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R/C Blogs
Build Log **Arado 555**

#1 gke

Apr 21, 2016 11:05 AM

Arado 555

4 Attachment(s)
Commenced build of an Arado 555 based on that of Josef Poisinger's 1200mm version:

https://www.rcgroups.com/forums/showthread.php?t=180962

I have used an 8% Phönix airfoil instead of the original 12% to hopefully improve glide performance.

Build will be 3/4oz glass directly over foam cores using water based polyurethane (WBPU) which I have used before as a covering technique.

Propulsion will be either 2-4 EDFs or single propellor interchangeable on plug-in pylons.

Cores weigh 160gm bare without wing extensions which will be solid balsa - foam too hard to cut accurately. I am using lightweight filler to repair minor and one major (photos) hot wire cutting problems. The foam I am using sands well and I may put a light wash of filler over the wing.

#2 gke

May 12, 2016 10:49 PM

Starting Assembly

5 Attachment(s)
Simple box fuselage provides a more flexible solution for joining wings, batteries and alternative motor configurations. Larger wheels than Josef's to suit the grass runways I fly from. The fuselage could have been narrower but I wanted to preserve the option of 2 x 2200mAH 3S packs.

The main wing joiner is about 2/3 of the inboard wing panel. There is a second short joiner at the back of the battery box. The joiners are glued where they overlap inside the fuselage.

In a fit of madness I also attempted to cover with brown paper today but it got the wrinkles so

I have stripped the paper off and sanded it back a little. I will now cover as originally planned with glass cloth and WBPU.

#3 gke

May 14, 2016 06:32 PM

Juggling Act

3 Attachment(s)
Well assembly of the wings was a little bit of a juggle, aided by copious masking tape, but lateral symmetry seems OK.

Now patience as the glue cures in the foam to balsa joints ;).

#4 gke

May 17, 2016 06:08 PM

Cockpit

4 Attachment(s)
Cockpit stub built up from foam scraps and covered with a couple of layers of 3/4oz glass again with WBPU.

Cockpit proper is from the top section of a 90mm diameter drink bottle. Screwtop cutoff leaving an opening that is a perfect fit for the plastic trim from an Aeronaut folder. Rear wall of cockpit 10mm balsa with locating dowels and magnet retainer.

Cockpit diameter turns out to be 2.5M at full scale which seems reasonable for two aircrew abreast. Length of full size fuselage commonly given as 25M.

Weight of bare airframe now 595gm.

#5 gke

May 22, 2016 12:22 PM

Ready to Fly?

7 Attachment(s)
Finished complete with authentic covering ripples and other manufacturing defects ;). AUW with Turnigy D3536/6 1250Kv, Master Airscrew 8x6 3 blade prop and 2200mAH 3s pack is 1165gm. This is a little heavier than the planned 950gm with some of this due to the larger wheels for grass strips.

Josef has the CG at 312-330mm which is consistent with my calcs of 316mm or 20% . In my case there is a fuselage which changes the MAC and the CG position. How much is the question but if the fuselage was a wing section it would be 304mm so that is where I will start for test flight(s). Tail heavy flying wings are very bad :eek:.

CG position calculated using WingCGCalc. Wing Plan used is **HERE**.

#6 gke

May 24, 2016 02:27 PM

Test Flights

Test flights were entirely successful. Trims where neutral with CG at 320mm behind LE. Pitch down on rapid throttle up but not too dramatic. Hand launches are a non-event so the wheels will go to save a little more weight.

ROG sees it veering to the left due to motor torque and of course there is no rudder to correct the yaw on the ground ;). The drag wires that Josef suggests were in my case on the bottoms of the vertical stabilisers not the tips which I judged to be too weak. They were also not under compression so the one on the inside of the turn was dragging and the one on the outside was off the ground.

Needs to be flown fast but landings can be quite slow and comfortable :).

20160524 Arado 555 Maiden (2 min 31 sec)

#7 jj604

May 24, 2016 04:42 PM

Very nice! Flies extremely smoothly Greg.

Congratulations.

J

#8 gke

May 24, 2016 07:14 PM

Quote:

Originally Posted by **jj604** (Post 34849526)

Very nice! Flies extremely smoothly Greg.

Congratulations.

J

Thanks John. It was a blustery day with the wind around 25Km/H but with a bit of speed it just cuts right on through it.

I will drag it along to indoor some time.

#9 jj604

May 24, 2016 07:48 PM

Just don't fly it there! :)

#10 pmullen503

May 25, 2016 05:56 AM

Congrats on the successful maiden. I build one to Josef Poisinger's plans except from foam and it is my favorite flyer. Mine glides a loooong time. It's a great design.

Here's mine: https://www.rcgroups.com/forums/show....php?t=2092366

#11 gke

May 25, 2016 08:54 AM

Quote:

Originally Posted by **pmullen503** (Post 34853955)
Congrats on the successful maiden. I build one to Josef Poisinger's plans except from foam and it is my favorite flyer. Mine glides a loooong time. It's a great design.

Here's mine: https://www.rcgroups.com/forums/show....php?t=2092366

Thanks Pat.

I found your thread a month or so back and that prompted me to try brown paper over what is for me solid foam cores. I made a mess of it as I did not wet the paper properly so as you see I went back to glass.

Yes it glides surprisingly well and will be a lot of fun to fly. I intend trying it as a slope-soarer later this week. I can remove the motor pod to reduce drag as well but that probably won't be

necessary. After that I will try 2 EDFs. Most of my fields do not permit ROG so my hand launches are more of a glide at around 30% throttle with about 4mm of up elevon on my flight mode switch. I think I may have fractionally more down angle on my motor but it does pitch down if you throttle up quickly. Of course on a launch no airspeed means the reflex is not generating restoring pitch moment to counter the forward CG.

Congratulations on your huge collection of great builds as well.

Cheers
Greg

#12 pmullen503

May 25, 2016 11:39 PM

I too have some up elevon on a switch for hand launches, though it takes off just fine from grass.

I would think it would be a good model for slope soaring. Mine will thermal under the right conditions.

I haven't have much luck with brown paper over solid foam cores. A solid foam core isn't as stiff as a built up foam wing and thus is very susceptible to warping from uneven drying.

I plan to build another soon with drag rudders.

Have fun with yours!

Pat

#13 gke

May 26, 2016 02:25 PM

ROG Modifications

2 Attachment(s)
Pat and Josef have convinced me to persist with ROG attempts. They are having no problems so I have made some mods that may help my efforts.

I now have a single wheel still in the position shown in Josef's schematics and have removed the rear one so that the wire skids, which are on the vertical stabilisers, are held firmly on the ground. The AOA has been increased to around 5 degrees. A piece of velcro has been put in the aperture where the rear wheel was to assist with hand launches.

I have mixed rudder into the elevons in addition to ailerons. The convention and habit of most pilots on the ground is to use rudder only for ROG ground handling and this may have been part of the problem in the test flight takeoffs. Elevon differential has also been set quite high

at 60% for testing.

#14 pmullen503

May 27, 2016 12:30 AM

I have no skids on mine and it has to take off into the wind. Control on the ground is somewhat random.

#15 gke

May 27, 2016 01:10 PM

ROG Modifications

> Quote:
>
> Originally Posted by **pmullen503** (Post 34869201)
> *I have no skids on mine and it has to take off into the wind. Control on the ground is somewhat random.*

Tried it with skid wires and no rear wheel this morning. Grass was not freshly mown so it was a bit tufty. No problems at all with holding a good line. Only issue is landing; if you come in a little quick then the high AOA set by the front wheel tends to re-launch it ;).

I have reduced the amount of up elevator on launching by half to around 4mm. It now has less tendency to "pop up" on a hand launch.

CG with the added area of my fuselage now seems good and I am able to do slow glides. Trims are neutral. You are correct Pat mine should also thermal and will certainly be happy in light slope lift.

#16 gke

May 31, 2016 07:09 PM

More Test Flights - low and slow with touch and goes and some aerobatics

ROG and hand launches now effortless. CG position now 318mm behind LE increasing speed range down to almost walking pace and quite stable.

20160531 Arado 555 Low & Slow (5 min 6 sec)

#17 gke

Jun 02, 2016 08:23 AM

EDF Motor Pylon

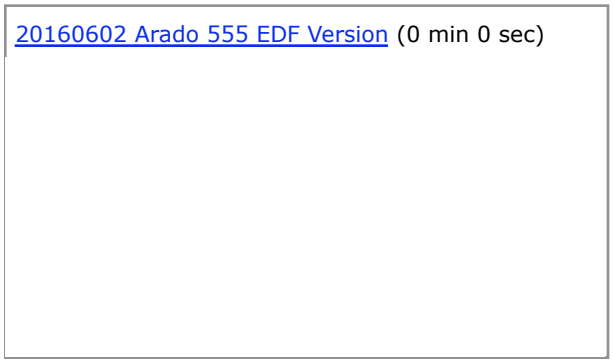
5 Attachment(s)
Trying, without too much optimism, a couple of EDFs.

These are the original 6 blade EDF55s with the H300 motor from HK not the later ones with more blades. Still using a 2200mAH 3S pack.

Well it flies but I need the later version of the EDF55s. The old ones I have are definitely 230gm thrust each. The current "Plus" version claims around double the thrust which will be interesting.

http://www.aeorc.cn/products/motor/e...l#.V1qPVL7y4eU

20160602 Arado 555 EDF Version (0 min 0 sec)



#18 pmullen503

Jun 16, 2016 01:46 AM

Nice. What thrust angle did you use for the EDFs? I drew up a 1.8M version with four EDFs, retracts and drag rudders. Probably make the outer panels removable for transport and adjustable incidence.

#19 gke

Jun 17, 2016 05:25 AM

Quote:

> Originally Posted by **pmullen503** (Post 35030751)
> *Nice. What thrust angle did you use for the EDFs? I drew up a 1.8M version with four EDFs, retracts and drag rudders. Probably make the outer panels removable for transport and adjustable incidence.*

Hi Pat

I am in the UK at the moment but the thrust line from memory goes through the same point as the prop version did but the EDFs are much closer to the wing. The test flights showed a little pitch down but not to bad as the fans spin up slowly. I have them on soft start with no brake. The prop version is on hard start but could also be soft. I have brake on. eDFs and prop version motor pylons are interchangeable.

Plug in tips would work well as the servo in my case at least is screwed into the vstab. As Josef observed 1800mm is awkward to put in most cars.

Retracts sound good for the large version. I intend to make the single front wheel I have steerable.

Not sure about drag rudders myself and would probably go for real rudders. Differential also compensates for adverse yaw but can mess up rolls. Maybe ailerons with no differential mixed with rudder input at max differential.

... regarding tip incidence I found I had zero trim once the CG was right - no idea how Josef got to the figure he used for the step washout.

#20 pmullen503

Jun 17, 2016 05:46 AM

I played around with aileron differential and you can get better looking rolls.

I figure drag rudders would give more yaw and less side slip than rudders. I thought I could mix them to act as brakes too which might make some interesting maneuvers possible.

I should probably program in at least a soft brake for less drag while gliding. Mine is free wheeling. I've been meaning to try a folding prop but haven't gotten around to it. My typical flight profile is mostly gliding.

Even with removable wing tips, the center section alone is big on the 1800 mm version.

#21 gke

Jun 17, 2016 11:06 PM

Quote:

Originally Posted by **pmullen503** (Post 35041079)
I played around with aileron differential and you can get better looking rolls.

I figure drag rudders would give more yaw and less side slip than rudders. I thought I could mix them to act as brakes too which might make some interesting maneuvers possible.

I should probably program in at least a soft brake for less drag while gliding. Mine is free wheeling. I've been meaning to try a folding prop but haven't gotten around to it. My typical flight profile is mostly gliding.

Even with removable wing tips, the center section alone is big on the 1800 mm version.

Yes I agree trying the drag rudders could be fun and its all about experimentation.

I glide most of the time as well and a windmilling prop generates a lot of drag. In fact using very low throttle makes a good airbrake on aircraft without airbrakes or flaps.

The 1800mm is big for sure. Even the root chord at 750mm is up there.

What EDFS were you thinking of using?

Now approaching Edinburgh by train with the countryside whizzing by :).

#22 pmullen503

Jun 18, 2016 01:14 AM

I'm thinking about 65mm fans. Pretty good price/performance. It depends on how much room I have for batteries. I'll end up with four smaller fans or maybe two larger fans with dummy nacelles.

I need to settle on the flight profile. Do I want the power/performance of my smaller version (short flight times) or a more sedate profile with longer flight times.

#23 gke

Jun 20, 2016 03:15 AM

Quote:

Originally Posted by **pmullen503** (Post 35047257)
I'm thinking about 65mm fans. Pretty good price/performance. It depends on how much room I have for batteries. I'll end up with four smaller fans or maybe two larger

> *fans with dummy nacelles.*
>
> *I need to settle on the flight profile. Do I want the power/performance of my smaller version (short flight times) or a more sedate profile with longer flight times.*

Probably go for performance as the EDF cluster is pretty draggy. That being said the EDF drag can be lessened at low throttle. In the video you can hear us comment that we were holding altitude at about 1/6 throttle on the 2x230gm thrust EDFs.

Very hard to beat a large folding prop for efficiency.

#24 pmullen503

Jun 21, 2016 02:32 AM

Quote:

> Originally Posted by **gke** (Post 35061864)
> *Probably go for performance as the EDF cluster is pretty draggy. That being said the EDF drag can be lessened at low throttle. In the video you can hear us comment that we were holding altitude at about 1/6 throttle on the 230x2gm thrust EDFs.*
>
> *Very hard to beat a large folding prop for efficiency.*

Well that's the issue. "Building" it in my spreadsheet it's clear that getting anything like the performance and duration of a single prop with EDFs will add a lot of weight. And it's tricky to get enough batteries (in the right places for CG) into the wing.

As you said, it takes very little power to actually fly the plane. So a somewhat sedate flight profile is looking like the best compromise: no more unlimited vertical! I'll order a 64mm 12 blade EDF to see what it sounds like and what kind of performance I can get out of it. I think the model would be impressive, even if it wouldn't have the performance of the prop version.

I like the idea of interchangeable power pods. So I could choose the performance of a pusher prop if I wanted.

#25 gke

Aug 05, 2016 06:40 PM

Using "Plus" versions of the EDFs

The "Plus" versions of the 55mm EDFs are much better but are very battery hungry. I may go back to the propellor version and move to other builds for now.

20160804 Arado 555 EDF Version 2 (1 min 21 sec)

#26 gke

Sep 25, 2016 09:23 PM

Slope Soaring

As expected the Arado slope soared magnificently in what was quite gentle slope lift also catching a few thermals on the same day as they rolled through at Glenfern Road.

Having a couple of magpies attacking me, not the Arado, made final approach and landing just that much more fun. Spring is here :).

Very pleased.

All times are GMT +10. The time now is 01:28 PM.