May 2020

The ‘Lock down’ Eased

The moment you had all been waiting for arrived. At last here you all were - flying once more. Chris Vernon very kindly took this very impressive panorama of you guys all socially distanced and once more enjoying your sport.

Great to see that the weather kindly treated you to a really lovely afternoon too. I have been wondering how many of the small Hobby shops we have relied on for years are going to survive this ‘New Normal’. I buy my printing inks from a supplier run by a husband and wife team. Lovely people to deal with but, because the photographic societies are no longer being able to meet, we can no longer run print competitions. No printing of course results in no printing ink orders so how can that business survive.

Likewise, I use another small company for my printing paper but of of course, once again we are no longer ordering the quantities of print paper. Realistically it will mean that things we have relied upon can unfortunately become things of the past and never to return.

So how does this all affect model aircraft. There is only one way these suppliers are going to survive and have the confidence to continue and that will be for us to keep their businesses vibrant.

Yes guys, this means **spend, spend spend**.

A VIEW FROM THE HEDGE. (By Will Sparrow)

I awoke with a start. Had it all been a dream? Unfortunately the last seven weeks have been all too real, with no beautiful models to see and the famous viewing twig unused (although I have been giving it the occasional dusting). With no model aviation to occupy my leisure hours I have been helping the other sparrows get the hedge in fine fettle for the coming nesting season (some members are well into the swing of things). We have been training the new young twigs to align themselves with the lay line that passes through our hedge - I do this task for the sake of compliance with the popular mood rather than a sense of belief in such things. Now that I think of it, there is a strong Wiccan following in this hedge: I've had the feeling, more than once, that some of the older hens look at me as if I would make a good mid-summer sacrifice. Maybe I'm becoming a wee bit paranoid in my old age?

Thankfully, the lockdown, that you lot have been experiencing, has ended and, before the day of liberation dawned, I observed a flurry of activity on the field as some of your stalwart committee members arrived to mark out the areas to be used for the social distancing requirements set by your great leaders. The flight line was even treated to some new, properly placed, marker stones with "PILOT" stencilled on them. You are very fortunate to have a committee that looks after your interests so well – the flying field has been cut throughout the lockdown period and (to my eye, at least) everything looked to be in fine fettle. All that was now needed was for modellers to return in droves and I would be a happy sparrow again…

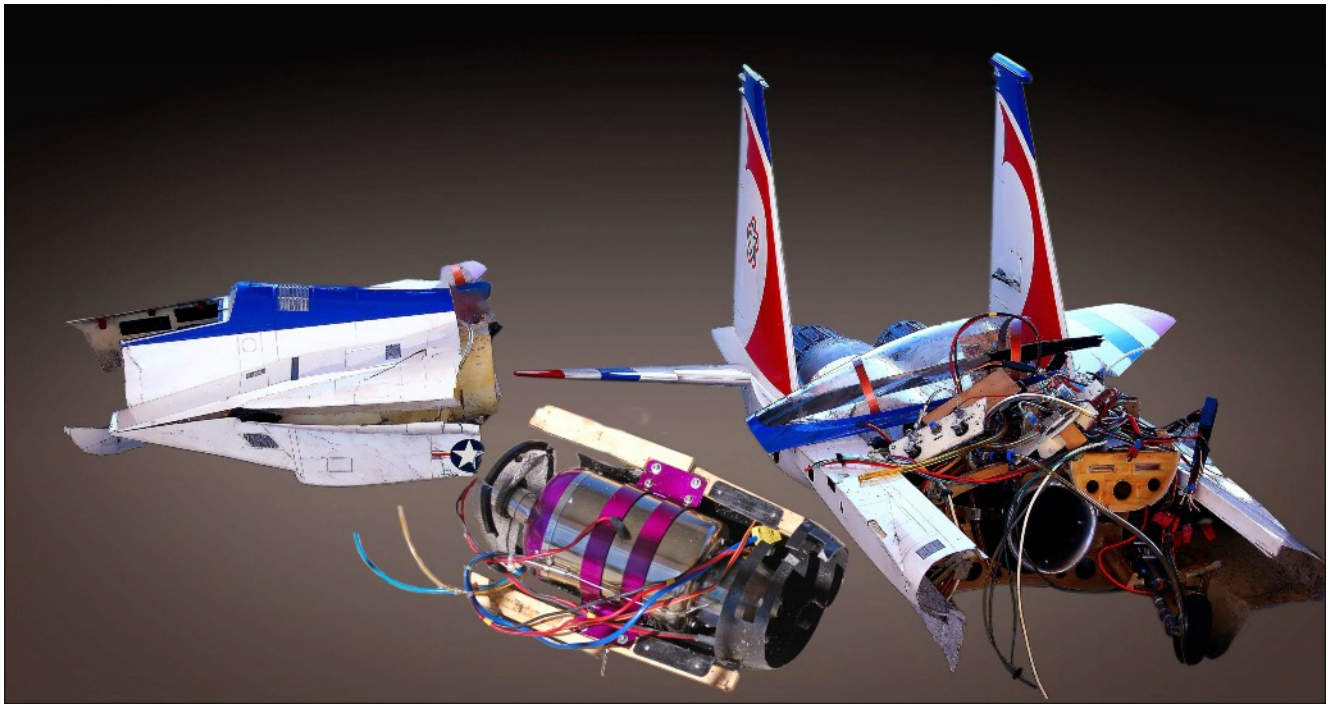
Have you ever witnessed cows, having been confined to their byre over the winter, being released into a field come spring? Their joy seems unbounded and they run and leap to celebrate their new-found freedom. I had expected a similar response from you modellers at the dawning of your release day: to be honest, I was a little underwhelmed. Okay, a few members turned up on the Wednesday and one stalwart was there on Thursday morning with a couple more watching. Admittedly, the weather was not that good for flying and the wind was a bit chill and gusty but I must admit to being a bit disappointed; I was expecting more joi-de-vivre from you lot. More spring-like weather is on its way (if the hedge seaweed is to

A View from the Hedge continued/.....

be trusted) so, no doubt, you will all be tempted off your couches and away from those little screens that so many people seem to spend all their waking hours staring at!

It is a known fact – I've been observing the modelling scene for a long time – that, after a long lay-off, folk get skill-rusty. Modellers forget things that they once took for granted. Please take the time to check over your models and radio equipment and re-familiarise yourselves with all your transmitter's knobs and switches. Don't select "crash-mode" on your first flight when all that you wanted was "low rate"! As you know, I love to see you lot enjoying yourselves and giving me pleasure as a result. Keep a little bird happy: I would not like to see any of you carrying the bin bag of shame as you go to retrieve the shattered remnants of your pride and joy.

WS



Jet Day at a flying field just outside Perth, Australia - these pilots seemed to enjoy playing chicken with their models - they were flying within inches of a tarmac runway at full throttle!

Avro 504N Build Log Part 2

May 2020

Article by Steve Warburton

Wings

PIC 17

As the plan only illustrated the left hand side of the lower wing fully I decided to build it first rather than the top wing first as stated in the instructions. The reason being that the centre section of the top wing has more complicated leading and trailing edge arrangement whereas, the lower wing leading and trailing edges align with those of the lower wing.

The cut out for the aileron can be seen, which almost follows the outline of the aileron illustrated on the plan for decorative detailing, the original model only having rudder and elevator control surfaces. I used some parallel bars from my tool-making days to put some weight on the upper forward main spar whilst the glue dried. The curved lower edge of the wing rib complicated the build and required careful packing under the leading edge to attain the correct relationship between the wing ribs, the 1/16″ upper and lower sheeting and the leading edge.

PIC 18 – Next, rather than using the left had wing side of the plan I decided to trace the plan onto some grease proof paper which I then inverted and laid over a sheet of white lining paper. This made building the right hand lower wing a lot easier than using the plan for the left hand wing.

The cut out for the aileron, the lower 1/16" sheeting, which extends under the trailing edge and the leading edge packing, can be clearly seen.

PIC 19

Next the wing strut attachment points were made. This involved bending 16 off, 20SWG wire clips (8 for each wing) which were then

Avro 504N Build Log

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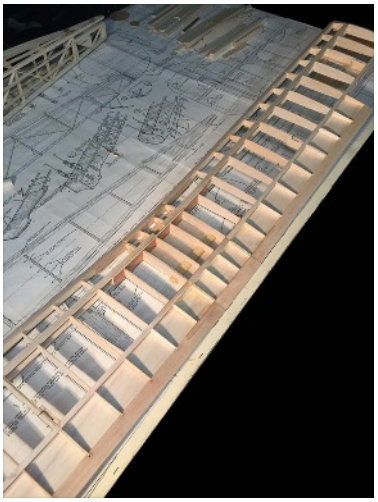
Article by Steve Warburton

bound using thread to square plates made from 1mm plywood, which then had to be accurately glued in position to protrude from the upper surface of the rib. 3/16" balsa blocks to reinforce the wing strut clip plates were added for local strengthening of the rib. I decided to rebate the blocks to house the wing strut clip plates, to provide more contact area with the surface of the rib, to spread the load.

PIC 20 – Next the right and left hand upper wings were built using the same method used for the lower wing. The leading edge packing and copious pins were used to stabilise the structure whilst the glue dried.

PIC 21 – Next structural provision for the aileron servo, access panels and diaphragms was made in the left and right lower wings only (having been advised not to have ailerons in the upper wing).

PIC 22 – The next stage was perhaps the most difficult part of building the wings. Four plywood dihedral gussets were supplied for joining the two lower wing halves to the centre section however, after fitting the left hand wing at the Trailing Edge and upper and lower Rear Spars,for no apparent reason the gap between the upper/lower main spars and the dihedral gusset was far too great requiring a thicker plywood gusset to be fitted.



PIC 23 – Shows the two lower wing halves successfully joined to the centre section using the thicker plywood dihedral gusset. Notice how the forward main spars extend into the centre section requiring the lower spars to be chamfered first so that they would

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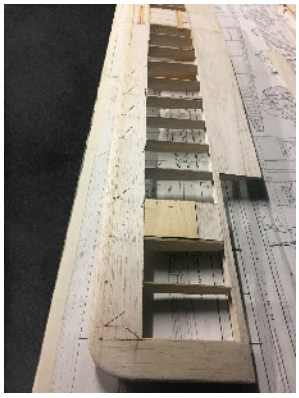
Article by Steve Warburton

lie flat on the underside of the centre section. Also the extension of the top spars needed to be filled in with a chamfered strip of balsa, the voids between the undersides of the extensions of the main and rear spars having been filled in with block balsa previously.

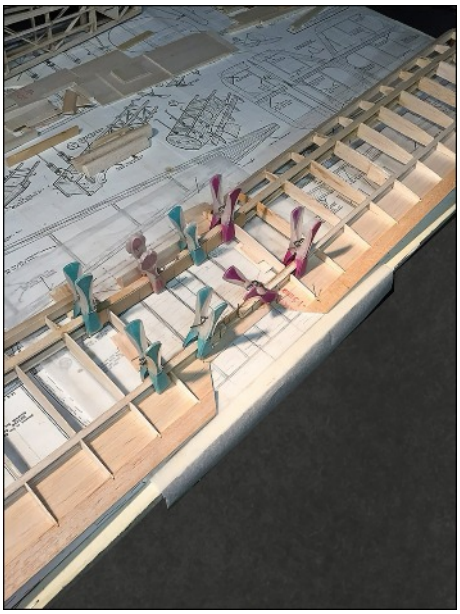
PIC 24 – Shows the upper leading edge and centre section sheeting pinned in place.

PIC 25 – Shows the lower leading Edge sheeting pinned in place and the centre section with 3/16" sheeting blocked in between the ribs fitted.



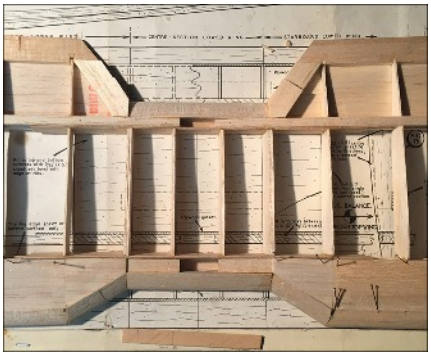
PIC 26

Shows the upper wing centre section main spars and rear spars clamped to the main and rear spar dihedral gussets, the shape of the trailing edge cut out can also be seen.



PIC 27

Next the upper wing centre section ribs, leading and trailing edge fill ins' were added, the voids between the undersides of the extensions of the main and rear spars having been filled in with block balsa previously.



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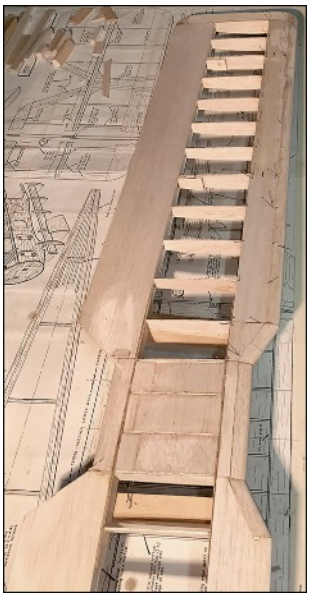
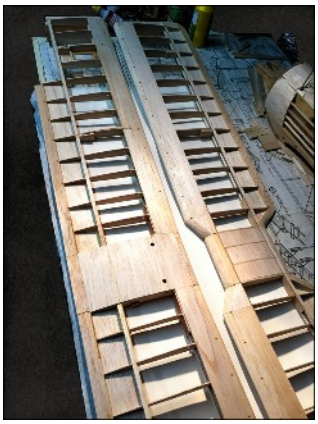
PIC 28 – This shows the upper leading edge sheeting glued and pinned.

PIC 29 – Shows the lower leading edge sheeting glued and pinned in place. And the centre section blocked in with 3/16" sheeting between the ribs.



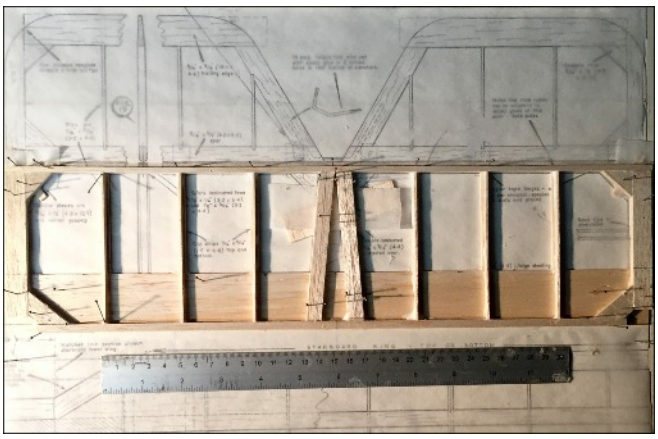
PIC 30 – Shows the upper wing outer wing strut clips on the lower surface of the wing, note that the rib also has a doubler rib fitted for additional strength.

PIC 31 – Having drilled the servo wire holes in lower wing ribs and centre section, both wings were sanded smooth with just the ailerons needing to be built and hinged to the wing.



Tail Feathers

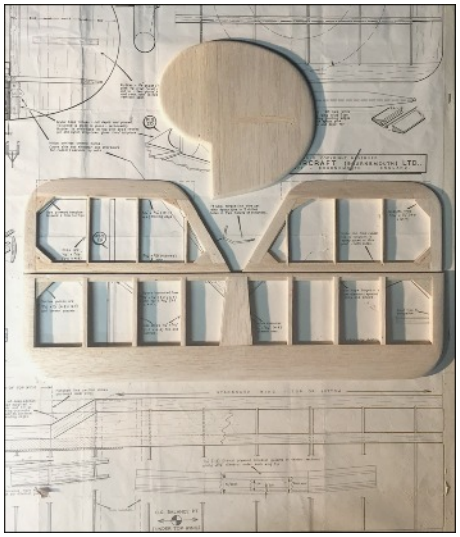
PIC 32



This shows the simple construction of the lower structure of the tailplane, with 1/16" x 3/16" rib cap strips below the 1/16" x 3/16" ribs and the 1/16" lower sheeting extending below the ¼" square leading edge. The rear spar was laminated from 1/8" x ¼" and 1/8" x 3/16" to provide a landing for the rib cap strips.

PIC 33
This shows upper tail plane leading edge sheeting and upper rib capping strips glued and pinned, along with the left and right hand elevator halves, which are to be joined with a 14SWG wire torque link set in holes drilled in the elevator dovetail edge strips.

PIC 34 And finally the Tail-plane and Elevator corner radii added and surfaces sanded along with the simply constructed sheet balsa Fin.



Note from editor.

Well done to Steve for this build blog. I don't think it's been an easy build at all and well done to him for his very detailed record. So I guess it will now be covering, final assembly and radio installation to e ready for flight.

Joining Components

Article by Brian Holdsworth

A rather odd example of a low-strength technique for joining materials is generally referred to as "Velcro". This is a registered trade mark and it shows the attitude of some companies that several have tried to claim ownership of the name, even though they had nothing to do with it! Fortunately, the owner seems prepared to allow usage of the name and technique without resorting to protective litigation.

It is a two-part system, generally in the form of tapes of synthetic fabric where one part has a loose tangled pile on one side with the other part having one side covered in short plastic hairs with a hook at their outer ends, similar to the spines on teasels which are the seed heads of large thistles, distributed by the hooks catching on the fur of passing animals. "Hook and Pile" is a quite descriptive name often used for the material. A few are moulded plastic where both parts consist of hairs which interlock when pressed together, separating when pulled apart; these are generally inferior in performance, though may be adequate.

The tapes are attached to the items to be joined with the active areas outside. Some are available with adhesive already applied similar to plastic adhesive tapes, where some are better than others, but all show age deterioration, tending to peel off after a period up to a few years, which can make them unsuitable for some applications. When the parts are pressed together, the hooks tangle with the loose pile, joining them. It is relatively easy to pull them apart, which is useful for some applications. However, the joint is strong in shear where the forces slide the parts past each other. When joined, a small amount of relative movement is possible, so it is only suitable for applications where such movement is not a problem or even an advantage.

The ease of closure and separation makes its use convenient for many applications. For example, clothing such as jackets may require flaps over zips or pocket openings to provide protection from rain or to retain any contents. Detachable linings may be secured with easy adjustment to compensate for size variations from wear, shrinkage etc.

It can be useful for mounting light, delicate equipment where the relatively loose mounting can be helpful to provide some protection against the effects of

Joining Components continued/…..

Article by Brian Holdsworth

vibration. Mounting 2.4 GHz radio control receivers and smaller Speed Controllers are modelling examples. Servo mounting is obviously inappropriate since a more rigid technique is required for positioning precision. Heavier electronic items (over ~30 grammes) generally need more substantial mounting.

Electric flight batteries usually use Velcro to attach them to the airframe with a strap round them to resist the forces trying to separate them. The Velcro stops the battery sliding through the strap, which is usually also Velcro providing precise length adjustment to match the actual battery dimensions, allowing easy fitting and removal of the battery.

After many separations, the pile will wear reducing the force required for separation. The hooks may also become damaged, particularly on cheaper items. For usages such as electric flight batteries, which are generally changed for each flight, this could become a problem since a loose battery would try to batter its way out of the airframe with obvious undesirable consequences! Frequent inspection and periodic replacement of the pile part are appropriate. Large batteries would benefit from the use of multiple straps, as their greater weight and length increases the forces, making them more vulnerable to separation in flight. LiPo's tend to puff as they age and their resultant increasing diameter is readily taken up by the strap. Any puffing during flight would impose considerable forces on the strap which is a reason for discarding a battery showing any puffing change during a discharge cycle. Also, such puffing is a major indication of battery problems suggesting immediate replacement.

There is a group of techniques which melt the material so that parts become bonded together when cooled.

Welding is widespread for joining steel components where additional material is usually added to fill any gaps. Descriptively, this material is referred to as "welding rod". Molten metal is prone to oxidation so that a flux is often applied for protection and to help the material to flow. Considerable heat is required to achieve melting-point of over a thousand degrees centigrade, not helped by the materials being good conductors of heat tending to disperse the effects. The

Joining Components continued/…..

Article by Brian Holdsworth

heating generates considerable stresses so that the joined items may need to be held in a jig or straightened after welding. Additional temperature cycles may be needed to relieve the stresses and temper the metal to achieve the required characteristics.

When well done, the resultant joints can be stronger than the original material. This is exploited in some large applications where, for example, ships do not have access hatches to replace bulky items such as engines. If required, a large hole is cut in their hulls with welding used to join it together again. This includes nuclear submarines where high crushing forces at their considerable operating depths have to be sustained, so it must be considered adequate!

A major problem is the inclusion in the weld of contaminants such as slag, air pockets etc. which would significantly reduce the strength of the joint. Critical applications make considerable use of non-destructive testing methods such as X-rays, ultrasonics etc to identify any defects so that the joint may be remade or the part discarded.

For small applications, spot-welding is often used where thin metal sheets are overlapped and a large electric current is passed through an area a few millimetres in diameter while pressing the parts together for good contact. The metal melts in that area, joining the parts when cooled, leaving a characteristic indentation at the point. With the intense localised heat, fluxes are rarely needed and distortion of the part is minimal. This technique is widely used for the fabrication of sheet metal items such as cabinets up to motor cars etc.

Aluminium is difficult to join with a narrow temperature band between the surface melting required for welding and collapsing into a puddle. It also needs fluxes and often an inert atmosphere to avoid oxidation. Welding is used in some specialised applications but most use other methods such as pop-rivets for simplicity.

Joining Components continued/…..

Article by Brian Holdsworth

Sometimes, a different metal with a lower melting point and a flux is used for the additional material, referred to as solder. This is a widely-used technique for applications such as joining components in electronic circuitry.

In its basic form, a heated soldering iron is used to melt the solder so that it flows smoothly over protruding wires on a printed circuit board, joining them mechanically and electrically. A major problem, greatly affecting electronic reliability, is poor solder flow due to contamination and/or inadequate heating, producing what is termed a dry joint causing intermittent circuit functionality, especially with operating temperature variations and vibration.

To improve soldering quality in large-scale production, although with significant equipment costs, molten solder may be held in a bath and the assembled circuit board floated quickly over the surface drawing solder into the joints via capillary action and the flux properties, while reducing the potential for overheating of the components.

A more complex technique is generally used for circuit elements such as processor and memory chips which are very vulnerable to overheating due to the many connections to be made - maybe hundreds on a single device. Tiny blobs of solder paste are applied to the required areas with the components held in place by the stickiness of the paste. An oven is used to melt them with heat applied directly or via infra-red etc. This technique is only practicable for automated assembly due to the considerable cleanliness and positional accuracy requirements .

For higher strength joints between steel components, silver soldering or brazing using a higher melting point solder may be used, usually with the heat applied by a blowtorch etc.

Plastics can be difficult to join. For very thin sheets such as bags, an effective technique involves heating overlapping surfaces sufficiently to start melting them, bonding when cooled.

Joining Components continued/…..

Article by Brian Holdsworth

The simplest method uses a heated shoe pressed on the join area. Sometimes, joining and cutting to length are combined where one side of the shoe is hotter than the other, joining on one side and melting on the other to separate the bags. There are considerable difficulties in keeping the shoe clean from debris such as molten plastic, so that it does not catch and tear the material or reduce the transferred heat due to the insulating effects. There is a fine line between overheating with holes appearing, and insufficient heat with the joint pulling apart.

More exotic techniques induce tiny vibrations in the touching surfaces so that the friction of their relative motion generates heat, melting the touching surfaces without affecting the outside. This is achieved by ultrasonics or RF heating, avoiding many of the problems with physical heating and producing more consistent results. Capital equipment costs are greater, but overall production costs should be lower due to reduced rejects, maintenance etc. The technique can also be used with thicker materials such as equipment cases.

For all these techniques, heating the joint quickly is essential to reduce damaging effects on the rest of the item.

Club Instructors

Jason Reid, Mark Conlin, John Higgins, Brian Holdsworth, Chris Vernon, Andy Harrison, Jim Sheldon, Paul Cusworth, Justin Goldstone, John Prothero.

May 2020

In Conclusion

So another month almost gone and for model flyers it has at last been a positive one. We can only hope that there is not another 'spike' in Covid-19 causing a return to full restrictions being re-applied.

To all the kind members who wished my daughter a speedy recovery, thank you. She came through it and has in fact got back to work.

To all of you who are able to get back to the field, enjoy your flying guys. Thanks to all of you who have contributed to this newsletter including Chris who took a couple of very good panoramas. This is the other shot Chris sent me. As ever guys, Stay Safe.