

Scale Soaring UK

The forum for all your modelling requirements relating to scale gliders
<https://scalesoaring.co.uk/phpBB3/>

1/3 Scale T21 by Jilles Smits

<https://scalesoaring.co.uk/phpBB3/viewtopic.php?f=12&t=755>

Re: 1/3 Scale T21 by Jilles Smits

by **Barry_Cole**

Page **1** of **1**

Posted: **02 Jun 2017, 15:27**

ChrisGordon wrote:

Wonderful.

Lovely to behold!

Chris

While we are talking of beholding. Are we going to behold you at White Sheet this Sunday??

Come early, fly longer....

BC

Re: 1/3 Scale T21 by Jilles Smits

by **ChrisGordon**

Posted: **02 Jun 2017, 10:50**

Wonderful.

Lovely to behold!

Chris

Re: 1/3 Scale T21 by Jilles Smits

by **Jilles**

Posted: **28 May 2017, 04:55**

Good to hear the maiden went so well. Congratulations

Just for my design records what is the flying weight you ended up with and how far from the L/E did you locate the C.O.G.

Look forward to see more pictures and a better quality video in future.

Cheers

Jilles

Re: 1/3 Scale T21 by Jilles Smits

by **Peter Balcombe**

Posted: **27 May 2017, 14:30**

Congratulations Cliff.

Best of luck with all further flights at Sandhayes during the weekend.

Yet another superb plan from Jilles.

Re: 1/3 Scale T21 by Jilles Smits

by **Ray Watts**

Posted: **27 May 2017, 13:32**

It towed up extremely smoothly behind my Red Bull with apparently no trim change needed and the landing was perfect to watch. During the second flight it started to rain suddenly but still no issues. Annoyingly once it was back on the ground the rain stopped again.

Well done Cliff

Re: 1/3 Scale T21 by Jilles Smits

by **VinceC**

Posted: **27 May 2017, 13:11**

First grainy video of maiden flight:

http://www.scalesoaring.co.uk/Uploads/T-21_maiden.mp4

Re: 1/3 Scale T21 by Jilles Smits

by **Peter Balcombe**

Posted: **26 May 2017, 22:47**

Probably still trying to read the map!

Re: 1/3 Scale T21 by Jilles Smits

by **VinceC**

Posted: **26 May 2017, 20:25**

Where's the crew? In the Bar?

Re: 1/3 Scale T21 by Jilles Smits

by **Peter Balcombe**

Posted: **26 May 2017, 18:21**

I hope it flies ok without Mary having to hold the wings to keep them level! 😊

Re: 1/3 Scale T21 by Jilles Smits

by **Barry_Cole**

Posted: **08 May 2017, 12:06**

VinceC wrote:

It'll never fly 😊

With Decals as good as those, it cannot help but fly..

Good work with the roundels Cliff.



BC

Re: 1/3 Scale T21 by Jilles Smits

by **Geoff Pearce**

Posted: **08 May 2017, 10:19**

Cliff Evans wrote:

Yes it will!

Dry days only, no canopy see.

Good luck with maiden looks impressive.

Re: 1/3 Scale T21 by Jilles Smits

by **FrankS**

Posted: **08 May 2017, 08:16**

It's very impressive, are all the churches in Bristol now on roof watch.....

Re: 1/3 Scale T21 by Jilles Smits

by **VinceC**

Posted: **07 May 2017, 18:19**

It'll never fly 😊

Re: 1/3 Scale T21 by Jilles Smits

by **Phill Tadman**

Posted: **09 Feb 2017, 22:52**

Haha! They're great 😊

Phill

Re: 1/3 Scale T21 by Jilles Smits

by **Peter Balcombe**

Posted: **07 Feb 2017, 20:38**

A few last minute items before the paint shop 😊

Rubber hose obtained for main skid, so that has now been test fitted as shown below.

Also getting the radio installation sorted. FrSky Redundancy-10 unit and primary X8R receiver have been shock mounted onto the front of Former 8 in the bay immediately behind the seats.

A small secondary receiver unit will also be fitted just forward of Former 8, but on the LH side.

The eight servo leads will be connected to the row of servo outputs on the LH side of the Redundancy unit in due course. No servo connections are needed to either Rx as they talk to the Redundancy unit via the SBus, with the primary Rx being telemetry enabled and also SPort connected.

Last job before the paint shop is to sort out attachment points for the two windshield mounts. These have been 3D printed by Cliff and hold the



Main skid fitted



Initial radio installation
windshields very nicely.

Re: 1/3 Scale T21 by Jilles Smits

by **Peter Balcombe**

Posted: **05 Feb 2017, 12:52**

Wing centre cover made from 0.5mm aluminium sheet.

It hooks onto two small cap head servo mounting type screws in the front underside of each wing and is clamped to the trailing edge using a piece of aluminium bent to a Vee around the TE

& two M2 threaded rods as shown below.

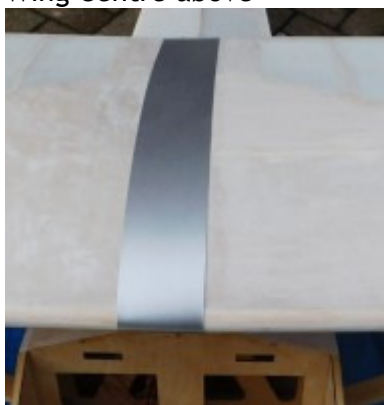
The main wing/fuselage attachment is also shown. The two main struts secure using high tensile M4 bolts.



Wing centre



Wing Centre above



Wing Cover front



Wing Cover rear



Wing Cover inside rear



Wing Cover overall

Just about ready for the paint shop now 😊

Re: 1/3 Scale T21 by Jilles Smits

by **VinceC**

Posted: **18 Jan 2017, 19:47**

Looking good for summer

Re: 1/3 Scale T21 by Jilles Smits

by **Peter Balcombe**

Posted: **18 Jan 2017, 18:27**

Covering is nearly finished, with just the rudder (just started), one aileron, fin & pylon left to do.

As previously mentioned, I wanted to do a check assembly with the wing covering on & proper wing bolts fitted in order to check/adjust wing-pylon top clearance with wing properly attached.

This was done today & the opportunity taken to get some shots of the model just before painting (apart from primer already on the tailplane & elevators).





Just the centre wing cover to make now.

Re: 1/3 Scale T21 by Jilles Smits

by **Peter Balcombe**

Posted: **11 Jan 2017, 17:26**

Now in the process of covering the 2nd wing (starting with the underside) using Ceconite applied using the Superseam glue to secure just the edges.

This is so, so, so much easier than trying to attach in most places with Superseam as I did with the first wing.

I have wrapped & attached the Ceconite around all the edges (apart from the tip so far as that will need hot iron treatment to follow the compound curves).

Once the tip has been done I will tack down the fabric onto the undercamber area cap strips before shrinking out the remaining slackness & then doping the fabric to fully attach all over.

Rudder & 2nd aileron also ready for covering & then just fuselage to do. The fuselage is ready for its coat of sanding sealer prior to covering, so it shouldn't be long before I will be looking for a dry day to do a complete assembly in order to do final pylon top adjustments to allow the wings to sit snugly in place with the proper wing fastenings.

Final piece to make will be the wing centre cover strip.



Wing servo MPX sockets in top of pylon



Tailplane servos MPX socket

Photos of the wing & elevator servo MPX connectors shown below.

Re: 1/3 Scale T21 by Jilles Smits

by **Roger**

Posted: **09 Dec 2016, 14:52**

One can do the same as Jilles talks about with sanding sealer. I have recently covered a powered model with ceconite. Process was to paint the edges of the structure with two coats of nitro cellulose sanding sealer thinned 50/50. Sand lightly. Lay fabric over the structure and apply sealer thinned 3/1. This dissolves the under lying sealer and there you have it a secure bond. I sealed the weave with 4 coats of sealer thinned 3/1.

Re: 1/3 Scale T21 by Jilles Smits

by **Jilles**

Posted: **07 Dec 2016, 07:05**

just as a matter of interest for those interested

My Dad used to do maintenance on full scale gliders in the 50-60's

to fit the fabric the surface got a coat of Sikkens Kleef lak (sticky lacquer in English I suppose) after it was dry the fabric was put in place and then with a wet cloth of Sikkens Thinner you went over the fabric where it needed to be fixed. The thinner dissolved the Kleef lak and it went into the fabric weaves

The thinner evaporated fast and the fabric was fixed. then many layers of Shrinking dope was required

I remember applying a lot of fabric to gliders and got more or less high on the thinner fumes

Cheers

Jilles

Re: 1/3 Scale T21 by Jilles Smits

by **Peter Balcombe**

Posted: **06 Dec 2016, 09:58**

Many thanks for that John.

That method would also make it a lot easier to apply even the 'Superseam' adhesive if you only do the edges & initially tauten the fabric, although the undercamber areas would need securing to the rib cap strips before taughtened too much.

I persevered with the Superseam adhesive for the first wing as I already had it to hand, applying it in small increments over much of the solid structure, pulling the fabric roughly taut as I went. It took a while, but worked out OK in the end.

Your comment about doping confirms that I still need to apply a coat or two of dope (as per the manufacturers instructions for full size application) to seal the fabric weave before applying any primer/paint layers.

Re: 1/3 Scale T21 by Jilles Smits

by **john greenfield**

Posted: **06 Dec 2016, 09:30**

Peter Balcombe wrote:

Hi John,

Does that mean that you use Balsaloc as normal for say Solartex by applying a coat all over, but then apply the fabric straight onto the Balsaloc with an iron to fix at the edges first?

Hi Peter

Sorry for the late reply but I have been away.

I only apply the balsaloc around the edges so that when the covering is tightened it will settle out evenly over the structure. Not sealing the wood all over with Balsaloc will also allow the dope to penetrate the wood so giving a stronger bond.

AEB

Re: 1/3 Scale T21 by Jilles Smits

by **Peter Balcombe**

Posted: **05 Dec 2016, 14:40**



Starboard wing covered



Stbd wing aileron up

Starboard wing now covered and ready for sealing the fabric weave.

Re: 1/3 Scale T21 by Jilles Smits

by **Peter Balcombe**

Posted: **17 Nov 2016, 00:03**

Hi Jilles.

Yes it looks as if there are easier options to the proprietary Superseam adhesive.

The SIG product doesn't appear to be that easy to get hold of over here, but Balsaloc is readily available & I gather that thinned PVA glue might well work in a similar way and is far cheaper than proprietary glues.

Peter

Re: 1/3 Scale T21 by Jilles Smits

by **Jilles**

Posted: **16 Nov 2016, 23:38**

Balsaloc is indeed much easier. An other heat sensitive glue option is SIG Stix-it This comes in half pint and pint sized cans

Apply it on with a brush. in 30 minutes you can apply the covering with an Iron like normal film, No problem if you run out of time it will work the next day or days thereafter.

Re: 1/3 Scale T21 by Jilles Smits

by **Peter Balcombe**

Posted: **15 Nov 2016, 11:00**

Hi John,

Does that mean that you use Balsaloc as normal for say Solartex by applying a coat all over, but then apply the fabric straight onto the Balsaloc with an iron to fix at the edges first?

Re: 1/3 Scale T21 by Jilles Smits

by **john greenfield**

Posted: **15 Nov 2016, 10:15**

Peter

I do not use the "cement" any more to apply my covering. I now use Balsaloc as it is much easier to cover the edges of the structure with Balsaloc applied with a scrap of foam and then lay the covering on and iron it down around the edges before finishing in the normal way.

AEB

Re: 1/3 Scale T21 by Jilles Smits

by **Peter Balcombe**

Posted: **14 Nov 2016, 19:40**

Finally managed to get to start covering the first parts with fabric - in this case Ceconite Lite. This is applied using a proprietary Superseam cement after first sealing the wood surface. I started with the tailplane, following on with the elevators & then the first aileron.

There is obviously a knack to fabric application, so I have hopefully been slowly improving my technique as I have worked through these items.

The Superseam cement is applied unthinned onto the wood & the fabric laid on whilst still wet in order that the cement penetrates through the fabric to encase the fibres. The cement starts drying in seconds!!, so you can only apply the cement over a very small area (say one rib bay at a time) before you have to lay down the fabric & rub down to make sure the cement penetrates the weave.

I started cutting the edges with pinking scissors, but have now changed to using a sharp scalpel to trim all around after leaving small glued down overlaps. One other trick is to wipe down the joints with the MEK thinners as this removes any lumps of dried cement and also tends to smooth off the cut edge joints. A gentle sand of the final glued edge softens this nicely.

Luckily, I was able to apply the fabric fairly evenly, so that a quick run over with a sealing iron is all that is required to tauten the fabric - at least for now.



Tailplane & elevators



First aileron

Hopefully, the fuselage and wing panels will go well in due course

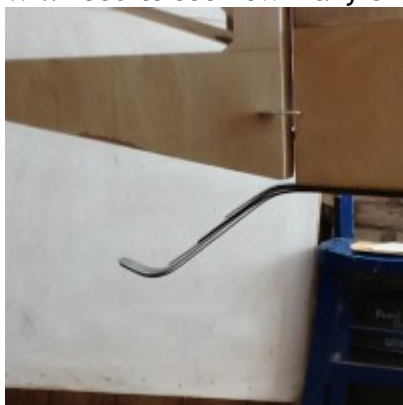
Re: 1/3 Scale T21 by Jilles Smits

by **Peter Balcombe**

Posted: **21 Oct 2016, 14:04**

Spring steel leaf tailskid now heat treated and all leaves nicely springy.

Will need to see how many of the leaves are actually needed in due course.



Heat treated skid

Meanwhile, the tailplane & elevator are now ready for covering - so time to see how difficult it is to apply the Ceconite Lite fabric using the recommended glue etc.

Re: 1/3 Scale T21 by Jilles Smits

by **Peter Balcombe**

Posted: **22 Sep 2016, 22:26**

Spring steel tailskid leaf spring parts now fabricated with 5 leaves, which is hopefully too many.



The required number will be found by experiment on the completed model once the strips have been hardened then tempered to get the springing characteristic.

Re: 1/3 Scale T21 by Jilles Smits

by **Peter Balcombe**

Posted: **21 Sep 2016, 12:14**

Now with nose cone/weight assembly fitted and gap filled.

Also, the first trial tail skid strip has been bent (easily done between fingers as material is relatively soft in the supplied state) and screwed to the prepared mounting points.



Nose assembly fitted



First tail skid strip

The reason I added the internal doubler plate for the fixings was partly to be able to easily fit the tee nuts and partly to have a thicker mounting plate tied into the lower fuselage longerons.

Re: 1/3 Scale T21 by Jilles Smits

by **Peter Balcombe**

Posted: **20 Sep 2016, 19:38**

After making the various Plaster of Paris moulds, I have finally been able to cast the nose cone lead plug and fix it into the GRP nose cone, backed by the ply attachment plate.

The nose cone took 5lb of lead, so we have a fair bit of the necessary ballast up front.

In the unlikely event that this proves to be too much - then I can always take the nose assembly off again to adjust 😊

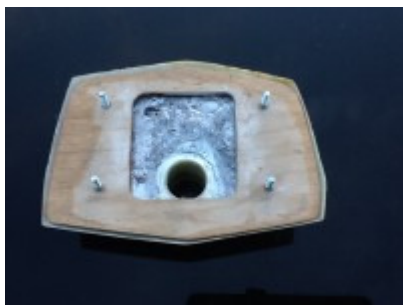
The lead was set into the nose cone with silicone sealant to give some flexibility in this interface, then the backing plate fixed to the cone with epoxy, including a 'Vee' bead between ply and GRP cone to hopefully make sure the lead stays attached.

A further shot will be posted tomorrow once the assembly has been fitted to the fuselage, to give a more complete look to the front end.

In parallel with all this, a ply doubler has been fitted inside the rear fuselage between the last 2 formers, complete with two M3 captive nuts in readiness for fitting the tail skid. The skid is being fabricated from a few strips of Spring Steel. Barry Cole kindly put me on to AJ Reeves who stock annealed strip in various gauges and widths (as used for making model railway locomotive leaf springs) - thanks again Barry 😊😊



Nose weight assembly parts



Assembled nose cone

Using this material allows the necessary cutting, drilling and bending to be easily done prior to heat treating the finished strips to get the springiness put in.

Re: 1/3 Scale T21 by Jilles Smits

by **Peter Balcombe**

Posted: **16 Sep 2016, 09:38**

Brian,

That is the idea.



Underside skinning

Underside skins now complete, so am concentrating on getting the nose cone (complete with "bomb" housing) made.

Re: 1/3 Scale T21 by Jilles Smits

by **B Sharp**

Posted: **13 Sep 2016, 17:11**

Peter, on the T21 I learned to fly on they had a large slug of iron with a rounded nose generally called "the bomb" which fitted into the tube and was held in place with the pin and hasp. This was employed to get the CG in the right position when flying solo or with two small lady pilots. You could easily use a lead version of this to get your CG in the right place and it would look very scale like.

Brian. 😊

Re: 1/3 Scale T21 by Jilles Smits

by **Peter Balcombe**

Posted: **13 Sep 2016, 16:33**

Jilles, there are two Li-ion packs mounted under the top nose skins, just forward of the instrument panel.

I have now made a GRP nose cone and embedded a GRP tube to represent the ballast housing.

Most of the rear of this cone will be filled with lead and a studded piece of ply epoxied into the rear to enable the whole assembly to be bolted onto F1.

A photo of the full size is shown below, together with my cone & 3D printed ballast housing fixing ring.



Nose cone



Lower nose skinning



Full size ballast housing

Meanwhile, having made up the main skid and bracketry, the fuselage lower nose skins are being added. I have finished the former by former section & can hopefully finish the lower skinning with just one further piece per side.

Re: 1/3 Scale T21 by Jilles Smits

by **Jilles**

Posted: **04 Sep 2016, 03:47**

Well this is already extra weight in front of the c.o.g. Couple of pilots will help also in my project internal gear like batteries and volt regulators go as much forward as possible. If you need weight in the front just as well make it useful. All my scale gliders are powered by a 3S-2200 lipo with an 8A UBEC. never had a power supply problem and you can fly for hours

Re: 1/3 Scale T21 by Jilles Smits

by **Peter Balcombe**

Posted: **02 Sep 2016, 16:27**

One nose skid plus associated brackets fettled.



Nose skid parts

Now where did I put that old car heater hose?

Re: 1/3 Scale T21 by Jilles Smits

by **chris williams**

Posted: **31 Aug 2016, 13:49**

Weight is only one half of the equation. With the T21, drag is a big factor, what with that big open cockpit and the struts. Barry has a Wot 4 that might do the job, though 😊

Re: 1/3 Scale T21 by Jilles Smits

by **Barry_Cole**

Posted: **31 Aug 2016, 10:56**

That's no heavier than Geoff Crew's K8, and I have towed that with my Titan, with a Zenoah 62. Why all this obsession with huge tugs.



BC

Re: 1/3 Scale T21 by Jilles Smits

by **Jilles**

Posted: **31 Aug 2016, 06:11**

Yes you need a lot of weight with that short nose. My computer gave me a figure of 11.5-12kg (26 lbs) on the total design with c.o.g in place, but is subject on the density of material used. Plywood and balsa differ in density from supplier to supplier. I cannot calculate glue, cover material and paint.

In the end 12 kg is not too heavy for this size of model. If it ends up at 15-16 kg it still would be o.k. for a scale like flying speed in still air.

It will need a powerful tow plane

Re: 1/3 Scale T21 by Jilles Smits

by **VinceC**

Posted: **30 Aug 2016, 17:52**

This is not a model, it's a flying machine. Superb, don't forget the video camera on its' first outing

Re: 1/3 Scale T21 by Jilles Smits

by **Peter Balcombe**

Posted: **30 Aug 2016, 17:33**

Glassed struts have been used to assemble wings to fuselage & get an idea of how much nose weight will be needed - a lot!!



Rear view



Front view

A couple of photos taken to show the overall assembly so far.

Re: 1/3 Scale T21 by Jilles Smits

by **VinceC**

Posted: **24 Aug 2016, 20:15**

I need a couple knocking up. Do you do orders 😊

Re: 1/3 Scale T21 by Jilles Smits

by **Peter Balcombe**

Posted: **24 Aug 2016, 19:33**

Photo below shows next couple of stages of main strut build (with balsa facings & then sanded to streamlined profile ready for glassing) plus the two tailplane struts ready to fit.



Struts part built

The tailplane struts fit using 2mm pins, whilst the wing struts use 6SWG pins.

Re: 1/3 Scale T21 by Jilles Smits

by **Peter Balcombe**

Posted: **16 Aug 2016, 21:51**

Thanks Cliff.

Forgot to mention that there are a few air holes to fill tomorrow before any casting can take place - mainly to help the casting release cleanly.

Re: 1/3 Scale T21 by Jilles Smits

by **Peter Balcombe**

Posted: **16 Aug 2016, 20:40**

Nose template removed from the mould fairly successfully (thanks to foresight in putting a substantial piano wire reinforcing bar through the ballast box cylinder) The cylinder did snap off low down, but the reinforcing bar allows the top part to be slotted back into position. 😊



Nose section mould

I will let this dry for a bit longer before attempting a lead cast & probably pre-heat the mould to try to reduce spitting whilst pouring.

Re: 1/3 Scale T21 by Jilles Smits

by **Peter Balcombe**

Posted: **15 Aug 2016, 20:36**

First main wing strut core has been fabricated from 3/16 X 1/2" spruce strip, strengthened by a layer of carbon tape each side & then the attachment fittings bolted on at each end. Note that the attachment fittings are securely held on by the brass strip band and lots of fixings.

The core will now be encased in a balsa sheath & sanded to a streamlined profile.



Wing strut core



Nose block mould making

The nose block template is in the process of being used to make a female mould for casting the lead section.

Hopefully, I can successfully remove the template tomorrow to leave the desired shape for casting.

Re: 1/3 Scale T21 by Jilles Smits

by **Peter Balcombe**

Posted: **13 Aug 2016, 22:34**

No posts for a while but the build has slowly progressed with 2nd wing structure now built and the D box skinned.

Spoiler installation completed as per the first wing.

Both wings check fitted to the fuselage mounts ok, so now need to get on with the wing strut build before we can see the overall structure.



2nd Wing spoiler installation



Nose block template

Ballast can hole has been machined in the nose block template (thanks Maurice) so I can now set about making the nose weight casting mould.

Re: 1/3 Scale T21 by Jilles Smits

by **VinceC**

Posted: **29 Jul 2016, 15:01**

Detail, detail, detail....all important stuff. 😊😊 Well done

Re: 1/3 Scale T21 by Jilles Smits

by **Peter Balcombe**

Posted: **29 Jul 2016, 13:02**

Fuselage side access hatch added as per the full size.

The plan is that this will allow me to get to the rear of the rudder closed loop tubes etc. if ever needed.

Cliff has cut a couple of extra pieces to allow the removeable part to sit flush with the rest of the exterior.



The removeable hatch will clip behind the forward framing and secure with a screw in the top rear corner as per the full size.

Re: 1/3 Scale T21 by Jilles Smits

by **Peter Balcombe**

Posted: **26 Jul 2016, 10:38**

Nose block moulding template kindly provided by Cliff has been fitted with fixing threads, secured to the front former and sanded back to profile. Full size ballast housing recess still to be made.





The intention is to use the mould to cast a solid church roof block, complete with ballast housing recess and fixing threads.
Looking much more like a T21 nose now.

Re: 1/3 Scale T21 by Jilles Smits

by **Peter Balcombe**

Posted: **23 Jul 2016, 15:12**

2nd wing build is progressing and the upper D box skins are in place.
The wing is now ready for the lower spar cap infill to be sanded back flush to the ribs prior to addition of the lower D box skins over the next few days.



Tailplane LE template



Tailplane LE added

Meanwhile, I have managed to add the first of the tailplane leading edges using 0.4mm ply. I cut a paper template which included the forward skin gusset plates, used this to cut the ply to shape, soaked the ply in water for a couple of hours to help it take up the tip end curvature without cracking & then carefully glued in place.
The result is shown below (root & tip ends still to be cut back to suit).

Re: 1/3 Scale T21 by Jilles Smits

by **Peter Balcombe**

Posted: **05 Jul 2016, 16:30**

Radio battery switches have been mounted in bottom of each of the 3D printed



Battery switches
cockpit instrument panel boxes & can hardly be seen by the casual observer.

Re: 1/3 Scale T21 by Jilles Smits

by **VinceC**

Posted: **21 Jun 2016, 10:54**

Noël - please let me know if you find them. I took a look this morning and found nothing of that size

Re: 1/3 Scale T21 by Jilles Smits

by **Noël Rumers**

Posted: **21 Jun 2016, 10:32**

Thanks Peter!

I will be looking around to find them.

Noël

Re: 1/3 Scale T21 by Jilles Smits

by **Peter Balcombe**

Posted: **21 Jun 2016, 00:03**

Vince/Noel,

Look for mini F clamp sets.

I have found sets of 3 made by Expo tools or similar.

You may find other similar ones.

There are slightly larger ones available at suppliers such as Screwfix, but I think you need to specifically look for 'F clamps'.

Re: 1/3 Scale T21 by Jilles Smits

by **Peter Balcombe**

Posted: **20 Jun 2016, 23:54**

Vince/Noel,

I have had the clamps for a long time and they came as a set of 5 or so of different lengths, complete with a couple of small magnetic bases so that they could be mounted via these if necessary.

I know that Barry Cole was looking for these a year or two back, but don't know if he found the same ones or something similar.

I just know he said that he had found something which suited.

I will scan the web to see what I can find.

Peter

Re: 1/3 Scale T21 by Jilles Smits

by **Noël Rumers**

Posted: **20 Jun 2016, 16:07**

Hi Peter and Vince,

Looking very impressive, indeed!!!

These clamps look very handy to me too...

Noël

Re: 1/3 Scale T21 by Jilles Smits

by **VinceC**

Posted: **20 Jun 2016, 11:13**

Peter, where did you get those vertical clamps from which hold the pylon deck skin down?

Re: 1/3 Scale T21 by Jilles Smits

by **Peter Balcombe**

Posted: **20 Jun 2016, 10:28**

Both upper fuselage decks now in place and



LH upper fuselage skin



RH upper fuselage skin
nearly ready to add the pylon skins.

Re: 1/3 Scale T21 by Jilles Smits

by **VinceC**

Posted: **19 Jun 2016, 18:29**

This is the best T-21 I have ever seen. Going to be great

Re: 1/3 Scale T21 by Jilles Smits

by **Peter Balcombe**

Posted: **19 Jun 2016, 17:31**

LH upper fuselage piece is now on as the rain today resulted in an early finish to my flying on the Peak.

The RH piece has been prepared & is ready to fit tomorrow, once I am able to sand the mating edge on the first piece flush with the formers.

I will fit the small piece in front of the pylon next.

Will put up more photos tomorrow once both pieces are in position, ready for pylon skins.

Re: 1/3 Scale T21 by Jilles Smits

by **Peter Balcombe**

Posted: **19 Jun 2016, 15:34**

Forward fuselage skinning now completed once the edges have been sanded back on the last piece.



Fuz skins RHS



Fuz skins LHS

Time to address the upper fuselage skinning methinks.

Re: 1/3 Scale T21 by Jilles Smits

by **Peter Balcombe**

Posted: **17 Jun 2016, 10:38**

Many thanks Vince.

Talking of which, a FEMA 5" wheel fits perfectly 😊

Meanwhile, sheeting of the forward fuselage has started using 0.8mm ply.

First piece tried was one of the main side pieces, which I tried to cover in one piece up to the top deck.

However, the double curvature over the cockpit coaming level stringer meant that this had to be done in 2 pieces as shown below.



Wheel in place



Lower fuselage side skin



Upper fuselage side skin

The join areas of both pieces were bevelled and overlap to increase the glueing area. The joint can be sanded back later.

Next job is to repeat the above exercise on the other side before addressing the top.

Re: 1/3 Scale T21 by Jilles Smits

by **VinceC**

Posted: **09 Jun 2016, 15:04**

"Wheel neat again"

Re: 1/3 Scale T21 by Jilles Smits

by **Peter Balcombe**

Posted: **09 Jun 2016, 11:37**

Wheel plates are made from 1/8" Ali sheet and bolted to the inner keel.



Wheel plates

I also applied epoxy to the joint as for the other metal fittings.

Re: 1/3 Scale T21 by Jilles Smits

by **VinceC**

Posted: **07 Jun 2016, 20:16**

Very nice indeed

Re: 1/3 Scale T21 by Jilles Smits

by **Peter Balcombe**

Posted: **06 Jun 2016, 15:17**

Aerotow release pin now uses a 2mm rod which looks to be more than adequate and slides easily in the brass guide tube without the need for any flexible joint.

The 3D printed instrument panel cubbyholes have been epoxied onto the back of the panel & look good.

Meanwhile, the rudder has had its cap strips fitted in order that the leading edge & top can be fitted & roughly shaped. These now just need sanding to proper edge profiled.

The laser cut holes for the rudder hinge pins have been enlarged to 5mm to take the specified 3/16" pin hinges. The hinges have been epoxied into the rudder (remembering to fit balsa backing blocks first) & then check fitted to the fin as shown below.

The two brass tubes have been fitted in the centre section (full 12" lengths) and two shorter ones at the C/L exits for rudder C/L control. The specified tubes were easy enough to gently coax through the centre section former holes to take up the 'S' shaped curves and then held in place with epoxy on each former face.



Rudder dry fitted



C/L exit tubes



Panel cubbyhole boxes



Fuz front view

The C/L exit tubes were gently bent into their 'S' curves before being epoxied into their forward support former hole and side exit slot. I extended the side exit slots forward by nearly 9mm to get the exit part of the tube to penetrate with an appropriate shallow angle.

Re: 1/3 Scale T21 by Jilles Smits

by **Noël Rumers**

Posted: **31 May 2016, 14:38**

Hi,

I was puzzle with the same question...for the SF27...

Looking at this tow hook and the size of servo you need compared to the arm on the tow release I think I am ok with a 7 kg servo on my tow hook.

The arm is a bit longer and I need just a small amount of moving the holding arm over the center line.

This means The hook will automatically open when force is pulling on it due to the spring release.





But Chris, nice knees too, I will have a test done like you showed us to make sure it works,
Murphy must be overruled fully!!!
Noël

Re: 1/3 Scale T21 by Jilles Smits

by **Peter Balcombe**

Posted: **31 May 2016, 13:29**

Ok guys, I owe an apology to Jilles for some of this discussion on the tow release 🙄

As Jilles says, the design calls up a 4-40 release rod (which slides in a 5/32" o.d. Brass tube).

I had lazily not looked up an equivalent metric size for a 4-40 rod, but wrongly assumed that a 16 s.w.g. rod (which at 1/8" is a good sliding fit) was ok.

I now see that a 4-40 thread has a major dia. of 0.112", a pitch dia. of 0.095" & a minor dia. of 0.081".

A 2mm rod has a dia. of 0.079"



Fin skinned

The release rod travel only really needs to be 8-10mm to go from resting on the crossbar, to well clear & close to the front of the rear guide tube.

This travel can be accommodated using the inner servo arm holes, with nearly +/-45 degrees movement.

I have now skinned the fin as shown in the photo below.

Re: 1/3 Scale T21 by Jilles Smits

by **Barry_Cole**

Posted: **31 May 2016, 12:22**

Right, Here we go then. See attached drawing.

With the unit in the engaged position, the servo arm points directly at the release. The mathematics of where you attach the rod to the arm are simple. The distance from the centre, is the same as the movement that you need. As you hit the release switch, the servo starts to move, basically under no load, as the arm moved down, the rod hardly moves to start with. This gives the servo motor time to run up to full speed. The pull on the rod at this point is very high, (Maths later) so it will break the static friction and get the rod sliding through the tow loop. As the arm moves nearer the 90 degree position, the speed of the rod increases, but the amount of pull reduces in proportion. This does not matter too much, as we have broken the static friction, and the load on the rod due to the moving friction will be less.

The amount of pull in the rod, is proportional to the distance that the connection to the arm, is below the centre of the servo, and NOT the length of the servo arm.....

Now some simple maths. Assume a servo of 5Kg/Cm torque. This means that if we fixed the rod to the servo arm, one Cm from the centre, we would get a pull in the rod, of 5Kg, at the 90 degree position. $5/5 = 5$

For reasons of simplicity, we will assume that in the engaged position, the point at which the rod is connected to the arm, is 0.1mm or 0.01Cm below the centre of the servo. (This is because dividing by 0, hurts my brain).

So, the max pull is the rod at the engaged position, can be $5/0.01 = 500\text{Kg}$, or about 1/2 a ton in old money. The actual load, will depend on the friction required to move the rod.

Then, the max pull is the rod at the dis-engaged position, can be $5/0.7 = 7\text{Kg}$, or about 16Lbs in old money. The actual load, will depend on the friction required to move the rod, as before.

Tow Release.pdf

(6.78 KiB) Downloaded 110 times

I hope that helps, I have always done it that way, usually using a fairly small servo, but more of that later is you want it.



BC

Re: 1/3 Scale T21 by Jilles Smits

by **spike spencer**

Posted: **31 May 2016, 06:45**

"to get the maximum force on the pin the servo arm should be perpendicular as possible to the release pin"

Unless I have misunderstood your use of the term "perpendicular", that is not quite true. The release rod at 90 degrees to the servo arm is where the pin Velocity will be greatest and the pin will require highest force from the servo.

C'mon Barry, your turn.

Still, with a 10+Kg/cm Gorilla servo, probably nit picky as far as the mechanicals go.

From your photos, the travel of the pin seems to be a little more than the full length of one of the clevis fittings (15mm ?). If the aperture is correct, full lock to release should be possible with half of that travel. Then, being able to use half the previous servo arm length will provide double the force available at the pin.

When "Gorilla" force is appropriate, it doesn't make sense to reduce pin travel by adjusting "end points" at the Tx, that just wastes available servo power. Preferable to use a shorter servo arm.

Much of this was debated and lost on the old Forum. Perhaps we should start a new Topic specifically for release mechanisms ?

Re: 1/3 Scale T21 by Jilles Smits

by **Jilles**

Posted: **31 May 2016, 01:57**

My suggestion was to use a 4-40 rod for the release pin directly connected to the servo arm. 3 mm is too heavy

The travel of the pin need to be 15 mm at best. to get the maximum force on the pin the servo arm should be perpendicular as possible to the release pin

The servo arm only needs to move 15 degrees either way from the neutral position. With this set up there is not much bending required of the 4-40 release rod. with a 10Kg/cm+ servo this setup I have on all my scale gliders and have never had any problem.

Re: 1/3 Scale T21 by Jilles Smits

by **spike spencer**

Posted: **29 May 2016, 10:05**

The side advantage is that he can still sing Alto Tenor 🎤 🎤

Re: 1/3 Scale T21 by Jilles Smits

by **Barry_Cole**

Posted: **29 May 2016, 09:54**

Take care, he still has the scars. Both mental and physical.....



BC

Re: 1/3 Scale T21 by Jilles Smits

by **chris williams**

Posted: **29 May 2016, 00:58**

And then, Peter, test it...! Suggested min



release point tension=weight of model

Re: 1/3 Scale T21 by Jilles Smits

by **Peter Balcombe**

Posted: **28 May 2016, 23:33**

I take your point Robbie. The release must be 100% reliable.
I will have another look at it tomorrow.

Re: 1/3 Scale T21 by Jilles Smits

by **RobbieB**

Posted: **28 May 2016, 23:19**

Peter,

Any soft soldered connection in the release pin, particularly in a model of that size needs to be given some serious thought - not the best way to go about it in my view. Far better, if possible to have a no-connector set-up straight to the servo with a 'z' bend into the servo disc as shown below.



I know with your present installation this is not possible but first off, is a 3mm pin really necessary? If you replaced that with a 14swg rod and moved the servo back, the flexibility in that set-up would solve the problem in a much safer way. A 14swg pin would be more than up to the job even in a big T21. You could reduce the diameter of the brass tube by inserting smaller tube/s inside. If you did use 14swg you would need to support the front of the pin when in the closed position.

By the time the dolls are in the cockpit I'm sure the release servo would be barely visible.

The reliability of your release system is absolutely top priority.

Re: 1/3 Scale T21 by Jilles Smits

by **Peter Balcombe**

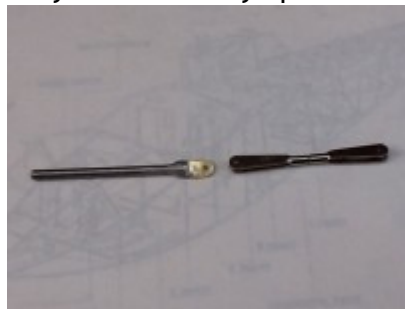
Posted: **28 May 2016, 19:45**

Sorted!!

Steel pin slit for 5-6mm with a slitting disc to allow 6mm wide 16g brass strip to be inserted & soft soldered quickly with a big iron.

Clevis hole drilled in strip which is then cut & radiused.

Photos show finished pin assembly and connection to servo using 2mm threaded rod when at fully closed & fully open ends of travel.



Tow release pin



Release in closed position



Release fully open

The brass guide tube set into the front block is 15mm long. If necessary, this could probably be removed and extended.

Re: 1/3 Scale T21 by Jilles Smits

by **Barry_Cole**

Posted: **28 May 2016, 18:42**

I was going to say that.....

Spike rules, KO...

BC

Re: 1/3 Scale T21 by Jilles Smits

by **spike spencer**

Posted: **28 May 2016, 18:31**

See also Barry's advice from an adjacent thread:

"My preferred way is to have the servo arm pointing straight forwards (Say 12.00) when the release is locked, and at the left or right when open. (3.00 or 9.00) Have the servo arm as short as possible so that you get just enough movement on the pin to go from locked to open"

You could unintentionally be adding unnecessary friction with your arrangement.

To avoid unnecessary side load on the pin, you could drop the servo down a bit so its inner holes are more in line with the release pin. The servo could be connected to a shorter pin with flexible 'Bowden' cable - it will be stiff when made to pull (release) but should be stiff enough to

close the pin when under no strain. Alternatively, a small closing spring on a shorter pin and butch fishing trace for the release pull.

Re: 1/3 Scale T21 by Jilles Smits

by **Barry_Cole**

Posted: **28 May 2016, 17:26**

Peter,

Steam Rules. KO

BC

Re: 1/3 Scale T21 by Jilles Smits

by **Peter Balcombe**

Posted: **28 May 2016, 17:20**

I was just thinking the same thing Barry 😊

I think I will try to arrange a flexible coupling of some sort to the servo arm.

Maybe I could solder a brass plate into a slit cut into the end of the steel release pin, then use a short crank to the servo arm which will take up the angular difference a bit like a steam locomotive piston crank.

I would think that the servo been put where it is so that it is far enough forward to keep it out of view from the very large & open cockpit, thus enabling a more scale like appearance.

Re: 1/3 Scale T21 by Jilles Smits

by **Barry_Cole**

Posted: **28 May 2016, 15:21**

Peter,

How are you going to attach the release rod to the servo arm??. The rod looks too large to bend as the arm makes a radius as it moves.

Is there any way you can move the servo back, and either get a flexible joint just behind that former, or just give the rod more length to flex??

It does not seem the best setup to me..

BC

Re: 1/3 Scale T21 by Jilles Smits

by **Peter Balcombe**

Posted: **28 May 2016, 14:58**

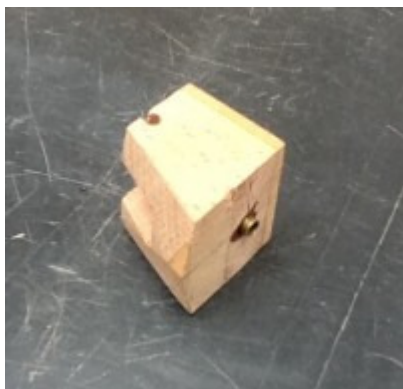
Moving on to the underside, the two landing skid hose mounting hard points fit into slots cut in the inner keels and the relevant formers (F5 & F7). Once epoxied in position, I packed out the 6mm space between the hard points and the outer keels with small hardwood strips in order to achieve a really solid fixing to the fuselage structure.



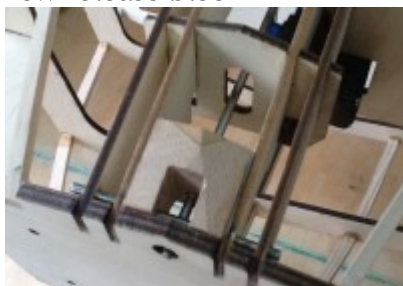
Landing skid hard points



Tow release block



Tow release block



Release added-bottom



Release & servo

At the front end, the tow release is a 3mm pin, running in a brass tube mounted in a hardwood block. The release pin passes just above a 3mm cross-pin which ties in the block to all four the keel pieces. The photos show two views of the block prior to fitting & then after fitting with the 3mm release pin visible, just poking through the hole in former F1.

The tow loop will be inserted via in a hole in the bottom of the fuselage immediately behind the nose block/F1.

Re: 1/3 Scale T21 by Jilles Smits

by **Peter Balcombe**

Posted: **27 May 2016, 16:00**

Moving on, the balsa fairings have been added immediately in front of the tailplane mounting area and also around the base of the fuselage pylon to support the upper fuselage & pylon ply skins to be added later.



Rear fuselage fairing



Pylon skin supports



Control column 1



Control column 2

Also, Cliff's 3D printed dual control column arrangement has been installed to check the centre console aperture and pivot mountings onto the front of F5. The columns move fore & aft, plus side to side.

Re: 1/3 Scale T21 by Jilles Smits

by **Barry_Cole**

Posted: **16 May 2016, 21:44**

The Wookie shows respectful silence.

Although in fairness, Motley and Mel tend to fly them like that....



BC

Re: 1/3 Scale T21 by Jilles Smits

by **Peter Balcombe**

Posted: **16 May 2016, 19:02**

Last of the forward stringers still clamped up & only the middle lower pair to epoxy in place now.

Thus, as promised, a few photos of the structure so far, including with my 1/4scale Oly to give some idea of the overall size of the beast 😊

The fin will increase in height by a few inches when the balsa top is added.



Hopefully, you can see the two seats and the centre console top which is removeable to give access to the rudder servo.

Yes I know it needs a second wing Barry 😊😊

Re: 1/3 Scale T21 by Jilles Smits

by **Peter Balcombe**

Posted: **15 May 2016, 19:35**

Most of the stringers are in now, so a picture of these in a day or so.

In the meantime, the fin assembly has been put together and attached to the fuselage.

Assembly of a completed fin assembly to the fuselage complete with stringers is a bit fiddly, but fairly easily achieved by inserting F20 at an angle behind its position in order to engage the stringers, twisting square & sliding forwards to engage the rear former over the stringers & slotting the bottom tabs into their slots in the fuselage bottom sheet.



T21 fin assembly



Fin assembly in place

An alternative may be to assemble the fin in situ, but this would need to be done in one go to make sure everything links together properly.

Note that FR2 is probably best being glued to the top of FR1 & the forward slot cut out to match that in FR1, then the pair will slide down F20. Otherwise you will need to split FR2 as the slot needs to go right to the edges of this fin rib!

Re: 1/3 Scale T21 by Jilles Smits

by **Peter Balcombe**

Posted: **12 May 2016, 12:03**

The rear fuselage goes together pretty easily once you have joined the front & rear parts of the fuselage top & bottom sections.

With the forward fuselage assembly laid on its side and propped up to put the vertical centreline parallel to the bench, former F11 is added along with the rear top & bottom sections, these tabbing into F10 & F11/K1 respectively. (Support the rear ends of the fuselage with a flat block at the appropriate height.)

The rest of the rear formers, except F17 & F18, fitting diagonally between the top & bottom fuselage can now be added as all of these tab into the fuselage top & bottom sections. (Make sure that you don't put in any of the rear formers upside down as they will tab in either way around - the tops are wider than the bottoms).

Do not fit F17 sub-assembly or F18 yet as these really need stringer S3 to be in place to locate onto the upper part of the fuselage structure.



Rear fuselage formers being fitted



Rear fuselage attachments



Rear T/P mount fitting

Methinks it is now time to splice up some 1/4" square spruce to get the various stringer in place to stiffen up the structure.

The fin sub-assembly can also be made up and fitted in place.

Re: 1/3 Scale T21 by Jilles Smits

by **Peter Balcombe**

Posted: **11 May 2016, 16:51**

The two seats build up as a seat pan plus seat back sub assembly.

The seat back then plugs into the pan unit to provide the finished seat, which will be slotted onto the appropriate formers later.



Seat assemblies



Tailplane fixing assemblies

Meanwhile, 3 small fuselage former sub-assemblies are built up (to provide the tailplane bolt down points and tailplane lower strut mount) before the rear fuselage is assembled.

Re: 1/3 Scale T21 by Jilles Smits

by **Peter Balcombe**

Posted: **10 May 2016, 19:49**

I am just building to the plan, using the laser cut parts supplied, so a lot of it is down to the

quality of Jilles' design and the accuracy of the cut parts.

Re: 1/3 Scale T21 by Jilles Smits

by **Peter Balcombe**

Posted: **10 May 2016, 13:02**

The very important wing mounting interface has now been checked and happily everything fits nicely.



Fuselage wing mount check



Wing attachment check

The photos below show the fuselage mounts checked to make sure I get 6mm rod through both mounts, then the real moment of truth checking that the wing mount spacing is the same as on the fuselage 🤖

Re: 1/3 Scale T21 by Jilles Smits

by **Peter Balcombe**

Posted: **06 May 2016, 12:09**

As mentioned before, the rudder servo mounting plate has to be fitted between the two centre console sides (K2) before they are dropped into their slots in the fuselage formers at the same time as former F7 is added.

Once the K2 pieces are in place, the remaining front formers F1 and F1A can be dropped into place.

Finally, the two side keels (K3) are added to tie the front end together.

The instrument panel F4 will be added next once the glue has dried on the newly assembled pieces.





The photos below shows progress so far, including the additional rectangular aperture cut into each centre console side to allow a scale dual control column arrangement to be fitted later on. (The forward horizontal slot is for the rudder horn, whilst the rear vertical one is for the control column).

Re: 1/3 Scale T21 by Jilles Smits

by **Peter Balcombe**

Posted: **05 May 2016, 15:25**

Not much relieving needed on my parts so far Jilles, mostly on the thicker formers, especially the really thick section formed by the F8/8A glued pair. 😊

The F8/F10 assembly has now been fitted to the two main keel pieces (K1), not forgetting to add F9 At the same time.

This assembly was checked to make sure that both main formers were square to the keel strips with the keels spaced above the workbench & also checked for side to side level before being left for the glue to set.

The photo below shows progress so far, with formers F2, F3, F5, F6, plus upper keel K4 fitted. Note that although the front former F1 is shown in place, it is not yet glued as this must be left until the K2 assembly is added.

The rudder servo mounting plate is tabbed and fits between the two K2 sub-keel/centre console sides. This is added later, at the same time as former F7, as the K2 tabs need to be engaged into F7 as it all slides down onto the main keel pieces.

Once the K2s have been fitted, the remaining instrument panel former & side formers can be added to make the front end structure look pretty much complete.



Fwd Fuselage structure started



Seat frame



F1A with aerotow servo mount

The other shots show one of the two seat assembly frames prior to adding the 0.8mm ply seating pieces, plus the F1A assembly complete with aerotow release servo. F1A must also be fitted after the K2 pieces have been put in place.

Re: 1/3 Scale T21 by Jilles Smits

by **Jilles**

Posted: **04 May 2016, 00:59**

The front fuse is a bit of a puzzle but during the computer design I looked into this and it is possible if you workout the order of getting parts together.

The slot relieving always seems necessary because plywood is sometimes a bit thicker than the nominal size

For local designs with parts cut in Australia I make the slots 0.2 mm wider and still need some relieving but do not want to make the slots too wide during laser cutting.

On this T21 design because of the size extra bracing are added. This also ensures that the parts go together straight, level and square without the need for making a Jig

Cheers

Jilles Smits

Re: 1/3 Scale T21 by Jilles Smits

by **Peter Balcombe**

Posted: **03 May 2016, 17:47**

Once F8/8A & F10 have been fitted with their wing attachment brackets, these can be linked with the pylon bottom (BR1) & sides (BR2) to form the first major fuselage assembly.

Note that I have glued these parts together only after having done a dry assembly check onto the keel pieces.

There are tabs on the pylon parts which locate all the pieces together nicely, but it is very difficult to add these parts once F8 & F10 on the keels as the parts then have little fore & aft movement.



F8/F10 sub assembly

F9 will be added shortly, when F8/F10 are fitted to the keels, which form the wheel box sides as part of their function.

The main wing attachment former (F8) is at the bottom in the photo below.

Re: 1/3 Scale T21 by Jilles Smits

by **Peter Balcombe**

Posted: **02 May 2016, 19:05**

Well, I don't think the Bridson jig will be needed after all for this build as the laser cut parts slide into each other (with a little bit of slot relieving here & there) to give a dry assembled basic forward fuselage structure before any gluing starts.

First jobs though, are to make up a few initial sub assemblies, such as gluing the main wing attachment area formers F8 & F8A together (hefty 6mm ply here as all the wing loads go through these formers!) and then bolting & epoxying the tungsten steel wing attachment plates to these formers.

Note that there are 2 types of upper attachment plates (short & long) and these need to be fitted with a short plate on the rear of F8/F8A and the front of F10, otherwise the plates will interfere with other items to be fitted between the formers later on.

The photos below show both sides of the F8/F8A former and the rear face of F10 once the wing & strut attachment plates have been added.



F8/F8A front



F8/F8A rear



F10 rear

I will try to identify a stage by stage assembly process for the forward fuselage section, as the interlocking of various parts using slots/tabs means that care has to be taken in the part assembly order to avoid making subsequent part assembly difficult/impossible without removing tabs.

Thus for example, do NOT start by trying to glue all of the main forward formers to the main keels as you will then be very likely to find it virtually impossible to fit other items without surgery.

Re: 1/3 Scale T21 by Jilles Smits

by **Peter Balcombe**

Posted: **30 Apr 2016, 18:49**

With the LE in place and roughly shaped, I will now hang the wing up safely out of the way and start the fuselage build.



LE fitted awaiting profiling

Now where did I put my Bridson jig? 😊

Re: 1/3 Scale T21 by Jilles Smits

by **Peter Balcombe**

Posted: **29 Apr 2016, 11:40**

Spoiler blade now fitted with the specified Dubro hinges and epoxied into place (although it can be removed by sliding out the hinge pins).

Larger than specified spoiler actuation servo mounted using hardwood blocks, which are then bolted onto the servo mounting plate. A short (approx. 65mm long) pushrod links servo to the spoiler horn. Everything works fine.



Spoiler servo from below



Spoiler blade core closed



Spoiler blade core open

Meanwhile, Jelutong LE strips are being glued into place ready for planing/sanding back to profile.

Re: 1/3 Scale T21 by Jilles Smits

by **Peter Balcombe**

Posted: **25 Apr 2016, 14:40**

D box skinning now completed and the aileron removed.



Wing with aileron released



Aileron with 1st LE sheet

Pic below shows first 1/4" layer of aileron LE glued into place. Final 1/4" layer will now be added before I sand to profile.

Re: 1/3 Scale T21 by Jilles Smits

by **Peter Balcombe**

Posted: **23 Apr 2016, 17:25**

With the upper D box skinning completed, the building tabs have been removed and the lower D box skinning is just over 50% complete.



Lower D box skinning

The strut mounting plates have been fitted as these penetrate the D box skins.

Re: 1/3 Scale T21 by Jilles Smits

by **Peter Balcombe**

Posted: **18 Apr 2016, 11:01**

Upper D box skin completed on the first wing using sections approx. 16" long, but adjusted to finish at nearest rib/sub-rib.

Each scarfed joint is supported by 1/8" balsa on each side of the rib. Additional 1/8" balsa support strips have been added at the rear of the main spar where more skinning will be added behind the D box (at root, spoiler, aileron root & aileron servo areas).

I used aliphatic glue to attach the skins (hence the pins & weights shown in earlier photos), but the white glue method as demonstrated by the AEB would probably be a better alternative.



Upper D box skinned

Next jobs are to add the lower D box skinning (to lock in the wing structure shape before the aileron is released), and also to sort out the spoiler blade fixing & servo mounts.

Re: 1/3 Scale T21 by Jilles Smits

by **Jilles**

Posted: **18 Apr 2016, 02:24**

Just from my own experience you can apply long ply sheets to a D-box when there is a constant chord. In other words the cross section is the same over the full length of the plywood

If the model is painted in the end it does not matter where ply joints are.

If you apply plywood in one go from top to bottom wrapped around the Leading edge (my favorite where ever I can) do not fit sections longer than 300 mm
6 mm balsa support under the ply scarf joints is a must.

Cheers

Jilles

Re: 1/3 Scale T21 by Jilles Smits

by **Peter Balcombe**

Posted: **16 Apr 2016, 11:41**

Three sections of upper wing skinning now in place.



Top wing skinning started

Joints between sections outboard of the spoiler area are on the D box sub ribs to avoid having a joint down the middle of a triangular rib capping gusset.

Re: 1/3 Scale T21 by Jilles Smits

by **Peter Balcombe**

Posted: **15 Apr 2016, 11:21**

Hi John,

Many thanks for that info about full size, which I wasn't aware of.

The T21 build has a false leading edge so I am only skinning up to this & adding solid L/E later, thus not that difficult with larger pieces.

However, I will revise to using 16" sections.

I am indeed adding balsa strips under the joins as glueing supports & an example is shown

below. The rib doublers I mentioned before are actually these balsa support strips either side of the rib wherever the joins are made.



Rib doubler strips for skin joints

In fact looking at this "doubler" position again, it needs to move outboard 2 rib bays to where the L/E has an angle change 😞

Re: 1/3 Scale T21 by Jilles Smits

by **john greenfield**

Posted: **15 Apr 2016, 10:45**

Peter

Putting the wing skins on in 4' sections will be more difficult that doing it in shorter sections and also not "scale" Almost all full size gliders I have looked at have the sheeting in 4' sections so at your reduced scale shorter pieces would be appropriate.

If you are scarf jointing all the sheeting you do not need the balsa strips under the joins ?

AEB

Re: 1/3 Scale T21 by Jilles Smits

by **Peter Balcombe**

Posted: **15 Apr 2016, 10:05**

Correction to my last post in that I had forgotten to add the root end shoulder spar, so that has now been done.

As I plan to initially skin the D box area & then add additional skins at root & spoiler areas etc. later, I have also fitted some 1/4" square balsa strips behind the spar in appropriate places as

rear skin glueing lands.



Spoiler area



Root area

Last pre-skinning job was to add balsa doubler strips around ribs where the skin pieces will have to be overlapped (every 4ft in my case)

Re: 1/3 Scale T21 by Jilles Smits

by **Peter Balcombe**

Posted: **12 Apr 2016, 12:34**

All the wing spars have now been fitted, including those for the shortened spoiler area as per the plan option for the earlier model T21. Note you need to decide which spoiler size you will need BEFORE you assemble the ribs onto the spars as the outboard spoiler rib placing is swapped with another as appropriate.

The balsa capping has also been added each side of the main spar & sanded back to the rib profile.

The substantial Dubro hinges have been ordered ready to install the spoiler blade. I really like the way that Jilles has provided a solid recess to seat the blade when closed.



Aileron spars



Wing root fixings



Spoiler spars



T21 spoiler

The wing root mounting plates have also been fitted and the brass tube fit checked. I will delay soldering these in place until I have checked the fit to the fuselage mounting points.

Next up is to start fitting the D box sheeting.

Re: 1/3 Scale T21 by Jilles Smits

by **Jilles**

Posted: **07 Apr 2016, 00:37**

Good to see the hours I spent on the design were worthwhile and a model is in the making. with today's laser options one can do so much more in large scale. Nothing wrong with hand cutting parts but in that case I would go for

4 mm solid balsa ribs instead of 3 mm ply wood, unless you have plenty of time and patience. 4mm solid balsa ribs would be structural the same strength as 3mm plywood open structure ribs. the overall weight would be close to the same for both options. No matter how good you are, Laser is so much more accurate than the best hand cut parts.

Cheers

Jilles Smits

Re: 1/3 Scale T21 by Jilles Smits

by **Peter Balcombe**

Posted: **03 Apr 2016, 11:18**

First wing structure now more or less assembled to give a feeling for the completed structure.



1st Wing build_root end

All joints now to be made good, aileron spars, attachment metalwork and spoilers fitted.

Re: 1/3 Scale T21 by Jilles Smits

by **Peter Balcombe**

Posted: **30 Mar 2016, 17:30**

Olympia now finished, so back to the T21 🤔

I have decided to press on with the first wing build, so the rear spar assembly has been made & is shown below with main spar and most of the ribs, ready to start the overall wing assembly.

First marked all the rib positions on both the main and rear spars to make sure that they are correctly positioned. The front and rear of the ribs locate in slots in the dummy leading edge & the trailing edge pieces.

Having checked that all ribs slide along the main spar to the relevant point and the rear spar slots into the relevant rib holes, it's time to slide all the ribs into place in the correct order from the tip end, remembering to include R8 which only slides onto the rear spar assembly. Note that the rib numbering is not in strict numerical order, so double check the order and also that they are all in place BEFORE you start glueing.

Once satisfied that all is correct, it's a matter of adding the D box sub ribs & dummy L/E sections as you glue all ribs into place, not forgetting to fit the two servo plates between the appropriate ribs as you go.



Wing parts



Wing build started

The pics below show the main parts and then the ribs slid into place over the plan and glueing started from the root end.

Re: 1/3 Scale T21 by Jilles Smits

by **Peter Balcombe**

Posted: **15 Feb 2016, 20:08**

Thank Cliff.

First main spar assembly now complete and Fuselage/strut attachment brackets check fitted.



Completed main spar



Main spar_Fuz attachment point



Strut attachment point

I will make the first rear spar next when I get bench space again.

Re: 1/3 Scale T21 by Jilles Smits

by **Peter Balcombe**

Posted: **14 Feb 2016, 13:35**

1st spar now fitted with root end doublers and carbon strip outboard of doubler end.

The 2 hardwood blocks have also now been shaped and epoxied into position.



Spar with carbon outboard



Spar with mid & root blocks

The front webbing assembly will be added tomorrow to complete the box, which just leaves the fuselage & strut attachment bolt holes to be drilled through using the laser cut webbing holes as guides.

Re: 1/3 Scale T21 by Jilles Smits

by **Peter Balcombe**

Posted: **11 Feb 2016, 13:45**

Have started build up the first main spar assembly during a brief lull in other build programmes. The main spar is built as substantial box spar assembly with continuous ply webbing front and back from root to tip.

The spars themselves are 1/2"x1/4" spruce, doubled from root to mid section where the strut attaches.

The wing/strut attachment fittings are specified as chrome steel which bolt to the wing main &

rear spar assemblies.

The lower wing spar face has a noticeable taper change after the strut attachment on the outboard section.

All of the main ribs have a rectangular hole cut in them for the main & rear spar assemblies, allowing each rib to be slid along the completed spars. The void between the outer edge of the spars and the wing surface is filled with balsa, sanded to the surface profile.

Instead of splicing up many 36" lengths of spruce to make up the spar strips, I have used 2.4m lengths of 8mm x 4mm pine strip available from B&Q, bonding these in pairs to make up each (slightly over thickness) spar strips, albeit with a 300mm extension spliced onto the tip end to give the overall spar length. However, a bonus is that the lower spar taper change can be more easily accommodated, so a preformed lower spar strip was glued up.

The downside is that the spar strip is thicker (8mm), so I need to reduce the root end spar doubler to a single 4mm strip to achieve the same overall spar thickness, thus deviating slightly from the plan. However, I should still have at least the same minimum spar thicknesses everywhere.



Main spar webbing & top spar strip glued



Main spar webbing & lower spar strip glued



Root spar block



Strut location spar block

I have now glued the outer spar strips to a pre-assembled ply rear webbing strip.

The front webbing strip is shown on the photos below alongside the build. This webbing has slots cut in it to locate the rear of each D box sub-rib.

Also shown below are the root and strut attachment point blocks, constructed from strips of 1/2" x 1/4" spruce strip. These will be profiled to the plan shaped before being securely epoxied in place as they transfer wing stresses to the wing attachment fittings.

Re: 1/3 Scale T21 by Jilles Smits

by **Jason Griffiths**

Posted: **31 Jan 2016, 15:30**

Looking very nice Peter, looks like you are doing a excellent job as always 😊

Re: 1/3 Scale T21 by Jilles Smits

by **Peter Balcombe**

Posted: **31 Jan 2016, 10:10**

Tailplane structure now completed.



The parts are going together really quickly.

Re: 1/3 Scale T21 by Jilles Smits

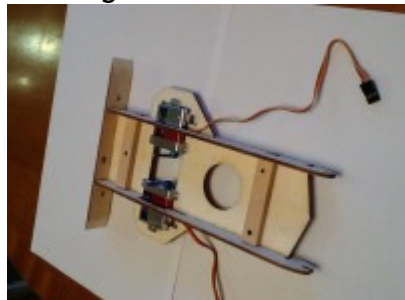
by **Peter Balcombe**

Posted: **30 Jan 2016, 16:56**

Tailplane centre section assembly built and servos fitted.

Photo shows underside of the assembly with the 2 Turnigy 225MG elevator servos used in place of Jilles' suggested A55H types.

The large circular hole is where the fuselage mating connector goes.



Tailplane centre assembly

This assembly will now be glued onto the front of the previously built spar assembly prior to adding ribs & false L/E pieces.

Re: 1/3 Scale T21 by Jilles Smits

by **Peter Balcombe**

Posted: **29 Jan 2016, 16:33**

Rudder framework assembled



Rudder framework less diagonals
(3 diagonal ribs still to be fitted).

Re: 1/3 Scale T21 by Jilles Smits

by **Jilles**

Posted: **27 Jan 2016, 23:59**

You are lucky to get 6" wide balsa sheets these days here in Australia

I was informed by my supplier that because balsa is now all plantation grown they do not wait until the trees are big enough to cut 6" wide sheets.

However with the ply/balsa/ply construction it does not matter if you have a (glued) butt joined in the balsa

Re: 1/3 Scale T21 by Jilles Smits

by **spike spencer**

Posted: **27 Jan 2016, 08:33**

Nice one, Peter. That is going to be an enormous thermal-sniffer - but, if its performance is Scale, don't be tempted to get too far downwind !!

Ply/Balsa/Ply sandwich is a great material. I have used it several times on models of all sizes. The joy is that you can make any thickness you want and it responds well to all cutting methods (especially the laser). 0.4mm/3mm/0.4mm for small electric models to 1.5mm/6mm/1.5mm or even larger. The easiest way I have found to produce it has been to make up sheets of 6" wide balsa by the usual tape and glue method, then after that glue has cured and the joint sanded to clear any nibs, spread glue over the whole area and pop the lot into a vacuum bag for a couple of hours. This ensures intimate contact across the whole sheet while curing.

I have used both aliphatic and PU glues for these wide sheets, both easy to spread and will cure quite quickly. Neither type has yet failed on me. I keep finding and using old offcuts from my scrap box. 😊

Re: 1/3 Scale T21 by Jilles Smits

by **Jilles**

Posted: **27 Jan 2016, 03:03**

Those laminated spars from balsa with plywood liners are a weight saving effort.

I learnt this from my early Goevier model built from somebody else's drawings where even the fuse formers are made like that.

It takes a bit more building time but is worth the effort on a short nosed design like the T21 every extra gram at the tail is 6 gram more lead in the nose.

1/3 Scale T21 by Jilles Smits

by **Peter Balcombe**

Posted: **25 Jan 2016, 14:59**

Just started the test build of this large woodie from Jilles Smits.

As for the Bocian built last year, the laser cut short kit has been provided by Cliff Evans, with many ply parts which appear to slot together very nicely.

As workbench space is currently a bit limited, owing to a few jobs still to finish on my current Olympia (VV401) build, I am starting with the tail feathers. Having said that, the tailplane spans 1.2m!!



Tail spar assemblies



Elevator framework

First shot shows the tailplane and both elevator spar assemblies which comprise ply parts either side of 4mm balsa. The next shot shows the first elevator assembly once the ribs & T/E have been added, with the 2nd elevator partially assembled.

