

Project CHEROKEE II N373Y

Tony Condon, abcondon@gmail.com



In 1964 Stan Hall wrote an article in Soaring titled "Project Cherokee – Final Report." Forty five years later I'm proud to continue Stan's work with my own Project Cherokee report. It really started in 2005 when I bought my Cherokee II, N373Y. Dave Schuur had done a good job getting it airworthy again but his new paint job really didn't get along very well in many places with the old paint. After a few years the old paint was starting to crack underneath the new finish too, which didn't look that great. It didn't help that I kept landing the glider in dirt fields, pastures, roads, and pretty much anywhere but a nice airport, which was hard on the finish. After a few years of this sort of abuse I realized that the glider was going to need to be recovered sometime soon.

I was in my junior year at Iowa State at the time when I realized this, and money was tight. So it had to wait. More landouts, more paint chipped off the side of the fuselage but my mechanic would still sign it off. He noted in the last Condition Inspection that the fabric was in good shape but the paint job was poor. That was last spring and I was moving to Wichita, Kansas. Finally I was making some real money and could afford to do the work! One last season of cross country flying in a new state with some good flights logged and then the Cherokee went under the knife. Not before the great vintage rally at the end of September though, and not before we

bought Leah her own Cherokee for her wedding gift.

Around the middle of November we started. Taking all the old fabric off was the first order of business. First I decided to open up the rudder. It had to be removed anyway as my rented garage was not long enough to fit the fuselage with it attached. Plus I could work on the rudder in the comfort of my living room! I figured it would be a good way to test my skills on the Stewart System recovery process by making mistakes on a small piece before messing up on the fuselage and then wings. The wood on the rudder looked great and I was hopeful that the wood in the fuselage was just as good.

I cleaned up the rudder and had new fabric on it in pretty short order. I found the process easy to work with. Up until this point I had only done fabric patches using Poly Fiber or Randolph products. However I had no problems using the Stewart cleaner and glue.

Now was the time to tear into the fuselage. The first cut was hard to make but the fabric started to come off very easy and within a few minutes my glider had turned into a wooden skeleton that only many months of hard work would fix. My wife Leah was a great helper although a bit timid to tear fabric at first.

One major benefit of moving to Wichita is that I am now in the company of some real experts in wood glider restoration. So with the frame exposed I had Neal



Here is the rudder with fresh paint on the rudder hinges. Looking good!

Pfeiffer and Harry Clayton come over to take a look at the frame and give me their opinion. There were a couple areas that were questionable as far as water damage but after a little more inspection it was determined that they were OK. Whew! I did identify a few pieces of wood that looked damaged and needed replaced. One was a piece of plywood in the tail that held the lower longeron in place. It appeared to be cracked; I suspected this was from the bottom

of the fuselage dragging occasionally when loading it on and off the trailer. The biggest area of broken wood was entirely my own fault. When I had removed the rudder I had forgotten about the massive return springs on the rudder pedals. Taking all of the tension out of the control system caused the right rudder pedal to snap forward into a frame and bust it up pretty bad. Lastly I had some water damage in a trim piece right under the canopy. An order of 1/2" spruce stock and mahogany/birch plywood from Aircraft Spruce and a little time at Harry's shop and the new pieces were ready. Late in January Wichita had a couple days with temps over 50 so I took advantage and epoxied the new wood in place. Harry gave me a sheet of 3-ply birch plywood to replace the 1/8" trim piece that had water damage. Leah did a nice job of cutting it to shape and we epoxied it in place as well.

After attending the SSA Convention and spending plenty more time oogling over Dean Gradwell's Cherokee (see page 62) and visiting with Dean, I decided to cut out the shelf on 373Y. The main factor driving the decision was that I think this will give me a little more legroom and a slightly more reclined seating position. Comfort is key in flying any glider and I want to keep flying my Cherokee for a long time. The first cut was a hard one but after a few hours of work with the saw, chisel, and sand paper the shelf

The filler piece next to the fuselage.



Well after inspecting Dean Gradwell's glider at the SSA Convention I decided to bite the bullet and cut out the shelf in my Cherokee. Getting to the point where about the only thing that I have left to do on the fuselage is some epoxying and new varnish on areas where there is new wood or we have sanded.



was history. Now I will be able to sit back all the way to the front spar.

I was about to start work on the wings. This was pretty risky in my mind. The main goal of my project was to be prepared to drive the glider to Marfa, TX on April 17. Initially my thought was to do the fuselage first and then if time allowed to do the wings. I was not against flying with a newly recovered fuselage and old wings for this season and recovering the wings next winter.

However, Wichita was in the middle of its coldest winter on record. Now, it really wasn't THAT cold, especially compared to the winters I had grown up with in northwest Iowa. But the temperature did not get above 60 degrees for a solid three months which has never happened here in recorded history. My garage is not heated and I needed warm air to do things like glue fabric and paint. So I was getting to the point where if I wanted to get anything done on the project I needed to start working on the wings.

I also realized that I should have enough time to uncover the wings, make minor repairs, and get them covered again. If major repairs were going to be needed I might run out of time, but if major repairs were needed I was going to be happy that I opened them up anyway and wasn't flying them anymore. So the decision had been made. The wings came to town and I started work on them immediately.

The wood underneath looked like it was in great shape in general. There were, of course, a few spots that raised flags, but that is to be expected of a 40+ year old wood structure that hasn't seen the light of day for 35 years or better. I was pleased to find that no ribs were broken. The trailing edges were really straight, especially when compared to some other vintage wood gliders which have suffered from years of shrinking dope.

There were a few places in the plywood leading edge that needed attention. Before I owned the glider it had spent many years sitting in the trailer in cradles. These of course had held moisture close to the wing and you could see in the leading edges where those cradles had been by discoloration in the wood. After close inspection I found that the damage was not too bad on the left wing. However I had some issues to deal with on the right wing tip.

The nice thing was that I knew this was coming. When Dave Schuur had my glider in his shop in 2003 he had replaced a rotted section of the right wing root and found damage at the right wing tip. Unfortunately the owner at that time didn't have the money to properly fix it and Dave didn't catch it until the paint job was finished. A couple squirts of epoxy into the wood with a syringe firmed up the soft wood as a temporary fix. Dave was always quick to remind me whenever he saw me that I would need

to give that wing some attention when I opened it up. Well it didn't take me long to find the bad wood. And as I was poking at it to see how soft it really was, my finger poked through!

I got to work with my new chisel set and cleaned out the rotten wood. I was lucky that this plywood is non structural so I felt comfortable cleaning back to the nearest ribs and just butt jointing the new plywood into place. With the bottom skin removed and cleaned out, it was really obvious from looking at the inside of the wing that the top skin in that area was in bad shape too, so I removed it as well.

It wasn't warm enough to work in the garage every day but I had plenty of inside work to do. I spent two Sundays in a row covering ailerons. We did one a day. It was quite a fun time really. At first it was a fun personal challenge just to see if we could do it. Of course this was just getting the fabric glued in place and shrunk, no filler or paint involved. Also, we uncovered the Elevator and disconnected it from the Horizontal Stabilizer. My Horizontal is covered in fiberglass skin so I didn't have any fabric work to do to that. However I found that in a few places the fiberglass skin had broken free from the rear spar of the Horizontal. So with some West Epoxy, clamps, and stacks of old Soaring magazines I glued the skins back in place.



Rotten wood replaced on the bottom of the right wing.



When I did work in the garage there was not only the repair work to do but plenty of sanding. In fact for a few weeks I felt like Pig Pen from Peanuts as a cloud of sawdust seemed to follow me everywhere I went. But I just kept sanding the wings and eventually all of

the old finish and sealer was off of them and they were nice and smooth. Once I had the damaged wood removed from the right wingtip and everything cleaned up well, I got some 1.5 mm plywood from Neal Pfeiffer and using many bungee cords, clamps, West

Epoxy, steam, and luck I managed to get the plywood glued in pretty close to its proper place. This brought me up to the end of February. The clock was ticking. Of course there was still sanding to do. Plus I had one more repair to do to the Left Wing. The root rib on it was in really



Rotten wood removed from the top surface of the right wing.

sorry shape. Between constant handling during assembly and disassembly along with some water damage it was warped and looked somewhat rotted. So out it came. Neal had once again come through in a pinch and found me some Mahogany plywood that was the right thickness, 1/8" I believe, to replace the old wood. After spending a few nights carefully removing the old wood I cut a piece of the plywood and epoxied it in place.

The only other work left on the wings was to do some filler work on the right wingtip where the skin repairs had been made.

Of course my rookie repair job wasn't perfectly smooth so I covered the area in Poly Fiber Superfill epoxy filler. This stuff is great! A very easy to use two part filler and super light weight. Of course the first time I didn't put enough filler so after sanding it to a rough shape I had to add more filler. I think I may have had to add filler again a third time but eventually I got the shape that I wanted and was satisfied with the job.

Lastly both wings were brushed with a coat of the Stewart Systems wood sealant. Now they were truly ready for fabric. Like I had done for the trailer, I



And here's how the patch looked once I finished sanding.

decided the best way to cover the wings would be a weekend long workshop with friends. I managed to get the use of Nick Moore's basement to do the work and Jesse Angell agreed to come down from Lincoln to help out. So Nick, Jesse, Leah and I were the team.

We transported the wings to Nick's place at about 12:30 AM on a Saturday. We got started after breakfast that morning. I had covered the ailerons and rudder and it was somewhat intimidating covering the wings. Harry Clayton had some engine stands from Harbor Freight that



I knew the general Stewart's process from doing the control surfaces but had never covered anything nearly as big as a wing before. We started out by cleaning the wings with the heavy duty cleaner, and then painting glue around the perimeter of the

wing and along each rib. Then, with the glue somewhat dry, we laid the fabric in place over the wing and used the iron to re-activate the glue and set the position of the fabric. This worked like a dream.

we had adapted as wing stands. It was nice to have my wings on a Rotisserie.

We covered the bottom of the wings first. The days work reinforced my satisfaction with choosing the Stewart System even more. The process is really easy and very forgiving. First step was to brush glue on everything you wanted to glue to. Then let it dry. The glue is heat activated so once the glue was dry we laid a piece of fabric in place and then used the iron to tack it down to the wing. Then we

brushed glue through the fabric and let that dry to complete the bond. The great part about this method is you aren't racing the glue. At one point we were hungry so Jesse went out and got some pizzas and we just stopped in the middle of gluing and took a break. Wonderful!

By late in the evening on Saturday night the bottoms of the wings were glued in place and the initial shrink was completed. I would wait until the next morning to do the final shrink so that

the glue had a chance to set completely. I did get inspection rings located and glued into place. We called it a night after about 13 hours of non stop work.

Sunday was much a repeat of Saturday. We just covered the top of the wings. With our experience from the day before the process went a lot faster. We were finished by 9 PM

So the weekend was a fantastic success. Both wings completely covered! Nick



We glued three inches either side of the leading edge and along the root and tip and both side of the trailing edge. The fabric laid in place pretty well. We would heat the leading edge in place first and then work the top of the leading edge in place.



With the rest of the fabric blanket free to move there were very few issues with wrinkles. Then we'd attach the trailing edge, root, and tip. Then flip the wing over and do the top of the leading edge and the top of the trailing edge.

even put together a really neat time lapse video of us covering one of the wings and put it on YouTube. Do a search for "Covering Glider Wing" and you should be able to find it. I had a few more things to do to the fuselage before it was ready for fabric so it was back to the garage.

The main thing I needed to do to the fuselage was varnish. I had the new wood pieces in place that needed varnished as well as the scars from cutting the shelf out. Of course there

were a few other odds and ends like instrument plumbing, battery mount, and the oxygen bottle that needed my attention.

I used the Stits Epoxy Varnish for the areas in the fuselage that needed it. Worked really well but after getting used to the Stewarts stuff it was a drag dealing with chemicals. I also needed to remount the speaker and microphone for the radio, do some rewiring behind the panel,

reconnect the rudder return springs, and attach the Pitot Tube and fresh air vent.

Since I knew I was going to Marfa with the glider an oxygen system was a must. Field elevation there is nearly 5000 feet and if lift is good at all climbs into the mid teens are expected. There is always the hope of wave in the spring which opens the possibility of soaring over 20,000 feet. With this in mind I purchased a nine cubic foot bottle with mask and cannula and attach clamps. I



Right side of the fuselage skeleton, ready for covering.



Another shot of the fuselage skeleton; left wing on the right.

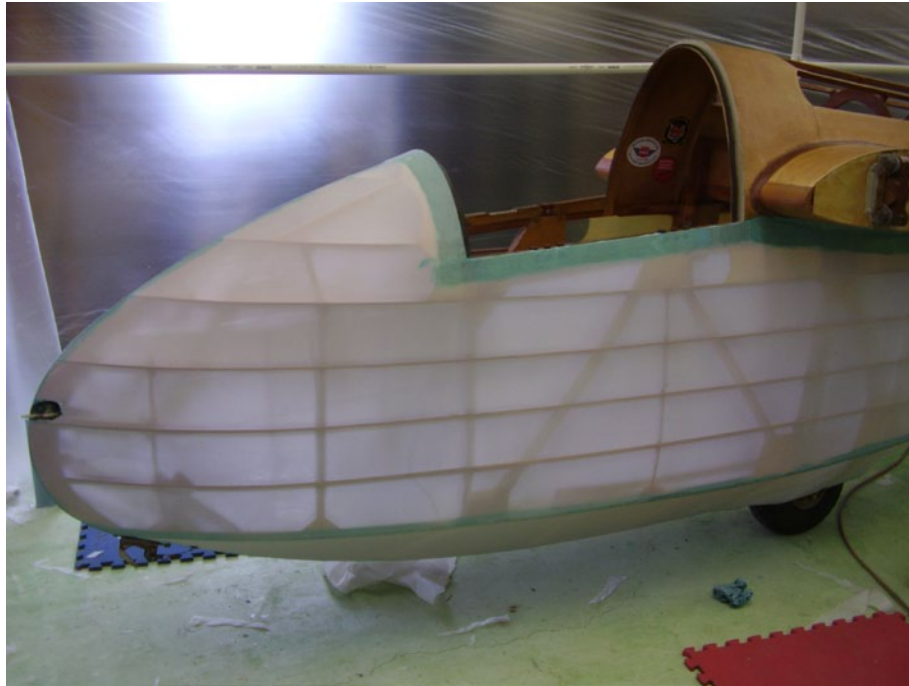
just needed something to attach to. With a little shopping at Lowe's I came up with a solution. I ended up bolting the bottle to the floor so it would be right under my left leg. I was careful to avoid the control cables in this area and make sure that it would be under my leg. It turned out to be a perfect location. One of my favorite parts about it is I have direct access to the valve and can monitor the pressure of the bottle. One neighborhood kid stopped by while we were doing some work on the fuselage and upon seeing

the oxygen bottle mounted in the cockpit asked "Is that Nitrous???"

With this work completed we put Stewarts Wood Sealant on the fuselage longerons and stringers and anywhere else that we had sanded down way back when. Now the fuselage was ready for fabric. The problem was the temperature was still really marginal and I still hadn't really determined a good solution to a big problem. Where to paint?

Well once again, Neal Pfeiffer came through big time. If it wasn't for him I never would've finished this project.

He had just finished painting the wings for his Ka2b and had a plastic tarp paint booth set up in his shop at the Gliderport. He told me to bring the Cherokee out and use the paint booth to get it finished. Wow what a relief! Not only that but it was great motivation to try to get the project finished to minimize the impact that it would have on Neal's own projects. We move the glider out there on March 25th and Leah and I decided to make a big push that upcoming weekend to get the glider covered and start the priming and painting process.



Covering applied to the left side of the nose.



And a close-up shot of the turtle deck. I liked this one.

Covering the fuselage started off pretty rough. It was covered using the same methods as the wings and done with two pieces of fabric, a left and right half. We got started fairly late on Friday due to other obligations and it wasn't going well. Finally at about 2 AM I threw in the iron and went home. Thankfully the next morning I was getting along with the fabric a lot better and the left side of the fuselage was finished shortly after that.

Nick Moore had been helping out a bunch and he kept it up as we covered the fuselage. The right side went on really

easily and I got to work on doing tapes and detail work. Leah started brushing cross coats of EkoFill on the control surfaces. EkoFill is a Stewart Systems product that fills the weave of the fabric and provides UV protection. It is a Charcoal color. The first two coats are brushed on with foam brushes. Nick did a great job covering the wing roots on the fuselage and by the end of Saturday the fuselage was entirely covered.

The next several days are still sort of in a fog. We were regularly working until past midnight every night of the week.

So I'm just going to tell you what we did, generally in the order that it happened.

Leah and I started brushing EkoFill onto the wings. This went pretty fast really and before long my wings were gray. Then Leah, Nick, and I all brushed the fuselage until it was gray too. About the only thing that wasn't gray was the elevator. That was because we hadn't covered it yet! One night Leah and I covered it and the next day it was gray too.

Now it was time to spray. It was April 1st. 16 days to go. I hadn't sprayed paint since I was in high school so I had a

bit of a learning curve. It didn't go too bad though. I sprayed a few more cross coats of EkoFill on the glider first, to help completely fill the weave. I decided to spray white EkoFill, which does not have the UV blocking characteristics. I mainly did this because I was going to be painting the glider with a light topcoat and didn't want the gray base layer to darken it. The spraying went fairly well with only a few runs. I was pretty

paranoid about putting it on too thick, almost too paranoid actually. I had to be careful not to put it on too thin! It didn't help that at one point I ran out of White EkoFill. I still had half of one wing left to spray and didn't know what I was going to do. Once again, Neal saved me by finding a gallon of White EkoFill that he had hiding around the house.

So now it was time to paint the topcoat. I had ordered Daytona White. I carefully

followed the instructions for mixing the catalyzed paint and after reading the manual about 100 times to get the right spraying procedure down pat I went for it. With the Stewart Systems paint you spray two cross coats, or four coats of paint. Each has a little more paint than the last. The first two coats are pretty tough to see but the 3rd and 4th coats really fill in the gaps and bring out the shine. At least that is how it is supposed to work. And for the most part for me, that is how it worked. However, I ended up with a fairly thin paint job in the end. Everything is covered but it certainly isn't museum quality. One thing was I was hyper paranoid about runs and in general about spraying too much paint. There were a few warnings in the book about that which I probably took a little too much to heart. Plus, I was spraying off white paint onto a white surface and I was having some trouble just telling where I had sprayed at all on the first two coats.

All of this aside I ended up very happy with my paint job. We spent about three nights in the shop getting it finished. The base coat was done on April 7th. This just happened to be my 25th birthday and it also was the 88th birthday of William Ree, the original builder of the glider. The next day I painted the N numbers and trim. I decided to copy a scheme that Dave Schuur used on his Cherokee II, which is now Leah's. My glider got a chord wise stripe on the top



Covered, painted and ready to fly!

and bottom of each wing and a horizontal stripe on the vertical stabilizer and rudder. I decided on Pontiac Red for the stripe to have a nice contrast with the Daytona White. It turned out looking really nice.

The Condition Inspection was scheduled for April 12th and we were ready. After the paint was finished we only had a little work to do in the cockpit. Mainly things like bolting in the seatbelts, running wires, and hooking up the Pitot line. The Condition Inspection went off without a hitch and 373Y was legal to fly!

I had been working like mad in the background getting ready for the trip and didn't end up having time to fly the glider until we arrived in Marfa. I can report that it flew beautifully. The recover job resulted in at least a 20 lb weight loss and I could really feel the lighter weight in flight. I ended up with 13 hours in four days of flying in Marfa, including a six hour flight which was a duration record for me and for the glider. I also flew it to 12,200 feet, the highest it has ever been. And not only that but it looked great!

This project never would've been completed without a lot of peoples help and I can't thank many of them enough, but special thanks is owed to Leah Condon, Neal Pfeiffer, Harry Clayton, and Nick Moore.

Upon returning to Wichita I flew the glider on a 193 mile distance flight from Sunflower Gliderport to Falls City, Nebraska. This is the furthest distance ever flown by me or the glider and qualifies for Gold Distance. But that is another story...

You can follow my adventures with N373Y on my blog <<http://cherokeesailplanes.blogspot.com>>.



Tony and N373Y in Falls City, Nebraska. Photos taken shortly after flying 193 miles from Sunflower Gliderport, a record for Tony and the glider, and good for the Gold Distance.





The photo of the cockpit of Dean Gradwell's Cherokee II N72DG. After spending plenty of time oogling over this sailplane

and visiting with Dean, Tony decided to cut out the shelf on N373Y. Notice the data plates and the wood finish.

