Healing the Sick: Rejuvenating an LS-4



By Amelia Adams

Why I did this . . .

- § Been around gilders since a small child
- § Destined to fly from birth
- § Have been to numerous glider contests with my father
- **§** Began taking lessons summer of '05
- § Soloed in fall of '05, four days after my birthday!
- § Found out about the state of the LS4a owned by club, decided to do something about it
- § Also, needed a "Personal Project" for IB

About IB

§ International Baccalaureate Programme
§ Very demanding academic program
§ In sophomore year, required to complete a "Personal Project"

- The form of the project decided by student
- Extend over 6 months



The Project's Beginnings

- § Went to look at the glider for problems back in fall of 2006
- § Wrote down a list of what needed to be done
 - Fix gear doors

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- Replace wheel and brake
- Rewire instrument panel
- Fill chips in canopy
- Send tail in to be refinished

Began preparing a formal presentation for the CSA Board of Directors

Getting It Approved

S Called various workshops for bids on refinishing the tailplane

- § Added up all the costs to create a potential cost of repair (just under \$5,000)
- § Created a formal presentation
- § In December, the project passed the board by one vote!

LS4a Tune Up

Dec. 18, 2006

- Amelia Adams, IB Personal Project
- work on LS4a with Rich Roberts as mentor
- Father will be supervising in between meetings with Rich
- What I will work on (discussed with Rich):
 - wheel & brake (Rich Roberts says they are not fit for the ship, aren't on the equipment list. The ultralite is not meant for the speeds and weight)
 - § from Wings and Wheels, received estimates from Tim Mara
 - § 4" KOBOLD 103-20 Wheel with anchor bolt M10x1/25+ nut flange 6mm \$577.00
 - § TOST Tire 400x4 \$88.95
 - § Inner tube Wredestein 4.00-4 standard valve 32 also in stock at \$16.90
 - § Shipping costs, estimated \$30
 - finish on fuselage and tailplane (crazing on all control surfaces in tailplane and in wing root. Chipping on canopy and around canopy frame)
 - o looked into costs of refinishing (estimates) as well as \$500 for shipping:
 - § Yankee Composites in Lakeport, CA \$12,000 for fuselage, \$3000 for tailplane, could get the ship in within 3 weeks
 - § Williams, CA \$8,000 and \$3-2500, end of Jan.
 - o gear doors need to be fixed
 - o rewire and plumb the instrument panel
 - o a donated Zander flight computer from the Adams'
 - o additional supplies gel coat, paint, etc. \$300
- In summary, consider and approve covering costs of wheel and brake as well as tail plane recoated, estimated cost of \$4250. I plan on starting the first week of January and finishing in March. There will be an IB open house for everyone to display there personal project. It will be an opportunity to show off the ship as well as advertising for CSA.

Sending in the Tail

§ First job was to retrieve rudder and elevator to make a crate to ship them in

- § Spent over a week (during winter break) making a wooden crate from scratch. Sent the parts to David Nelson in Michigan (awesome guy)
- § Wanted an expert to refinish tail



Getting the Glider

§ Complications with retrieval due to severe snowstorm a few weeks previously
§ Had to shovel a path for the truck and trailer through a 2 foot snow drift
§ Took apart and stored the glider in 15 degree weather!

Kept having to jump in the car to warm up

- Reputating to jump in the call to warm up

- Took us over an hour to disassemble it



Beginning Work



Taking the Cockpit Apart

- § Disconnect all wires connected to the instrument panel
- § Remove the inner panels and instrument panel
- § Remove canopy for easier access, also to paint it later on



Gear Doors

§ Needed reconstruction on corners



Cleaning

§ Vacuumed everything inside the cockpit
 § Using either Xylol, lacquer thinner, or acetone, removed rust and other unidentified residues

§ Took out all hardware, and what was savable was wire brushed, painted, and put back in

§ Washed the fuselage (harder than it sounds)











Sanding the Tail

§ Had to remove tail numbers to paint on new ones

§ Crazing in the tail was bad enough that a new coat of gelcoat was necessary
§ Took two and a half weeks to sand off, using only 600 grit



Problems Arise

§ Instrument panel was unsalvageable

Missing crucial elements
Didn't completely meet FAA requirements

§ New wheel and brake didn't fit on axle
§ Much of the hardware was rusted beyond repair

§ Huge hole in the seat pan!

Creating Solutions

§ Would have to:

- Create new instrument panel
- Create spacers to make wheel fit on axle
- Match old hardware with new and install
- Fill in seat pan with fiber glass
- § New projects kept popping up!



















Nearing the "End"

- § Installing newly made instrument panel, completely rewiring it
 § Installed new flight computer (Zander)
 § Gel coating and painting tail
 § Putting the canopy back on, matching up all the hardware
 § Little clean up jobs, making it look pice
- S Little clean up jobs, making it look nice



At the End of the IB Project

§ Originally thought there were only five tasks
§ In the end:

- sent off the plane parts to Michigan to be refinished
- completely remade the instrument panel and rewired the all electrical and plumbing
- installed new flight computer
- painted almost every instrument, gear, and hardware piece inside the cockpit
- sanded, gel-coated, painted, and finished the tail
- replaced all hardware in the ship

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spent almost 10 hours cleaning alone

Spent over 200 hours working on the plane









Next Task . . .

S Decided to put a nose hook in the plane

- Bought kit from DG required by the technical bulletin
- Had to ask club for more money . . .
- § Plane was back in our garage
- § Had to
 - Thread pitot tube through fuselage
 - Completely tear apart inside the nose of ship
 - Install parts for nose hook





To Date-

- Acquired operating limitations from FAA
- Acquired current flight manuals from DG
- Removed and reinstalled rudder
- Removed loose 7 lb weight from tail
- Built crate to send rudder and elevator to be refinished by Dave Nelson
- Carefully sanded off letters (both red and white paint)
- Applied gel coat to vertical stabilizer
- Sanded out gel coat and polished
- Applied registration numbers
- TBD- apply contest letter
- Removed nasty tape, residue, piece of tubing from total energy tube
- Scrubbed bottom of fuselage
- Removed total energy tube from top of fuselage (was not connected)
- Filled hole, sanded and smoothed filler
- Removed, repaired, refinished and reinstalled gear doors
- Removed illegal wheel and brake
- Removed hydraulic brake system mount from bottom of cockpit
- Acquired and installed Tost wheel, brake, tire and tube
- Created new sleeve for wheel
- Installed new brake cable
- Removed pedal assembly and inspected the nose weight mount per the service tech bulletin
- Sanded chips around and on canopy, gel coated, re-sanded, polished, and waxed

- Removed all latch hardware from canopy
- Sanded all the tubes and latches, painted
- Replaced and painted hardware
- Polished canopy Plexiglas
- Painted canopy rim black
- Cleaned entire cockpit
- Removed instrument panel, wiring, tubing
- Traced all tubes and wiring, then correctly labeled them
- Built new speaker box
- Rewired microphone
- Cut, sanded, and painted new instrument panel and pedestal
- Re-plumbed and rewired instrument panel (added connecters for all wiring and plumbing)
- Reinstalled instruments, including Zander computer
- Put in multifunction stick switch for Zander, wired it and painted it
- Acquired and applied new placards from DG
- Wired and installed flight computer
- Removed instrument panel shroud
 - Removed old fabric
 - o Sanded
 - Primed and painted
- Sanded paint off vent, primed and repainted
- Sanded and painted gear, rim, and air brake levers
- Made and installed new stick boot
- Rebuilt battery mount, added mount for flight computer

- Removed, acquired and installed new seatbelts
- Removed seat back cable and replaced it
- Removed and replaced pedal adjustment cable
- Patched holes for hydraulic brake line
- Removed and repaired seat pan (from hydraulic system)
 - Fiber glassed
 - Painted and spackled
- Washed wings
- Touched up chips on edge of wing tip with filler
- Printed out all manuals (maintenance, operating, radio) and placed in portfolio
- Obtained and printed out tech bulletins and ADs
- Printed out operating limitations, made pocket for them, registration, and airworthiness certificate
- Measured and sewed a side pocket, Velcroed to side of ship
- Washed and mended headrest cover
- Made new canopy cover
- Attempted to re-glue wing saddles (carpet to metals)
- Had the ship re-weight and balanced, annualed
- Repaired the wing stand
- Installed nose hook
- Installed tail fin pitot tube
- Repaired scratches on underbelly of nose

To Conclude

§ Long project- still going on
§ Gained invaluable information about gliders and how they operate
§ Glad I did it, but wouldn't do it again!

Special Thanks To:

§ My amazing mentor, Mr. Rich Roberts

§ My dad, Aland Adams, who helped me through the process every step of the way

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Any Questions?

Can view a copy a copy of presentation at www.adamsfive.com/soaring