ANATOMY OF FUSELAGE REPAIRS

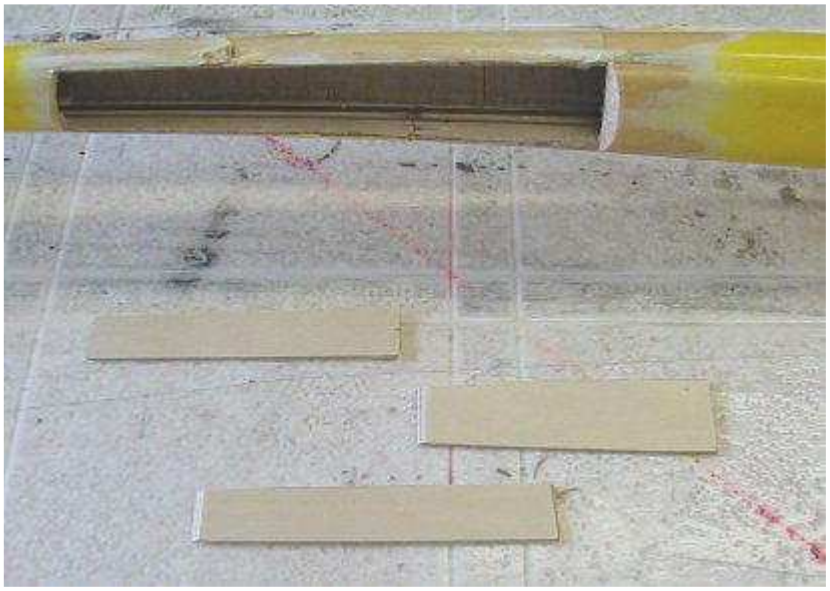
The first part of this file is about doing a repair on the glassed-over fuselage. The latter part covers some repairs on composite fuselages.

The glassed-over fuse will stand a pounding on landings, but two weird calamities in 15 years have snapped the boom area. On 4/14/04 I launched the prototype LT/S on a strong hi-start and caught the wing on my wide-brimmed hat. The ship could not be straightened up before going inverted, spearing the ground under full tension, tow ring still attached. This was a really hard rap. The tips disengaged and other than some minor delaminations where they plugged in, there was no wing damage. However, the fuse broke about 6" behind the wing.

The first step was to disengage the rudder cables and pushrod from the servos. The CF pushrod was intact. Acetone on a rag easily removes Krylon spray paint. This was done to get a good look at the damage and prepare for reglassing with Sig polyester resin which would have eaten into the paint if not removed.

Splinters were picked away so the severed sides could be butted together in original alignment. The plan was to internally splice 1/16" ply doublers across the breaks. To make access, a section of the balsa bottom, 1/64" ply and triangular stock were cut away.

Each of the three doublers was sized to make full contact with existing structure. The rear ends were beveled to prevent rudder cables from catching on them when later inserted forward from the exit holes by the fin.



The doublers were to be attached with epoxy, one at a time, carefully eyeballing to retain the original alignments. The one at the top was attached first to the intact 1/64” ply. The side ones were then separately attached.

New triangular stock was applied where the ply doublers made corners and where new 1/64” ply was to be replaced on the bottom.

New balsa was added to the 1/64” ply. The “Icing” putty mentioned in the Fine Finishing file was used to fill creases, pits and dings on the exterior.

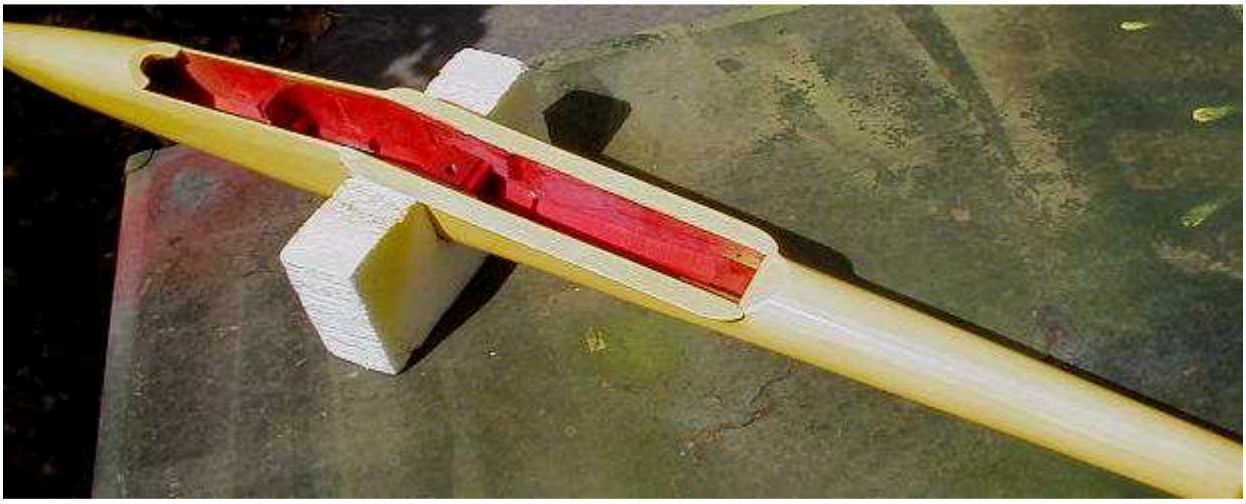
The profile on the prototype was higher than what I later decided I liked better, so while I was at it, I decided to lower it and size a new canopy to fit.

The Icing putty was used to fill a dip forward of the canopy where I cut too deeply.

I decided to redo the fuse yellow, except inside in the equipment area. I removed all the original outside red paint and the original yellow paint, back to near the fin. Using the Sig Finishing Resin, I applied two overlapping layers of 1.4 oz. glass cloth where the balsa had been replaced, also around the lowered nose area and on the sides under where the canopy goes. After this cured well, the edges were feathered and a flow coat applied over the reglassed area. When cured, this was all wet sanded and merged to the original glassed areas. The whole fuse was recoated with a scratch filler and finely wet sanded, ready to repaint.

The new canopy in the foreground had to be fine fitted to the LE of the wing. I also decided to attach it in a different way. See the drawing in File 1.

The fuse was first masked to repaint the interior red. Then this was shielded with cardboard to spray yellow on the horizontal edges where the canopy and wing go. Then overall yellow was applied to the main fuselage.



The restored fuse looks like new and is stronger than it was originally. The repair can't be found. Using a hacksaw and files, a hook tooth was made from a piece of aluminum T-bar to screw attach under the nose. Servos are in, new canopy fine-fitted and painted. Rudder cables and pushrod are hooked up, ready to fly.

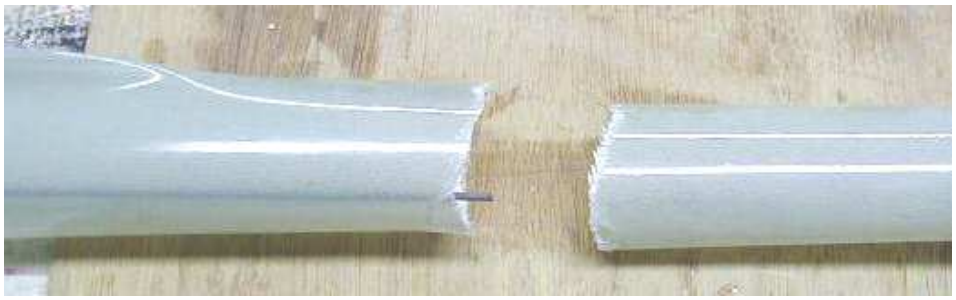
Red accent was added to spiff it up a bit. Color rendition indoors is better than outside.

EPILOGUE: On 4/24/04 I took this ship flying for the first time after being repaired. I got it nicely trimmed out again. Friend Jay Decker asked to fly it, did so a while and then said he wanted it, although he has a new Pike and a Graphite. Oh, well, I continued to build new ones. The 9th one is now finished and it has the composite fuselage. Jay says he will be building an LT/S for himself as time permits.

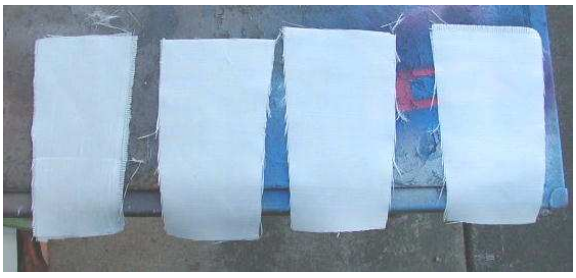
REPAIRING A BROKEN GLASS FUSELAGE

The picture below displays the result of launching on a short high start with the Tx switch off. Such events instill humility and present an "educational opportunity".

After "study" I decided to use the tapering rear section as a form around which to create a sleeve to install inside to rejoin the two sections. With bagging wax, I applied and polished three coats so epoxy would not bond to it.

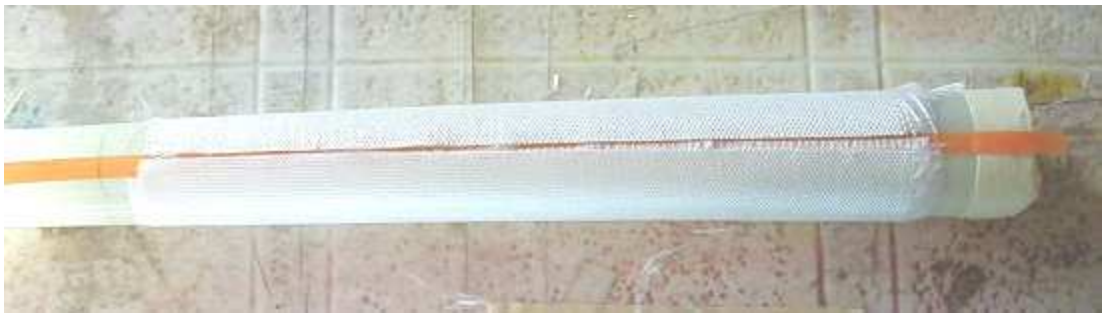


I removed the pushrod pieces and rejoined them with a metal split sleeve. By making a small hole in the skid area of the fin, the rear coupler could be visually aligned and threaded back into the bell crank clevis after the fuse was repaired.



4 pieces of 4 oz. glass cloth were cut and sprayed with 3M77 for fray control.

For a visual reference I stuck a length of ¼" wide plastic masking tape along the bottom seam line and waxed over it. The wraps were carefully sized to leave a narrow space along the bottom seam.



I mixed ½ ounce of West 105 and brushed it well into the wraps. I cut some long 2" wide strips of plastic drop cloth to apply in barber pole pattern to hold the wraps tightly in place while curing. After curing, the sleeve was progressively loosened and peeled away.

The sleeve could be narrowed to slip directly into the front part of the fuse from the rear opening and then left to spring apart again. It was shortened so about 2-1/2" would slip into either side of the break. It weighed .3 oz. and was bonded in with quick epoxy used up front first and then at the rear. Oozing epoxy was wiped off with acetone on a rag.

Icing putty was used to smooth up the joint. The repair is undetectable. That's the actual repaired and painted fuselage below.

This next repair was on the fuse of Genie #29. On Saturday, May 19, '06 I first launched it on a winch at a Pasco, WA sod farm. Wind was 12-15 MPH which made for a spectacular launch followed by a lovely flight of about 10 minutes. What a magnificent airplane at 83

ounces using the composite fuselage! The JR receiver being used had been looked over by Horizon after a different ship, using a different transmitter, had no control after a normal winch launch and release. They replaced some receiver part and said all was well.

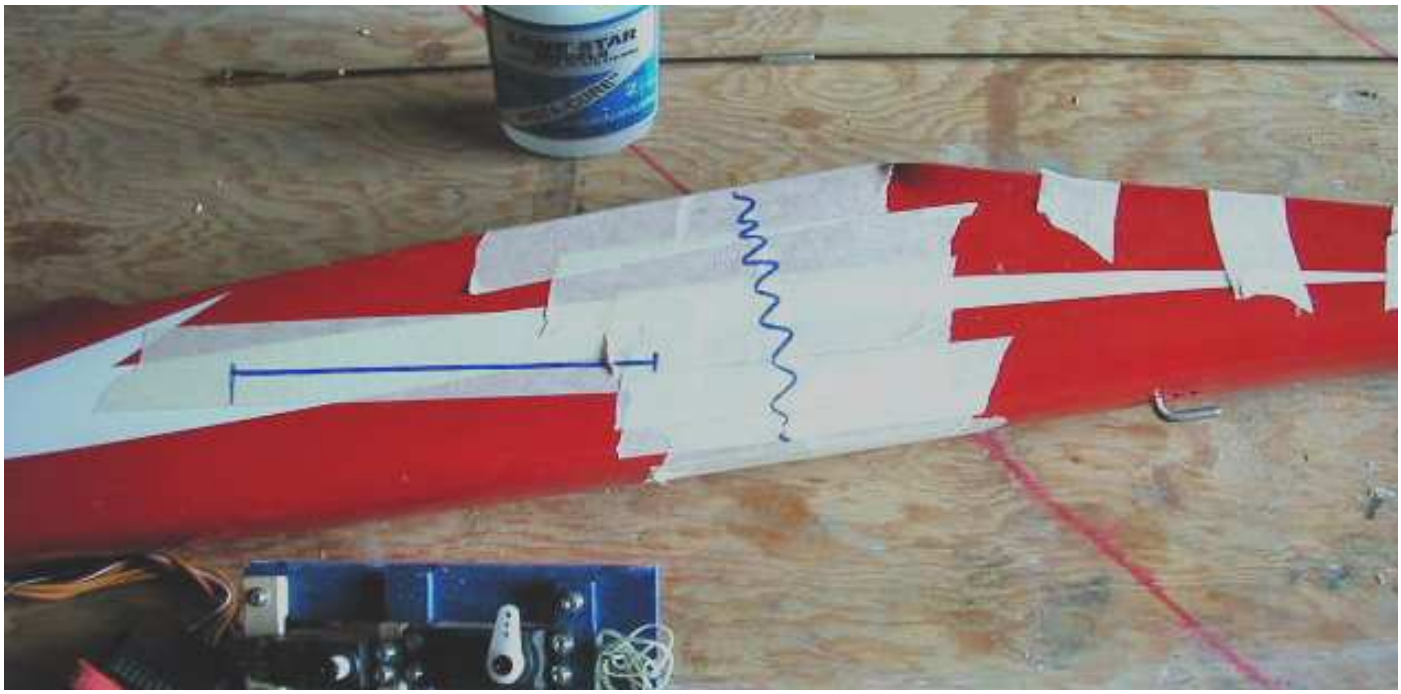
In the meantime, I'd retired that transmitter, having had one other such puzzling experience last year and uncertain if it was a Tx or Rx problem. On the 2nd winch launch, all went well until release from tow, then nothing, same as last year, locked in a spiral. On inspection after it hit, the switch was on in its rearward position and servos were moving normally.

Using this different transmitter, I'd earlier attended a 2 day contest and flew two other ships with it without incident. Following the spiral, I flew a different ship without incident, so the receiver in #29 is suspect of intermittently not receiving. Perhaps the impact knocked something back in position.

At impact, the fuselage was severed ahead of the wing, the servo tray dislodged and the CF pushrod broken in two. My repair approach was as follows:

Take stuff out of the fuselage, clean up the severed edges, align the parts, join them with instant CA glue and apply tape on the outside to hold stuff together well. Then inside, using bagging epoxy, laminate some CF and glass cloth pieces over the breaks.

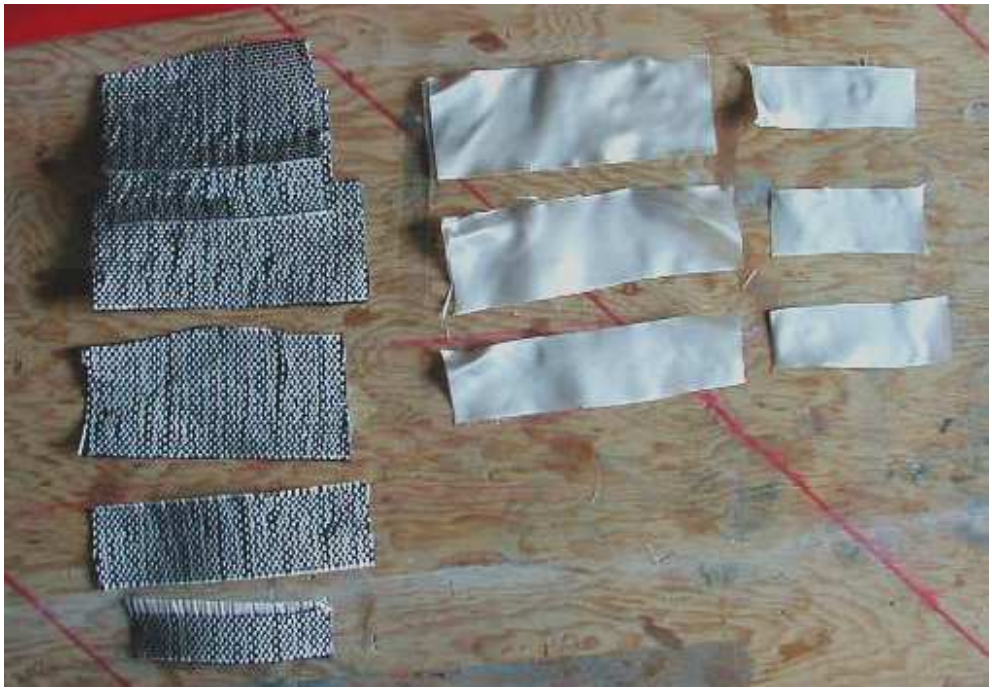
Preparation is shown below. In the intact saddle area, I taped the rudder cables out of the way.



The solid, angled blue line is where the tray goes back. The squiggly line is the location of the break which is similar around the bottom and up the other side.

The CF pushrod by the glue bottle had snapped and had a shattered area. Using a split sleeve and CA, a section of scrap pushrod was joined on to restore original length.

The next pics show the pieces of CF cloth and glass sized to go inside and tools used.



Larger cloth pieces were cut about 5" long to extend either side of the breaks. CF went down first, then the smoother glass pieces.

The long tweezers helped position pieces to be wet out one at a time.

The epoxy was warmed to reduce viscosity and readily penetrate the pieces.

With all wetted out and taped together the work went into a hot box to cure.

After curing, the tape was removed to start the exterior restoration.

Paint was removed with acetone, razor blade and wet sanding with #240 grit paper. As shown below, Icing putty was used to fill irregularities along the break, making the fuselage ready for primer and new red top coat as next shown.