

SHOP TALK

THE NEWSLETTER OF THE SONEX BUILDERS & PILOTS FOUNDATION
SONEXFOUNDATION.COM

February 2014

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Shop Talk

Robbie Culver, President - Sonex Builders and Pilots Foundation

During a webinar hosted by EAA in November 2013, (available at "[Using Modern Flight Recording Tools to Measure and Confirm Sonex Flight Performance](#)") Sonex Aircraft LLC CEO Jeremy Monnett discussed some of the value of logging performance data. If you haven't seen the webinar, I would suggest making time to watch it. It was very well done and full of great information.

The Sonex Builders and Pilots Foundation wants to expand on this webinar and begin gathering real world flight data for use by potential builders, current builders, pilots and new owners for comparison of performance using data from a Sonex aircraft set up as close to their own as possible.

As a result, we would like to invite all Sonex owners and pilots to submit any data they have now, and participate in a day of data logging in the summer of 2014. We do not need location specific data, nor private details of the owner or flight. What we do need is accurate data, including the engine, propeller, airframe and configuration, method of logging, and field elevation as well as temperature and wind.

While this sounds complex, it is actually very straightforward. Many EFIS systems allow data to be exported in various formats. Our goal is to gather as much real world data as possible so comparisons may be made on actual flight data, allowing prospective builders, those currently building, and pilots of Sonex models to compare engine and propeller combinations, as well as various data sets.

As far as we know, no other homebuilt community has done this, so once again Sonex could lead the way! Specific details will be posted as the year progresses. If you have any questions or suggestions please contact Robbie Culver at robbie@sonexfoundation.org

Our status with the IRS an officially recognized tax-exempt organization continues to be a matter of waiting. In early 2014 we were informed the IRS is over a year behind reviewing submissions for this status, and that we will have to continue to wait.

While we do not expect any issues with this status, we wanted to inform members of this status.

Recent updates

The Sonex Builders and Pilots Foundation continues to patiently wait for IRS status on our Not for Profit status. At last word, the IRS was over a year behind on approving these submissions, but we will continue to wait and will post progress updates as they are received.

Did you know the Sonex Builders and Pilots Foundation has a tool loan program? We do - details may be found at the following link - [Tool Loan Program](#)

Wayne Flury, Sonex 191 owner, sent us information about an upcoming Sonex fly-in he is organizing in Buffalo, Minnesota on June 7, 2014. Note from Wayne: "If you are interested in attending this fly-in and would like to be added to an email information and invitation list, please respond to Wayne Flury at wflury@wh-link.net, or call 763-670-6021. Let me know what fly-in activities would entice you to

attend. For persons who are willing and able, I also solicit your possible participation in the fly-in as a speaker, demonstrator, vendor, etc." Check out the [Calendar & Events](#) page to learn more!

Dana Baker sent us the link to his [photo sharing site](#). Dana has taken some very high quality photos of his Sonex 1534 scratch-build project. You can also find a link to his build log along with many other builder links in our [Builder's Pages](#) area.

Vic Delgado, Sonex 969 builder, shared a tip about using simple cleco pads as a cost-effective alternative to the molded more expensive cleco pads available through many aviation tool supply companies. Check out his tip [here](#). We've posted a link to his build log on the [Builder's Pages](#) as well.

Jim Hicke, Waix 162 builder, shared a couple more videos with us this week. He illustrates his AeroBrake installation and walks everyone through how he designed and installed his Waix instrument panel. You can find his video links in the [Videos](#) section of [Tip & Tricks](#).

The Best Part of Building an Airplane

By Doug Raby, Sonex 1189 November 8, 2013

In October I finally got to fulfill my dream of flying my own plane to the **American Sonex Association** fly-in held annually in Crossville, Tennessee. The goal was set when I met Robert Eley at AirVenture in 2008. He suggested I attend the A.S.A. and promised to take me for a ride at the event. How could I resist, especially since I had just started building my Sonex.

That fly-in was the beginning of many great friendships with people with a wide variety of backgrounds and one very common bond - the love of aviation; and in particular aviation in home built Sonex airplanes. And I can't say enough about the fantastic support and encouragement those friends have given so freely.

More on this later.

For me this trip was a real challenge. Previously, the longest flight I had made was to the Earlton Airport in Northern Ontario, Canada. Like so many other guys, most of my flying was fairly local, hundred-dollar-hamburger flights. But this was much more complex, and, by far, a lot more flying. Add to this the complications of crossing the border and navigating into unknown airspace, and you have the makings of a very daunting challenge.

Volumes have been written on the complications of dealing with Customs and Border Patrol. So I won't bore you with my own border crossing. Suffice it to say, if you have all your ducks in a row and do your flight planning properly; it really isn't all that bad.

For me the most challenging thing in making long flights is the fact that you are dealing with more than one day's worth of weather. Most of the time, we just go flying in one small part of the weather map. For the trip down to Tennessee, I left on October 1st and got there on the 4th.

Day one was a late start due to lingering morning fog, which blanketed most of my route. By the time I got to Lima, Ohio it was 5:30pm and I was baked after flying all day in the haze left behind as the fog lifted.

The next day I didn't get airborne until 3:30pm because of thick fog. My flight that day was a short hop to Dayton-Wright Brothers Field, south of Dayton, Ohio. By the time I landed there, the skies ahead had turned battleship grey. It wasn't long until the rain started. As a result, I ended up spending two nights in Dayton.

The morning of October 4th was bright and clear. After a fuel stop in Frankfort KY, I finally arrived at Outlaw Field in Clarksville TN, greeted with a friendly "Welcome to the USA" from a voice on the Unicom frequency. Also there to greet me, was my good friend **Robert Eley**. Finally our planes got to meet each other!



C-GGDR and N926AR finally share the ramp together.

After a few days of decompression, Robert and I launched on the last leg of my journey and had a great flight to Crossville, TN. There to greet us was another Sonex builder and founder of the American Sonex Association, and all around great guy, John Davis.

The next few days were a love-in for Sonex builders with a record-breaking 40 Sonex aircraft arriving and a total of 142 persons in attendance.

<http://www.americansonexassociation.org/>



Over the Cumberland Plateau near Crossville

Back to the subject of friendships...

While at the fly-in, I took a couple of these good friends for rides in my little bird. After these flights it sunk in who these guys were and how lucky I was.

Charlie Steffey, has spent more time upside-down in airplanes than I have right-side-up, having flown all sorts of military aircraft including Harriers and then spent years flying commercial airliners. He's currently finishing his masterpiece Waix and he had a blast in my plane.

Wayne Andrews, flies a beautiful scratch-built Sonex which he has been flying for several years. His plane satisfies his "need for speed". You see, Wayne was a champion NASCAR driver back in the sixties. And he loved my plane! What a payoff!

As my good friend Peter Van Schalkwyk (former commercial pilot from South Africa and Waix owner) explains:

"A bunch of boxes arrive on your doorstep. From all these parts, you somehow end up with an airplane. Then you build the engine, hang it on the plane and test fly it, and get everything working.

Then you fly it a long distance and you think you have done a good thing. Then two awesome guys like Charlie and Wayne are your co-pilots....

It doesn't get any better than that!"



Charlie takes a ride in C-GGDR

The flight home was relatively uneventful with good weather all the way. It was a great relief to finally touch-down in Peterborough and tuck my plane away for a well-deserved rest. After all, it had just performed beautifully on a total of 19 individual flights and taken me safely on an 1850 mile trip.

Most importantly, it has been the vehicle that has led to many extraordinary friendships.

If you've already had a great aviation adventure of your own, you know what I'm talking about. If you are still working on your project, keep plugging away.

You will have much more than an airplane when you're done!

Upgrades and Modifications - Wing Leading Edge Skins

by Michael Farley, Waix 0056

One aspect of homebuilding and experimental aviation I personally happen to enjoy is the ability to perform modifications and upgrades to your airplane, even after it's flying. Only on the most rare of occasions is a homebuilder truly done with their project on the first flight; for most of us, there is a never-ending quest to always be dreaming or working on the airplane in an effort to, one day, call the project complete. Only after the airplane is as good as we can make it will we allow ourselves to call the build portion of the project truly done.

In many cases, cosmetic touches such as interiors and paint jobs aren't accomplished until the airplane has flown, and maybe for good reason. The last thing any aircraft owner wants to think about is destroying a brand new, beautiful paint job (not to mention expensive!) in order to fix a mechanical issue that may pop up shortly after the airplane starts Phase 1 testing. In addition to cosmetic items, other items like wheel fairings, landing gear leg fairings, exterior lighting systems, and even avionics upgrades are sometimes avoided until well after the airplane celebrates its first flight. I don't think us builders are purposely being lazy; rather, I think there is a goal to try and fly the airplane as soon as practical, and of course budget concerns may also factor into this equation as well!

If this is thought and motivation is a homebuilt aircraft "standard", I certainly fit the mold. When I first flew my Waix in early spring 2012, there were a lot of items still on my completion list. At the time, only part of my airframe was polished. I had yet to purchase any sort of an interior kit, and there was no baggage area either. Even now, I still have a list of items to complete before my airplane is done; eventually I want to add landing lights, a transponder, and how could I forget about all of the polishing I still need to finish! Not only that, but there are a few parts of the airplane that I'm not completely happy with and would someday like to do over. Perhaps one day, I'll gather the motivation to replace my front windshield that's a little scratched up, or rebuild the canopy I rushed through and didn't do a very good job with.



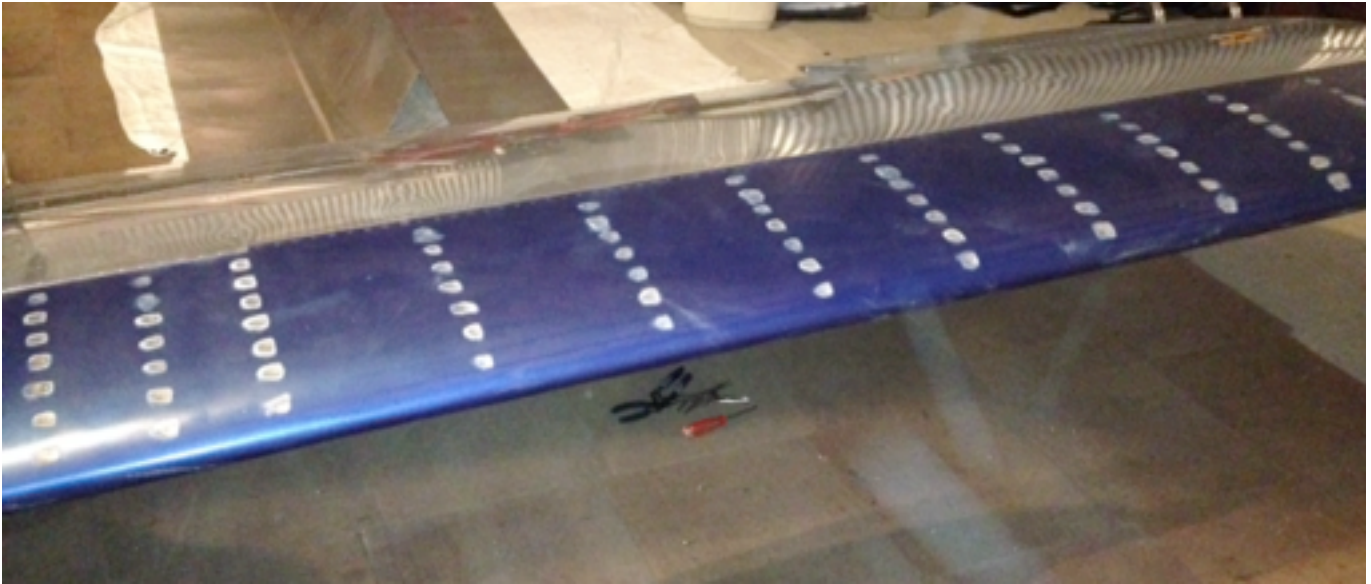
Until recently, another item I was unhappy with was the installation of the wing leading edge skins on my Waix. These delicate skins seem to have a way of creasing at the most inopportune times, as I found out when I was installing my left wing skin. Then, to add insult to injury, my right wing skin was dented in several spots when I moved the project from my garage to my airport T hangar. There was no damage I considered to be a safety of flight issue, but that didn't keep me from wanting to scream! In order to keep the build process moving I elected to use some lightweight body filler and paint my leading edges for an acceptable finish, but it was one area of my airplane that was my own personal eye sore. I knew I could do better, and I knew that one day, I would have to replace those skins before my airplane was truly complete.

Over the course of this winter, I went ahead and completed this small "cosmetic surgery" on my Waix. The task began with the purchase of two new wing skins, and a whole lot of CCC-42 and CCP-44 rivets from Sonex. Shortly after my purchase, Conway trucking showed up at my home with a very large and well packaged box containing my new skins.



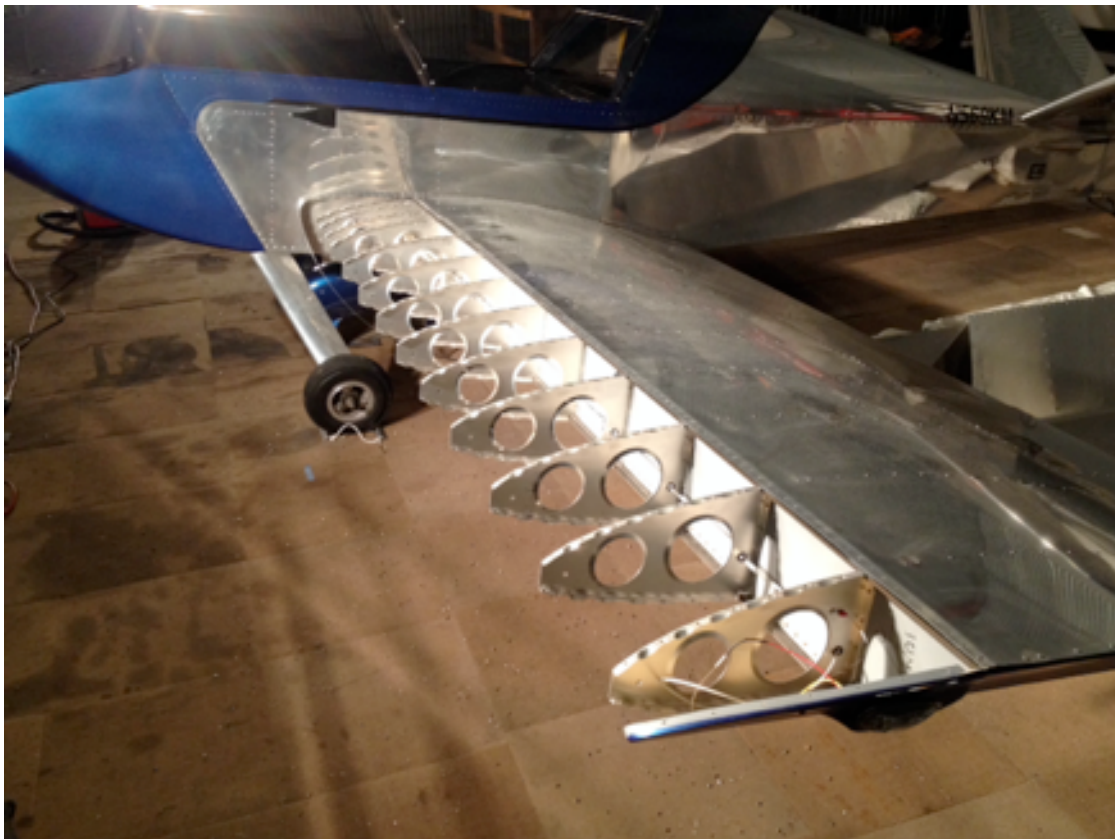
After carefully unwrapping the skins, my first order of business was preparing these new skins for eventual installation. Let me say one quick thing about the Sonex kit: it is amazing! Without the modern CNC machines and laser-cut skins that's provided in the kits, this project would have been much more difficult. Given the accuracy and quality of the parts however, everything would eventually fit perfectly and I would have no issues with parts fitting when rebuilding my wings. I applaud the Sonex factory for taking the time and effort to make the kits now being offered a complete "matched hole" design, which will not only make the build go much faster, but will greatly decrease the chance for builder errors. Way to go Sonex!

Prepping the new skins was a fairly straightforward task. First, I updrilled the necessary holes to 1/8" and deburred them. Second, I deburred and dimpled all the holes that would eventually have the countersunk CCC-42 leading edge rivets installed in them. Again, a simple, albeit time consuming task. After a general cleanup and inspection, I deemed the new skins ready for installation.



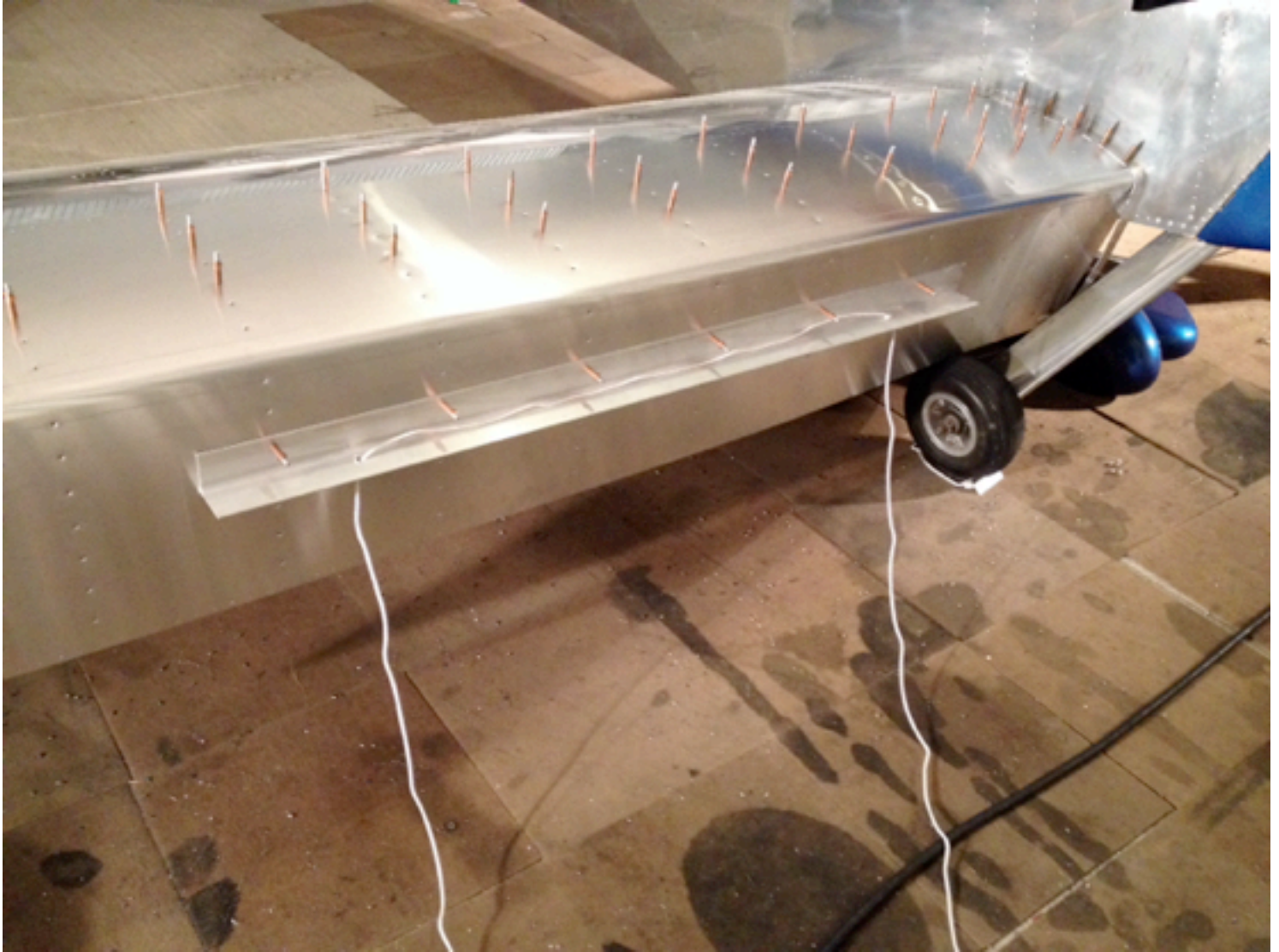
The next step was to be the most time consuming and tedious part of the entire project; drilling off the old skins. I began by removing the paint and body filler that was covering the top surface countersunk rivets to gain access for drilling those rivets out.

Once complete, it became time to drill off both old wing skins. Needless to say this took a while, but overall was a fairly simple process. I was able to drill out all the CCC-42 countersunk rivets in a few days, then all of the main spar CCP-44 rivets took a few more days. Finally, I had both skins off the airplane.



After running a few additional wires for the possibility of a future landing light upgrade, as well as installing the pitot tube reinforcement plate onto the new skin, it was time to finish this project by installing the new skins.

In an effort to perform this entire project by myself, I did have to create a method of pulling the lower wing skins back into place. With my control surfaces still installed on the trailing edge of the wing, the Sonex recommended method of using cargo straps and wood strips was not an option, so I fabricated a spare piece of angle that I could cleco to the bottom edge of the skin.



Notice the rope I tied around the angle. By laying under the wing with my feet towards the tail, I was able to wrap the rope around my feet and actually pull the bottom skin into place using my feet, thus leaving my hands free to install the first few cleco's. Very rudimentary and rugged, but it served its purpose!



The rest of the project only took a few evenings of riveting everything back together. Again, with the quality of the predrilled holes in the skin, everything lined up and went back together perfectly. After approximately two weeks of down time, my Waix was once again ready to take to the cold Ohio air!



I've had several people call me crazy for performing this work, and in most cases I do agree with them. At the same time, it's my airplane and I was never going to be happy until the job was done. I'm thrilled with the results, and once it warms up so I can polish these new skins, I'm going to consider this a job well done!

So you've heard my story...what's left with your airplane before you consider it done?

Thank you for reading,

Mike Farley
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DIARY OF A HOME BUILDER

OR

THE CHUCKLE BROTHERS BUILD A SONEX!

By Tim Shaw

'To You...., To Me'
'To Me...., To You'

After an hour of 'to and fro', Mike Moulai, Lee Wilkinson and myself finally managed to squeeze the component parts of Sonex Kit No 1600 into the back of a, too small, van, and start the slow journey from Sandtoft to Grimsby.

My car was ejected from the dry comfort of the garage and relegated to the snow covered drive, as the single space garage filled with large wooden crates and long cardboard packing cases. There was nowhere near enough space to store an aircraft, so the spare bedroom was filled to the roof with canopies, propellers and myriad of aluminium parts. (Where she still around, my wife would have gone ballistic!)

This was the first week of February 2013.

I thought that, after celebrating the completion of year one of the build, it was time to assess the progress and maybe share some of the chaos with others.

I'd had a hankering to build again, after the MiniMax and Rans S10, and was looking for a suitable, i.e. affordable, project. I had been watching Mike Moulai's attempts to get U.K approval for the Sonex by the L.A.A and thought that it ticked nearly all the right boxes. It was fast, efficient, capable of touring and looked pretty quick to build. I didn't fancy a ten year project! There was only one problem.....actually two problems....

Problem 1... affording it ... and
Problem 2... 'God! It was ugly!

Anyway, all of this soon became moot, as my wife was diagnosed with terminal Cancer. All of a sudden the desire to build again was pushed firmly to the 'back burner'.

Moving forwards two years, my wife had died, my financial circumstances had changed, 'thank god for insurance', and I still wanted to build. Lee Wilkinson, who shares flying the Shadow with me, was quite keen to be involved too. There still remained one problem however. The Sonex was still ugly!

More months of researching different aircraft and their building processes, I still came back to the Sonex, even though I had never worked with riveted Aluminium structures before. My mind was made up, the Sonex it was. After all, I aint so cute myself and, what's more, I'd be sitting inside it, looking out, not looking at it!

The Kit was ordered, paid for and the long wait for delivery was filled by planning, building a work bench, collecting the required tools, (and as many unrequired ones too). I had wanted the plans in advance, so that I could spend time learning how to read and understand them. However Sonex were unwilling to send them to the U.K without the kit (they want to keep control), so I had to wait. Strangely enough, after months of trawling through Sonex related information, the looks started to grow on me. And, I figured that a clever paint job would help immensely. (I still have to learn that skill!)

Now, we are back to where I started the story.

The cases were unpacked over the coming week, and the items carefully ticked off the list.....carefully being a relative term, as we were totally unable to find four major components! After firing off emails to Sonex and Mike Moulai, I finally confirmed their worst fears..... They had indeed, sold their kit to a pair of morons! The parts were exactly where they said they were!

There were however a few parts that were 'to follow' and we spotted that they had sent two right hand verticals, instead of a left and a right, and completely missed off the trim system (Hurrah!... one up to the Morons!)



Long sheets of metal were slid under the bench that filled the single car garage. Pre-bent leading edges were stacked behind the bench, tightly stored in their boxes so that they didn't unbend, and long lengths of angle were squeezed along the bench shelf. 'Look, we still have room to move... a little anyway'. Lee shook his head and pointed wearily to the huge box of pre-built wing spars. 'Oh Well! Let's move everything.....again!'

The plan had always been to build the tail sections first and then store them in the spare bedroom. Then the wings would be next, storing them by hanging them in the garage roof (as I had with the MiniMax). The next stage would be to build the Tail cone and Fuselage sides, before dismantling the bench and joining fuselage together and attaching the undercarriage. At which point it would be a free standing assembly which we could move around.



Now theory is a great thing, and measurements are great, but putting them into practice, can be quite a different matter! Yes, all of the bits would fit into the garage, but there were also sanders, pillar drills, grinders, compressors, rivet guns, drills and a million other bits and pieces that had to have homes without causing damage to delicate alloy skins etc. The next year would be spent tripping over, dropping, losing, finding and losing again, a hundred different tools or parts that just disappeared amongst the chaos of too little room, and a serious lack of tidiness! Two big blokes stomping around, locked in the tiny confines of a single garage, laughing and swearing in equal measures, could have been a recipe for disaster. However, amid the chaos, we started to create the pieces of a proper aeroplane.

As per plan, the Vertical Stabilizer took shape, then the Horizontal Stabilizer, then Rudder and Elevators. Each part has to be checked, clecoed, up-drilled, de-burred, corrosion proofed, and clecoed again and

then riveted. In all 10,000 rivets had to be set, and each one requiring a four or five part process. There was a lot of work ahead!

As the parts came together, the inspector called to check them before we could seal up the skins, but pretty soon, working a bit every night, we had a completed tail section.

There were of course problems (part of the fun of building, is overcoming the difficulties) and, if it were that easy, there would be no satisfaction in the doing of it. Very early on we had a setback, One of the new packs of drills we had bought had been labelled wrongly and some of the first major bolt holes we drilled were slightly too large. Much swearing followed, but a chat to John Cooke, our inspector, eased our minds, and the holes were drilled up to the next size bolt. First lesson learned, always double check! (It was to be a lesson I had to re-learn on numerous occasions!)

With the tail completed, the left wing was started, and with our confidence and experience growing, the wing soon took shape. With the left wing completed, the plan to store it hung from the rafters suddenly appeared to be not such a good idea. When I had stored the MiniMax wing, it had been a wooden frame, which the strip lights shone through. This was a solid aluminium, stressed skin lump of twice the size and a million times the density! I can honestly say that not a lot of light was able to penetrate it when placed in the rafters. DOH! The Chuckle brothers strike again!

Lee came to the rescue by sourcing some free standing spotlights; god knows what my electric bill will be! But it's better than building by Braille! Now we could see again, the second wing came together pretty quickly, (we had done a great deal of the preparation while building the first wing). Though it can get confusing building a mirror image to the plans, all went well until I made the decision not to up-drill the spar mounting blocks, a decision that would haunt me later. We were now six months into the build had a complete tail section, two completed wings, even less room to move and.... we were still talking to each other! Result!

The fuselage section was then laid out on the bench and started, though we were still awaiting the missing parts, which duly arrived, just in the 'Nick of time' (thanks Sonex). With the cockpit sides built and stored, the rear turtle deck took shape on the bench. It was so tall that it was almost up against the suspended wing in the roof, which then proved to be a source of numerous cuts and grazes to my bald pate, as I drilled and riveted whilst standing on the bench!

Finally, we dismantled the bench. The front and rear fuselage halves were joined, firewall and floors were fitted, and the engine mount, undercarriage and the wheels and brakes were also attached. We had a free standing chunk of aircraft at last, it just fitted into the garage with barely 2" to spare with the doors shut! All of the major components were now built all we had to do was fit them together.....How hard could that be?

The tail went well, a bit of filing, a bit of wiggling followed by some judicial jiggling and a bit more filing, and the tail was on, as were the elevators and rudder. That was easy! Just the wings now!

The saying 'Pride comes before a fall' suddenly comes to mind. Maybe we were getting a bit complacent or just a bit smug, or we did not have the best tools for a very difficult job, (or maybe we were just a pair of tools on the job!) But the mounting of the wings turned into a nightmare.

Drilling through the right wing spar blocks to the fuselage angles, onto which they would be bolted, went very badly. The holes ended up oval not round! Fitted like that, the wings could have flapped like a Hummingbird!



Now, I would have to go back to Sonex, to order new cockpit angle, drill out the old and refit, make new wing blocks (the third lot!) and then try to re drill the holes again. Many expletives later I had calmed down enough to think the problem through. We had all we needed, except for the angle, and we were, by now, pretty good at drilling out rivets (Don't Ask!). It was a small set back, not a total catastrophe. I sourced some new angle from Germany, delivered two days later with great Teutonic efficiency, and set about making the new parts. A week of work and we were back to the place it all went wrong, drilling the spars.

Lee once again came to the rescue, sourcing better drills and with lessons learned, the right spar was drilled....correctly.....god what a relief! The Left spar drilling went well too and we could breathe again. I later found out that, of four completed U.K. builds, three also had major problems at this point.

In January this year, eleven months since we started, The Sonex No 1600 was moved out to Riby, where we could fit the wings and tail to enable us to rig the controls. As I write, the elevators are attached and working at the correct angles of deflection, as is the Rudder. The trim tab is attached but not yet correctly set up. The Spats are attached and the wings should go on this week so that we can set up the Flaps and Ailerons.

We are 90% done, only 90% to go.

This build has been, thus far, a great experience. When things go wrong it would be very easy for building partners to fall out, but Lee and I have remained great friends and laughed a hell of a lot more than we disagreed. We have created a sleek, sturdy and well-built airframe.

Did I mention that we have laughed (a lot) at our own and each other's inadequacies and never really had a cross word, even when things weren't working out well with the build.

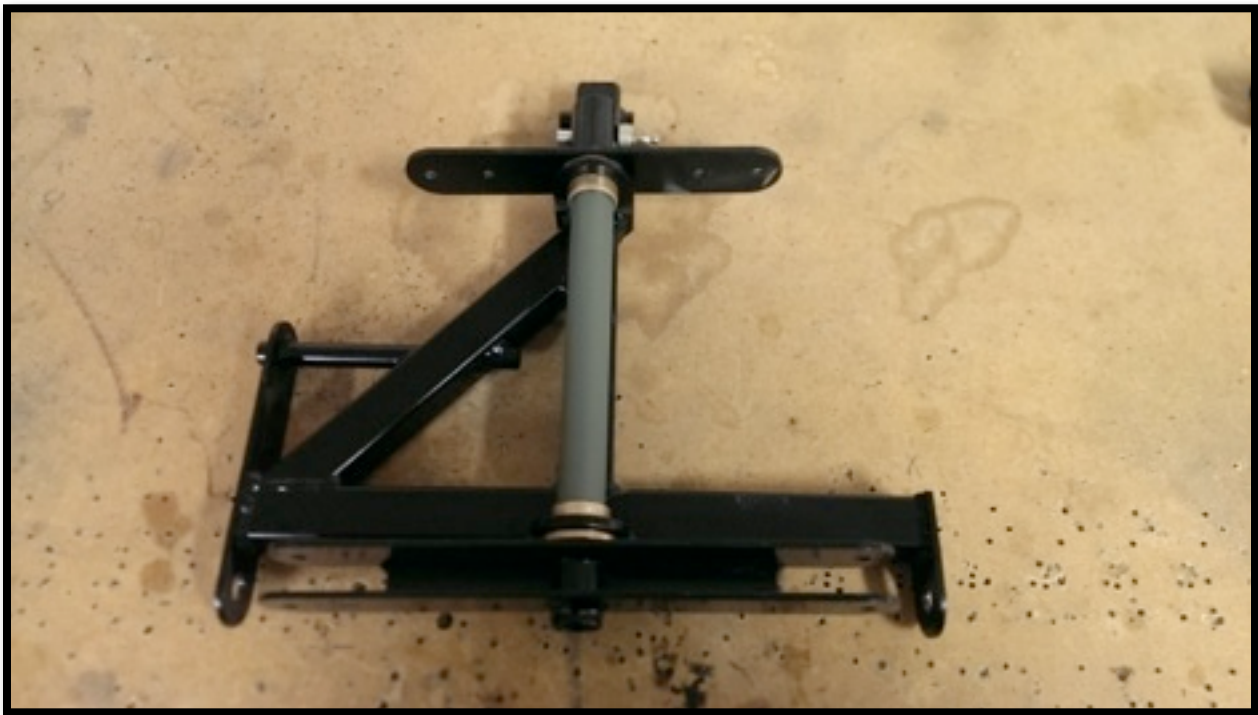
I have no idea when she will be flying but we will get there. All we need now is an Engine which I can't afford until I sell Coco the Shadow!Anyone want to buy an aeroplane?

Taper Pin Installation

Written by Eric Seber, A&P, Waix 153

February 4, 2014

I recently began working on my Waix flight control system. A specific part of this control system is the mixer assembly. This assembly receives a single input from a control rod which attaches to the control stick assembly. The mixer assembly then simply splits the input to two control rods which actuate the ruddervators.



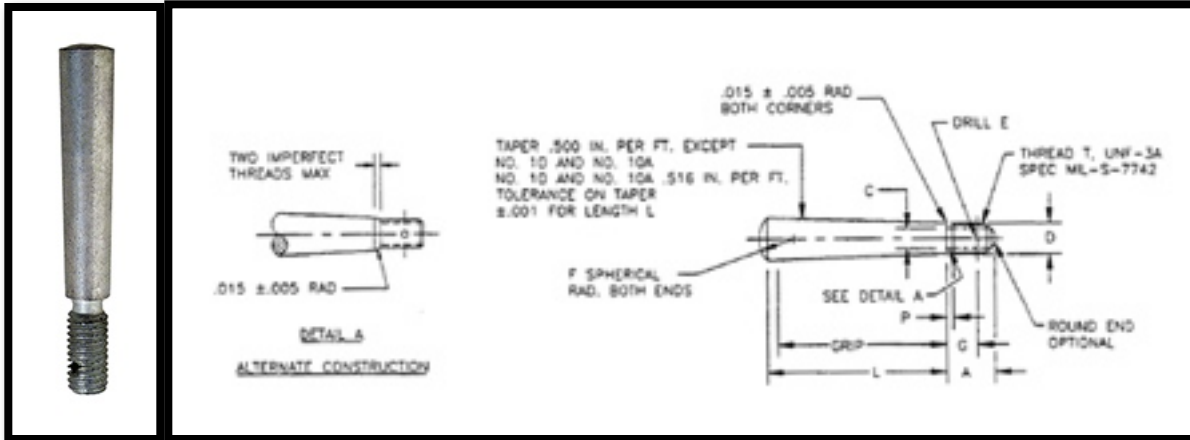
Assembled Mixer Tree.

This assembly is called out on plans sheet WIX-C02.

It is important to assemble these components so that there is no slop in the attaching parts. To help reduce the potential for a sloppy connection, the plans call for a taper pin which attaches the upper output arm to the pivot shaft of the mixer assembly. I had never personally installed a taper pin prior to this project, so a little research was in order. Unfortunately, Advisory Circular (AC) 43.13 1b/2b (known as the mechanic's bible) did not provide much guidance on the actual installation of a taper pin. By the way, if you don't have a copy of AC 43.13 handy, I'd recommend picking one up. Aircraft Spruce sells them for \$20 USD <http://www.aircraftspruce.com/catalog/bvpages/ac4313act.php>

What is a Taper Pin?

An AN386 taper pin is manufactured from alloy steel and has a minimum tensile strength 125,000 PSI. AN versions are usually cadmium plated and are installed with a AN975 taper pin washer, AN320 shear castle nut and cotter pin or with AN364 elastic stop nut. When installed, the small end of the tapered shank should protrude no more than 1/16" above the surface of the assembly. The first dash number – is the Brown & Sharpe (B&S) taper pin reamer number and the second dash number is the grip length in eighths of an inch. Undrilled threaded shanks add the letter "A" after second dash number.



The Sonex/Waiex plans do not call for the use of the recommended AN975 taper pin washer. The only problem with not installing the special washer is that if the taper pin is installed correctly, the inside diameter of an AN960-10 washer may not seat completely over the protruding shank. As stated above, no more than 1/16" is to protrude past the attaching material. This can be tricky to achieve and a taper pin washer helps to take up the extra space. Here are a couple of pictures showing what I'm referring to.





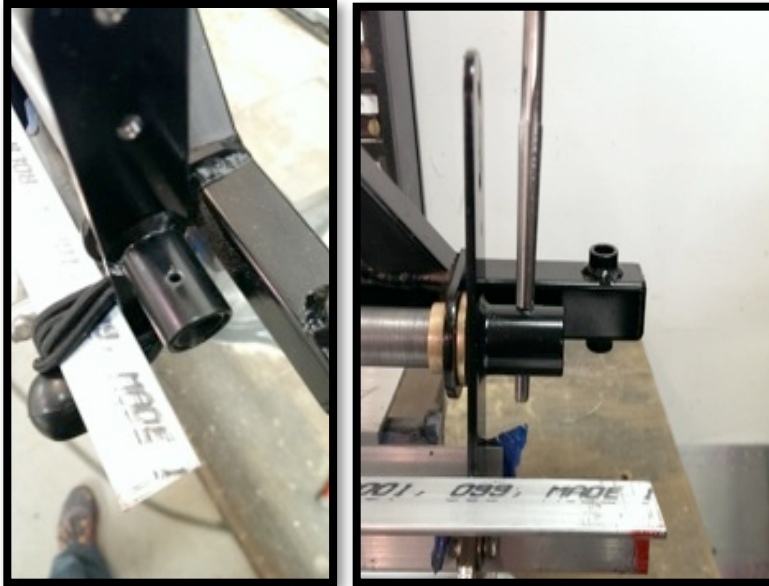
How Do You Install a Taper Pin?

To achieve a tapered hole in the pivot assembly you must use a taper pin reamer. Disclosure: The tapered reamers used for this installation are quite pricey. I purchased one from Aircraft Spruce for \$48 USD. <http://www.aircraftspruce.com/catalog/topages/reamers.php?clickkey=73650>

The B&S No. 1 tapered reamer is the size that you will need when installing an AN386-1-8 taper pin.

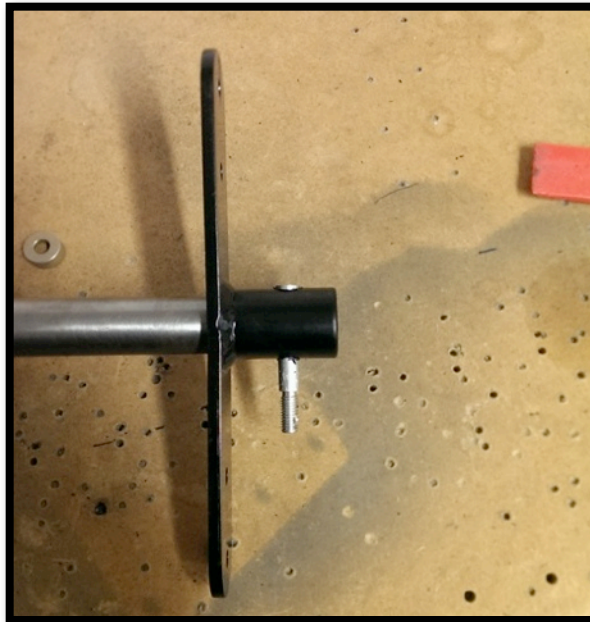


First, you need to mark your hole location and pilot drill. I started with a #40 steel bit, updrilled to a #30, and updrilled once more to a #11 hole size. The #11 bit is just slightly smaller than the small end of the taper reamer. I then inserted the reamer and opened up the hole making sure to make several light passes so not to oversize the hole.



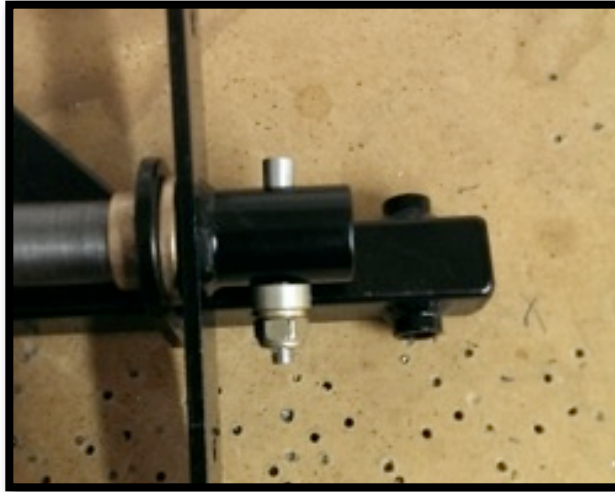
Don't Oversize the Hole!

Be careful! A brand new taper reamer is extremely sharp! It is very easy to oversize the tapered hole and this is exactly what I did on my first try reaming the hole. In the end I had to order new pivot shaft and output arm weldments. The next photo is not what you want to see. I do want to emphasize that this is not an extremely hard task to complete. Just take your time, ream the hole slowly, and do multiple fit checks.



Final Installation

Here is what the final installation build-up looks like. So as not to have excessive thread protrusion, I added an additional AN960-10 washer under the AN364 fiber lock nut. On the second try I did achieve a very tight fit with no slop in the mixer assembly. As always, this worked for me and your mileage may vary. Blue skies and safe, happy building!



Other Taper Pin Applications

Other builders have recommended installing the same taper pins in the control stick assembly to help reduce the amount of slop. Feeling slop in the control stick is not desirable and this method works well and is strong enough for the application area. The plans call for an AN4 bolt to be installed. However, when drilling circular double-wall tubing, it is difficult to achieve a perfectly round close-tolerance hole using basic shop techniques and tools. I decided to install the same size taper pins in my control sticks and I'm happy with the results. Here's a link to a discussion on Sonexbuilders.net which has some good info on this topic: <http://www.sonexbuilders.net/viewtopic.php?f=3&t=396&hilit=taper+pin&start=10>



North Central Sonex Fly-In Update

February 16, 2014

Wayne Flury passed us the following update on a Sonex event in Minnesota.

Great Response: Thanks to all pilots, builders and others interested in the Sonex line of aircraft who responded to my initial posting/inquiry about hosting a Sonex Fly-In at the Buffalo Municipal Airport on June 7, 2014. The response far exceeded my expectations!

Feel free to submit the Sonex Fly-In info to your local EAA chapter or pilot group for greater distribution of publicity. Emphasize that anyone interested in attending should contact me. Wayne Flury, Sonex Fly-In Organizer Sonex s/n 191 763-670-6021 wflury@wh-link.net

Sonex Forums Groups: I will make another posting on the Sonex forums groups. However, there are many Sonex pilots and builders who no longer monitor these forums, so if you know someone who has dropped their forum membership or never participated in those groups, please do me and the Sonex world the favor of alerting them to this event.

Fly-In Agenda: I'm trying to develop an agenda that will appeal to those who are already flying their Sonex, as well as something that will provide interest and instruction to those who are in the build process, or now considering a building project. For the current builder/pilot, it may be sufficient just to have a destination to fly to, the chance to "show off" their airplane and do some hangar flying. But others may expect more hands-on or technical experiences. Let me know if you have thoughts on this or would be interested in making a presentation. Fly-in hours to be determined.

One thing is for sure – LUNCH!! We will have lunch available to registered guests, and I'm striving for something more enticing than burgers/brats!

Parts and Tools Swap/Sale: If you have tools, parts, raw materials, instruments, etc. (Sonex appropriate only, please), let me know. We may set up a table at the fly-in for this, or perhaps establish an "on-line" swap meet. You would be responsible for pricing and your sales table.

Buffalo Fly-In: The Sonex Fly-In on Saturday will precede the Buffalo Fly-In, Air Show and Car Show on Sunday, June 8. This is one of the kick-off events for the weeklong Buffalo Days community celebration and it always draws a crowd. Plan to make it a weekend!

Airspace Around Buffalo: The Buffalo Airport lies outside of Class B airspace, so anyone uncomfortable with getting close to MSP can plan their approach accordingly.

Sonex Aircraft Pre-Purchase Inspection Guidelines

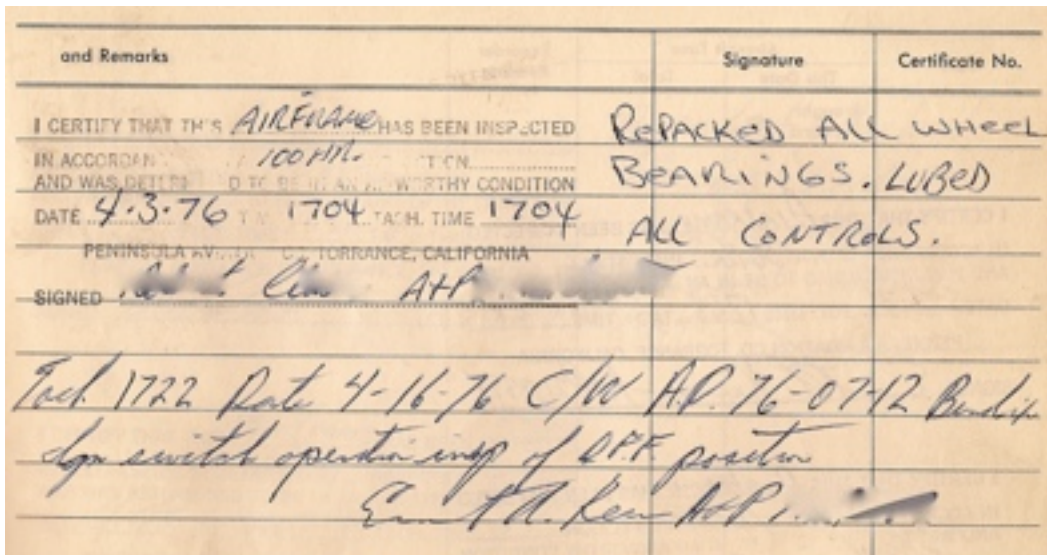
During the early morning hours on February 28, 1998, Sonex designer John Monnett took the original Sonex for its first test flight. Shortly thereafter, plans and kits were offered, and builders began construction on their own airplanes. By mid June 2000 the first customer completed Sonex, a Jabiru 3300 powered example, was test flown for the first time.

Since then, Sonex Aircraft LLC. has sold nearly 2000 airplane plans and kits, with over 450 examples already flying. With more and more first flights being reported on a regular basis, the size of the Sonex fleet will continue to grow at a very rapid rate.

Ultimately, a percentage of the flying fleet will be up for sale as owners pass their prized airplanes to eager new owners. In an effort to help perspective new buyers with the purchase of an already flying example, we composed a list of things to check over before purchasing your new pride and joy!

1. Aircraft Logbooks

I recommend you start an aircraft inspection with a logbook review. The logs will tell you a lot about the airplane, it's history, as well as the organization of the owner. There should be at least three logbooks; one for the airframe, one for the engine, and one for the propeller. Check the serial numbers of the airframe, engine, propeller, etc. to make sure the logbooks match with the airplane. When looking through the logbooks, each maintenance entry should contain, at a minimum, the date of the entry, what work was accomplished, who signed off the work, and finally the A&P or Repairman certificate number. If the person performing the work isn't an A&P or doesn't have a Repairman certificate, they should write down a pilot certificate number or some other form of identification.



When reviewing the logbooks, remember to check over the airworthiness requirements necessary in FAR Part 91, as well as the Operating Limitations that were issued with the original Airworthiness Certificate. For example, in order for the airplane to be considered airworthy, a Condition Inspection and ELT check is required to have been signed off within the previous 12 calendar months, a transponder check (if equipped) must be signed off with the previous 24 calendar months, etc.

A current copy of the aircraft's weight and balance information needs to be available in the airplane, and most records of these measurements are also found in the logbooks. It's a good idea to ensure the original airworthiness entry from the FAA or DAR is present, as well as the logbook sign off indicating the completion of the Phase 1 testing phase, assuming it has been signed off. This is also a good time to review the logbooks to check for any damage history and repairs, if applicable. Finally, make sure you review that all Sonex Service Bulletins (SB's) have been complied with and are recorded in the logbooks. A complete listing of SB's can be found on the Sonex factory website or by contacting the factory directly.

2. Aircraft Structure

When it comes time to take a look at the actual airframe, the Sonex design is fairly straightforward and easy to inspect. The entire structure is fabricated out of 6061-T6 aluminum, and most exterior skins are 0.025" thick. When inspecting the exterior skins, check the entire airframe to make sure there are no creases, dents, dings or tears in the exterior skins that would require repair. When looking at the Stainless Steel Avex pulled rivets (also called popped rivets), the heads of the domed rivets should sit flush on top of the skin and be tight and secure. The wing leading edge rivets are countersunk into the skin and ribs to ensure laminar airflow over the wing, and these rivets should be flush with the exterior skin and also secure.



As you're able, pull off fairings and inspection panels to check for interior corrosion issues (corrosion will normally look like a white, powdery film, normally where two pieces of metal are attached), wing and tail attach fittings for any deformation or cracks, as well as tightness and security in all control pushrods and cables. Speaking of controls, this would also be a good time to ensure all control surfaces move freely, have adequate and proper control deflections, and are properly secured at the hinge mounting points via a cotter pin or some other means. If any external antennas are present, check to make sure they are secure and not bent.

The Sonex kit comes with fiberglass wingtips, wheel pants, cowling, and tail end tips. All of these pieces should be secure and no cracks should be present.

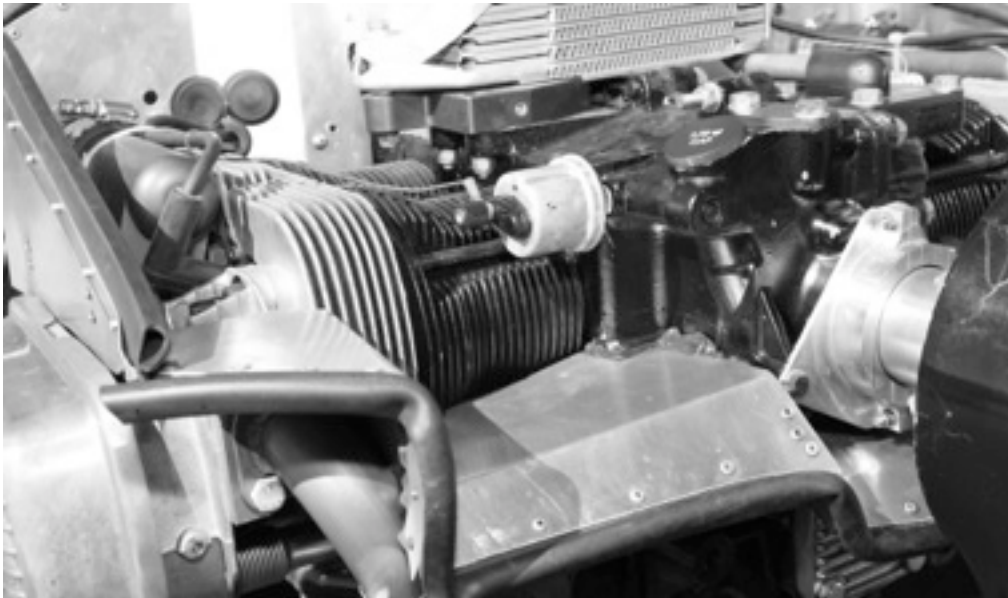
Finally, be sure to check the bottom of the airplane for any dents or damage as well as excessive exhaust residue and/or oil leaks. If you find a lot of oil or black sooty exhaust on the bottom of the fuselage, this could indicate an engine oil leak, worn piston rings, or a host of other potential issues which may warrant additional investigation.

3. Landing Gear

The landing gear designed for the Sonex is very rugged and robust, utilizing solid titanium dowel rods for the main gear legs, as well as the tailwheel leg if equipped. This can be a challenging area to inspect due to the factory supplied wheel pants and landing gear leg fairings. At the very least, try to check the visible portion of the tires and brakes for security and wear. If a hydraulic brake setup has been installed, check for any leaks or any indications of brake fluid residue.

If putting the airplane on a set of jacks is possible, do so to ensure the wheels rotate freely but no excessive play is evident. Also, try to gently twist the wheels to ensure the axle and engine mount bolts have not been elongated in their sockets. If the wheels are loose, this could lead to wheel vibrations during takeoff and landing.

4. Engine and Cowling



When inspecting the airplane, insist that the cowling be removed to allow you a thorough visual inspection of the engine, cowling, and propeller area. This is a vital area to cover so take your time and check things over thoroughly. If the seller is able to perform a engine leak down/compression test, that can be a good indication on the condition of the internals of the engine. When looking at the engine itself, check for oil leaks as well as any possible indication of engine damage. This could involve such items as crankcase cracks, cracked cooling fins on the cylinders or heads, and leaking or damaged engine accessories.

On the Sonex aircraft, pay special attention to the cylinder head and spark plug area to ensure there is no indication of cracking or damage. All engine accessories, such as the starter, alternator (if equipped),

magneto, etc. should be tight and secure with no movement possible. Don't forget about the exhaust system as well; the exhaust pipes should be securely mounted to the cylinder heads, and no cracks should be noted. If you look inside of the exhaust pipe, you should notice a dray, gray color inside of the tubes. If the inside of the exhaust tubes are black or oily, that may indicate an excessively rich mixture or possible valve/ring wear issues. While you're in the area of the exhaust pipes, take a look at the crankcase breather line to ensure there are no obstructions.

The carburetor on the Sonex engines is located beneath the engine and secured to the intake system. The carburetor should be checked for security, proper orientation, and all controls should be checked for freedom of movement and security. The fuel intake line will connect to the carburetor; this line should be secure with no indication of fuel leakage noted. Finally, check the air filter to ensure it's clean and unobstructed. Most Sonexes do not have a carburetor heat control installed, but if this airplane does, inspect proper orientation and operation.

Take a look at the rubber engine mount grommets on the engine mount to ensure the rubber mounts are properly safetied and have no excessive wear. While inspecting that area, perform a visual inspection of the engine mount to check for any sort of cracks, as well as to ensure all sensor wiring is properly safetied. In most cases, wires should not be simply tie wrapped to the engine mount as this could cause engine mount damage in the future. In many cases, engine control cables are routed next to, and secured to the engine mount; this is a good opportunity to ensure all engine control cables are properly secured, do not bind, and provide complete control movement to the engine accessories.

Moving slightly aft, perform a visual inspection of the firewall to ensure there is no damage, possibly the result of a hard landing. Many accessories on the Sonex airframe will be bolted to the firewall; ensure these items are all properly secured. The battery on the Sonex is normally mounted to the engine side of the firewall, so this is a good opportunity to inspect the battery, terminals, and battery box for signs of damage or battery corrosion.

Finally, perform a visual inspection on the propeller and engine cowling to ensure they are properly safetied, and there are no cracks or other damage present. Most Sonexes have wood propellers which require propeller nut re-torquing on regular intervals; make sure the torque is properly set per the propeller manufacturer's instructions.

5. Fuel System

The stock fuel tank in the Sonex is a rotationally molded, polyethylene fuel cell located under the glareshield in the forward fuselage. A simple on/off fuel valve is normally incorporated right underneath the fuel tank, followed by a solid aluminum fuel line to the firewall. Historically, many builders incorporate a firewall mounted gascolator for fuel filtration, but many builders are now substituting a simple inline fuel filter as a substitute in lieu of the gascolator. A flexible, stainless steel braided line is normally used from the firewall to the AeroCarb/AeroInjector. The system is designed to operate on a gravity feed setup, and as such a fuel pump is generally not installed or needed.

Fuel level monitoring can be accomplished by an electronic, capacitance style fuel probe threaded into the bottom of the fuel tank, or by incorporating a clear visual sight tube into an upper and lower port into the fuel tank.

When looking over the fuel system, check to make sure there are no fuel leaks anywhere in the system, as well as ensuring the entire system flows downhill with no interruptions. If the system includes a gascolator, take a fuel sample to check for any contamination in the system. Finally, the fuel cap should be tight and secure and the fuel vent should also be inspected for any blockage and security.

6. Cabin and Interior

As you begin looking at the cabin area, start by performing a visual inspection of the front windshield and canopy. The front windshield, as designed by Sonex, is a flat piece of polycarbonate ("Lexan" as it's generally known) wrapped over to form the curved front windshield. Polycarbonate provides excellent bird protection properties and is generally very easy to work with, but as a downside it's easy to scratch or haze over if certain chemicals are spilled. Aviation fuel must be wiped off immediately or there is a potential for windshield damage. The canopy is a single piece acrylic bubble, mounted to the canopy frame via machine screws or aluminum rivets. Acrylic is more durable, but the older Sonex canopies are prone to cracking around the screw/rivet holes. The new canopies Sonex now ships include a rubber compound mixed into the acrylic that reduces the chances of cracking. Be sure to check for cracking as part of your inspection, as well as general fit of the canopy to ensure it closes and latches securely.

The Sonex kit includes a 4 point harness seatbelt as standard for each seat. This includes an aviation style lap belt with quick disconnect, as well as a shoulder harness attached to the upper longeron in the rear fuselage area. An inspection of the seatbelts is important to ensure there is no fraying or wear of the seatbelt itself, as well as proper operation of the latches.

If an interior has been installed in the airplane, an inspection for any wear or damage is important. Be sure to check cushions for any tears which could expose interior foam pieces, as well as overall interior condition. Most Sonex owners will secure interior panels and/or cushions with industrial grade Velcro, so an interior removal to complete a visual inspection should be a simple task. If the seat cushions are aftermarket, it may be a good idea to sit inside the airplane to ensure the cushions are at a proper thickness, as well as ensuring the cushions do not interfere with control stick deflection.

Finally, if the baggage area has been outfitted with a cargo sling or pan, inspect the area for proper security and to ensure any cargo will not interfere with the rudder cables or elevator pushrod. This may also be a good time to ensure the Airworthiness Certificate and Registration Certificate is present and in sight of aircraft occupants.

7. Avionics and Electronics

Each Sonex airplane is highly customized by the individual builder which can make a check of the electrical system a unique, airplane by airplane affair. In general however, safe wiring practices can be assured by checking under the instrument panel as you're able to ensure proper size wiring is used, and said wiring is properly secured. Watch for areas of possible electrical wire chafing and secure any wires where this is a concern.

In general, a thorough test of all electrical equipment is very important. Many Sonexes have digital EFIS or MFD screens installed, so take your time to go over each unit to make sure everything works properly. If there are panel mounted electronic equipment such as a COM radio, transponder, intercom, etc., make sure everything powers up properly and all tuning knobs and switches move freely and work properly.

Many builders are now installing exterior lighting systems into the wings of their Sonexes for potential night usage, as well as a safety consideration. If the aircraft has such lights, take the time to ensure they are secure and working properly by turning on each lighting system individually and performing a visual check.

Finally, be sure to check over the condition and security of any pitot tube, static port and/or Angle of Attack (AOA) probe that is installed on the airplane. Most builders install the pitot tube in the right wing leading edge skin, but locations may vary. These probes should be secure and clear of obstructions when performing a visual inspection.

8. Test Running Engine

At some point, it's highly recommended that the engine be started and allowed to warm up to normal temperatures. While the engine is running, check operation of the alternator and ignition systems. The engine should run smoothly with no excessive temperature or pressure issues noted. If you are standing outside the airplane, watch the exhaust area to ensure there is no dark smoke coming out of the engine which could indicate a rich mixture. With the airplane tied down or otherwise secured, ensure the engine runs smoothly from idle all the way to wide open power. You don't want to run the engine at full power for long as this could overheat the engine, but if possible try and get a check of the RPMs at full throttle to ensure they are within the engine's guidelines.

Once the engine has ran, perform another visual check of the engine compartment to ensure there are no new oil leaks and that all accessories are still secure.

Final Thoughts

Given the highly customized nature of each Sonex, a thorough pre buy inspection is very important. If you are unfamiliar with the Sonex series of airplanes, try and get a hold of a local builder or owner for a second opinion if you find any issues. The Sonex community is full of friendly, helpful people who would be more than happy to assist in your purchase. The Sonex factory is always available for questions as well.

Here are some online websites that may assist you as well:

www.sonexaircraft.com - Official Company Website

www.sonexbuilders.net - Online Web Forums

www.sonexfoundation.com - Home Of The Sonex Builders and Pilots Foundation

Best of luck on the purchase of your new airplane!