, procure a hand polishing kit from a Plexiglass dealer or your canopy supplier.

CP35/6

BUILDER HINTS

Canopy frame construction - VariEze and Long-EZ.

The following optional method includes several revisions to the plans procedure that make the canopy frame easier to build:

Cut out and locate the plexiglass canopy onto the fuselage per the plans. Using gray "duct tape" as a release, protect the fuselage longeron full length from the F28 to the firewall. The F28 bulkhead and firewall bulkhead should also be protected with gray tape.

Now working with 2 inch thick urethane foam scraps about 12 inches long, fit them all around the canopy per plans. They should be a reasonable fit to the canopy and to each other. Do not use micro to "glue" these blocks to each other and to the plexiglass, rather use Liquid X 40, foam-in-place (or an equivalent 2 lb/cubic ft "pour-in-place"-foam). Mix up small quantities and paint the liquid into the gaps and joints until the "frame" is securely bonded to itself and to the plexiglass canopy. Within an hour you can carve the frame to the required shape per the plans. The "pour foam" joints will carve and sand almost as easily as the urethane and a whole lot easier than micro joints. Glass the "frame" per Long-EZ plans:

1st ply: BID at 45 degrees overall (F28 to firewall)

2nd ply: BID at 45 degrees overall

3rd ply: UND lengthwise, sides only

4th ply: BID at 45 degrees front and rear only

5th ply: UND lengthwise, sides only;

UND side strips should lap 3 inches onto the front and rear BID.

Allow this layup to cure for 48 hours, then Bondo lumber stiffeners to the canopy frame per plans and remove the entire thing from F28 to the firewall. Turn it upside down and support it well on two saw horses. (Use Bondo to hold it firmly). Carve the inside (including all hard points per plans) and layup the same glass schedule as used on the outside, full length from F28 to the firewall. Allow this to cure for 48 hours, then you can cut the front and rear covers off per plans. These edges can be treated in a variety of ways, flox corners and ply of BID is fine. Several builders have made lapped or joggled edges using dry micro for a more weather proof joint.

Mike recently installed a "drip tray" around the front cover to canopy joint, which really does a job on keeping moisture out of the avionics, even in driving rain. \*\*SKETCH OMITTED\*\*

This is tough to install as a retrofit but can be done easily at the time of the original construction.

CP40/7

VariEze and Long-EZ - Cooling vent door, installed easily in the little NACA scoop in the canopy frame. It is so simple and works so well, it is amazing. Designed by Gene Zabler, himself a VariEze builder/flyer, this little door can be installed in 10 minutes. You control it with one finger from completely shut to full open or anywhere in between. It eliminates the need for a foam plug and you can keep your hankie in your pocket when it rains. Gene will sell you one for $6.00 plus .50 for packaging and postage. Contact:

Gene Zabler,

48 Robin Hill Drive,

Racine, WI 53406

CP67/4

I installed a small NACA scoop just to the right of center in the canopy frame next to where the normally plans-fitted scoop would be. This keeps the rain out of my eyes and the bugs off of my teeth, plus blows all air over my right shoulder to the backseater. With a ball vent valve, it makes a great source of air and is right where you can get your hands on it.

CP69/8

Chapter 22

CP Issue 17-6

Subject safety catch

MAN/GND Plans for secondary canopy catch. Prevents open canopy accidents. DO NOT OMIT THIS!!

CP69/8

Chapter 22

CP Issue 18-8

Subject fuselage tank

Fuselage fuel tank requires changes in canopy construction.