Glasair News

Newsletter No. 17 2nd Quarter, 1985

AWARD WINNER

We mentioned, in the last newsletter (#16), that several Glasairs had received awards at the Sun & Fun Fly-In in Lakeland, Florida. Jerry Gruber's Glasair RG won the Grand Champion award, Ron Bowden's TD won the Best Composite Aircraft award, and Richard Dobson's TD was judged the Best Low Wing Aircraft.

Glasairs have continued to win awards. Jerry Gruber's Glasair RG also won the "Champion Custom Built" award at the 1985 Indiana EAA State Convention, and has been selected to receive the Wright Memorial Award for Glasairs at Dayton, Ohio.

Bud Herron, a builder from Slidell, Louisiana, has also won some awards for his Glasair TD, He was awarded First Place in a field of 35 homebuilt airplanes at EAA Chapter 405's Fly-In at the Louisiana Balloon Festival in Hammond, Louisiana, and also won First Place at EAA Chapter 479's Shady Tree Fly-In in Gulfport, Mississippi.

HANGAR FLYING

Mr. Chuck Mason, who has a Glasair TD flying in the Washington, D.C., area, has experienced problems with elevated cylinder head temperatures. This is a problem that other builders have experienced, although it is not a universal problem with Glasairs. We have flown our RG prototype, N87SH, in temperatures up to 110° without difficulty. Other builders, even in Florida, have not had problems.

Mr. Mason's analysis of the problem resulted in his conclusion that the cowling exit area should be approximately 1 1/2 times larger than the inlet area in order to achieve adequate cooling under all conditions. The standard inlet and outlet areas on the Glasair are 39 sq in and 42 sq in, respectively. Mr. Mason solved his problem by simply cutting two 4" X 2" slots on the underside of the lower cowling, 1 1/2" ahead of the firewall (this increases drag slightly). He says that, with the slots, his average cylinder head temperatures have been reduced considerably. He also noted that the oil filler access door does not bulge as much as previously, an indication that the pressure in the lower cowling has been reduced, allowing a freer flow of cooling air.

Mr. Mason intends to try internal cowl flap doors over the slots, actuated by a Volkswagen engine cooling air intake housing bellows. This idea, for automatically actuated cowl flaps, was described by Tony Bingelis in his book, Firewall Forward.

Mr. Mason is also using autogas in his airplane and has found, through repeated testing, that the fuel will begin to vaporize in his fuel lines when the cylinder head temperatures exceed 425 °F. This happens despite the fact that he has followed our recommendations for ducting cooling air to the fuel pumps and has installed firesleeve on all the fuel lines in the engine compartment. His recommendation for anyone flying with autogas is to always keep avgas in the header tank and to make all landings and takeoffs on the header tank. He says that, as long as the cylinder head temperature is below 400°, he has no problems with fuel vaporization.

We, at Stoddard Hamilton, have done no testing with automotive type fuels and have no knowledge of the vaporization properties of these type fuels. Therefore, we recommend using only aviation grade fuels in your Glasair aircraft.

MULTIPLE PURCHASE POLICY

Glasair kits may now be purchased in quantity at a reduced price. If 5 to 9 complete Glasair kits of any type are ordered at once, a discount of 5% off the retail list price of each kit will apply. If 10 or more complete Glasair kits of any type are ordered at once, a 10% discount will apply. In order to take advantage of these savings the following restrictions apply:

- A deposit of 25% of the total purchase price is required.
- Deposits are non-refundable for any reason.
- AH kits must be ordered simultaneously.
- Different delivery dates and multiple purchasers are acceptable.
- Delivery dates may not be postponed.
- The discount does not apply to Glasair Options.
- All other terms of the standard Glasair Purchase Agreement apply.

INSURANCE FOR YOUR PROJECT

In the last issue of "Glasair News" (#16), we warned that most homeowner's insurance policies would not cover your Glasair project while stored in a garage or workshop, and recommended purchasing hull insurance for the project during construction. Since then, we have received questions concerning where to find insurance for a homebuilt aircraft.

Aviation Underwriting Agency, Inc. is one insurance company we know of that insures homebuilt airplanes, both while work is in progress and after the airplane is completed. Aviation Underwriting Agency, Inc. has two offices:

AUA-West P.O. Box 60400
Reno, NV 89506

AUA-East P.O. Box 19267
Greensboro, NC 27419

SHELF LIFE AND STORAGE DATA

The shelf life of unpromoted resin and MEKP is approximately six months, although it may last longer or shorter depending upon storage conditions. The shelf life of gelcoat is approximately three months. CoNap and DMA promoters have approximately a two-year shelf life.

Builders should store all of these ingredients in a cool, dry, dark, well-ventilated area, and protect from freezing. Transferring the resin and gelcoat into well-sealed clean glass or metal containers will help extend the shelf life.

WARNING: Do not transfer the MEKP, DMA or CoNap into metal containers.

The shelf life of resin and gelcoat can be cut in half or more by summer temperatures of 80°F and above. Never leave containers open for extended periods of time.

Promoted resin has a shorter shelf life than unpromoted resin, also depending upon storage conditions. For this reason, promote resin in one-gallon quantities only. Promoted resin that has been stored for a long period of time may become unusually thick or lumpy. If so, discard and mix up a new one-gallon batch of promoted resin. Storage and shelf life control are builder responsibilities. WARNING: CoNap must never be mixed directly, or come into contact, with MEKP catalyst. A violent reaction will occur which may result in fire or explosion. Keep CoNap and MEKP physically separated while in storage, preferably in separate cabinets. As a precaution in the event of accidental spillage, never have both CoNap and MEKP containers opened at the same time. CoNap and MEKP are boxed and located separately in the original kit shipment.

WARNING: KEEP ALL CHEMICALS OUT OF THE REACH OF CHILDREN.

If builders follow storage recommendations and shelf life guidelines, they should not have problems with proper curing of resin. Builders should be aware, however, of how to spot "bad chemicals", and have the responsibility of insuring that their resin cures properly. Following are some guidelines for identifying "bad chemicals."

Resin: When resin exceeds its shelf life, it becomes unusually thick and lumpy. When it begins to thicken, often it is the result of styrene evaporating. The cause is usually from leaving the lid off of the container for long periods of time. Styrene will also slowly permeate through plastic containers. One builder reported that he could constantly smell styrene, from resin stored in a closet in the house, until he transferred the resin into glass jars.

When resin becomes thick, workability of the material becomes a concern. As long as the resin continues to completely saturate into and through the cloth, it may be used. When resin starts becoming lumpy and interferes with proper saturation, it should be considered unusable and discarded.

MEKP: When MEKP exceeds its shelf life, there are no physical changes to visibly detect in the chemical itself. The only indicator is the curing gel time, which will be longer. It is important to have a general feeling for your standard gel time, which is dependent on your particular environment (see Typical Gel Time Chart in the Instruction Manuals for guidelines).

If you notice a dramatic increase in the gel time of your resin or incomplete curing of a laminate, discard the MEKP and order a fresh bottle. (Remember that gel time is also greatly affected by temperature and the amount of MEKP used. Try to keep these variables constant).

DMA: DMA (N, N Dimethylaniline) is simply an accelerator. It does not play any part in the overall strength of the cured laminates, and may be left out completely. Consequently, the shelf life of DMA is of much less concern. DMA is quite stable. Our shelf life of two years on DMA is conservative. Some sources have said that, under proper storage conditions, shelf life could be indefinite.

DMA slowly degrades in the presence of oxygen, so keeping it in as small a container as possible will help extend the shelf life. If DMA degrades it will turn darker in color and give off the smell of ammonia (hard to detect, since DMA gives off such a strong pungent odor anyway). Keep DMA from freezing.

CoNap: CoNap (Cobalt 12'%) plays an important part in the chemical composition of cured resin. Its shelf life is important. CoNap is a relatively inert substance, very stable, and under proper storage conditions could also have an indefinite shelf life. The only physical characteristic we have been able to detect is that it will thicken over time. The effects of using bad cobalt in the resin would be similar to the effect of bad MEKP: slow and incomplete curing. We have placed its shelf life at two years (under the proper storage conditions). Keep cobalt in small containers and avoid very cold temperatures.

MEKP CATALYST HAZARD

Although we have published specific warnings in our Instruction Manuals concerning some of the dangers of MEKP, we recently received a reminder from the Flight Safety Foundation, Inc. which prompts us to repeat and emphasize the warning concerning MEKP's danger to your eyesight. At a safety conference, an eye specialist urged caution in the use of MEKP. The specialist said that a drop of this catalyst in the eye will progressively destroy the tissue and result in blindness. This will occur in some instances even when an attempt has been made to wash the catalyst from the eye. Furthermore, once the chemical has begun to destroy the eye, there is no known way of stopping the destruction or repairing the damage.

Material published on the subject indicates that washing an affected eye within four seconds after contamination prevented injuries in all cases, but no known chemical neutralizer has been reported. We strongly suggest the use of protective glasses when using MEKP. The builder should also keep an eyewash bottle (available at safety supply outlets) filled with clean water next to the resin mixing station, so that the water is immediately available in the event of MEKP contamination of the eyes.

FIRST FLIGHTS

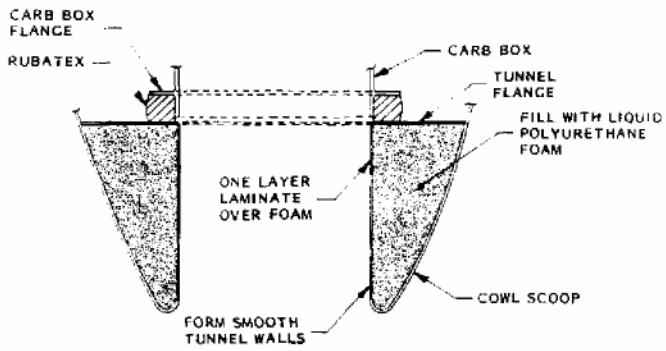
The following builders have reported the first flights of their Glasairs since the last newsletter: Paul Wallace and Everett Davis of Jackson, CA, have flown their RG; and Noel Douglas of Merced, CA, Chris Metzger of Decatur, GA, Norm Spitzer of Berkeley, CA, Bob Huntington of Scottsdale, AZ, Paul LeBlanc of Reseda, CA, Norm Alumbaugh of Walnut Creek, CA, Don Yoakley of Omaha, NE, and Eldon McDaniel of Merrimac, WI have flown their TDs. These airplanes make 80 Glasairs that we know have flown. We are fairly sure that there are more, but have no way of knowing unless you call us.

IMPROVED CARBURETOR AIR INLET

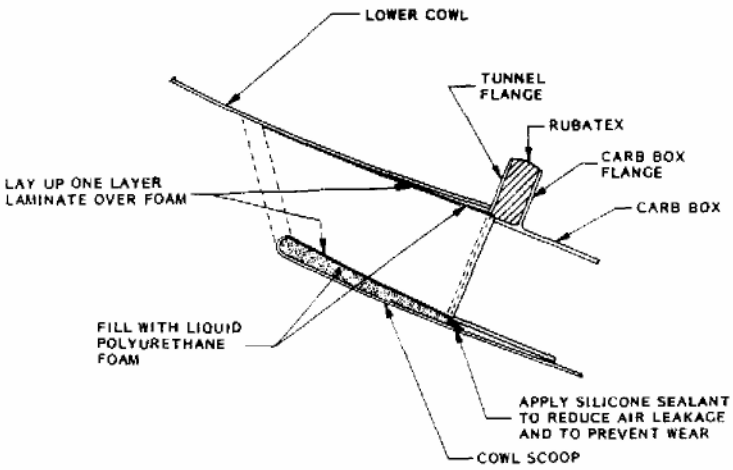
Glasairs equipped with carbureted engines are often plagued by engine roughness. The symptoms of this problem are a general roughness at full power settings, an intermittent hesitation or stumble at cruise power settings, and an excessive dependence on correct mixture setting for smoothest operation. One of our builders suggested a modification to the internal shape of the carburetor air inlet chamber which provides a significant improvement in engine operation.

The carburetor air inlet chamber is formed between the inside of the lower scoop and the underside of the lower cowl. If the air inlet is assembled as described in the Glasair Instruction Manuals (refer to the Cowling Scoop Installation and Carburetor Heat Box subdivisions), the inwardly curled lip at the inlet opening and the irregular internal shape of the inlet chamber cause turbulence which restricts the air flow to the carburetor.

The suggested modification consists simply of fabricating a smooth walled, aerodynamic tunnel from the inlet opening in the cowl scoop to the inlet of the carb heat box. Since the fuel/air mixture is determined by the carburetor setting and the venturi and will vary with the amount of air available, the undisturbed air flow provided by the modified inlet tunnel results in a more even air distribution throughout the induction system, reducing the engine roughness problem.



PLAN VIEW THRU COWL SCOOP



SIDE VIEW THRU COWL SCOOP

AIR INLET TUNNEL **FABRICATION**

The first step in completing the air inlet tunnel modification is to use a liquid polyurethane foam to fill all the irregularly shaped spaces of the existing air inlet chamber. The idea is to fill the entire volume of the existing air inlet except for a tunnel whose forward end is the same shape as the air inlet opening in the cowl scoop and whose aft end is the same shape as the inside of the carb heat box inlet. Bend a thin sheet of aluminum into a flattened cylindrical shape to fit between the cowl scoop inlet and the carb box inlet opening in the tunnel flange. This aluminum tube serves as a mold for the walls of the new inlet tunnel. The mold does not have to be perfectly shaped since the foam can be contoured relatively easily after it cures. Wax the outside surfaces of the aluminum mold and also all areas of the cowling where you don't want the foam to adhere.

Use either two component liquid polyurethane foam (X-4Q) or one component liquid polyurethane foam in an aerosol can (Polycel One) to fill the volume between the outside of the aluminum sheet mold and the inside of the existing air inlet area of the lower cowl. X-40 and Polycel One are both available from Aircraft Spruce and Specialty.

After the foam has cured, remove the aluminum sheet mold and shape the inside of the air inlet tunnel to smooth contours. Seal the foam using a thin Q-cell mixture. Fill any irregularities, depressions, or dents in the foam with a thick Q-cell mixture.

Lay up a one layer laminate (preferably, using fire retardant resin) on the inside of the tunnel. When the laminate has cured, sand any seam areas and rough edges smooth.

Make sure that there is adequate clearance between the front of the carb box inlet and the rear of the air inlet tunnel to allow for engine movement during engine start-up and shutdown. Also check that the Rubatex gasket on the carb box flange seals well to provide as airtight a coupling between the carb box and the inlet tunnel as possible. We used silicone sealant (bathtub caulk) between the lower front end of the carb box and

the inside of the cowl scoop to help prevent air leaks and to provide a cushion to prevent wear between the fiberglass parts.

CARBURETOR NOZZLE REPLACEMENT

A slight hesitation, stumble, or roughness in the engine during routine flight also occurs on some Lycoming 0-320 engines equipped with Marvel-Schebler Part Number 10-5009 or 10-5062 carburetors. This problem, and a modification to the carburetor that alleviates the problem, are described in Avco Lycoming Service Instruction No. 1305C. The fix consists of replacing the conventional nozzle employed in the carburetor with an atomizing nozzle which provides better vaporization and distribution of the fuel/air mixture.

Service Instruction No. 1305C can be obtained from:

Avco Lycoming, Williamsport, Division^
Avco Corporation Williamsport,
Pennsylvania 17701

A kit Part No. LW-13761) to accomplish this carburetor modification is available through all Avco Lycoming distributors.

BUILDER HINTS

Although we don't always have time to try all of these builder hints ourselves, be assured that suggestions for simplifying construction of the Glasair are much appreciated by your fellow Glasair builders. Any time-saving procedure that a builder can add to his "bag of tricks" is always welcome, so, if you have any such suggestions, please send them in.

SCRATCHES IN PLEXIGLASS:

Sometimes, unavoidably, during the construction process, scratches will occur in the plexiglass windshield and canopies. Every builder hates to have something like this marring the perfection of his airplane, and, fortunately, there are methods of repairing the scratches without replacing the entire part.

One method is the "Micro-Mesh" process that uses a series of progressively finer cushioned sanding sheets to polish out the scratch. Micro-mesh is manufactured by:

Micro-Surface Finishing Products, Inc.
Box 318
Wilton, Iowa 52778
(319) 732-3240

Another method, recommended by a Glasair builder, uses more readily available (and probably less expensive) materials. This method is as follows:

1.) Sand the area of the scratch with very fine sandpaper (600 or 800 grit). This sanding should be done with dry sandpaper and just enough to remove the scratch. Keep the area as small as possible.
2.) Work the sanded area using Dupont #7 polishing compound (white color; not to be confused with rubbing compound) on a soft cloth. Diaper flannel is the best material to use for this. Polish the area until the appearance of the previously sanded area is completely changed. 3.) Next, use Mirrorglaze "Professional Plastics Cleaner #17", again with a piece of diaper flannel, to polish out the plexiglass. This step requires a lot of time and work but, when completed, the glass will again be transparent.
4.) Use Mirrorglaze #10 for the final cleaning and polish.

EMPENNAGE COUNTERWEIGHTS

Instead of using solid lead for the empennage counterweights, use lead shot mixed with a resin to fill the recesses for the weights. This method requires a slightly larger volume to achieve the same mass, but avoids the difficulty and relative danger of melting and pouring the lead. The counterweight for the rudder in which the molten lead is poured into the rudder over a tub of cooling water, is especially dangerous — at least one builder has been burned when he accidentally poured the molten lead into the water. In order to achieve the highest density possible when using the lead shot method, use just enough resin to bind the shot together. In other words, the mixture should be mostly lead, with the resin just filling up the spaces between the shot.

TAPING FUSELAGE SEAMS

Try using nylon fiber reinforced strapping tape for the fuselage seams instead of masking tape. The nylon tape will not stretch and does a better job of keeping the fuselage parts properly aligned.

AILERON AND FLAP HINGES

When installing the aileron and flap hinges, use 4-40 screws and nuts installed through elongated holes in the control surface shearwebs to clamp the hinge halves to the shearwebs. Use two screws per hinge half, one through each end, avoiding the areas where the rivet holes will be drilled. The slots in the shearwebs allow the height of the control surface to be adjusted relative to the lower surface of the wing, and the screws provide easy clamping of the hinge halves for drilling the rivet holes.

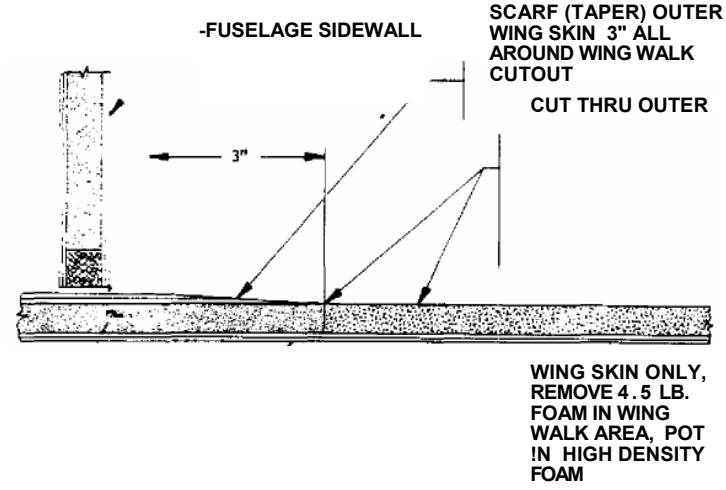
After the hinge halves are riveted to the aileron and flap shearwebs, use a similar method to clamp the other halves of the hinges to the lower wind panel. Elongated holes through the lower wing panel allow adjustment of the gap between the control surface shearweb and the lower trailing edge of the wing to achieve the proper downward deflection of the ailerons and flaps. The screws, again, simplify holding the hinge halves for drilling. After the hinge installation is complete, remove the screws, fill the elongated holes with mill fiber mixture, and, on the wing panel, finish with dabs of gelcoat.

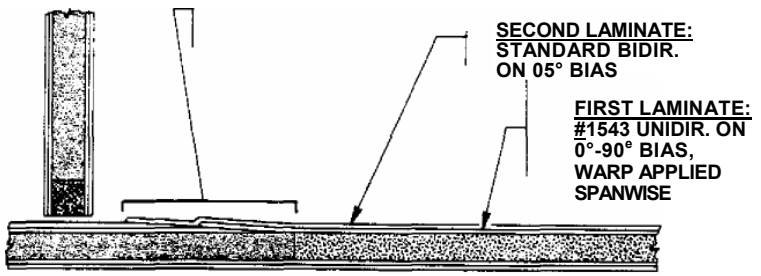
WING WALK AREA

We have found, over time, that entering and exiting the airplane subjects the upper wing panel in the wing walk area to damage and possible delamination of the wing skins. Also, if you kneel on the wing while working on the inside of the fuselage, your knees point load the wing panel, compressing the foam and accelerating any deterioration. We recommend protecting this area with some kind of sturdy pad to spread out the loads while working on the airplane.

If your wing panels are not yet bonded together, it would be a good idea to replace the foam core in the wing walk area with a high density foam. To accomplish this, cut and peel off the inside skin in the areas where the foam is to be replaced (round the corners of the cutout), scrape the 4,5 Ib. foam off the inside of the outer wing skin, pot in the high density foam (20 or 40 Ib.) using a Q-cell mixture, and then cover the new foam with a two layer laminate. The first layer should be a layer of #1543 unidirectional cloth, applied on the 0-90° bias with the warp spanwise (the warp is parallel to the selvage edge). The second laminate should be the standard bidirectional cloth applied on the 45° bias. Overlap the laminates beyond the cut for at least 1 1/2" all around.

If the wing is already closed and you have suffered extensive damage, the foam can be replaced from the outside (or, on the RG, through the wheelwell opening) with slightly more difficulty. After the outer skin and foam core have been removed (round the corners of the cutout), the existing outer skin around the cutout will have to be scarfed, as shown in the accompanying illustration. EA-AC 43.13-1A & 2A "Acceptable Methods, Techniques, and Practices: Aircraft Inspection and Repair/Aircraft Alterations" prescribes a scarf length of 100 times the skin thickness for this type of repair, which, for the Glasair wing skins, results in the 3" scarf length shown. Replace the foam core, as described above, and laminate one layer of #1543 cloth on the 0-90° bias, and one layer of standard bidirectional cloth on the 45° bias. Sand the overlap area smooth, fill the weave of the cloth with body putty, and apply the gelcoat finish coat.





VIEW THRU TOP WING PANEL
(LEFT SIDE LOOKING AFT -
LAMINATE THICKNESS EXAGGERATED FOR CLARITY)

PREVENTING CONTACT BETWEEN SIDE BRACE ARM AND TRUNNION

In Service Bulletin *2,* which was sent to Glasair RG builders with landing gear from the second production run (landing gear kits numbered 071 through 220), we warned about the possibility of the main gear side brace arm binding under the squared shoulder on the underside of the trunnion which could lock the gear, preventing proper gear retraction, and possibly causing damage to the retraction linkage. To prevent this, we recommended bonding a wear block to the side of the oleo to guide the side brace arm and prevent binding.

An alternate method suggested by one of our builders, which may be just as effective, and which avoids the problem of bonding to the oleo strut, is to install a thin, large diameter washer onto the side brace bellcrank axle between the upper side brace arm and the aft side brace bracket. The washer prevents the side brace arm from angling aft and contacting the oleo strut. Each builder will have to determine the proper thickness of the washer through trial and error.

ENGINE MOUNT SUPPORT STRUCTURE

In the past, we have recommended putting the fuselage on its nose for ease in seaming together the fuselage. One builder suggested that the engine mount reinforcement gussets and the firewall rib are also easier to fabricate with the fuselage on its nose. This will require a very tall ceiling, of course, or moving the airframe outdoors.

REMOVING SIGN-STRIP

Some builders have reported difficulty removing the Sign-Strip which is the protective coating applied to the plexiglass windshield and canopies. The Sign-Strip doesn't seem to be water soluble, as advertised, and, in many cases, is applied too thinly to be easily peeled off. One suggestion is to use 2" wide masking tape which adheres to the Sign-Strip to allow easy peeling.

GLASAIR PICNIC REMINDER

We are still taking reservations for the second annual Glasair Picnic. The dates for this year's event have been set for Saturday and Sunday, August 24 and 25, and the location will again be our facilities in Arlington, Washington. At this time we have reservations from about 50 builders and guests, and 11 builders have indicated that they will be bringing their completed Glasairs.

The deadline for informing us of your plans to attend the picnic is July 26, so, if you don't want to miss the fun, use the coupon below to make your reservations as soon as possible. The cost of the picnic is $35,00 per person. All motel billings will be sent direct from the motel. If you need more information about the picnic, refer to the last issue of Glasair News (#16), or give us a call.