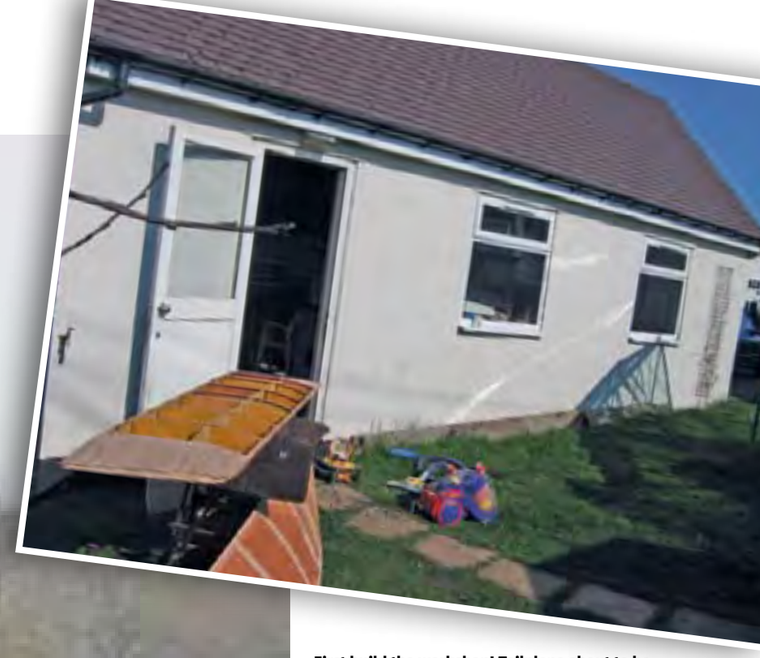
JODEL DR1050 REINCARNATE

Microlight designer Bill Brooks talks us through his rebuild, with a modern engine and instrumentation, of a 1950s' Jodel

Felipe Vizoso's DR100A, my inspiration and also soon to convert to Rotax 912S power *(Photo: Paul Chandler)*



First build the workshop! Tailplane about to be re-skinned, interior is varnished

Rib Jig can be set up indoors to allow the Aerodux to cure

I acquired my Jodel DR1050 parts in September 2010. The wing came from G-AWEN, damaged – probably in a groundloop sometime around 1985. The port wing was completely broken about one metre outboard of the undercarriage pickup. The port wingtip and damaged tail plane structure came from another, unidentified, Jodel, and the bare fuselage shell from G-AWWO, repaired after hitting an earth bank in about 2004.

The master plan was to collect or make all the necessary remaining parts and to power it with a 100hp Rotax 912S rather than its usual Continental O-200. Bill Sherlock, who used to be the MD at Pegasus Microlight Aircraft, had owned a Jodel DR100A (the forerunner to the DR1050) which I thought was delightful on the couple of occasions when I flew it. He'd thought of powering that with the 912S but chose to overhaul his O-200, as the aircraft was then on a C of A and the modification approval process was looking long and expensive.

This was all in the back of my mind during construction of a nine-metre-long, detached garage/workshop during 2005-7; the Jodel's span is 8.75m. Having transported my prize back home, I set about obtaining materials and went on a day's LAA woodworking course (thanks Dudley). While waiting for materials and plans, I designed an engine mount. LAA member Felipe Vizoso, who now owns Bill's old aircraft, had the same Rotax idea for his rebuild. After a false start, he decided to collaborate with me in getting a pair of mounts made.

I worked out how far the engine would have to move forwards to compensate for the reduced weight of the Rotax (about 150mm) and submitted my design to LAA Engineering using the CS-VLA design code. After resolving a few issues, John Tempest declared he was happy with it. The mount uses the Rotax ring mount and Lord J-3608-1 rubber mounts and is made from 3/4in 16swg 4130 tube. CKT Engineering has now made them, and a very nice job they made too.

Phil Hall, the project's inspector, looked around my acquisition and workshop, sucked through his teeth a bit and asked some pertinent questions. He gradually came around to the idea that this assemblage of pieces had a flying future and we set out some inspection stages, including inspection of the spar boom scarfed joints before gluing and a general inspection of the spar before the ply box was closed.

I began by producing the jig for the wing ribs from MDF; I had a pattern rib so did not need to produce the NACA 23012 profile from co-ordinates. I cut out ply washers with a hole saw to make eccentric clamps and made a soaking tank from an old drainpipe for curving the rib booms. There are 14 components and 24 joints in each rib. Most of this was done in January 2011, requiring the rib jig to come indoors to allow the Aerodux to cure. I used Aerodux (now made by Prefere) resorcinol adhesive because it is tried and tested. Its amazing staining properties make it very obvious where glue is and is not, compared to the translucent Aerolite. If starting again, I think I'd use an epoxy, which is tougher than the Aerodux and will also still develop good strength even if there are gaps; with Aerodux, the fit-up of parts has to be accurate. The only downside of epoxy I can think of is possible loss of strength with a dark-covered structure in the sun. I use a small digital kitchen balance to mix Aerodux batches down to 15gr and have made test pieces for each batch from spruce scraps, using Technora strips of reinforced transparent sailcloth to set the assembly staples into. When the adhesive has set, the staples can be rapidly pulled out by pulling the sailcloth strip off – those that remain with one leg still in can simply be pulled off with pliers.

BUYING THE LAMBORGHINI

I started repairing the main spar booms according to an LAA approved repair scheme (never start without this!) preparing the 1:15 scarf joints using a jig and a router... and soon finding that the router only works well one way, i.e. brushing down on the grain rather than lifting it up. In the end, I made a jig for a portable circular saw which produced good results in either direction. I made further jigs to cut the angled aileron and elevator ribs accurately, using a fine toothed dovetail saw. Making jigs and using sharp tools aids accuracy and saves time and scrap. Laser levels are great for aligning spar booms and ribs.

I think a repair project of this sort is more difficult than building from scratch. Care, precision and patience are certainly needed. As far as possible, I kept the original spar box intact when I prepared each spar boom scarf so that the repair would be self-aligning. When I had produced the new spar boom extensions and glued them all in place, I stripped back the ply and began to prepare the scarf joints on it. I bought an excellent 75mm Lamborghini sander, which has a tight radius on the nose-roller, enabling access into tricky corners. My wife, Judy, was slightly aghast when I told her I'd bought a Lamborghini! She has started her own podiatry business, which has been very useful in providing dust masks, rubber gloves, all sorts of nail files and diamond rotary burrs, which work very well on spruce.

I made up a kind of operating table to align the wingtip with the main spar correctly

when assembling the dihedral joint, and I did remember to slide all the ribs along the spar first! The Jodel spar is straight inboard but has a fiendish twist at the tips. The front and rear spar faces are vertical and the top and bottom faces slope.

At a cursory glance, one might expect the Jodel inboard panels to be untwisted. In fact, the trailing-edge rises 30mm from root to tip. I glued all the rib noses onto the spar and then, to get the correct twist, had to scarf joint the top spar booms of the three most outboard ribs to get the twist right. I lined all the ribs up with a laser, comparing the new wing with the undamaged starboard side for symmetry. Looking closely at the starboard ribs, I found some of them had similar joints in too. Then I made up all the packing pieces between the spar box and rib booms. There must be hundreds of components in a Jodel wing.

The 20mm x 1mm steel tube for the air brakes proved very hard to get, so I've used ¾" x 18swg 4130, which has identical torsion strength and stiffness at a slight weight penalty. I fitted IGUS polymer bushes where the tube used to run straight in the rib ply blocks, making sleeves by boring out sections of old 20mm tube to allow clamping of the air brake ribs and operating horn.

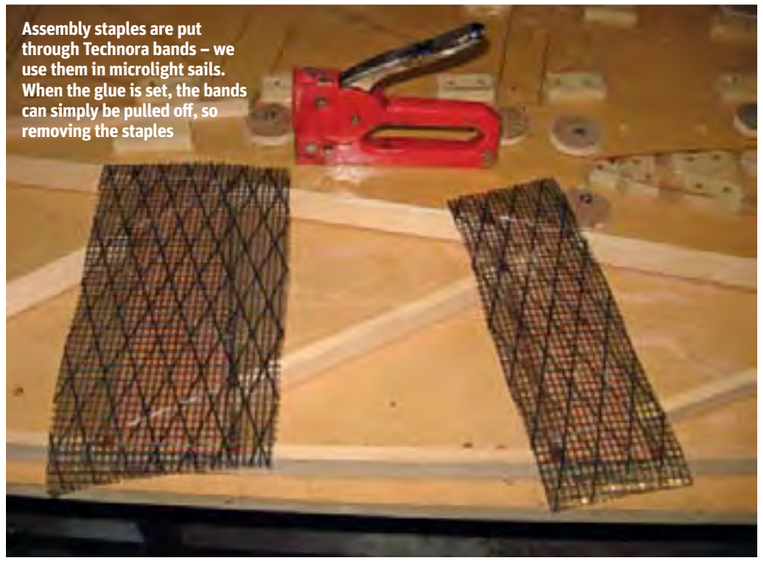
As time has gone on, I've managed to acquire most of the major parts. We had a long weekend trip to Lincolnshire where I bought a canopy frame jig from Richard Yates, who also by good fortune had most of the metal parts for the airframe including joysticks, fuel tanks, seats and many other assorted widgets. These are now all cleaned up and powder-coated. I found rudder pedals, wheels and brakes in France, and bought some newly-made undercarriage legs from Peter Thomas. And I found a tailwheel and rudder at Skycraft.

I also acquired a Rotax 912S with only 400 hours on it, plus a complete set of MGL Voyager instruments and backup mechanical instruments. I'm also going to fit a vacuum-operated turn indicator from an old Rallye I used to fly. My cowlings will be based on an old Eurostar one.

The wing is completed and ready for inspection and varnishing, and the airbrakes are installed and working. I repaired one aileron and made the other from scratch. Currently, I'm making a set of elevators, which will complete the airframe structure. Then I'll take the wing to work where I have more space for covering, and bring the fuselage back home for powerplant installation, instruments, controls runs, etc. So, things are progressing and I'm probably about a year away from completion. In the meantime, I'm enjoying it despite working on microlight aircraft all day. I think it's because it's at home, it's built in wood and there's not the same commercial pressure as there is at work.

Dreams of flying to France *en famille* keep me going. As Dudley says, you have to enjoy the process for its own sake and because you can build something to your own requirements, otherwise it's probably cheaper and quicker to buy one.

In my case, I will end up with a (just!) affordable classic aeroplane which has been completely rebuilt, with the benefit of a state-of-the-art, lightweight powerplant and instruments. It's also teaching me quite a lot about economy of design, where there's just enough of everything and everything does several jobs. Then I may be better placed for my own efforts. The cost is about £15k, so far. ■



Assembly staples are put through Technora bands – we use them in microlight sails. When the glue is set, the bands can simply be pulled off, so removing the staples

Scarf joints in main spar booms and new spar box diaphragms

Dihedral ribs set up by laser to achieve the correct washout. The laser spot can just be seen on the rib just above the small clamp

Wing assembled and ready for inspection prior to closing the spar box

Rotax 912S engine mount trial fit (below). So far, so good – just as well as there are two of them (see background)