SCALE MATTERS: ARTICLE 9

Hangar 9 Tiger Moth ARF

By John Armarego

This 9th article features modifications and scale detail I added to the Hangar 9 Tiger Moth.

Insert Photo Hangar ARF ¼ scale DH82 Tiger Moth

I could not think of a better subject for issue 9 of 'Scale Matters' than describing some of the detail modifications to the Hangar 9 Tiger Moth DH82 (HAN 4615). This is a ¼ scale ARF, 88 Inch wingspan biplane and is designed for a 20-30cc petrol engine. My Tiger Moth is now around 8 years old and in many ways looks better now than when I first put it together. This has been a very enjoyable aircraft and I would estimate that I have around 100 hours flying time under the wings. It fly's very nicely as a scale aircraft. Unfortunately it suffered a mid-air early in its life but since then the worst thing that has happened is several almost nose overs resulting in no more than a cracked or broken wooden propellers (Touch wood).

For anyone out there that has one of these ARF Tigers, do yourself a favour, build it and fly it.
The key to longevity is not to abuse the airframe, fly it like the real aircraft. It is one of the most delightful slow flying aircraft I have had the pleasure of owning, it can be flown in almost any conditions especially if you have some strong power up front, just anticipate weathercocking in heavy winds. The slow flying characteristics have to be seen to be believed.

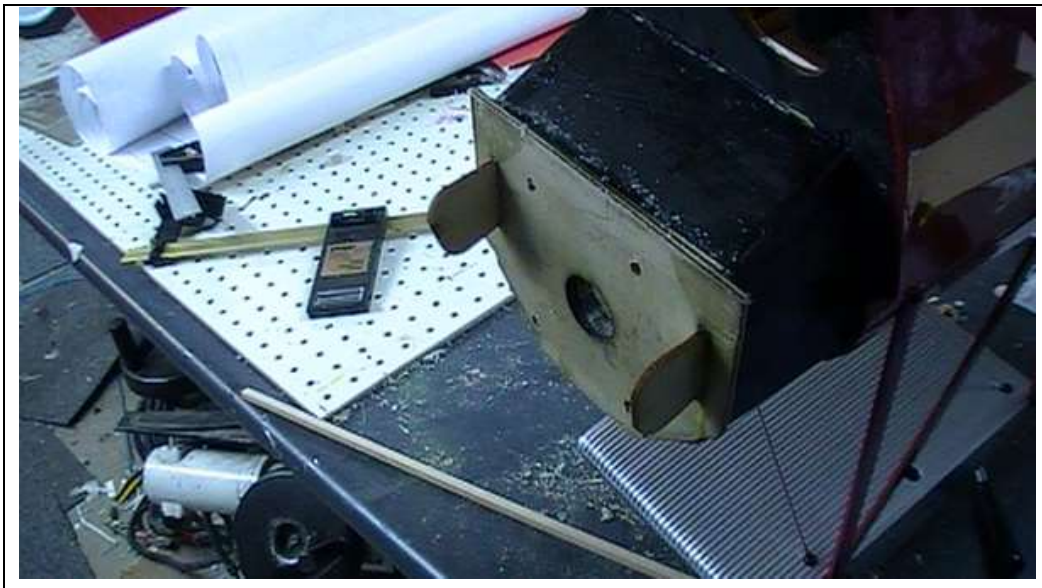
When I initially started putting the Tiger together it had only just been released (2006). There was internet discussions (googleology) about people having to add a lot of nose weight to the model to get it to balance. I made the decision to mount a Saito FG-36cc petrol 4 stroke, if I need weight then I always add motor not lead if possible, and also the Saito should put out about the same power as a 20-30cc 2 stroke.

Engine Installation

Fitting the larger Saito 36cc engine along with the Saito aluminium mount meant that I had some work to do in shortening the firewall mounting box to get the propeller hub to line-up with the end of the cowl.

Picture: I had to shorten the firewall mounting box to move the firewall back mounting point while ensuring that the thrust angle was maintained.

Picture: New firewall made with two additional ply beams to ensure that the fire wall is very firmly located. Remember, it can be more the gyroscopic forces that can rip the motor out rather than anything else.



Picture: Firewall glued in place with the blind nuts already inserted for easy installation of the Saito aluminium engine mount. I always use slow (30 minute or more) epoxy for this type of application to ensure maximum strength.

Picture: Magnificent Saito FG-36cc Petrol motor mounted inverted in the Tiger.

Picture: Nice view of the Saito engine, almost looks like the de Havilland Gypsy Major from the front with the pushrod tube visible.

As things turned out, the centre of gravity published in the instruction manual was wrong and had to be corrected. (***the manual should read, C of G is 7 5/8" – 8 1/4'".)***
The end result was that no weight had to be added with the Saito FG-36cc motor fitted. The FG-36 spins a nice big prop and sounds delightful while also lasting forever in this installation. Being a petrol 4 stroke (burn about ½ as much as a two stroke and ½ again on petrol) you also get the advantage of well over 40 minute flights from a small tank (Fuel Efficiency 30cc/minute full throttle).

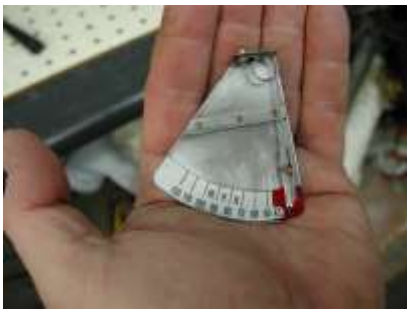
Air Speed Indicators

I replicated the DH82 air speed indicator that sits out on the left hand front wing strut. This is a simple reliable device on the real aircraft. It measures the air speed of the aircraft by using the drag on the needle arm pushing against the spring to indicate on the scale the wind velocity. The pilot looks out to the left wing to read the air speed, simple but effective.
I used images obtained from the internet to get an idea of what size the ¼ scale version should be. Each of the pieces was cut out of thin aluminium sheet using fine scissors to the required scale size (K&S sheet). The small bends where put in the required locations using long nose pliers. A few small brass screw were used to assemble the unit. The spring was hand wound using K&S spring wire to the required shape. The linear dial was draw up using CorelDraw, printed and then cut out to size and glued in place. A little bit of red nail vanish was used to indicate / highlight the stall speed on the scale. Simple but effective scale detail.

Picture: The full sized indicator on a DH82 Tiger Moth

Picture: Thin Aluminium sheet cut out to size using scissors to form the main components of the Air speed indicator.

Picture: Bare Airspeed assembly.



Picture: Completed Airspeed indicator with printed scale linear dial.

Picture: Air speed indicator fitted to left hand side front strut.

Picture: Some brass tubing bent to shape and aluminium strips used to replicate the fuel line from the top wing mounted fuel tank.

The Pitot tube air speed indicator was also fabricated from aluminium sheet and again cut out with scissors, copper tubes were bent to the appropriate shape to form the static and the dynamic instrument tubes, nothing to hard hear just a bit of good old innovation as with all scale detail. I used heat shrink tubing to simulate the rubber hoses, and on the bottom hose attachments I simulated hose clamps using thin aluminium strips.

Picture: Pitot air speed indicator fabricated using aluminium sheet and copper tubing.

3D Plastic Printing

As explained in previous articles of scale matters, 3D printers can be very useful for developing scale detail, they have again been put to good use in this Tiger project. The seats where drawn using CAD and then

printed to the correct scale size along with the bulk head behind each seat. The bulk heads were then covered in artificial leather and then had the pins inserted before fitting them into the airframe.

Picture: Some more 3D printed parts.

Picture: 3D plastic printed pilot and co-pilot ready for flight

Recovering

There is nothing to stop you recovering your ARF with Acetate as described in previous Scale Matters articles. I recovered the Tiger fuselage after a slight airborne altercation, and after minor repairs to the fuselage. I used red dyed Acetate following my true and tried methods. The coloured Acetate assists as it reduces the amount of paint that is required to give good coverage. Again the Acetate gives a textured finish like the real aircraft and will not wrinkle or stretch in the sun as the plastic covering does. Once painter I then used the Roland sticker cutter to generate the masks for spraying all the fuselage lettering. The masks were applied and airbrushed using Tamia paint. The end result is crisp quality lettering without any lip between the red and the white colours.

Picture: Recovering using Acetate and painting the fuselage

Picture: Tiger at Shepparton Mammoth Fly-In

Picture: Tiger flying at Tumut (CASA approved).

Picture: Tiger at home in the NAAS valley Canberra A.C.T in its natural habitat.


Picture: Another NAAS member with a green colour scheme nearing completion and preparation for formation flying.

Event Suggestion

Anybody interested in participating in an anniversary event to be held at the National Aeromodelling and Aviators Society Canberra (N.A.A.S) A.C.T to commemorate 80 years of the Pipe Cub please email www.naasact@outlook.com. We could set a world record for the most Cubs in the sky at once or the most Cubs at a single event, hell everybody has one, just come forward and admit it, it would be a lot of fun.



Pictures: Club Cub day at N.A.A.S

If you have specific questions about any of the Scale Matters articles you can email me aeromodeller@outlook.com and I will do my best to answer any questions.
You may also find some interesting "build information" at www.nitrodude.forumer.com
The web site for the National Aeromodelling and Aviators' Society (NAAS) can be found at www.naas.org.au. or on facebook. www.facebook.com/naasact/

Until then, happy building and plenty of flying.