

Scale Soaring UK

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

1/4 Scale Charlesworth ASK13**

<https://scalesoaring.co.uk/phpBB3/viewtopic.php?f=12&t=2709>

Re: 1/4 Scale Charlesworth ASK13

by **Peter Balcombe**

Phew, well done Cliff 😊

Page 1 of 1

Posted: **12 Jul 2020, 14:41**

Re: 1/4 Scale Charlesworth ASK13

by **Cliff Evans**

Posted: **12 Jul 2020, 14:25**

Just maidenied the K13 at Sandhays. Flew straight off the tow, no trim change.



Just 1 sticky air brake to sort out.

Re: 1/4 Scale Charlesworth ASK13

by **Cliff Evans**

Posted: **19 Jun 2020, 11:03**

Peter has finished the glazed canopy now.



note the 3d printer clearview window runners.

Re: 1/4 Scale Charlesworth ASK13

by **Cliff Evans**

Posted: **12 Jun 2020, 10:48**

Here is the full size:



We have produced both canopies for it, winter/summer!

Re: 1/4 Scale Charlesworth ASK13

by **Cliff Evans**

Posted: **12 Jun 2020, 10:45**

Yes, Callie Graphics in the States she is very good, very quick and reasonable prices! they cost me \$12 including postage!

<https://callie-graphics.com/>

Re: 1/4 Scale Charlesworth ASK13

by **VinceC**

Posted: **12 Jun 2020, 08:38**

I drew it out and it was printed by Callie Graphics

Re: 1/4 Scale Charlesworth ASK13

by **chris williams**

Posted: **11 Jun 2020, 20:50**

Nothing boring about that finish...! How was the fin/rudder graphic made?

Re: 1/4 Scale Charlesworth ASK13

by **terry white**

Posted: **11 Jun 2020, 15:13**

Very nice Cliff.

Re: 1/4 Scale Charlesworth ASK13

by **Cliff Evans**

Posted: **11 Jun 2020, 09:07**

Getting there!



Getting there!

Re: 1/4 Scale Charlesworth ASK13

by **Peter Balcombe**

Posted: **30 Mar 2020, 19:20**

With forward instrument panel mounting plate in place just forward of the front of the cockpit opening (a bit further back than the rear of Former 2 as shown on the Charlesworth plan), it was clear that the Cabriolet canopy forward structure was going to have to be removed in order for any pilot to see the panel when using this canopy arrangement.

Thus, I marked a hoop line on the Cabriolet forward face & then set about removing the surplus material & entire front framework whilst glassing the inside of the canopy skin to stiffen up what was left.

The forward structure was removed in 2 bites. The central part only was removed initially, with the accessible skin then painted with epoxy.

The remainder was then removed and the whole front end internally glassed with a couple of layers of lightweight cloth.





With the Cabriolet canopy fitted in place, it is clear that the forward instrument panel will be visible.

It would probably be possible to undertake a similar process to remove the rear cockpit framework, but the rear face of this is pretty close to where the instrument panel needs to go.

The dowel visible in the rear cockpit is a 3/8" removeable dowel which acts as a compression strut between the wing root LE. (This fits in place just in front of the pilot figure for flight).

Re: 1/4 Scale Charlesworth ASK13

by **Peter Balcombe**

Posted: **27 Mar 2020, 15:49**

Rear console now installed using short brass tube stubs. One of the carbon rods is retractable to allow fitting/removal.

The tail skid has been made from a piece of hard aluminium sheet & then fixed using 2 small screws.



Cliff 3D printed the rubber shock absorber.

Finally, some 1/8" Sq. Balsa strip has been epoxied to the lower fuselage to provide a bonding surface for either thin ply plates or direct covering to simulate the canvas shroud fitted between main skid & fuselage.

Re: 1/4 Scale Charlesworth ASK13

by **Peter Balcombe**

Posted: **27 Mar 2020, 00:10**

Time to sort out the seat fixings, so used the Cabriolet canopy to get both fore & aft, plus height correct using a sample pilot figure.

Cliff had made up the two seats from thin ply, so these were secured to pads mounted on spruce cross rails, which themselves slot into Liteply plates glued to the fuselage sides. This arrangement allows the whole lot to be removed for painting or adjusted in height later if required.

The pilot figure height is largely determined by the need to keep the rear pilot head a little lower than the top of the fuselage to ensure no bulge is required in the enclosed canopy moulding!!

As it happens, the shoulders are just below the Cabriolet canopy coaming, which is about right according to pics of the full size.





The rear cockpit instrument console box will be installed next, but this must be removable as it would normally project above the fuselage cockpit coaming level. It would interfere with the central part of the Cabriolet canopy frame.

Re: 1/4 Scale Charlesworth ASK13

by **VinceC**

Posted: **25 Mar 2020, 09:44**

I did the same on my Weihe, but with Vinyl cloth and secured to the skid using a length



of thin aluminium cut from lithoplate 'nailed' to the skid using model railway track pins cut very short into predrilled holes

Re: 1/4 Scale Charlesworth ASK13

by **Peter Balcombe**

Posted: **24 Mar 2020, 10:47**

Hi Jilles,

Yes, Tweety has what looks like a crinkly canvas cover over the gap between fuselage & skid, with everything below the main fuselage line, from front of skid to rear of wheel fairing painted red to stand out from white lower fuselage.

I covered the gap on my Oly 2b with 0.4mm ply side plates to replicate the silvered canvas covering.

Luckily everything has stayed put - so far 😊

Peter

Re: 1/4 Scale Charlesworth ASK13

by **Jilles**

Posted: **24 Mar 2020, 00:36**

Hi Peter

looking good. Just my view on skids in general. My experience with skids is that they are the first item to come apart or get damaged. on full scale as well. If you do not land straight or cross wind more than likely they will be twisted off the fuse. With an open construction as this I would fit the skid not too firm. If it has to come off it will minimize damage to the main fuse construction. I am pretty sure that on the original you would not see those rubber blocks because the sides are covered with a green colored canvas. This was done to minimize drag and preventing built up of dirt on the skid.

On most of my glider designs with covered skids the fuse formers are extended to support the skid and support for the canvas side surfaces with on the model will be 1 mm ply painted green, Filling the spaces in between the formers with balsa would help as well

In later life of the ASK13 you could get a kit to fit a nose wheel at the front then a skid was not required anymore

Cheers

Jilles

Re: 1/4 Scale Charlesworth ASK13

by **Peter Balcombe**

Posted: **23 Mar 2020, 19:05**

Nose now filled & fuselage glassed with lightweight cloth & epoxy resin.

Once the glass had been rubbed down, it was time to fix the 3 main skid shock absorbers in place by epoxying suitable split pins into pre-prepared holes.

Cliff has been able to 3D print the shock absorbers using a rubber look-alike material, these can then be fitted using short lengths of piano wire through the split pin eyes.



With a rear clamping strip made up from 1/4" brass strip, its time to trial fit the 1/8" spruce strip skid, using screws at the front & the clip at rear.

Once the fuselage has been painted, the skid can be screwed & glued at the front. The rear clamp allows the skid to slide through as it deflects under load.

Just the 1/4" triangular balsa shock absorber chocks to be added on fuselage & skid now to complete this area.

Re: 1/4 Scale Charlesworth ASK13

by **Peter Balcombe**

Posted: **03 Mar 2020, 15:31**

Time to cover the wings after sorting out the fuselage fit.

Extra nose weights blocks also added after checking rough balance position, which comes out 20mm or so behind the rearmost point - so plenty more still needed!!



With the weights added, the nose can now be filled and shaped before the fuselage is glassed.

Re: 1/4 Scale Charlesworth ASK13

by **Peter Balcombe**

Posted: **19 Feb 2020, 17:21**

The canopy locking tabs have now been fitted.

The full canopy tab/tube has been fixed to the actuation rod using a smear of epoxy, whilst the Cabriolet tab has been soldered to the actuation rod adjacent to the rear catch. (This is less visible & can easily be got at via the open cockpit.



Full canopy from outside



Full canopy from inside



Cabriolet release tab



Nose weights

I have also been busy making Plaster of Paris moulds for the 4 cast lead nose weights. (Sat on CH boiler for a couple of days to really dry out - otherwise the hot lead releases the moisture as steam & spatters lead everywhere 😬)

Having now safely cast these, they come out at a total of 1.75lbs, so I will initially only glue in the 2 smaller ones, pending a model assembly for rough balance check - just in case I don't need it all 😊

Re: 1/4 Scale Charlesworth ASK13

by **VinceC**

Posted: **16 Feb 2020, 13:40**

I have a kit I got from a deceased local modeller of the HP-18 Pat Teakle kit. I



used to have one years ago and enjoyed it and for £20 I couldn't turn it down. This is the example I am following, but build time is extremely limited as my wife is in Hospital

Re: 1/4 Scale Charlesworth ASK13

by **Barry_Cole**

Posted: **16 Feb 2020, 12:48**

VinceC wrote: ↑16 Feb 2020, 10:46

Very neat indeed. I might use that on my present model

So what are you building Vince???



BC

Re: 1/4 Scale Charlesworth ASK13

by **Peter Balcombe**

Posted: **16 Feb 2020, 12:44**

Many thanks Stephen.

I think that I fitted 4 off 6mm diameter magnets on my Fauvette canopy & they were fine.

Peter

Re: 1/4 Scale Charlesworth ASK13

by **StephenB**

Posted: **16 Feb 2020, 12:28**

A very neat job on the canopy retention mechanism Peter, first class workmanship as usual. And scale too!

Having seen this I'm wondering if the magnets I currently have installed for the canopy retention on my Fauvette are up to the job!

Re: 1/4 Scale Charlesworth ASK13

by **VinceC**

Posted: **16 Feb 2020, 10:46**

Very neat indeed. I might use that on my present model

Re: 1/4 Scale Charlesworth ASK13

by **Peter Balcombe**

Posted: **15 Feb 2020, 22:07**

Although the Cabriolet is now ready for the locking mechanism to be installed, I decided that I would get the alternative full canopy sorted first. The idea is then that I can get the more visible Full canopy release mechanism sorted and then mate the Cabriolet canopy to the fuselage locking system.

So ... with a set of new full canopy frame parts kindly cut by Cliff, the basic canopy frame was quickly put together & hinged as for the Cabriolet version.

The full size uses a long locking rod on the LHS which slides in bushes in each cockpit & engages in short tubes immediately forward of each bush. Short handles are welded to the rod in each seating area just forward of each clear view screen to allow the handles to be reached via the screens from the outside.

However, reaching in through the screen often leads to damage, so a modern Mod. is to have a short handle welded to the locking rod, which moves in a rebate cut in the lower surface of the canopy frame, either at the front or middle of the canopy, for external release purposes (Many thanks for the info. Gordon).



Ext. Release at canopy front



Locking rod on LHS



Canopy locked



Canopy open

I bent up a length of 16 SWG wire to replicate the release rod & then made bushed plates (as per the fuselage side of the canopy hinges) which were glued & screwed to cockpit coaming & canopy frame in 2 places.

The external release is still to be made & fitted, but this will essentially be another bushed plate which will be cyanoed to the locking rod in the appropriate position to suit a rebate yet to be cut in the canopy frame.

Re: 1/4 Scale Charlesworth ASK13

by **Peter Balcombe**

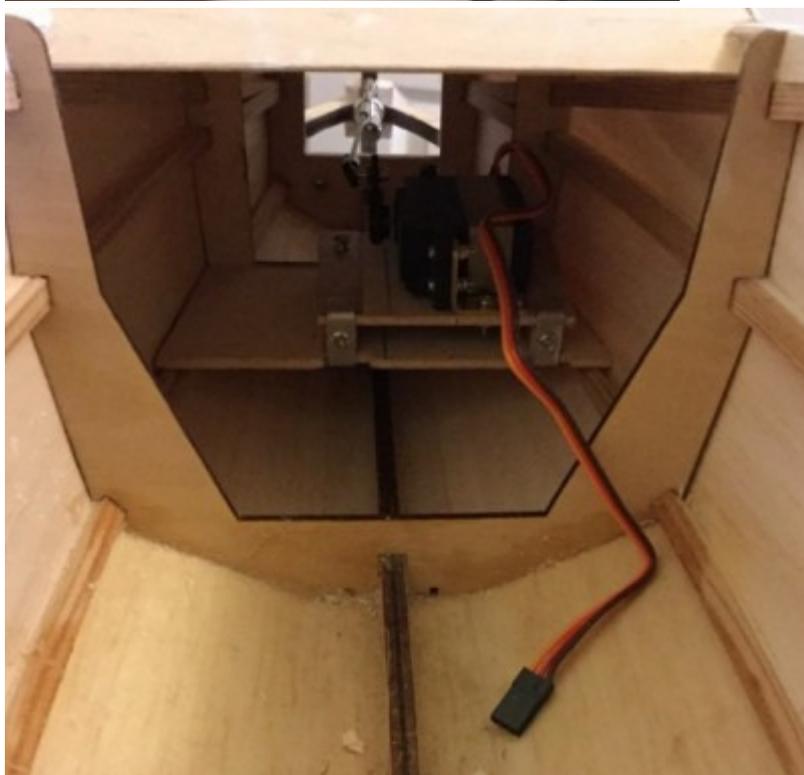
Posted: **10 Feb 2020, 20:54**

With the nose release in position, the release servo installation has been completed & actuation pushrod installed.

After a false start, I decided to fix a 3mm Liteply plate across the fuselage immediately behind the 2nd former. The servo plate then clips onto this plate at the front & is secured using a couple of rear brackets, allowing it all to be removed if necessary.

Meanwhile, although the Cabriolet canopy was originally built to Jilles' plan and used 2 pegs at the rear, plus a sprung loaded catch at the front for fixings, it has now been modified to replicate the full size hinges to allow either the Cabriolet or closed canopy to be fitted interchangeably.

Current status shows the Cabriolet canopy hinged on the RHS, but not yet secured on the LHS. Simple pin hinges were made using 1/4" wide brass strip , plus 16 SWG brass rod & tube which could be easily soldered together. The fuselage side of the hinge has 2 tubes, whilst the canopies have 2 pins. The hinge pieces are all glued & screwed to the respective frame parts. The plan is to make the catch using a similar tube/sliding pin arrangement. The full size has 2 locking pins, connected by a rod so that the canopy can be released from either seating position/via the ventilation sliding ports.





Balsa pieces have been shaped for each of the 4 nose block quadrants, so the next job is to make up some moulds to allow pieces of church roof to be cast & then epoxied into place 😊

The final piece of upper turtle-deck has also been fitted as well as small spruce blocks in the cockpit floor where the skid rubber retaining split-pins will be secured later.

Re: 1/4 Scale Charlesworth ASK13

by **Elliot Howells**

Posted: **02 Jan 2020, 13:29**

you old guys! so easy to wind up xx

Re: 1/4 Scale Charlesworth ASK13

by **John Vella**

Posted: **02 Jan 2020, 00:51**

Elliot Howells wrote: ↑01 Jan 2020, 13:45

Peter, that's a great idea!

you can swap the aerotow nose out for the SLES nose when you've not got a tug to hand 😊

Happy new year! Elliot.

Me thinks you're joking Elliot, but you are abit early for April Fool. Happy New Year , John.

Re: 1/4 Scale Charlesworth ASK13

by **Cliff Evans**

Posted: **01 Jan 2020, 21:45**

Elliot Howells wrote: ↑01 Jan 2020, 13:45

Peter, that's a great idea!

you can swap the aerotow nose out for the SLES nose when you've not got a tug to hand 😊

Happy new year! Elliot.

Noooooooooooooooooo!!!!!!!!!!!!

Re: 1/4 Scale Charlesworth ASK13

by **Elliot Howells**

Posted: **01 Jan 2020, 13:45**

Peter, that's a great idea!

you can swap the aerotow nose out for the SLES nose when you've not got a tug to hand 😊

Happy new year! Elliot.

Re: 1/4 Scale Charlesworth ASK13

by **Peter Balcombe**

Posted: **01 Jan 2020, 13:29**

A bit more work over the last couple of weeks.

The main visible progress is that I have decided to replace the solid hollowed out hardwood nose cone as suggested on the plan with two CNC parts cut to form an interlocking 1/4" Ply nose assembly cruciform which is then drilled out to take a commercial tow release.

The cruciform is epoxied to a backing plate to allow bolting/glueing to the fuselage front former whilst still allowing good access to the release mechanism.



Nose cruciform/Release fitted



Church roof can be added before the outside is filled & shaped to the nose profile.
The photos show the basic structure with small balsa blocks added to support the front drilled joint, plus a claw type release fitted.

Re: 1/4 Scale Charlesworth ASK13

by **Peter Balcombe**

Posted: **08 Dec 2019, 17:57**

Many thanks Geoff.

This wing is from the new CAD version of the Charlesworth wing design, so Cliff Evans should now be able to supply the parts as an alternative to the original Charlesworth version.

The wing spar assembly uses interlocking ribs & spar webs, plus top & bottom spars, rather than the Charlesworth method of making up the spar box & fitting rib sections to front & rear. The false LE is also notched for rib tabs & the ribs have pre-cut spar notches. Building tabs on each rib should ensure the correct washout is automatically built in.

The RH wing is from the original Charlesworth short kit set, so the maiden will soon identify any differences 🤖

Re: 1/4 Scale Charlesworth ASK13

by **Geoff Pearce**

Posted: **08 Dec 2019, 12:47**

Looking very nice Peter,l

Looking very nice Peter,l

Re: 1/4 Scale Charlesworth ASK13

by **Peter Balcombe**

Posted: **08 Dec 2019, 11:32**

D box & root end skinning now complete on the LH wing,



with aileron still to be cut out, LE, tip and all rib cap strips to be fitted.

Re: 1/4 Scale Charlesworth ASK13

by **Jilles**

Posted: **08 Dec 2019, 01:41**

Hi Peter. nice touch that scale like operating trim tab. However it is working the wrong way. When set to a certain setting the trim tab should move the opposite way to the elevator movement. If the elevator moves up the trim tab moves down relative to the elevator and the other way around

All Schleicher models from K6CR to ASK13 had this feature except those with the all flying tail plane like K6E

If the glider needs down trim the elevator needs a down thrust that is achieved by the trim tab going up.

I did experiment this on a full scale K8, by keeping the stick(elevator) in a fixed(blocked) position. One can then control pitch by the trim tab only. but moving the trim lever forward resulted in nose up and they other way around.

Re: 1/4 Scale Charlesworth ASK13

by **Peter Balcombe**

Posted: **05 Dec 2019, 12:41**

Moving back to the wings, I have have progressed the LH wing top surface around the brake box & covered the D box to the start of the last bay.



Next job is to tackle the root end which tapers down towards the next rib.

Re: 1/4 Scale Charlesworth ASK13

by **John Vella**

Posted: **02 Dec 2019, 01:04**

Robbie, if you look at the pics of my K8 you can see that the Flettner Tab system is quite a noticeable feature. I am modelling a scale glider and the extra load on the elevator system is minimal and my servo and double battery system is well able to cope .



PS the elevator loads on the full-size are rather light, and the system was put in to deal with ham fisted abinitio pilots. Regards John.

Re: 1/4 Scale Charlesworth ASK13

by **Peter Balcombe**

Posted: **01 Dec 2019, 23:18**

Robbie,

As I said earlier, the trim tab operation happens to be scale, but was chosen to simplify model rigging - slot the tailplane on without any need for separate elevator or tab linkage connection



(Same form of operation on the original Charlesworth Olympia 2b plan & my VV400 flies very well with a standard analogue servo).

Peter

Re: 1/4 Scale Charlesworth ASK13

by **RobbieB**

Posted: **01 Dec 2019, 22:49**

I'm very familiar with the operation and principle of Flettner-type trim tabs in all their guises - numerous years experience with them on big ship's rudders was my first introduction and experience with those boys.

My point is, why introduce something into a model, purely in the interest of scale that is not in the best interest of a servo doing its best to operate the control surface - it's a servo, not a human. It serves (no pun intended) no useful purpose other than scale fidelity and will have a detrimental effect on the servos performance and power consumption.

Scale versus logistics? In this case, for me, logistics wins hands down - all cons and no pros.

I now await my lashing from the Scale Police with baited breath.....

Re: 1/4 Scale Charlesworth ASK13

by **John Vella**

Posted: **01 Dec 2019, 15:50**

RobbieB wrote: ↑01 Dec 2019, 14:49

Peter, why would you want an anti-servo tab on a servo operated control surface?

Set up as that, the servo is trying to move the elevator up and the tab is trying to push it down again. Anti-servo tabs are designed to put some 'feel' into the stick with a pilot on the other end of it, not a servo. It's just making the servo work harder.

Robbie, the reason for doing it is because it imitates the movement of the full size K13. On my Charlesworth K8 as the tailplane is normally left rigged the push rod comes from a quadrant on the fuselage under the tailplane. The tab movement thus follows the full elevator travel in a scale antibalance fashion. This scale setup has worked well for many years. In the event of derigging one mini lock nut on the end of the push rod is undone. Regards John.

Re: 1/4 Scale Charlesworth ASK13

by **Peter Balcombe**

Posted: **01 Dec 2019, 15:20**

Robbie,

That is just the way it happens to work with the push rod fixed to the tailplane in order to make rigging easier (the tailplane comes off complete with trim tab pushrod attached & happens to work in a similar way to the elevator tab on the Charlesworth Oly2b - its just that on that model the tab pushrod goes from a horn on the bottom of the tab to a horn on the top of the tailplane).

On the full size ASK13, the elevator trim tab pushrod connects to a bellcrank inside the fuselage just below the elevator half connection, which in turn is operated from the trim levers in both cockpits.

The trim tab on a K13 is not just a trim tab it is also an anti-servo tab.

In trim mode the tab moves the opposite way to the elevator. ie if trimmed forward (nose heavy) then the tab will move UP which forces the elevator down.

In Anti servo mode as you move the elevator the tab moves the same way as the elevator, which increases the load on the stick the further the stick is away from the elevator neutral position. Viewed from outside, the trim bellcrank moves the same way as the elevator with zero deflection of both elevator and trim tab happening at about the same point. The trim effect is to move the zero deflection of the trim tab point to either elevator 1/3 up or 1/3 down.

Hope this makes sense, but I happen to have used the anti-servo mode on the model in order to simplify rigging.

Peter

Re: 1/4 Scale Charlesworth ASK13

by **RobbieB**

Posted: **01 Dec 2019, 14:49**

Peter, why would you want an anti-servo tab on a servo operated control surface?

Set up as that, the servo is trying to move the elevator up and the tab is trying to push it down again. Anti-servo tabs are designed to put some 'feel' into the stick with a pilot on the other end of it, not a servo. It's just making the servo work harder.

Re: 1/4 Scale Charlesworth ASK13

by **Peter Balcombe**

Posted: **01 Dec 2019, 13:44**

The tail feathers have now been covered with natural Solartex and the elevator assembly attached to the tailplane as shown below.

A short piece of piano wire goes from the trim tab horn to the underside of the tailplane between the elevator horn and RH tailplane locating pin, just forward of the elevator hinge spar (where a full depth balsa block was installed to fix the tailplane locating pins).

A couple of small bends on the wire allows the wire to clear the elevator during full movement. The result causes the trim tab to act as an anti-servo tab.



Rudder & Tailplane



Trim tab operation



Fuz skinning nearly done

Meanwhile, up forward - a couple of 0.8mm ply turtle deck sections have been fitted plus the outstanding side sections to finish the skinning apart from the final front turtledeck section over the servos & a bit of fairing around the rear of the root rib once the angled ends have been finally fixed.

Re: 1/4 Scale Charlesworth ASK13

by **Peter Balcombe**

Posted: **27 Nov 2019, 13:02**

A couple of bits of rework have been done on the fuselage servo installation & wheel mounting.

I decided that having a remote rudder crank behind the servo area was going to make any maintenance tasks very difficult once the turtledeck had been completed, restricting access to the front only (unless you have a removeable turtledeck section above the wing joiner area). An extended rudder servo arm has thus been bolted to a servo disc & the servo raised slightly to ensure that the C/L wires pass above the elevator pushrod.

The 2nd issue was that with the mainwheel now available, the space between the wheel pant sides was going to be insufficient to get the wheel in once I had fitted the two 20G aluminium axle supports. Thus the wheel pant had to be removed, a couple of mm taken off the sides of the fuselage former slot & everything put together again 🤔
However, once done (and the inside of the new wheel pant re-glassed) there is ample space.



Wheel fairing etc.



Forward skid mount



Revised fuselage servos

With the wheel installation sorted, the hardwood skid rear mount and aft balsa fairing have been fitted & roughly shaped.

The skid has also been cut from 1/8" Spruce sheet and the hardwood forward skid mount made & fitted.

Re: 1/4 Scale Charlesworth ASK13

by **Peter Balcombe**

Posted: **20 Nov 2019, 21:05**

The elevator trim tab now has a (longish) horn fitted and has been hinged - although the outer hinge pin can be removed to remove the tab for covering etc.



Talking of which, the next job here is to cover the structure before the elevator is fixed to the tailplane

Re: 1/4 Scale Charlesworth ASK13

by **Peter Balcombe**

Posted: **17 Nov 2019, 13:58**

The 2 pics below show the full



size elevator trim tab & pushrod for info.

Re: 1/4 Scale Charlesworth ASK13

by **Peter Balcombe**

Posted: **17 Nov 2019, 12:35**

Further progress has been made to install the Rudder & Elevator servos on a tray in the fuselage, plus make up the elevator push rod from a length of thick walled carbon tube as shown below.

The rudder has also been hung and now just needs a few rib cap strips to complete.

The elevator has also progressed to install the hinge plates, and then the rib capping once the trim tab aperture had been cut out.

The plan appears to show a solid tab, but I cut off the tab area from the built-up structure & faced the LE prior to sanding a curved LE as shown.



Elevator crank connection



Fuz servo tray



Rudder hinged



Elevator nearly done



Trim tab

Although the Charlesworth plan shows a hinged tab, it doesn't mention any method of tab control.

The full size K13 has a longish horn mounted on the top of the inboard end of the tab, with a push rod connecting this horn to a bellcrank under the rear of the tailplane within the fuselage opening. The bell-crank is operated by trim levers in each cockpit. The push rod passes the inboard end of the elevator & disappears into the fuselage opening near the elevator connection.

For our purposes, the forward end of the push rod can be fixed to the bottom rear of the tailplane to make rigging easy. The trim tab should then appear to work as an anti-servo tab as on the Charlesworth Olympia 2b.

The rudder servo will connect to an intermediate rudder bar to achieve the correct C/L same connection spacing as on the rudder horn.

Re: 1/4 Scale Charlesworth ASK13

by **Peter Balcombe**

Posted: **12 Nov 2019, 19:30**

Today's job has been to revise the elevator horn/pushrod attachment method to ease rigging in due course.

The following method was used successfully on a Charlesworth Olympia 2b and allows the tailplane to be easily placed in position without any need for coupling up the elevator pushrod.

A 16SWG cross pin is soldered into the elevator horn as shown below and this is arranged to be able to drop into a slot in an upright pivoting arm, actuated as normal from a long pushrod down the fuselage.

The pivoting arm is made from 4 strips of epoxy board, epoxied together as shown. The outer strips have a crosswise slot cut at the top to receive the elevator horn cross-pin, whilst one of the inner strips has a forward projection for the pushrod clevis. The other inner strip is just a spacer to give sufficient gap between the outers to easily accept the elevator horn.

The slots in the outer strips needs to be a good sliding fit on the 16SWG cross pin to avoid elevator connection slop.

I find that if the slot is initially cut with a hacksaw blade, a rectangular needle file makes the slot width just right.





On the ASK13, the protruding 1/4" wide bottom keel strip make a good base to which a couple of side plates can be epoxied.

The pics below show the assembled arm, installation in the fuselage and the elevator horn cross pin.

(Note that the fuselage attachment point will be reinforced with balsa blocks in due course.)

Re: 1/4 Scale Charlesworth ASK13

by **Peter Balcombe**

Posted: **09 Nov 2019, 13:51**

Progress has been made on the tail feathers over the past couple of weeks.

The fin has been completed and fitted to the fuselage, as has the tailplane - after getting the rake angle of the elevator hinge spar correct.

(The elevator hinges pivot at the rear face of the tapered elevator LE, so the tailplane hinge spar needs to be raked to suit the elevator taper angle in order to get a uniform gap between tailplane & elevator LE.

The tailplane is mounted using 2 pins at the lower rear, which slide into small brackets. The front of the tailplane rests on a bed and is secured using a single bolt into a captive nut.

The elevator has had its trim tab hinge spar added, so the tab space can now be removed & a solid balsa item fitted. The tab is pin hinged, but no details are included on the plan as to how this is intended to be operated (else fixed in position?). The Charlesworth Olympia 2b has a link back to the tailplane to give opposite tab movement wrt the elevator, but nothing is shown on the ASK13 plan.







The rudder horn has been fitted & a start made on adding the skinned areas.

Meanwhile, back on the fuselage, MPX connectors have been fitted at the wing root to connect the wing servos. The connectors are actually mounted on an internal part of the fuselage root structure which recesses the connectors slightly. (The wing connectors can be pushed back into wing root pockets, so connectors/cabling are tidied away for storage).

Re: 1/4 Scale Charlesworth ASK13

by **Peter Balcombe**

Posted: **24 Oct 2019, 12:02**

Moving on to the tail feathers, I spent a quiet day yesterday attaching the fin, rudder & tailplane ribs to their respective spars using Cyano, ensuring alignment using a straight strip of balsa clipped between TE of end ribs for Rudder & Elevator.

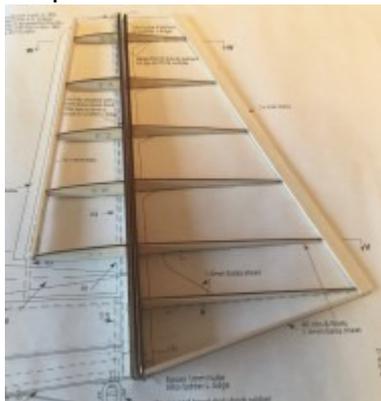
Although the plan calls for TE from lengths of rectangular balsa, tapered to TE profile, then skinned with 1.5mm Balsa each side to match skinning elsewhere on each part, I decided to amend the process a little.

I firstly attached a strip of 0.4mm ply to the end of each rib underside to form a TE core, which would better define a sanded edge.

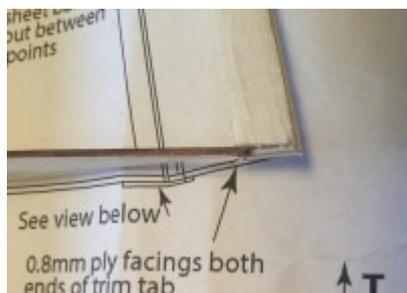
I then applied 1/16" balsa cap strips each side of this on the rudder (as there was very little rib contact, even after widening the TE strip from 9mm to 1/2") & similarly on the elevators after first glueing 1/16" balsa infill on top of the ply strip between each rib & sanding to profile before adding the top 1/16" cap strip.



Tailplane structure



Fin & Rudder



Elevator T/E

The photos below show the components at this stage, apart from adding the top 1/16" balsa cap strip to the elevators. You should just be able to see the ply line at the TE after sanding the infill.

At present, I am building the RH elevator as standard. At some point, the trim tab will be released & either the removed piece hinged, else replaced with solid balsa item.

The various tips will be balsa blocks to be added later.

The Rudder LE also needs to have a tapered 1/2" balsa piece fitted to the front of the current 1/8" laser cut item - the whole then shaped into a semicircular LE.

Re: 1/4 Scale Charlesworth ASK13

by **RobbieB**

Posted: **22 Oct 2019, 23:33**

Pheeeew, I can sleep easy tonight..... 😊

Re: 1/4 Scale Charlesworth ASK13

by **Peter Balcombe**

Posted: **22 Oct 2019, 14:04**

Just to put your mind to rest Robbie, Ive got the fuselage prepared to accept both wings as below - although still tailless 😊

With the dihedral now in the wing joiner tubes, the fuselage joiner/incidence pins are both simple straight-though affairs (yet to be encased in ply doublers).



The wings will be retained by a single band/spring.

MPX connectors will be fitted into the fuselage wing roots just behind the main joiner - with 'floating' connectors in the wings.

Re: 1/4 Scale Charlesworth ASK13by **Peter Balcombe**Posted: **20 Oct 2019, 15:23**

Don't worry Robbie. The wings will soon be attached to a fuselage 😊



Wing brake slot



Meanwhile, the airbrake slots have been released in the wing ready to accept the brake boxes & the brake components prepared.

(The blades & box sides come as laser cut items)

In order to ensure all parts have the same centres, the brake arms are assembled as a set, checking that the three pivot centrelines match up.

Re: 1/4 Scale Charlesworth ASK13by **RobbieB**Posted: **17 Oct 2019, 18:14**

Started a K13 - ended up a Horten!

Re: 1/4 Scale Charlesworth ASK13by **Peter Balcombe**Posted: **17 Oct 2019, 15:35**

Now that the 1st wing root TE has been strengthened, the outstanding job of making holes in the root end ribs for the rear incidence tube can go ahead, using the other wing to ensure good alignment (2nd wing had laser cut holes for the tube).



Finally, the part built wings can be put together.

Re: 1/4 Scale Charlesworth ASK13

by **Peter Balcombe**

Posted: **16 Oct 2019, 13:50**

With the 2nd wing quickly built to about the same stage as the first, I decided to get to grips with the wing root TE fairing.

The drawing has note which says that a 2.4mm balsa sheet fillet is inserted between the 0.4mm ply TE strips, but then talks about tapering from 4.5mm to zero over the span of the fillet! The shaped fairing is then skinned with 0.4mm ply.



ASK13 Root TE fairing



Root TE core



Looking at a photo of the full size, what I think the drawing note means, is to insert a fillet core between the 0.4mm strips, then 4.8mm balsa is put each side to block out roughly to the the root rib thickness, tapering the blocks to nothing over their span.

I have decided to use a 0.8mm ply core to give a better defined edge, with 1/4" balsa blocks as shown in the pics prior to shaping.

Re: 1/4 Scale Charlesworth ASK13

by **Peter Balcombe**

Posted: **12 Oct 2019, 12:35**

The ply TE strip can be held in place beneath the ribs & quickly attached using cyano. Then the balsa infill can be glued into place (use of spruce strip underneath to ensure straightness is recommended). I used a 25mm wide strip of 1/16" balsa followed by a further 1/4" wide strip at the front. (the infill is sanded to profile before the top TE ply strip is put on later).

The main joiner tube is epoxied into the rib slots & then blocked in using 1/8" ply as for the first wing before the top spar is added.

Once the top spar is in place, inverting the structure allows the ply front spar webs to be put on (I needed to run a thin file down the rib slots to slightly enlarge them as the main spar had encroached a little).

Then, the webs pieces can be carefully slid into place. I applied cyano to attach the web faces to the spars once they were fully in place, but slower acting glue could be applied before final insertion once you are sure that they are going to slide fully into place.





With the rear incidence tube slid into place through the laser cut holes, this can be epoxied at each rib. (I double checked that the rear tube was parallel to, & at same angle as the main joiner by temporarily inserting blade/rod).

Once the rear incidence tube is fixed, it can be blocked into each rib & other lower sub-spars fitted.

The pics below show the progress and also show the aileron servo cable, & root rib servo connector, access holes as manually added on the first wing.

Re: 1/4 Scale Charlesworth ASK13

by **Peter Balcombe**

Posted: **11 Oct 2019, 21:02**

Many thanks Greg.

I have to keep moving as I still have another 3 projects waiting in line 🤖

Re: 1/4 Scale Charlesworth ASK13

by **Greg Smith**

Posted: **11 Oct 2019, 20:02**

I am amazed at your productivity, Peter: congratulations! I am still off and on with the second wing of the Olympia, but events here in the US are consuming an addictive attention, to say nothing of events there, too. Best, Greg.

Re: 1/4 Scale Charlesworth ASK13

by **Peter Balcombe**

Posted: **10 Oct 2019, 12:15**

So...., with a set of laser cut parts as shown below, let the build of the 2nd wing commence. The first job was to cut & splice the tapered spars as for the first wing, but this time the rear spar web can be assembled & glued to the spar ready to accept the ribs.

Then it is a simple matter to slot the ribs onto the spar/rear web over the plan, the lower building tabs giving the washout angle along the length of the wing. The False LE is also added to correctly align each rib as you go.

(I initially used a couple of 1/4" blocks to support the lower spar at root & mid span until enough ribs were in place to take over the job)

The 2 servo trays are also fitted between the appropriate ribs as these are slotted into place.

Thin wing type servos can easily be fitted into the plates from the bottom.



Laser cut parts



Wing structure

Finally, the root rib is attached to the spar (with the dihedral angle defined by the end of the root web) & the separate root piece of false LE inserted.

The pic below the initial assembled structure with the top spar sat in place to check fit.

Re: 1/4 Scale Charlesworth ASK13

by **Peter Balcombe**

Posted: **08 Oct 2019, 12:10**

With the upper spars in place, the outer D box skins are added (using the Wood glue/iron-on method).

I am joining the skin sheets just outboard of the brake area.

The photo below shows the outer skins in place, together with the aileron servo cable routed through the spar webs & D box.

The brake servo will be fitted under the rear skins between the 2nd & 3rd ribs & servo cables will exit the root rib via a MPX connector for simple rigging.

Balsa skin support has been added where the D box skins will meet the rear skin.



This wing will now be put to one side whilst I get the 2nd wing built, plus make the brakes which

need to be added (& outermost surfaces profiled flush with ribs) before the inner D box skins are added.

Re: 1/4 Scale Charlesworth ASK13

by **Peter Balcombe**

Posted: **01 Oct 2019, 11:47**

Progress on the first wing has been slowed by the decision to re-engineer the wing design to replicate Cliff's design in devWing, complete with false LE, spars, webs, brake assembly aperture, servo decks, building tabs, etc. to ease the build process in future builds.

Cliff Evans has cut a set of ribs to prove during the 2nd wing build, so more will be shown then, but just as a taster, a sample is shown below with old & new ribs for comparison.



Ribs old & new



Top spars in position



Joiner box encased

Meanwhile, the trailing edge assembly has been completed (using hardwood strips clamped each side of the TE whilst the glue dried to ensure a nice straight TE line).

Slots have also been manually cut in the ribs for all upper surface spars, including an extra one to define the rear face of the brake box & support the ribs when the brake box aperture is cut out later.

Work is currently progressing on addition of all of the spar webs now that I have encased the brass joiner box in 1/8" ply - hidden inside the 1/16" ply webs shown on the plan.

Re: 1/4 Scale Charlesworth ASK13

by **Peter Balcombe**

Posted: **21 Sep 2019, 19:38**

With the fuselage ready to insert the wing joiners, its time to move onto the wings.

A look at the drawings and parts, leads me to think that a few things can be improved to make

the build & subsequent rigging much easier than it would have been back in Cliff's day. So ... the aileron & brake servos will be moved to the wing & the fuselage angled wing joiner will be made straight, with angled brass boxes in the wings - allowing the use of a single removeable joiner blade, plus rear incidence rod.

The wings use a 1/8" thick spruce spar tapering from 20.8mm at the root, to 2.4mm at the tip, plus ply/balsa webbing on both sides between the ribs to make a box section. The first job is to cut all of the rib slots to take top & bottom spars.

Note that the root rib is much deeper than the next rib and the wing skins bridge the gap.

However, the spars must be recessed 6mm into the root ribs to preserve the straight spar line & 0-6mm wedges are used to provide support for the 0.4mm ply skins.

The TE is formed from 0.4mm ply strips top & bottom with balsa infill.



With the basic first wing structure now well on the way, I realise that I will still have to manually cut all of the rib slots for drag spars, airbrake area skin support, ailerons, joiner etc. so Cliff & I are looking at reverse engineering the wing design to update the laser cut ribs to include the various slots, which will make for a much easier & accurate build. Watch this space.

The attached pics show the 1st wing structure with the top spar laid roughly in place. The rib notches now have to be adjusted to suit at each station before it can be inserted. The joiner box can be seen dry fitted. This will be epoxied into place & then blocked out with hardwood prior to fitting the spar webs.

Re: 1/4 Scale Charlesworth ASK13

by **Peter Balcombe**

Posted: **02 Sep 2019, 21:52**

The open cockpit frame assembly is now more or less complete apart from fitting the windscreen base supports & a final bit of shaping.





There will now be a short holiday break before the build continues 😊

Re: 1/4 Scale Charlesworth ASK13

by **Peter Balcombe**

Posted: **28 Aug 2019, 16:40**

More progress with the fuselage skinning, with the front end now done plus rear sides done, leaving the top & area around the rear of the wing root to complete.



I will probably leave the wing root areas & above until the wings have been built and joiner assembly inserted.

Meanwhile, the canopy frame structure has had the last few bits added, so is now ready for skinning.

Re: 1/4 Scale Charlesworth ASK13

by **Peter Balcombe**

Posted: **22 Aug 2019, 18:00**

Rear fuselage skins now added, plus the more complex pieces at the very rear.

The plan calls for a 1/16" ply tail skid support to be rebated into the bottom skin, but I decided to use this as a template to cut out the shape from a piece of 1/16" balsa sheet before glueing the ply into the hole and then glueing both to the fuselage, tapering the front into the rest.

Meanwhile, with all but the upper waist band of fuselage skin in place, I clipped the open cockpit canopy base into place on the upper fuselage longeron line & started to populate that, plus sort out the alternative canopy fore & aft fixings.

A new forward upper former was made (based on the front canopy frame former), but extended downwards to be able to attach to the top fuselage longeron. The upper keel piece was replaced with one which extended past F1 to tie into the new forward canopy upper former. The open cockpit structure has 2 dowels which slide into holes drilled in fuselage Former 5B at

the rear, plus a central latch pin at the front.



Also added, are the other curved former top sections which will be skinned as a turtle deck later.

Note that I found that the top of former 5B stuck up above the turtle deck line, so took 4mm off the bottom to improve matters.

Re: 1/4 Scale Charlesworth ASK13

by **Peter Balcombe**

Posted: **21 Aug 2019, 20:00**

I mentioned earlier that a 1/16" skin had been applied to the bottom of the forward formers & this has been followed up with a further 1/8" layer as indicated on the plan.

Once the edges of the resultant 3/16" Balsa plate have been sanded back & bevelled to suit to next skin band, further 1/16" Balsa skin bands can be applied, working towards the cockpit coaming. Note that the 1/8" balsa need to be added before the adjacent skin bands are fitted in order to make a stiff enough angled joint (i.e. not as I did it 😞).

Note that the drawing shows the landing skid attached to the bottom of the fuselage using two hardwood blocks which appear to mount directly to the bottom Balsa surface (effectively 3/16" thick), rather than tied directly to the keel or formers. (I'm not sure if Cliff Charlesworth intended one of the bottom layers to be ply rather than balsa, but no material type is mentioned as far as I can see.

I'm not sure how robust the keel fixing will be in resisting any unplanned sideways forces during landing, so I may reinforce these fixing points later.



The forward lower fuselage has now been skinned as shown below using 36" long sheet, plus additional balsa skin supports added at the rear of these areas to support the rear skin joints. An additional balsa skin support has also been added at Former 12 as the last section will be done separately. I have also added a skin support directly below the waist longeron as the upper & lower sections will have to be skinned separately due to the joint angle at Former 12. Next job is to add the rear fuselage skins.

Re: 1/4 Scale Charlesworth ASK13

by **Peter Balcombe**

Posted: **19 Aug 2019, 20:37**

With all longerons in position, I realised that I hadn't fitted the upper keel piece between the front two formers!

However, there was no slot pre-cut in the front former (Former 0), so the fuselage had to be released from the jig to get at this.

The slot was duly added & the keel piece glued into place. Drawings have been updated.

I was thinking it necessary to refit the fuselage into the jig as before, but upon reflection realised that if secured to the building jig frame upside down, it would still hold everything straight whilst all of the lower & side sheeting was fitted.

In the inverted state, the rear half of the fuselage lies flat on the board, so it is easy enough to clamp this straight, whilst the nose/tail formers are clamped to the front/rear verticals.



Inverted Fuz structure



Former clamp



Inverted nose centre skin



Rear lower skin support

Once this has been done, a 1/16" Balsa sheet was fitted on the central flat area ahead of the wheel (drawing is confusing as it says 3/32" Balsa), the wheel pant fitted and the 1/4" Balsa support strips fitted (in two 1/8" layers each side of the keel aft of the wheel. Once dry, the edges of these pieces are bevelled to align with the formers, ready to accept the lowest fuselage sheeting layers.

Note that the rear former has vertical sides, so the rearmost fuselage skin will have to twist nearly 45 degrees over the rearmost inter-former space.

Also note that the top of the rearmost former is approx. 1.25" wide, so the rearmost section of lower skin support widens over the rearmost inter-former space.

Re: 1/4 Scale Charlesworth ASK13

by **Peter Balcombe**

Posted: **18 Aug 2019, 13:06**

Using some 9mm Sq. stripwood moulding from the local DIY store, I then made a series of 'goalposts' which could be screwed to the sides of my jig base, giving verticals at each former

position, but with a crossbar above the lower longeron position to allow access to all longerons for insertion.

Next, a straight upper centreline reference strip was fitted to the tops of the jig end pieces & vertical centrelines also marked onto each former (temporary balsa strips being fitted to the open topped formers for this purpose).

With the goalposts in position, the formers were glued to the keel and clamped to the goalposts, ensuring they were vertical in both axes, using the top reference line to sight along/drop a vertical line down (plumbob!)

Note that formers 5, 6 & 7, together with 2off 5A & the root ribs all slot together to make an interlocked sub-assembly before this is sat onto the keel.

(This is where I found the first issue, as a tab slot was missing on the root ribs & part of a tab uncut on a former - however these were soon rectified).



Formers on jig



Nose former



Rear former



The longerons can now be fitted at waist, upper & lower positions, noting that the upper longeron needs to be spliced at 3 points to achieve the shape shown on the plan side view. I chose to deviate from the plan (6mm Sq. Balsa) & use an inner 1/4 x 1/8" Spruce strip + outer Balsa strip of the same size. The aim here was to give a bit more strength and make the front end curves a bit easier. (The waist slot on Former 4 needed raising a few mm & the tops of formers 3 & 4 was also found to be out of line.

Note that all of the issues I am finding have been fed back into the CAD drawing to allow Cliff to update the laser cutting files for future parts supply.

1/4 Scale Charlesworth ASK13**

by **Peter Balcombe**

Posted: **16 Aug 2019, 11:01**

This plan has been around for a while & apparently quite a few built over the years. As with most other Cliff Charlesworth designs, the plans are available through Cliff Evans (Laser Cut Sailplanes) who has digitised the plans and makes a short kit available. However, Cliff has recently been made aware that some of the parts don't fit as well as they might, so this build has been requested to investigate and make improvements where necessary. Also, this build will have the alternative open cockpit (Cabroilet) arrangement.

The supplied plan sheets are big, so you need a bit of space to spread them out 😊

Initial inspection showed that the wings use the Cliff Charlesworth preferred built-up main spar assembly approach (so I will alter the build here to use my preferred build up from lower spar approach), plus the fuselage longerons are balsa (which I will change to spruce & balsa to add more strength).

Also, I felt that a few more build notes would be helpful, especially for a less experienced builder.

Anyway

Starting with the fuselage, I first made up a simple fuselage build jig from softwood (bottom rail with vertical end pieces glued vertical at overall fuselage length + 2mm separation). This was marked with centre lines along the bottom strip & up the inside of the end pieces, plus former locations. (I made the end pieces 220mm high to allow a straight edge to be placed along the top, just above the highest former to give an upper sighting centreline.



Keel in jig

Next job was to draw a reference line on the plan, just below the keel at F2, with the formers at 90 degrees to this.

The idea is now to fix pedestals at each former position to position the keel strips at the correct height relative to the reference line.

(Note that Cliff's plan has a 'Datum' line marked in the canopy area, but I needed one below the keel).

Next, Cliff arranged for me to receive some keel pieces cut from 1/4" ply, which could then be epoxied together to make up a full length keel, complete with wheel pant surround.

With the keel sat centrally on the support blocks the front & rear formers were glued onto the keel and tacked to the jig end pieces (each spaced off with a couple of 1mm ply strips to allow them to be released later).

All this is hopefully clarified in the pic below.