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On the cover

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Zlin Z-37 Cmelák

Hangar 9 P-47 PNP

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ON THE COVER:

A nice shot of Umberto Ghirardelli's Stinson L-5 Sentinel, built at 1:4.5 scale from Raffaele Oberti's plans.

RC SCALE INTERNATIONAL

ZLIN Z-37 CME

HANGAR 9 P-47 PNP

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RC SCALE INTERNATIONAL

EDITORIAL

Dear friends,

I would like to welcome you to this new issue of R/C Scale International, and also thank all of those who regularly write to us with messages of encouragement and appreciation for the magazine: this is hugely encouraging, as keeping such a magazine thriving at this time is not easy, and requires a lot of work. Consider that I work on three magazines: Scale International, Jet International and the Italian Modellistica - I can't deny that having a job role so indelibly linked to precise deadlines is also a source of great stress, and in fact this has had some affects on my health...but I'm not complaining: I do a job I love, and consider myself very lucky to be able to do it.

It appears that Covid is slowly diminishing in some countries and in fact we are already hearing rumours about many big events reappearing back on the calendar: fingers crossed!

I would like to mention a few articles in this issue, starting with P.J. Ash discussing techniques for landing using flaps: a very interesting and valuable topic, since we all know that "take-off is optional, but landing is mandatory"!

For lovers of traditional builds, and I would say traditional subjects too, don't miss the first part of the series of articles about constructing WW1 aircraft, full of valuable and interesting tips, written by our co-editor Colin Straus!

I also want to talk to you about the test review, made by yours truly, of the Hangar 9 Fun-Scale P-47 PNP: this model, in my opinion, can be really valuable to those who want to enter the world of scale models; having a traditional wood structure, with simplified lines (hence the name "Fun Scale"). It is perfect to learn the techniques needed for traditional structures, whilst it can also be used as a base to learn the secrets of weathering, and how to add details such as panel lines, fake rivets, etc.. And why not remove all the covering film, and make it completely different, replicating the scheme of another full scale P-47? In fact it's a model that could help a number of aeromodellers enter the wonderful world of scale models without problems!

I will now leave you to read on, and wish you, as always..., good flights and happy landings!

Marco

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Zlin Z-37 Čmelák

An unusual scale subject

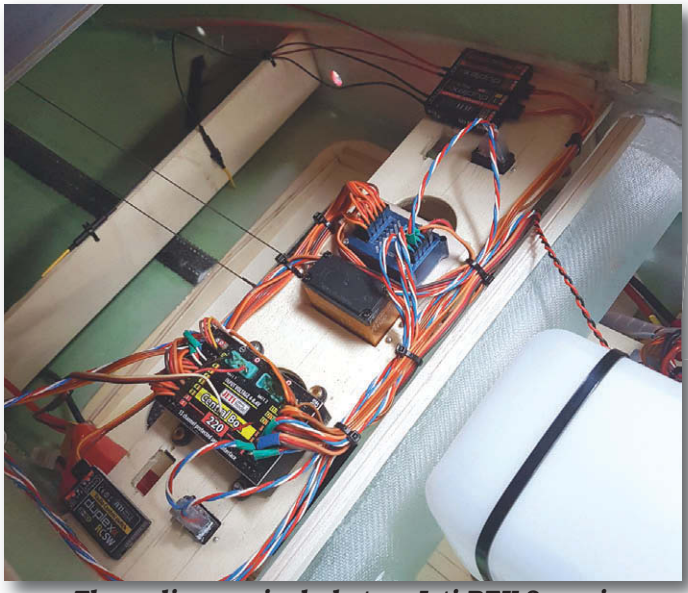
John Greenfield - Photos: John Greenfield & Bob Petrie

part 2

With the model fully painted it was clear that I would have to add something to the cockpit area, as with the large number of windows the area looked very empty. With weight in mind, I needed to come up with something that would fill the void but at the same time be lightweight, so I decided to build a cover to go over the radio gear from foam board. This is a lightweight foam sheet with thin card on both sides making a strong but light material. Rails were glued to the fuselage sides and the foam board slotted in. This nicely filled the back of the cockpit, but more was needed, so the next obvious thing to make was a dashboard.

Again, with weight in mind I needed a light solution so found a picture of a Cmelak dash on the internet and scaled it to the correct size. I then cut a thin lite ply dash panel and cut

The dashboard has been made keeping the weight at minimum.
The fantastic pilot is made by Tailored Pilots, including the "Ghost Squadron" baseball cap!



The radio gear include two Jeti REX-3 receivers, a 900 mHz backup receiver, a CB210 central box and a PowerBox iGyro 3E

holes in it to match the instrument faces. A thin backing panel was also cut and then the whole lot sandwiched together with a sheet of thin clear acetate so that the instruments showed through the holes in the dash panel. A few switches and trim pieces were added from the scrap box and some placards printed out and stuck on the dash. The coaming over the dash was made from 1/16" balsa, covered in 1mm thick foam and then a stretch vinyl cover – the final result looks good and is very light. This just left the pilot and the obvious choice here was a Tailored Pilot; a call to them asking if they could make a super lightweight version resulted in an order for one of their Premier models complete with civilian clothing, and as a nice touch they produced a Ghost Squadron baseball cap. The pilot was fitted to a lightweight seat above the fuel tank and nicely filled the cockpit.

I decided to install Jeti radio in this model as Jeti UK are the importers of Fiala motors and also helped with the shipping of the kit from Airworld, so it seemed a logical choice. I have a Jeti DS 24 on loan from Bernie at Jeti UK so I teamed it up with 2 REX 3 receivers plus a 900mhz backup receiver and a CB210 central box. I also decided to use the Jeti remote switch so I can turn the model on and off from the transmitter, thus no switches are visible. For servos I elected to use a mix of Savox SA-1256TG and SH-1290MG.

Fitting the servos into the mounts I had fitted during construction was easy but the install of the 3 receivers and central box took some thought, as I needed good reception to the aerials and a strong safe mount for the equipment, which would also assist in getting the centre of gravity in the correct place without using any lead. I finally decided to mount the gear on a modified wing tube support which also holds the rudder servo, so again one piece of wood doing 2 jobs. To get the C/G correct the batteries needed mounting just in front of the wing tube but I wanted to be able to access them from the bottom hatch for charging, so I cut away the wing tube brace and made a box to fit in the area to hold the 3 batteries. I also made provision to fit a gyro as I had a Powerbox I-Gyro 3 left from another project.

Unfortunately the landing gear springs were two different sizes and lengths, so they had to be replaced

The fuel tank was mounted on a light ply plate full of lightening holes in front of the wing tube to get the fuel load as close to the C/G as possible. This also made it easy to mount the fuel pump alongside, making everything easily accessible with the firewall unbolted.

With the radio layout decided it was time to start on the finishing of the airframe. My original idea was to copy a Belgian full size scheme that had scantily clad women along the fuselage but I had second thoughts about this perhaps not being such a good idea in the "PC" world we inhabit now and that such a scheme may offend some people without me knowing. A rethink was required and as my model is just for fun and not serious competition, I decided to go my own way and the final design is made up of graphics from several different Cmelak aircraft all blended together. The registration is also fictitious, GSJ simply stands for "Ghost Squadron John" as that is who I am, and Ghost Squadron is the name of the flying team

All the stencils were made by Flightline Graphics in the U.K.

The seam on the cowling not lining up with the seam on the fuselage puts the cowl moulding details off centre.

To get a nice finish, all the seams have been cleaned up, then all the low points were filled and sanded, before being repainted the same colour

I belong to. The stencils for all the graphics were produced especially for the model by Nigel at Flightline Graphics and of course were excellent quality. He worked carefully with us to ensure the stencils for the registration on the wing were "stretched" correctly to give the correct layout over all the corrugations on the wing and the bumble bee on the cowling looked correct.

Before the graphics could be added the problem of the bad seams and mouldings needed to be addressed and here I have to say a big thank you to my flying buddy Matt Smailes, as he offered to de-seam the model and re-paint. He carefully ground out all the defective seams and moulding lines all over the model and then filled the areas with Dolphin Glaze filler. In many places this took several goes to get a good finish. Where this work was done, the moulded-in surface details were lost, so they then all had to be painstakingly put back on one by one to match the surrounding details for a seamless appearance. Airworld had provided the RAL number for the pink colour, so a local car refinishing company mixed some 2K paint to match and the reworked areas were blown in with an airbrush and then blended with the gel coat. The stencils were then applied and using a fine airbrush Matt slowly built up the graphics that bring the model to life. This work took Matt a great deal of time, but the result was superb. To help with the blending in of the paint and to bring the model to life we decided to do a full weathering job on the model as all the pictures I had seen of the full size showed a lot of wear and dirt.

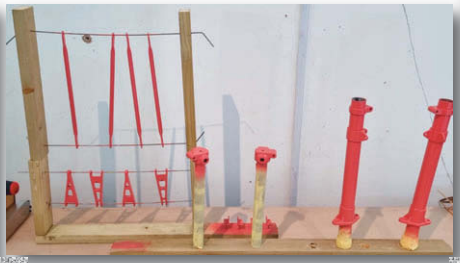
Masking the cowl to paint the matt black section

The matt black finish gives a realistic touch to the Cmelak

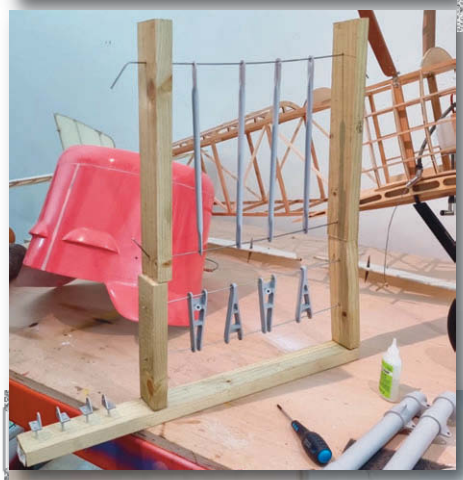
And here comes...the bumblebee! (Cmelak in Czech)

The new flap hinging system

Above and right: painting the registration letters on the wing



All the landing gear parts have been primed and painted in the same pink as the model



Above: the fuselage ready for weathering
Right: the weathering brings the surface to life

The target of keeping the weight under 25Kg has been achieved!

The finished Cmelak at the airfield, ready for some fun!

To do the weathering we mixed oil based household black paint with white spirit to thin it down and then rubbed it over the model with a rag and then wiped it off in the direction of the airflow. This was the first time we had tried this technique and we found that the paint dried really quickly so only small areas could be worked on at a time, but the final result looks really good. We developed this technique as the normal methods of weathering require a clear coat to be applied to seal in the weathering, and we could not afford the weight of the clear coat on such a big model with so much surface area.

With the paint job finished and left to harden for a few days it was time to reinstall all the gear and get the model ready for test flying. All the way through the build I had been worried about the final weight and had taken every step I could to minimise weight wherever possible. It finally came time to properly weigh the model, and to do this accurately the model was assembled, the fuel tank filled and the model set on a set of 3 calibrated scales. The final weight came out at 24.85Kg. All the effort put into weight saving had paid off…. but only just. For example, if I had gone for a full painted finish or even traditional methods of weathering and a clear sealing coat, the model would have exceeded 25Kg.

At this point I must mention that in anticipation that the model may have ended up weighing over 25Kg I had been building the model fully in compliance with the UK "Over 25Kg scheme" so that it would pass all the necessary requirements. In the UK the scheme is administered by the Large Model Association on behalf of the CAA and inspectors are appointed for each model to ensure that the model is safely built to the requirements, and to assist or mentor the build if necessary. Once complete the model is signed off and then when the necessary paperwork is in place, the model has to complete a series of test flights in front of an approved person to ensure not only that the model is safe, but also that the nominated pilot has sufficient skill to operate the model safely in accordance with requirements.

Putting a model through the scheme is an easy process and not something to be concerned about, but in the case of this model I wanted to be able to take it on my foreign trips, and there is currently no reciprocal arrangements in place for model certification across Europe, so keeping under 25Kg was an easier solution.

To transport the model a cradle was made for the airframe to sit in, with this being cleverly designed so it could be turned over and used to support the fuselage upside down whilst the wings were fitted. Details like this allow assembly and operation of the model by a single person, which makes the model so much easier to use. With the wings on and batteries fitted through the bottom hatch the model can be easily rotated over on its nose to the upright position, before fitting the tailplane, after which the Cmelak is ready for use. Transporting and storing the wings needed a bit of thought as the undercarriage is fixed to the wings, meaning they can only really be transported lying on their upper surfaces and this will lead to scratches and possible damage. The solution was a set of wing bags and I found that Revoc made a set for this model – an order was placed for these plus a tail bag and they fit perfectly. Now the wings and tail can lie in the back of my van with no damage and all the control surfaces are protected.

With the model complete and C/G checked for the final time it was time to go flying. With the experience I had gained operating the Valach 420 on my Klemm I felt confident in running the 250 on the airframe, so had not done any prior running in on a test bench.

On the day of the test flight the first thing to do was a full range test and this showed the installation to be correct, as the signal strength being read on the Jeti transmitter showed all was well. All 3 receivers were checked during this process. Now it was time to start the motor. I was aware from operating the 420 radial in my Klemm that the first start can be difficult as priming the motor for the first time takes a lot of prop flicking, but I was surprised how easily it started and then settled down to a fast idle with no fuss at all. I did adjust the end point of the throttle on the radio to lower the idle and then reset the failsafe. I then tried full power and it ran smoothly with no adjustment needed, Fiala say they run all motors in the factory before shipping and clearly this one had been set up well. With the motor purring away all the range checks were repeated with exactly the same results, indicating that there was no

effect from the ignition system.

After the range checks the model was shut down and given a full check over for anything loose, but all was fine so the tank was topped up and it was time to go flying. Taxiing out to the take-off position was easy with the wide track undercarriage and steerable tailwheel, so the model was lined up with the runway and the throttle opened slowly. There was a bit of a swing to the left due to engine torque but this was easily corrected with rudder, and after a very short run the model was airborne and climbing steeply. Quite a bit of down elevator was needed to stop the climb but other than that it was flying well, with no aileron or rudder trim required. I put in full down trim but the model still wanted to climb, so used the height for a quick check of the flaps, which surprisingly produced no trim change at all, so I left them down and made a landing to investigate the elevator issue. On the final approach I still had to hold in down elevator and keep quite a bit of power on against the drag of the big flaps, but the model was still nice and stable.

The model was shut down and the elevator inspected. Clearly a lot of down elevator was visible, but my fears about pushrod or servo problems were unfounded so it looked like a tail incidence problem. Knowing the model had no real vices I decided to adjust the pushrods to give more down elevator and put the transmitter trim back in the middle. On the next take off the model did not climb as steeply but still needed almost full down trim for level flight. With the model flying straight I could start to explore the handling. The ailerons and rudder seemed quite unresponsive, but the elevator was fine at the recommended throws. I landed and adjusted the rudder and ailerons for the maximum available throw the hinges would allow and took off again. The rudder was now fine, but the ailerons were still not nice. Unfortunately, some surgery would be required to get more throw, as the leading edge of the aileron was now hitting the wing at full deflection, so this would have to wait until I got back to the workshop.

On the next flight I was playing with the flaps when disaster struck. Coming round the final turn to land at slow speed with full flap, one of the flap hinges broke off the flap and the flap twisted up causing the model to violently roll. Within a second the model was upside down only a few feet off the ground and continuing to roll. Instinctively down elevator and full power was applied and by the grace of God the model

missed the ground and climbed away still rolling. I put the flaps up and found I still had control of the model, so a quick circuit and a no flap landing was made. I was very lucky that the model was not a metre or so lower and my instincts were sharp that day, or the model would have been smashed to pieces.
A close investigation of the failure showed that the moulded flap hinges on the bottoms of the flaps were nothing more than blobs of filler under the gel coat with no structural properties at all. The blob of filler had just broken off the glass cloth skin of the flaps.
Back in the workshop I realised how lucky I had been not to lose the model but clearly a complete redesign of all of the flap hinges would be required. The solution I came up with was to cut all the "blobs" off the flaps and set in 2mm fibreglass sheet hinge supports that went right through the flaps and bonded to the inside of the top skin. This was a lot of work and fiddly to ensure the alignment of the flaps all stayed the same, but the end result was a proper strong structural hinge.
I also need to address the lack of aileron response, and this involved increasing the hinge gap to allow more movement. At this point I was glad I had made the metal hinges as by heating them up with a very large soldering iron the epoxy softened and the hinges could be extracted. They were reglued back in with a bigger gap and the pushrods adjusted to their correct new length.
Further flying of the model has shown that the moulded in tailplane seat is at an incorrect incidence to the wing and this is why so much down elevator (approximately 20mm) is required for straight and level flight. A look on YouTube at other Airworld Cmelak's flying reveals that they are all flying with lots of down elevator. A job for this winter will be to cut the tailplane seat off the fuselage and remount the tailplane at the correct incidence. Notwithstanding the above the model does seem quite happy flying at all speeds with the down elevator trimmed in. I also feel the aileron and rudder throws as specified in the instructions are insufficient and my model is now flying with 70mm of up aileron throw and 60mm of down. Rudder throw has also been increased to 75mm each way which gives much more authority.
In conclusion the Cmelak has been an interesting model to assemble, challenging in places due to poor parts but in the end the finished model is a real joy to fly. The motor is superb and overall the package has delivered what I set out to achieve in a practical every day model that is quick to assemble and flies well out of my local flying field.

John Greenfield

BUILDING WW1 MO

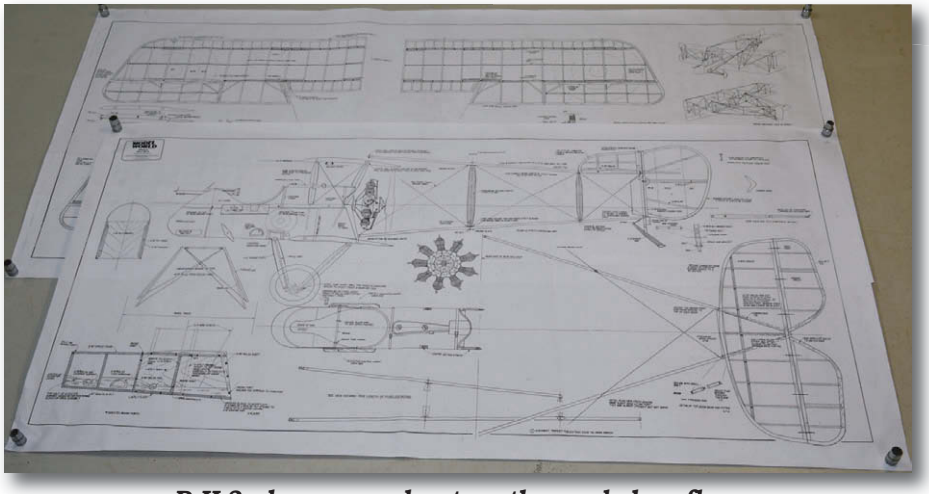
part 1

Colin Straus

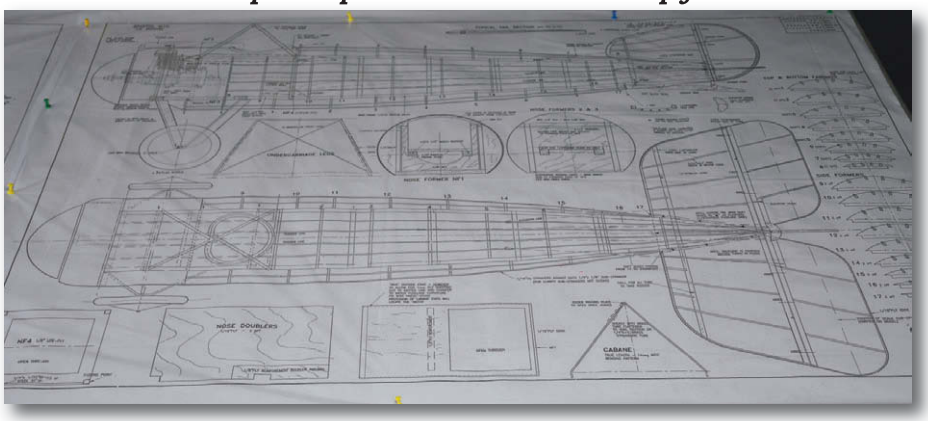
Welcome to the first of a series of articles aimed at the less experienced builder and those that want to move on from ARTF scale models to the very enjoyable process of building from plans and/or part kits. ARTF scale models have become extremely popular over the last couple of decades and have many benefits, allowing those that prefer to fly rather than build to get airborne quickly and relatively easily, with a wide variety of models ranging from tiny to huge. Having said this, they do of course have limitations, as manufacturers will naturally focus on the subjects they think will sell in large numbers, generally this means better known aircraft, thus the huge number of Piper Cubs, Spitfires, Mustangs etc currently available. The other side of this is that many aircraft are not available in ARTF formats, purely as the manufacturers consider that sales would be too low to make production viable.

A second issue when buying an ARTF scale model is that generally only one colour scheme is available, which of course means that if more than one example arrives at the flying field they will be identical, many modellers of course not wanting this, preferring to have something unique.

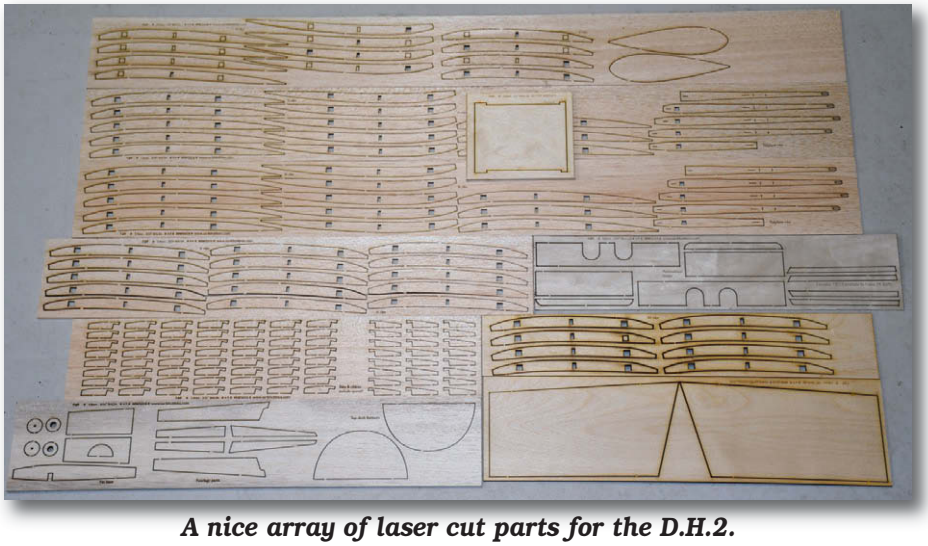
Building from a kit allows any colour scheme to be reproduced, but even here the manufacturers will only produce kits that will sell in volume, so for designs that are less popular a plan might be the only way that such a model can be built, as we are now in the realms of personal choice, where a modeller may have decided to design a model of a subject that is of appeal, not caring if it might be a commercial success. Due to this, and the fact that single plans can be printed at a relatively low cost and quite simply, over the years a huge range of plans have become available to modellers, with some of the companies selling these



D.H.2 plans spread out on the workshop floor

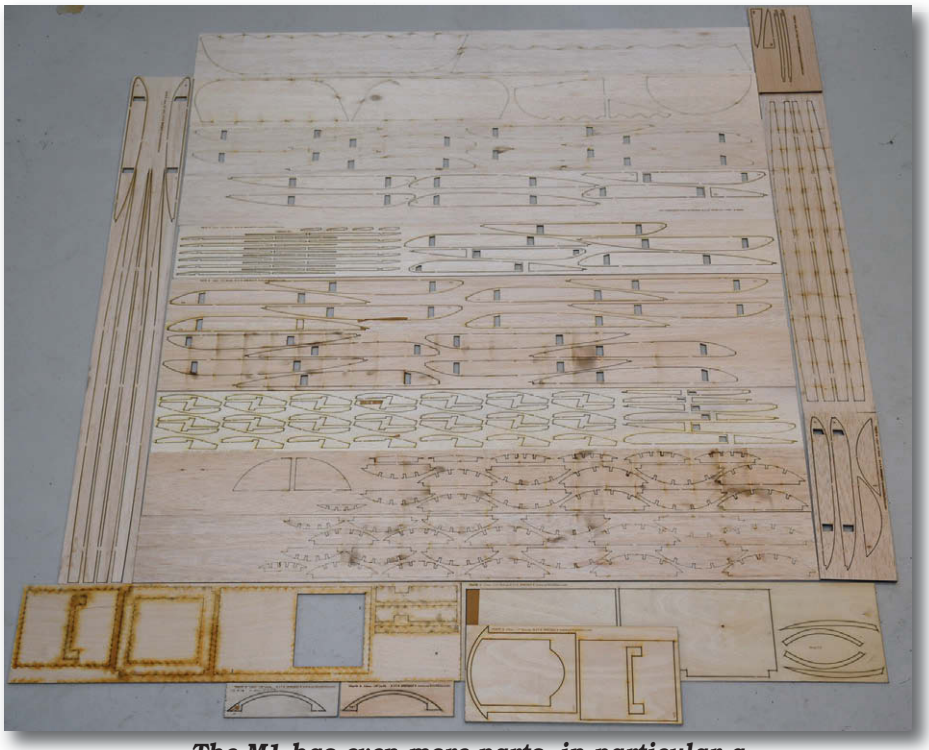


The M1 fuselage and tail plan laid out on the building bench ready for work to commence



A nice array of laser cut parts for the D.H.2.

DELS FROM PLANS



The M1 has even more parts, in particular a vastly greater number of fuselage formers.

Adhesives used for the builds are from Deluxe Materials, shown together with a few of the laser cut parts.

also offering laser or router CNC cut sets of formers and wing ribs etc, as well as moulded canopies and cowlings.

Based as we are in the U.K., the largest range of plans currently available is supplied by Sarik Hobbies, who offer more than 3,500 different plans, including many by very well-known scale designers such as Brian Taylor and Duncan Hutson etc. Of course, not every plan is of a scale model, but there is still a massive range and variety of scale plans available, with many of these available with part kits of ribs, formers etc, plus moulded parts as well.

All this is great, but the very thought of building a model from a plan can be quite off-putting for many, particularly those that have only ever assembled ARTF models in the past, or who have built only a couple of simple kits. The additional challenges that come with building from a plan can seem too much, so this article, plus those to follow, aim to show that building from plans is actually not difficult, can be extremely fulfilling and enjoyable, with the end result being a model to be proud of.

The series of articles will cover techniques, materials and adhesives used in the builds of 2 rather different WW1 aeroplanes, a relatively simple 61" wingspan Bristol M1 monoplane and a much more complicated 56" wingspan D.H.2 biplane, both of these designs being by Dave Hurrell, and originally intended to be powered by I/C engines, a .52 four stroke in the case of the M1, and a .70 four stroke in the D.H.2. Given the development since these models were designed of electric power systems, the plan is for both aircraft to be converted to electric, which in the case of the D.H.2 will be of particular benefit, as the pusher layout with the engine and propeller inside the tail struts and rigging would make starting an I/C engine a little more difficult than usual. I will be buil-

Building from plans means that some sanding is essential, shown here are the most commonly used tools from the Permagrit range.

ding the D.H.2 and my good friend Ted Gilbert will be assembling the Bristol M1.

Although the entire build process will be detailed, the focus will be on the more unusual techniques and materials used, with photos to clearly illustrate what is being done. Given that both models are completely built-up from balsa, ply, spruce, bass and beech etc, as well as using aluminium tube, piano wire and other materials, a wide range of adhesives will be required. As I have for many years use glues and other modelling products from Deluxe Materials, the builds will be carried out mainly using their Roket cyano, Speed Epoxy, Aliphatic resin and Super 'Phatic glues, although other Deluxe products such as Cover Grip, Model Lite Balsa, Eze Kote and Liquid Gravity will come into use in the finishing process. We will cover when and why each of the various adhesives is used as we progress through the builds.

Scrap liteply was used to make the former that the laminated wingtips for the D.H.2 were bent around, parcel tape protects the former from the glue used.

Four lengths of ¼ x 1/16" balsa are held in place around the former using masking tape.

The completed laminated wingtip next to the former.

Tools used will be those common to most builds, so sharp scalpel, metal ruler, pins etc, however there is a fair amount of sanding required so sanding blocks and/or the excellent sanding tools from Permagrit come in very useful. Luckily I have acquired a wide selection of suitable tools and sanding bars etc over the years, so we were well set for the builds.

Delivery of the plans and laser cut part kits took place just a few days after we placed the order with Sarik, and the box was quickly unpacked so that we could take a look at what had arrived. The plans come as two sheets for each model, and are nicely detailed, although we did find that some information was missing, which required careful thought at times during the builds. The laser cut parts are laid out on both balsa and ply sheets, with these parts having to be cut free of their sheets, as they are held in place

A close up of the four laminations of the wingtip.

The tailplane leading edge was laminated in a similar manner, although in this case bass was used instead of balsa.

in the sheets with short tabs where the laser switches off for a few millimetres. This does take a little time, as it is wise to sand off any sections of these tabs that are proud of the surface of the part, whilst at the same time removing any excessive charring of the cut edges.

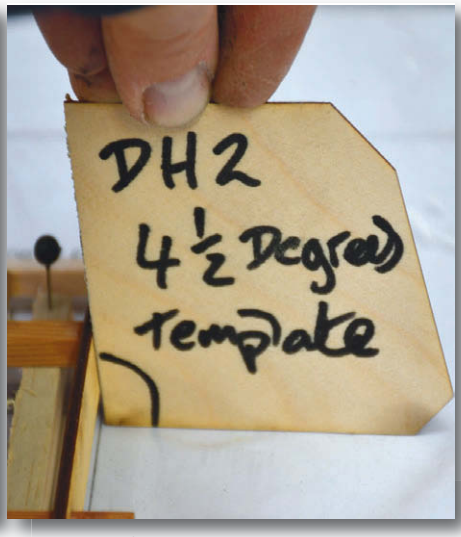
Ted and I spent some time working out exactly what balsa, spruce and ply we would need for the models, and then placed an order with SLEC UK Ltd, with the wood arriving less than 48 hours later, truly excellent service, particularly as we had asked for specific grades of balsa. To ensure the parts we build will be straight, and free from warps it is essential that the board we will be building on be absolutely level, and it should accept pins as these will be used to hold parts down accurately over the plan.

With everything prepared we started work, initially focusing on the tailplanes of both models. Interestingly both tailplanes used different construction methods – the M1 tailplane has a solid core of 1/16" balsa, with thin ribs and sub-ribs being glued into place on both sides. The plan was covered in a plan protector from SLEC, and the tailplane core pinned down, after which the spruce spar, ribs, sub-ribs and hardwood trailing edge strip were glued into place. Once the glue had fully cured the tailplane was removed from the bench and turned over, so that the spar, ribs etc could be added to the other side, the tailplane being pinned down inverted, but with pac-

Partway through the assembly of the D.H.2 left lower wing panel, note how the spars are supported on 3/8" balsa strips to allow for the undercamber of the wing ribs.

Close-up showing the way that all three spars slide into holes in the wing ribs, then being glued when all the ribs are correctly aligned.

The trailing edge of the wing was made up from a lamination of 1/32" ply and 1/8" balsa, then being tapered ready for fitting.



A simple template was made up from scrap ply to set the correct angle of the root ribs of the wings

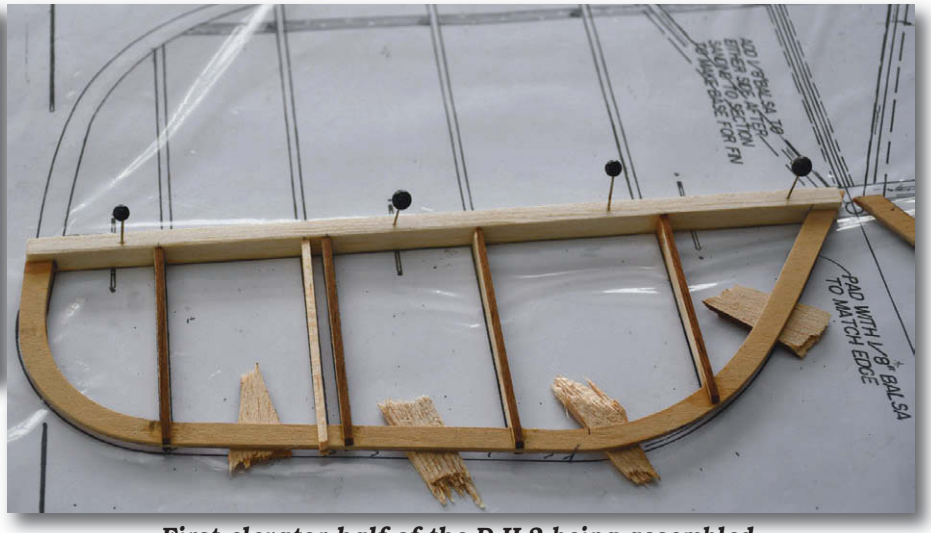
Super 'Phatic is the ideal glue for situations like this were the parts have to be aligned before gluing, as this very thin glue has been developed to "wick" into tight fitting joints.

Structure of the tailplane showing the spruce spar and laminated bass leading edge.

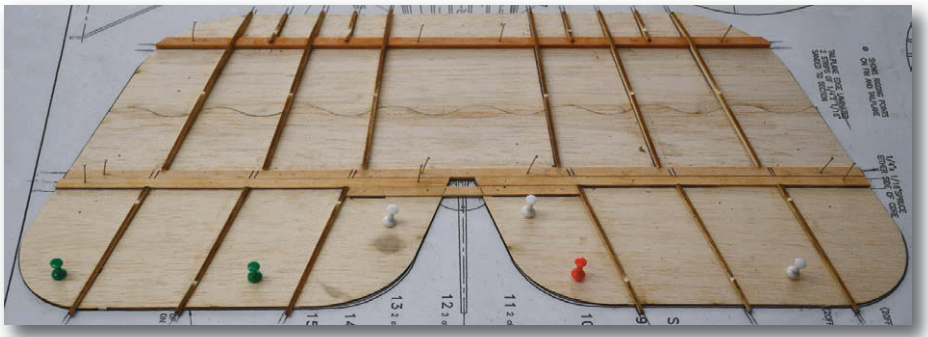
king to support it level. At this point two strips of ¼ x 1/16" balsa were laminated around the leading edge and tips of the tailplane and then left to dry. The elevator halves were built in a similar manner, as were the fin and rudder, although the control surfaces used a single piece of 1/16" ply around the trailing edges to give them some additional stiffness and ding resistance.

In contrast the tailplane of the D.H. 2 has full depth ribs that are slid onto a 3/16" square spruce spar, with this being carefully positioned over the plan and packed up before pinning in place so that the ribs are just clear of the surface, the trailing edge then being pinned in place, again on packers, these being of the correct height to ensure that the tailplane is level. The tailplane ribs could then be glued to the trailing edge and spar. The leading edge could now be offered into place and the front of the ribs gently sanded to the correct angle.

I had prepared the leading edge in advance, as I know that this would take some time, given that it is a laminated part. To produce this I cut a former from ¼" liteply to the exact shape of the front and tip of one side of the tailplane, as the leading edge runs right round to meet the trailing edge. Parcel tape was run around the leading edge to protect the liteply from damp and glue, and four strips of bass were soaked in hot water for around 30 minutes. This allows them to be bent around the former without snapping, and once all four were in place they were secured with a mix of clamps and masking tape, then being left to dry in a warm place. The bass strips were then removed from the former and were glued together using aliphatic resin (ideal for this as it takes a little time to dry, but once fully dry it sands easily, without the rubbery edge left with normal PVA), with the excess then

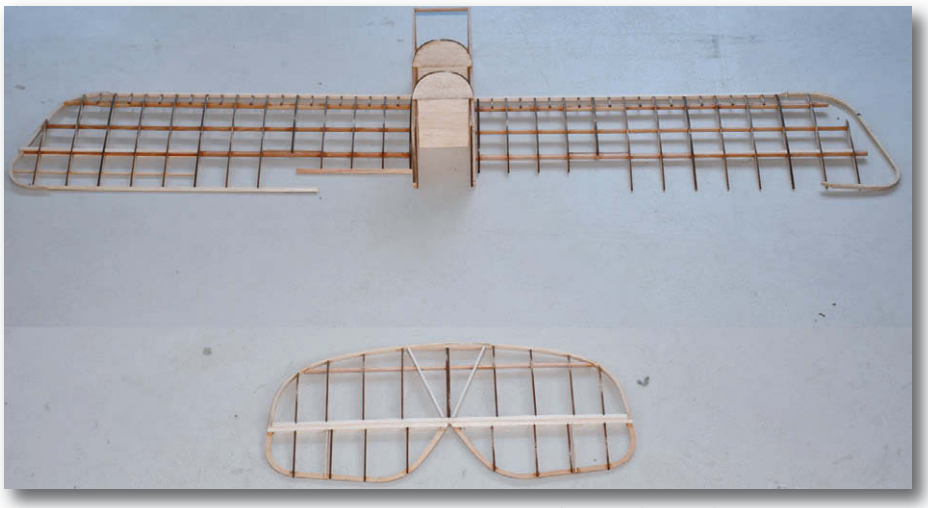


First elevator half of the D.H.2 being assembled.

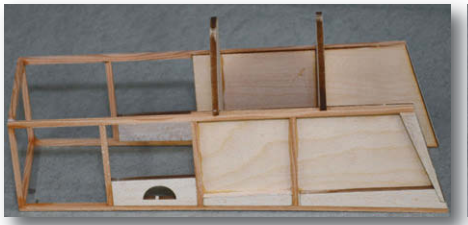


The tailplane and elevator halves of the Bristol M1 are quite different to that of the D.H.2, with a balsa core and separate ribs on both sides.

D.H.2 (above) and M1 tailplane (below) are similar in size but not in their construction.



Completed parts of the D.H.2 laid out in their rough final positions on the workshop floor.



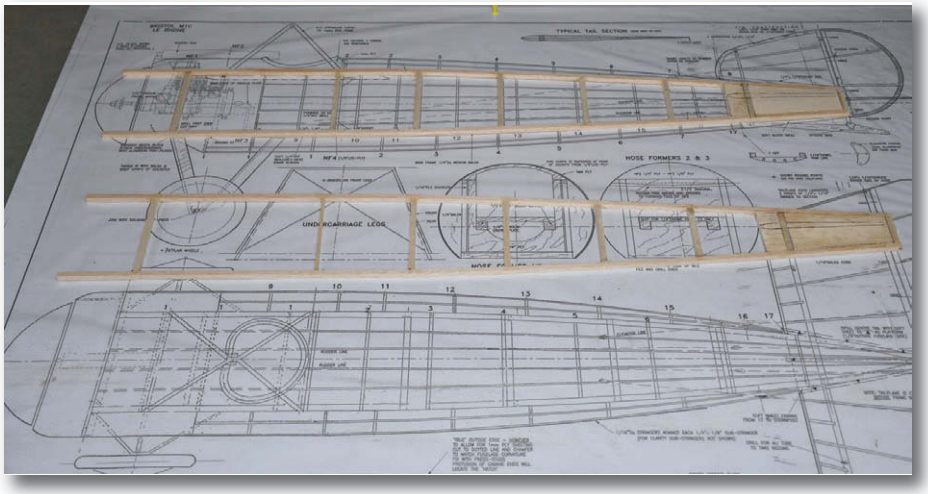
The compact fuselage of the D.H.2 partly assembled.

Lefthand lower wing panel almost complete, just the aileron to cut free and complete.

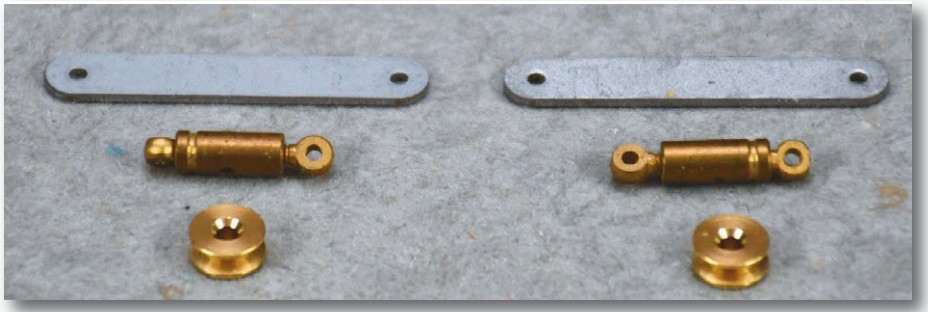
being wiped off, before being placed back over the former and taped firmly in place. Once the glue was fully dry the laminated assembly was removed from the former and sanded smooth and to match the tailplane cross section. Once a second half had been produced I was able to glue the two halves together with a scarf joint and epoxy. The complete leading edge produced using this method is incredibly strong, and ideal for the D.H.2 tailplane given that there is no fuselage to give support, and that holes have to be drilled through the leading edge for the attachments to the frames from the rear of the wing panels.

Once glued into place the tailplane could be removed from the board and given a careful overall sanding, it was then put to one side so that work could move on to the elevator halves – these were quite straightforward, again being built over the plans with suitable packing, although the trailing edge was a little unusual being made from ply. As the plans showed 2mm ply which is uncommon in the U.K. I cut the trailing edge from 1/16" ply and then added a layer of 1/64" ply, the combination being almost exactly 2mm thick.

With four wings to build for the D.H.2 one of these was next on the board, with the first step being to pin down several strips of 3/8" balsa for the spars to sit on. The D.H.2 wing section is undercambered, so the ribs etc cannot be laid flat on the board. As the wing ribs are slid over the spars the logical way to hold everything in place was to support the spars on the balsa strips and then use pins at an angle into the balsa to secure the spars. This avoids weakening the spars by pinning through them, which would of course not be easy as they are spruce. Once the local spar reinforcements had been glued into place, and all ribs aligned correctly they were glued into place, again using Super 'Phatic – Roket Hot cyano could have been used as an alternative, but Super 'Phatic has a little flexibility so is better suited to a wing such as this that has to absorb stresses in various directions including



The fuselage sides of the Bristol are built over the plan as can be seen at the top, the second side below.



Some of the hardware bought for the build of the D.H.2, including miniature turnbuckles and tiny pulleys, these for the closed loop control cables.

from the rigging wires. With all the ribs glued into place I was able to add the leading edge to the wing, followed by the trailing edge; here I made a small change as the plans showed the T.E. to be a piece of 3/16 x ¼ balsa, which I felt would not be strong enough when the wing was being covered, so I made up a trailing edge from a lamination of 1/32" ply and 1/8" balsa, this not being much heavier, but it is substantially stronger. The previously prepared laminated wingtip was then added (made as per the tailplane leading edge, but with four 1/16 x ¼" balsa strips), along with other small reinforcing sections – at the time of writing all that is left to do is to cut the aileron free and fit the leading edge. Just three more wing panels to go!

The D.H.2 has a short fuselage, given that it is a pusher, and the basic fuselage sides were made from 3/16" spruce, glued together over the plan, this then having balsa and ply reinforcements added, before the sides were joined with a pair of balsa formers and a couple of spruce cross members. The Bristol is quite different again, and has a full and rounded fuselage, but here again the basic fuselage sides are made from strip wood, ¼" balsa in this case, glued together over the plan.

The next article will cover the remaining work on the fuselages of both models, as well as the wings of the Bristol and the all-important wire bending required for the wing struts of the D.H.2 and the undercarriage of both models. We also hope to include how the rear tube framework of the D.H.2 is produced and supported.

Colin Straus

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WHAT IS AVAXHOME?

STINSON L-5B

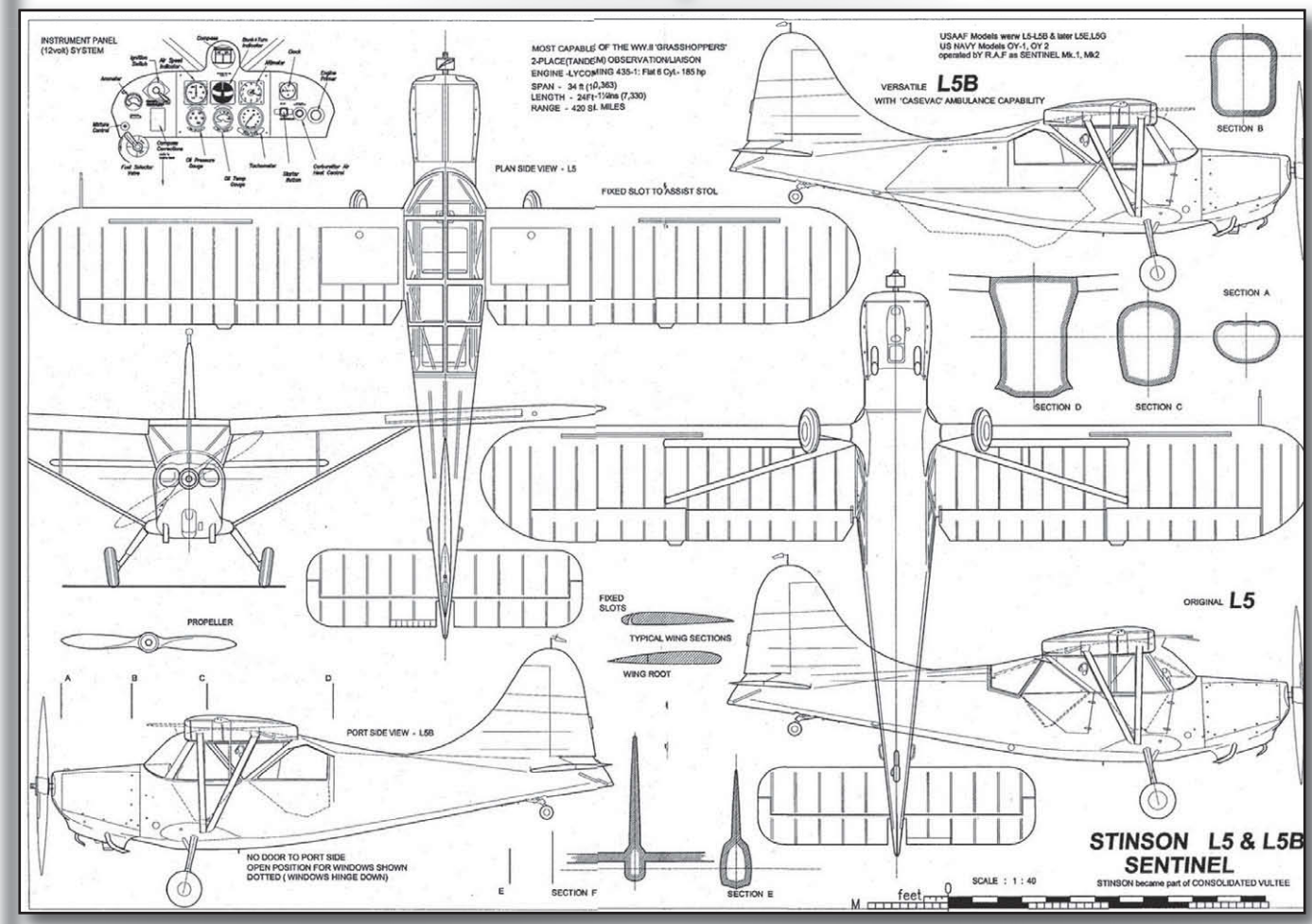
The "Sentinel" at 1:4.5 scale

Umberto Ghirardelli

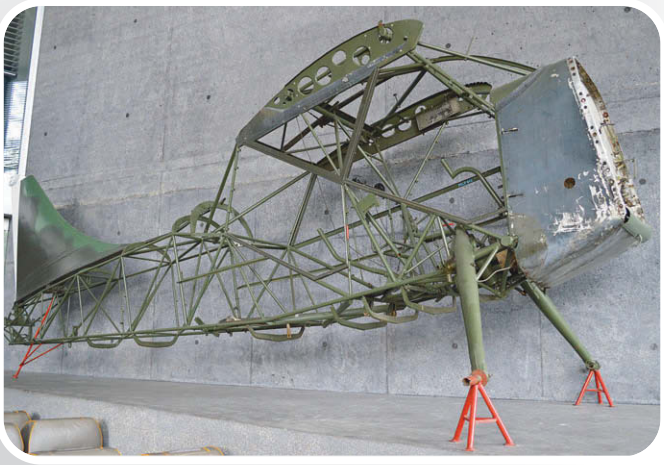
From the start of the first lockdown in spring 2020 and right through the general restrictions during 2021 we had very few opportunities to get to the airfield, and boredom, for a pensioner who has always been very active in life, is bad company. Since I was a young boy my hobby has been modelling in general, but my main interest soon became aeromodelling/flying. I have several models that are ready to fly, currently more than 15, and for the whole of 2020 I spent my time reviewing, improving and finding more practical and up-to-date solutions to

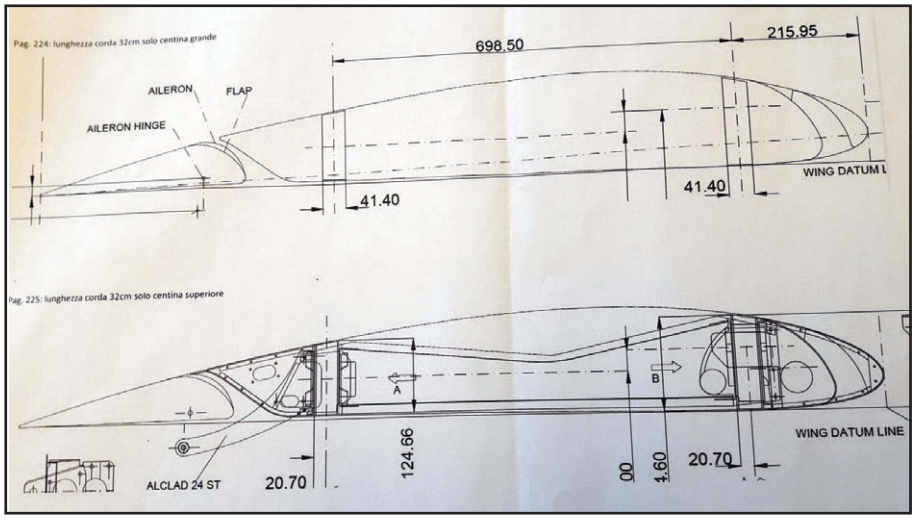
Enrico and Umberto Ghirardelli with the Stinson Sentinel

Short history of the L-5



The L-5 made its first flight in 1941. It had a length of 7.33 metres, a wingspan of 10.37 metres, a wing area of 14.4 sq metres and a maximum take-off weight of 980Kg, powered by a horizontal 6-cylinder air-cooled 185hp Lycoming O-435 engine, giving it a top speed of 205km/h. The Stinson L-5 began its military role after the U.S. Army Air Forces acquired the first aircraft, and over time the aircraft underwent many modifications to adapt it to a wide variety of tasks, but today those that remain airworthy are mainly used as glider tugs. Structurally, it was a simple, inexpensive, fairly small and light transport and liaison aircraft with a high mounted braced wing and a mixed metal/wood frame structure. The decision at that time to reserve light alloys for the production of fighters resulted in the redesign of the aircraft with wooden wings and elevators, while the fuselage retained the welded steel tube structure. The cockpit had two tandem seats, the fuselage sides were lowered to improve visibility and clear roof panels were added. The main undercarriage's hydro-pneumatic shock absorber travel was increased almost twofold. Originally designated O-62, it was renamed in April 1942 as the L-5, following the introduction of the Liaison category. The main purpose of aircraft in this category was to perform liaison for the Army Air Force, and reconnaissance for the Army ground force artillery. A total of 3,590 aircraft were produced from November 1942 to September 1945. Although the official name given to the aircraft was Sentinel, its robustness and versatility led to it receiving the nickname "Flying Jeep". Obviously, as an Italian, I searched for some information about the history of the Sentinel flying in my country, and I learned that it operated in Italy with the Aeronautica Militare (Italian Air Force) until 1953, being decommissioned and given to the Aeroclub d'Italia.
The full size aircraft, painted as per the model I built, but with different markings, is on display at the Volandia museum in Somma Lombardo (Varese), Italy.





Airfoil and details of the full size Stinson L-5

The flaps and aileron hinges have been designed to replicate those of the original aircraft, as they also have an aerodynamic function: the aileron hinges have been made so that the leading edge of the aileron protrudes from the top of the wing when the aileron is deflected down, this to reduce adverse yaw. The flaps are similar, but in this case to increase their braking effect

install in my models, some of which are more than 2 decades old. In recent years, electronics has also made some significant steps forward in our field, so I thought it useful to take advantage of this. But this commitment, now that we had reached December 2020, had come to an end! And I was starting to get impatient, bored but still enthusiastic, so my son Enrico, who knows me well, suggested a new build, the Stinson Sentinel L5, a tow plane that he knows extremely well. But I lack the space, I can't even fly some of my current models that have been sitting around for a long time.... The guest room already contains 4 large models with wingspans of around 240cm, and no more space is left in the two cellars and the garage! My passion for building has made me overdo it! However... I would need storage space "purely" for the fuselage, the two wings would find a place in the material loft. So I put up little resistance and decided to start building; needless to say, my son Enrico's commitment didn't stop at simple advice, he assisted throughout the build process with solutions and with photographs taken of the full size plane that flies from the Valbrembo airport, where he is a glider flying instructor with aerotowing qualification. From my friend Luca Oberti, the owner of the website https://gruppo-aereomodellisticocolibribergamo.blogspot.com, which lists many projects designed and developed by his father Raffaele Oberti, a well-known Italian designer and builder, including one of the Stinson L5, I obtained an enlarged example of the plans, with a wingspan of 230cm, thus at the scale of 1:4.5 that I wanted. He also provided me with a short kit of ribs and formers, and later on he will also supply the required and specially produced decals. Thanks Luca, not just for the time saved, but for the precision of the parts and how well they fit together! On the Internet, my son Enrico also manages to find the construction plans of the full size: over 200 pages full of drawings, sections and photographs. Since the fuselage is a tubular structure, this resource was particularly useful for the flap and aileron hinge points and for the details of the landing gear damping: I'll use springs, although the full size is hydraulic. I note that the full size airfoil is the same as that shown on the

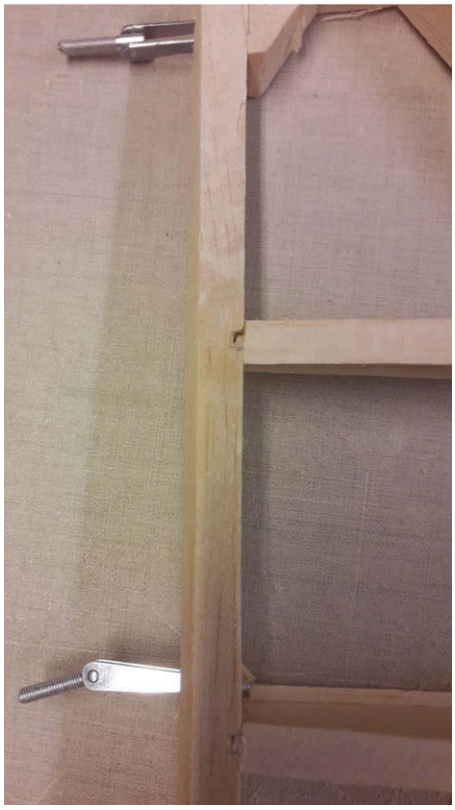
model's plan! Very good! I copied the exact hinge points of the flaps and ailerons because I consider them very important for realism, both on the ground and in flight. These hinge points are located below the axis of the airfoil, this off-centre position allowing the leading edge of the aileron of the inner wing in the turn, which rises, to protrude below, eliminating adverse yaw. In the case of the flaps, which of course only lower, the hinge is actually below the underside of the wing so that the leading edge of the flap projects above the wing, acting as a brake. For the hinges of the tailplane/elevator and the fin/rudder, I used 3mm clevises with 3mm threaded rod sections, flattened at one end and drilled to match the clevis pin (see photo). The two parts, which form a hinge, were glued into place, one to the fixed part of the flying surface and the other to the control surface itself. This can be seen in the photo. The construction of the wings and tail surfaces was carried out in the traditional way: ribs from 2.5mm balsa and spars made from a balsa and poplar plywood sandwich glued together. On the wings, the slats are made of 0.3 mm aluminium, shaped at the leading edge. At the trailing edge of the wing at the positions of the ailerons and flaps I fixed a 0.3 mm aluminium strip, thus obtaining the exact gap required between the fixed part of the wing and the control surfaces. The whole model is covered in military green Oratex fabric, protected from possible stains and dirt with a light coat of two-pack clear matt varnish. For all the clear parts of the cabin like windows, truncated cone at the tail, the roof and windscreen, I used 0.5 mm PETG as it has excellent transparency, some parts being attached to the structure with 1.2 mm self-tapping screws or 1.5 mm aluminium rivets. While building, the target was to keep the weight down to 7Kg, and I managed to do it! At the end the final weight was only 6.5Kg! I have an almost new O.S. 120AX engine, which will be ample, indeed probably more than is needed, for the 6.5Kg finished model. This fits entirely inside the cowling, which is rather small, although even the custom-built aluminium silencer is hidden within the confines of the cowl. The silencer proves to be a good idea, as the sound is almost like that of an

Flaps and ailerons are finished and ready to be covered in Oratex

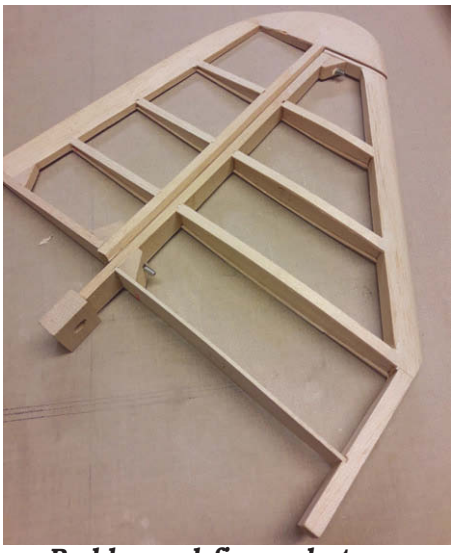
The Stinson L-5 has fixed slats and these have been replicated on the model

The gap needed to allow full movement

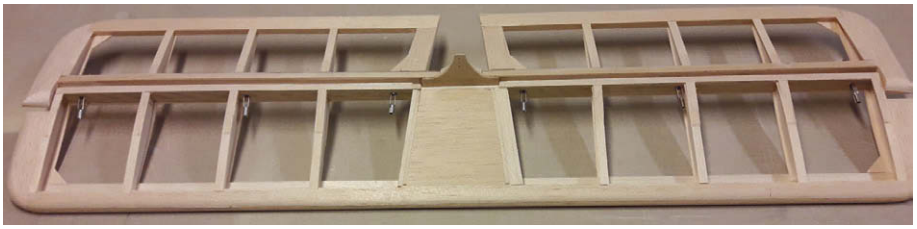
A 0.3 mm aluminium strip has been added to obtain the exact gap required between the wing and the control surfaces



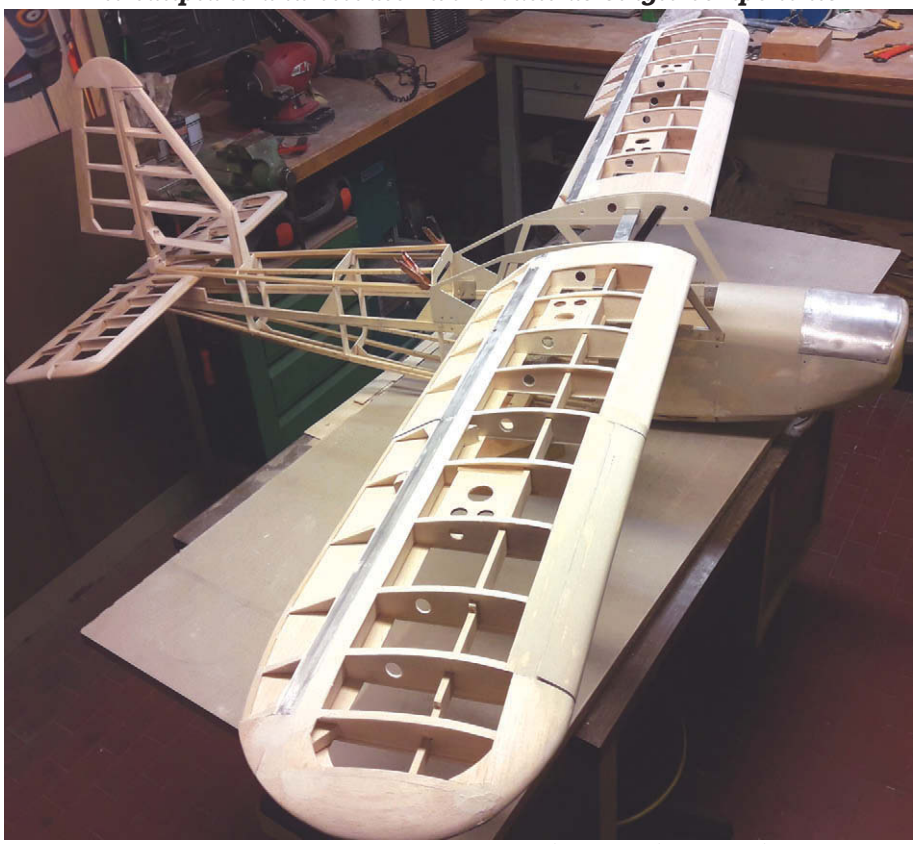
A close look at the elevator hinges



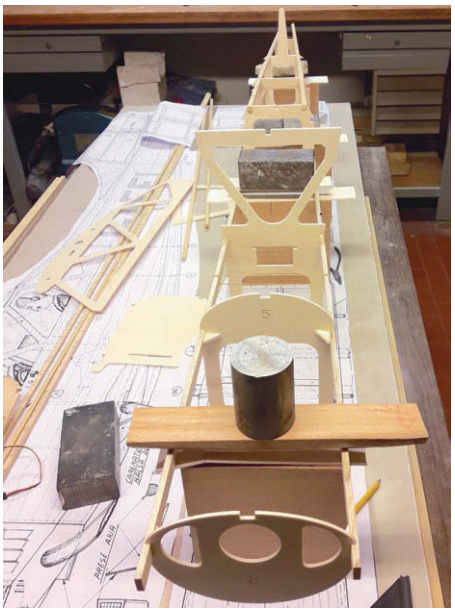
Rudder and fin ready to be fitted to the fuselage



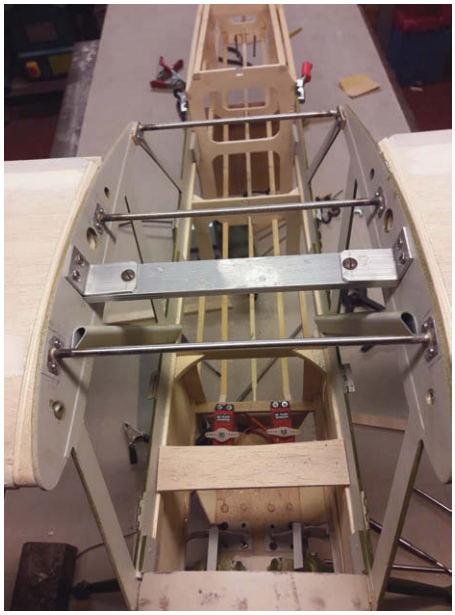
The tailplane and elevator were built as single components



Some "assembly checks" are required during a build



The traditional fuselage structure



The central part of the fuselage includes these welded struts and metal wing panel joiner

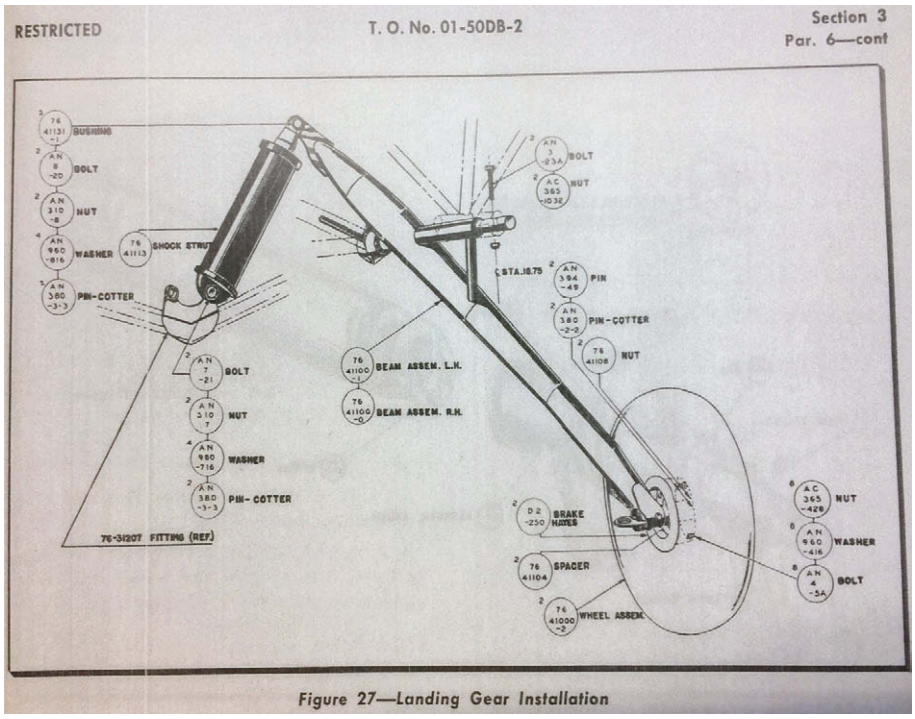
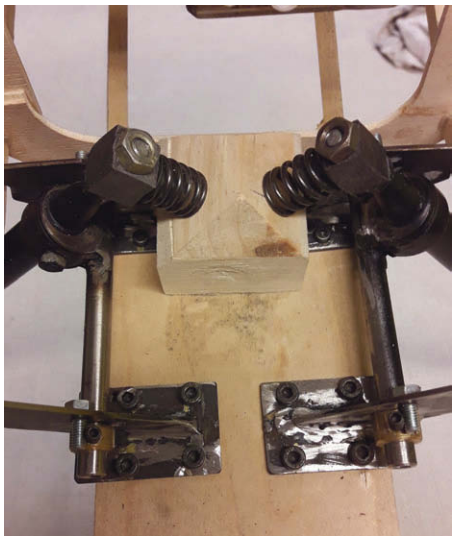
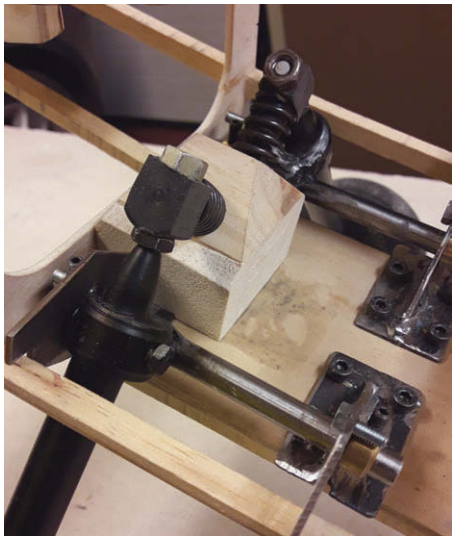


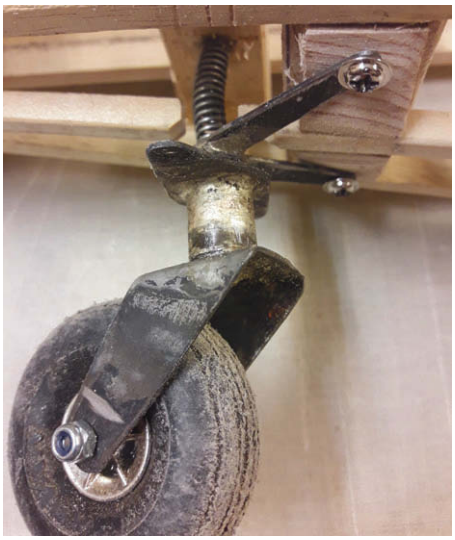
Figure 27—Landing Gear Installation

The original drawings of the landing gear

electric motor. The finished airframe is the first build I have completed that didn't require lead in the nose or tail to achieve the desired balance point. The cowl is removable: glued inside are tubes in line with the "hi" and "low" carburettor needles, allowing easy adjustment with the cowl in place. To securely mount the cowl, I fitted 4 aluminium inserts to the firewall, made on the lathe and having a 4.2 mm hole, whilst at 90 degrees to this is a 4mm threaded hole with dowel. The cowl has 4mm rods glued to it, in line with the 4 inserts glued to the firewall. This system is clean and secure, the only visible indication being the 4 small holes on the sides where the 2mm Allen key is inserted. The landing gear is hinged, with two pivot points, on a 5mm birch ply support fixed to the bottom of the fuselage, and the shock absorbers are based on two strong springs. Once in flight the springs unload and are stopped by the spring retainer. The legs of the landing gear are tapered at the end and I made them by cutting off the end of aluminium mountain poles. They were then reinforced by fitting a 4.5mm diameter piano wire rod inside and then filling the space with microballons and resin. I then bent the end part by 90 degrees to allow the springs to be attached. The fuselage build does not present any difficulty, but for the clear areas it is useful to give it careful thought in advance, given the structure: the stresses on the centre of the wings are of course entirely taken by this structure. I asked Luca to make the two sides in 3mm birch plywood because, having increased the scale, I thought it would

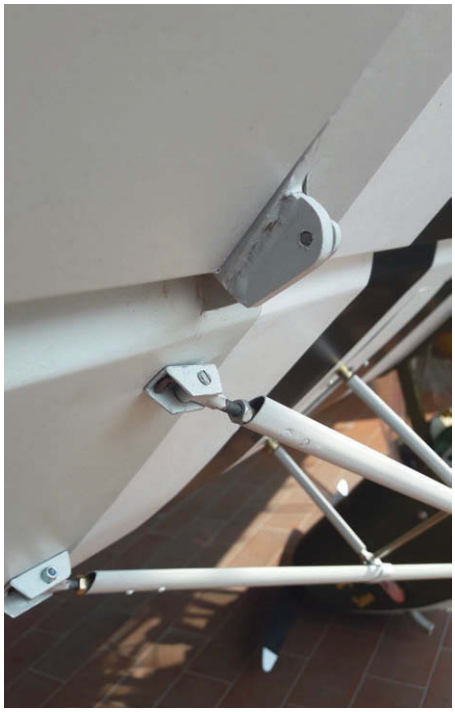




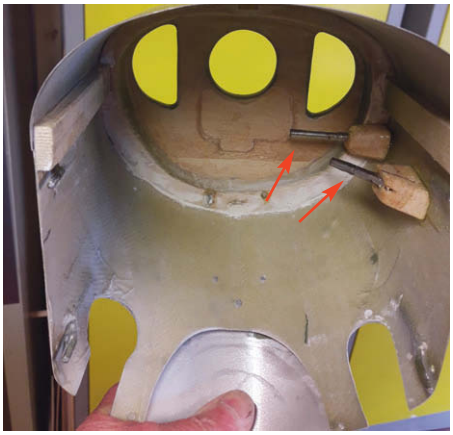


The landing gear has been accurately replicated, but the damping is based on springs rather than the hydraulic system used on the full size

Even the landing gear legs are painted



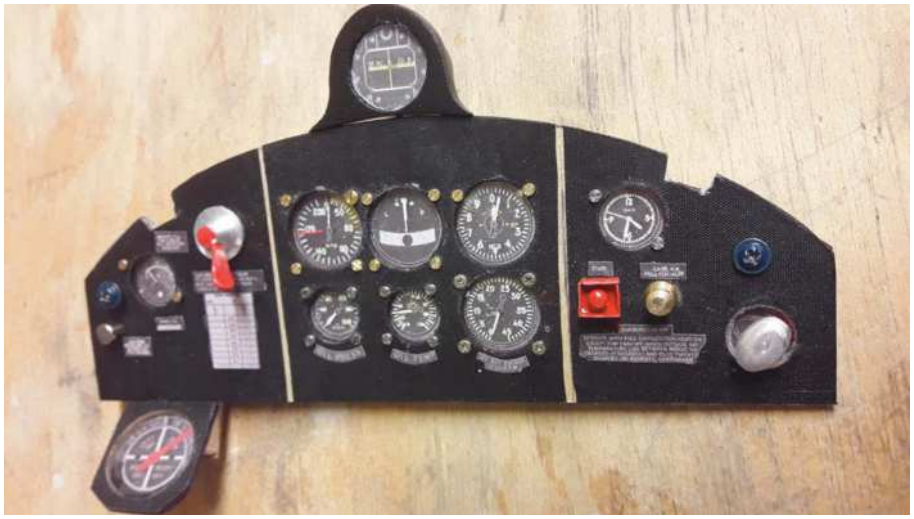
The wing struts are hinged on the wing panels



A clever way to access the "hi" and "low" carburettor needles

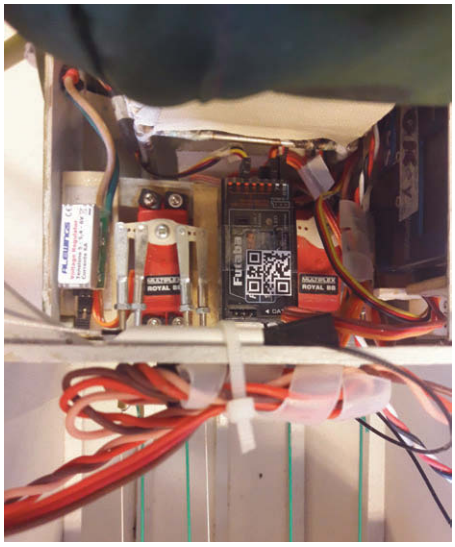
increase the strength of the structure. It is a semi-scale model, as the doors on the right, under the windows, have not been replicated. In their place I made a door large enough to access the interior, where the servos, receiver etc are installed. The pilot was fitted along with the instrument panel, this being made by copying the instrumentation of the real plane; it has been made removable to allow access to the

The opening cockpit doors on the left side

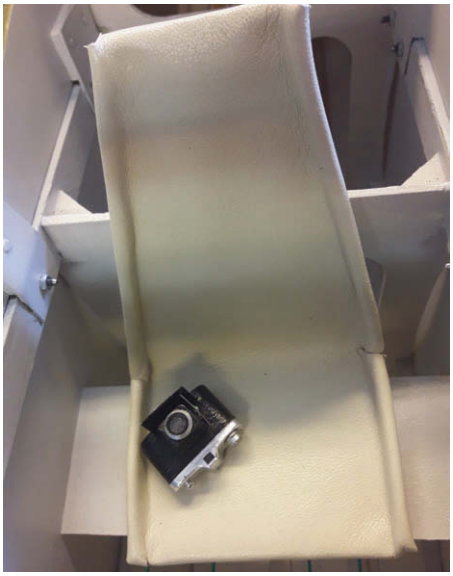


The instrument panel is also been reproduced as per the original

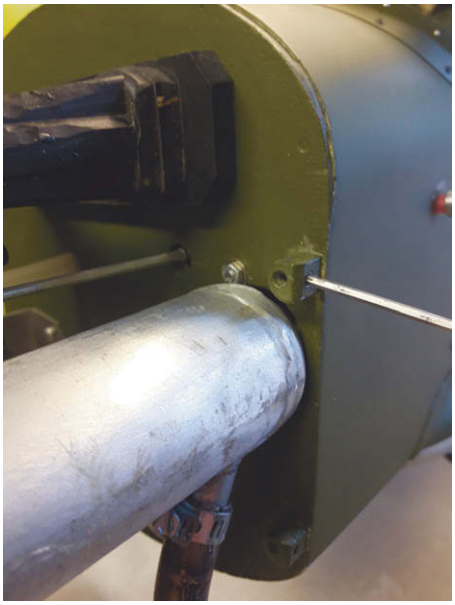
The OS 120AX fits perfectly in the engine cowl



The radio gear is quite simple on a model of this size



The observer forgot his camera on the backseat!



The system used to mount the cowl

tank and the engine mountings.
The day of the maiden finally arrived. The test took place at the Palosco airfield of the Bergamo "Falchi" Club without any problems whatsoever.
The high wing configuration, the airfoil used, the initial design, the low wing loading and the reliability and performance of the engine almost guaranteed an excellent flying performance from the model and in fact it was possible to carry out the flights with precision, elegance and without surprises. Obviously it's not a model which can perform high G aerobatic maneuvers, but during normal flying and gentle aerobatics or through the various touch and goes performed afterwards it proved to be on the pilot's side. It also proved to be a great glider, thus requiring the use of maximum flap deflection to reduce the length of the landing approach/run. To conclude, I can state that it's been another great adventure!

Umberto Ghirardelli

LANDING WITH FLAPS

Hints and tips for a good landing

P.J. Ash

What goes up, must come down! A term that almost everyone has heard before. It is a simple statement, but very true. I had a Submarine Officer tell me that, "what goes up, must come down, however, what goes down doesn't always come up". I am very glad I became a pilot rather than a sub-mariner.

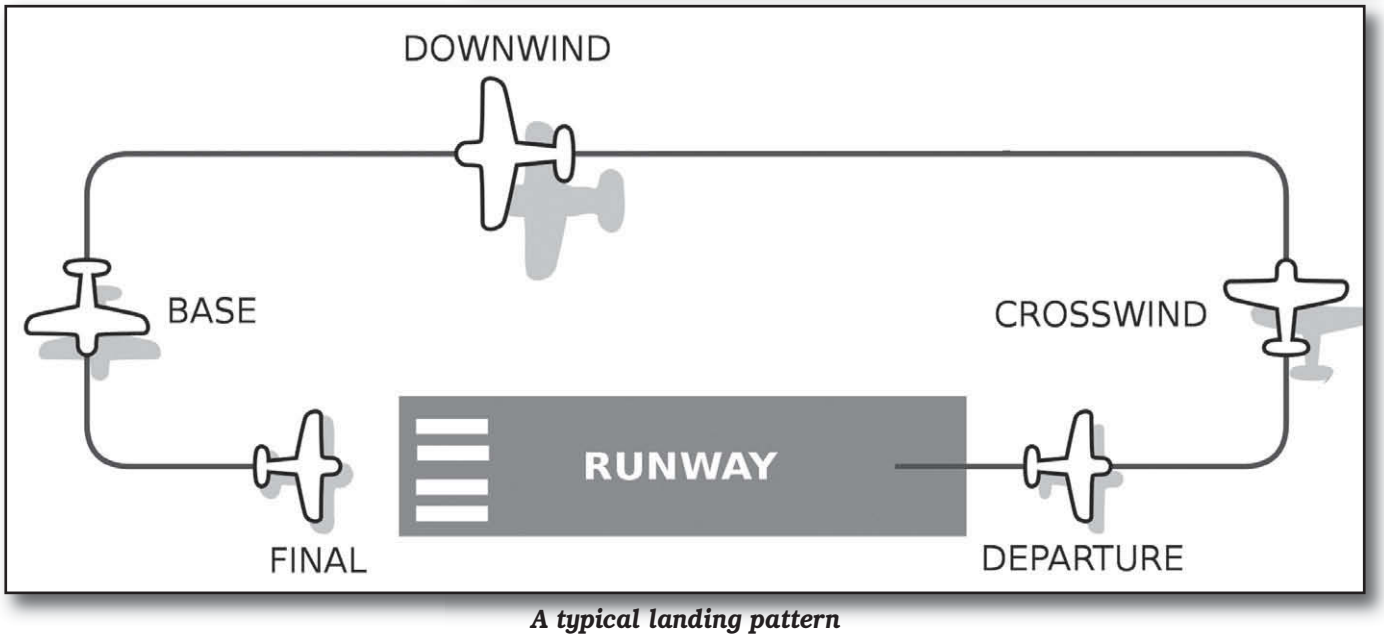
I have been blessed in my life to enjoy the hobby as well as full scale flying as a commercial pilot. I've been able to fly virtually everything in radio control from WWI tissue and fabric aircraft to the latest turbine jets, with the same going for my full-scale flying. I have noticed a critical, but in many cases overlooked area of scale flying, this being the landing! There are numerous times that I've watched a superb airplane take to the skies and perform beautiful maneuvers, only to set up for a landing and pow! Either they come down way too hard, way too fast, or way too slow. They usually rid the plane of that pesky gear as the aircraft comes screeching to a halt with holes in the place the gear used to be, a broken wing or worse! Ouch!

So why in the world am I writing in a scale magazine about landings? Why not stick to my other articles about building scale replicas or sharing some techniques I've learned over the years? Well, because nearly every airplane that I've seen where the pilot has trouble, is as you may have guessed, a scale aircraft! Why is that? I believe that several factors are involved; one is that whenever you add a large amount of scale detail, you always seem to add weight. Weight will always affect how a model flies. Another is of course nerves - when a modeler puts all that time and energy into a scale model or considers the amount of money we actually spend (not the amount we tell our significant other), nerves can get hold of us.

Other than practice and/or time with the plane, there is not much that one can do about this. The third factor and the subject I would like to spend some time on is technique. Yes, that pesky part of any aircraft operation, the technique in bringing your beautiful bird back onto the ground!

In flying both full scale and model aircraft, there are several areas that I think are constants in any safe landing operation. Believe it or not, the airplane does talk to you! And

Same landing attitude for these two Phantoms: R/C replica (left), full scale (below)



A typical landing pattern

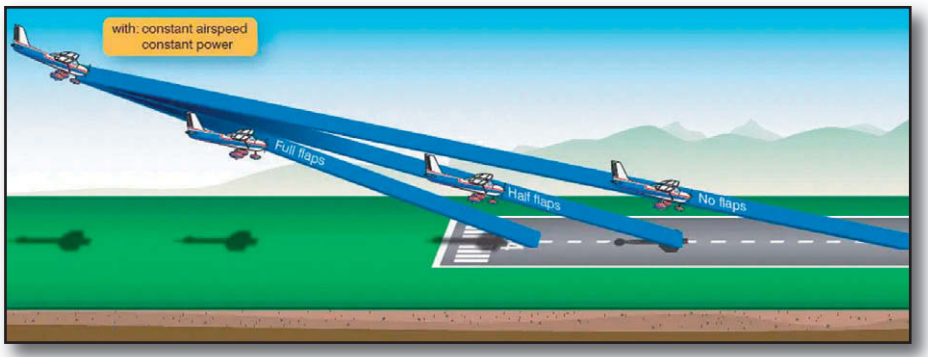
A full scale Mustang landing with full flaps: look at the attitude and at the up elevator used

airplanes, just like people, have different personalities, quirks, and that point where, if you push too hard, it will snap at you! Yes I mean both airplanes and people. The type of plane you have will largely affect how you set up for landing and how you eventually get her on the ground!

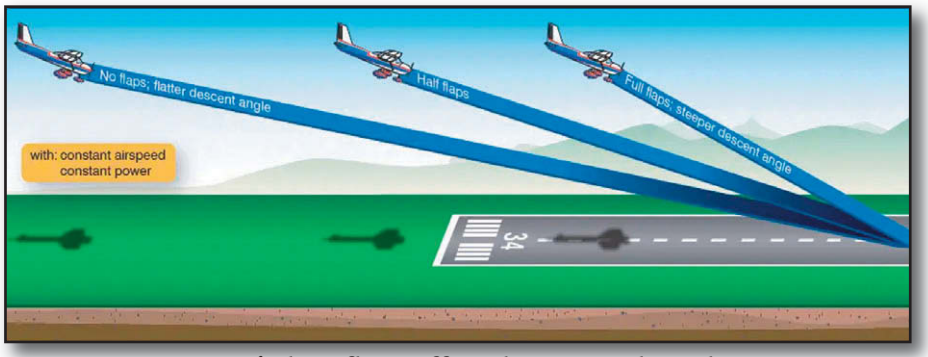
Before we start, the first thing any good modeler will need to do is research! Basically, how did the real one perform? If the model is true to scale, you can be sure that it will fly much like the full scale does. Before technology allowed us to fully demonstrate an aircraft virtually, we made models of airplanes and put them into wind tunnels. Two totally different types of aircraft are the Sopwith Pup and McDonald Douglas F-4! Yes, both have wings and both have an undercarriage, but that is about the end of the similarities between them. If you tried to land an F-4 like a Sopwith Pup, I dare say you wouldn't even get close to the runway before the poor jet would snap into the ground! Why? Well, that's easy to explain! They are both totally different types of airplane and as such they have very and I mean VERY different "personalities". Okay, so enough of that, but how about a pilot who has been flying a P-47 for a season or two, but now would like to build and fly a P-51! They are both warbirds, both have retractable gear, both have flaps, so they should both land the same, correct? Actually wrong! A P-51 has a very different "feel" on final approach and landing compared to a P-47 and if you are not careful, you can easily snap a Mustang at a speed much greater than you might be used to when flying a P-47. Does that make a P-51 a bad subject? Absolutely not, you just need to know what the flight characteristics are, fly within the aircraft limitations, and you will really enjoy the P-51.

I am going to focus on some of the basics that I've found work well with every airplane type. So, we've done some basic research and gained an understanding of the basic principles involved with landing your plane. The first and absolutely the most important part of any successful landing is the proper set up and initial glide angle. What do I mean by that? Well, first let's discuss the 4 legs of any flight pattern. We pretty much fly a standard pattern (unless you are a helicopter pilot and/or 3D pilot and well, they are in their own world! Just joking). The first leg would be after the "takeoff" or if you are already in the air going the same direction as when you took off, and is the "upwind leg". When you make your first turn perpendicular to the runway, that is your "crosswind leg". Your second turn that has you going the opposite direction from your takeoff and is usually furthest away, is called your "downwind leg" which is followed by your third turn where you are turning back towards the runway but perpendicular to the runway, this being called the "base leg". Your last turn in the pattern is where you set up for final approach and landing and is called your "final leg". For this section, I want to focus on your "base leg to final leg" because truthfully, if you do not have your scale plane ready by your final leg for landing, go around! I've seen so many crashes on landings where the pilot seemed to "fight" the plane all the way down. I bet you've seen it too! The plane porpoises up and down and/or side to side, then at the last second, hits the runway, bounces, a cloud of exhaust can be seen as the pilot jams the throttle forward and bam! Off comes the undercarriage and at least one wheel is rolling down the runway past the pilot. Often this is followed by the pilot looking down at the radio as if it is the radio's fault!

Let's break this section down a bit further. I like to have my plane fully prepared for landing before I turn final. What I mean by this is that I want the landing gear fully extended, flaps in the landing position and speed brakes out (if I want them deployed in flight), canopy set, landing lights on, etc. I don't want anything moving and causing a change in the airstream and aircraft performance whilst on final. Depending on the type of air-



Here is how flaps affect the landing point



Here is how flaps affect the approach angle

craft I usually put in my first stage of flap as soon as I turn onto my downwind leg, making sure my speed is safe for deploying the flaps. Right after that, I will go ahead and hit the gear switch. Usually this is after the halfway point of the downwind leg. When I am "abeam my landing" or directly across from the point where I want to land, I will bring in the second stage of flap. Now I will go into my base leg with the gear almost extended or fully extended and my flaps the same. So, by the time I've turned onto my final leg, the plane is configured for landing, and I know that the characteristics will not change due to the airflow changing. If you wait until final to start hitting switches, or you are flying around with the gear and flaps down at full throttle, you are putting undue stress on the control surfaces, and you really have no idea how the plane will handle at the slower airspeed and with all that "stuff" hanging out.

Once I am on final approach, I like to have my speed at the level required for landing – this is not the speed at which I touch down, but my "approach speed". Depending on the aircraft again that speed will vary and will require a different amount of throttle. Let's go back to my F-4 for example. When I am on base to final, I have my flaps fully deployed and my gear down. I have at least 2/3rd throttle. and on a hot humid day I might be at full throttle in the turn! The second I make the turn I bring the plane back to about 1/3rd throttle for just a second or two. I will notice the nose start to come up where I can just see the bottom of the fuselage and wing. At that point I will apply at least ½ throttle and carry that almost all the way down to my touchdown point. Very rarely will I land my F-4 on idle. Almost every time, that plane will just get in a groove and ride that all the way down. Many will say that an F-4 is hard to fly but in fact nothing is further from the truth. This is a plane that requires power no matter what you are doing, but with the right power settings on landing, you can "hit the numbers" every time! Now, my big P-47 is very different. I've learned that when I have the set-up I want, I will usually only carry a little bit of power on final, maybe 1/4 power. Another important aspect of the approach is that power sets your descent, not elevator! I know that is tough because the first thing you want to do when the plane starts to sink is add back pressure. However, if you think about it, that is the worst thing you can do! If your plane is already slow, then suddenly starts to descend, in most cases its not creating enough lift and is getting ready to stall. We've all seen aircraft get too slow and you start to feel that screech in your brain as you see the pilot continue to apply elevator until, you guessed it - the pilot was able to relieve the plane of the undercarriage! Adding power brings more airspeed and if you leave the elevator alone (meaning whatever back pressure you are using to hold the initial descent), the plane will get back into the groove and you won't be porpoising up and down for the rest of the descent. I believe that if you have a good glide angle set as soon as you can on your final approach and your plane configured for landing before

final, you will find that during this part of the approach you can focus purely on the power setting and will notice your workload decreasing. Every airplane lands well this way (unless you are flying a sailplane, then you are on your own).

So what is all that flap about? I understand that flaps are supposed to help slow the aircraft down or allow the plane to have control at slower speeds. However, not every situation requires full flap or any flap at all! Let's take a ¼ scale model. If you are flying in a semi-breezy day, let's say 10mph with gusts to 15mph. This means that your airframe is experiencing 4 times that much (if it were the full size). So you are on approach with your prized ¼ scale P-51 with a 10mph head wind. This means, the airplane is experiencing a 40mph head wind, with gusts up to 20 mph! I can tell you that if you are flying a full scale P-51 with those winds, you are very busy on final approach and you are crazy for even attempting that! So, on a gusty day, if you slow down so you can touch down at a safe speed, the wind change or shift might cause your aircraft to suddenly stall! Remember these models fly much like their full size parents! So many times I've seen airplanes make a nice approach with those huge "barn door" flaps hanging down. Then, all of the sudden it seems to just drop out of the sky! What happened? In many cases the very thing that is designed to help you....was the culprit in hurting you! This is worsened in a situation where you have a crosswind, and seriously, how many times are we blessed with winds right down the runway? Here is an example I hope might help explain. Let's say that the ¼ scale P-51 will stall when clean, meaning gear and flaps up, at 40mph. With the flaps in landing configuration and the gear down, let's say (for this example) this reduces the stall speed to about 25mph. Good right? However, let's say we have that 10mph wind with gusts to 15mph. You have full flaps down on landing, but very easily you could lose some or all of that headwind. You very quickly go from a good landing approach to a tip stall, as the airspeed suddenly suffers an immediate ¹0mph loss of lift over the wing! If a P-51 has full flap and is going too fast the model will "balloon" or try to gain altitude as flaps increase the lift from the wing. If you are using full flap in windy conditions on a P-51 and are keeping the power up, you could be fighting the aircraft all the way to the ground, only to suffer a premature flare and either a very hard landing, or again, rid the aircraft of the gear! In this situation (especially in a crosswind), I suggest that you try landing the airplane with half or first flap setting. If the wind is really harsh, try not using any flap at all. In this situation, you have more airspeed to "play with" and, more airflow over the controls. Many aircraft get "mushy" when slow, this is because the amount of airflow over the controls is reduced, requiring the application of more control to achieve the desired affect. The plane can feel "heavy". Yes, you will touch down at a higher speed, but the aircraft will be more controllable all the way from final to touchdown. I also know that in the case of some airframes, the tailwheel does not do a great job keeping the plane on the centerline until it slows down. Sometimes it's too late and you will see the plane do a ground loop or a quick 360-degree turn. If you do decide to use flap or use "some flap", once the plane has touched down, immediately retract the flaps. That period when the plane has just touched down and the tail is "coming down" is a very critical time. Several things are

happening. As the plane slows down, lift from the wing is decreasing as the weight is being shifted to the gear. As the wing lift decreases, the tail begins to drop. If you pull elevator too soon, the plane might jump back in the air as there is still just enough lift to maintain flight. However, you want to get the tail down and get weight on the tail gear so it can do its job. There is that critical time when the tail is coming down, lift is reducing and the airflow over the rudder is not enough to allow it to counteract torque from the propeller, the drag from the tires etc, and it seems as if the plane is just going to turn regardless! Also, another factor to consider with aircraft like a Corsair with its huge split flaps is that the flaps themselves can block the airflow over the elevator! If you immediately clean up the plane or retract the flaps after you know the touchdown is permanent, you will also reduce the wings' lift much faster and get the weight onto the tires (importantly the tail wheel) thus allowing quicker and better control on the ground!

Another aspect of good landings is to know the difference between how propeller driven aircraft and jet aircraft are controlled during this critical aspect of flight! In a propeller driven aircraft, you have the propeller "pushing" airflow across the control surfaces, especially if you are slow and decide to do a "go around" where you apply full power and climb away for another landing attempt. In this situation, you do have to be very careful that the torque of the propeller doesn't try to flip the plane over (because it will), but you will, in most cases, notice you will have good control. Not so in a jet as it is using only the thrust of the engine, and yes it can be argued that the blades are like mini propellers, but all of that air being pushed doesn't help the controls. It is going through a thrust tube and out the back of the airplane. So, in a jet, whatever airspeed you have is the only air you will get over those controls. Now in scale jets, usually the ailerons are rather small because the aircraft is designed to go fast! You don't need much aileron movement at Mach 2 or so! If you find yourself in a situation where you are slow and you realize either that you are going to land short, or you ate up too much runway trying to slow down and you push the throttle to full, there are two things you need to remember! One, if the plane is "mushy", it will still be mushy until you get enough speed to feel better control. Another aspect that is not as detrimental now thanks to modern turbine technology is something called spool up time. This means the time it takes for the turbine to spool up to full power and full thrust. I studied in college several air disasters with the 727 that had between a 6 second and 8 second spool up time! On a hot summer day where the turbine doesn't produce as much thrust, a 727 was on final approach and became way too slow. By the time the pilots noticed, they did not react fast enough and did not apply enough power. They came from 4 engine piston driven aircraft and got behind the power curve. The airplane slammed into the dirt about 100 feet before the runway. In this situation, the turbines were only at about 80 percent and were still spooling up when the plane hit. Now our models have much faster spool up times, in many cases spooling up almost immediately, but even a couple of seconds matter on final approach with a heavy jet! In the case of my F-4, I noticed that if I can get the plane to the point that I like, then use only power to keep her on the glide slope, I find my workload is much lower and I usually nail every landing!

I know that every airplane is different, every runway is different, and every weather condition is different. You have to know your plane, understand its limitations, and listen to it on final approach. It will tell you what it wants and what it needs by its reaction! Take the time and do the research early on so you can enjoy the flight all the way to the end!

I have been asked numerous times, "Hey P.J., what is the best part of your flight". I always reply with the same answer. "The taxi back"!

P.J. Ash

HAWKER HURRICANE

The legendary fighter in accurate 1/4 scale

part 3

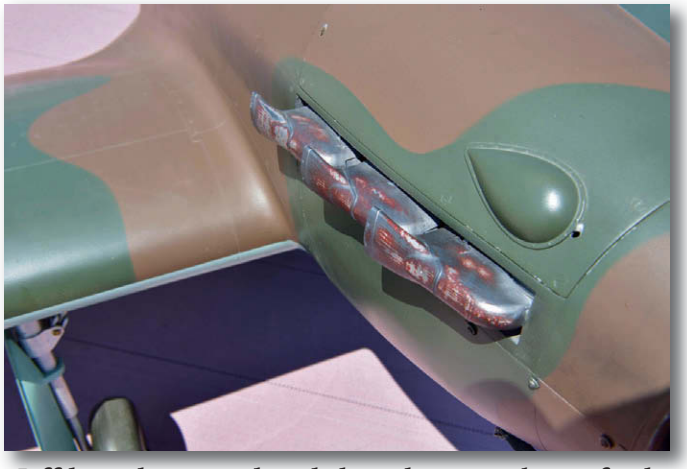
David Andersen

Jeff Quesenberry and his Hurricane powered by a DLE 85 cc

Flying the Hurricane

After all the work required to build such a model, the best reward is to fly it, and luckily the Hurricane is a great subject to fly! To give a taste of this here are a couple of flight report from modelers who have built their own Hurricane's from David Andersen's plans, Jeff Quesenberry and Roy Maynard; these are doubly interesting as one of the models has a "traditional" power system using a gas engine, whilst the other one is electric powered! So, let's see what they have to say and their impressions of the Hurricane.

The characteristic Hurricane framed canopy



Jeff has also reproduced the exhaust stubs perfectly

The typical Hurricane structure is still visible through the paintwork

How about this for detail!

The Hurricane cannons

The rib stitches are clearly visible

Jeff Quesenberry: "I find the Hurricane to be a very stable, gentle, great flying airplane. For a gas engine set-up, I would find the DLE 85 or anything larger to be of more than sufficient power. The plane flies very lightly on the controls and tracks nicely thru level flight and turns. I find just a bit of rudder is needed to maintain a nice, coordinated turn, but is not inherently required to maneuver the airplane thru a turn. The ailerons and elevator are more than effective, without being sensitive. I use about ¾ inch aileron, with some mechanical differential (maybe 2 splines forward on the servo arm at neutral setting), and maybe 3/8 to 1/2 inch elevator travel. On the ground, you can feel that the tail feels very light for a plane of this size. I have landed with both 35 and 50 degrees of flaps: In both configurations, the plane is rock solid and floats gently to the ground with controlled throttle setting(s). The only thing I found is that, with more flap, you will need to get off of the flaps early when landing on grass. The sudden deceleration on the grass, coupled with the high lift created by the wings/flaps, tends to rotate the airplane over onto its nose. I did not find this issue with the 35 degree setting. In either case, the airplane is rock solid, a great flying machine and gentle to land. Overall, this Hurricane design is probably one of the nicest flying planes I have built and owned."

Roy Maynard: "I concur with Jeff: the electric version has more than ample power for takeoff and flight maneuvers. Takeoff requires a little elevator until the tail comes up, then back off the elevator and allow it to build up speed, and the Hurricane will lift off by itself with no surprises. In the air it is a very stable platform and it is capable of very slow flight. Of course with the electric motor one must be careful to monitor motor temperature during high speed passes and limit the duration of full throttle maneuvers. Generally the model has been flown at 1/2 throttle. Setting up for the landing configuration is best done with flight modes to adjust elevator for each flap setting with the Hurricane wanting to climb as flaps come down. With a relatively low wing loading for a large model, 30 degrees of flap seems about right. On the last outing, after a 5-1/2 minute conservative flight, only 4000mAh were used out of the 10000mAh on board and voltage in the cells averaged 3.85 volts on landing."

To conclude this short series of articles on the ¼ scale Hurricane it can be seen that the design by David Andersen has been kept as simple as possible, enabling more modeler's to build and fly their own example of this iconic WW2 fighter. The end result is a fantastic scale replica that will turn heads at any flying field, and of course as so many full-size Hurricane's were built


LE A

Roy Maynard and his electric powered Hurricane

there are a myriad of colour schemes available. Even better is the option to power the Hurricane either with a gas engine or electric motor, making it suitable for flying even at very noise sensitive sites. The Hurricane plans are not the only designs from David, this and others can be found at:

www.mnbigbirds.com/Andersen%20Plans.htm

David Andersen

Hangar 9 P-47 PNP

Fun scale warbird

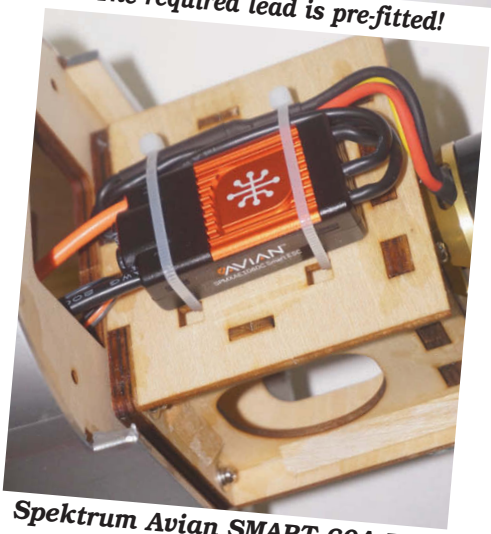
Marco Benincasa

Foam models have often split aeromodellers into those that appreciate all its undoubted qualities and merits in terms of cost, simplicity, ease of repair etc, and those who just can't stand foam and will only consider more traditional materials such as wood and composites.

Furthermore, until now, plug-and-play models, i.e. those that are supplied pre-fitted with servos and electric motor/ESC for the mass market (i.e. not turbine jets etc.), have almost exclusively been made of foam.

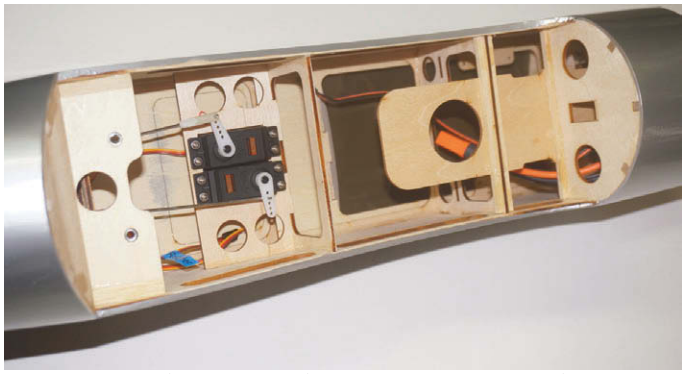
Well, Horizon Hobby, one of the largest producers of foam models under their E-flite brand, is once again changing the rules by combining the two types of construction in the new Hangar 9 Fun-Scale P-47 PNP, which is manufactured

The required lead is pre-fitted!



Spektrum Avian SMART 60A ESC

The fuselage straight out of the box



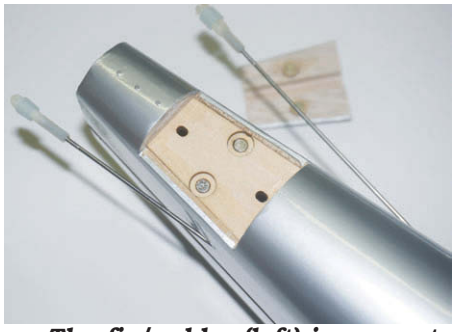
All servos are included and installed; these for the tail surfaces

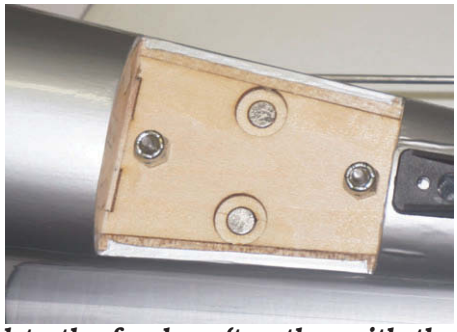
The cooling air outlet, essential in an electric powered model

with a traditional wooden structure and is film covered.
That's right, the new P-47 PNP combines a traditional structure with the simplicity of foam models in terms of both technical set-up and assembly time: it is supplied complete with servos, motor, ESC and retracts already installed, can be assembled in minutes, and it's even possible to choose between two colour schemes, both options being supplied!

Description

Let's start by making it clear that the new P-47 WAS NOT DESIGNED TO BE A PERFECT SCALE MODEL, it's been developed as a "fun-scale" model, and this definition means very simple, basic and uncomplicated. Its lines follow those of the original aircraft, i.e. the P-47 Thunderbolt "Bubble Top" version (the one with the teardrop-shaped canopy and lower rear fuselage, the other version being the "Razorback", with the canopy being faired into the taller rear fuselage), but NOT completely accurately.The shape has been simplified, although without significant distortion, for example by making the sides flat whereas the original's fuselage is rounded, having strip ailerons, no flaps, and the tail surfaces are flat rather than profiled; all this does not affect the "look" of the famous warbird, but makes it structurally simpler and therefore has advantages both in terms of production and when in use by any modeller who loves these subjects but is looking for a simple, everyday model. This philosophy continues with its dimensions, as it is compact but not small: 1.43m (56") wingspan and 1.09m (43") length. It is thus also perfect for those who have always previously flown foam models and want to switch to a built-up wooden one, allowing them to broaden their horizons: as an example, if the model suffers minor damage, repairing damaged areas of wood and/or replacing sections of covering film are two skills that can be developed by those who had never in the past worked with these materials.





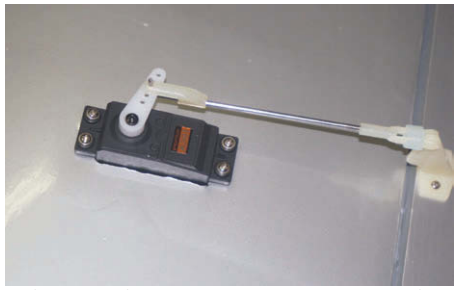
The fin/rudder (left) is connected to the fuselage (together with the tailplane/elevator) by means of two threaded rods; these "pop out" into the seat shown above, and the two self-locking nuts are screwed on. The seat is then covered by a hatch secured with magnets.

It's also ideal for those who have always preferred traditional materials, and can now enjoy the reality of having a model that doesn't require months of work at home but instead allows you to go and have fun at the field almost immediately after opening the box (less than the time it takes to charge the battery!). It is also ideal as a first warbird! Thanks to its beneficial features, it is a perfect tool to learn takeoffs and landings with a tailwheel warbird with retracts, as well as to fly it (if you want) as realistically as possible. The motor is a 600Kv brushless outrunner, and the ESC is a 60A AVIAN series with SMART technology, which means that if we fit a Spektrum SMART receiver we can receive real-time full telemetry (really comprehensive) on our Spektrum transmitter, reading ALL the battery, ESC and motor

The ailerons are full length. With a little work, we could cut them in half to produce separate ailerons and flaps, having first decided where the flap servo will go.

Wing panels are jjoined with a sturdy wingtube

Electric retracts are already installed, complete with legs and outer doors



Aileron linkage, short and precise

Spektrum AR8360T receiver comes with AS3X, SAFE and SMART telemetry

The large removable canopy gives full access to the inside of the fuselage (top). The ingenious attachment ssystem utilises front pins and magnets together with a small tab at the rear

data, as well as other flight related information, as we will see later.

The removable canopy comprises a large part of the upper fuselage. It is held in place by two pins at the front, three magnets at the rear, and a key that fits into a dovetail slot at the rear; to remove it, simply push it forward and lift the rear section; thanks to this simple but ingenious system, also used for the cowl (we'll cover this later), no screws or anything else is needed!

The wing is supplied as two panels, which are joined using the wing tube provided, and the tail surfaces are attached to the fuselage by screwing two nuts onto the screws embedded in the tail boom (another step we'll talk about later).

A detail that shows the care with which Horizon models are tested and tuned before production is evident when looking at the motor mount: we find, already fitted in place, the weights necessary for the model to balance correctly! This is a great way to make life easier for modelers! To complete the P-47 PNP we just need to add the battery pack and receiver.

Suitable batteries are 4S Li-Po packs, with capacities ranging from 3,000 to 5,000mAh, however the choice of battery pack also involves having to consider other factors such as the propeller, and whether or not to glue some parts together, but more on that later.

The receiver being used must have at least 5 channels (using a "Y" lead for ailerons and the 5th channel for retracts). If you use Spektrum, then you should not miss the opportunity to take full advantage of all the possibilities provided by SMART technology and the stabilisation provided by the AS3X system, which virtually eliminates the effects of wind, turbulence, gusts etc.

For this test I have fitted the Spektrum AR8360T, and the model will be flown using a Spektrum NX6 transmitter.

Assembly

As usual, Horizon group manuals give all the necessary information in a clear and simple way, and if you follow them you will have no problems.

There is very little to do to assemble the P-47 PNP, and you can follow the sequence suggested by the manual or put ther model together as you prefer: I started by assembling the tail surfaces, first inserting the tailplane and then the fin/rudder, which fits through the tailplane with the two threaded screws (pre-glued inside the fin) onto which the self-locking nuts are threaded to lock everything in place; these nuts are hidden inside the fuselage, concealed under a small detachable section of the fuselage, this held in place with magnets: a nice touch!

I then joined the wing panels, which in theory remain detachable, however they are joined by the wing to fuselage connection, which is attached to the wings with small screws on both sides; if we want to split the wing panels again we would first have to separate this wing to fuselage connection.

I then moved on to the dummy engine: that's right, a dummy radial engine is supplied and has to be glued inside the wide cowl of the P-47, after removing the plastic segments between the

"cylinders": this is necessary to allow the air to pass through for cooling; the dummy engine must be positioned in the cowl very carefully, making sure that it doesn't touch the electric motor: it's an outrunner, so the front part of its case must not rub against the plastic of the dummy radial when it is spinning. The dummy engine can be glued into place with either silicone or cyanoacrylate. Another touch I really appreciated is the way the cowl is attached to the fuselage: the screws are all internal, so you can't see anything from the outside. Bravo to the designers for using this technique. Once the assembly was finished, I chose the colour scheme I wanted: the 'Hun Hunter'! Red is my favourite colour....

The dummy engine before (left) and after opening the gaps between the "cylinders" (right)

4S or 6S battery?

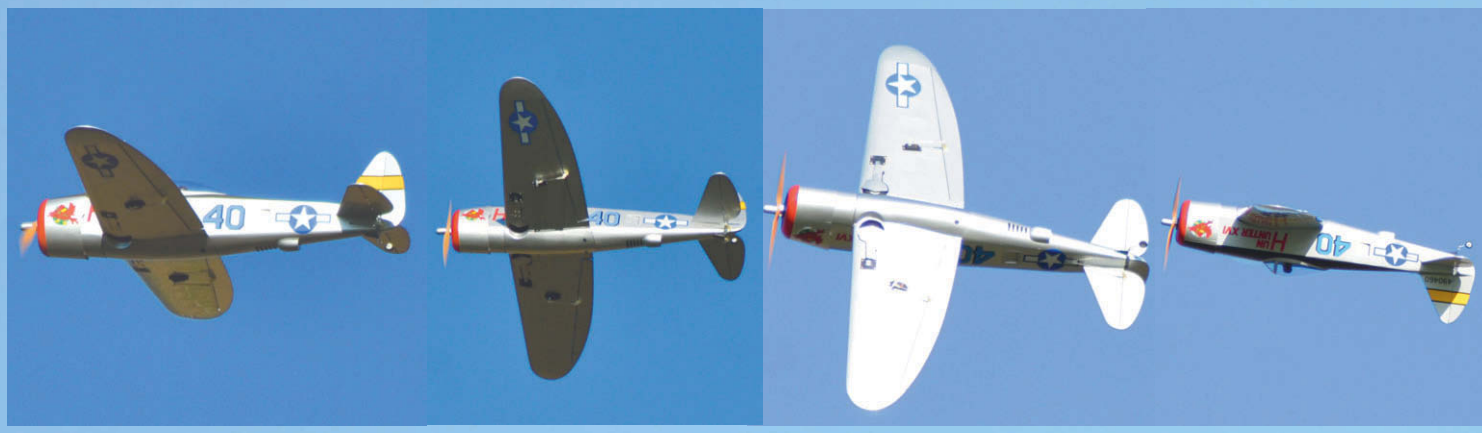
Before we go any further, it's time to talk about what's involved in choosing a 4S or a 6S battery pack.
Let's start with the propeller: the one supplied in the box is a 14x12" wooden electric propeller, and is perfect for use with a 4S pack. If, however, you choose the "High Power" setting using a 6S pack, then you should fit a 12x8" propeller (more revs due to higher voltage = smaller propeller to stay within the maximum current draw limit).
But the choice of battery does not only affect the propeller: the manual suggests that if you choose the 6S pack, you glue the wings together and also glue the tail surfaces to the fuselage instead of securing them only with the two nuts mentioned above. This is needed to obtain the additional structural strength required to withstand the higher speeds that are achievable with the 6S pack and the 12x8" propeller.
Of course, you can decide to assemble the model without gluing anything, start by flying with 4S packs, whilst still having the option of gluing the wings and tail surfaces into place later if you ever want to try the "High Power" configuration. More about this in the flight testing.

The receiver and programming

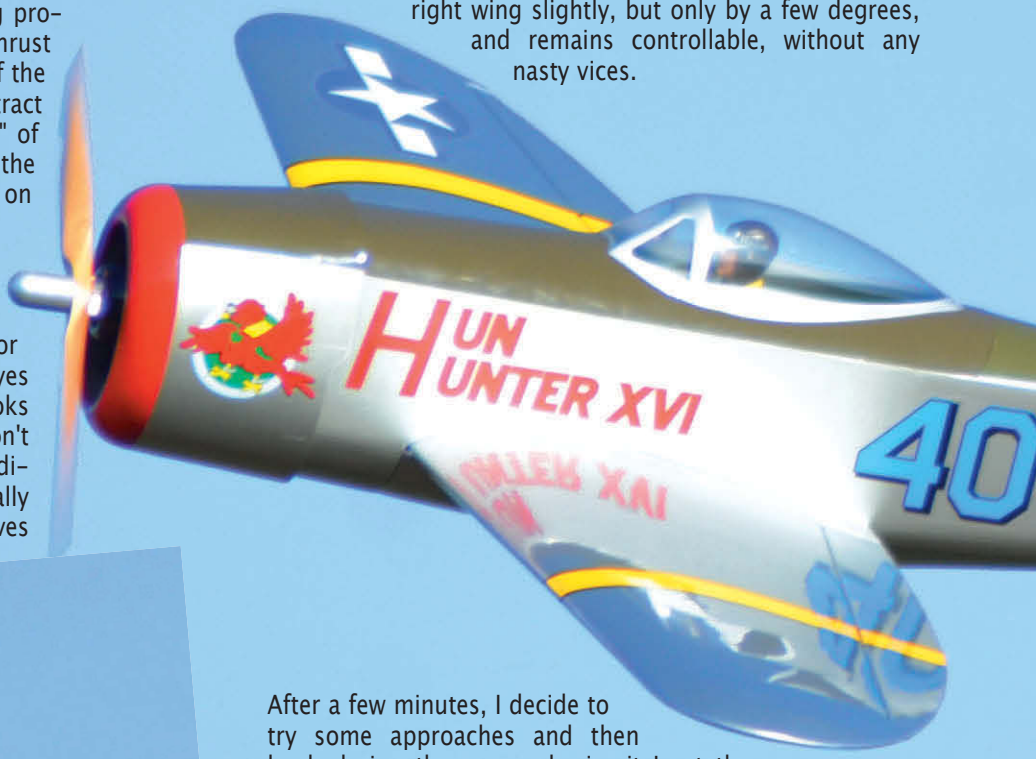
Once the decals had been applied, I turned my attention to the Spektrum AR8360T receiver. If we want to use the AS3X system we have to adjust the gyro gain on each of the three axis, and we can even set two different sensitivities that we can select via a switch on the transmitter. The programming of the Spektrum AS3X receivers can be done through the transmitter, but I chose an even easier way: the Horizon team in fact makes available for free on its new Google Drive all the files specific to each model of the group, which can be downloaded and uploaded, through the free Spektrum Programmer software and the special USB cable, which has to be purchased separately (a great buy for a few Euros!), in receivers and transmitters. I therefore chose to take advantage of this opportunity and loaded the relevant file into both the receiver and transmitter; in this way I started from a safe setting, which I can then refine according to my preferences as the flights go by.
IMPORTANT! Always remember that a receiver that includes gyros must always be mounted to the model very securely, without any risk of it detaching in flight or moving! As you can imagine, the effects would be disastrous!

The flight

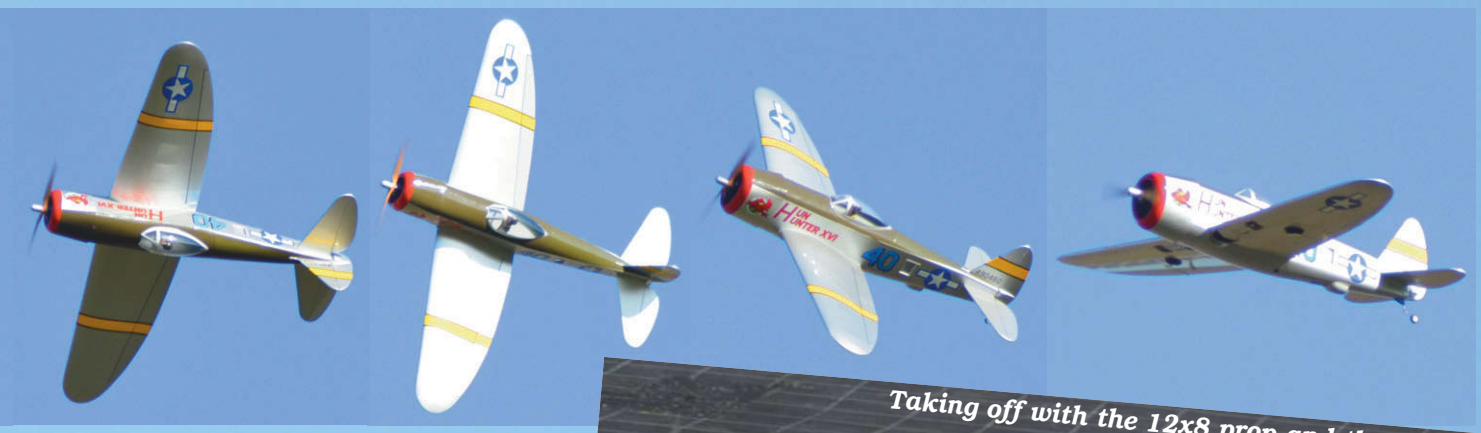
I planned the first day of flight tests this way: two flights with a 4S FullPower 4200mAh pack (this will not give me all possible data on the battery in real time) with the supplied 14x12" wooden propeller, and then two more with a 6S Spektrum SMART 3200mAh pack (so full telemetry on the battery too) and the propeller detailed in the manual, which is a 12x8", specifically an APC Electric. My P-47 PNP weighs 2524 grams without batteries, 2944 with the 4S 4200mAh pack, and 3011 grams with the 6S 3200mAh pack. The centre of gravity suggested in the manual will prove to be correct, and in the case of

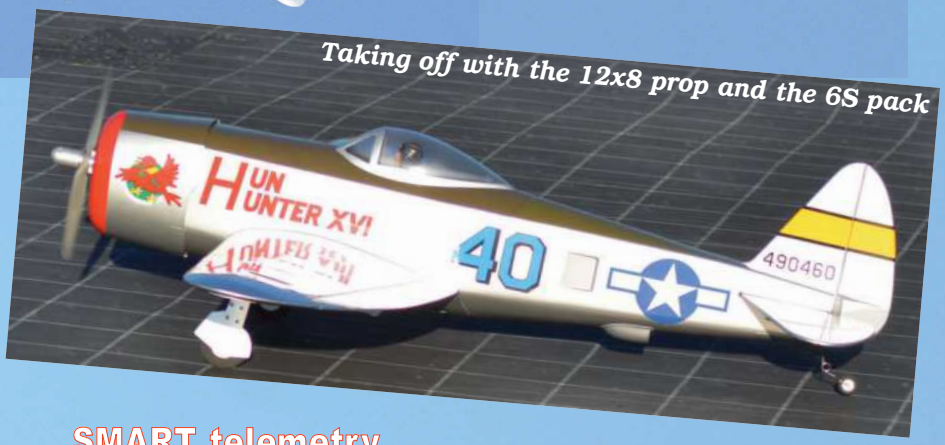


batteries of different weights, as in my case, simply place them further forward or back to achieve the desired C/G.
For this first day, I decided NOT to glue the wings to each other, nor the tail surfaces: I only reinforced the tailplane to fuselage joint with some strips of transparent tape. In fact, I wanted first to see the real difference in performance between the two configurations; with the "High Power" configuration I will gradually increase power, reaching maximum power only momentarily - if the speed reached appears excessive, then I will stop the tests, glue the parts as shown in the manual and then resume the flights. So I start with the 4S Fullpower pack and the supplied 14x12" propeller: the wind is down the runway centreline, and the takeoff is a no-brainer; the big propeller at low speeds provides plenty of thrust and the P-47 accelerates well: I get it off the ground after a run of less than 50m. I retract the landing gear and apply a few "bips" of trim to the ailerons and rudder: after the first turn the P-47 PNP is already flying on rails, and that's with the AS3X system deactivated! I'll activate it later, after checking that everything is working properly. The control throws programmed by Team Horizon are perfect for the way I fly. I have to say that to my eyes the top speed in this configuration looks about right and is nice and realistic, I don't feel the need to make it go faster. In addition, the wooden propeller occasionally emits a kind of peculiar "whistle" that gives a really nice touch to the presence of the model in flight. After a few passes for the camera, I try some basic manoeuvres: the rolls are pleasant and fun, they can be done either in line or in a realistic, "barrel" way. Carrying out a wide loop I notice that at the top the power is somewhat limited, but it is still more than enough to have fun.
As the wind increases, it's the perfect time to test the gain of the AS3X system: switch it 'on', and immediately the wind disappears! Already perfectly stable without 'help', the P-47 is now 'nailed down'. However, looking more closely I spot that the wind is still causing it to rock slightly in the roll axis...ok, I'll increase the gain on this axis a bit for later flights. Stall tests are a pleasure: the P-47 drops the right wing slightly, but only by a few degrees, and remains controllable, without any nasty vices.



After a few minutes, I decide to try some approaches and then land: during the approach circuit I set the stick to idle and then give a notch to leave the motor running at very low revs, so that the propeller creates a braking effect; despite this, the P-47 penetrates, and the speed decreases very slowly... I'm long! I have to power up and try again: this time I start at a lower altitude, and from further away. Ok, now it's better, but the speed is still higher than I'd like. I land on the second half of the runway, and the P-47 comes to rest a few inches short of the grass. Wow! Making it lose speed on landing is not easy! Flaps would be useful to increase drag and thus better control the speed. OK, we'll just have to do a few flights to get the hang of it and reduce the final approach speed.
The second flight is identical to the first, no surprises. I manage to lower my landing speed a bit, but I'm still a bit 'longer' than I'd like.



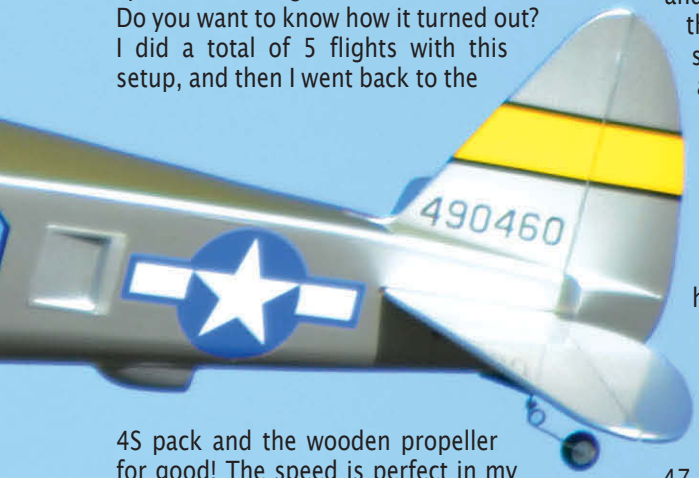


Taking off with the 12x8 prop and the 6S pack

After the second flight, it's time to try the "High Power" configuration: I fit the 12x8" propeller and the 6S Spektrum SMART 3200mAh pack. On take-off I increase the power gradually, curious to see the performance: the acceleration is similar to the previous configuration, I don't notice a big difference. In flight, honestly, I still do not see a great difference in performance, except for a more pronounced vertical pull. The horizontal speed is slightly higher, and so I don't really understand the need to glue on the tail surfaces, let alone the wings.

I've made two flights in this configuration, and I must say that I was not thrilled; moreover, the smaller propeller disc makes it even more difficult to lose speed on landing.

Do you want to know how it turned out? I did a total of 5 flights with this setup, and then I went back to the



4S pack and the wooden propeller for good! The speed is perfect in my opinion, the thrust is much more constant and progressive, and that 'hiss' you hear during low passes is really cool! Given its flying characteristics, the P-47 can be not only the perfect second low wing model, but also the first "scale warbird"!

SMART telemetry

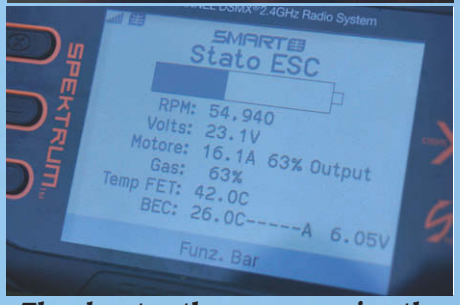
I must say that it is a really useful tool for monitoring the operation and status of our propulsion system, but that's not all! The Spektrum 8360T receiver is also equipped with a G-meter!! That's right, you can see both during the flight and once back on the ground the loads that your model is subjected to, on all three axes, and it is really interesting to know that you have reached, for example, a maximum of +4.68 G positive and -3.81 G negative: it makes us understand the stresses that the structure is having to cope with.

Conclusions

I can confidently say that the Hangar 9 Fun-Scale P-47 PNP is the perfect model for those who want to have fun with an uncomplicated semi-scale model whilst still enjoying great performance.

Given its characteristics, it can be not only a second low wing model, but also the first scale aircraft! In addition, for those who want to try something new, it is also an excellent base to learn the techniques for making panel lines, fake rivets, dirtying, weathering etc.! In short, a model that offers a very wide range of possibilities! Well done Horizon!

Marco Benincasa



Thanks to the sensors in the SMART controllers and receivers, the telemetry provides detailed information that can be read both during the flight and once back on the ground. As you can see you can read the "G", all the data about the motor, the ESC and perhaps most important, the battery

A pilot is essential!

The supplied decals really add to the appearance of the model

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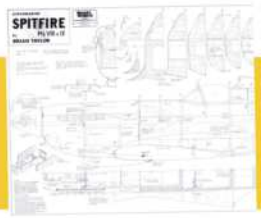

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Colibrì MB2

An original 1/2 scale replica made in Italy

Cosimo Di Mauro

Hello scale fans, I would like to take this opportunity to present to all of you this large scale replica of a home-built aircraft that is well known in the full size aviation world, but much less so in the aeromodelling arena: the Brügger Colibrì MB-2.

OUR COLIBRÌ

Twenty five years ago, my father, Domenico, was so taken by the clean, elegant and unique lines of this aircraft that he built a two metre wingspan scale example; the model proved very successful, so much so that I ended up falling in love with the Colibri, as I watched it complete perfect, clean, sweet and realistic flights, even though I am a pilot who generally loves pure aerobatics.

The first Colibrì has been a part of the family for around 25 years, and so some 4 years ago, we thought "Why not make another at 1/2 scale? This would result in a beautiful Colibrì with a three metre wingspan!" No sooner said than done. Obviously, the design has been modified to suit this larger scale and to take into account the new

Cosimo and Domenico look happy after the maiden flight!

techniques, skills and materials we have adopted in the years since the first one was built, but the basic philosophy remained the same: to build a robust but light, stable and accurate model.
The model is built using traditional methods: balsa and plywood hand cut piece by piece, while other parts such as the cowling, the wheel spats and landing gear are made of fibreglass. After about two months of intensive work, the first prototype was complete: making it the largest R/C MB2 Colibrì in the world and, I as I proudly say, it's entirely Made in Italy!

ENGINE

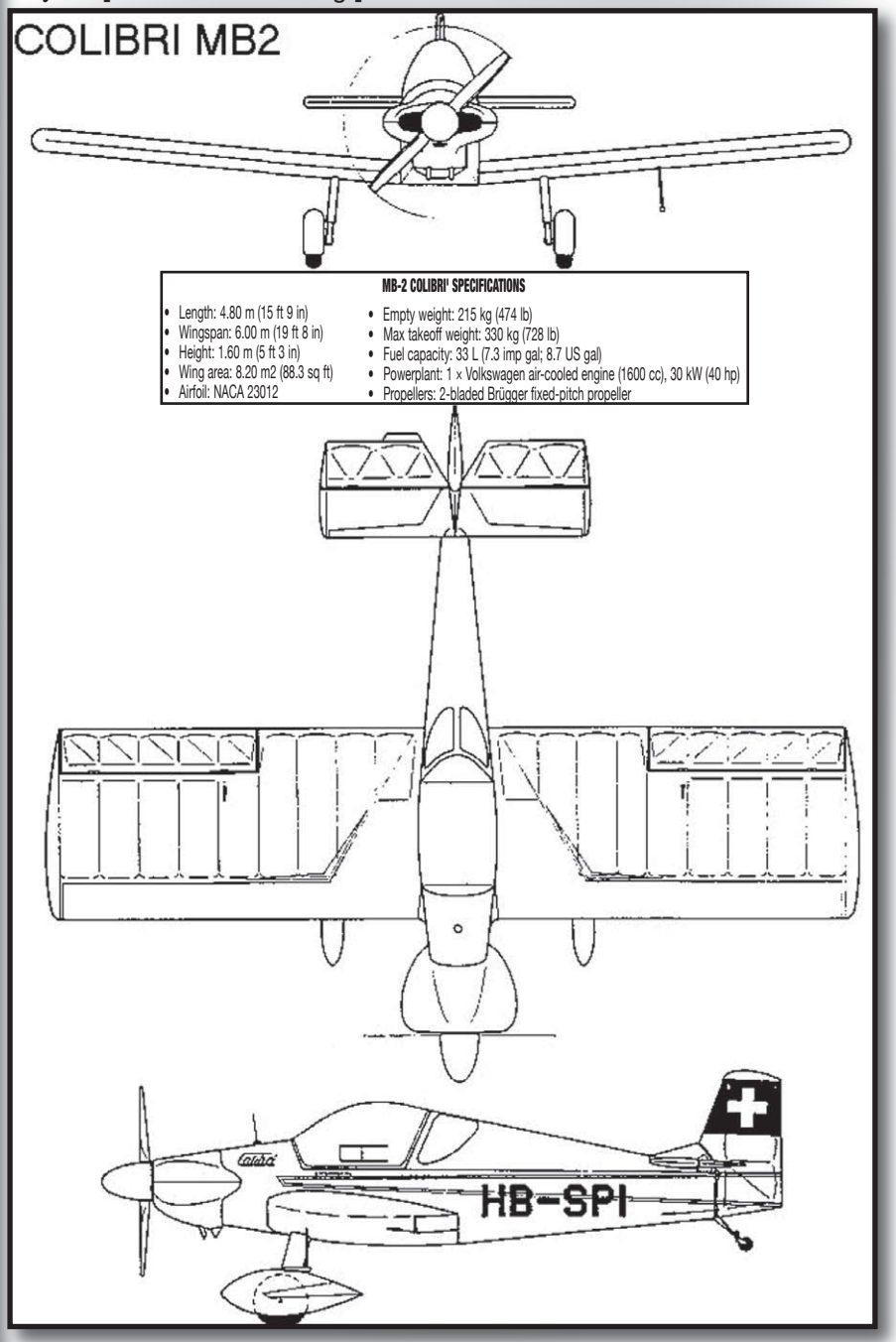
The engines tested in my MB-2 Colibri range from 100 to 120cc; in the first example I used a DLE 111 V3 with a 28x10 propeller; with this powerplant the model weighs just 16 Kg, and given the large wing area the model is a real blast, both for scale flying and fun aerobatics, always though bearing in mind what the full-size aircraft was capable of.

RADIO SYSTEM

The radio equipment installed in our MB2 Colibri has been selected so that it is more than adequate but at the same time is not overly demanding from an cost point of view.
The model requires one servo on each aileron, these should have a torque figure of 25 to 40 Kg.cm, one on each elevator of 20 to 30 Kg.cm, and one of about 30 to 40 Kg.cm on the rudder, plus a standard servo for the throttle; for the prototype I used two JR MP82 TWV for the ailerons, one JR NX8921 for the rudder and two Hitec 8335 for the elevators. The radio system is powered by two 2800mAh 2S Li-Po batteries managed by a PowerBox SensorSwitch, and the engine ignition uses an 1800mAh 2S Li-Po pack with an Alewings kill switch.

THE BRUGGER COLIBRI'

The Colibrì (Hummingbird in English) is the brainchild of the Swiss designer Max Brügger who, between the 60's and 70's developed a family of small homebuilt single-seater sport aircraft, utilising cantilever wings and fixed tailwheel type landing gear, powered by air-cooled Volkswagen car engines converted for flight. The first, logically named MB-1, flew in 1965 and served as the basis of the final design, which was the MB-2, first flown in 1970. Built entirely of wood and covered in fabric, the Colibrì has an expansive large transparent canopy. In 1976-77 Brügger built and tested an all-metal version of the MB-2, which he named MB-3. Today there are numerous examples flying or under construction by enthusiasts, who appreciate its slow flight capabilities and very compact dimensions: a wingspan of a mere 6 metres!



Building the fuselage







IN FLIGHT

From the very first flight with my new Colibrì it was clear that I had a real "radio-controlled aircraft": extremely realistic, precise, smooth and with a great presence in the air.
As the flight testing continued, I soon found that we had produced not only a large 50% scale model, but also a plane with excellent basic aerobatic capabilities: first to be tried was straight flight, both fast and slow, then inverted flight slow and fast, then some loops and rolls: impressive!
Next to be tested was its spinning performance, where I was amazed by the immediate stops, followed by various rolls, including both 4-point and slow ones.... truly a great model! We couldn't have been more delighted!

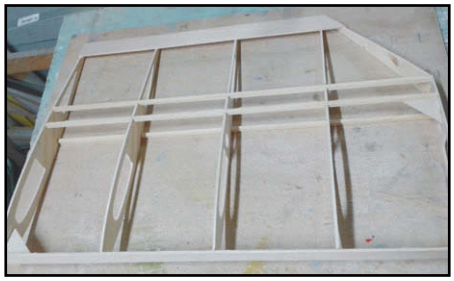
Each part was made by hand

Carefully fitted sheeting

Internal view of the rear fuselage

The fuselage top deck is completely sheeted

The unusual all-flying rudder



Building one of the stabs

Cosimo and the completed fuselage

The beautiful wing structure before the balsa sheeting is applied

PRODUCTION

Given the complete success of the tests, which have shown that this model is very easy to fly, we decided to put it into production under our own brand, D&C models. Our aim from the beginning has been to offer a unique product, and we feel that in this we have succeeded: it has the "plus" of being made in Italy and is completely different to other models currently available.
The entire model has been designed for simplicity in all areas: the low number of servos keeps down the overall cost without compromising safety and controllability.
The D&C Colibrì is supplied with a lightweight wooden structure fuselage covered with film, along with

No doubt about it: there is plenty of space inside!

Close-up of one of the rear windows

Right elevator servo installation

the buit-up and pre-covered fin/rudder, tailplane halves and wings, all of these having servo mounts installed.

For more information you can contact me via email at cosimodimauro@virgilio.it

Cosimo Di Mauro

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