

# A SONEX IS BORN

**Andy Carter** goes from making model aeroplanes (big ones, admittedly) to a full-size light aircraft, a Sonex. Here's his story from start to finish

**>** IT all started about 15 years ago when I was still playing with toy aeroplanes. They were pretty large at third or quarter scale and they took a while to build. My last one was a quarter scale Pup and I put about 12 months into it. I was at a display somewhere, Woodvale I think, and someone on the flight line said, "If you're going to build them that big you might as well build a real one."

I thought he was having a laugh. I didn't know then that you could 'build a real one'.

Anyway, something must have stuck in my head because a couple of years later I stumbled on an American website advertising 3/4 scale Tiger Moth kits that you could actually sit in and fly. That was it, I was hooked. I knew some day I would build my own aeroplane.

I had no particular aeronautical knowledge, apart from modelling. I had left school at 16 to become an electrician and later a carpenter in my father's building firm. Later still, I left all that behind to get into computers and a desk job. Some time around 2005, I remembered I had promised myself an aeroplane one day and, as my financial circumstances at the time were pretty good, I decided to do some research.

I logged back into the Fisher website to have a look at the Tiger Moth kit and decided that

that was the one for me; it was also around that time I first heard about the PFA.

I soon discovered that my dreams of a 'dawn patrol' in a replica Tiger were probably not realistic when I learned of the difficulties of getting an unapproved American kit through UK approval. Back to the keyboard.

I spent another year or so researching different types, but for one reason or another nothing quite grabbed me... until one day I stumbled across the Sonex website.

I liked the aeroplane right away and then when I saw the prices advertised and read the write-ups, I liked it even more. Inevitably, I found out that this type was also not approved over here. I seriously considered putting it through the approvals process myself (I was still pretty naïve, obviously) when I heard that a guy called Mike Moulai at Silverfern Microlights, Sandtoft had beaten me to it. So I gave him a call.

It was early days for Mike as he had only just taken delivery of his kit, but I met up with him, liked the quality of the bits he had been shipped, and eagerly awaited him finishing his build and getting the approval.

I kept in touch with him and made several visits to Sandtoft to keep up with progress. I was amazed at how quickly the aeroplane went together and was even more determined to build one myself. Mike got the Sonex



Andy Carter and his Sonex kitplane under construction. Big smile as it starts to look like an aircraft!

through the PFA approvals process and I placed my order.

It then struck me I had better learn to fly! I spent the next two years doing just that in amongst the rest of the things I'm about to describe, and I passed my GFT in July 2008.



Andy's completed Sonex bathed in sunlight outside the hangar at its home base, Crosland Moor.



Panel is fitted with MGL Avionics 'glass cockpit'.



Sonex grew 'bit by bit' which helps motivation!



The kit arrived in September 2007 and I drove to Sandtoft in a pick-up truck to collect it. I had decided on a tricycle undercarriage with dual sticks, and plumped for the AeroVee engine. My budget for the entire project was £25,000 and that wouldn't stretch to the Jabiru 3300 engine that Mike had installed in his prototype build.

I initially ordered just the airframe kit with the intention of ordering the engine as and when I was ready for it. This turned out to be a good move as my financial circumstances changed halfway through the build and I was glad I didn't have £5000 of engine sitting on my garage floor when they did.

Speaking of the garage (don't let my wife know, but it was the reason I bought the house), it's fairly large at 6m by 10m and is under the house. It's the main reason I managed to build my Sonex in the time I did. You can't beat being able to do a bit, even if it's only a little bit, every day. But I'm getting ahead of myself.

#### **SORT THE WORKSHOP**

While waiting for the kit to make it across the pond (it took about eight weeks from when I placed my order), I sorted out my garage with a solid 10ft by 6ft workbench made out of 3/4in MDF on a 4in x 2in frame with six adjustable legs to get it dead level. I also bought some

*'I took the opportunity to rack, stack and sort all of the components into the garage in the order I felt I would use them during the build'*

new tools based on the advice on several of the American builders' websites. These are a terrific resource and I don't think my build would have been as pain-free without them.

I don't know where those guys find the time to build an aeroplane and maintain such professional sites. The two best ones, in my opinion, are Jeff Schultz's site at [www.sonex604.com](http://www.sonex604.com) and Kansas Flying at [www.kansasflying.com/sonex1017/sonexbuildinglog.html](http://www.kansasflying.com/sonex1017/sonexbuildinglog.html)

The tools I ended up with were a 10in radial arm saw, a timber cutting bandsaw, a combination bench belt/disc sander and a grindstone in which I replaced one stone with a Scotchbrite wheel. I also bought the hand tools and drills listed on the Sonex site, as well as the clecos Sonex suggests, but in double the suggested quantities. I also purchased a small compressor and a pop rivet gun. All told, I spent about £1000 on tools, bench, etc.

I also took the opportunity to formalise my relationship with my PFA Inspector, David Bremner, who I had met during my

research period. David kindly agreed to take on my build and has been a source of knowledge and inspiration during the entire project. Many thanks David for your support and encouragement. David carried out the obligatory visit to my workshop and duly signed my build book to the effect that it was satisfactory and that he was happy with the quality of the kit components.

The kit was extremely well packaged and labelled and it was soon apparent, on checking it against the inventory, that nothing had been damaged in transit. All told, the inventory check took about two full days and I took the opportunity to rack, stack and sort all of the components into the garage in the order I felt I would use them during the build.

Despite itching to start, I made myself sit down with the extremely comprehensive and well-drawn plans for a week to familiarise myself with the build before committing anything to aluminium. The plans are daunting at first and you need to get yourself into the swing of the page and part **►**

## > BUILD YOUR OWN

numbering conventions. Once it clicks, it makes the build process much easier.

The Sonex doesn't have a build manual. Everything you need is on the plans. In the States, it is possible to scratch build the Sonex by buying the plans and the wing spar extrusions (custom made for Sonex) and buying your own aluminium sheet, angle, tube etc. Not a job for the faint-hearted.

That said, the Sonex build from the kit is by no means an 'assembly' although the aluminium skins do come pre-cut and pilot drilled along with many of the flat sheet parts and the welded steel components. However, the builder still has to 'manufacture' about 700 parts from 6160 T6 sheet, channel and angle aluminium stock.

Sonex seems to allow for some minor hiccups in the quantities it supplies. I had to remake a few parts during the build, but had more than enough material to accommodate this.

So, on to the actual build. I decided to start with the rudder assembly as it requires most of the skills you will need to make the entire aircraft, and if you screw up it's relatively

inexpensive to replace. All went very well and I soon grew in confidence and started to construct the horizontal and vertical tail assemblies. Due to the very accurate laser cutting of the pre-cut skins, everything goes together very well, and no jigs, other than a level and a true worktable, are required. If you decide to build your own Sonex be prepared to drill and de-burr a lot of holes and pull a lot of pop rivets – over 9,000 in all.

### TAKING SHAPE

This basic procedure was applied to each and every part and very soon my garage was filling up with recognisable bits of aeroplane. I started with the rudder and went on in the following order: empennage, ailerons, flaps, wing spars, wings, rear fuselage, front fuselage. This approach really kept me motivated as I could treat each component as a separate project and got the satisfaction of seeing the finished aeroplane growing bit by bit.

I'm sure if I had made all the parts first and then done the entire assembly, I could have shaved off some build time, but if I

build another Sonex I would do it in exactly the same way. I would, probably, go for the factory-made wing spars and angle parts next time, however. The spars and angle parts aren't that bad to make, but I've done it once and would take the easier option a second time around.

During April 2008, I changed jobs and ended up with three months' garden leave, so I spent all of the spring and early summer in the garage happily building the Sonex, which meant I had the entire airframe rear of the firewall completed by June that year.

I then had to think about getting an engine installed, so I placed my order with Mike and picked it up in September.

The AeroVee engine is a converted VW and comes as a box of parts that needs assembly, which isn't as daunting as it sounds, and the engine was built over a couple of weekends and installed into the airframe.

I then started on the cowlings, windshield and canopy and these turned out to be the trickiest part of the build as they all involve a lot of fitting, measuring, trimming and re-fitting etc. Not particularly difficult, but very time consuming.

The next job was to decide on which instruments to fit and, following advice in the PFA, now LAA, magazine, I opted for a glass panel backed up with analogue ASI and altimeter. This was a bit of a squeeze as

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Building done, the Sonex is now flying with a full Permit.

the panel on the Sonex is quite small and oddly shaped, but it all went in and I'm very pleased with the result. I chose the MGL Enigma for the glass panel and I like the functionality it gives.

Eventually, March 2009 to be exact, I loaded the Sonex onto a trailer that I had borrowed from David Bremner, and moved her up to the airfield at Crosland Moor in Huddersfield where she would be hangared. I then set about the process of rigging the wings, setting the control throws and starting the polishing of the aluminium, as I had decided that polished aluminium with painted cowling and wing and tail tips was the way to go. Polishing is hard work, but the result is fantastic.

#### FINAL INSPECTION

David was duly called upon to carry out the final inspection and, after carrying out the list of minor jobs this brought to light, I submitted the paperwork to the LAA and waited with baited breath for the Permit to Test to hit my letterbox. The LAA was very helpful during the entire process and made some suggestions to enhance safety which involved me retro-fitting a carb heat system as it was felt that the AeroConversions throttle body carburettor could be susceptible to carb ice in the UK climate. As luck would have it, Sonex detail an optional carb heat system in the plans, so I built this and installed it. I sent

photographs of the installation through to Francis, along with static rpm reading from the engine, and in September 2009 I got my Permit to Test.

On 11 September, 2009, Mike Moulai flew G-ZONX for the first time from Crosland Moor and ferried her back to Sandtoft for flight testing and final adjustments. I stood and watched him take to the air with a mixture of pride and horror, but after a couple of circuits he called on the radio to say everything was fine and off he went.

Three-quarters of an hour later (it seemed like days), he called to say the trip had been uneventful and the aeroplane had flown very well and all the engine readings had stayed in the green. Mike started to do the flight testing, but was now battling with very poor weather and the worst winter we have had for 30 years. Despite all that, he submitted the flight test results to the LAA in late January and on 10 March, 2010, I got my Permit to Fly.

I'll never forget the feeling I had as I got airborne in her for the first time. Priceless!

So many people have supported me with the build of my Sonex, but special thanks go to Mike Moulai, David Bremner, the Engineering team at the LAA, my good friends Alan Dalgetty and Mark Chambers, and to Anne, my wife, without whose encouragement, understanding and forbearance, none of this would have been possible.

## THE BUILD PLAN

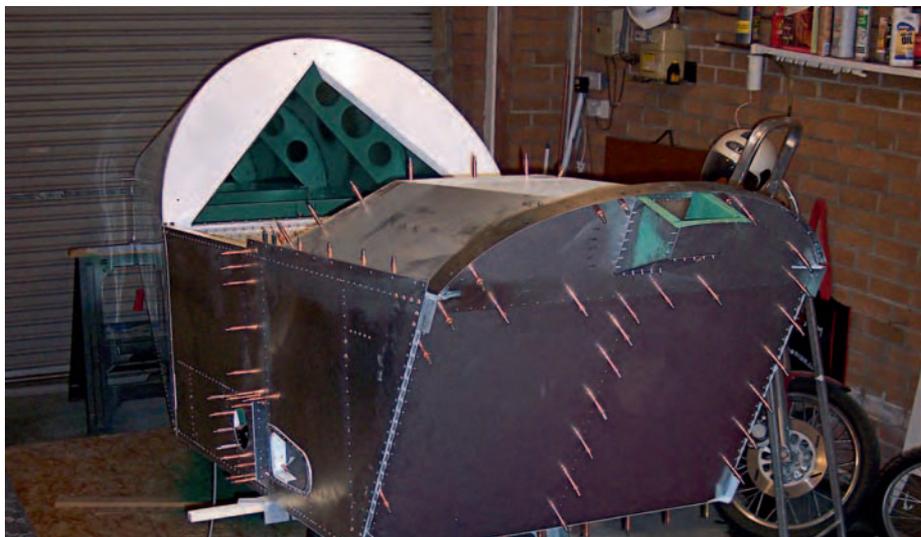
- Read the plans for that assembly
- Select the pre-made parts
- Make parts that are builder manufactured
- Assemble the component with 3/32in silver clecos
- Check and recheck dimensions, etc
- Read the plans
- Up drill to 1/8in and reassemble with copper clecos
- Read the plans
- Disassemble
- De-burr
- Read the plans
- Assemble with copper clecos
- Replace clecos with rivets
- Check dimensions, etc
- Oh, and did I mention?... Read the plans!



The team 'planning and building' in the rain.



Four-cylinder air-cooled AeroVee engine is light weight and economical to buy and operate.



Cleco metal fasteners everywhere you look! Temporary until replaced by rivets.