

Homebuilding- Annex Two –Simple step by step.

A guide to making your own balloon and the rest of the story building the Sackville AH-31 G-CISD.

Sewing – A simple skill, bit like flying a Tiger Moth, it was used as a trainer in world war two. Very easy to start and get going, but a sod to master completely and as your expertise increased, so did your flying improved. That is exactly what sewing is like. It has shown me I can achieve and do something if I put my mind to it. Even at my age 63, you can build your own balloon. Financially you are squids in. It is a great escape from this overheated modern world we live in. Flying the envelope, you have built is a reward in itself, there is nothing complicated, just a lot of repetition work. There is also a lot of expertise out there and all the balloon manuals from the manufacturers hold a lot of information within them. Maybe that's where I have scored – by asking lots of questions. More often than not I have got an answer or at least a lead. There are many hurdles which I could have stopped at or failed in, but have a go, I did! The reason behind building this Airtour 31 was to complete the Airtour set of three, 31, 56, and a 77. I believe there were only fourteen Airtour balloons ever built and only three 31's. The big problem was locating the templates for the balloon. Many of you will know from the Aerostat magazine that Mark Stelling got the lead and found they were in the loft of Pooley's shop at Cranfield Bedfordshire. It took a while to obtain permission to use them, it turned out they were worried about litigation issues, but a simple letter absolving anyone else resolved that. I took me three days to sort out all the templates until I had a complete set for the 31. I had enough material to make this balloon the same as the

previous two, the only problem was that the load tapes were too heavy, so I ordered a 1000 meters of 14mm wide at a cost of £650. The bulk of the cost was setting up the looms; it would have only cost £1400 for 10,000 meters of this material, but that's life. I had some parachute line but needed to purchase the Kevlar center lines. The Rip line, Crown Line and Pulleys all came from Peter Bish at Zebedee as did the crown ring which was old stock from Thunder and Colt days. The wire became a problem as there were no drawings, but there was for the first time a template for the scoop and from that we had a good idea and ordered the wires. Load tape feeding straight into the foot of the sewing machine, while you sew a fell seam underneath with both gores, tape is sewn in at the same time – a big time saver.



404 meters of Orange Ripstock. Now this is 1500mm wide but the drawings were made for fabric at 1300 wide, so naturally there was a lot of waste. Plenty of 8 inch off-cuts to practice on should anyone want a go. 140 meters of blue, that is a ratio of three parts orange to one-part blue and that was the reason we chose the pattern determined by the fabric I purchased at the time. In total, 544 meters run of fabric, or another way, 816 square metres less waste of approximately 200 meters. AAH, Nomex! Ran out of it, went to purchase some more, but it's very expensive as DuPont have the patent on this material and you can't but it cheaply anywhere.



first free flight in a hopper for Tim

Time cutting the fabric

All 14 panels were 12 layers deep with three blue and nine oranges. First, the cutting table is 24 feet long, and the larger middle panels are done only one template at a time. The top and bottom panels can be reversed so that the two together will have the same angle reducing waste. Then you can cut them with a circular cutting blade in one go, saving a lot of time. Each needs to be marked with seam number and left or right and folded individually, with the seam number telling you the correct way up. It is very simple to sew them in upside down near the middle. Now cut out the parachute and the rest of the securing attachments made from load tape. Total time spent cutting was 16 hours.



Each clip has a panel, there are three oranges to one blue. At the bottom move the blue panel up one on each gore to get a spiral pattern. All photos in this article by Tim Wilkinson.

Sewing

Before you get too enthusiastic, take two equator panels and sew on the registration letters. Then take one panel at a time and sew all 16 panels together to make one gore. Do this twelve times and you have all the gores sewn. This normally takes two hours a gore, times twelve gores i.e. 24 hours to sew the gores. Next task is to sew the gores together with the load tape at the same time (this sounds difficult but with the load tape feeder it makes the task simple). Only two gores sewn together, top end in the distance, bottom end in the foreground. Keep the system going – it will make life a lot easier when all twelve gores are sewn together.

Before you sew the whole lot together, leave the last vertical load tape till later. This takes around 14 hours. Next on the outside sew on all the horizontal load tapes. By this time the amount of fabric around your feet is colossal, and is a nightmare if you don't have a logical system to follow. If you have then it's simple and takes around 8 hours. Next turn the whole thing inside out and sew on the Pulley and the fixing point for the Ripline going up the Parachute securing line. Then do the Velcro around the top which is another 6 hours work. Now go back and sew that last vertical load tape. This next step took me a while to figure out. The trick here is to bring the fabric to the left of the sewing machine as normal. Now normally the fabric would come through the machine on the right but you take it in front of the machine and bring it a little at a time and sew it, repeating until finished. Stop at each horizontal load tape and sew them in with the overlapping tape. Time taken was 6 hours. The excess load tapes at the bottom can now

thread in the wires and sew the tapes up. Another 4 hours done. Now go to the top and calculate the circumference using Pi to calculate the length of the load tapes minus the crown ring which can be sewn in at this point. I only sewed it temporarily till inflated to see if it was the correct length. Another 4 hours. Now sew the parachute together with a light load tape around the edge and load tapes to tie the parachute line and centering line and the Velcro, making sure now that it is the hooks Velcro sewn in as the soft Velcro is on the parachute and the two have to join to form the bond. Another full 12-hour day! Now go inside the envelope and secure the parachute lines to the envelope and the Ripline, with takes another 3 hours. Now we are nearly finished. Time to sew up the scoop which is simple after all the other work done and fit it – 5 hours' work. Total time spent on the project in the workshop with the sewing machine came to approximately 150 hours.

Now allow five days of organizing including inspection at Chris Dunkley's Easy Balloons Centre. The process of inflating to center the parachute can take all day. Register the balloon at the CAA (which is best done at the start), sort the insurance and then Test fly the balloon in a tether. Then when totally happy with everything – go fly your creation.

Planning

The major part of this is planning. Planning is everything. Buying a twin stitch machine, finding all the suppliers of the materials, knowing where to go to find out the contacts. For example, at the Lindstrand sale, the labels on the products had details of all the suppliers which was very helpful sent from the delivery notes, Thanks very much. Comments from

people on what type of threads used, or just going onto the internet with days of trawling and phoning and asking the right questions, until somebody says “we normally sell this to balloon manufacturers”. Bingo- go for it! It is very easy to talk and not to listen to advice but keep an open mind. This has been a brilliant challenge which has kept me totally occupied all summer, which kept me fascinated in all of the technical aspects. I now look at a balloon in a totally different way. Absolutely mind bogglingly different, simple and yet fascinating. If I can do it – so can you so what you waiting for? Have a go! Tim Wilkinson

