glens models pre-built

30% CAP232 – Pre-built notes – 04/09/06

These are manufactured to our specification are as near as is practical to our kit designs and utilise the same materials and techniques wherever possible.

Laser cut from our CAD files, using the same European wood as our kits they are hand crafted and beautifully covered in Profilm, again to our specification, and are supplied complete with scale decals, applied where appropriate, pre-drilled aluminum undercarriage, epoxy glass parts, completed, painted ready to use, and high quality European hardware.

The 30% Cap232 is 87" span, 81.1/2" long,(depending on spinner fitted), with approx.1350sq.in. of wing area. All prototypes have come out at approx. 17lbs with a Zenoah 62 and two 1000mah five cell nicad packs and switch harnesses and backer.

It requires 5kg or above torque standard size servos for ailerons and rudder such as Futaba 9202 or better. If setting up with 3D movements these will also be required for the elevators. It is specifically designed around the Zenoah 62 and 45 fitted with a 60mm prop driver. The engine mounting box components are machined around these engines.

The model is scale in outline however will still manage full 3D flying due to the large movements facilitated by the scale hinging setup. Having said this it is very straightforward to fly and is ideal for general sports flying and IMAC style aerobatics and should present few problems for a reasonably experienced club flier.

These notes and pictures offer a little further guidance in addition to the online kit manual where required. They are not intended as a blow by blow description of assembly as these designs are aimed at reasonably experienced modelers who will have their own preferences in many areas. If any further assistance is required please email and I will endeavor to reply as soon as possible.

Assembly of these pre-built models is both straightforward and swift and should take no more than a few evenings.

The covering used is Profilm. It is very tough, durable and petrol proof.

The covering may have slackened however due to the climatic differences between the Far East and the UK so the first task is to work your way around the model with your tacking iron carefully tightening the covering and ensuring that it is well attached to the wood underneath. Tare care over decals not to melt them as they are vinyl and won't take the heat from the tacking iron.

glensmodels scale aerobatics

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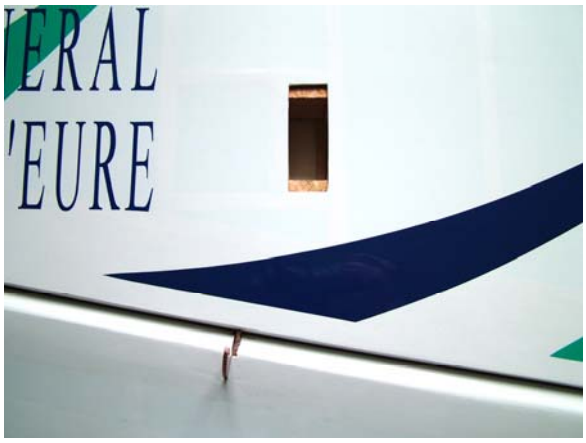
Wings:



The aileron servo locations and bearers are already built in to the wing structure. Once you have ironed the film around the servo mounting cut the film with a very sharp modeling knife or scalpel and tidy the edges with the tacking iron.

The aileron servo, horn and linkage setup is very simple. The horns are an integral part of the aileron hinge next to the servo location.

The aileron linkages themselves are 3mm threaded rod with a ball link at either end fixed to both the servo and the horn with 2mm screws nuts and washers. It's worth putting a spot of white PVA adhesive or other threadlock on these to prevent them from coming loose.

It is worth pushing a shortened pin or length of cocktail stick into the leading edge of the ailerons on either side of the hinge from the underside. This will prevent the brass tube in the middle of the hinge drifting out through time.

Aileron servos will require extension leads to reach the Rx in the fuselage. For extension leads I like to make up my own using a slightly heavier grade of wire and twist them tightly along their entire length. I have found this to be a simple and very effective form of interference rejection on even very long servo leads.

Aileron Mass balancing:

Being centre hinged the ailerons require mass balancing. This helps prevent the risk of aileron flutter at high speed, reduces static and dynamic servo load, minimising the effects of vibration and as a result dramatically reduces battery drain and increases servo life expectancy!

The ailerons are balance by cutting away the film covering over the openings in the wooden balances on the ends of the ailerons and filling the void with lead. You can either epoxy in three layers of lead flashing or fill with lead shot. Exact balance isn't critical but filling this void is fairly close and works very well.

The wing tube is over length and will require cutting to length with a hacksaw before dressing the cut end with a file ready for use.

The wing is secured to the fuselage and prevented from rotating by the M5 nylon66 machine screw pre-glued into the root former. This screw is very tough and strong and having it fixed in the wing eliminates the chance of pushing a blind nut into the wing at the field!

To prevent light movement it is worth sandwiching a small patch of sandpaper to the wing root around the screw. Inside the fuselage I simply screw a blind nut onto the bolt. I prefer these to wing nuts as their light weight makes them less likely to vibrate loose. I bend the prongs to avoid injury and 'nip' them with a coin or screwdriver when I'm flying.

Tailplane:

The elevator servo locations and bearers are already built in to the underside of the tailplane. Once you have ironed the film around the servo locations cut the film with a very sharp modeling knife or scalpel and tidy the edges with the tacking iron.

The servo locations are offset such that both servos lie on the same side. This allows the use of a simple Y lead setup as both elevators will operate in the same sense eliminating the difficulties of complicated mixing and associated trim issues with some radio sets.

If 3D movements are required the cnc machined elevator horns supplied should be fixed to standard servo disks with four M2 screws nuts and washers such that they 'hook' forwards in exactly the same sense as the elevator horns. This gives a one to one ratio of servo to elevator movement facilitating 60 degree elevator travel!

The servos themselves are held in place by their grommets between hardwood blocks.

It will be necessary to cut a hole to pass the servo lead through the servo locations to the openings in the center of the tailplane underside.

It is worth pushing a shortened pin or length of cocktail stick into the leading edge of the elevators on either side of the hinge from the underside. This will prevent the brass tube in the middle of the hinge drifting out through time.

As with the ailerons the elevator servos will require extension leads to reach the Rx in the fuselage. Again here I make up my own twisted triple lead and prefer to connect the servo leads in a Y with only one lead running the length of the fuselage to the Rx.

The linkages themselves are 3mm threaded rod with a ball link at either end fixed to both the servo and the horn with 2mm screws nuts and washers. Again it's worth putting a spot of white PVA adhesive or other threadlock on these to prevent them from coming loose.

Hatches should be made up from scrap 2mm lite ply or similar. These can be secured with small self taping screws into small hardwood blocks glued into the tailplane.

Elevator Mass balancing:

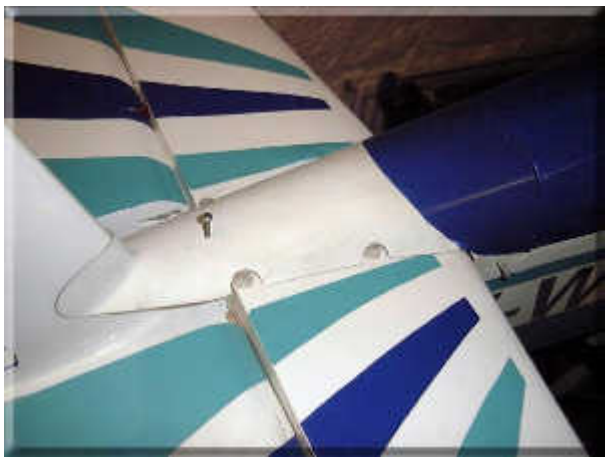
Just as with the ailerons the elevators require mass balancing using small amount of lead, (14gm approx.) secured behind the leading edge of the elevator balances on the underside. Again exact balance isn't critical.

Tailplane Fairing:

The tailplane fairing should be cut out to clear the 5mm Nylon66 tailplane bolts and shaped as shown.

The fairing is held in place with three small self tapping screws into small wooden blocks, one on either side of the fuselage at the end of the rear deck and one attached to either the trailing edge of the tailplane itself or a block fixed to the fuselage. The fin to fuselage joint is not faired, it is left square the same as the full size aircraft.

Small blocks can be glued to the fuselage behind the tailplane together with small balsa wedges at the front to eliminate any movement when it is screwed in place.

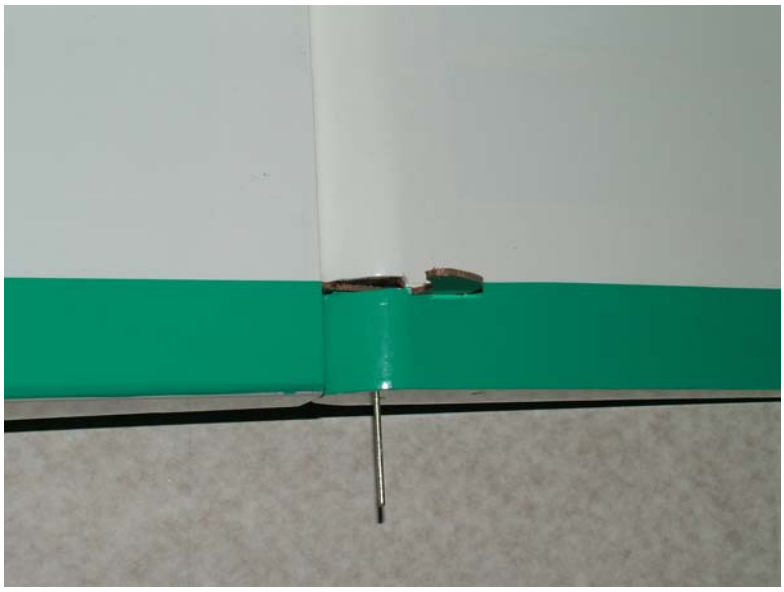


Rudder:

The rudder is hinged with 2mm piano wire. It is necessary to drill a hole in the top of the rudder for this however the hinge components and rudder ribs are alredy drilled.

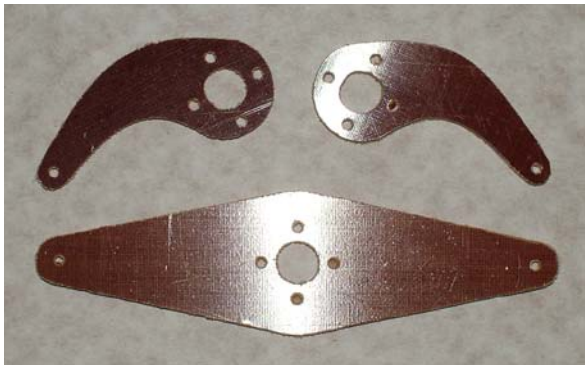
The wire should be cut into two pins. The last 12mm or so can be bent through 90 degrees and pushed in flat. I put a small piece of magic tape or similar over this when flying to make sure it doesn't work its way out.

The rudder is easily removed for transport and storage.



The rudder is configured for a closed loop setup. For 3D type flying a CNC machined Tufnol servo arm is included which should be bolted to a standard servo disk on your rudder servo. This, like the elevator servo arms gives 1:1 ratio of servo movement to rudder allowing 60 degree rudder travel!

Closed loop wire and crimps are supplied. I simply pass the wire through the Tufnol arm or standard servo arm and crimp the wire.



At the rudder end it is useful to have some adjustment. For this end there are ball links and M2 fasteners to secure them to the built in horns. I then use short lengths of 3mm threaded rod to fabricate adjusters. I cut approx. 25-30mm lengths and file a small flat on one end before drilling a small hole to accept the wire.

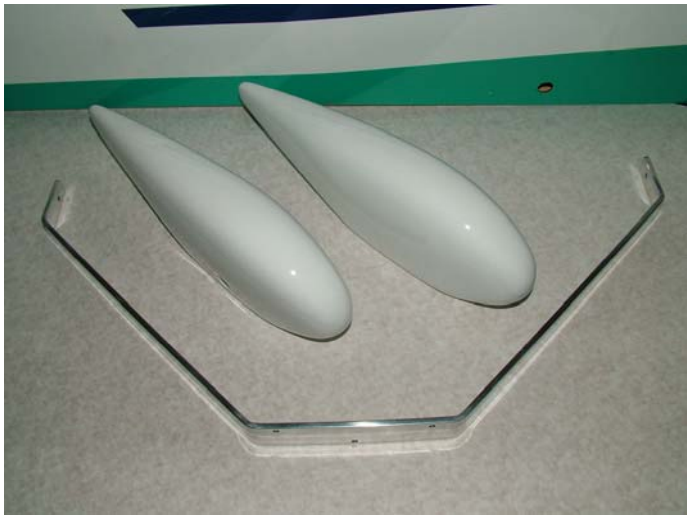
If you plan to remove the rudder regularly these can be replaced with standard 2mm brass adaptors and M2 metal quicklinks, these are more than adequate and I have used this system for many years.

Undercarriage:

Undercarriage fitting is straightforward using the M4 x 20 screws, washers and blind nuts.

Wheels and spats are fitted using M5 hi tensile bolts as axles with two normal nuts and a nyloc nut.

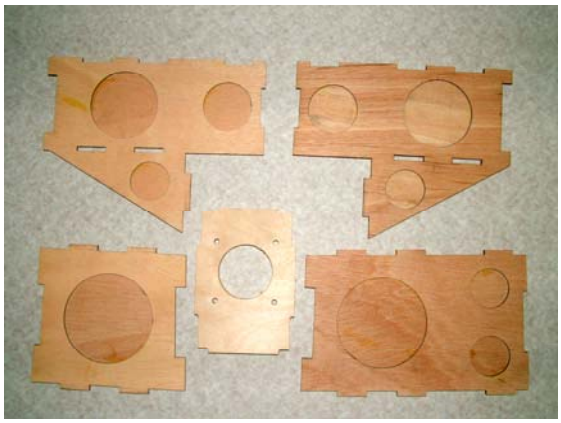
The axle passes through the wheel from the outside, with the nuts and washers as follows; washer, wheel, washer, 2 nuts, washer, undercarriage, washer and finally nyloc nut. The spat can be fixed to the undercarriage by drilling a small hole through the undercarriage and using a small self taping screw through the undercarriage into the plywood reinforcement in the spat. A small amount of silicon sealant between the spat and undercarriage leg helps to hold the spat in place.



The undercarriage mounting on all of these models is a slightly critical area. It is designed such that in the event of mishap it the first area to break, minimizing damage elsewhere should you hit a hole at the side of the runway or the like. Repairing this area is far easier than rebuilding a fuselage!

The undercarriage is in the scale location. This gives excellent ground handling on very smooth surfaces with practically no chance of bounce or ground loop however on rougher surfaces it can give a tendency to nose over. If you do fly from rough grass it is worth loosening the undercarriage screws and packing the rear edge to angle the wheels forward to reduce this.

Engine mounting:

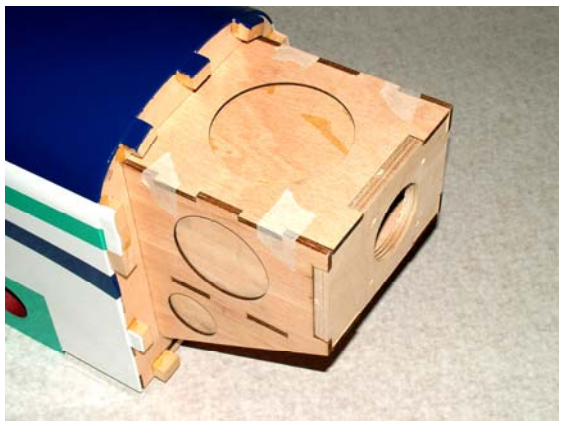


The engine mounts on a simple five sided box. The top, bottom and sides are laminated from two layers of lite ply such that the lightening holes end up on the outside. This is constructed in the same way as in the kit manual however the laser cutting provides a slightly greater tolerance in the joints allowing the use of good quality PVA adhesive or 1hr epoxy for the basic box but still using medium cyano for the bulkhead itself together with some small pieces of glass cloth and medium cyano reinforcement from the bulkhead to the box. This allows the bulkhead to break loose in the event of an 'arrival'.

This helps dissipate a lot of the energy involved and can greatly reduce more significant damage to both the airframe and the engine. It is also a very simple and accurate repair job rather than a pile of matchwood!

IMPORTANT: - Remember to put the engine box together with right thrust!

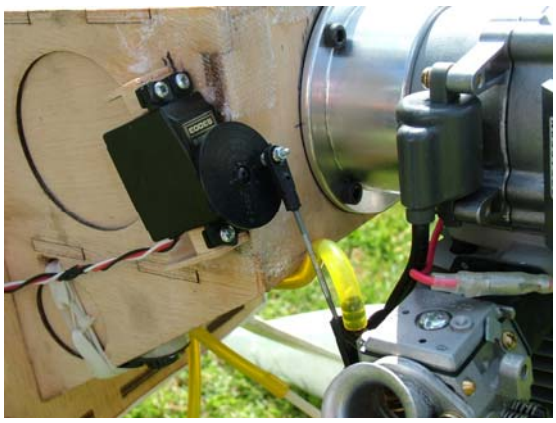
The box can be glued into the fuselage using the same good quality PVA or 1hr epoxy. I would suggest gluing the box together and gluing it to the fuselage at the same time. You can hold the joints together with a few pieces of masking tape while the glue dries.



In order to fit the cowl the engine must first be mounted on the model. It should be mounted with M5 bolts, washers, plain hex nuts and then locknuts.

If fitting an engine other than a ZG62 or 45 the holes in the bulkhead can be used as a reference as they are equidistant around the centerline of the crankshaft.

When fitting the Zenoah ZG62 or 45 the throttle servo can be mounted and setup as shown.



It is always worth applying a coat of fuel proofer to the engine box and bulkhead area.

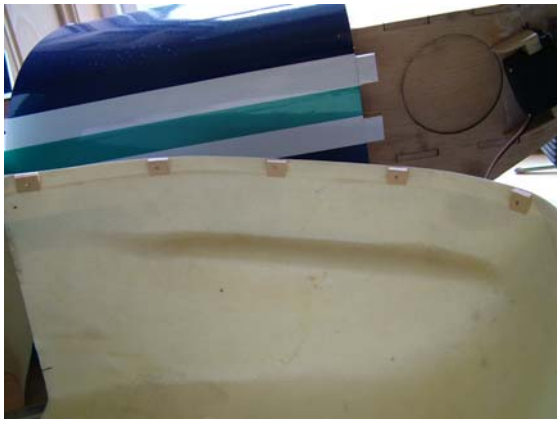
The throttle arm shown on the carb is simply made from a large servo disk by removing the collar which normally sits over the servo output shaft, drilling out the central hole to match the throttle shaft on the carb and cutting away a segment of the disk. With the return spring on the carb servo shaft unhooked and pushed back the disk can be clipped onto the shaft and secured with either a small self taper through the throttle arm into the disk or with a small nut and screw

Cowl:

The cowl is in two pieces which are secured to each other with a series of small self tapping screws. Small blobs of epoxy can be added to the inside of the lower piece to support the screws if required. Alternatively small hardwood blocks can be glued to the inside of the cowl with medium cyano having firstly keyed the surface to be glued with coarse abrasive paper as shown. (prototype shown)

The complete cowl is then fitted to hardwood blocks around the front bulkhead with at least eight small screws.

The cowl is cut away to clear the leading edge of the wings.



Cooling holes are cut in the cowl as shown, one below the spinner and one either side. The one to the left of the cowl is either omitted as shown or blocked to prevent too much airflow over the carb.

A large exit hole should be made in the bottom rear of the cowl, almost the full width of the underside and approx. 100mm in length. Aim to have the exit area 4x the inlet area, remember petrol engines are primarily air cooled where glow motors are primarily fuel cooled.

Four pieces of scrap balsa can be arranged to duct air from the hole below the spinner straight on to the cylinder as this helps to improve power.

Without the ducting most of the air going in simply misses the cooling fins and does nothing to cool the motor. This ducting also prevents air from rushing past the carb intake.

Please also notice that the carb trumpet has been shortened and angled upwards towards the side cheek of the cowl.

This setup reduces intake roar, improves running qualities and produces the maximum available power.

Hatches:

Two hatches are made up from the eight CNC machined pieces of lite ply supplied. These form two lightweight 'picture' frames which are covered with film and hinged to each other with the covering.

These hatches fit on the underside of the fuselage between the wings with the smaller of the two at the front.

Don't worry if they appear too flexible, once secure they work very well, following the line of the underside of the fuselage.

The smaller hatch is secured with a small self tapping screw in each corner into small wooden blocks fitted in the fuselage.

The rear hatch then hinges to this and can be held up with a further two screws at the rear corners.

This larger hatch is then opened to facilitate fitting and removal of the wing panels and aileron servo connections.

Fuel tank and radio installation:-

The nicad and receiver can be situated above the undercarriage, however they may be moved elsewhere for balancing. The switch(es) can be mounted in the fuselage side at a convenient point. I use two fairly small five cell nicads with a two switches and a proprietary battery backer.

The tank generally used is a 32oz tank with a screw cap and felt filtered clunk positioned above the wing tube. The tank is held in place withy several large wing bands.

Basic setup:

The center of gravity should be set at 6mm in front of the center of the wing tube, although the center of the wing tube is the theoretical ideal many people may find this a little too 'neutral' for general flying. You may find that you have to add weight to achieve this starting point c of g but please do so then remove a little at a time once you become more familiar with the model.

The control movements on the prototype model are as follows;

Elevators:- 22mm up, 32mm down with around 16% expo

Ailerons:- 20mm up & down with around 16% expo

Rudder:- 75mm to either side with around 25% expo

It is worth mixing around 20% up elevator with rudder to compensate for any tendency to pitch down when rudder is applied thus improving rudder correction during maneuvers and making knife edge flight easy.

More movement may be required at a later stage if scale type maneuvers are to be performed. Remember with Zenoah 62 fitted there is a good excess of power available and this model is very lightly loaded, most straight and level flight is performed at very low throttle settings!

All movements are suggested as a starting point, you may wish to alter these to suit your own requirements, the full 60 degree elevator and rudder movements can be set up for 3D flying if you have used sufficiently powerful servos.

Obviously all the normal pre-flight checks apply, give all surfaces a good tug to be sure all is well and double check all control movement and direction before each flight.

A proper range check is essential with any model. I always perform a full range check engine off followed by the same range check engine on and measure the difference. If the difference is more than 10%, DO NOT FLY, you have a problem!

This model is very easy to fly. The best advice I can offer is to take off, throttle back, relax and enjoy your first flight. Yes, it may be bigger than the models you are used to, and yes, it has a good excess of power however it is very forgiving, goes where you point it and does exactly what you ask it to do!

It is fairly lightly loaded and will fly very slowly indeed. Almost all landings should be 3 point or tailwheel first, if they aren’t then you’re landing too fast!

Happy landings! - Glen Fletcher